ASSESSING THE SCIENCE FACULTY PERSPECTIVE ABOUT THE NEED AND USE FOR CURRICULUM MAPPING OF AN ANATOMY AND PHYSIOLOGY COURSE AT A COMMUNITY COLLEGE

by

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INTRODUCTION AND BACKGROUND

Project Background

I have been teaching at a community college in Indiana for the last 20 years. This community college is unique in that it is a singly accredited institution that currently has 45 campus and site locations across the state of Indiana that serve nearly 160,000 students a year in traditional face to face classes and online classes (Ivy Tech Community College, 2017).

During my tenure at this institution, I have had the opportunity to serve in various roles. Currently at my local campus, I am a professor within the science department mainly teaching anatomy and physiology courses to students wanting to earn a degree in nursing, medical assisting, or health care support. Prior to my current position, I served as the chair of the life and physical science department. This position allowed me to schedule classes, add/remove courses, onboard new full-time and adjunct faculty members, mentor faculty members, etc.

In addition to the roles and responsibilities at the local campus level, I have also been involved with statewide College policies, procedures, roles, and responsibilities. For instance, I served as one of our College's representatives for the Association of American Colleges & Universities (AAC & U) for the last two years, and I have served on the statewide Life Science Curriculum committee for the last ten years. This committee works with items such as instructor credentialing, developing and modifying course learning objectives/outcomes, course assessments, articulation agreements with 4-year

institutions, etc. This committee must be diligent with our work because our decisions ultimately affected the 45 college locations across the state.

By working at my local campus with new(er) faculty members, working with the AAC & U, working at the state level of the College, and working with other colleges with articulations agreements and transferability of credits, I began to see a pattern. I learned that new(er) faculty members do not know what to teach and other colleges want more specific learning objectives/outcomes. This led me to take a closer look into our curriculum to investigate and determine what was actually being taught. So, with this project I wanted to develop a curriculum map to determine if this tool would be beneficial for the faculty members at my particular campus.

Focus Questions

The purpose of this research was to assess science faculty about the need for and use of curriculum mapping for anatomy and physiology courses at a community college. Questions to be answered included:

How did faculty use the current learning objective for this lesson?

How beneficial and appropriate was the current learning objective to faculty?

How would a curriculum map be received and used by faculty?

How would faculty feel about pairing up their lesson with nationwide standards?

What were the differences between the interpretation and understanding of this learning objective between full-time and adjunct faculty?

What content did faculty members currently cover in their anatomy and physiology course?

How well did the material that instructor's teach match up with the Human Anatomy and Physiology Society Standards?

After reviewing faculty course material, what amount of horizontal consistency was there between the faculty of this course?

Support Team

There have been multiple individuals who helped me during this initial process and who will continue to help me over the next several months. First, as my committee chair and instructor, Walt Woolbaugh has helped me a tremendous amount over the last two courses that I had him as my instructor. By having weekly assignments, Dr. Walter Woolbaugh always provided valuable information, ideas, suggestions, etc. that have definitely helped to shape my paper and research. Secondly, my science reader Dr. Steve Kristoff is a former colleague of mine, and we have been friends for years. I love that Steve is a very intelligent individual who was able to provide valuable feedback for this project. I have emailed him multiple times and met with him this semester to discuss my research. All of our communication has been very worthwhile from grammatical changes to altering my interview questions to make them more appropriate for what I was trying to ask. Dr. Rebecca Rahschulte is part of my support team also. She is also very intelligent and my wife. She loves research and writing research papers. Having her on my team is great because she, more than anyone, wants me to graduate. However, because she is a research fanatic, she is very critical about every single aspect of my work. I have learned over the years not to give her a paper and ask her to critique it because it will come back butchered. Instead, I give her a section/part/paragraph/sentence

and then I will ask her a specific question about it. Otherwise, I will get a long lecture on why it is not done correctly. But she is great at what she does. Professor Ron Nicholson is also on my team. Ron is an English faculty member with whom I have worked very well with over the last several years. He is very good at writing, formatting, citations, etc. I have worked with all of these individuals in the past and they are great resources to utilize in this process.

CONCEPTUAL FRAMEWORK

Having a well-developed curriculum is important at any level of education. A standard curriculum beginning at the kindergarten level is necessary so that students will be able to develop the skills, tools, and knowledge necessary to understand concepts and be successful at the next grade level. Nationally recognized standards within the states are known as the "Common Core." Currently, forty-two states have adopted the Common Cores State Standards and are using this curriculum to prepare students for college and a career (Common Core State Standards Initiative, 2017).

However, when students graduate from their high school and attend college, most courses will not have a state or national curriculum of core standards. (Some courses will have core standards based on their governing bodies and the majority of these are degrees that require certifications and/or licensures, such as state nursing boards or CISCO for some computer science degrees).

However, even though there are courses that do not have a curriculum of core standards, there are major learning objectives that must be covered within the courses. Therefore, courses should have horizontal and subject matter coherence in which

curriculum within a similar course should have the same learning standards (Hidden curriculum, 2014; Schweitzer, 2017). For instance, an English 101 course at one institution should be similar to another institution's English 101 course because they will have similar major learning objectives. However, the majority of time these learning objectives are very vague. At the college level, instructors have their specific knowledge base and research interest based on their own educational backgrounds. Because of this, they are able to tweak the learning objectives to fit into their knowledge base and research. The students' ability to learn from a particular instructor who has expertise in a specific area is a wonderful experience, but sometimes it leads to some learning objectives being covered more than others or some not covered at all. This can also create too much variation between classes of the same subject matter, even within the same college, and we lose some consistency between the materials covered. So, is it possible to take the major learning objectives that are used in the college setting and develop a basic curriculum map that will help guide instructors on the core concepts that need to be covered during that particular course material without hindering their content expertise and academic freedom?

Curriculum mapping was largely influenced by Fenwick English in the 1970's and 1980s (Jacobs, 1997). According to English (1980, p. 558), "Curriculum mapping is a reconstruction of the real curriculum teachers have taught." He wanted to determine what was actually happening in the classroom. The two parts of curriculum mapping that English was interested in were the content taught and time spent covering that material. Once this was determined, he thought that teachers/schools/districts could build

sequencing of instruction and decrease the amount of repetition of material (English, 1980).

Over the decades there has been additional research completed on curriculum mapping. Curriculum mapping has been defined as "the process of indexing or diagramming a curriculum to identify and address academic gaps, redundancies, and misalignments for purposes of improving the overall coherence of a course of study and, by extension, its effectiveness" (Hidden curriculum, 2014, para. 1). Randles (2017, para. 1) stated, "Curriculum mapping lets educators collect and record curriculum-related data that identifies the core skills and content taught, the processes employed and the assessments used for each subject area and grade level." Burns (2001, para. 2) stated, "A curriculum map serves this purpose by identifying the actual taught curriculum and allowing teachers to compare their curriculum with that of others who teach the same grade or subject…" However, as it is defined, a curriculum map allows us to investigate our classes to determine what needs to be taught.

In addition to identifying the content taught, there were additional benefits to curriculum mapping. Mapping ensured horizontal continuity (horizontal coherence) between classes (Burns, 2001; Hidden curriculum, 2014; Hoyle, English, & Steffy, 1994). Mapping maximized the use of student time (Burns, 2001; English, 1980; Hoyle, et al., 1994;). Mapping avoided unnecessary instruction overlaps (repetitions) or gaps in material (Burns, 2001; English, 1980; Hidden curriculum, 2014; Hoyle, et al., 1994). Mapping enabled schools to reach their goals (subject-area coherence) (Hidden curriculum, 2014; Hoyle, et al., 1994).

As was previous mentioned, I worked in various capacities within my college at a local, state, and national level. I wanted to determine if I could use this experience and exposure to make an impact at my local level of this institution. The best way I determined I could make a change was within my classroom and my science department by making our classes stronger. Therefore, this research was to investigate and assess if science faculty members thought there was a need for the development of a curriculum map within our anatomy and physiology classes, and to determine if this curriculum map would be useful to the faculty members.

Hopefully, this research could lead to similar results that were documented by Uchiyama and Radin (2008). Their research involved eleven school of education faculty members, from four different institutions, in higher education who received a grant to develop standards for their courses. Their goal was to align and articulate their curriculum. This was first done horizontally by course and secondly done vertically across a sequence of courses. They were able to develop curriculum maps that were beneficial for the faculty. This project also led to increased collaboration and collegiality between the faculty members involved.

METHODOLOGY

The community college where this research took place is located in Indiana. This college is divided into fourteen regions throughout the state and has 45 campus and site locations that serve about 160,000 students a year (Ivy Tech Community College, 2017). The particular region that was used in this study was the Southeast regions, which consists of the Madison, Lawrenceburg, and Batesville campuses/sites. This region is Ivy

Tech Community College's smallest region and has a student enrollment of 2,000+ students per semester. While there are a high number of transfer students, Ivy Tech's specialty programs for this region include nursing, medical assisting, health care support, education, computer science, informatics, and criminal justice. The most common programs that require the anatomy and physiology course which was the subject of this research are nursing, medical assisting, and health care support.

This region currently has seven faculty members who teach the anatomy and physiology course that was used in this research. This includes four full-time faculty members and three adjunct faculty members. This region offers thirteen anatomy and physiology I courses. Our classes are capped at 24 students with the average class having 22, which means that these classes typically have 286 students in them per semester.

Because this is a community college, these are two-year Associate Degree programs. Students will typically begin their first semester taking anatomy and physiology I along with other courses. If the students progress through their courses and program as expected, they earn their Associate's Degree in two years. The majority of the students who went through the nursing program and earned their R.N. (Registered Nurse) degree continue on at our local four-year institution to earn their B.S.N. (Bachelor of Science in Nursing).

Instrumentation

For this research, I interviewed four full-time faculty members and three adjunct faculty members. The full-time faculty members who were interviewed have been teaching college courses from 4.5 to 33 years, while the adjunct faculty ranged from 1.5

to 23 years. The average length of time they have been teaching at the college level is 15 years for full-time faculty and 10 years for adjunct faculty. Specifically, for teaching a human anatomy and physiology course, the full-time faculty have taught between 1 to 33 years (12-year average) and the adjunct faculty have taught between 2 to 17 years (8-year average).

I began my study by collecting some general background information about the faculty members. I gathered this information during one-on-one interviews that I conducted with each faculty member. I thought the process of gathering this information first would allow them to speak about themselves and items that they are already familiar with before we dove into the main part of the interview which could have been more challenging for some of the faculty members. The background information consisted of items such as their highest degree earned, the last conference/seminar that they attended that involved the topic of anatomy and physiology, and how long they have been teaching, etc. The questions that were asked of faculty members are seen in Table 1 below.

Table 1
Initial Background Questions for Faculty Members

What is your highest degree (Be specific)? _____
How many graduate credit hours have you taken in anatomy or physiology? _____
When was the last seminar/conference/etc. that you attended for anatomy and physiology?_____
How long have you been teaching?_____
How long have you been teaching at the college level? _____
How long have you been teaching at this college?_____
How many years have you been teaching A&P? _____
Have you had previous/current career(s) in science-related field(s) that were not teaching? If yes, please explain. _____

After the initial information was gathered from the background questions, an additional series of questions was asked. For this part of the interview, the faculty members were initially given a piece of paper with the College's current learning objective that covered the Integumentary System. This learning objective is, "Identify and describe the structure and function of the skin and accessory structures" (Ivy Tech Community College, 2015). The faculty members were asked to review this learning objective. Once reviewed, the faculty members were asked to respond and rate several questions about this learning objective. These were questions one through three in Table 2 below.

Table 2
Questions to Faculty about The College's Current Learning Objectives

1. What do you think about the learning objective that is currently used for the Integumentary System for APHY 101?

   Probe: Why do you think this?

   The current learning objective provides me with sufficient information to teach this material.

   strongly disagree disagree neutral agree strongly agree

2. Looking at the current learning objective, I know what I am expected to cover in regards to the Integumentary System.

   strongly disagree disagree neutral agree strongly agree

   Probe: Why do you think this?

   The learning objective provides enough information to cover the material accurately.

   strongly disagree disagree neutral agree strongly agree

   Based on the current learning objective, I am confident that I am covering what is expected.

   strongly disagree disagree neutral agree strongly agree

Table 2-Continued

Questions to Faculty about The College's Current Learning Objectives (continued)

3. How do you determine what you are going to cover in regards to the Integumentary System?

   Probe: How did you come up with this method to determine what you were going to cover?

   (ex. From current full-time faculty, from your teaching experience, from your previous work experience, other?)

   Do you believe it works?

   Explain.

4. I would find it beneficial if there was a curriculum map to guide me about what course content should be included for the Integumentary System

   strongly disagree disagree neutral agree strongly agree

   Probe: How would this help you?

   How would this possibly change how you currently teach or prepare your lesson?

   Having the access to a curriculum map will help my teaching or prepping of this lesson (Integumentary System).

   strongly disagree disagree neutral agree strongly agree

   Explain.

   I feel that a curriculum map will develop consistency/continuity between classes of various instructors.

   strongly disagree disagree neutral agree strongly agree

   Why or why not, explain.

   I think a curriculum map would be beneficial for all faculty members.

   strongly disagree disagree neutral agree strongly agree

   Why or why not?

   I think a curriculum map would be beneficial for new(er) faculty members.

   strongly disagree disagree neutral agree strongly agree

   Why or why not?

5. Do you or the College have student learning outcomes for this course?
   Probe: If yes, what specifically are they and how do you know that you are meeting these outcomes?

6. Are you familiar with the Human Anatomy and Physiology Society (HAPS)?
   Probe: I am familiar with the HAPS standards.

   strongly disagree disagree neutral agree strongly agree

Table 2 - Continued

Questions to Faculty about The College's Current Learning Objectives (continued)

7. It would be beneficial to link the course learning objectives to state or nation-wide anatomy and physiology standards (such as HAPS).
   strongly disagree disagree neutral agree strongly agree
   Probe: I believe that having the course learning objectives linked to a nation-wide anatomy and physiology standard would help me prepare and teach the course material better.
   strongly disagree disagree neutral agree strongly agree
   Explain.

8. Other comments/suggestions

Next, faculty members were given a curriculum map over the Integumentary System. The curriculum map can be seen in Table 3 below. Faculty members were asked to review this curriculum map. Once reviewed, faculty members were asked to respond and rate several questions about this curriculum map. These were in question four in Table 2 above.

Table 3

Curriculum Map for the Integumentary System

Curriculum Map for the Integumentary System

Main Heading	Learning Objectives	Subheadings	
Functions of the skin	Understand and be able to describe the main functions of the skin.		1. Temperature control 2. Water barrier 3. Barrier to the outside environment 4. Houses sensory receptors and provides sensory information excretes wastes 5. Synthesizes vitamin D 6. Protects underlying tissue from UV radiation
Layers of the skin		Epidermis	Thin Skin Thick Skin

Table 3-Continued
Curriculum Map for the Integumentary System (continued)

	Differentiate between the epidermis, dermis, and subcutaneous layer.		Types of Cells 1. Keratinocytes 2. Melanocytes 3. Langerhans cells 4. Merkel cells 5. Extracellular lipids
			Layers of Epidermis 1. Stratum Basale 2. Stratum Spinosum 3. Stratum Granulosum 4. Stratum Lucidum 5. Stratum Corneum
			Keratinization
		Dermis	Layers of Dermis 1. Papillary region 2. Reticular region
		Subcutaneous layer	
Skin Color	Explain how skin color is determined.		1. Melanin 2. Carotene 3. Hemoglobin
Accessory Structures of the Skin	Differentiate between the accessory structures of the skin.		1. Hair 2. Skin Glands a. Sebaceous glands b. Sudoriferous glands c. Ceruminous glands 3. Sensory receptors 4. Nails a. Nail body b. Free edge c. Nail root d. Cuticle e. Lunula
Skin Damage and Repair	Understand the types of skin damage and the stages of repair.		1. Epidermal Wound Healing 2. Deep Wound Healing a. Inflammatory phase b. Migratory phase c. Proliferative phase d. Maturation phase

After the curriculum map portion of the interviews were complete, faculty members were given a copy of the Human Anatomy and Physiology Society (HAPS) Standards for the Integumentary System. “The mission of HAPS is to promote excellence in the teaching of anatomy and physiology” (Human Anatomy and Physiology Society, n.d.). HAPS Standards provide guidelines and learning outcomes for anatomy and physiology courses. The HAPS Standards can be seen in Table 4 below. Faculty members were asked to review these HAPS Standards. Once reviewed, faculty members were asked to respond and rate several questions about the HAPS Standards. These were in questions six and seven in Table 2 above.

Table 4
HAPS Standards: Guidelines and Outcomes for the Integumentary System

Topic from HAPS Guidelines	Learning Outcome
1) General functions of the skin & the subcutaneous layer	1. Describe the general functions of the skin.
	2. Describe the general function of the subcutaneous layer.
2) Gross & microscopic anatomy of the skin	1. With respect to the epidermis
	a. Identify and describe the tissue types making up the epidermis.
	b. Identify and describe the layers of the epidermis, indicating which are found in thin skin and which are found in thick skin.
	c. Correlate the structure of thick and thin skin with the locations in the body where each are found.
	d. Describe the processes of growth and keratinization of the epidermis.
	2. Identify and describe the dermis and its layers, including the tissue types making up each dermal layer.
	3. Identify and describe the subcutaneous tissue, including the tissue types making up subcutaneous tissue.

Table 4-Continued
HAPS Standards: Guidelines and Outcomes for the Integumentary System (continued)

	4. With respect to skin color:
	a. Describe the three pigments most responsible for producing the various skin colors
	b. Name the layers of the skin that contain each of these pigments.
3) Roles of specific tissue layers of skin & the subcutaneous layer	1. With respect to the epidermis
	a. Describe the functions of the epidermis
	b. Explain how teach of the five layers, as well as each of the following cell types and substances, contributes to the functions of the epidermis; stem cells of stratum basale, keratinocytes, melanocytes, Langerhans cells, Merkel cells and discs, keratin, and extracellular lipids
	c. Explain why the histology of the epidermis is well suited for its functions.
	2. With respect to the dermis:
	a. Describe the overall functions of the dermis.
	b. Describe the specific function of each dermal layer and relate that function to the skin's overall functions.
	c. Evaluate the advantages and disadvantages of the structure of the papillary and the reticular layers/regions.
	3. With respect to the subcutaneous layers:
	a. Describe the functions of the subcutaneous layer.
	b. Evaluate the advantages and disadvantages of having areolar connective tissue in this layer.
	c. Describe the thermoregulatory role played by adipose tissue in the subcutaneous layer.
	4. Analyze the benefits of skin being a multilayered organ.
4) Anatomy & functional roles of accessory structures	1. With respect to the following - sweat glands (eccrine and apocrine), sebaceous glands, nails, hair (follicle and arrector pili muscle), and sensory receptors (Merkel cell, Meissner's & Pacinian corpuscles, hair follicle receptor and temperature receptors):
	a. Identify each structure
	b. Describe the location of each structure in the body
	c. Describe the anatomy of each structure
	d. Describe the function of each structure

Table 4-Continued
HAPS Standards: Guidelines and Outcomes for the Integumentary System (continued)

	2. Describe the growth cycles of hair follicles and the growth of hairs.
	3. Explain the physiological importance of the presence or absence of sebaceous glands, sweat gland, and hair in the skin of the palms and fingers.
5) Application of homeostatic mechanisms	1. Provide specific examples to demonstrate how the integumentary system responds to maintain homeostasis in the body.
	2. Explain how the integumentary system relates to other body systems to maintain homeostasis.
6) Predictions related to homeostatic imbalances, including disease states & disorders	1. Predict factors or situations affecting the integumentary system that could disrupt homeostasis.
	2. Predict the types of problems that world occur in the body if the integumentary system could not maintain homeostasis.

While faculty members still had access to the HAPS Standards, they were asked to identify if they taught each of the HAPS Standards guidelines and learning outcomes. The faculty members completed this information within Table 5 below. In addition to faculty identifying what they covered, I asked them to provide me with their Powerpoint lecture notes to review. Upon review of each instructor's Powerpoints, it was determined if each of the HAPS Standards guidelines and learning outcomes was found in their Powerpoint notes or not. This information was also collected in Table 5 below.

Table 5
Guidelines and Learning Outcomes Covered Through Course Material and Assignments

		During the faculty interview, the faculty member stated this item was covered by:				
HAPS Guideline, Learning Outcome	This item is found in the faculty's Powerpoint notes.	lecture	lab	assigned readings	homework	Other
1.1.						
1.2.						
2.1a						
2.1b.						
2.1c.						
2.1d.						
2.2.						
2.3.						
2.4a.						
2.4b.						
3.1a.						
3.1b.						
3.1c.						
3.2a.						
3.2b.						
3.2c.						
3.3a.						
3.3b.						
3.3c.						
3.4.						
4.1a.						
4.1b.						
4.1c.						
4.1d.						
4.2.						
4.3.						

Table 5-Continued
Guidelines and Learning Outcomes Covered Through Course Material and Assignments (Continued)

5.1.						
5.2.						
6.1.						
6.2.						

The gathering of multiple sources of data allowed me to triangulate this information (Table 6).

Table 6
Questions showing way in which data collection occurred.

	Interview with individual instructors with current College Learning Objectives	Review of instructor's notes	Link the instructor notes with the HAPS Standards	Interview with individual instructors using a curriculum map of this course material
1.Science faculty perspective about the need for curriculum mapping in an A&P course.	X			X
2.What do the faculty members that teach A&P currently cover?	X	X		
3.Does the material that is taught match the HAPS standards?	X		X	
4.To what degree is there horizontal consistency between various instructors of this A&P course?	X	X		
5.Would a curriculum map influence the faculty's development of their course material?	X			X

To help maintain and insure validity and reliability, data was collected objectively during the faculty interview process by the researcher. The instruments used were reviewed by peers and by the professor. The interview questioning was consistent

between the faculty who were interviewed. An IRB exemption was granted for this research by Montana State University Institutional Review Board (Appendix A).

DATA AND ANALYSIS

Interpretation of Results

A review of the Initial Background Questions for Faculty Members in Table 1 was the first step in this process. A variety of educational backgrounds were identified with the faculty during the interview process. Seventy-five percent (75%) (*N*=4) of full-time faculty and 66% (*N*=3) of adjunct faculty hold a master's degree. For full-time faculty, these included a M.A. in Executive Development in Public Service, a M.S. in Anatomy, and one faculty member has earned a M.A. in Secondary Teaching (for biology), a Master's in Divinity and an additional Master's in Philosophy. One of the adjunct faculty members holds three master's degrees, an M.A. in Life Science Education, M.S. in Curriculum and Instruction, and a M.S. in Educational Leadership; while another adjunct faculty member has a M.S. in Biology. Of these four full-time faculty members that were interviewed, 50% of them earned a doctoral degree, one was a Ph.D. in Molecular Pathology and the other was a Ph.D. in Education. Thirty-three percent (33%) of the adjunct faculty earned a doctoral degree, and that was a Ph.D. in Physiology and Biochemistry. Another adjunct faculty member is in the process of earning an Ed.D. in Educational Leadership.

The educational background information that was gathered produced generally the same percentage of degrees between full-time and adjunct faculty members. Table 7 indicates the educational background and the types of degrees earned by faculty members

who were interviewed. This College minimally requires a master's degree in the area in which instructors teach, so there was no surprise that every faculty member holds a master's and/or doctoral degree.

Table 7
Educational Background of Full-time and Adjunct Faculty.

		Master's Degree	Doctoral Degree
Full-time Faculty	Faculty 1	Executive Development in Public Service	Ph.D. in Education
	Faculty 2	M.S. in Anatomy	
	Faculty 3		Ph.D. in Molecular Pathology
	Faculty 4	Secondary Teaching (biology), Divinity, Philosophy	
Adjunct Faculty	Faculty 1	Life Science Education, Curriculum and Instruction, Educational Leadership	Currently earning an Ed.D. in Educational Leadership
	Faculty 2		Ph.D. in Physiology and Biochemistry
	Faculty 3	Biology	

Through their graduate level of education, 57% of the faculty interviewed (25% of these full-time faculty members and 66% of the adjunct faculty) have never taken a single course in human anatomy and physiology. However, 71% of the faculty members interviewed (75% of the full-time faculty and 66% of the adjunct faculty) had previous experience in science-related fields, as research assistants, lab technicians, research analysts, and research scientists. And, currently 14% of the faculty (25% of full-time faculty and 0% of adjunct faculty) are members of a science organization. Since the majority of faculty members do not have a background in human anatomy and

physiology, they tend to rely mainly on textbooks to determine what information they will teach during this class. Other faculty stated that they will have discussions with other faculty members, their department chair, or they draw on past experience/work to help them determine what they will teach within this human anatomy and physiology course.

The second step in the data analysis was interpreting the results from Table 2, Questions to Faculty about The College's Current Learning Objective. When asked if the learning objective provides sufficient information to teach this material, full-time faculty members all agreed with this statement and scored it a 4/5 on a Likert scale while adjunct faculty all disagreed with this statement and scored it a 2/5 on a Likert scale. Even though full-time faculty members agreed that the statement provided sufficient information to teach the material, they also expressed that it was "a good starting point", "not specific", and "vague." Adjunct faculty members stated that it was "too vague", "no information about the depth of the material to cover", and "there is not enough guidance about what is expected." It appears that full-time faculty understand expectations better than the adjuncts do. So, even though full-time faculty think the current learning objectives provide sufficient information as "a good starting point", they understand where the ending point is supposed to be. Because adjunct faculty do not appear to have a full understanding of the culture and expectations of the College, the current learning objectives do not provide sufficient information for them.

The faculty were then asked, by looking at the College's learning objective, do you know what you are expected to cover in regards to the Integumentary System? The results from full-time faculty to this question varied from neutral (3) to strongly agree (5),

with the average being a 4.25/5 on a Likert scale, while adjunct faculty all disagreed (2) with the statement and scored it a 2/5 on a Likert scale. This appears to be because the adjuncts are not immersed in the College, like full-time faculty are, and therefore want more specific guidance. When the question was followed-up by asking if they believe that the learning objective provided enough information to cover the material accurately, full-time faculty results varied more, ranging from disagree (2) to strongly agree (5), with the average being a 3.25/5 on a Likert scale. Adjunct faculty results ranged from strongly disagree (1) to disagree (2) and averaged a 1.7/5 on a Likert scale.

Full-time faculty appear more sure of what to cover because they are full-time faculty and because they have more understanding of the college system. Because adjuncts are not full time, it appears that they want to have more guidance, approval, and support that they are teaching the right material accurately within the classroom.

When faculty were asked “how confident do you feel that you are covering what is expected for this material,” full-time faculty responses ranged from neutral (3) to strongly agree (5) with an average of 4.5/5 on a Likert scale. Adjunct faculty ranged from disagree (2) to strongly agree (5) with an average of 3.7/5 on a Likert scale.

Even though faculty want more guidance with the material taught, most are still confident they are covering what is expected. This is due to the fact that most of faculty members cover the information that is in the textbook.

The faculty were then asked if they thought most faculty would interpret these learning objectives the same way. Most of the full-time faculty disagreed with this statement. Results from the full-time faculty ranged from disagree (2) to strongly agree

(5) with the average of a 2.75/5 on a Likert scale. Adjunct faculty all disagreed (2) with this statement and averaged a 2/5 on a Likert scale. The faculty's perspective on the current learning objectives of the College is seen in Figure 1.

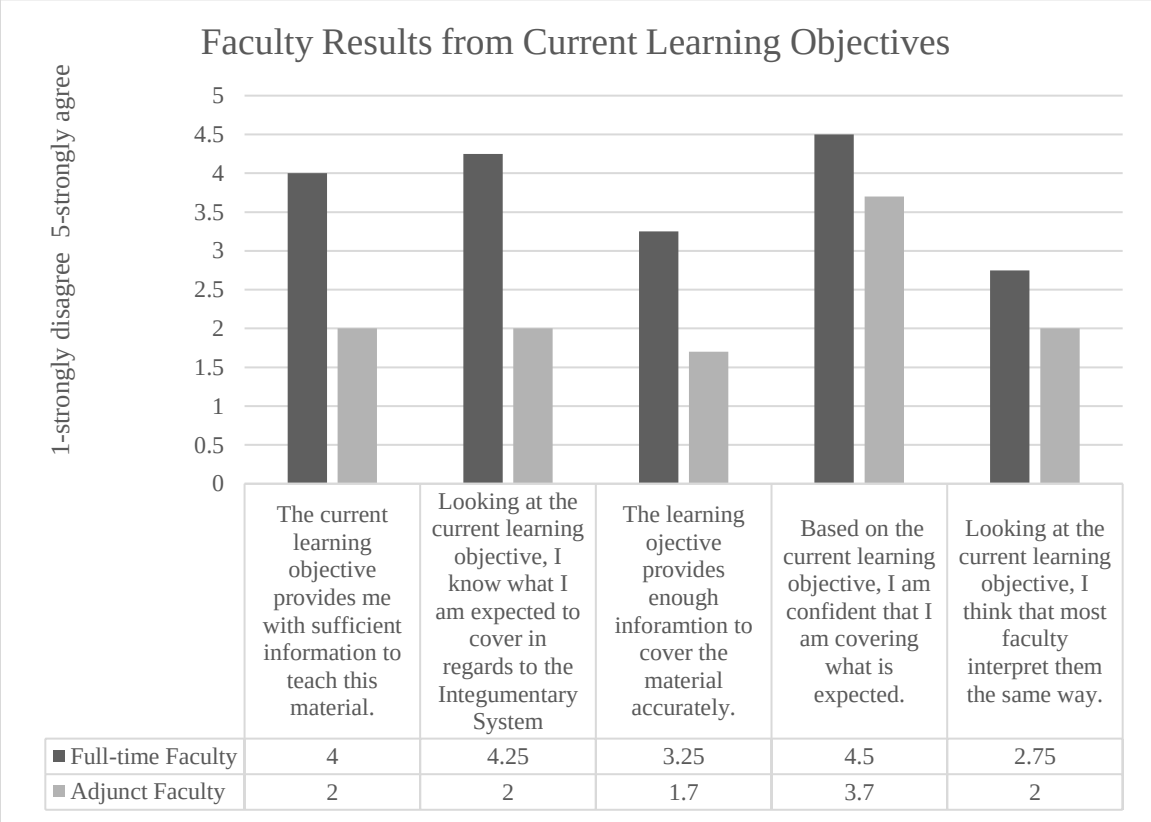

Figure 1. Faculty perspective on current learning objectives, (*N*=7).

Clearly, most of the faculty do not believe that the current learning objectives are interpreted the same way. This could be due both to lack of faculty educational background in anatomy and physiology and vague learning objectives that are left up to each person's interpretation.

The combined results from the full-time faculty about the current learning objective for this class are positive. However, the data showed a drop with the adjunct faculty. The adjunct faculty do not believe the current learning objective is sufficient

enough, they do not know what they are expected to cover in class, and they do not believe that it provides enough information to cover the material accurately. However, both faculty groups are confident that they are covering what is expected. Neither faculty group believes that other faculty members will interpret the learning objective the same way.

The faculty were then asked to review the curriculum map for the Integumentary System (see Table 3). While looking at the curriculum map, the faculty were asked if this would be beneficial to guide them in what course content should be included in the Integumentary System. All of the full-time and adjunct faculty members strongly agreed (5) with this statement and both faculty groups had an average score of 5/5 on a Likert scale. Full-time faculty stated the curriculum map provided a "great outline of the material," it was "more specific," and it was "more clear about what needs to be covered." One adjunct faculty member stated, "It is more detailed to understand my expectations." The faculty were then asked if having accessibility to a curriculum map would help their teaching and/or prepping of this lesson. Full-time and adjunct faculty all strongly agreed (5) with this statement and averaged a 5/5 on a Likert scale.

The interviewed faculty were asked if the curriculum map would develop consistency between classes of various instructors teaching human anatomy and physiology and the full-time and adjunct faculty results ranged from agree (4) to strongly agree (5). Faculty comments included, "We would know what the other instructors were teaching," "The faculty would all be on the same page," and "Students would not 'shop

around' for the easier teacher." The full-time faculty averaged a 4.75/5 on a Likert scale and the adjunct faculty averaged a 4.7/5 on a Likert scale.

When asked, full-time faculty thought that the curriculum map would be beneficial for seasoned faculty members (4.75/5 on a Likert scale), but thought it would be more important (5/5 on a Likert scale) for new/er faculty members. Adjunct faculty results indicated that the curriculum map would be beneficial for seasoned and new/er faculty members equally since their results were a 5/5 on a Likert scale for both of these questions. Comments from faculty included, "Everyone would benefit from this tool" and "This map is critical for the onboarding of every new faculty member."

However, one potential negative to curriculum mapping could be the limitation or reduction of academic freedom. Even though the curriculum map was more detailed than the College's current learning objective, the faculty members did not think this would limit their academic freedom. One faculty member commented that "This would broaden my teaching because this would show me additional content that I wouldn't normally cover. I really like it." The full-time faculty members averaged a 1.25/5 on a Likert scale and the adjunct faculty member's results averaged a 1.7/5 on a Likert scale. The faculty's perspective on the use of the curriculum map is seen in Figure 2. This does not appear to be a factor in limiting the instructor's academic freedom because the majority of content on the curriculum map are items that are currently being taught by these faculty members.

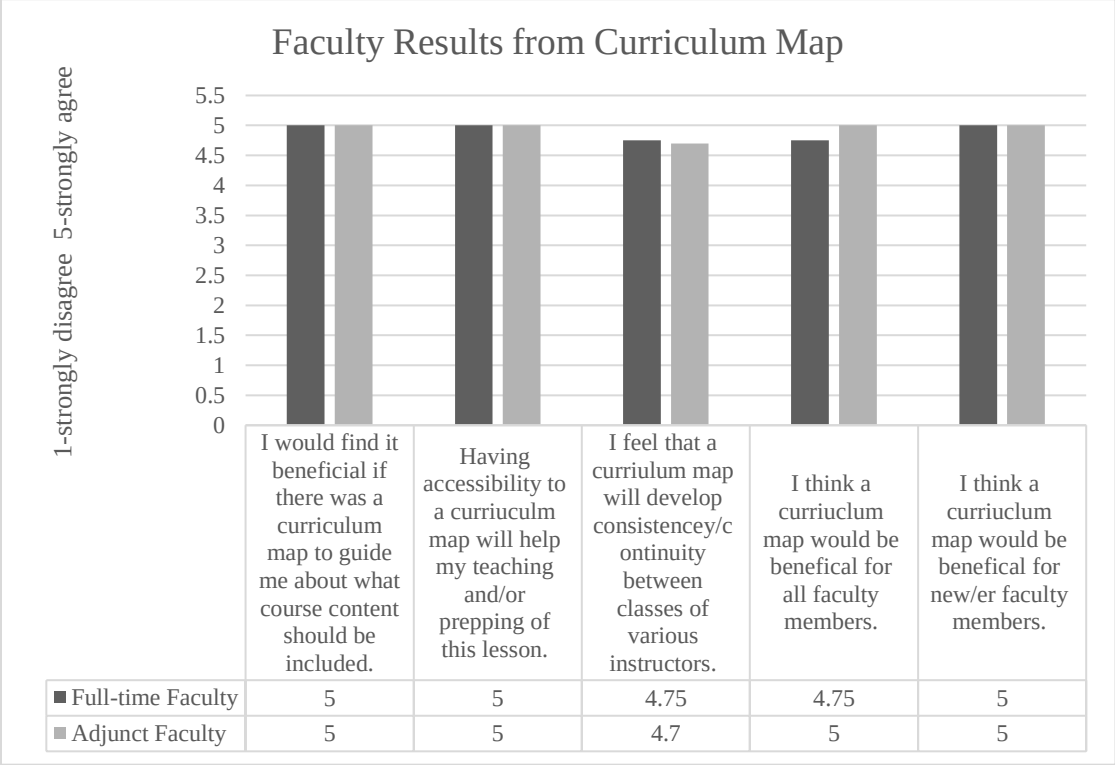

Figure 2. Faculty perspective on curriculum map, (*N*=7).

The data showed that the combined faculty thought a curriculum map would be greatly beneficial to help guide them about what course content should be covered. The data also suggested that a curriculum map would be beneficial to faculty teaching and/or prepping of their material for class. Faculty thought it would develop more horizontal consistency between classes. Lastly, the data strongly suggests that a curriculum map would be beneficial for all faculty members. This indicated that faculty members want to have more structure and guidance to make sure they are accurately covering what is expected in their class.

The faculty were then asked if they were familiar with the Human Anatomy and Physiology Society (HAPS). Two of the full-time faculty members have heard of the

HAPS organization, and another faculty member was very familiar with HAPS because he is a member of this organization. Only one adjunct faculty member was familiar with the HAPS organization. When the faculty were asked if they were familiar with the HAPS Standards for teaching human anatomy and physiology, they ranged from strongly disagree (1) to neutral (3) on a Likert scale for full-time and adjunct faculty members. The average of their familiarity with the HAPS Standards was 2.25/5 on a Likert scale for the full-time faculty and a 1.3/5 on a Likert scale for the adjunct faculty. When the faculty were asked if it would be beneficial to link the course learning objectives to nation-wide standards, such as HAPS, the results ranged for full-time faculty from disagree (2) to strongly agree (5) with the average being 3.75/5 on a Likert scale. For the adjunct faculty, the results ranged from agree (4) to strongly agree (5) with an average of 4.7/5 on a Likert scale. Some faculty stated that it was "too detailed" and "too specific" learning outcomes. An example of this that was brought up during the interviews was HAPS Guideline 4 Learning Objective 1. While all of the faculty members covered the sweat glands, sebaceous glands, nails, and hair for this objective, none of them discussed Merkel cells or Meissner's & Pacinian corpuscles.

When this question was followed up by asking if the HAPS Standards would help the faculty better prepare and teach the course material, the results ranged again from disagree (2) to strongly agree (5) for full-time faculty members and agree (4) to strongly agree (5) for adjunct faculty members. The full-time faculty averaged a 3.75/5 on a Likert scale while the adjunct faculty averaged a 4.7/5 on a Likert scale. The faculty perspective on the HAPS Standards is seen in Figure 3.

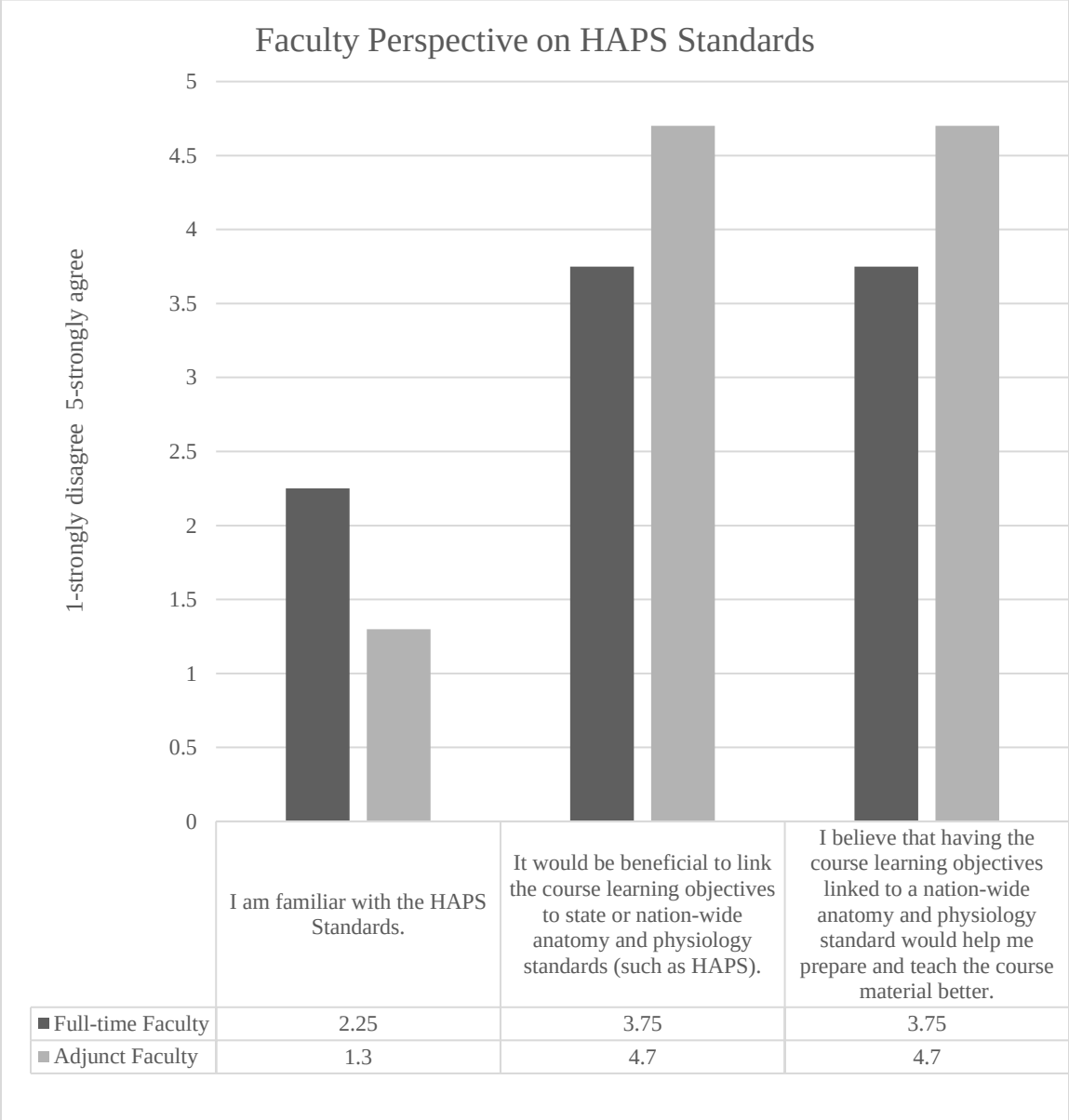

Figure 3. Faculty perspective on HAPS standards, (N=7).

This suggests that belonging to or even being familiar with a national organization, such as HAPS, is not important to the majority of faculty interviewed. Because the majority of faculty do not have an educational background in human anatomy and physiology, learning more does not seem to be an interest. Even though the

faculty are not familiar with this organization, they still graded the HAPS Standards high which indicated that they still want guidance about what material to teach in their course.

The final question from Table 2 that was posed to the full-time faculty members involved reviewing the current college learning objective, the curriculum map, and the HAPS Standards. The faculty were asked which would be the most beneficial for them to develop and teach the course material. Eighty-six percent (86%) of the faculty, 100% of the full-time faculty and 67% of the adjunct faculty, stated that the curriculum map would be the most beneficial to them. One faculty member stated, “I wish I had this 10 years ago.”

Even though most of the faculty interviewed were not familiar with HAPS or the HAPS Standards, they agreed that incorporating nation-wide standards (such as the HAPS Standards) into our current course learning objectives would be beneficial. After reviewing the interview results, it was determined that most faculty (especially adjunct faculty) want additional guidance in regards to the material that needs to be covered within this course. The faculty want to know that they are covering the correct course material.

The fourth step in the data analysis was to determine what the faculty teach during the study of the Integumentary System and how that correlates to the HAPS Standard guideline and learning outcomes. This was tracked by using Table 5 Guidelines and Learning Outcomes Covered Through Course Material and Assignments. This began by asking the faculty members what they covered in lecture, lab, assigned readings, homework, and other material.

When interview and results were tallied, the full-time faculty members covered an average of 86% of the HAPS learning outcomes in lecture while the adjunct faculty members covered an average of 84%. When asked which learning outcomes were covered during the laboratory portion of class, the full-time faculty averaged 41% while the adjunct faculty averaged 27%. Faculty commented that “This material was covered in lecture, so I don’t cover it in lab.” and “I don’t really have a good lab for this topic.” One faculty member stated, “I don’t know how to build a lab exercise for this topic.” The lecture and laboratory results were then tallied together against the HAPS learning outcomes and between a combination of both of these portions of class, the full-time faculty covered an average of 93% and the adjunct faculty covered an average of 95%. It is good to see that the majority of the information from the HAPS Standards are being covered by the instructors. However, it appears that the laboratory component needs to be strengthened to make the learning process for students better. This could be completed by hosting a group session with all of the faculty or a lunch and learn event to develop collaborative thinking among the faculty. It also needs to be stressed to faculty members the importance of the laboratory portion of class in regards to the students educational progress and learning.

PowerPoint (Lecture) notes were also received from the faculty to determine what HAPS learning outcomes were met. These were reviewed and analyzed. It was determined that 27% of the HAPS learning outcomes were met by the full-time faculty notes and 24% were met by the adjunct faculty’s notes. Because the faculty use their PowerPoint (Lecture) notes to a varying degree, this was not a great reflection of what is

being taught in their classroom. Faculty commented that, “Not everything is on my lecture notes” and “I only have main topics in my notes and I expect the students to take notes and fill in the missing information.” Because the information on the PowerPoint (Lecture) notes ranged from minimal to detailed, drawing a common theme from all of them was not possible. The notes are designed by the faculty members and each faculty member has their own view of how the material should be presented and the student’s responsibility in regards to note taking, listening, and paying attention.

Figure 4 below indicates what percentage of the HAPS Learning Outcomes were met through lecture and/or lab, and what was covered in the faculty’s PowerPoint (lecture) notes.

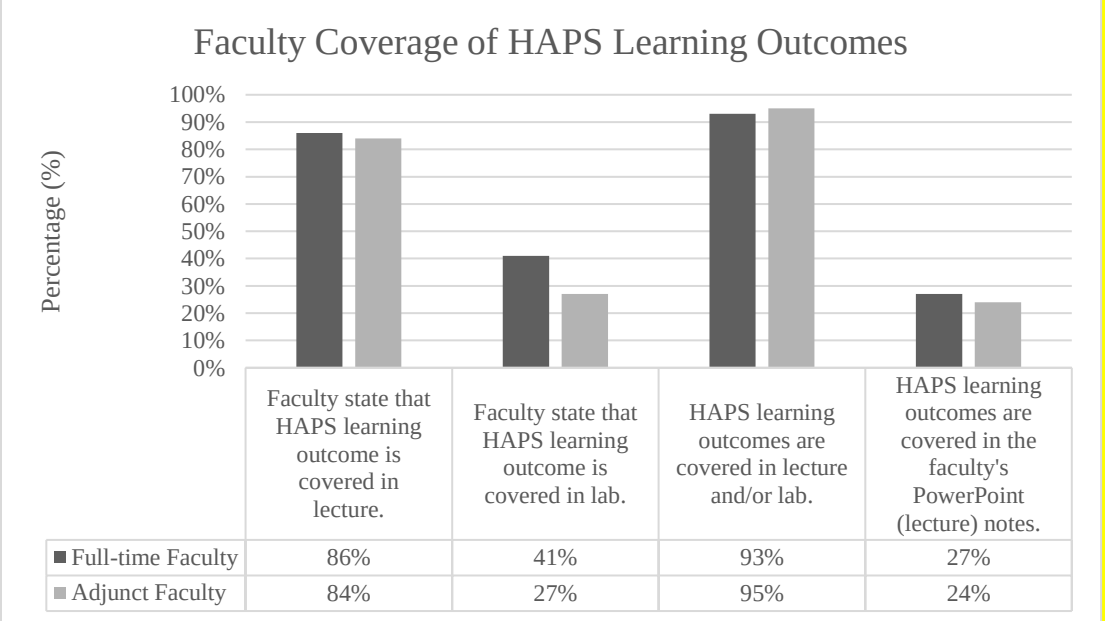

Figure 4. Faculty coverage of HAPS learning outcomes, (N=7).

All of the faculty members stated that they expect students to read the textbook and any other associated readings. The faculty interpreted this as the assigned readings

and homework. There was no other homework or other assignments that were given to the students by the faculty.

These results were also investigated to determine if there was horizontal consistency between instructors/classes. Even though the review of the faculty's PowerPoints showed that 26% of the HAPS learning outcomes were covered, the majority of the faculty only had 10% of the same material covered. When the lecture interview was reviewed, it revealed that the majority of full-time faculty covered 90% of the same HAPS learning outcomes and the majority of adjunct faculty covered 87%. During lab, the majority of full-time faculty covered 63% of the same HAPS learning outcomes and the majority of adjunct faculty covered 43%.

There is a discrepancy between the faculty's PowerPoint (lecture) notes and what they state is covered in the lecture and lab during the class. Even through the faculty cover similar content during the lecture portion of their class, there is difference between what is covered during the laboratory portion. This created horizontal inconsistency between these anatomy and physiology courses. This appears to be mainly linked to the faculty's educational background. Faculty who have a stronger science education background were more likely to complete labs that correspond to the lecture material.

INTERPRETATION AND CONCLUSION

This research was designed to assess the science faculty perspective about the need and use of a curriculum map for anatomy and physiology courses at a community college. Through the research it was determined that the faculty at this community college have diverse educational and teaching backgrounds. While all of faculty have

graduate level educational degrees, the majority (57% full-time and 71% adjunct faculty) of them have not taken any graduate level anatomy and physiology course work. Because of this, they mainly rely on textbooks to provide the information and guidance of what should be taught in their classroom. Some faculty reach out to colleagues and/or use their previous science related experience to determine what should be taught within their course.

The goal for this research was to first determine what the full-time and adjunct faculty thought about the current learning objectives for this anatomy and physiology course. What was determined from the research was that full-time faculty and adjunct faculty thought about the current learning objectives differently. Full-time faculty were able to take a one sentence learning objective and extrapolate that to understand what they were expected to cover within that material and to do it with confidence. Adjunct faculty did not have the ability do this.

This research finds that full-time faculty members are more involved, invested, and understanding about what is expected from their students and within this classes. Because of this, full-time faculty members are able to take a one sentence learning objective and better understand what that actually means. Since the adjunct faculty do not have the same relationship with the College, they do not know what is expected of them or their students. This creates a gap between the full-time and adjunct faculty that is seen in this research.

However, when full-time and adjunct faculty members were given a curriculum map to review, the received feedback changed. The curriculum map took the current

learning objectives and expanded on them to identify what needed to be covered within the classroom and what the students were expected to learn. Full-time and adjunct faculty members both agreed that this curriculum map would be beneficial to them. This map would be beneficial to faculty by allowing them to understand what material should be taught within this course. It would help with the preparation of the course material without effecting academic freedom. For the adjunct faculty, this curriculum map gave them structure and more importantly identified what they are expected to teach within that course content. According to this research, it gave them more confidence.

To take this a step further, the faculty reviewed the learning objectives set by the national organization HAPS. Both full-time and adjunct faculty thought these objectives provided structure and guidance, but they believed they were too specific about what needed to be taught. So, according to this research, the learning objectives by HAPS were better than the current learning objectives because they provided guidance, but because they were too specific they were not as beneficial as the curriculum map. Therefore, the incorporation of full-time and adjunct meeting(s) to discuss what needs to be taught within the course will be a great addition to the base curriculum map to determine what should and should not be covered within the course. Also, by having faculty involved with the process will help to create faculty acceptance of the use of the curriculum map.

The PowerPoint (Lecture) notes did not reveal any consistencies about what the faculty taught during this lesson. It would be beneficial to visit the faculty member's classroom next semester when they are covering this content to determine how the

material is covered within the lecture and the lab components. This will provide a better understanding of what the faculty teach during this lesson.

So, while the current learning objective provides a general overview of what is to be taught in the course, it did not provide enough information for the faculty. The current learning objectives allows an individual to skim the material quickly to determine what the main topics are for the course. However, faculty want to understand more specifically what is expected of them. This was the reason why 86% of the faculty stated that they would chose to use the curriculum map compared to anything else. One hundred percent (100%) of the faculty stated that a curriculum map would develop consistency between the anatomy and physiology classrooms.

VALUE

This research has impacted the researcher along the way. Speaking with my colleagues about courses, course development, learning objectives, HAPS, etc. helped me to understand them more. I also gained confidence that our faculty has done a great job in developing their course material and it is wonderful to know that our students have gained a great education.

However, we have things to work on. One of the items that I took away from this research is related to the adjunct faculty. We have to more involve the adjunct faculty with the department and the College. Adjunct faculty have to be taught about the College, such as the expectations, culture, an understanding of our policies and procedures, etc. We need to explain to them why we do what we do (inside and outside the classroom).

We need to realize that even though this learning objective makes sense to us, it does not make sense to the adjunct faculty member who is on campus one day a week and sees fifteen students for a few hours and then goes home. These faculty do the best they can to the extent that they know. Sometimes they will not understand that this course content needs to be taught because students will need it for anatomy and physiology II or advanced physiology, or medical surgical technology class, etc. The development of meetings/trainings/lunch and learns/etc. needs to be developed for faculty to make our department move more smoothly and to give our students the best education.

Because the curriculum map was a benefit for the faculty, the next step in this process is to develop a curriculum map for every lesson in our anatomy and physiology course. This will involve full-time and adjunct faculty members meeting together to discuss this material. The initial step would be to have each faculty member map out what they already teach in the class (lecture and lab). Then, this material should be reviewed chapter by chapter and then section by section aggregating all of the information from the faculty members. Once this is complete, the faculty will have to determine strengths, gaps, and weaknesses. We would have to fill in the gaps and weaknesses to make the map more complete. After this is complete for the first chapter, the process will continue until all of the course material goes through this process. This will be a live document that will have to be revisited periodically to make sure it is covering what is needed and wanted. When a single course is developed in this method, faculty will need to determine what type of assessments are appropriate for the content. Once a single course is complete, faculty will have to continue this process in other

related courses. This would allow faculty to develop vertical consistency between various levels of courses. This will be a consuming project, but definitely worth the effort since it will benefit the faculty and ultimately the students.

REFERENCES CITED

Burns, R. C. (2001). Curriculum handbook: Curriculum mapping, Alexandria, VA: Association for Supervision and Curriculum Development.

Common Core State Standards Initiative (2017). *Standards in Your State*. Retrieved from http://www.corestandards.org/standards-in-your-state/.

English, F. W. (1980) Curriculum mapping. *Educational Leadership* 37(7), 558-559.

Human Anatomy and Physiology Society (n.d.). *About HAPS*. Retrieved from http://www.hapsweb.org/?page=AboutHaps.

Hidden curriculum (2014, August 26), The glossary of education reform. Retrieved from http://edglossary.org/hidden-curriculum.

Hoyle, J. R., English, F. W., & Steffy, B. E. (1994) *Skills for successful school leaders, 2nd edition*. Arlington, VA: American Association of School Administrators.

Ivy Tech Community College (2017). *About Ivy Tech Community College*. Retrieved from http://www.ivytech.edu/about.

Ivy Tech Community College (2015). *Collegewide Course Outline of Record*. Retrieved from https://wwwapps.ivytech.edu/cor3/d/3/0/nCvLJwYJryz0TbkWYKIE52zc8deg7vwp93T4VsVlKYlXZmDpO8fGskZ95eTx4JPv.

Jacobs, H. H. (1997). *Mapping the big picture: Integrating curriculum and assessment K-12*, Alexandria, VA: Association for Supervision and Curriculum Development.

Randle, J. (2017, April 28) 6 benefits of curriculum mapping [Blog post]. Retrieved from https://www.iste.org/explore/articleDetail?articleid=935&category=Lead-the-way&article.

Schweitzer, K. (2017) Curriculum Mapping: Definition, Purpose, and Tips. Retrieved from https://www.thoughtco.com/curriculum-mapping-definition-4155236.

Uchiyama, K. P. and Radin, J. L. (2008) Curriculum Mapping in Higher Education: A Vehicle for Collaboration. *Innovation in Higher Education*, 33, 271-280.

APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD EXEMPTION LETTER

MONTANA
STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

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MEMORANDUM

TO: Scott Rahschulte and Walt Woolbaugh

FROM: Mark Quinn Mark Quinn Chj

DATE: October 16, 2017

SUBJECT: *"What Effects Would the Development and Use of a Curriculum Map Have on the Teaching of Anatomy and Physiology Courses at a Community College?" [SR101617-EX]*

The above research, described in your submission of October 16, 2017, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

__X__ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

__X__ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

____ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

____ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.

____ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

____ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.