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TECHNIQUES IN TEACHING PHYSIOLOGY**

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FACULTY AND STUDENT PERCEPTIONS OF EFFECTIVE TECHNIQUES IN
TEACHING PHYSIOLOGY

by

Benjamin T. Jeter

A Doctoral Project Submitted to,
the College of Education and Human Sciences
and the School of Education
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

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ABSTRACT

Students enrolling in Human Anatomy & Physiology (A&P) often acknowledge it as being one of the more challenging courses of their college career. Human A&P is a two-semester prerequisite for multiple healthcare-related disciplines. Jackson State Community College (JSCC) is home to multiple healthcare programs including a nursing program and allied health programs that include physical therapy assistants, occupational therapy assistants, radiologic technology, respiratory care, and medical lab technicians. Each of these programs require students to complete at least one of the A&P courses before being granted admission to the program. Therefore, the aim of the study was to determine faculty and student perceptions on effective techniques in teaching physiology to undergraduate students preparing for a healthcare-related profession.

To complete the study, faculty and students were each surveyed with a cross-sectional survey design to determine the perception of students and faculty. Lecturing is the primary form of instruction at JSCC, and based on data collected from the surveys, students and faculty feel lecturing to still be effective for teaching physiology. The researcher concluded the study by making data-driven recommendations for both students and faculty to better improve learning of physiological concepts for future A&P students at JSCC.

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I would like to acknowledge Dr. Holly Foster for her tireless efforts to meet with me throughout this educational journey. You have been nothing short of professional and I hope others that you advise in the future are aware of the efforts you put in to helping students succeed. Your willingness to work with me during conflicts with my own work schedule has been a breath of fresh air that reminds me that you genuinely want the best for you students. Thanks again for all your help throughout this experience.

DEDICATION

I dedicate this capstone project to my family that has continually supported my efforts to better myself through higher education. Thank you to my wife, Katie, for dealing with my added stress of completing a doctoral degree. I appreciate you being patient with me to allow me to fulfill this dream of mine. To my mother (Tootie), thank you for always pushing me to do more. You always said I could do this and now I am doing it. To my father, thank you for encouraging me to do what I loved and was passionate about. I remember in my last year of undergrad you told me to do something that made me happy after I told you (and Tootie) that I didn't want to pursue pharmacy school. I am thankful for your words to follow my dreams and do what I wanted to do. Finally, to my grandmother (Nanny). Thank you for washing my clothes, sheets, and feeding me when I needed it for so many years. You were always willing to listen and I hope I have made you proud.

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LIST OF COMMONLY USED ABBREVIATIONS

<i>A&P</i>	Human Anatomy & Physiology
<i>JSCC</i>	Jackson State Community College
<i>USM</i>	The University of Southern Mississippi

CHAPTER I – INTRODUCTION

Anatomy & physiology, commonly referred to as A&P, serves as a staple course among pre-requisite undergraduate courses necessary for entry into medical programs in multiple disciplines. Anatomy is regarded as the study of structure while physiology is considered the study of function. Shier et al. (2019) note that anatomy and physiology cannot be separated and need to be considered as one entity because structure determines function. This statement echoes from the molecular level of life and continues to the organismal level of life. Many undergraduate students generally grasp the anatomy content more so than the physiological content as the study of anatomy is primarily devoted to memorizing information, such as anatomical terminology, body regions, or cell types to provide some examples. However, physiological concepts are often more challenging for students to grasp. Ultimately this is because physiological processes require a comprehension of the subject matter that memorization cannot provide. Furthermore, understanding physiology is crucial to any future medical student as they will be required to complete a pathophysiology course focusing on abnormal body function and disease.

Therefore, the aim of the study is to determine perceptions of students and faculty regarding effective techniques used in teaching physiological concepts. Since the inception of higher education, teaching methodologies have evolved from traditional lectures to more active learning strategies to improve student comprehension. Anatomy & physiology is not segregated from this evolution and many studies currently show benefits and drawbacks to certain methodologies when teaching A&P.

Background

It has been noted that generally the most common method to teach A&P is through traditional lectures (Alaagib et al., 2019). It is most likely due to this being a method that allows the instructor to convey information to a large audience with little to no cost involved in delivering information. A&P is no exception regarding classes with a high volume of students. Class sizes in community colleges are generally much smaller than those of their four-year counterparts, and even some sections of A&P classes at community colleges are some of the larger classes. Colleges and universities now use learning platforms where PowerPoints, notes, or lectures can be instantly uploaded for students to obtain and use during class or after for studying purposes. However, many studies have demonstrated that the usage of traditional lectures do not actively engage students in the content and often leaves them unenthused about the content with a lack of focus during the lecture (Lattuca & Stark, 2009). This explains why many instructors have begun to shy away from traditional lectures to more active learning activities to fully engage students during class. Additionally, Lattuca and Stark (2009) note that active learning techniques prove to be successful in the classroom and that many learners note they feel they gain a better comprehension of the content. These activities are implemented in a wide variety including, but not limited to, the flipped classroom methodology, team-based learning activities, or lectures based on problems.

Comparatively, many instructors, in some capacity, still retain traditional lecturing as part of their A&P course. Whether the instructor relies on this method primarily for class alone or provides recorded or pre-recorded lectures so students may review them, lecturing still seems to be a pivotal piece to teaching A&P. Therefore, from

the perspective of faculty members, instructors may want to familiarize themselves with various learning styles. The VARK learning styles have emphasized the four categories of how students learn which include visual learners, auditory learners, kinesthetic learners, and reading/writing learners. Perhaps the need for inclusion of traditional lectures is that they may be able to reach most of these VARK learning styles. However, the consensus has not currently been reached as to which method, traditional or active learning, best reaches all learners and most data show that if A&P students were exposed to active learning, it was through approximately one activity. For example, Mikkelson (2015) provided short videos on renal (kidney) physiology for students to watch and then partake in a class activity around filtration, reabsorption, and secretion (urine formation) in the kidneys. However, it is noted that these students were exposed to this type of activity once for Mikkelson's study. Thus, if students had been exposed only to traditional lectures until the time an active learning technique was implemented, they may respond positively to the active learning method as it was an alternate teaching style that perhaps helped in teaching a difficult concept. Furthermore, the in-class activity mentioned primarily engages visual learners. Those with other learning preferences may not have found this tactic to be beneficial. Thus, there may still be a need to include traditional lecturing alongside active learning strategies. Eagleton (2015) noted that when active learning techniques were blended with technology, which could include PowerPoints, videos, or websites, for example, that all learning styles were reached, and performance improved in A&P classes.

However, challenges exist with all instructional methods. For example, some students may not have adequate internet access to download PowerPoints, listen to

audio/video recordings, or visit supplemental websites or online aids, such as Mastering A&P or Connect. This can be especially true in the community college sector of higher education. Therefore, it is not only important to attempt to reach all learning styles, but to do so in a manner that is cost-efficient and productive to comprehension of the content.

Statement of the Problem

Due to the diversity of instructional methodologies and learning types, it is important determine which methodologies are suitable to all learning types to effectively teach physiological processes. Instructors may lecture, either live or via recordings, or engage students through active learning activities. The desire is for these methodologies to reach all learning types to improve student comprehension. A&P, for many students, is the first exposure students get to a pre-medical course and should create the foundation of knowledge they need to build from for their future careers. As A&P courses are divided into lecture and laboratory components where more of an anatomy focus is emphasized in the lab, the lecture is where students get exposed to physiology. It is the physiological processes that students generally find the most difficult to grasp and retain which explains why multiple methodologies of instruction have been implemented to aid in student comprehension. The importance of student comprehension is noted in a study by Colthorpe et al. (2018) where ultimately academic hindrances such as a lack of understanding, leads to disengagement, decreased motivation, and potential failure in the course.

Additionally, a comprehension of normal human body physiology is imperative to grasping pathophysiology as practicing professionals will need to be able to assess patients and diagnose them appropriately. By performing this study, steps may be made

to definitively improve the teaching of physiology. As a biology professor for Jackson State Community College (JSCC), where A&P is the highest demand biology course, it is imperative that measures be taken to improve student understanding of human physiology. This study will further allow instructors to improve upon their own teaching methods, or possibly alter them entirely, to better engage students in their learning. And finally, this study will aim to improve retention into allied health and nursing programs. Therefore, the problem addressed is determining which methodologies are most appropriate to reach all learning types and improve student comprehension of physiological processes.

Purpose of the Study

The purpose of this study is to determine which instructional methodologies are most effective for teaching physiological processes. Furthermore, it is paramount that these methodologies be determined effective as to improve student retention of the content covered in A&P. Colthorpe et al. (2018) note the difficulties students face with physiology as studying these processes requires substantial efforts including reasoning to better comprehend these concepts. Additionally, A&P instructors at JSCC will be able to evaluate their current teaching practices to determine if they are effective in promoting student comprehension of human physiology. Therefore, the objective of this study is to determine the method or methods of instruction best suited to improving the teaching of physiological processes to pre-nursing and pre-allied health students at JSCC.

Research Questions

This study aims to answer the following questions by surveying students at Jackson State Community College with pre-nursing and pre-allied health focuses

regarding their comprehension of physiological concepts. Select physiological topics will be selected to determine effective teaching strategies regarding those concepts.

1. What instructional methodologies are being used to teach physiological processes at JSCC?
2. What is the correlation between instructional methodology and student comprehension at JSCC?
3. Is there a correlation in instructional methodologies and gender?

Description of the Project

The study will be initially composed of a survey provided to A&P instructors employed at Jackson State Community College to determine their preferred teaching methodology. Additionally, other teaching methodologies each instructor incorporates into their class will be described by the instructor. Second, a survey will be provided to A&P students to determine learning types of individual students. Additionally, the student survey will identify their expected area of emphasis (e.g., nursing), and their perceptions of learning leading to improved comprehension of the subject matter. Third, correlations of faculty and student perceptions will be compared by student area of emphasis and years of teaching for the faculty member. Data will be obtained from this assessment for a quantitative analysis of the results.

Anatomy and physiology courses are generally of the highest abundance regarding biology courses offered by community colleges. As technology advances, new techniques of instruction and learning have been implemented into A&P courses, including software such as MasteringA&P available via Pearson Education. Kuyatt and Baker (2014) note students can learn human anatomy with digital software such as PAL,

which is now accessible via MasteringA&P. Jackson State Community College adopted the second edition of Erin Amerman's *Human Anatomy & Physiology* text in 2018 published by Pearson Education. Additionally, the Tennessee Board of Regents, the governing body of Tennessee community colleges and technical schools, began the Digital Engagement Initiative (DEI) the following year. The DEI utilizes an inclusive access (IA) model to offer electronic materials (e.g., textbooks) to students while reducing the costs of course materials and making these materials available to students on the first day of class (DEI – TBR, n.d.). The overarching goal of this initiative is to improve student success and completion. Therefore, through the DEI, A&P students have access to the Amerman e-text and MasteringA&P. Several of the A&P faculty at JSCC have adopted this technology as part of their courses with the belief that utilizing this as a learning tool will improve student comprehension of difficult physiological processes.

Assumptions and Limitations

1. Lecturing is the primary method of A&P instruction at JSCC. Knowing this, other instructors may not be willing to try implementing other methods of instruction. This limitation may prevent a higher sample size of students to test comprehension.
2. Students at JSCC are not required to take any introductory science courses prior to enrolling in A&P. Thus, teaching methodology may not be as important as the students enrolled in A&P will likely find the discipline of physiology challenging regardless of the teaching method.

3. Given the transition to virtual learning due to the COVID-19 pandemic, the response rate may be low.

CHAPTER II – LITERATURE REVIEW

Most college students would likely argue that some of the more challenging courses they were required to take were science courses. Amerman (2019) defines science as “a way of observing and measuring natural phenomena in order to try to explain them” (p. 1). And being able to grasp the concepts taught in science courses may require abstract thinking as most students will be unfamiliar with the content being covered. Science courses are unique in the organization of their content. First, science courses not only require students to attend a lecture, typically two to three days per week, but they also require students to attend laboratory. Laboratory components are designed to emphasize the content discussed in the lecture by adopting a more kinesthetic approach allowing students to pick up a heart or dissect a kidney, for example. Thus, as most academic disciplines are beginning to move away from the traditional lecturing format, where the instructor stands before a class of students and conveys information to them, science courses have been doing this to a certain degree in the laboratory for years. It is the lecture where science courses may be somewhat archaic in the presentation of their content and this is especially true in Human Anatomy & Physiology (A&P) courses. Because of the large populous of students interested in pursuing careers in the medical field, it is no surprise that instructors must find a way to effectively disseminate information to these students, and more often, the method to do this requires lecturing. Thus, the aim of the literature review is to identify teaching methodologies that are most effective at providing students necessary knowledge to not only make them successful in A&P, but also to be able to apply that knowledge into their future studies and professional lives.

Instructional Style

Instructional style is perhaps the most important topic for discussion as the aim of this study is to determine the most effective means of teaching physiology to undergraduate students. Furthermore, the variety of methods of instruction are so vastly different from one another and each possess strengths and weaknesses. This section will focus on four common methods used in physiological education including traditional lectures, lectures based on problems, interactive lecturing, and the flipped classroom method.

Traditional Lectures. Lecturing has been the key mechanism of content delivery since the inception of higher education and is still presently the primary approach taken by most A&P instructors when conveying content to a class of students. This does not come as a surprise as A&P courses generally have large student enrollment with a diversity of students. For example, in the community college sector, a classroom may have multigenerational learners consisting of traditional and nontraditional students. Lecturing is also the most cost-efficient way to present content to many students and the methods of lecturing differ from one instructor to another (Coyner & Razik, 2008). Some instructors may simply use a whiteboard to convey content to a class, while others may use technology, such as PowerPoint, videos, or websites. There is the option to blend these methods together, too as noted by Eagleton (2015) whose findings note that blending traditional delivery methods with technology reaches learners of all types and better improves performance in A&P. However, it is often noted that the students that most benefit from a lecture are the ones that prepare in advance so that they follow along with the lecture more effectively (Alaagib et al., 2019). Unfortunately, lectures may

range anywhere from fifty minutes, with a course meeting three times per week, or close to three hours if a course meets once per week. With the amount of time a student must devote their attention to the lecture, Lattuca & Stark (2009) note this likely to be a challenge. Thus, they note that students have a difficult time paying attention when an instructor relies strictly on using the traditional lecture format, and this has only seemed to worsen in recent years.

Lectures Based on Problems. To counter the lack of enthusiasm on the part of the students, Alaagib et al. (2019) developed lectures based on problems (LBPs) which resulted in students paying better attention and taking a more active role compared to a traditional lecture. Based on the data analysis from the study, Alaagib et al. (2019) note that 64 percent of students found the LBP to be more enjoyable and these students performed better than a control group when quizzed on content that was also covered in a traditional lecture. Thus, many instructors may find implementing LBPs like those of Alaagib et al. (2019) to be especially useful when teaching physiological concepts, but there are disadvantages to this method. First, incorporating activities into the course will not be cost efficient as supplemental materials may be required to complete an activity to convey core concepts to students. Community colleges, for example, are already financially restrained when compared to four-year institutions, which would make this method of delivery difficult. Secondly, A&P courses do have a lab component where many of these activities already occur. However, it could prove beneficial if both the lecture and laboratory were using similar teaching methodologies to reinforce core content. Hecimovich and Volet (2014) used a technique like Alaagib et al. (2019) but did so in the laboratory setting where third-year physiology students were role playing that of

a physician and students from a neighboring institution were their patients. Activities such as these will play an effective role in better preparing the future health professionals meet the needs of their patients. However, this likely is not feasible when dealing with first-year or second-year students as their knowledge of the human body is limited in comparison to those in their third-year or fourth-year. Furthermore, Waldrop (2018) notes that there is a hesitancy for science faculty to adopt active learning activities as they are primarily familiar with lecturing. This explains why so many science faculty members revert to this method of instruction. Additionally, community colleges typically offer a two-semester A&P course that can be completed in one year. These students would not have exposure to a third-year or fourth-year regarding physiological content as they should now be in their respective program, such as nursing. Thus, this technique does not work in all avenues of higher education.

Interactive Lecturing. Instructors may opt for interactive lectures where students are presented content by the instructor but are asked to actively engage by answering questions that correspond to the content being covered. For example, an instructor covering the rate at which oxygen dissociates (releases) from hemoglobin in the blood may indicate to the class that an elevation of body temperature can cause oxygen dissociation to occur much faster than regular. Thus, the students may then be asked to describe what effects this could have if an individual had a fever that continued to elevate. Hopefully, students will then be able to correlate that a prolonged fever would reduce oxygen saturation and could pose serious injury to the brain because of a lack of oxygen delivery. Ernst and Colthorpe (2007) utilized this method of teaching when covering respiratory physiology and note that for students with weaker science

backgrounds may not be able to correlate the importance of the subject matter and its application in a professional program (e.g., nursing). Through their study the received student feedback indicating greater student engagement and positive attitudes toward difficult physiological concepts.

Flipped Classroom. Another effort to reach students is to adopt the flipped classroom methodology that has been successfully implemented in other academic disciplines, including biological science courses. In this method, instructors may inform students of material to review prior to class by pre-recorded lectures or assigned reading possibly with supplemental materials, such as PowerPoint slides, that would be made available to students via an institution's learning platform. Students should complete these required activities prior to class and during the lecture an activity may take place where students can take a more active approach in their learning. Glann & Klann (2017) noted that when students completed these in-class activities that they referred to as team-based learning (TBL), students felt better prepared and seemed to grasp more challenging concepts than their contemporaries in sections of the class not using the flipped methodology. This is comparable to data reported by Mikkelsen (2015) where short lectures were recorded for students to view prior to class, but an active-learning activity was developed for students to complete while in the lecture period. Students that responded to an online questionnaire noted that the short lectures alongside the active-learning activity improved their content knowledge. However, the data obtained by both Mikkelsen (2015) and Glann and Klann (2017) did not receive 100 percent response rates by students in the course. Therefore, students that enjoyed the in-class activities may have been more apt to respond to the questionnaires as they related to the activity more so

than others. Comparatively, however, student satisfaction seems to be of a greater magnitude in the flipped-classroom environment than in the traditional lecture based on these studies.

Learning Styles

Learning styles must also be considered alongside instructional method. Most agree there are four principal learning types including visual learners, auditory learners, reading/writing learners, and kinesthetic learners. Students that identify with one of these learning types would be considered a unimodal learner, whereas students that benefit from a combination of these learning types would constitute a multimodal learner. Collectively these learning styles have been used to create the acronym VARK and is the principal means of identifying which students fall into which learning type. To assess learning types, a VARK questionnaire is administered to students to determine which style is best suited to an individual student. Additionally, Elrick (2018) emphasizes methods for educators to reach each of these learning styles. In this section, different learning styles will be emphasized, and the challenges instructors need to be aware of when presenting physiological concepts to diverse student groups.

Visual learners. Visual learners are those who require visual aids including, but not limited to, images, diagrams, or written directions (Elrick, 2018). The usage of a whiteboard or projected images are best to convey physiological concepts to visual learners. Additionally, this can be further emphasized as many A&P courses have adopted textbooks that include specific software programs (e.g., MasteringA&P) that include visual aids. For example, an instructor may assign homework that includes labeling the parts of a neuron. For visual learners, these assignments can be very

beneficial to understand basic neuron anatomy which is essential to understanding the physiological role of a neuron (i.e., neurophysiology). Tchaptchet et al. (2013) also noted improved student understanding when a virtual lab on neurophysiology was substituted for a traditional wet lab as the virtual activity allowed students the opportunity to visually see the effects of abnormal membrane potentials. Furthermore, by using the flipped-classroom approach emphasized in Mikkelsen (2015), students were expected to watch short videos posted by their instructor related to renal (kidney) physiology prior to attending class and partaking in an active-learning activity. This approach allows visual learners to better grasp what is happening when the kidneys filter blood and how they will then reabsorb what is necessary for the body to use, such as glucose. Once the in-class activity begins, visual learners will now be better prepared to participate in discussion around the topic.

Auditory learners. Auditory learners include learners that would most likely benefit from a traditional lecture. However, that does not mean that lecturing is the most beneficial way to convey concepts to auditory learners, but that by having an explanation of physiological processes explained in detail while in lecture, these students are likely going to appreciate that most. Many auditory learners will repeat things that an instructor says back to the instructor for clarification, thus they are not afraid to speak up during class, and will likely be the ones explaining, for example, details of an assignment to a group of peers (Elrick, 2018). When instructors provide opportunities for students to answer questions regarding the lecture content, these students greatly benefit from that. Thus, these students would likely be most engaged in interactive lectures giving them opportunity to respond directly with their instructor. However, these students may also

benefit from in-class activities where they can explain physiological concepts to their peers, such as in team-based learning activities as referenced in Gopalan and Klann (2017).

Reading/writing learners. Some learners gravitate toward reading and writing as their means of comprehending difficult concepts. These students benefit most from written words such that assigned readings would be an excellent strategy to get them engaged in content. Elrick (2018) notes that there is some overlap between these learners and visual learners, but ultimately these learners will benefit most from reading content and then writing based around the content studied. For example, an instructor may ask a class to write an essay describing in detail the process of skeletal muscle contraction and provide students with either a lecture on the content or assigned readings from the text on the content. Furthermore, perhaps these students will be doing a laboratory exercise around muscle physiology. By allowing these students to explain a process in essay form, when the students begin a lab activity that is more hands-on, they will be better prepared and likely comprehend the content to greater extent.

Kinesthetic learners. Kinesthetic learners are those that perform best when they are able to use their hands. Elrick (2018) refers to these learners as tactile learners, and instructors need to allow these students to move and engage to a greater capacity than other learners, even if it only includes having them write on a whiteboard as part of their learning. Kinesthetic learners studying physiology are likely to perform best during laboratory. Typically, an A&P lab is designed to allow for students to engage material through hands-on activities, such as studying the bones of the body and the features that accommodate the bones. Students are expected to pick up the bones and note the features

to help deduce orientation (right versus left), for example. Thus, when comparing an activity such as this to a study conducted by Griff (2016), students were expected to learn origins, insertions, and actions for muscles, but rather than requiring students to do all of these things, origins and insertions were provided and student groups had to predict the action of the muscles they were assigned. Not to mention, Griff (2016) notes that the laboratory component of a science class is where an instructor learns student names and which concepts they are struggling with. Therefore, the laboratory component is not only beneficial for kinesthetic, and by that any learning type, but also for instructors to build relationships with their students.

Multimodal learners. Multimodal learners are the most diverse group of learners as they encompass more than one of the previously mentioned learning styles. Currently, much literature regarding physiology education correlates with the notion of trying to reach all learners of varying learning styles. Most teaching techniques mentioned previously from lecturing or active-learning activities are likely to reach multimodal learners to a greater capacity than learners that learn best through one method. Eagleton (2015) provides further evidence that instructors that blend teaching styles better engage all types of learners and ultimately improve student comprehension.

Gender

Another factor to consider when concerned with effective teaching techniques regarding physiology is gender. If an instructor is concerned with learning style preferences of students, it would make sense to also consider if gender influence the learning style. According to data obtained by Slater et al. (2007), first-year medical students were sampled with a VARK questionnaire. From the data, 56.1 percent of males

and 56.7 percent of females responded they benefitted most from multimodal learning. These learners again exemplify the notion that multimodal learners are the generally compose the highest percentage of learners. Interestingly, this data is comparable to a study conducted by Kharb et al. (2013) where, again, first-year medical students were surveyed to determine their learning styles with data showing 61 percent of the students are multimodal learners. Kharb et al. (2013) further notes that students preferring unimodal learning prefer kinesthetic learning such as dissections to improve their content knowledge; however, these were mostly male students. Comparatively, unimodal female students gravitated more to auditory learning in relation to male students. Slater et al. (2007) note that female students were more diverse in their learning styles than male students which correlates to data obtained by Kharb et al. (2013).

CHAPTER III – METHODOLOGY

The purpose of this study was to determine effective teaching techniques in teaching physiological concepts to undergraduate students. To perform the study, 314 students were surveyed to determine their preferences on learning (lecturing, exam study guides, digital software) and how they perceived those techniques to be. Additionally, the A&P faculty members were surveyed to determine their perceptions on how best to approach teaching physiology to undergraduate students. Faculty were asked to provide their years of experience teaching at any level compared to their years of teaching in higher education.

Research Design

The study used a quantitative research design that was implemented with web-based questionnaires developed and administered through Qualtrics® (See Appendices A1 and A2). Qualtrics® is an online experience management platform that may be used for the creation of surveys and data collection. Access to Qualtrics® is provided freely to researchers affiliated with The University of Southern Mississippi. For the following study, a cross-sectional survey design was selected to better understand student and faculty perceptions regarding teaching physiology. Cross-sectional studies are implemented in various studies, including medical research, when data collection occurs with populations at a single, specific time (Wang & Cheng, 2020).

Instrument

Each survey was designed to gather faculty and student perceptions on effective teaching methodologies regarding physiology. Each survey contains between 17-19 questions formatted as close-ended, open-ended, and Likert-scale. Students were

provided a series of demographic questions covering age, gender, VARK learning type, area of interest (e.g., nursing), followed by questions aiming to gauge student perceptions of their current instructor's teaching style and their preferences regarding instruction styles. Faculty were asked demographic questions that included their years of experience teaching in general, as some faculty members have also taught in high schools, alongside their experience teaching in higher education. Additionally, faculty were asked if they instructed A&P I, A&P II, or both as some faculty members, including adjuncts, may have only instructed one course rather than both courses. The final demographic questions for faculty were to identify if they only teach lecture sections, lab sections, or both. Finally, faculty were asked a series of opinion questions that used a Likert-scale. These questions emphasized their current teaching techniques (e.g., lecturing), the usage of discussions in the classroom, provision of study guides, for example.

Timeline

Each survey was developed in the spring semester of 2020. Initially, the surveys were analyzed by the Research Support Center (RSC) with The University of Southern Mississippi in March of 2020. Based on the advice of the RSC, adjustments to the survey were made to expand on faculty and student questions and provide clarification in the questions being administered. After updating the surveys, each were submitted to The University of Southern Mississippi's Institutional Review Board (IRB) in April of 2020. The researcher received IRB approval on April 17, 2020. The surveys became active on August 31, 2020 and closed on October 4, 2020 allowing for a five-week period to obtain data from faculty and students.

Participants

Students enrolled in Human A&P courses during the fall 2020 semester were selected to complete the survey. All students were recruited through an announcement via D2L. D2L is the current learning management system (LMS) at JSCC. Each faculty member was provided access to the student survey link in an e-mail sent on August 31, 2020 which asked them to make the link available in their D2L shells for their students to complete the survey. Additionally, students were also notified by the instructor of their respective course of the importance of the survey. All students were notified of the length of time required to complete the survey, an explanation of Qualtrics®, approval granted the IRB, preferred contact methods for the researcher, and a link to the Student Survey. Consent was given once the student followed the link to the survey in the e-mail announcement.

All full-time and adjunct A&P faculty were selected to participate in the study to gain better insight into faculty perceptions of effective teaching techniques when teaching A&P. JSCC contains ten full-time faculty that teach A&P lectures, labs, or a combination of both. Additionally, JSCC employs three adjunct A&P instructors that were also selected as participants in the Faculty Survey. These thirteen individuals were sent a description of the project and a link to the survey in their JSCC e-mail addresses. Mirroring the student announcement, the faculty e-mail notified participants of the length of time required to complete the survey, an explanation of Qualtrics®, approval granted the IRB, contact information for the researcher, and a link to the Faculty Survey. Consent was given once the faculty member followed the link to the survey in the e-mail announcement.

While students and faculty were recruited in different ways, each group received the same information from the researcher regarding the importance of this study. Each group provided consent by following the respective links to their surveys.

Data Collection Procedures

Using Qualtrics®, data were obtained from students and faculty that completed their respective questionnaires. Each survey provided the students and faculty that completed them anonymity as no personal data was obtained at the conclusion of the surveys. After data collection of a five-week period, the researcher noted a total of 64 completed surveys out of an estimated total of 314 surveys administered to students. Additionally, 10 faculty surveys were completed out of a total of 11 surveys administered to faculty. This resulted in completion rates of 20.4% of students and 90.9% for faculty. To analyze the responses, the researcher used the summary statistics provided by Qualtrics®. Additionally, Microsoft Excel was used to generate data tables, graphs, and perform comparative statistical testing.

CHAPTER IV – FINDINGS AND RESULTS

In this chapter, the researcher will present the results of the study beginning with the student participant demographics and faculty participant demographics. These demographics are presented initially so that readers will better comprehend the results that follow each investigation with students and faculty. Information obtained includes age, gender, VARK learning types, and programs of emphasis that students will be applying to. In the next section, correlations were made between the faculty and student surveys to determine perceptions of faculty and students regarding effective teaching techniques. Topics correlated include perceptions on simultaneous enrollment in A&P lecture and lab (students have the same faculty member for both sections), students viewing lectures more than once, the use of PowerPoint as a teaching tool, and the use of study guides. The third section includes intrarelational correlations where student responses of those that are planning to transfer to a four-year institution were correlated with their perceptions of preparedness to advance their education. Finally, intrarelational correlations of faculty responses were analyzed to determine various materials used to improved learning including videos, articles, recordings, and textbook software.

Student Participant Demographics

All student participants were Human A&P students enrolled at JSCC. Human A&P is a two-semester course required for various programs related to the medical field. During the Fall of 2020, 314 A&P students were solicited to complete the student survey and only the completed surveys were used in the data analysis. Thus, the population of completed student surveys is $n = 64$. Demographic questions provided the researcher with information regarding age, gender, learning type, program area of emphasis, transfer

plans, the number of college-level science courses completed, and internet access at their residence.

Age

Most students were between the age range of 18-24 years of age, approximately equating to 68.75% of the student responses (n = 44). The remaining categories included students between 25-29 years of age equating to 7.81% (n = 5), those between 30-34 years of age equating to 9.34% (n = 6), those between 35-39 years of age equating to 10.94% (n = 7), those between 40-44 years of age equating to 1.56% (n = 1), and those between 45-49 years of age equating to 1.56% (n = 1).

Gender

From the student responses, 86.7% of the students self-identified as female (n = 52). Additionally, 13.2% self-identified as male (n = 8). Gender was collected from students to determine the correlation between learning perceptions and gender. Figure 1 provides a breakdown of the gender responses.

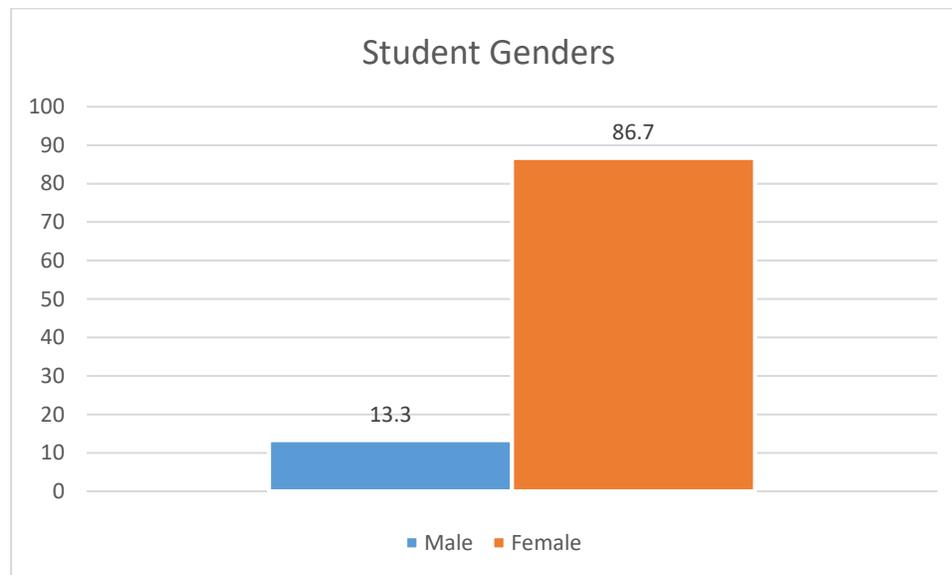


Figure 1. Student gender demographics.

Learning Type

Surveyed students were asked to select the VARK learning type that best described them. The options to select from included visual, auditory, kinesthetic, or multi-modal learners. Based on the responses, 40% of the students identified as visual learners (n = 24), 5% identified as auditory learners (n = 5), 38.3% identified as kinesthetic learners (n = 23), and 16.7% identified as multimodal (n = 10). Figure 2 provides a breakdown of the student learning types.

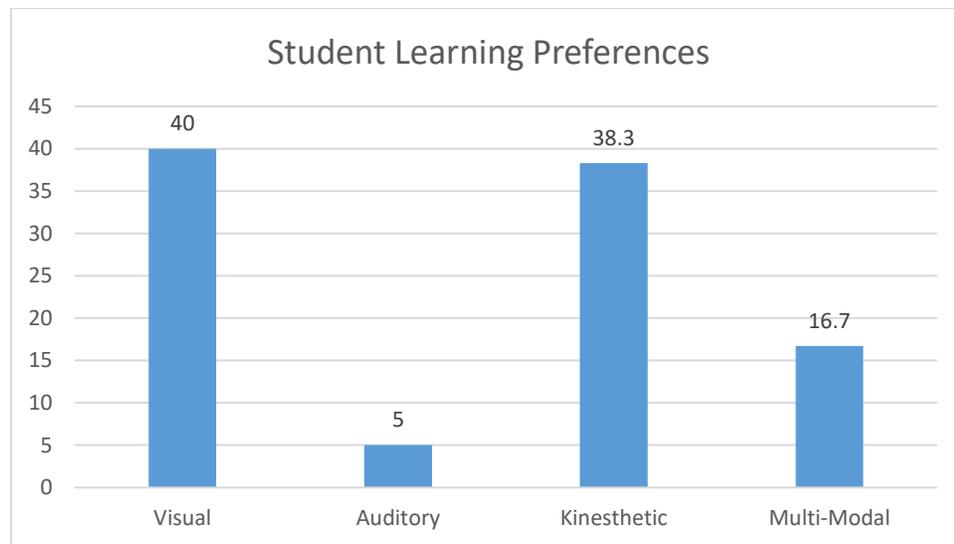


Figure 2. VARK student learning preferences of A&P students at JSCC.

Program of Interest

The last demographic question asked students to select their program of interest with JSCC. Programs of interest included nursing, physical therapy assistant (PTA), radiologic technology, medical laboratory technology (MLT), occupational therapy assistant (OTA), and respiratory therapy. Based on the responses, 53.6% of the students are planning on attending nursing school. PTA students comprise 10.7% of the student responses, while 17.9% are planning to apply to the radiologic technology program.

7.1% of the students are planning on applying to the MLT program and another 7.1% are planning on applying to the OTA program. Finally, 3.6% are planning on applying to the respiratory therapy program. Figure 3 provides a breakdown of the students' areas of emphasis regarding medical programs offered at JSCC.

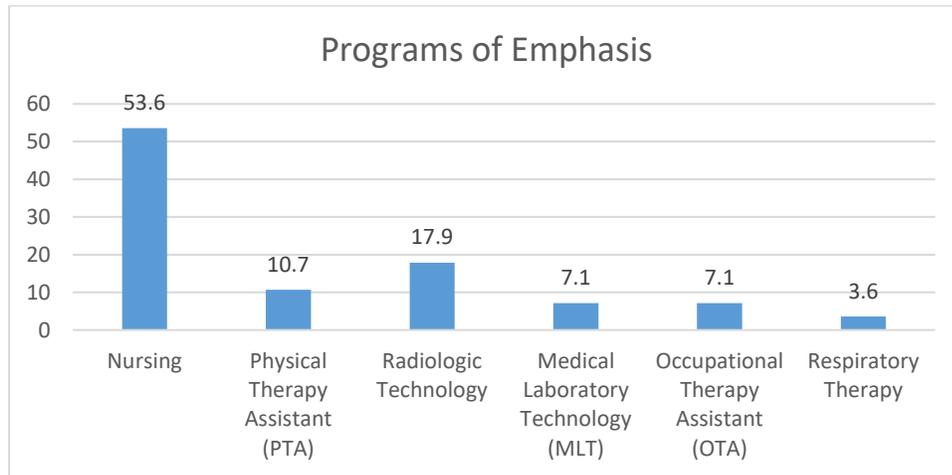


Figure 3. Programs of emphasis that students are applying to at JSCC.

Perceptions on simultaneous enrollment in lecture and lab.

In the student survey, students were asked about their preferences in having the same instructor teach their lecture and laboratory sections. 48.3% of students strongly agreed with this statement. Student responses to this statement were measured with SPSS software and can be found in Table 1.

I perform better in science courses when I have the same instructor for lecture AND lab.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	29	45.3	48.3	48.3
	Somewhat agree	12	18.8	20	68.3
	Neither agree nor disagree	16	25	26.7	95
	Somewhat disagree	3	4.7	5	100
	Total	60	93.8	100	
Missing	System	4	6.3		
Total		64	100		

Table 1. Student preferences regarding instructors teaching lecture and lab.

Comparatively, faculty were asked to provide feedback on their perceptions of the performance of students that are enrolled simultaneously in their lecture and lab. Most faculty, 50%, strongly agreed with this statement. Table 2 provides the raw data on these perceptions among JSCC faculty.

Students enrolled simultaneously in my lecture and lab are my highest performing students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	50	50	50
	Somewhat agree	2	20	20	70
	Neither agree nor disagree	3	30	30	100
	Total	10	100	100	

Table 2. Faculty preferences regarding simultaneous enrollment of students in lectures and labs.

By performing Pearson correlations with the valid percentages from student and faculty responses within Microsoft Excel, the results show a correlation of **0.9934**.

Considering this number is close to +1, this indicates a positive correlation. Positive correlations are strong correlations, thus, the data show that both the perceptions of faculty and students are that students will perform better if they have the same instructor for lecture and lab.

Perceptions on students reviewing lectures more than once.

In the student survey, students were asked about their performance when allowed to view or listen to lectures recorded by their instructor. Survey results indicate that 55.2% of the students surveyed strongly agreed with this statement. Student perceptions on the effectiveness of this technique can be found in Table 3 below.

I perform better when my instructors provide recorded lectures for repeat listening and viewing.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly agree	32	50	55.2	55.2
Somewhat agree	14	21.9	24.1	79.3
Neither agree nor disagree	7	10.9	12.1	91.4
Somewhat disagree	2	3.1	3.4	94.8
Strongly disagree	3	4.7	5.2	100
Total	58	90.6	100	
Missing System	6	9.4		
Total	64	100		

Table 3. Student perceptions on being provided recorded lectures for review.

Comparatively, faculty were provided a similar statement regarding their perceptions on student performance when allowed to listen or view recorded lectures. Survey results indicate that 70% of the faculty surveyed strongly agreed with this statement. Table 4 below provides the responses from faculty.

I believe if students have an opportunity to listen to my lectures more than once that they will perform better.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	70	70	70
	Somewhat agree	2	20	20	90
	Neither agree nor disagree	1	10	10	100
	Total	10	100	100	

Table 4. Faculty perceptions of student performance when provided recorded lectures.

By performing Pearson correlations with the valid percentages from student and faculty responses within Microsoft Excel, the results show a correlation of **0.9937**. Considering this number is close to +1, this indicates a positive correlation. Thus, the data show that both the perceptions of faculty and students are that students will perform better if they are provided with recorded materials allowing them to review content covered in lecture more than once.

Perceptions of the usage of PowerPoint as an effective teaching tool.

In the student survey, students were asked their perceptions regarding the usage of PowerPoint by their instructors and if they found it to be effective in delivering difficult content covered in anatomy and physiology. Survey results indicate that 38.3% of students stated that they somewhat agreed with this statement. Student perceptions on the effectiveness of PowerPoint as a teaching tool can be found in Table 5.

I perform better on exams when my instructor uses technology-based learning methods including, but not limited to, PowerPoint, videos, or textbook software.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	20	31.3	33.3	33.3
	Somewhat agree	23	35.9	38.3	71.7

	Neither agree nor disagree	11	17.2	18.3	90.0
	Somewhat disagree	3	4.7	5.0	95.0
	Strongly disagree	3	4.7	5.0	100.0
	Total	60	93.8	100.0	
Missing	System	4	6.3		
Total		64	100.0		

Table 5. Student perceptions of the effectiveness of PowerPoint (and other materials) for teaching.

Comparatively, faculty provided perceptions of the usage of PowerPoint as an effective teaching tool for anatomy & physiology courses. Survey results indicate that 50% of faculty surveyed stated that they somewhat agreed with this statement. Table 6 provides the responses from faculty.

I feel that using PowerPoint is an effective teaching tool.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly agree	4	40	40	40
Somewhat agree	5	50	50	90
Somewhat disagree	1	10	10	100
Total	10	100	100	

Table 6. Faculty perceptions of the effectiveness of PowerPoint as a teaching tool.

By performing Pearson correlations with the valid percentages from student and faculty responses within Microsoft Excel, the results show a correlation of **0.9830**. Considering this number is close to +1, this indicates a strong, positive correlation. Thus,

the data show that both the perceptions of faculty and students are that both faculty and students view the usage of PowerPoint as an effective teaching tool.

Perceptions of study guides for exam preparation.

In the student survey, students were asked if they preferred when instructors provided study guides for anatomy & physiology exam preparation. Survey results indicate that 83.3% of students strongly agreed that the usage of study guides helped them to feel better prepared for exams when provided by instructors. Table 7 provides student responses.

I feel prepared for A&P exams when if I am provided study guides.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	50	78.1	83.3	83.3
	Somewhat agree	5	7.8	8.3	91.7
	Neither agree nor disagree	3	4.7	5.0	96.7
	Somewhat disagree	2	3.1	3.3	100.0
	Total	60	93.8	100.0	
Missing	System	4	6.3		
Total		64	100.0		

Table 7. Student perceptions of study guides for exam preparation.

Comparatively, faculty were asked to provide perceptions on the benefit of study guides as a tool to improve learning by aiding in the organization of content for students to know in preparation for exams. Interestingly, 50% of surveyed faculty only somewhat agreed with this statement. Table 8 provides the faculty responses.

Study guides will greatly benefit students by helping them to follow along with the course content.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	30.0	30.0	30.0
	Somewhat agree	5	50.0	50.0	80.0
	Neither agree nor disagree	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

Table 8. Faculty perceptions of study guides.

By performing Pearson correlations with the valid percentages from student and faculty responses within Microsoft Excel, the results show a correlation of **0.2124**. Considering this number is positive (greater than zero), this still indicates a positive correlation. However, because it is extremely low, the correlation is very weak. Therefore, the researcher can deduce that the data show that both the perceptions of faculty and students mostly differ in the usage of study guides as effective tools for teaching physiological concepts.

Intrarelational Correlations.

The data provided in this section show correlations obtained from questions on the student survey only. During the survey, students were asked if they planned to continue their education by transferring to a four-year university. From the data, 53.3% (n=32) of students responded “yes” while 46.7% responded “no” (n=28). Student responses to this statement were correlated with the statement that students felt their instructors teaching styles had adequately prepared them to advance their educations. Students agreeing that this statement was valid equated to 81.6% (n=49). The correlation of these data sets resulted in a correlation of **0.7007**. Again, because this number is positive, this indicated a positive correlation. Furthermore, this indicates that most

students have the perception that their instructors have effectively prepared them to continue their education. Additionally, 53.6% of the student respondents were nursing majors, making up the majority of the student respondents. This is an important measurement considering that many nurses are debating earning Bachelor of Science in Nursing (B.S.N.) degrees and some hospitals are requiring a B.S.N. for employment. This is especially apparent in major cities across the nation (Smith, 2017).

Additionally, faculty were asked to specify additional materials they may use to teach difficult content to students. The materials listed included videos, articles, recordings, and textbook software. The faculty were provided Likert-scale responses to each of these options that allowed them to respond with strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, and strongly disagree. For videos, 70% of faculty strongly agreed to their usage (n=7) while 30% of faculty somewhat agree their effectiveness (n=3). Survey results indicate that 100% of faculty somewhat agree to the use of articles as effective teaching tools (n=10). Survey results indicate that 30% of faculty strongly agreed with the use of recordings as effective teaching tools (n=3), while 60% somewhat agreed with this notion (n=6), and 10% neither agreed nor disagreed (n=1). Finally, 40% of faculty strongly agreed that using textbook software (e.g., Mastering A&P) was effective (n=4) while 20% somewhat agreed (n=2), 30% neither agreed nor disagreed (n=3), and 10% somewhat disagreed (n=1). To determine the strength of agreement across the faculty regarding the various instruments that may be used to improve teaching, the responses were assigned a number of 1-5 with strongly disagree as 1 and strongly agree as 5. Thus, the closer the value is to 5, the stronger the

agreement. Table 9 below summarizes the faculty responses to each of these items including the total number of respondents (n), the mean, and the standard deviation.

Group		n	Mean	Std. Deviation
Faculty	Additional materials to teach - Videos	10	4.70	.483
	Additional materials to teach - Articles	10	4.00	0.000
	Additional materials to teach - Recordings	10	4.20	.632
	Additional materials to teach - Textbook software	10	3.90	1.101
	Valid N (listwise)	10		

Table 9. Summary of the strength of agreement among faculty and additional teaching materials.

Because the teaching materials were assigned values of 1-5 and the option of “videos” received a mean of 4.70, this indicates that most faculty strongly agree that of all of the listed options of additional teaching materials, videos are most effective at helping to teach difficult concepts to students. This is an important measure as 40% of the student respondents noted they were visual learners (see Figure 2).

Discussion and Recommendations

Discussion.

The research shows that 68.75% of student respondents are between the ages of 18-24 years of age with 86.7% of the respondents identifying as female. Additionally, 40% of the student respondents identify as visual learners making up the majority of learning types. Furthermore, Jackson State Community College offers a nursing program

and four programs allied health programs (see Figure 3), and from the student respondents, 53.6% were interested in pursuing a career in nursing.

The focus of the study was to determine correlations between student and faculty perceptions regarding effective teaching techniques when teaching physiology. Therefore, both students and faculty were asked to answer a series of questions using a Likert-scale allowing respondents to select whether they strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, or strongly disagree. Each survey had questions that overlapped between faculty and students, while also maintaining specificity to each survey group. To determine where student and faculty perceptions were similar, the researcher chose to conduct Pearson correlations within Microsoft Excel. A Pearson correlation will result in values between -1 and +1. The closer to +1, the stronger the correlation, which is referred to as a positive correlation. The opposite, a negative correlation, would result if the correlation value is closer to -1. Data tables generated with SPSS software are provided with frequencies, percentages, valid percentages, and cumulative percentages. The valid percentages are considered when forming correlations as these percentages are those that eliminate incomplete responses from both the student and faculty surveys.

The first correlation made was on the perception of students having the same instructor for both their lecture and lab sections of Anatomy & Physiology. The results show a correlation of 0.9934 which indicates a strong and positive correlation. Therefore, this would indicate that perhaps JSCC should reevaluate their registration process to ensure that students have the same faculty member teaching their lecture and lab. Secondly, a correlation regarding students viewing lectures more than once resulted

in a correlation of 0.9937 also indicated a strong and positive correlation. Therefore, A&P instructors should strongly consider providing students with an opportunity to review lectures to improve student comprehension. Thirdly, a correlation regarding student and faculty perceptions on the usage of PowerPoint in teaching resulted in a correlation of 0.9830 indicating a strong and positive correlation. Therefore, the data show that JSCC students and faculty may continue to benefit from the usage of PowerPoint in their classes to improve student comprehension. Fourthly, a correlation was made regarding the effectiveness study guides for exam preparation. This resulted in a correlation of 0.2124, thus, while positive, it is a weak correlation. Most students view study guides as vital for success in their A&P courses while many faculty respondents do not necessarily view them as vital. Therefore, faculty may need to re-evaluate their usage or implementation in the future.

Intrarelational correlations were made with students planning to transfer to a four-year institution and how they perceived their preparation for transferring to a four-year college. Results show a correlation of 0.7007 indicating that most students feel prepared to continue their education after completing their two-year education at JSCC. This is an important measure as 53.3% of student respondents noted they planned to continue their education once their two-year education was completed with JSCC. Finally, intrarelational data from faculty were made in determining supplemental material deemed most effective in improving student comprehension resulted in most faculty viewing videos as effective. This is an important measure considering most students (40%) identified as visual learners.

Recommendations.

After analyzing the data, the researcher recommends that Jackson State Community College consider improving registration means by working to ensure that students can enroll in Anatomy & Physiology with the same lecture and lab instructor. It has also been noted in the past that lecture and lab courses were synced which ensured students did have the same instructor for lecture and lab. Perhaps the college may opt to reinstate this method of registration regarding A&P. Additionally, faculty should consider recording their lectures to ensure students can watch and listen to them more than once. Most of the respondents of the student survey indicated their interest in pursuing a career in nursing, which is JSCC's largest medical-affiliated program; thus, it would be imperative that we ensure students gain a firm foundation in physiology which will no doubt resurface in nursing courses. Furthermore, regarding technology in the classroom, many JSCC students prefer PowerPoint for learning as many faculty prefer to use PowerPoint in the classroom. Therefore, using PowerPoint may be effective in teaching. However, many textbook publishers offer software that may be used in the course (e.g., MasteringA&P), but the faculty ranked this as the lowest item regarding its effectiveness when compared to free videos, articles, or discussion. The greatest difference in student and faculty perceptions of effective teaching come from the usage an implementation of study guides. It is not surprising students prefer them while faculty do not find them vital. Perhaps the faculty should reconsider the implementation of study guides in A&P courses. Faculty often develop their own study guides, so, perhaps these could be combined as departmental study guides to be given to all A&P students regardless of instructor. This may help to create more uniformity across the A&P courses.

Conclusion

The faculty and students surveyed in this study largely overlap in various perceptions regarding effective teaching of physiological concepts. Therefore, minor suggestions have been made on how faculty may improve upon the foundation currently affiliated with A&P courses at Jackson State Community College. Unfortunately, due to the coronavirus pandemic and the transition to virtual learning, much of this study had to be altered from its original conception. Therefore, one recommendation would be to perhaps recreate this study with students in face-to-face format utilizing various teaching methods (e.g., traditional lecture, flipped classroom) to teach a difficult physiology concept. This may help in determining which teaching methods are most effective at tackling challenging physiological concepts.

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APPENDIX A – Faculty and Student Surveys

Effective Techniques in Teaching Physiology_Student Survey

Q4 Please select your age range.

▼ Under 18 years of age (1) ... 50 years or over (8)

Skip To: End of Survey If Please select your age range. = Under 18 years of age

Q1 Please select your gender.

- Male (1)
 - Female (2)
 - Other (Please Specify) (3) _____
-

Q2 Which learning type do you most identify with?

- Visual (1)
 - Auditory (2)
 - Kinesthetic (Hands-On) (3)
 - Multi-Modal (4)
-

Q3 Please select the following JSCC program to which you are currently enrolled or planning to apply.

▼ Nursing (1) ... Respiratory Therapy (6)

Q20 Do you plan to transfer to a 4-year school?

Yes (1)

No (2)

Q5 What is your current year of study?

Freshman (1)

Sophomore (2)

Transient (3)

Q6 Select the number of college-level science courses you have completed. (*Completion indicates that you have finished the course and have earned a letter grade. If you have not completed any college-level science courses, please select “0.”*)

▼ 0 (1) ... 5 or more (4)

Q7 Do you have adequate access to the internet at home?

Yes (1)

No (2)

Q9 Did your lecture instructor also teach the lab?

Yes (1)

No (2)

Q10 A&P is the most challenging class I have taken at JSCC.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q11 Lecturing is my instructor's primary method of teaching.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q12 I feel lecturing is an effective teaching method.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q13 I perform better on exams when my instructor uses technology-based learning methods including, but not limited to, PowerPoint, videos, or textbook software.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q14 I perform better on exams when my instructor uses traditional teaching methodologies including, but not limited to, drawing or writing on the whiteboard.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q15 I perform better in science courses when I have the same instructor for lecture AND lab.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q16 I perform better when my instructors provide recorded lectures for repeat listening and viewing.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q17 I feel my instructor's teaching methods have effectively prepared me for advancing my education.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q18 I feel prepared for exams in A&P based on my instructor's teaching methods.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q19 I feel prepared for A&P exams when if I am provided study guides.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Effective Techniques in Teaching Physiology_Faculty Survey

Q1 How many years have you been teaching at any level?

- Less than 1-year (1)
 - 1-9 years (2)
 - 10-19 years (3)
 - 20 years or more (4)
-

Q2 How many years have you been teaching at the college level?

- Less than 1-year (1)
 - 1-9 years (2)
 - 10-19 years (3)
 - 20 years or more (4)
-

Q3 How many years have you been teaching college-level A&P?

- Less than 1-year (1)
 - 1-9 years (2)
 - 10-19 years (3)
 - 20 years or more (4)
-

Q4 Do you generally teach A&P I, A&P II, or both?

- A&P I (1)
 - A&P II (2)
 - Both (3)
-

Q5 Do you generally teach lecture, lab, or both?

- Lecture (1)
 - Lab (2)
 - Both (3)
-

Q6 Please select your age range.

- Less than 24 years old (1)
 - 25-34 (2)
 - 35-44 (3)
 - 45-54 (4)
 - 55 years or over (5)
-

Q7 Please indicate your gender.

- Male (1)
 - Female (2)
 - Other (Please specify) (3) _____
-

Q8 My teaching methodologies are the same in A&P I and A&P II.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q9 I engage my students in lecture through discussion.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q10 I use PowerPoint when presenting material to my students.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q11 I feel that using PowerPoint is an effective teaching tool.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q13 When appropriate, I use additional materials to teach, such as:

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
Videos (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Articles (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recordings (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Textbook software (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Students enrolled simultaneously in my lecture and lab are my highest performing students.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q15 I believe if students have an opportunity to listen to my lectures more than once that they will perform better.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q16 I believe that hands-on learning is best reserved for the A&P lab.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q17 Students are best prepared for exams by attending my class and taking notes.

- Strongly agree (1)
 - Somewhat agree (2)
 - Neither agree nor disagree (3)
 - Somewhat disagree (4)
 - Strongly disagree (5)
-

Q18 Study guides will greatly benefit students by helping them to follow along with the course content.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

APPENDIX B – IRB Approval Letter

Office of
Research Integrity



118 COLLEGE DRIVE #5125 • HATTIESBURG, MS | 601.266.6576 | USM.EDU/ORI

NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.
- FACE-TO-FACE DATA COLLECTION WILL NOT COMMENCE UNTIL USM'S IRB MODIFIES THE DIRECTIVE TO HALT NON-ESSENTIAL (NO DIRECT BENEFIT TO PARTICIPANTS) RESEARCH.

PROTOCOL NUMBER: IRB-20-144

PROJECT TITLE: Effecting Techniques in Teaching Physiology

SCHOOL/PROGRAM: School of Education, Educational Research and Admin

RESEARCHER(S): Ben Jeter, Holly Foster

IRB COMMITTEE ACTION: Approved

CATEGORY: Expedited

7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: April 17, 2020

A handwritten signature in cursive script that reads "Donald Sacco".

Donald Sacco, Ph.D.

Institutional Review Board Chairperson

APPENDIX C – Participant Recruitment Announcement

Subject: Perceptions of Effective Techniques in Teaching Physiology

Faculty/Students,

I am currently in the process of completing my doctorate degree in Higher Education at the University of Southern Mississippi. For my capstone project, I am attempting to identify student and faculty perceptions of effective teaching strategies when teaching undergraduate physiology. To help identify which strategies are most effective, I have created a short survey using Qualtrics®, an experience management platform to help collect data surrounding the topic. Shortly, you will receive an email asking you to participate in your respective survey. The surveys will gather data concerning the opinions and knowledge of biology faculty (full and part-time) and students enrolled in BIOL 2010 and BIOL 2020 from JSCC. The surveys will take approximately 10-15 minutes.

Thank you so much for taking the time to complete the survey.

This project has been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406, 601- 266-5997.

Benjamin T. Jeter, M.S.
Associate Professor of Biology
Jackson State Community College
2046 North Parkway
Jackson, TN 38301
P: (731) 424-3520, ext. 50275



APPENDIX D – Consent Form

Dear Potential Participant,

I would like to ask you to consider participating in a study because you are a Jackson State Community College (JSCC) faculty member or student. The purpose of this study is to determine the most effective techniques when teaching physiology as human anatomy & physiology (A&P) is essential for all students planning on careers in healthcare. Thus, determining methods of instruction to improve student comprehension of physiological content should improve their success in their healthcare program of choice.

If you are a faculty member and choose to participate in this study, you will be asked to complete a short questionnaire consisting of 7 demographic questions, 8 questions involving lecture, 2 questions involving lab, and 1 question involving study guides. The survey should take approximately 10-15 minutes to complete.

If you are a student and choose to participate in this study, you will be asked to complete a short questionnaire consisting of 9 demographic questions, 4 questions involving student performance, 3 questions involving your instructor's teaching method(s), 2 questions involving student preparedness, and 1 question involving study guides. The survey should take approximately 10-15 minutes to complete.

There are no risks involved with participation in this study. Participants will follow a hyperlink to complete the survey with Qualtrics. All data collected will remain completely anonymous. Any information inadvertently obtained during the course of this study will remain completely confidential. Participation in this project is completely voluntary. You may choose to decline participation or to discontinue participation at any point without concern over penalty, prejudice, or any other negative consequence. Data will be aggregated with the usage of Excel and Qualtrics and research reports will be submitted by the researchers for a graduate research capstone at the University of Southern Mississippi. Upon completion of data compilation, all questionnaire data will be destroyed. If you have questions concerning this research, please contact Benjamin T. Jeter at bjeter@jsc.edu or ben.jeter@usm.edu. This research is being conducted under the supervision of Holly Foster, Ph.D.

This project has been reviewed by the Institutional Review board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820.

By completing and returning the attached questionnaire the respondent gives permission for this anonymous and confidential data to be used for the purposes described above.

Thank you for your consideration.

Sincerely,

Benjamin T. Jeter

