COMPARING STUDENT PERCEPTIONS IN TRADITIONAL AND ONLINE ANATOMY &

PHYSIOLOGY COURSES AT THE COMMUNITY COLLEGE LEVEL

by

Benjamin Curtis Wright

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

This paper is intended to compare student perceptions of learning environments within anatomy & physiology I and II courses at the community college level. Literature suggests that student perceptions vary depending on the learning environment. The purpose of this study stems from very little research within science courses. Students participating in the research will be grouped into two categories based on the type, of course, they are completing: A traditional face-to-face course or a distance education course. All learning materials within the courses are identical. The Distance Education Learning Environments Survey (DELES) will be used to gather data on student perceptions.

Keywords: DELES, Traditional Students, Distance Students. SPSS

Dedication

This manuscript is dedicated to my family. Their support and encouragement while pursuing my educational goals go beyond what words can express.

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No figures were used in this research

List of Abbreviations

Distance Education Learning Environments Survey (DELES)

Multivariate Analysis of Variance (MANOVA)

Statistical Package for the Social Sciences (SPSS)

CHAPTER ONE: INTRODUCTION

Overview

Chapter one of this paper is an orientation into research proposed by the author. The focus of this research revolves around the impact that live lecture has on student perceptions within an anatomy & physiology course taught at the community college level. The research will focus on the impact of live lectures on student perceptions in traditional classroom settings compared to testing results from students enrolled in distance education courses.

Background

Distance education has become a phenomenon in post-secondary education that did not exist just a few decades ago. More post-secondary institutions are moving toward offering more distance education courses (Morrison, 2011). Post-secondary leaders claim that the move to offer more online courses is driven by student preference while making education more accessible (Wilson & Allen, 2011). The problem of the study focuses on the ability of post-secondary students to excel in distance education courses such as anatomy & physiology, where content knowledge is less latent than in other subjects such as English. This study is essential to understanding the transition from traditional to distance education as more leaders move their departments and institutions toward offering more distance education courses (Bristow et al., 2011). This movement has lateral consequences, as some students need to be equipped to handle the requirements that distance education places on them. They need to gain self-discipline to complete coursework promptly and stay motivated with personal interactions with their instructor and other students in the course (O'Rouke et al., 2014).

Monlescu et al. (2004) wrote a text that focused on the evolution of distance education. Inside the text, various issues related to distance education were discussed, and case studies were

conducted by various researchers related to distance education. In more than one instance, students discussed learning environments within distance education and clearly defined a difference between those and traditional course learning environments (Monlescu et al., 2004). Even in the infancy of distance education, it was clear that the structured learning environment found in traditional courses would be somewhat absent in distance education courses. Moore and Anderson (2003) echoed these findings in their text. While the text is viewed as one of the gold standards in distance education, they also clearly define learning environments within distance education as more different from those in traditional courses.

Panda (2003) wrote a text that focused on implementing distance education in various settings. Panda (2003) also realized the importance of learning environments on student learning and course perceptions. Panda (2003) highlighted several key factors, such as various methods of instructor involvement and various methods used to facilitate learning and dialect within distance education. Panda (2003) theorized that distance education would become more and more prevalent as technology allowed for more accessibility. Bradley and Yates (2002) theorized a similar increase in distance education courses and programs when they published their text. Authors from both texts remarked that the accessibility that distance education provides institutions is remarkable and allows those same institutions to reach more potential students instead of being locked into those students who can attend the traditional, brick-and-mortar classroom (Panda, 2003; Bradley & Yates, 2002).

While distance education has created a more accessible educational model in various settings, it has also created an educational model that could create an unstructured learning environment (Bradley & Yates, 2002). Suppose more educational leaders continue the trend of offering more distance education courses. Where will students fit into the plan that requires more

of a traditional, structured learning environment to help facilitate proper learning? Are these students with more self-discipline required for distance education coursework to facilitate better learning (Robinson & Doverspike, 2006)? Should distance education courses only be available to more advanced students in post-secondary settings?

Chen et al. (2013) studied accounting courses to determine if course level significantly impacted the outcomes of traditional versus online courses. Students were enrolled in both principles of accounting and advanced cost/managerial and financial accounting courses to determine the effectiveness of online courses compared to traditional courses across multiple levels (Chen et al., 2013). The study was conducted over three years in which students were enrolled in one of the four courses. The introductory course was a sophomore-level course; the other three were junior and senior. Students were given satisfaction surveys during their courses, and end-of-term student outcomes were also measured. Results showed that course level does play a significant role in both student satisfaction and learning outcomes between online and traditional courses (Chen et al., 2013). Higher-level courses showed the most significant contrast in student satisfaction and learning outcomes, which heavily favored the traditional setting. The lower-level course had no significant differences in satisfaction or learning outcomes when comparing traditional and online courses (Chen et al., 2013).

Van Duijn et al. (2014) conducted a study to determine if students in a physical therapy program would learn cervical psychomotor skills more effectively from online video instruction or face-to-face instruction. Fifty-three physical therapy students throughout four cohort groups took part in the study. Students were given tests at four intervals during their programs to measure competency in learning based on delivery mode. The design was a "single-blind, 2-group, posttest-only, crossover, experimental design" (Van Duijn et al., 2014, p. 96). After the

first interval, a difference was found in outcomes between those who had learned the skills via online video and those who had learned face-to-face. By the time the second testing occurred, no significant difference was found in learning, and this trend continued for the subsequent two cycles as well (Van Duijn et al., 2014). The study implies that some online learning tools are as effective as face-to-face instruction. The point of interest is that this study focused on advanced students in a doctoral program at the testing time.

Sinclaire (2011) conducted a study to assess student satisfaction with online learning. What was found was that students were satisfied with online learning to an extent, but many reported the need for more structure within the environment. This was related to organizational structure and how these students felt about job satisfaction. This relates directionally as well to their motivation to continue learning. Links were found between job satisfaction and student satisfaction in online learning, where organizational models showed a firm structure. Satisfaction levels dropped when a weaker structure was evident in job satisfaction and online learning (Sinclaire, 2011).

Problem Statement

While previous literature does an excellent job of delineating between traditional courses and distance education courses regarding student outcomes and perceptions of learning environments, it needs to adequately discuss student perceptions in traditional settings compared to distance education courses in anatomy & physiology courses. Students have some latent knowledge of most subjects, such as English and math, from previous years of learning. However, only some have latent knowledge of program-specific courses and prerequisites such as anatomy & physiology without taking a course in that subject area.

Live lectures from a post-secondary instructor in an anatomy & physiology course can more accurately describe and detail the physiological reactions and complexities occurring within the human body than a student simply reading the content from a textbook. Does this live interaction with a content specialist increase knowledge retention used for testing, or are subsidiary resources such as textbooks, recorded lectures, and PowerPoint presentations sufficient tools to engage knowledge retention in a complex subject?

Figlio et al. (2013) researched the effects of live lectures versus internet media instruction in an introductory microeconomics course. In the study, students were randomly assigned to live lectures versus other students that watched the same lecture in an internet setting (all other course factors were identical). Evidence showed that live lecture students scored better on post-lecture exams than those who viewed the lecture via internet resources. This was especially prevalent in Hispanic, male, and lower-achieving students (Figlio et al., 2013). The problem is that previous research needs to expound on the results of traditional course live lecture settings compared to distance education, where content is internet based in anatomy and physiology courses at the community college level.

Sinclaire (2011) found that while students enjoyed the online learning experience, they felt it needed more structure. The structure is explicitly necessary for anatomy & physiology courses due to the excessive amount of content in the courses. Students who struggle with distance education courses would more than likely find online anatomy & physiology courses overwhelming, especially as lower-level college students.

As the trend continues toward distance education courses, the movement of what many consider traditional laboratory courses taught in person has also begun to move into the distance education realm. Van Duijn et al. (2014) found that psychomotor skills were initially learned

only through distance education courses. Some students who are hands-on learners would likely struggle in distance education labs where they cannot physically handle a specimen or dissect tissues. Learning online is suitable for some students in this environment, but not all students.

Purpose Statement

This study aims to examine student perceptions in a traditional anatomy and physiology course compared to a distance education anatomy & physiology course where all other course factors are identical. While other research is more widely focused, this study aims to focus on students in lower post-secondary settings in a science-based discipline course. Student perceptions will be compared to traditional, live lecture courses and distance education courses where lectures can be viewed via recordings. Each student will complete the Distance Education Learning Environments Survey (DELES). The population for this study will be community college students in a southeastern community college with an average age of 24 years old, 68% female and 32% male. This study will take special notice of older post-secondary students and male students (considered special populations within the school at which the study is to be conducted).

The independent variable in this study is the lecture delivery method (either live or via recording). The dependent variable is student perceptions (based on the Likert scale questionnaire).

Significance of the Study

This study's significance is related to comparing student perceptions in traditional anatomy & physiology and a distance education anatomy & physiology course. Students are given the same material and subjected to the same course interaction treatments (discussion boards, blogs, and other methods). The only difference is the classroom's physical environment,

and live lectures compared to the distance education environment and recorded lectures accessed through online technologies.

The study will expand upon previous research in other disciplines to see if there is a crossover to a science-based course at a lower-level post-secondary institution. Other studies have shown that students at higher levels (graduate, doctorate) do not show as much discrepancy in learning outcomes (Van Duijn et al., 2014) when comparing distance education courses to traditional courses. Chen et al. (2013) also validated this research with similar results in another discipline. However, previous research points to the fact that lower-level students may struggle in distance education courses compared to traditional ones (Figlio et al., 2013). Is this because of the lack of experience in distance education courses for lower-level post-secondary students? Is this more related to content within a course than latent content knowledge? Science-based courses often have lower latent student knowledge than other, more prevalent disciplines.

As more and more post-secondary institutions move toward offering distance education courses in many disciplines, this topic is essential to assess and discuss. In an informal study conducted at the same community college where the research will be conducted, students were asked if they preferred distance education courses compared to traditional courses, and nearly 80% of students stated they preferred distance education courses over traditional ones. Students often cited the freedom of online learning and outside responsibilities such as jobs for this preference. This study could determine if student preference is most conducive to learning and knowledge retention that will be needed in real-world settings.

Research Questions

RQ1: Is there a statistically significant difference in student perceptions of learning environments in distance education anatomy & physiology courses compared to student

perceptions of learning environments in traditional anatomy & physiology courses at the community college level using the DELES?

Definitions

1. *Distance Education* – Education delivered via other means than traditional methods in brick & mortar settings such as online courses (Moore & Anderson, 2003).

2. *Traditional Setting* – Course taught in a traditional setting such as a classroom or laboratory (Moore & Anderson, 2003).

3. *Interaction Treatments* – Levels of interaction applied to educational courses such as blogs, discussion boards, live lectures, and recorded diaries(Sinclaire, 2001)

4. *Blackboard* – Online learning platform. One of the largest online learning platforms used by post-secondary institutions in the United States.

5. *Lower-Level Students* – Students still in first- or second-year student-level courses in a post-secondary setting (Figlio et al., 2013).

6. *Advanced-Level Students* – In junior, senior, or graduate-level courses in a post-secondary setting (Figlio et al., 2013).

7. *Online Education* – Another term used to describe distance education (Moore & Anderson, 2003).

8. *DELES* – Distance Education Learning Environments Survey (Walker, 2005).

CHAPTER TWO: LITERATURE REVIEW

Introduction

The purpose of this chapter is to introduce the theoretical framework upon which this study is based. This framework provides theoretical evidence of the need for this study in the field of education. The chapter will also provide a related and relevant literature review from previous works by other researchers that support this study's need. Topics discussed within the literature review include Distance education background, traditional education versus distance education, students' perceptions of learning environments, and validation of the DELES. Finally, a summary will be provided to condense the information from the chapter.

Theoretical Framework

The theoretical framework for this study is based on Bandura's (1989) social cognitive theory. Bandura (1989) held that some individuals learned from observing others and socially interacting with them. This theoretical framework plays a critical role in the basis of this study as it focuses on social interaction as a tool for learning and personal observations. Both items can be difficult to experience in distance education. In some instances, the student is an entirely autonomous learner that is given access to a course and left to disseminate the information on his/her own with the help of an instructor. The assumption is that the student can disseminate information in this manner and is well-equipped to participate and excel in an environment that may not be comfortable for him/her. While some students may be well equipped for autonomous learning, which is quite prevalent in distance education, other students may struggle. In looking at this objectively through the lens of the current research, students at the community college

level and even those who are dually enrolled as both post-secondary and high school students may need more educational maturity or background to be efficient autonomous learners.

Bandura's (1989) framework provides a theoretical reference to view the research and determine how distance education affects student perceptions. These perceptions will be compared to student perceptions within a traditional face-to-face course. The study will be anatomy & physiology courses, often designed to be very hands-on, natural learning environment driven. While categories of students will participate in anatomy & physiology labs, their perception of learning and the learning environment has the potential to be very different. Imagine trying to learn the complexity of the nervous system and how neurotransmitters work as an inexperienced college student who may have been away from education for over a decade. Now imagine this in a learning environment that may be very foreign to the student as both an inexperienced distance learner and a potential digital immigrant who may be somewhat technologically challenged due to a lack of experience.

Bandura (2001) went on to explain that "social cognitive theory distinguishes among three modes of agency: direct personal agency, the proxy agency that relies on others to act on one's behest to secure desired outcomes, and collective agency exercised through socially coordinative and interdependent effort" (p. 12). When examining how distance education works compared to traditional education, one can see a small amount of each of the three agencies that Bandura (2001) discusses. The student-learner is the direct personal agency responsible for completing all assignments within a given course. One could view the instructor in a distance education course as the provider acting at the behest of the student to secure desired learning outcomes by the way the course is set up and built. Finally, the collective agency that operates in a socially

coordinative manner would be the peers within distance education courses in which the student can learn socially and interact with others regarding common goals or assignments. In a distance education course, there will be limitations on the amount of peer interaction that takes place, or the student may need to fully understand the benefit of peer interaction via distance education as they would in a traditional face-to-face learning environment. While many research projects have suggested a much more assertive approach to the interaction between peers and instructors and peers to peers, not all distance education courses are built the same as academic freedom, and course content and delivery are still somewhat independent of the instructor and institution. Now consider a dual-enrolled student completing his/her high school and post-secondary requirements with no significant background in distance education. Course delivery and structure could severely impact their education outcomes and content knowledge retention.

A secondary theoretical framework comes from Moore (1993). Transactional distance theory states that when an instructional designer makes decisions, these decisions will result in a certain amount of structure, dialog, and autonomy. These amounts can be either unwitting consequences of the instructional design process or the result of conscious instructional design decisions. Regardless, these variables interact to create transactional distance. This is an important concept to understand as we discuss the importance of distance education designs and how they impact student perceptions within those courses. Throughout the literature review section of this research, students' perceptions of online distance education were most impacted by course design and the amount of instruction interaction and feedback provided. Students who seem less satisfied with distance education compared to traditional education often express a concern that relates heavily to a transactional distance within the course design or implementation. These are topics outside the realm of this research, but they play a critical role

in understanding what impacts students' perceptions of distance education compared to traditional education.

Related Literature

Distance Education Background

Distance education has become a phenomenon in post-secondary education that did not exist just a few decades ago. Post-secondary institutions are moving toward offering more distance education courses (Morrison, 2011). Post-secondary leaders claim that the move to offer more online courses is driven by student preference while making education more accessible (Wilson & Allen, 2011). The problem of the study focuses on the ability of post-secondary students to excel in distance education courses such as anatomy & physiology, where content knowledge is less latent than in other subjects such as English. This study is vital to understanding the transition from traditional to distance education as more leaders move their departments and institutions toward offering more distance education courses (Bristow et al., 2011). This movement has lateral consequences, as some students need to be equipped to handle the requirements that distance education places on them. They need to gain self-discipline to complete coursework promptly and stay motivated with personal interactions with their instructor and other students in the course (O'Rouke et al., 2014).

Monlescu et al. (2004) wrote a text that focused on the evolution of distance education. Inside the text, various issues related to distance education were discussed, and case studies were conducted by various researchers related to distance education. In more than one instance in the case studies, students have discussed learning environments within distance education and

clearly defined a difference between those and traditional course learning environments (Monlescu et al., 2004). Even in the infancy of distance education, it was clear that the structured learning environment found in traditional courses would be somewhat absent in distance education courses. Moore and Anderson (2003) echoed these findings in their text. While the text is viewed as one of the gold standards in distance education, they also clearly define learning environments within distance education as more different from those in traditional courses.

Panda (2003) wrote a text that focused on the implementation of distance education in various settings. Panda (2003) also realized the importance of learning environments on student learning and course perceptions. Panda (2003) highlighted several key factors, such as various methods of instructor involvement and various methods used to facilitate learning and dialect within distance education. Panda (2003) theorized that distance education would become more and more prevalent as technology allowed for more accessibility. Bradley and Yates (2002) theorized a similar increase in distance education courses and programs when they published their text. Authors from both texts remarked that the accessibility that distance education provides institutions is remarkable and allows those same institutions to reach more potential students instead of being locked into those students who can attend the traditional, brick-and-mortar classroom (Panda, 2003; Bradley & Yates, 2002). This is ultimately what leads institutions toward offering more and more distance education courses. The flexibility gives the students, the institution, and the instructors far exceeds that of the traditional setting.

While distance education has created a more accessible educational model in various settings, it has also created an educational model that could cause an unstructured learning environment (Bradley & Yates, 2002). Suppose the trend continues to offer more distance

education courses and create more distance education programs. Where will students fit into the plan that requires more of a traditional, structured learning environment to help facilitate proper learning? Are these types of students capable of summoning the required self-discipline required for distance education coursework to facilitate better learning (Robinson & Doverspike, 2006)? Should distance education courses only be available to more advanced students in post-secondary settings?

This discussion is outside the scope of online-only institutions, which are becoming more and more prominent in the higher education landscape. The ability to enroll thousands of students in an institution with almost no physical geographic land print compared to large universities with massive campuses is impressive. The lack of overhead expenses associated with that small physical structure creates opportunities to create revenue while still having the ability to advance every level of higher education degree. Students flock to these institutions because of the academic freedom afforded to them, but is it the best option for them to gain their degree and, more importantly, become efficient learners and masters of the content they need to be successful in their career endeavors?

Distance vs. Traditional

Bagley et al. (2015) conducted a study to assess the implementation of a synchronous distance education course in a sonography and radiology program. The course used in this research was a cadaver anatomy course. Researchers developed a distance education cadaver anatomy course and compared the means of test and overall final scores within the scores to assess how the distance education course would compare to the traditional course they had used previously for their program. The findings show that students who took the distance education

course scored significantly lower on their exams and final overall course grades compared to those who had completed the traditional anatomy course. This is one of the few studies that involve anatomy courses, although it is a much higher-level course being a cadaver anatomy course (minimum master's level course). This is a significant study for the current research because it not only shows a traditional science course producing higher exam and learning outcomes, but it also shows an anatomy course which is the subject of the current research.

Chen et al. (2013) studied accounting courses to determine if course level significantly impacted the outcomes of traditional versus online courses. Students were enrolled in both principles of accounting and advanced cost/managerial and financial accounting courses to determine the effectiveness of online courses compared to traditional courses across multiple levels (Chen et al., 2013). The study was conducted over three years in which students were enrolled in one of the four courses. The introductory course was a sophomore-level course; the other three were junior and senior. Students were given satisfaction surveys during their courses, and end-of-term student outcomes were also measured. Results show that course level does play a significant role in both student satisfaction and learning outcomes between online and traditional courses (Chen et al., 2013). Higher-level courses showed the most significant contrast in student satisfaction and learning outcomes, favoring the traditional setting. The lower-level course had no significant differences in satisfaction or learning outcomes when comparing traditional and online courses (Chen et al., 2013).

Van Duijn et al. (2014) conducted a study to determine if students in a physical therapy program would learn cervical psychomotor skills more effectively from online video instruction or face-to-face instruction. Fifty-three physical therapy students throughout four cohort groups

took part in the study. Students were given tests at four intervals during their programs to measure competency in learning based on delivery mode. The design was a "single-blind, 2-group, posttest-only, crossover, experimental design" (Van Duijn et al., 2014, p. 96). After the first interval, a difference was found in outcomes between those who had learned the skills via online video and those who had learned face-to-face. By the time the second testing occurred, no significant difference was found in learning, and this trend continued for the subsequent two cycles as well (Van Duijn et al., 2014). The study implies that some online learning tools are as effective as face-to-face instruction. What was interesting is that this study focused on advanced students that were in a doctoral program at the time of testing.

Emerson and Bruce (2011) conducted research comparing student learning outcomes in a traditional setting to distance education. Fifty-nine students participated in the research and were given a pre-and post-lesson questionnaire and exam that tested subjective cognitive workload stress. The results showed that students who participated in the lesson in a traditional face-to-face manner scored 24% better than those who viewed the lesson in a distance education course. While the lower number of students is not indicative of all students, it does show that traditional students perform better on testing in particular subjects when both groups are presented with the same content, with the only difference being delivery modality. This study has implications for current research because it strengthens the standpoint that distance education is not an option for all students in terms of academic performance.

Sinclaire (2011) conducted a study to assess student satisfaction with online learning. Students reported being satisfied with online learning to an extent, but many reported the need for more structure within the environment. This was related to organizational structure and how

these students felt about job satisfaction. This relates directionally as well to their motivation to continue learning. Links were found between job satisfaction and student satisfaction in online learning, where organizational models showed a firm structure. Satisfaction levels dropped when a weaker structure was evident in job satisfaction and online learning (Sinclaire, 2011).

Wright (2009) researched to compare student learning outcomes and perceptions of a traditional dietetic internship versus an online dietetic internship. The results show that students in the traditional dietetic internship performed better academically than those in the distance education internship and were considered more prepared at an advanced level than those in the distance education internship. Students in the distance education dietetic internship also had lower perceptions of the program than those in the traditional program. This supports the ideology that traditional courses offer more support and have higher student perceptions than distance education counterparts.

Xu and Jaggars (2013) researched a broad scale to see if a difference existed in student learning outcomes and overall grades, comparing distance education and traditional courses and the community college / technical college level. The findings show that students across a statewide 34-institution system performed significantly better in traditional courses than in distance education courses. The dataset compared all student grades from every distance education course and traditional education course where both existed. These findings suggest that distance education differs from traditional education settings regarding student learning outcomes and overall grade achievement.

Figlio et al. (2013) researched the effects of live lectures versus internet media instruction in an introductory microeconomics course. In the study, students were randomly assigned to live

lectures versus other students that watched the same lecture in an internet setting (all other course factors were identical). Evidence showed that live lecture students scored better on post-lecture exams than those who viewed the lecture via internet resources. This was especially prevalent in Hispanic, male, and lower-achieving students (Figlio et al., 2013). The problem is that previous research needs to expound on the results of traditional course live lecture settings compared to distance education, where content is internet based in anatomy and physiology courses at the community college level.

Sinclaire (2011) found that while students enjoyed the online learning experience, they felt it needed more structure. The structure is explicitly important in anatomy & physiology courses due to the excessive amount of content in the courses. Students who struggle with distance education courses would more than likely find online anatomy & physiology courses overwhelming, especially as lower-level college students. This also becomes critically important to understand in areas where high school students are dually enrolled and take science courses such as anatomy & physiology for their science credit for their high school requirements. Those students will likely have little if any, experience in an online distance education formatted course, and while they are digital natives, learning synchronously in an environment that is very new to them may prove to be a challenging obstacle to overcome.

As the trend to move more and more courses to distance education courses, the movement of what many considered traditional laboratory courses taught in person has also begun to move into the distance education realm. Van Duijn et al. (2014) found that psychomotor skills were initially learned only through distance education courses. Some students who are hands-on learners would likely struggle in distance education labs where they cannot physically handle a

specimen or dissect tissues. Learning online is suitable for some students in this environment, but not all students.

Thistol and Yates (2016) performed an institutional case study to review what could be done to help students in distance education programs attain a higher completion rate. The study found that students felt disconnected in a distance education environment and were more easily influenced by outside forces (work, personal reasons) when in distance education courses compared to traditional courses. A stricter engagement model was used in the distance education course to try and closely simulate face-to-face interaction opportunities, and student completion rates improved.

Ilyas et al. (2014) conducted a study to compare student success (overall grade/score attained in a course) in a traditional associate degree program to a distance education program. The courses used in this study included: Computer Programming, Electronic Technologies, and Mechatronics. Results indicated that students in traditional associate degree programs made higher grades with better overall scores compared to students in the same distance education programs (Ilyas et al., 2014). The inferred outcome of this study is that traditional education is more successful than distance education in associate degree programs. This study is critical because it reiterates that, for various reasons, lower-level students may need to be equipped or prepared to succeed in distance education courses. It also illustrates a comparison where traditional education was superior to distance education as far as student learning outcomes are measured.

Hemmati et al. (2013) researched to compare the effectiveness of internet-based learning (distance education) and traditional learning environments for a continuing education course for

CPR training. In this instance, the students were all physicians completing a continuing education course needed to maintain their CPR certification. The physicians either participated in a traditional CPR face-to-face training course or watched an internet-based PowerPoint presentation. An independent samples t-test indicated that the physicians who watched the internet-based PowerPoint scored higher on their final exam than those who participated in the traditional face-to-face CPR training course (Hemmati et al., 2013). This is important to the current research because it illustrates that students with higher academic achievement may do as well or better in distance education.

Student Perceptions of Online Learning

Smart and Cappel (2006) researched to examine student perceptions of online learning. The study was focused on students who both actively requested online learning modules in a course and students who were required to take online learning modules as part of a hybrid/blended course. The results showed that students who took the online learning modules electively were much more satisfied and had stronger positive perceptions of online learning compared to those who were required to take the online learning modules. For this study, 83% of the students were experiencing their first online learning interaction. Students who were forced to complete online learning modules often commented that they were unprepared for the rigors of online learning and felt disconnected from the content. While this research was completed over a decade ago in the infancy of the online/distance education boom, it is still relevant to current research because it illustrates the potential negative impact on student perceptions when they take a distance education course with little to no experience.

Rivera (2016) found that course delivery methods impacted students' perceptions of learning. Students' perceptions were surveyed both pre-course and post-course to estimate the impact of delivery methods in a traditional versus distance education program. Rivera (2016) found that several content areas and learning outcomes seemed to be impacted by course delivery methods. Students in distance education courses reported lower perception levels in several critical areas. These findings further support the ideology that distance education can influence student perceptions.

Tanner et al. (2009) researched to examine the difference between students' perceptions of online learning and that of faculty perceptions that taught online courses. Results from the research, where 890 students and 1,175 faculty responded to a survey questionnaire, show that students had a significantly lower perception of online distance learning courses in the field of business compared to the faculty responsible for instructing distance education business courses. The faculty were pleased with the flexibility distance education provided compared to traditional face-to-face courses. Students, however, felt disconnected and isolated in distance education courses. Students often referenced the lack of peer contact, instructor contact, and overall feedback as a negative perception of distance education. Students with little to no background in distance education had the most negative perceptions compared to the entire group. They often commented on how unprepared or uncomfortable they were in distance education because it differs from the traditional face-to-face educational model. This research is significant to the current study because it highlights the stark contrast in perceptions that may exist between those who build course and class schedules and those who may find themselves in a learning environment in which they are not comfortable or experienced.

Trimming and Bordelon (2016) conducted interviews with students in a distance education program to assess their perceptions of learning environments and ways to improve various student issues. What was found is that students felt disconnected when taking distance education courses. Students also discussed the difficulty of learning psychomotor skills in an online environment. This is a significant concern within this study as well. How well can students be expected to learn visually and in content areas that involve hands-on activities such as dissections and muscular model work, where they construct models from disassembled parts? Considering that many of the students in the proposed study are first- and second-year student-level students in a community college setting, the importance of social learning and student perceptions increase dramatically.

Dobbs et al. (2017) found that the course delivery method impacted students' perceptions. They compared traditional and distance education courses to see how course delivery methods impacted student perceptions. In total, 180 students participated in the study, with 100 students enrolled in distance education courses and 80 others in traditional courses. The findings show that student perceptions were somewhat negatively impacted by distance education. The findings revealed that students with previous experience in distance education were less negatively impacted than those who had never taken distance education courses. These findings are significant because they feed into the theory in current research that lower-level students may struggle more with distance education courses, especially those who have never taken a distance education course before.

Carver and Kosloski (2015) analyzed student perceptions of the psychosocial learning environment in both traditional and distance education courses in the career and technical

education spectrum in higher education. The findings revealed that students felt more connected and socially active within the traditional course framework compared to distance education courses. This lines up with the theoretical framework of the current study that students learn socially from observing and physically interacting with others and viewing their work. Carver and Kosloski (2015) referenced a report by the United States Department of Education in 2013 that the quality of education must be upheld while trying to find ways to reduce the associated costs for students. This information relates to the current landscape in higher education in offering more distance education courses to offset associated costs and keep up with other higher education programs and organizations.

Moshabab (2017) researched fourth-year undergraduate dental students to identify their preferences and perceptions about traditional and distance education. The study was based on a Likert scale questionnaire delivered to students electronically. Results show that over 50% of students agreed that students should be proficient in computer skills when taking an online distance education course. Results show a mixture of student preferences, as more than 40% of students preferred a blended approach to learning, including some traditional and online distance education environments. This study is critical because it shows that students understand the importance of computer literacy in an online learning environment and may need more time to be ready for a completely online learning environment. However, they are open to working toward one, with a preferable blended environment.

House et al. (2007) researched to examine students' perceptions of online distance education courses within an undergraduate Food and Resource Economics program. Researchers created multiple categories for students based on the number of online distance education

courses they had taken within their major in the last two years. Results showed that no matter how many online distance education courses were taken, students' perceptions of online distance education were lower than that of traditional courses. This information reiterates the importance of adequately building distance education courses and offering both traditional and distance education courses in higher education settings.

Young and Lewis (2008) researched to examine student perceptions in a teaching education program focused on distance education delivery. The results of this study revealed a differing perception between male and female students in the area of course structure, student/teacher interaction, overall course satisfaction, and peer interaction. Male students recorded higher perceptions in these areas compared to female students, and both groups scored low on perceptions of student/teacher interactions. Suppose future teachers struggle with these concepts and course delivery problems. What is expected of students in these scenarios, especially lower-level students who may not have much experience in distance education?

Libby et al. (2017) researched a dental hygiene cohort group to determine their satisfaction and perception of distance education. The researchers found over the entire program that while satisfaction and perceptions were low, to begin with, after the initial semester of study, subsequent semesters displayed rising satisfaction and perception rates. Students cited more familiarity with distance education and a more precise understanding of expectations in distance education after taking several terms successively. This research is necessary because it relates to the current study, which theorizes that not all students are well-equipped to take distance education courses, especially at a lower level of higher education (first- and second-year

students). By the end of the programs, students' perceptions of distance education had improved dramatically, but this study was conducted over a 2-year cohort group.

Elias et al. (2017) conducted a study in which face-to-face engineering courses used online (distance) education technology to complete assignments over a consecutive semester sampling. Over 500 students participated in the study to gauge student perceptions about distance education software and delivery methodology compared to their traditional face-to-face methodology. Student perceptions were significantly lower for distance education modules and online software compared to traditional methodologies within the first semester. In the second semester, student perception rates improved, as did perceptions of online learning software. This study further supports the ideology that not all students are prepared for distance education, and higher-level students in an engineering program have lower perceptions of distance education delivery methods than traditional ones.

Jones and Blankenship (2017) researched student satisfaction and perceptions of online education and what could be done to improve the new-age delivery method. What was discovered mimics many other findings in this chapter. Students in online/distance education courses felt disconnected from their instructors and peers. Jones and Blankenship (2017) suggested that higher interaction models should be used in distance education to help bridge the gap and help create a more social learning environment.

Isman et al. (2004) researched to evaluate students' perceptions of distance education. An essential conceptual point taken from the study is that content within distance education courses forms a student's most significant perception of that course. The content taught and students' perception of that content was found to be paramount in this study. Isman et al. (2004) went so

far as to suggest that online courses be designed with a particular group or target audience in mind. The authors state that research has shown that different age groups and genders respond differently to distance education. One of the more critical suggestions from this research related to the current study is that educational levels play a significant role in the capacity of a student to achieve higher learning outcomes in distance education courses.

Fish (2016) conducted a pre and post-course study to examine how student perceptions of online/distance education changed. The students that participated in this study were master's level students, and all of the students had participated in multiple distance education courses. This is important because it helps eliminate bias, as all participants had at least some experience in the distance education setting. The findings show that perceptions of several factors did not change throughout the semester, but some things, such as motivation and difficulty communicating with peers, were lower. This study feeds into the theoretical framework of social learning because students felt lower motivation levels when they were not in a face-to-face group and the continued presence of communication difficulties in distance education courses.

Fish and Snodgrass (2015) researched student perceptions of online business courses. This study specifically evaluated business students' characteristics - graduate vs. undergraduate, gender, and previous experience, relative to their perceptions of the online versus face-to-face environment concerning motivation, discipline, independence, time and cost investment, preference, happiness, and appropriateness of the learning environment. The students generally favored the traditional face-to-face environment on all student perceptual characteristics, regardless of whether they had taken online courses. As students completed more and more distance education courses, they became more comfortable in the distance education

environment. This study reiterates the importance of experience in distance education for students. Interestingly, more students preferred face-to-face courses in this study. However, higher learning institutions continue to move away from traditional face-to-face courses in favor of distance education courses.

Litterio (2018) researched to examine student perceptions of a first year online writing course that had previously been taught as a face-to-face course. Findings suggest that the student's confidence and comfort levels improved over time in the course. However, findings also suggest that instructor feedback and relevant course content positively affect student perceptions of an online course. These findings reiterate the importance of communication in distance education from the perspective of instructor-to-student and its importance to student perceptions of the learning environment.

Slapak-Barski and Edmonds (2017) conducted a study to examine both instructor and student perspectives in distance education. It was found that students essentially felt isolated in distance education courses. Some instructors even felt isolated from their students within the distance education environment. Slapak-Barski and Edmonds (2017) state that "the concept of distance in online education does not refer just to a separation in time and space, but also to the pedagogical space between distant learners and instructors" (p. 48). Feelings of isolation experienced by distant students are grounded in Moore's transactional distance theory, which states that transactional distance decreases as the number of dialogues increases. Accordingly, establishing a teaching presence in distance education courses can minimize the isolation effect and reduce the transactional distance in many ways. This study shows the importance of teacher

presence in distance education courses and how a lack of presence can negatively influence student perceptions of the learning model.

Biggs (2006) studied student perceptions across three delivery methods of traditional, hybrid, and distance education courses. This study is essential to the literature review because it highlights the emphasis on student perceptions in distance education compared to online education. The current study will also use the same tool to collect data. The Distance Education Learning Environments Survey (DELES) was used to collect data showing student perceptions of various topics related to course support. Instructor support was rated significantly higher in traditional courses than in distance education courses. Student interaction and collaboration were rated much higher in traditional courses than in distance education courses. Student satisfaction was also rated higher in traditional courses than in distance education courses. All three of these subjects could be vital in students selecting distance education courses compared to traditional courses as they reiterate the growing trend of lower student perception levels in distance education courses compared to traditional courses.

Scherrer et al. (2010) conducted research to study general student perceptions of online education and characterize the differences between various student demographic groups, focusing on differences between those who have and have not previously taken courses online. The researchers surveyed more than 300 students and analyzed their responses. Although almost every survey participant agreed that online courses are more convenient for students, there were significant disagreements and different perspectives about online education between the groups. Students who had previously taken online courses had different perceptions about distance education than those who had not previously taken online courses. High-level students (juniors

and seniors) had higher perceptions of distance education than lower-level (first- and second-year students) students. This research emphasizes student-level importance in distance education and explains why many students may select distance education courses.

Moore (2014) researched to emphasize the importance of establishing an online community in distance education courses. This study assessed ways to reduce attrition rates from distance education programs. By the very nature of distance education, students are in different locations from peers and instructors. This is one of the reasons that students find distance education so convenient. They can complete course tasks from anywhere they have an internet connection. The instructor's challenge is figuring out how to make students feel connected and able to succeed in this unique learning environment. Developing a sense of community is an effective and efficient way to help ensure the success of the distance education program and can directly address the challenge of distance education attrition. An instructor can create an environment conducive to student success by developing a sense of community. Moore (2014) ascertains that if students feel more connected to their instructor and peers, they will be less likely to leave that course, program, and institution.

Seok et al. (2010) researched to analyze the perceptions of both students and instructors as it relates to several facets of distance education. Some subscales included: flexibility, user interface, navigation, getting started, technical assistance, course management, universal design, communications, instructional design, and content. Results showed that students and instructors had positive perceptions of course effectiveness, but instructors scored higher on all subscales than students. There was a higher correlation between teaching experience and student perceptions, suggesting that more experienced instructors may be better suited for distance

education courses (Seok et al., 2010). This study is critical because it also evaluates instructor perceptions of online learning, which were higher than student perceptions. This study may also illustrate the disconnect in distance education courses between instructors and the students who are enrolled.

Almaghaslah et al. (2018) researched fifth-year pharmacy students to evaluate their preference for learning environments. An online survey of fifth-year pharmacy students yielded results showing that 97% of students had previously taken distance education courses, and 76% were science courses. A large majority of students preferred the traditional setting compared to the online distance education setting. Only 17% of students expressed no preference for learning environments. This is a critical study because it is in a related field of science. It demonstrates that many higher-level students (fifth-year pharmacy students are doctoral students) prefer traditional courses compared to distance education environments. It helps to reiterate that science courses often include intricate, hands-on material that may be difficult to learn or master in an online distance education setting.

Ortiz-Rodriguez et al. (2005) conducted a study to examine students' perceptions of online learning environments and the factors that most affected student perceptions of online learning. The study was built around estimating the quality of distance education through the eyes of the student. Communication was the most crucial factor that affected students' perception of online distance education. Another critical aspect of distance education that impacted student perceptions revolved around timely feedback provided by the instructor. Other components that were deemed to be significant were group exercises that helped create a sense of community within distance education courses and the use of discussion boards to help both summarize

learned content, but also to gain perspectives from other peers on related literature and course content.

Sahin and Shelley (2008) researched student satisfaction with distance education courses. The Distance Education Student Satisfaction Model was used in this study to estimate student satisfaction and perception of distance education on several scales. These scales include Computer knowledge, the flexibility of distance education, usefulness in distance education, and satisfaction. Results show a strong correlation between computer knowledge and distance education satisfaction (Sahin & Shelley, 2008). This is a critical study because it relates to the current research in that not all students may be prepared for distance education learning environments, especially those who may be digital immigrants (born before 1980) or those with lower computer literacy skills.

Richardson (2006) researched to investigate the relationship between students' perception of learning environments and how that impacts their study behaviors. Over 3,000 students were used in this research. Results show that a bi-directional relationship exists between students' perceptions of their learning environment and how it positively or negatively impacts their study behaviors. When students negatively perceived the learning environment, their study behaviors dropped below what was considered an acceptable rate compared to students whose study behaviors improved compared to acceptable in a learning environment they deemed as positive. While not a direct correlation to the current research, this shows that students with a negative perception of distance education may have impacted study behaviors that ultimately lead to poor academic achievement within that course.

Jelfs and Richardson (2010) conducted research using an equal number of disabled and non-disabled students to compare their perceptions of distance education courses. Results show that disabled students had a slightly lower perception of distance education than non-disabled students, but not a significant difference. What is essential for this research is that both disabled and non-disabled showed low student perception numbers for distance education courses. Students with dyslexia, mental health disorders, and fatigue disorders showed lower than-normal perception numbers compared to other disabled students and non-disabled students. This research is significant to the current research because it isolates an even smaller group of students and still shows a lower-than-normal perception of distance education. It also illustrates that students with learning disabilities likely prefer traditional face-to-face courses.

Not all studies show favor for traditional educational settings. Sad et al. (2014) researched to compare the perceptions of distance education courses and traditional courses in terms of students' perceptions of the quality of education. In this study, students in distance education courses were most optimistic about lifelong learning opportunities, learning-teaching procedures, and access to shared resources compared to traditional students, who scored lower in all three areas. This is important to current research because it shows that student variation can show a shift of favoritism toward distance education environments in some instances. The three areas this study focused on tended to favor online learning environments. Still, this research is vital to act as a buffer against several overwhelming studies that show students' perceptions of traditional education environments are higher than those of distance education environments.

Another study that showed higher student perceptions in a non-traditional learning environment was conducted by Vernadakis et al. (2012). This study compared students'

satisfaction between a traditional and a hybrid learning environment. Students showed a higher satisfaction rate with hybrid (blended) learning environments than with traditional ones. This study is critical because it shows that not all groups of students prefer traditional learning environments, and this study would support the null hypothesis presented within this research. It is also important to note that students preferred something other than a strictly online distance education environment. A hybrid learning environment is a blended environment with some face-to-face interaction with the instructor and some distance education components. Hybrid learning environments more favorably resemble a traditional environment than a strictly online one because there is still a good amount of face-to-face student-instructor interaction.

A study by Malinovski et al. (2015) shows that adult learners can excel in an online distance education environment if they are provided with an excellent quality of education. The adult learners in this study are all primary education schoolteachers that attended a videoconference-based program for teacher enhancement. Results show that participants liked the ease of participation and the student-teacher interaction they received during the videoconference. This study illustrates that some adults may be well suited for distance education courses but remember that these are all educated students with a minimum of a bachelor's degree. The relationship to a typical adult student that may or may not has taken college courses in over a decade bears very little correlational data for this study. It shows that more prepared and experienced students may prefer the distance education environment because of the flexibility it allows them with their time and the other obligations they likely have.

Instrument Validation

Validation of the instrument used in research is crucial. Many previous studies have used the Distance Education Learning Environments Survey (DELES) as the main instrument in their study to assess student perceptions of learning environments. While many of these studies focused on distance education, a couple used the DELES to assess student perceptions of traditional learning environments compared to distance education learning environments. This is a critical component of the current research because it validates the usage of the DELES to measure perceptions of learning environments strictly outside of the distance education delivery method.

Walker and Fraser (2005) originally developed and validated the DELES to assess distance education learning environments in higher education. Walker and Fraser (2005) wanted to develop an instrument that could be used for research to assess student perceptions of learning environments with a particular emphasis on distance education courses. The DELES was built with five different scales within the survey. These scales include Instructor support, personal relevance, authentic learning, active learning, and student autonomy. An additional enjoyment scale was added, but it is not a psychosocial learning environment scale (Walker & Fraser, 2005). Each learning environment item within the survey had a factor loading of at least 0.50 with its scale and less than 0.50 with all other scales (Walker & Fraser, 2005). The alpha reliability coefficient for each scale ranged from 0.75 to 0.94. Walker and Fraser (2005) state that the development of the DELES relied extensively on literature that focused on high-quality education and expert content validation techniques. The DELES uses Likert-scale questions that can be rated from 0 (least favorable) to 5 (most favorable).

The DELES was also validated in other languages to help assess student perceptions of learning environments. A Turkish version and a Spanish version of the DELES were built. Turkish (Ozkok et al., 2009) and Spanish (Fernández-Pascual et al., 2015) versions of the DELES found the instrument was found to valid in measuring and assessing student perceptions of learning environments through their five primary scales. Further validation shows the DELES to be a valid instrument for this study. The DELES was also in an Iranian version. A unique study was conducted by Kupyezadey et al. (2017) to assess the psychometric adequacy of the survey to evaluate educational environments. One hundred fifty students took part in the study. The validity of the questionnaire was confirmed. Cronbach's alpha coefficient of the questionnaire was 0.937 (Kupyezadey et al., 2017).

Biggs (2006) conducted a study to examine student perceptions of the psychological learning environment in a distance education classroom as well as a hybrid classroom and a traditional classroom. The DELES was distributed as a pre-test/post-test to three sections of the same course taught in each learning environment. Results show that the scale of instructor support was the highest in traditional courses (4.68 mean), while distance education courses were the lowest in instructor support (3.62 mean). Student interaction and collaboration is another scale of the DELES where students rated the distance education course vastly below that of its counterparts (3.12 mean). Other scales within the DELES did not show a dramatic difference in the means of the outcomes for the other three scales within the survey. This study is significant to the current research because it shows the usage of the DELES as an instrument to assess student perceptions of learning environments solely outside of distance education courses.

Ferrer-Cascales et al. (2011) researched to evaluate student perceptions of distance education learning environments to that of hybrid learning environments. A hybrid learning environment is one in which students complete some coursework via distance education (usually about 50%) and complete the other parts of the course in a traditional learning environment. The DELES was the instrument used in this study, and findings show that students' perceptions favored the hybrid learning environment over the distance education environment in all five scales of the DELES. Some scales were within 0.2 of each other, while others were significantly different. This is another critically important study to current research because it directly compares student perceptions of a distance education learning environment to another environment where instructor interaction is at least partially face-to-face.

Sahin (2007) conducted a study to analyze the characteristics of distance education learning environments. The DELES was used to explore the relationship between student satisfaction and the five scales within the DELES. Nine hundred seventeen students participated in the study, and results show that four of the five primary scales within the DELES (personal relevance, instructor support, active learning, and authentic learning) were significantly and positively related to student satisfaction with the course (Sahin, 2007). This research continues to validate the DELES as an effective instrument for usage in research. Sahin (2007) also found the reliability of the DELES to be over 0.85, which further helps support the use of the DELES as an instrument for this research.

Fotiadou et al. (2017) conducted research using the DELES to examine the relationship between learner autonomy and aspects of the learning process, such as student-student interaction and instructor-student interaction in a distance learning environment. The study was

conducted on 100 postgraduate students and yielded a positive correlation between learner autonomy, student-student interaction, and instructor-student interaction. The scales with the DELES were used further to show positive correlations between self-awareness and instructor-student interaction.

Keeney et al. (2017) conducted a study to assess distance learning environments and students' satisfaction with distance education. The DELES was the instrument used in the study. While some scales scored well (above 4.00 mean), others scored predictably lower, such as instructor-student interaction and authentic learning, were well below (3.38 mean and 3.31 mean, respectively). These findings further support the idea that distance learning environments may not be the most suitable for all students, especially those needing strong instructor interaction and support to succeed.

Summary

In closing, this chapter is composed on the premise that a significant difference exists between traditional face-to-face and distance education. This is very evident as it relates to student perceptions. Bandura's (1989) social cognitive theory is a theoretical framework upon which this study will be based. Students, as well as those outside of education, learn socially from observing and interacting with others. This becomes increasingly difficult in distance education learning environments. Moore's (1993) theory of transactional distance also plays a vital role because the decisions of the course designers in distance education courses indirectly impact the students' perceptions of distance education delivery methodologies.

A background in distance education is provided as a reference point to show how quickly education, more specifically, higher education, has progressed from a foundation based on traditional face-to-face courses to one in which more and more distance education courses and programs are offered to try and attract more potential students. As higher education organizations become available to students, the need to stand out and provide higher-quality education at an affordable price becomes increasingly important. As organizations and institutions fight to do this, the move to offer more distance education courses has been the most notable response… but is this the right move? Are all students prepared and equipped to succeed in distance education courses?

Several studies are examined to compare student learning outcomes in traditional and distance education courses. Student learning outcomes are critical to long-term student success and perceptions. What was found repeatedly in these studies is that students tend to perform at a higher level in traditional face-to-face courses often. This can be attributed to many different factors. However, one prevailing thought throughout the studies is that student-to-instructor and student-to-student interactions were significantly less in distance education courses.

Student perceptions were measured in various studies to examine if they were different in distance education courses compared to traditional courses. Various studies found that student perceptions were lower in distance education courses compared to traditional ones. The variety of subject matter traversed from specialized courses to engineering, dental hygiene, and physical therapy to more standard English and social sciences courses. The overall outcomes were the same. Students showed increased perceptions of distance education in some long-term studies that focused on cohort groups and the effectiveness of distance education. This is an essential

aspect of the literature review because this study focuses on lower-level students in higher education who may have limited experience in distance education courses. In addition, no studies were found that focused explicitly on anatomy & physiology courses at the community college level. This study will be significant because it fills a gap in knowledge in literature.

Finally, the DELES was examined in multiple studies to show its validity for use in this research. Several researchers used the DELES to show student perceptions of traditional and distance education learning environments. While many studies focused primarily on distance education environments, Biggs (2006) and Ferrer-Cascales, Walker, Reig-Ferrer, Fernandez-Pascual, and Albaladejo-Blazquez (2011) used the DELES in studies that focused on traditional and distance education courses. All in all, the DELES has been used in over 25 studies and in different languages.

CHAPTER THREE: METHODS

Introduction

This chapter aims to orient and describe to the reader the research methodology for this dissertation project. A variety of topics will be discussed in this chapter. Topics discussed in this chapter include research design, research question, hypothesis, participants and setting, instrumentation, procedures, and data analysis.

Design

The research design selected for this project is a causal-comparative study. The study is ex-post facto because the independent variable has occurred; no manipulated data occurs during the study (Gall et al., 2007). Students will complete the questionnaire after they have experienced course delivery methods for the lecture. The independent variable in this study is the lecture delivery method (either live lecture or independent reading/PowerPoint presentation). The dependent variable is student perceptions (DELES).

Ex-post facto means operating retroactively in Latin (Gall et al., 2007). In ex-post facto research, instead of manipulating the dependent variable, the researcher manipulates the independent variable. In causal-comparative research, the investigator/researcher seeks to identify cause-and-effect relationships between groups (Gall et al., 2007). In this instance, the researcher seeks to gauge the effects of course delivery methods on student perceptions of the course. Previous research shows that student perceptions are affected by course delivery methods, but specific research has yet to be conducted on anatomy & physiology courses at the community college level.

The vital component of causal-comparative research is how the independent variable is measured. In causal-comparative research, the independent variable is measured in categories

(Gall et al., 2007). The categories can be nominal or ordinal scales and categorical or interval ratio scales (Gall et al., 2007). Gall et al. (2007) state that "causal-comparative research can be re-conceptualized as correlational research by changing how the variables are measured" (p. 307). The researcher is seeking to estimate if a direct correlation exists between students' perceptions based on course delivery methods and learning environments.

Much of the research that serves as background literature for this project used a causal-comparative model for research. Van Duijn et al. (2014) and Figlio et al. (2013) conducted causal-comparative research that found differences in student outcomes and perceptions when comparing distance education courses to traditional courses. Biggs (2006) conducted a causal-comparative study using the exact instrument (DELES) used in this project.

Research Questions

RQ1: Is there a statistically significant difference in student perceptions of learning environments in distance education anatomy & physiology courses compared to student perceptions of learning environments in traditional anatomy & physiology courses at the community college level using the DELES?

Research Null Hypothesis

Ho1 – No statistically significant difference will exist in student perceptions of instructor support in traditional anatomy & physiology courses compared to student perceptions of instructor support in distance education anatomy & physiology courses at the community college level using the DELES.

Ho2 - No statistically significant difference will exist in student perceptions of student interaction & collaboration in distance education anatomy & physiology courses compared to

student perceptions of student interaction & collaboration in traditional anatomy & physiology courses at the community college level using the DELES.

Ho3 - No statistically significant difference will exist in student perceptions of personal relevance in distance education anatomy & physiology courses compared to student perceptions of personal relevance in traditional anatomy & physiology courses at the community college level using the DELES.

Ho4 - No statistically significant difference will exist in student perceptions of authentic learning in distance education anatomy & physiology courses compared to student perceptions of authentic learning in traditional anatomy & physiology courses at the community college level using the DELES.

Ho5 – No statistically significant difference will exist in student perceptions of active learning in distance education anatomy & physiology courses compared to student perceptions of active learning in traditional anatomy & physiology courses at the community college level using the DELES.

Ho6 - No statistically significant difference will exist in student perceptions of student autonomy in distance education anatomy & physiology courses compared to student perceptions of student autonomy in traditional anatomy & physiology courses at the community college level using the DELES.

Setting

The setting for this research project is a community technical college in the southeastern United States. The college is part of an extensive state network of community technical colleges that encompasses 17 total colleges within the system. The college used in the research project has six campuses and a five-county service region. The current enrollment at the institution is

6900 students. The average age of a student is 24 years old. The distribution of gender is 68% female and 32%, male. The institution is formed from two previous institutions that merged over eight years ago. The communities that the institution serves have a population of roughly 350,000 individuals.

The college has two-year associate degrees and certificate and diploma programs in industry-related fields. Most of the students participating in this study are pre-medical program students. The college has many medical programs like nursing, occupational therapy assistant, neuromuscular therapy, radiologic technologist, paramedic, and many others. A predominant number of these students are pre-nursing. At last check, the nursing program has over 950 students desiring to enter a nursing program on three of the six campuses. The anatomy & physiology traditional courses are taught on three of the six campuses within the institution. The corresponding labs for the distance education courses are taught on the same three campuses.

Participants

In this study, student selection is accomplished in a manner described as convenience sampling (Gall et al., 2007). The researcher had no control over who signed up to take the courses and was the primary subject of the study. The researcher will, however, manually place students into respective groups. There are two primary groups of students for this project. One group comprises students enrolled in a traditional, face-to-face BIOL 2113 (anatomy & physiology I) or BIOL 2114 (anatomy & physiology II) course. The other group comprises students enrolled in distance education/online BIOL 2113 or BIOL 2114 courses. Every student enrolled that meets the qualifications of having taken at least one distance education course, and one traditional course has an opportunity to participate in the study because it is on a volunteer

basis. No dual enrollment students will participate in the study as this study is focused on

community college students.

A rough estimation is that each group will have a sample size of approximately 45

students for a total of 90 students. The researcher will only try to equalize the groups if there are

an inordinate number of volunteers for a particular group. A group of this number will be a good

representation of larger samples, according to Gall et al. (2007). The researcher estimates that the

lowest number in each group would still be at least 30.

Instrumentation

The Distance Education Learning Environments Survey (DELES) for this research project

is used to attain data regarding student perceptions of learning environments. The DELES

developed by Walker (2003) has been used as a research instrument in over 25 studies. Dr.

Walker has given the researcher permission to use the instrument in conducting research for this

project. The DELES has been used in previous studies to measure student perceptions in courses

other than distance courses. Biggs (2006) and Ferrer-Cascales et al. (2011) have used the DELES

to measure student perceptions in that were not solely distance education courses.

The DELES is an electronically delivered survey with 34 questions on six scales. The six scales

in the DELES are instructor support, student interaction and collaboration, personal relevance,

authentic learning, active learning, and student autonomy. An additional eight-item scale of

student effect, designated the enjoyment scale, was included in the original DELES. The 42

DELES items have response value options of never, seldom, sometimes, often, and always.

Selecting an instrument with good validity and reliability is of the utmost importance to

researchers. The alpha reliability of the six scales ranges from 0.75 to 0.94 (Walker, 2005).

According to Gall et al. (2007), all of these values are considered acceptable and sound. The

DELES being used in several other studies helps to give it more credence as a vital instrument in research.

DELES is digitally administered via email. Student answers are recorded in a database provided by Walker (2005), and the researcher will have access to all the answers from each group in the study. Students will receive the DELES through their student email accounts after agreeing to participate in the study. Students will have four weeks to respond to the survey. No assent forms will be needed because all participants are 18 or older. If any students are under the age of 18, they will be excluded from the study. The organization has a small number of dual enrollment students, but only a few are enrolled in anatomy & physiology I and II courses as they are advanced.

<div align="center">**Procedure**</div>

The first procedure that must be completed to accomplish a research project is to apply for Institutional Review Board (IRB) approval. The steps needed to accomplish this task are to complete online certification for researchers, complete the research project application, prepare informed consent forms, submit proposal forms and make any adjustments deemed necessary from the IRB.

The second step is to gain permission from the college to conduct research on campus. This is accomplished by gaining permission from the college president and the vice president of academic affairs. Both individuals are already aware of the researcher's progress in studies, and both know the researcher plans on using the institution to complete research. Both have agreed to allow the researcher to use the institution as the site for research.

The next step would be to inform students of the study. The researcher will approach students in either BIOL 2113 or BIOL 2114 via email and in person (if possible, to meet before

their BIOL course or lab). Since no students taught directly by the instructor will be used in the research, the researcher will visit the other campuses where the BIOL courses are taught. The researcher has already discussed it with their direct superior, and permission has been granted. Once students have been met with and agreed to volunteer for the study, they will be given consent forms to sign. The researcher will retain these forms.

The formal study associated with this project is scheduled to be conducted during the fall 2018 semester. The DELES will be emailed to students in their student email accounts in week 8 of the term (midterm) and will be returned to the researcher by week 12. All reporting data will be housed in a database run by the DELES creator. The researcher pays a fee to the DELES creator (Walker, 2005) for this service. Only the researcher and anyone granted permission by the researcher would have access to this database. This will give the researcher time to complete the research needed to defend the dissertation at the end of 2018/beginning of 2019.

Finally, the researcher will be able to complete all data analyses affiliated with causal-comparative research. Once research and data analyses have been completed, the researcher will complete the findings section of the dissertation. Future recommendations for research will be made, and the researcher will be ready to submit the dissertation for approval to defend. The researcher will use the results from the study at the institutional level to help make decisions about the ratio of traditional and distance education BIOL courses moving forward will also use this information.

Data Analysis

The first step of data analysis will be calculating the descriptive statistics for the groups over the 34 questions of the DELES. Since each scale within the DELES pertains to student

perceptions, researchers consider this action acceptable (Gall et al., 2007). This process will display the mean and standard deviation for each group/scale within the DELES.

The second step in data analysis is assumption testing. Assumption testing is critical in research. Assumption testing provides validity to research and works to associate the research population with the general population. Gall et al. (2007) recommends using the following assumption tests for all *t-Test*. A Box and Whisker plot will be used for each group to examine the potential for extreme outliers. Assumption of normality will be tested using the Shapiro-Wilks test. The assumption of equal variance will be conducted using Levene's test.

The third step in data analysis is to input all scores from the questionnaire into a multivariate analysis of variance (MANOVA). The MANOVA will measure for a statistical significance between the scales within the DELES concerning perceptions of learning environments (Gall et al., 2007).

Once all data has been collected, analyzed, and tabulated using the above steps in SPSS, the researcher can draw their conclusions on the research to assess if a statistical difference exists between the two groups. Future research models could focus on including hybrid courses or even satellite campus courses where interaction is live via video streaming. The researcher intends to continue conducting similar research to build better courses to increase student learning outcomes.

CHAPTER FOUR: FINDINGS

Overview

This chapter aims to orient and describe to the reader the data and statistics of this dissertation project. Topics discussed in this chapter include a variety of descriptive statistics and data analysis methods used to test the hypothesis.

Research Question

RQ1: Is there a statistically significant difference in student perceptions of learning environments in distance education anatomy & physiology courses compared to student perceptions of learning environments in traditional anatomy & physiology courses at the community college level using the DELES?

Research Null Hypothesis

Ho1 – No statistically significant difference will exist in student perceptions of instructor support in traditional anatomy & physiology courses compared to student perceptions of instructor support in distance education anatomy & physiology courses at the community college level using the DELES.

Ho2 - No statistically significant difference will exist in student perceptions of student interaction & collaboration in distance education anatomy & physiology courses compared to student perceptions of student interaction & collaboration in traditional anatomy & physiology courses at the community college level using the DELES.

Ho3 - No statistically significant difference will exist in student perceptions of personal relevance in distance education anatomy & physiology courses compared to student perceptions of personal relevance in traditional anatomy & physiology courses at the community college level using the DELES.

Ho4 - No statistically significant difference will exist in student perceptions of authentic learning in distance education anatomy & physiology courses compared to student perceptions of authentic learning in traditional anatomy & physiology courses at the community college level using the DELES.

Ho5 – No statistically significant difference will exist in student perceptions of active learning in distance education anatomy & physiology courses compared to student perceptions of active learning in traditional anatomy & physiology courses at the community college level using the DELES.

Ho6 - No statistically significant difference will exist in student perceptions of student autonomy in distance education anatomy & physiology courses compared to student perceptions of student autonomy in traditional anatomy & physiology courses at the community college level using the DELES.

Descriptive Statistics

This section will focus on using descriptive statistics to help establish an accurate description of student perceptions of online learning environments in anatomy & physiology courses at a community college setting compared to traditional in-person anatomy & physiology courses focusing on the six scales found in the Distance Education Learning Environments

Survey (DELES). The DELES comprises six scales that assess student perceptions of learning environments. Those scales are Instructor support, collaboration, personal relevance, authentic learning, active learning, and student autonomy. The mean for these six scales will be derived by converting the DELES selections of never, seldom, sometimes, often, and always into a numerical scale. The numerical scale for conversion is as follows: Never = 1, seldom = 2, sometimes = 3, often = 4 and always = 5. By converting these DELES answers into the numerical scale above, the mean can be derived for each scale for the DELES, and comparisons can be made for distance education students and traditional students.

Results

The gathered data results will include 69 responses from traditional and distance education students. Of the 69 responses, 31 were from traditional students, and 38 were from distance education students. In other responses, students failed to complete all the questions in the DELES, so their responses were voided for this research. Table 1 shows the descriptive statistics for the study.

Table 1

Means and Standard Deviation by Student Type, DELES Scales, and total for each group.

Descriptive Statistics

	Student_Type	Mean	Std. Deviation	N
InstrSupp	Traditional	3.8105	.86835	31
	Distance	4.0888	.57239	38
	Total	3.9638	.72827	69
Collab	Traditional	3.8172	.82592	31
	Distance	4.1491	.68641	38
	Total	4.0000	.76483	69
PersRel	Traditional	3.8333	.82888	31
	Distance	4.1842	.54358	38
	Total	4.0266	.70341	69
AuthLearn	Traditional	3.6194	.79558	31
	Distance	4.0789	.58548	38
	Total	3.8725	.72027	69
ActLearn	Traditional	3.8817	.92516	31
	Distance	4.1228	.63161	38
	Total	4.0145	.78055	69
StudAut	Traditional	3.6000	.89144	31
	Distance	4.1053	.59500	38
	Total	3.8783	.77930	69

Analysis

The first step in data analysis was to examine for outliers in the data. Gall et al. (2007) recommends using a Whisker & Box Plot to examine outliers. Using the Whisker & Box Plots to examine extreme outliers is essential. An extreme outlier is any data that is more than three times the interquartile range below the first quartile or above the third quartile Gall, Gall, and Borg (2007). Extreme outliers are identified by star (*) markings in SPSS, while standard outliers are identified by a circle (o) (only 1.5 times the interquartile range below the first quartile or above the third quartile).
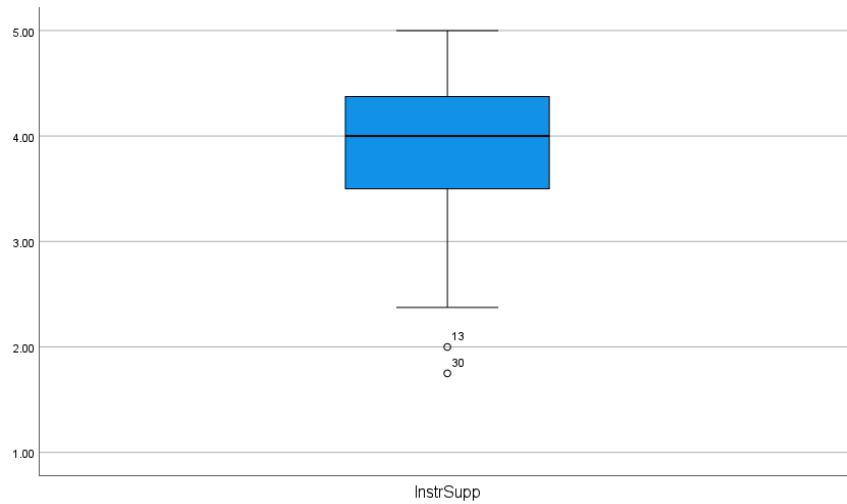
Table 2

Box and Whisker Plot for Instructor Support Scale in DELES

Table 2 illustrates two outliers for the scale of instructor support in DELES data. Students 13 & 30. Both students are traditional students. No students were identified as outliers in the distance education group. Neither outlier is considered extreme.
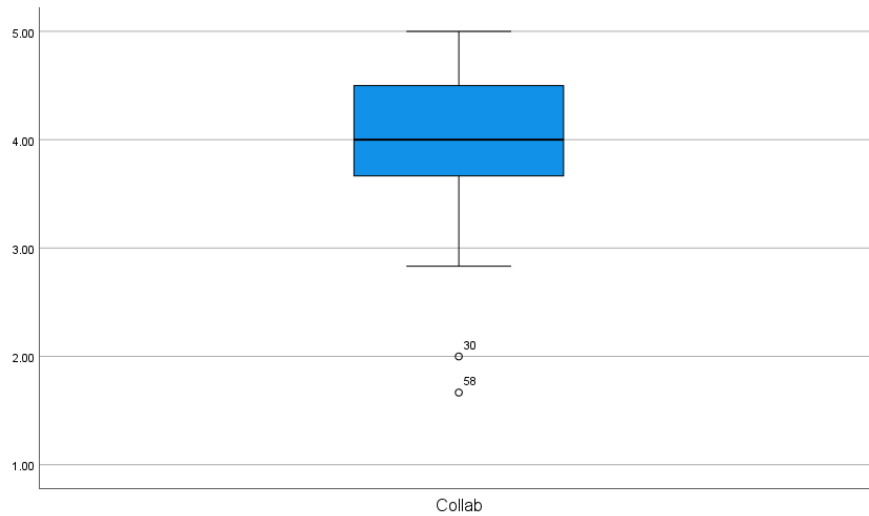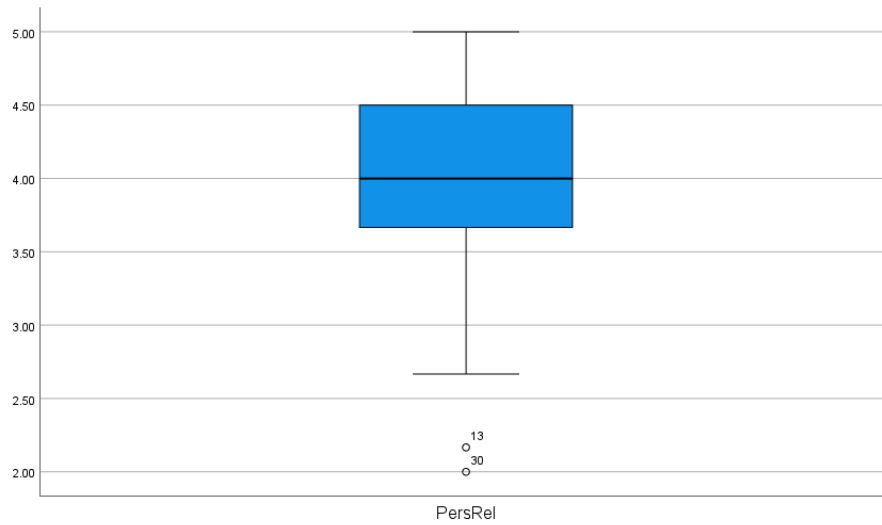
Table 3

Box and Whisker Plot for Collaboration Scale in DELES

Table 3 illustrates two outliers for the scale of collaboration in DELES data. Students 30

& 58. Student 30 is a traditional student, and student 58 is a distance education student. Neither

outlier is considered extreme.

Table 4

Box and Whisker Plot for Personal Relevance Scale in DELES

Table 4 illustrates two outliers for the scale of instructor support in DELES data. Students

13 & 30. Both students are traditional students. No students were identified as outliers in the

distance education group. Neither outlier is considered extreme.
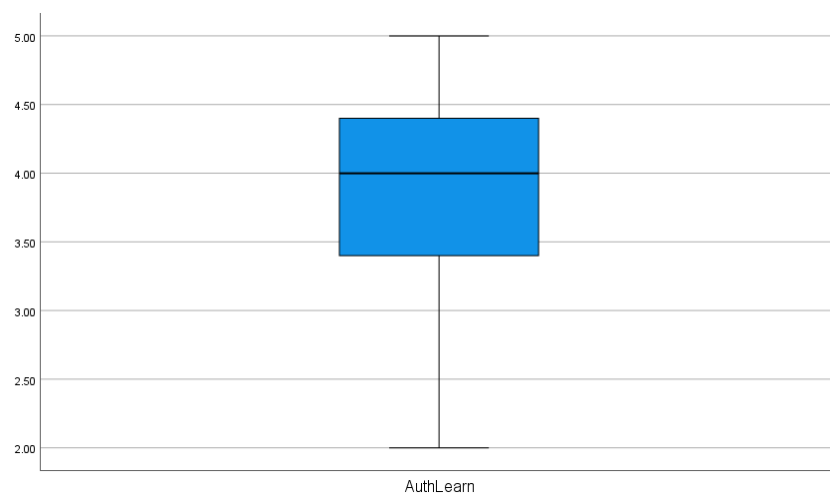
Table 5

Box and Whisker Plot for Authentic Learning Scale in DELES

Table 5 illustrates that no outliers exist in the scale of authentic learning in the DELES data.
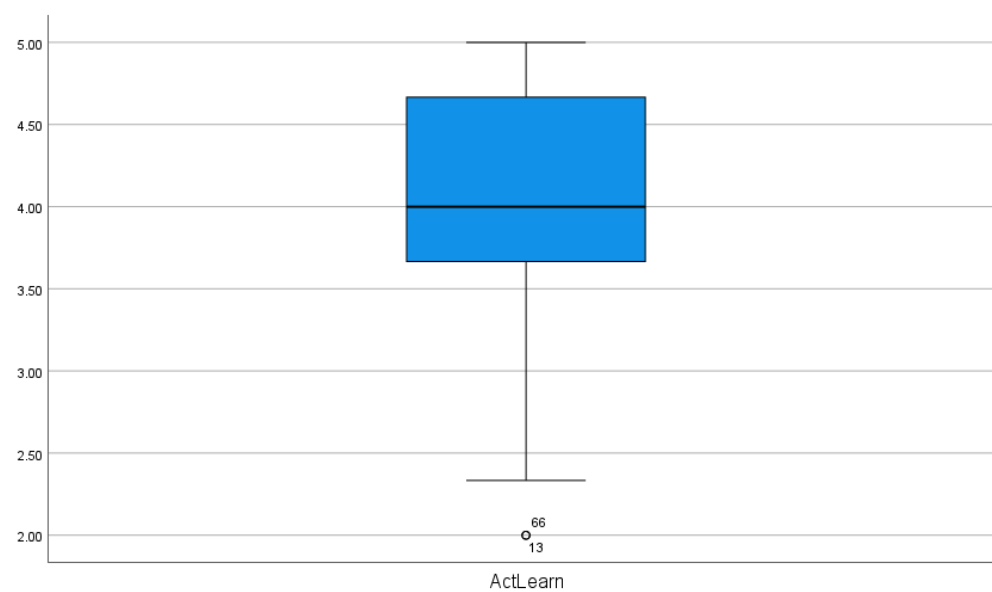
Table 6

Box and Whisker Plot for Active Learning Scale in DELES

Table 6 illustrates two outliers for the scale of active learning in DELES data. Students 13 & 66. Student 13 is a traditional student, and student 66 is a distance education student. Neither outlier is considered extreme.

Table 7

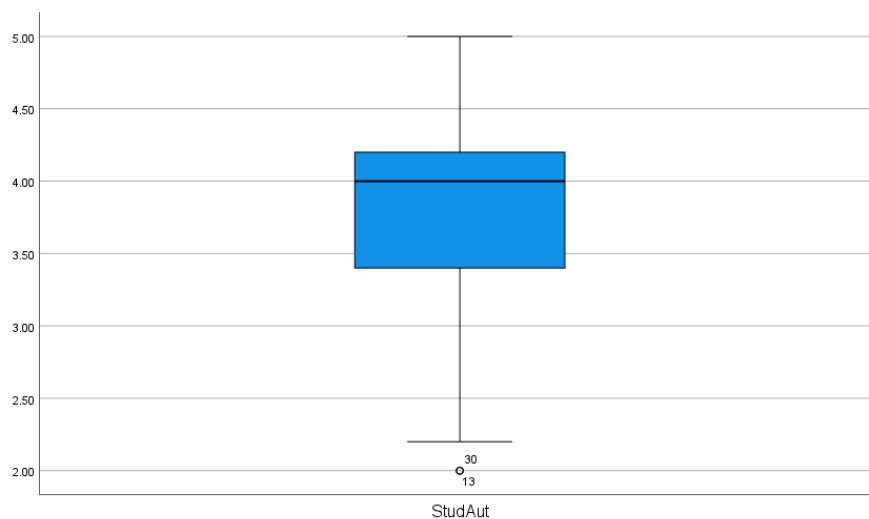*Box and Whisker Plot for Student Autonomy Scale in DELES*

Table 7 illustrates two outliers for the scale of student autonomy in DELES data. Students 13 & 30. Both students are traditional students. No students were identified as outliers in the distance education group. Neither outlier is considered extreme.

Gall et al. (2007) recommends using a Shapiro-Wilk test to examine the assumption of normality. This test shows the likelihood that the data collected represents the standard or normal population. A significance factor of 0.05 or above shows that data is likely to be derived from a normal population. Below 0.05 significance means the data is not likely to be derived from a normal population.

Table 8

Shapiro-Wilk Test of Normality of DELES data

Tests of Normality

	Student_Type	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
InstrSupp	Traditional	.110	31	.200*	.939	31	.077
	Distance	.123	38	.160	.936	38	.031
Collab	Traditional	.129	31	.200*	.938	31	.072
	Distance	.191	38	.001	.875	38	<.001
PersRel	Traditional	.128	31	.200*	.950	31	.154
	Distance	.212	38	<.001	.891	38	.001
AuthLearn	Traditional	.157	31	.050	.931	31	.046
	Distance	.133	38	.090	.943	38	.053
ActLearn	Traditional	.152	31	.065	.909	31	.012
	Distance	.265	38	<.001	.847	38	<.001
StudAut	Traditional	.105	31	.200*	.950	31	.152
	Distance	.219	38	<.001	.908	38	.004

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 8 shows that many DELES data groups are not normally distributed (Sig. <0.05). The distance education group in the instructor support scale (Sig. 0031) is not considered normally distributed. The distance education group in the collaboration scale (Sig. <0.001) is not considered normally distributed. The distance education group in the personal relevance scale (Sig. 0.001) is not considered normally distributed. The traditional group in the authentic learning scale (Sig. 0.046) is not considered normally distributed. The traditional group in the active learning scale (Sig. 0.012) is not considered normally distributed. The distance education group in the active learning scale (Sig. <0.001) is not considered a normally distributed group. The distance education group in the student autonomy scale (Sig. 0.004) is not considered a normally distributed group. In all, 7 out of 12 groups are considered not normally distributed. Removing the outliers from this data resulted in even more groups becoming not normally

distributed. Gress et al. (2018) stated that removing outliers in research is only sometimes

merited and often can result in magnified effects on the study.

Gall et al. (2007) recommends using Levene's test to examine the assumption of variance. This

test is used to assess the equality of variances.

Table 9

Levene's Test of Homogeneity of Variance

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
InstrSupp	Based on Mean	4.575	1	67	.036
	Based on Median	4.170	1	67	.045
	Based on Median and with adjusted df	4.170	1	58.954	.046
	Based on trimmed mean	4.173	1	67	.045
Collab	Based on Mean	3.222	1	67	.077
	Based on Median	3.192	1	67	.079
	Based on Median and with adjusted df	3.192	1	65.746	.079
	Based on trimmed mean	3.057	1	67	.085
PersRel	Based on Mean	6.393	1	67	.014
	Based on Median	5.369	1	67	.024
	Based on Median and with adjusted df	5.369	1	63.749	.024
	Based on trimmed mean	5.858	1	67	.018
AuthLearn	Based on Mean	2.987	1	67	.089
	Based on Median	2.011	1	67	.161
	Based on Median and with adjusted df	2.011	1	59.009	.161
	Based on trimmed mean	3.021	1	67	.087
ActLearn	Based on Mean	9.443	1	67	.003
	Based on Median	8.621	1	67	.005
	Based on Median and with adjusted df	8.621	1	66.890	.005
	Based on trimmed mean	8.445	1	67	.005
StudAut	Based on Mean	8.216	1	67	.006
	Based on Median	7.382	1	67	.008
	Based on Median and with adjusted df	7.382	1	64.417	.008
	Based on trimmed mean	8.132	1	67	.006

Table 9 shows that instructor support, personal relevance, active learning, and student autonomy do not show normal variance (Sig. <0.05). The other two scales appear to have normal variance (Sig. >0.05), so the homogeneity assumption of variance is met in these scales (Collaboration & Authentic Learning).

The last statistical analysis to be performed is the multivariate analysis of variance (MANOVA). A MANOVA is used to determine if differences exist between independent variables using more than one continuous dependent variable. In this research, the independent variables are the two types of students: traditional or distance education. The dependent variables are all six scales within the DELES.

Table 10

Multiple Analysis of Variance (Test of Between-Subject Effects)

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	InstrSupp	1.323[a]	1	1.323	2.551	.115	.037
	Collab	1.881[b]	1	1.881	3.325	.073	.047
	PersRel	2.102[c]	1	2.102	4.464	.038	.062
	AuthLearn	3.606[d]	1	3.606	7.629	.007	.102
	ActLearn	.992[e]	1	.992	1.644	.204	.024
	StudAut	4.358[f]	1	4.358	7.905	.006	.106
Intercept	InstrSupp	1065.304	1	1065.304	2054.375	<.001	.968
	Collab	1083.459	1	1083.459	1915.506	<.001	.966
	PersRel	1097.435	1	1097.435	2330.982	<.001	.972
	AuthLearn	1011.780	1	1011.780	2140.384	<.001	.970
	ActLearn	1093.875	1	1093.875	1812.410	<.001	.964
	StudAut	1013.611	1	1013.611	1838.491	<.001	.965
Student_Type	InstrSupp	1.323	1	1.323	2.551	.115	.037
	Collab	1.881	1	1.881	3.325	.073	.047
	PersRel	2.102	1	2.102	4.464	.038	.062
	AuthLearn	3.606	1	3.606	7.629	.007	.102
	ActLearn	.992	1	.992	1.644	.204	.024
	StudAut	4.358	1	4.358	7.905	.006	.106
Error	InstrSupp	34.743	67	.519			
	Collab	37.897	67	.566			
	PersRel	31.544	67	.471			
	AuthLearn	31.672	67	.473			
	ActLearn	40.438	67	.604			
	StudAut	36.939	67	.551			
Total	InstrSupp	1120.156	69				
	Collab	1143.778	69				
	PersRel	1152.361	69				
	AuthLearn	1070.000	69				
	ActLearn	1153.444	69				
	StudAut	1079.120	69				
Corrected Total	InstrSupp	36.066	68				
	Collab	39.778	68				
	PersRel	33.646	68				
	AuthLearn	35.278	68				
	ActLearn	41.430	68				
	StudAut	41.297	68				

a. R Squared = .037 (Adjusted R Squared = .022)
b. R Squared = .047 (Adjusted R Squared = .033)
c. R Squared = .062 (Adjusted R Squared = .048)
d. R Squared = .102 (Adjusted R Squared = .089)
e. R Squared = .024 (Adjusted R Squared = .009)
f. R Squared = .106 (Adjusted R Squared = .092)

Table 10 shows there are significant differences between some of the scales in the DELES data. Using this data and examining the significance of the scales using the student type (traditional or distance education) will answer the research's null hypotheses.

Ho1: There is no statistical significance in instructor support between traditional and distance education students (Sig. 0.115). Therefore, the researcher failed to reject the null hypothesis. The null hypothesis, in this instance, is accepted.

Ho2: There is no statistical significance in collaboration between traditional and distance education students (Sig. 0.073). Therefore, the researcher failed to reject the null hypothesis. The null hypothesis, in this instance, is accepted.

Ho3: There is a statistical significance in personal relevance between traditional and distance education students (Sig. 0.038). Therefore, the null hypothesis in this instance is rejected.

Ho4: There is a statistical significance in authentic learning between traditional and distance education students (Sig. 0.007). Therefore, the null hypothesis in this instance is rejected.

Ho5: There is no statistical significance in active learning between traditional and distance education students (Sig. 0.204). Therefore, the researcher failed to reject the null hypothesis. The null hypothesis, in this instance, is accepted.

Ho6: There is a statistical significance in student autonomy between traditional and distance education students (Sig. 0.006). Therefore, the null hypothesis in this instance is rejected.

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this chapter is to discuss the conclusions of this project. It will begin with a discussion of the results found in chapter four and how they compare with previous studies from the supporting literature review. Implications from this study will be discussed next in this chapter, and how the findings will be used to help further knowledge of the subject. Limitations will be discussed next. There are limitations in every study, and this study is no different. Geographical limitations and an ever-changing educational system that relies more heavily on distance learning courses will be discussed. Finally, the chapter will end with a discussion of recommendations for future research.

Discussion

Online delivery of courses has dramatically increased over the past decade in higher education. When this research project began, the world in general and higher education were still operating in pre-covid conditions. Since the beginning of the project, there has been a global pandemic that has impacted how many students go to school. Many higher education institutions were forced to move many, if not all, of their courses to online courses during the Spring 2020 term. Higher education institutions were not alone during this time, as many elementary and secondary schools were forced to make similar moves to try and limit transmission levels. Robson and Mills (2022) stated that many higher education schools must prepare to move to an online delivery format in the Spring of 2020.

Even before the global pandemic, online delivery methods for anatomy & physiology courses had become essential due to many factors. The purpose of this study was two-fold. The first purpose of the study was to determine what type of course, students perceived to create a more suitable learning environment for the content-heavy anatomy & physiology courses. The second purpose was to help make decisions for course offerings in future semesters. The pandemic has dramatically affected the latter as most of the courses offered at the institution used for this project have been primarily online since the Spring semester of 2020. As local and federal regulations regarding covid safety and social distancing are starting to return to pre-covid standards, there is a push within higher education institutions to bring back more traditional courses. Does the question then shift to whether students who have primarily taken online courses for the past two-plus years want to return to traditional, in-person classes or prefer online courses now?

This study was designed to understand better and expand knowledge of student perceptions of the different learning environments for anatomy & physiology courses at the two-year higher education level. The research design was a quantitative study to compare student perceptions of learning environments for traditional and online anatomy & physiology courses at the two-year higher education level. Students enrolled in traditional and distance education BIOL 2113 (anatomy & physiology I), and BIOL 2114 (anatomy & physiology II) were contacted by one instructor at the institution in the Fall term of 2018. Students who volunteered were emailed the DELES (Distance Education Learning Environment Survey), and their responses were recorded using the survey site Survey Monkey. Abel et al. (2005) stated that Survey Monkey is an acceptable way to collect data for higher education research. Two instructors were responsible for instruction in the traditional and distance education courses in which students were emailed

the survey. Both instructors taught at least one section of distance and traditional BIOL 2113 &

BIOL 2114.

All student responses were recorded and sorted using SPSS technology. Since the

DELES can be broken down into six scales focusing on different aspects of student perceptions

of learning environments, the mean for each scale was calculated for each group of students

(traditional and distance). A one-way multivariate analysis of variance (one-way MANOVA)

was used to analyze for a potential difference in the dependent variable, student perceptions, due

to delivery method (traditional and distance) and the potential interaction between the two

dependent variables (Null Hypothesis Questions 1-6).

Hypotheses testing resulted in varied results as well. There were no significant

differences found in the scales of instructor support, collaboration, and active learning between

traditional and distance education students according to MANOVA testing. There were

significant differences in the scales of personal relevance, authentic learning, and student

autonomy between traditional and distance education students according to MANOVA testing.

In all three instances, student perceptions of learning environments were higher for distance

education students than traditional students.

The results of this study contradict the results found in many previous studies. Wright

(2009) found that student perceptions were higher for traditional courses compared to distance

education courses in a dietetic internship course. Thistol and Yates (2016) conducted research

that showed students felt disconnected in distance education courses compared to traditional

courses. Rivera (2016) found that student perceptions of distance education were lower in many

critical course areas. Tanner et al. (2009) found that students felt isolated and disconnected in

distance education courses. Frimming and Bordelon (2016) found similar results with students feeling disconnected in distance education compared to traditional courses. Carver and Kosloski (2015) found that students felt more connected and socially active in traditional courses. Jones and Blankenship (2017) found similar results where distance education students felt disconnected within the courses compared to traditional students. Slapak-Barski and Edmonds (2017) discovered similar results where students in distance education courses felt more isolated and disconnected compared to their traditional student counterparts.

Dobbs et al. (2017) found that students' perceptions of distance education courses were lower than traditional ones, especially if they had taken very few courses. Libby et al. (2017) conducted a study throughout a dental hygiene program of study within the same cohort. Student perceptions of distance education were lower than traditional courses, but those perceptions improved as more distance education courses were taken within the program. Elias et al. (2017) found similar results in engineering courses where students' perceptions of distance education were lower than that of traditional education. However, their perceptions of distance education improved as they completed more courses. Fish and Snograss (2015) found similar results as well. In their study, student perceptions of distance education were lower, but the perceptions improved as more distance education courses were taken. Litterio (2018) found that student perceptions of distance education improved over time as more courses were taken within the same student population. Scherrer et al. (2010) found that student perceptions of distance education were impacted by their experience taking those types of courses. Students who had taken distance education courses previously had much higher perceptions of the learning environment than those with no experience.

Not all studies show that previous student experiences with distance education impacted their perceptions of learning environments. House et al. (2007) found that students had a lower perception of distance education courses than traditional ones. Students' experience levels with distance education did not affect overall perceptions in this study.

There are previous studies that support the findings of this research. Smart and Cappel (2006) found similar results that showed students in a distance education course had higher perceptions of those courses than traditional courses programs of study. Sad et al. (2014) found that students had a higher perception of learning environments within distance education courses than traditional courses, especially in learning-teaching and lifelong learning opportunities. Vernadakis et al. (2012) found that student perceptions were higher in hybrid courses than in traditional ones. While this does not directly support the current research findings, it shows students' preference for some online content delivery compared to traditional content delivery only.

Implications

Implications for the current research are multiple. Results show that student perceptions between traditional and distance education in anatomy & physiology courses at the community college level are varied. With no significant differences in instructor support, collaboration, and active learning, the implication is that available resources and instructor involvement in courses strongly influence student perceptions. Soliman et al. (2022) found that student perceptions of higher education were greatly influenced by the resources available in the course and instructor involvement before and after COVID. A possible outcome of this research is to ensure that both traditional and distance education courses have the same number of resources available and

instructor involvement. Creating collaborative environments in distance education has been a focal point for many years (Litterio, 2018).

There was a significant difference in student perceptions of personal relevance, authentic learning, and student autonomy. Fotiadou et al. (2017) stated that student autonomy is an essential factor in the learning process in both traditional and distance education. Wilson and Allen (2011) stated that student relevance within a course was a driving factor behind student achievement.

Relating the study's results to the current situation at the higher education facility where the research was conducted would result in more emphasis on creating equal courses in terms of content and instructor activity for both traditional and distance education courses. Also, creating more collaborative environments in traditional and distance education courses should be an emphasis moving forward. Creating these environments would be a significant step in building more effective anatomy & physiology courses for the ever-changing climate in higher education.

Results were varied for the data and research. The sample set of 69 students (31 traditional and 38 distance education) is not normally distributed according to the Shapiro-Wilk test. Levene's test revealed that several scales in the DELES data defied the homogeneity of variance. Removing the outliers (4 students) resulted in similar data for the Shapiro-Wilk and Levene's tests, so it was left in the data for hypotheses testing.

While there was no significant difference in some of the scales in DELES data according to the MANOVA, there was a significant difference in the scales of personal relevance, authentic learning, and student autonomy. In all three instances, the mean data shows that distance

education students had a higher perception of learning environments than traditional students. This contradicts the findings from Wright (2009) that showed students had a higher perception of traditional distance education courses. What factors influence the preference for distance education in anatomy & physiology courses compared to traditional courses?

Limitations

The limitations of this research project have grown since its beginning. The obvious limitation is the lower number of responses (69 total) compared with all students enrolled in BIOL 2113 & 2114 courses at the time of the survey (over 250). Another limitation is using this sample to project student perceptions for all community college-level students taking anatomy & physiology courses.

An unlikely but real limitation of this research is the emergence of COVID and how the pandemic has changed the landscape of higher education across America. Students answered the survey questions before they spent most of the previous two-plus years taking primarily distance education courses at the institution used to conduct research. Soliman et al. (2022) stated that student perceptions of online education changed dramatically after the COVID pandemic.

Gress et al. (2018) stated that outliers in data occur and often need to be left in the data sets. Removing the outliers did not result in significant differences in the not normally distributed data scales in the DELES. Examining the data sets shows that 7 of 12 groups (6 scales for each traditional & distance education student) are not normally distributed. Out of the traditional student groups, only authentic learning and active learning are not considered normally distributed. Both have a significance of <0.05. In the distance education student groups,

there are five groups considered not normally distributed: Instructor support, collaboration, personal relevance, active learning, and student autonomy. All five have a significance of <0.05.

Another limitation of this study is the four groups within the DELES data that do not show normal variance. Four DELES scales do not show normal variance: instructor support, personal relevance, active learning, and student autonomy. Only collaboration and authentic learning scales show normal variance within the data sets.

Recommendations for Future Research

Recommendations for future research would be too varied and diverse. Below are the researchers' recommendations for future research:

· Conduct another study using current students at the same institution post-COVID to get their updated perceptions of traditional and distance BIOL 2113 & BIOL 2114 courses.

· Conduct the same study at another community college institution in a different region of the country to determine if the results are similar or different based on location.

· Conduct the same study in different courses at the same college to assess if student perceptions change when the subject matter changes.

· Conduct the same study using a different instrument to assess if the questions in the DELES could have driven student perceptions.

· Conduct the same study but use gender and age groups as additional variables to assess student perceptions.

.Conduct a study using the number of distance education courses previously taken as a variable to compare student perceptions of learning environments.

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APPENDIX

Table 1

Means and Standard Deviation by Student Type, DELES Scales and total for each group.

Descriptive Statistics

	Student_Type	Mean	Std. Deviation	N
InstrSupp	Traditional	3.8105	.86835	31
	Distance	4.0888	.57239	38
	Total	3.9638	.72827	69
Collab	Traditional	3.8172	.82592	31
	Distance	4.1491	.68641	38
	Total	4.0000	.76483	69
PersRel	Traditional	3.8333	.82888	31
	Distance	4.1842	.54358	38
	Total	4.0266	.70341	69
AuthLearn	Traditional	3.6194	.79558	31
	Distance	4.0789	.58548	38
	Total	3.8725	.72027	69
ActLearn	Traditional	3.8817	.92516	31
	Distance	4.1228	.63161	38
	Total	4.0145	.78055	69
StudAut	Traditional	3.6000	.89144	31
	Distance	4.1053	.59500	38
	Total	3.8783	.77930	69

Table 2

Box and Whisker Plot for Instructor Support Scale in DELES
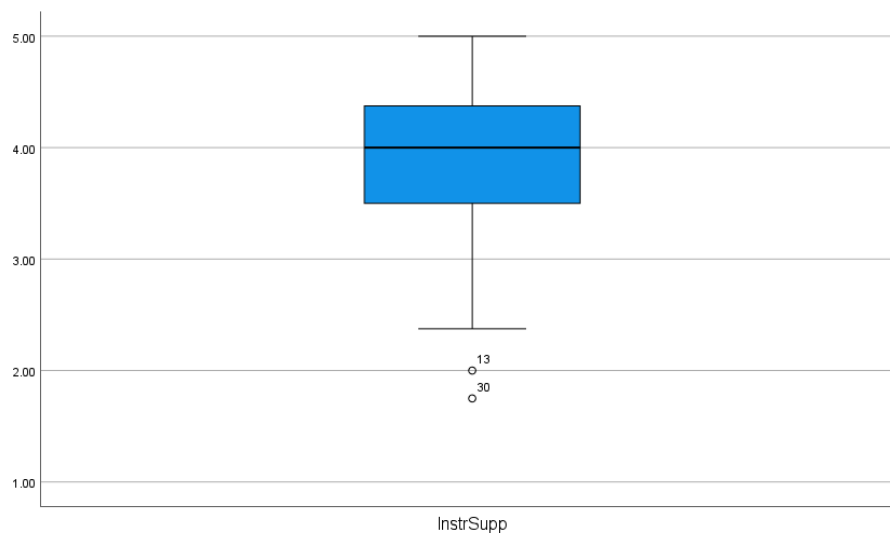
Table 3

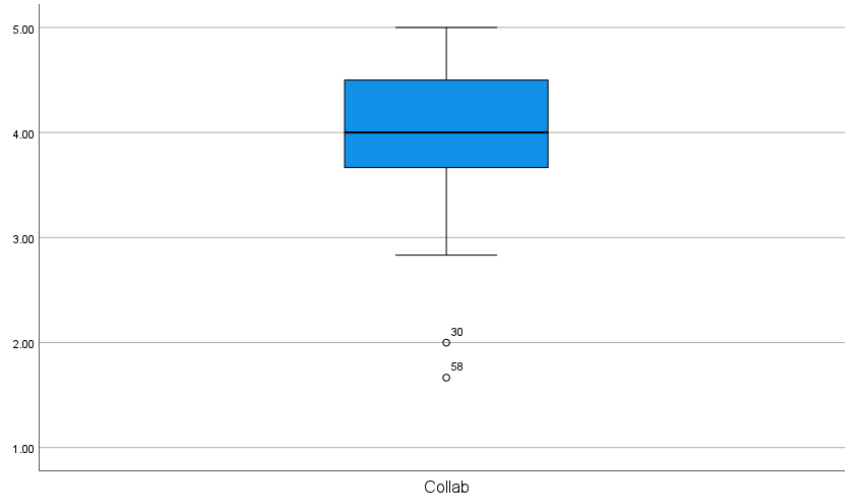*Box and Whisker Plot for Collaboration Scale in DELES*

Table 4

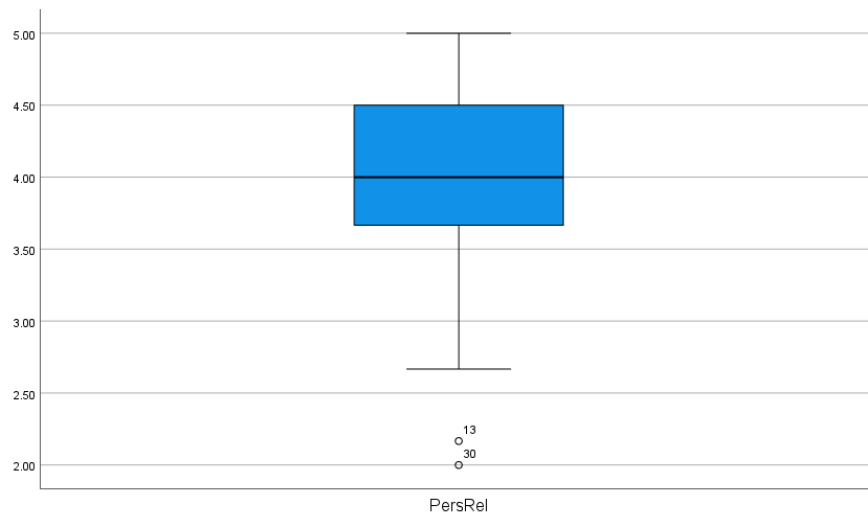*Box and Whisker Plot for Personal Relevance Scale in DELES*

Table 5

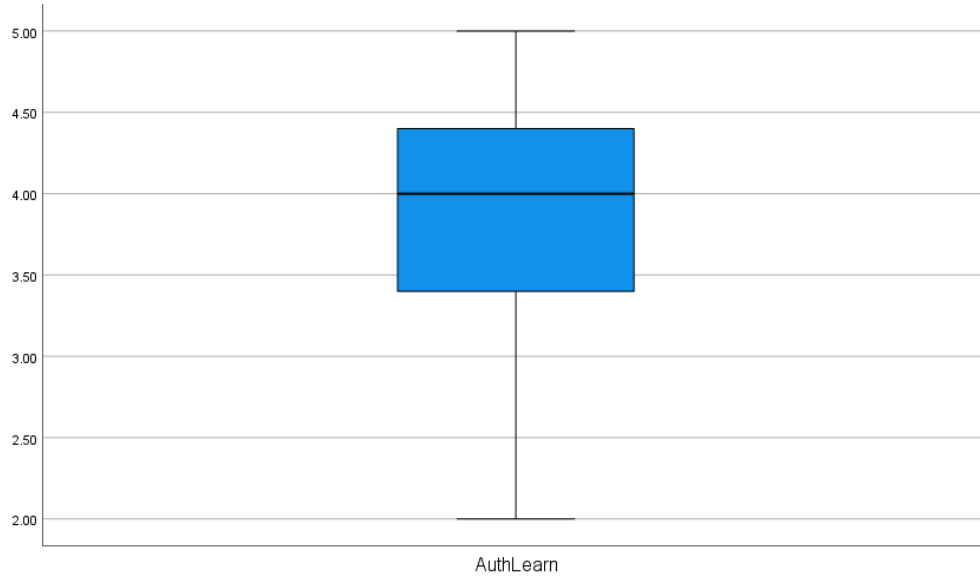*Box and Whisker Plot for Authentic Learning Scale in DELES*

Table 6

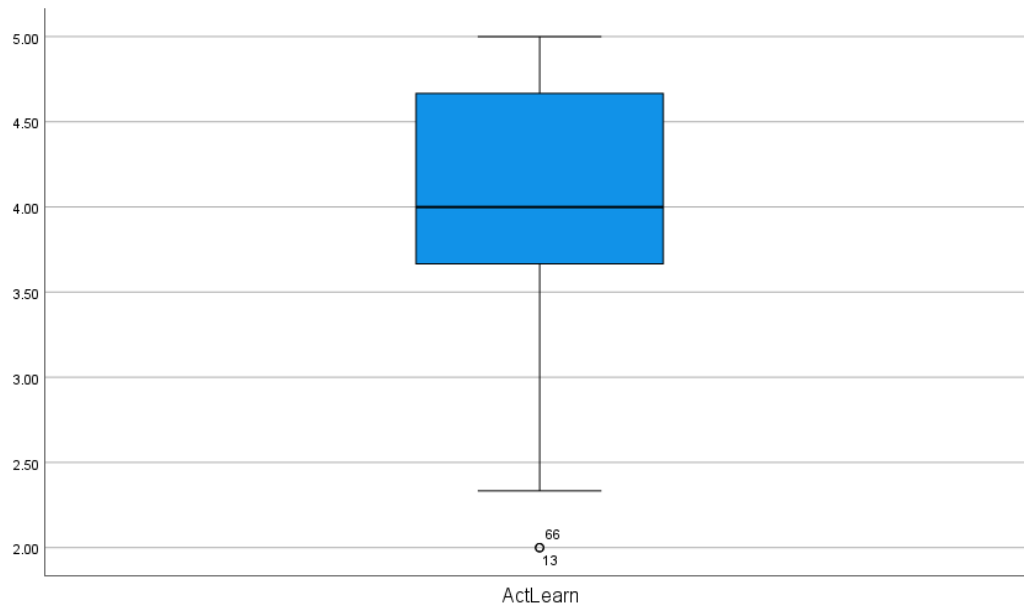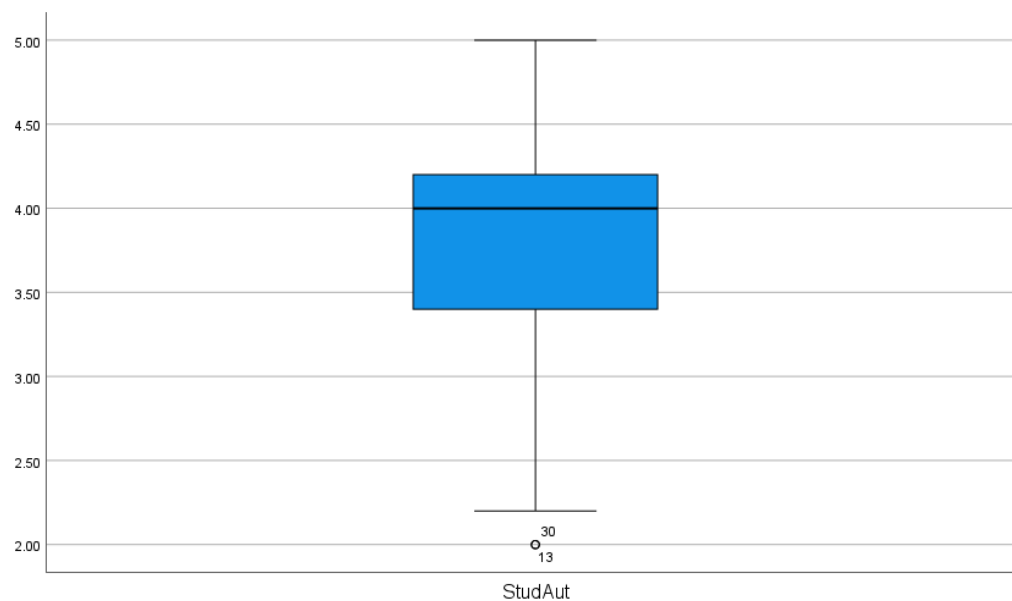*Box and Whisker Plot for Active Learning Scale in DELES*

Table 7

Box and Whisker Plot for Student Autonomy Scale in DELES

Table 8

Shapiro-Wilk Test of Normality of DELES data

Tests of Normality

	Student_Type	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
InstrSupp	Traditional	.110	31	.200*	.939	31	.077
	Distance	.123	38	.160	.936	38	.031
Collab	Traditional	.129	31	.200*	.938	31	.072
	Distance	.191	38	.001	.875	38	<.001
PersRel	Traditional	.128	31	.200*	.950	31	.154
	Distance	.212	38	<.001	.891	38	.001
AuthLearn	Traditional	.157	31	.050	.931	31	.046
	Distance	.133	38	.090	.943	38	.053
ActLearn	Traditional	.152	31	.065	.909	31	.012
	Distance	.265	38	<.001	.847	38	<.001
StudAut	Traditional	.105	31	.200*	.950	31	.152
	Distance	.219	38	<.001	.908	38	.004

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 9

Levene's Test of Homogeneity of Variance

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
InstrSupp	Based on Mean	4.575	1	67	.036
	Based on Median	4.170	1	67	.045
	Based on Median and with adjusted df	4.170	1	58.954	.046
	Based on trimmed mean	4.173	1	67	.045
Collab	Based on Mean	3.222	1	67	.077
	Based on Median	3.192	1	67	.079
	Based on Median and with adjusted df	3.192	1	65.746	.079
	Based on trimmed mean	3.057	1	67	.085
PersRel	Based on Mean	6.393	1	67	.014
	Based on Median	5.369	1	67	.024
	Based on Median and with adjusted df	5.369	1	63.749	.024
	Based on trimmed mean	5.858	1	67	.018
AuthLearn	Based on Mean	2.987	1	67	.089
	Based on Median	2.011	1	67	.161
	Based on Median and with adjusted df	2.011	1	59.009	.161
	Based on trimmed mean	3.021	1	67	.087
ActLearn	Based on Mean	9.443	1	67	.003
	Based on Median	8.621	1	67	.005
	Based on Median and with adjusted df	8.621	1	66.890	.005
	Based on trimmed mean	8.445	1	67	.005
StudAut	Based on Mean	8.216	1	67	.006
	Based on Median	7.382	1	67	.008
	Based on Median and with adjusted df	7.382	1	64.417	.008
	Based on trimmed mean	8.132	1	67	.006

Table 10

Multiple Analysis of Variance (Test of Between-Subject Effects)

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	InstrSupp	1.323[a]	1	1.323	2.551	.115	.037
	Collab	1.881[b]	1	1.881	3.325	.073	.047
	PersRel	2.102[c]	1	2.102	4.464	.038	.062
	AuthLearn	3.606[d]	1	3.606	7.629	.007	.102
	ActLearn	.992[e]	1	.992	1.644	.204	.024
	StudAut	4.358[f]	1	4.358	7.905	.006	.106
Intercept	InstrSupp	1065.304	1	1065.304	2054.375	<.001	.968
	Collab	1083.459	1	1083.459	1915.506	<.001	.966
	PersRel	1097.435	1	1097.435	2330.982	<.001	.972
	AuthLearn	1011.780	1	1011.780	2140.384	<.001	.970
	ActLearn	1093.875	1	1093.875	1812.410	<.001	.964
	StudAut	1013.611	1	1013.611	1838.491	<.001	.965
Student_Type	InstrSupp	1.323	1	1.323	2.551	.115	.037
	Collab	1.881	1	1.881	3.325	.073	.047
	PersRel	2.102	1	2.102	4.464	.038	.062
	AuthLearn	3.606	1	3.606	7.629	.007	.102
	ActLearn	.992	1	.992	1.644	.204	.024
	StudAut	4.358	1	4.358	7.905	.006	.106
Error	InstrSupp	34.743	67	.519			
	Collab	37.897	67	.566			
	PersRel	31.544	67	.471			
	AuthLearn	31.672	67	.473			
	ActLearn	40.438	67	.604			
	StudAut	36.939	67	.551			
Total	InstrSupp	1120.156	69				
	Collab	1143.778	69				
	PersRel	1152.361	69				
	AuthLearn	1070.000	69				
	ActLearn	1153.444	69				
	StudAut	1079.120	69				
Corrected Total	InstrSupp	36.066	68				
	Collab	39.778	68				
	PersRel	33.646	68				
	AuthLearn	35.278	68				
	ActLearn	41.430	68				
	StudAut	41.297	68				

a. R Squared = .037 (Adjusted R Squared = .022)

b. R Squared = .047 (Adjusted R Squared = .033)

c. R Squared = .062 (Adjusted R Squared = .048)

d. R Squared = .102 (Adjusted R Squared = .089)

e. R Squared = .024 (Adjusted R Squared = .009)

f. R Squared = .106 (Adjusted R Squared = .092)