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ASSESSING STUDENT LEARNING AND IMPROVING INSTRUCTIONAL METHODS FOR A KINESIOLOGY CAPSTONE COURSE

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Abstract

Introduction. Many college instructors use a teacher-focused rather than student-focused method of teaching their courses. This may result in a surface approach to learning by students. This study examines student feedback of a college course with the intention of understanding how a more student-focused approach may result in a deeper approach to learning by students. *Methods.* Investigators used surveys and concept mapping in order to gain a better understanding of how students in the course retained and understood course material as well as how they perceived their ability to apply that material. *Results.* Survey and concept maps indicate a portion of students enrolled in the course were unsure of their ability to understand and apply some of the concepts required to pass the course. Additionally, many were unable to make logical connections between some key concepts covered in the course. Finally, we learned how students perceived the course and how we may need to transition from a more teacher-focused to a more student-focused approach to teaching. *Discussion.* Based on these results a course redesign born of SoTL literature and based on the concept of integrated course design may be in order.

INTRODUCTION

Any inquiry into effective teaching must first begin with a critical consideration of how students learn. The publication of Ernest Boyer's *Scholarship Reconsidered: Priorities of the Professoriate* (1990) ushered in an increased interest in research focused on the learning sciences that has resulted in evidence-based principles on how to help students learn. The increased significance and value of scholarship of teaching and learning (SoTL) was in part formalized with the founding of the International Society for the Scholarship of Teaching & Learning in 2004 and the introduction of several journals that focus on SoTL, including the *International Journal for the Scholarship of Teaching & Learning,* the *Journal of the Scholarship of Teaching and Learning,* and the *Journal on Excellence in College Teaching.* Many college instructors, in particular college professors, who are experts in their field are not experts in how to teach students about their field. In fact, many instructors have little training in teaching. This is a missed opportunity to promote student success, increase student retention, and decrease the rate of failed and repeated coursework which decreases the time to graduation. For this study, we attempt to

introduce evidence-based practices into a capstone course to identify strategies for improving student performance.

The scholarship of teaching and learning is a recent focus in the academy that has the potential to improve instruction and student learning now and into the future (Gilpin, 2009). It uses discovery, reflection and methods that are based on evidence with the express purpose of improving teaching and student learning. It has also been described as "'scholarly teaching' the purpose of which is to affect teaching and learning, in addition to scholarly communication" (Richlin, 2004). Scholarly teaching takes seriously that learning one's field of study is an unending quest that requires continued engagement with the developments in the field as well as inquiry into how to convey this knowledge. This commitment is an important source for inspiring others to do the same and hopefully results in the development of newer and better methods of teaching (Boyer, 1990). Scholarly teaching is an emerging research focus in the field of kinesiology. Examples of SoTL in kinesiology include research that focuses on concept mapping (Henige, 2012), self-efficacy gains (Curry et al., 2010), and students' attitudes toward instruction methods (Henige, 2011). Despite the emerging scholarly literature, there are still significant gaps and ample opportunity for future SoTL research as it pertains to kinesiology.

The scholarship of teaching and learning has been defined in a number of ways. In a recent study it was defined as "having a primary focus on improving the learning of the teachers' students, while satisfying several key elements of scholarship: a scholarly inquiry leading to the production of a public artefact and the peer review of that outcome" (Trigwell, 2013). In that study they showed a positive relationship between key elements of SoTL and a Conceptual Change / Student-Focused (CC/SF) approach to teaching. This approach includes six dimensions they found to be consistent with SoTL (use of literature, articulation of a teaching / learning model, inquiry, reflection, teaching as a public activity, and peer review). For the purposes of this project, we focused on reflection which is "needed to ascertain whether student learning *is* being made possible" (Trigwell, 2013, p. 99). In doing this, we incorporated the CC/SF approach while conducting SoTL research.

Adopting a CC/SF approach is important because SoTL research suggests that an instructor's approach to teaching that encourages debate and discussion, encourages students to question their ideas, and monitor's students' changing understanding (Conceptual Change / Student-Focused [CCSF] approach) is correlated with a deeper approach to learning by their students (Gibbs & Coffey, 2004). Conversely, it has been found that when instructors focus on good presentation, making sure to cover course content, and presenting good notes (Information Transfer / Teacher-Focused [ITTF] approach), their students are more likely to report a more surface approach to learning.

At California State University Northridge (CSUN), not unlike many universities, students tend to memorize information rather than truly learn and understand what is being taught in class. In an attempt to address this situation, we turned to the science of learning that relies on evidence-based practices to enhance student learning. We took seriously the wisdom from *Rethinking University Teaching* (Laurillard, 2005, p. 3) that "teachers need to know more than just their subject. They need to know the ways it can come to be understood, the ways it could be misunderstood; they need to know how individuals experience the subject." Aware of the significant findings of SoTL research, we set out to better understand the intricacies of teaching and learning and to determine how that knowledge can guide the assessment and redesign of a course in our Kinesiology department.

Why focus on reflection as opposed to one of the other dimensions? Given prior knowledge of assessment methods related to reflection that facilitated implementation, this dimension was deemed the logical place to begin. Many instructors learned how to teach by observing or mimicking those who instructed them in the past with little to no formal training in how to teach based on SoTL. Remember that many instructors are experts in their field but are not necessarily experts in how to teach students about their field. Within the academy, there are systematic structures and standards in place to ensure that people have content knowledge but not comparable systematic structures and standards to ensure they have pedagogical knowledge in general or pedagogical content knowledge in particular. Although instructors may have developed a teaching style that seems to work, they may wonder if that style is actually effective at conveying the information and whether students are actually retaining that information (Ambrose, 2010). In many other countries, the training of university teachers has become common. This training is often oriented more towards student learning than improving teaching (Gibbs & Coffey, 2004). Two main approaches to teaching have been identified when studying how university instructors approach teaching: 1) Teacher-focused; 2) and Student-focused (Trigwell & Shale, 2004). The student-focused instructors tend to have students who attempt to have a deep understanding of the course content, as opposed to attempting to just memorize content. For the purposes of this study, student-focused methods were implemented to assess learning.

Background

California State University Northridge (CSUN) is a comprehensive university in an urban setting that is nationally known for serving a high percentage of underrepresented minority students. The department of Kinesiology has approximately 2000 students and 28 full-time tenure-track/tenured faculty (65 faculty total). For this study, we focused on *KIN 456: Exercise Program Design*, an upper-division course in the Kinesiology department at CSUN.

Exercise Program Design is a senior level "capstone" course that is required for the students in the Applied Fitness option and it is an elective for students in the Exercise Science option. Students in the Applied Fitness option generally pursue careers related to either fitness or strength and conditioning. Many graduates work in places such as the YMCA, for-profit fitness clubs, hospital affiliated fitness facilities, and high school and university strength and conditioning programs for athletes.

As a capstone course, *KIN 456* logically has prerequisites. In *KIN 300: Foundations and Analysis of Human Movement*, students learn to examine "anatomical and neuromechanical concepts relevant to human movement analysis and muscular control of movement. Application of functional anatomy to fundamental movements and select movement forms in exercise, sport and dance, emphasizing movement analysis across the lifespan and across a full range of abilities." In *KIN 346: Physiology of Exercise,* student learn the effects "of physical activity on the human physiological processes and of the physiological aspects of skill, endurance, fatigue, training and other phenomena related to physical performance." In *KIN 456,* students must recall and apply the knowledge and skills learned in *KIN 300* and *KIN 346* in order to develop a deeper understanding of exercise prescription in healthy populations and those with controlled disease.

Furthermore, students in *Exercise Program Design* examine the application of exercise guidelines and safety for adults and children based on the standards of the American College of Sports Medicine. Topics covered include proper client screening, exercise in different environments (heat, cold, altitude, poor air quality), exercise for those with controlled disease, and exercise as part of a weight loss plan. Course objectives also include discussing and understanding physiologic adaptations accompanying various exercise training programs as well as reviewing exercise testing for muscular strength and endurance, flexibility, body composition and aerobic endurance. Students are also challenged to read, understand, and evaluate scientific literature in exercise training for different populations.

Exercise Program Design is currently taught using a number of methods. Lectures are delivered every class meeting on the topics being covered for the week. PowerPoint software and videos presenting scenarios or problems from professional settings are typically utilized in support of the lecture. Occasionally, group discussions are used in order to present students with questions that may entail problem-solving beyond what is given in the lectures. Groups are designated at the beginning of the semester and are primarily for the purpose of working on two projects. Each group selects a topic to research. There are 25 different topics / conditions (e.g., childhood obesity, female athlete triad, type 2 diabetes) from which to choose. Each group project entails writing a research paper with an

introduction, literature review, methods, exercise prescription, and a final section detailing the expected results of the exercise prescription. The first research paper addresses aerobic exercise as it relates to their topic and the second research paper addresses how resistance exercise and flexibility relates to their topic.

Student progress is evaluated through several methods. Graded work includes the two group research papers, a number of quizzes, and a comprehensive final examination. In addition, students participate in a number of group discussions on various topics (e.g., exercise training at altitude, acute and chronic adaptations for exercise at high altitudes, crossfit training for pregnant mothers). These discussions are ungraded but are opportunities for students to delve deeper into a topic that was previously presented in the class lectures.

Currently, *Exercise Program Design* is taught in a style more in line with the ITTF approach. Over the past few years, students are, more often than not, memorizing material rather than truly understanding it. This leads to the following concerns: 1) Students memorizing material but not truly understanding it; 2) In some instances, understanding a topic but failing to know how to apply it; 3) Students inability to explain to a client why they are doing a certain exercise program and how that program will help or assist them with health concerns that they may have (e.g., obesity, metabolic and/or cardiovascular disease); 4) Students inability to review literature to help figure out a problem or course of action with an exercise client.

It is with this context in mind that we set out to examine *Exercise Program Design* in order to discover the effects of conducting the course with an ITTF approach, the perception of the students enrolled therein, and whether a more CCSF approach would be beneficial.

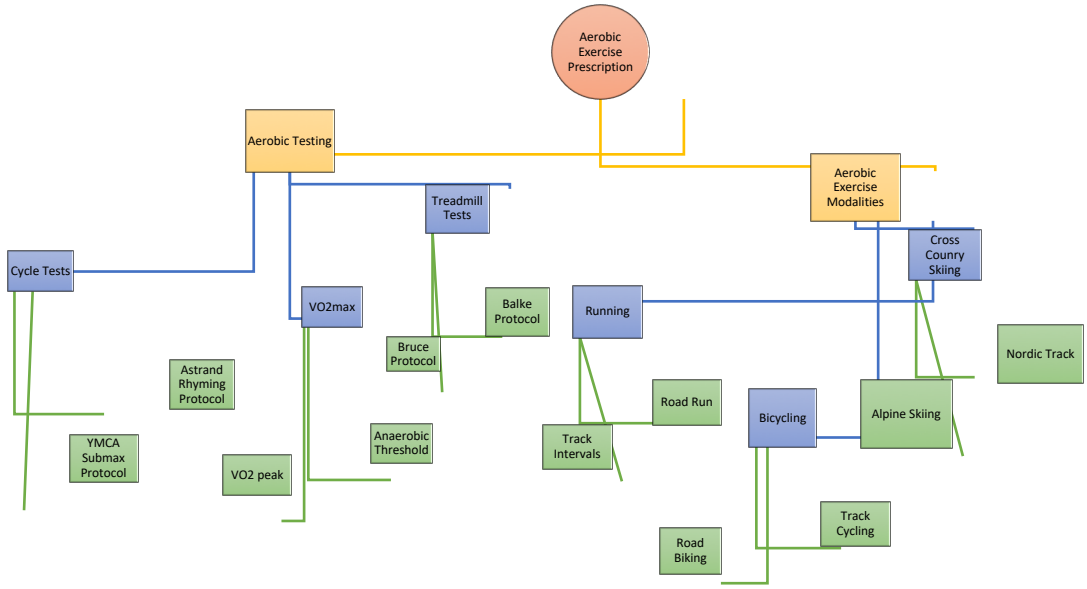
METHODS

We set out to investigate how students understood and retained the knowledge and concepts discussed in KIN 456: *Exercise Program Design* as it is currently taught – using an ITTF approach to teaching. Concept mapping, self-confidence surveys, and the Five Gains survey were the methods used to assess the course. Prior to determining what methods best suited our investigation, we discussed strategies for assessment of student learning with other colleagues who had experienced success with learning-centered teaching. Additionally, CSUN has a robust faculty development department and we consulted their staff for recommendations and strategies. One of the authors also joined a semester-long faculty learning community in which issues surrounding teaching were discussed and researched. It was following these steps that a strategy to investigate *Exercise Program Design* was developed. As mentioned above, the assessment methods selected focused primarily on the Conceptual Change /

Student Focused (CCSF) dimension of reflection. In part, these methods seemed to be the least disruptive to the current ITTF approach to classroom instruction.

Concept mapping is a tool that allows students to graphically represent course content knowledge (Novak, 2010). Students must visually organize their knowledge in a manner that conveys the logical relationships between ideas. A concept map starts with a main idea that is broken down into subtopics. The subtopics can then be broken down into further sub-subtopics. The topics and subtopics are drawn as nodes and links in a web-like structure. The nodes represent the topics and subtopics (usually within a circle or box), and the lines between the nodes represent relationships as shown in Table 1.

Table 1. Simple concept map example.



The benefit of asking students to draw concept maps is that it requires them to think critically about the course content and organize it in a thematic and organized way. Reflecting on the relations of the topics and subtopics deepens their understanding. Concept maps can also give an instructor insight into what a student already knows, what a student does not know, and how a student is processing the information being taught in a course.

Aerobic exercise prescription is one of the central ideas that is taught in *Exercise Program Design*. Instruction begins with how subjects are tested and screened to determine how exercise should be prescribed. This entails understanding how to screen subjects before testing, learning all of the different field and lab tests that are available for testing, and understanding when and why each test should be used. Instruction then turns to programming and prescription which entails an understanding of what mode of exercise may be best, what intensity and duration the subject should begin their

program with, and what duration of the exercise modality is recommended. It is expected that students should be able to know and understand this logical sequence and organization when asked to show an understanding of aerobic exercise prescription. Without this knowledge of the organization of aerobic exercise prescription, any programming of exercise would be sub-par at best and hazardous at worst.

Reviewing the concept maps, the instructor can direct teaching in an informed way that is tailored to the needs of the students as indicated though the assessment. Furthermore, concept maps are useful for revealing the students' understanding and knowledge of course content over time (Alberto & Joseph, 2010). Students must utilize knowledge and skills from prior courses as well as knowledge and skills learned throughout KIN 456. Concept maps require a representation that is cumulative and comprehensive. Done well, concept maps represent a sophisticated integration of prior content knowledge to current content knowledge. Even by filling in the gaps of concept maps provides, students are reminded of the relevance of the content they missed and learn to recognize the intricacies and complexity of the course content.

For *Exercise Program Design,* each group developed a concept map at midterm of the semester and then again in the final week of the semester. This was first introduced in the Fall semester with one section of the course and then repeated in the Spring semester with a different section. The main topic they mapped was "Aerobic Exercise Prescription." They were instructed to create a concept map with the main topic of "aerobic exercise prescription" at the top, and subsequently list ideas and concepts as they related to that main idea, from larger topics to more finite subtopics. Once the groups completed the maps they were collected and analyzed to observe any changes in students' understanding and developing knowledge on the topic. We compared the results of the concept maps created at the midterm of the semester to the concept maps completed in the last week of the semester.

Students also completed a self-confidence survey. The purpose of this classroom assessment technique is to provide feedback about a student's confidence in their ability to perform the skills and abilities that are required to be successful in the course. The survey was created through a three-step process. First, it was determined what required skills and abilities are necessary for success in the course. Second, specific questions were written to assess the students' confidence level in relation to the required skills and abilities. Finally, the formulated survey was given to the students to complete (Angelo, 1993). For the purposes of *Exercise Program Design*, a self-confidence survey was created with the specific and relevant skills and abilities needed to pass the course as enumerated in Table 2.

Students in *Exercise Program Design* completed the surveys toward the end of the semester. The survey consisted of ten statements aimed at determining how confident the students felt, near the end of the course but prior to the cumulative final exam, on each issue addressed in the statements

(Table 3). There were four options available for each question. Those options were: 1) "very confident"; 2) "confident"; 3) "unsure"; and 4) "very unsure". By administering the self-confidence survey prior to the final exam, students had an opportunity to reflect on how prepared they were for the final exam and direct their studying efforts on content about which they were less confident.

Table 2. Self-confidence survey questions.

1.	Based on our class lectures and discussions I know how to screen potential clients prior to exercise.
2.	When advising a client about exercise and health, I can explain to them how chronic exercise may have an effect upon blood pressure and cholesterol in the body.
3.	When testing aerobic fitness, I know how to determine what the best testing method is for a client.
4.	I know the proper order of fitness testing when it comes to aerobic, muscular, and flexibility testing.
5.	When prescribing an aerobic exercise program, I know how to safely and properly progress a client over time towards a goal.
6.	I know the difference between the types of resistance training discussed in class (isometric, isokinetic, plyometrics, etc.).
7.	I understand what lactate threshold is, and how it influences aerobic exercise performance.
8.	I know how prescribing aerobic exercise for older adults, may differ from prescribing for young and middle age adults and children.
9.	I know how to measure improvement in strength using the methods described in class (strength ratio, absolute weight, norm charts).
10.	I understand the different ways in which to measure body mass and body fatness (BMI, skinfolds, bod pod, etc.).

Table 3. Self-confidence survey results.

Statement	Very Confident	Confident	Unsure	Very Unsure
1. Based on our class lectures and discussions I know how to screen potential clients prior to exercise (92 responses)	25 (27.2%)	60 (65.2%)	6 (6.5%)	1 (1.1%)
2. When advising a client about exercise and health, I can explain to them how chronic exercise may have an effect upon blood pressure and cholesterol in the body (91 responses)	28 (30.8%)	43 (47.3%)	20 (22.0%)	0 (0%)
3. When testing aerobic fitness, I know how to determine what the best testing method is for a client (92 responses)	29 (31.5%)	45 (48.9%)	18 (19.6%)	0 (0%)
4. I know the proper order of fitness testing when it comes to aerobic, muscular, and flexibility testing (91 responses)	21 (23.1%)	46 (50.5%)	24 (26.4%)	0 (0%)
5. When prescribing an aerobic exercise program, I know how to safely and properly progress	36 (39.1%)	48 (52.1%)	8 (8.7%)	0 (0%)

a client over time towards a goal (92 responses)				

Finally, we created a survey and administered it at the mid-term of the semester assessing students' perception of the course. This was called the "Five Gains" survey. Information obtained from this survey was to be used to enhance future sections of course. The "Five Gains" survey items (Table 4) asked students to reflect on what they had learned and how they felt about what they learned. It also provided them an opportunity to convey other thoughts about the course. The purpose of the "Five Gains" survey was to determine if and how the students understood the material they had covered thus far and to assist the instructor in formulating strategies to enhance student learning in the second half of the semester. By prompting students to reflect on what they learned and how to apply their knowledge and skills, the survey provided feedback that will be beneficial to making evidence-based adjustments to content delivery in the future. For example, if the majority of students fail to identify a key concept in the "Five Gains" survey, then it can be concluded that some intervention is required to augment future instruction related to that concept.

Table 4. "Five Gains" survey.

1.	What have you learned in this course that you have used or applied outside of class?
2.	What have you learned in this course that you have shared with others outside of class?
3.	How do you feel about learning through our group projects, in addition to having lectures with quizzes and in-class scenarios?
4.	What are some of the things you have learned through our group projects, which you may not have learned in our textbooks or from previous courses?
5.	Is there anything else you might want to convey or express about the course that you found interesting, concerning, insightful, etc.?

RESULTS

The concept maps, self-confidence survey, and the "Five Gains" survey provided valuable information about student learning in the current course as well as guidance for efforts to improve teaching and learning in future semesters. As for assessing the learning by current students, the three tools revealed both positive and negative indicators. It was clear that students were making progress during the course of the semester in relation to the objectives, knowledge, and skills that are central to the *Exercise Program Design* course. But there were also indicators that students could still improve their knowledge of key concepts and how those concepts are applied in professional settings. Furthermore, as a capstone course, it would be desirable for students to not only have the requisite knowledge and skills but also be confident in their ability to implement them. The results also provided key insights into how to redesign the course and transition from an ITTF approach to a CCSF approach which will be discussed in the next section.

In *Exercise Program Design,* each group created two concept maps that related to the theme "Aerobic Exercise Prescription." Each group created their first concept map at the mid-term of the semester and their second concept map during the last week of the semester. The differences between the two concept maps allowed for assessment of any changes in how students were making connections between concepts taught during the class. Collectively, the groups created maps that showed more branching and connecting of ideas and subtopics from the first maps to the second. We found that in the concept maps done at mid-semester, nine of the 22 concept maps specifically listed exercise testing and exercise programming at the second level of their map. Unfortunately, only five of the concept maps completed at the end of the semester showed the same which suggests that students either were not sufficiently retaining prior course content or were not adequately integrating cumulative course content. However, ten mid-semester concept maps listed either testing or programming on the second level just as ten end of semester concept maps did. In the mid-semester concept maps, common subtopics (third level and below) included duration of exercise, intensity of exercise, and exercise testing. In the end of semester concept maps, groups captured slightly more detail. For instance, under the subtopic "intensity of exercise," the latter set of concept maps more frequently included key terms such as "VO2 max", "HR Reserve", "rating of perceived exertion", and "submax." The same improvement in detail occurred for the subtopic "exercise testing." Groups more frequently identified key terms such as "Bruce Protocol", "Step Testing", "1.5 mile run", "Rockport Walk", "12-minute walk" on their end of semester concept maps.

The students demonstrated a larger knowledge base of the different aspects of aerobic exercise prescription on their end of semester concept maps even though their maps did not always demonstrate accurate knowledge of the logical connections. Curiously, we found that six end of semester concept maps named aspects of exercise that had nothing to do with aerobic exercise prescription (e.g., type II muscle, insulin sensitivity, eating habits, flexibility, plyometrics, strength testing) while only two mid-semester concept maps had the same. This may reflect the larger cumulative knowledge base. While students knew about more topics and sub-topics, they still lacked a complete understanding of the topics, sub-topics, and their logical relationships. Furthermore, there were still enough errors to indicate that additional efforts need to be made in the future to help students develop a more thorough understanding of concepts, topics and sub-topics, and their relationships over the course of a semester. Overall, the increased detail from the first concept map to the second concept map seems to indicate that the students developed a larger knowledge base of aerobic exercise prescription during the semester even if their logical connections were limited.

We found that the results for the self-confidence surveys reflected our initial thoughts on the confidence students had performing or initiating certain tasks taught in the class (Table 3). The

self-confidence surveys were administered in the Fall and then again in the Spring semester. A total of 92 students completed the survey. Students were asked to indicate if they felt "very confident", "confident", "unsure", or "very unsure" for each statement on the form. For only two of the survey statements did at least 50% of the students indicate "very confident." Those two statements were "I know the difference between the types of resistance training discussed in class."and "I understand the different ways in which to measure body mass and body fatness." The majority of students indicated they were "confident" or "very confident" about eight of the ten statements. However, one statement ("I know how to measure improvement in strength using the methods described in class.") had a slightly higher percentage (35.9%) of students who indicated "unsure" or "very unsure." Although no other statement had as high of a percentage of students indicate "unsure," there were still four items that had at least 20% answer "unsure." For the statement "When advising a client about exercise and health, I can explain to them how chronic exercise may have an effect upon blood pressure and cholesterol in the body", 22.0% indicated "unsure". For "When testing aerobic fitness, I know how to determine what the best testing method is for a client" there were 19.6% of students who indicated "unsure". Very few students answered any of the items as "very unsure."

Overall, the self-confidence survey revealed the need to review a few concepts and lessons as the students prepared for their cumulative final exam. Based on the students' reported confidence, we reviewed the specifics regarding the prescription of exercise for different populations, different ages, and different disease conditions. A week before the final exam, we specifically reviewed the following topics: 1) Aerobic exercise prescription for healthy adults and the elderly; 2) Exercise prescription for children under age 18; 3) Dynamic flexibility, and when and where to use it; 4) Basics of using library databases for research; 5) Why being minimally physically active is better than being physically inactive.

These results are important for two reasons. First, while most items had a clear majority of students that indicated either "very confident" or "confident," there was still a significant percentage of students who indicated that they were "unsure" or "very unsure." The "unsure" and "very unsure" responses ranged from 7.6% to 35.9% on the 10 prompts. It is clear that steps must be taken to improve student learning and student confidence in relation to the three prompts with nearly 20% or more students indicating that they were "unsure" or "very unsure." The results are important because they may indicate an additional consideration. Rather than indicating student confidence as it pertains to the content knowledge, the results may indicate student confidence in implementing that content knowledge appropriately in a professional setting. In future courses, it will be important to determine if there is a difference in students' confidence as it relates to content

knowledge as compared to their confidence as it relates to the professional implementation of content knowledge.

The Five Gains survey was completed midway through the semester. It was used to determine students' perceptions about the information learned in the course and how the group projects helped them. A number of themes emerged including an improved ability to use research to create exercise programs and a recognition that there is more to prescribing exercise than just what is described in our textbooks.

Several themes emerged from students' responses to the Five Gains survey. For the prompt about what course content they have used or applied outside of class, a frequent response from students indicated how to prescribe exercise for a variety of different clients and special populations. For the prompt about what they have shared with others outside of class, two responses were indicated by a majority of students. First, they noted the practicality of dynamic stretching. Second, they noted that being physically active is always better than being sedentary. In regard to the prompt about learning through group projects in addition to lectures, quizzes, and in-class scenarios, the most common answers indicated that students enjoyed researching a topic and learning through the group process. Conversely, there were many students who indicated that they did not enjoy working in groups. For the prompt about what students learned through their group projects that they may not have learned in their textbooks or from previous courses, several themes emerged. First, students indicated that they learned how to design a long-term exercise program.

Second, students learned how to use research to ensure a proper exercise prescription and program design. Finally, students realized that there is more to exercise programming and exercise testing than what is in their textbooks. For the fifth prompt that allowed students to indicate anything else about the course, the most common responses revealed that students appreciated the teaching style and felt that the instructor had great engagement with students. But they also indicated that the pace of lectures was sometimes too fast.

The results of these methods of evaluating students' retention as well as their understanding of the content knowledge indicates a need for a redesign of the *Exercise Program Design* course. Concept mapping provided insight into how well students were making logical connections with the information discussed in class. While the concept maps revealed that students were making progress, they also indicated that they did not appear to make sufficient progress in understanding the relationships between key concepts. Through the self-confidence survey, we were able to observe that some students did not feel confident in their knowledge or application of a number of concepts needed to successfully navigate through the course. The Five Gains survey revealed how the students felt about what they were learning at the mid semester, whether they felt confident to research questions they had about a topic within the course, and if they were

comfortable with the pace and style of the class. The Five Gains survey provided perspective on student perceptions about the course that will be important when transitioning instructional methods from the current emphasis on ITTF approach to an approach more aligned with CCSF.

DISCUSSION

Based on the results from the assessment methods, we find there is clear evidence supporting our pedagogical concerns. Concept maps reflected, in many cases, a disconnect between topics covered in class and their logical relationship. They also lacked the detail or complexity sufficient to demonstrate that students adequately understand the essential parts of particular topics. Results of the concept maps may also indicate that many students are having a difficult time synthesizing the information into an orderly fashion. For instance, as described earlier, aerobic exercise prescription is taught in a specific order. Testing for aerobic fitness first is presented prior to exercise programming for aerobic fitness. It is taught in this fashion because it is the logical progression for a professional to initiate a client on a program to improve aerobic fitness. Clearly, from these results there is a disconnect for the students on how these different aspects are related and fit within the larger context of exercise programming and testing. Some students, as evidenced in their maps, took the attitude of just throwing everything they have learned in the course without taking the important additional step to indicate how that content in their concept maps is logically interrelated. Instead, students placed things out of order (aerobic testing on a higher level in the map than say, pre-screening) and even mentioned topics more appropriate for a sports nutrition course (carbohydrate loading).

The Self-Confidence survey confirms the concerns about students' ability to properly understand and apply course material. For example, what are the best testing methods for clients? Or, how should tests be applied to measure improvement? Or even, when should tests be administered and in what order? Between 19.6% and 35.9% of the students indicated that they were "unsure" or "very unsure" about how to address those questions. We also discovered that students, in addition to what is taught in class, enjoyed researching a topic, figuring out how to apply that research, and learning how it assists in the design of a long-term exercise program. Students did not indicate sufficient confidence to address these and related questions that are central to understanding exercise program design.

The Five Gains survey results indicate that although students felt unsure about a few topics, they were comfortable with sharing and using the information learned outside of the classroom. The results also indicated a general enjoyment of the teaching style of the instructor in the course as well as the instructor's engagement with students. This information is useful for the redesign of the course based on the principles of SoTL as the mode of instruction for the course transitions from the current ITTF approach to a more CCSF approach.

The results show that a modification or course redesign may be in order and we propose for the future a redesign born of SoTL and based on the model of integrated course design as described by L. Dee Fink (2003). The model includes four points of emphasis: 1) Identifying situational factors; 2) Establishing learning goals; 3) Feedback and assessment; 4) Teaching and learning activities. Situational factors include some factors about the teaching and learning environment that are, at this time, out of our control. These factors include the number of students in the class, the level of the class, the format of the class, and the physical elements of the learning environment. Another situational factor is the characteristics of the learners such as their life situations, their prior knowledge or experience of the subject, and their goals and expectations for the course.

While certain characteristics of our students are out of our control, understanding those characteristics and how they impact student learning is an important factor in implementing appropriate student-focused instruction. The general context of learning, in terms of learning expectations of the department and the nature of the subject as a combination of theoretical and practical applications in a dynamic field of study, requires clear communication so that students understand the significance, relevance, and complexity of the course. The final situational factor is the characteristics of the instructor. This entails the instructor's expertise of the subject matter, values related to teaching and learning, and strengths and weaknesses of teaching. This study is an indication of the instructor's interest in valuing and improving teaching and learning outcomes. The identification of these situational factors is the first step in redesigning a course based on evidence-based SoTL scholarship.

As a capstone course for the Applied Fitness major option within the department of Kinesiology, it has prerequisite coursework that includes *Physiology of Exercise.* Given these prerequisites, students enrolled in *Exercise Program Design* are expected to have extensive knowledge about a number of topics including exercise physiology, the application of functional anatomy to fundamental movements and select movement forms, and the analysis of movement across the lifespan and across a full range of abilities. It is not enough that students have passed the prerequisite courses; they must retain a significant amount of knowledge and skills from that coursework in order to be successful in *Exercise Program Design.* Therefore, it may be in the best interest of the department to observe and assess the students coming from prerequisite courses into the capstone to see if the students are sufficiently prepared for *Exercise Program Design.* It is possible that the prerequisite courses are also being taught with an ITTF approach which may compound the problem by the time students reach the capstone course. Ideally, the department will investigate all of its courses in order to ascertain the effectiveness of the teaching in their classes. But this is a laborious and time-consuming process and steps to improve instruction must be made prior to completing a thorough assessment of all departmental courses.

The next step is to establish explicit learning goals that will form a point of emphasis for the course. We have identified three core learning goals for *Exercise Program Design.* These goals are: 1) Understand exercise testing and prescription; 2) Identify sound exercise prescriptions when faced with "nontraditional" clients; and 3) Understand how to use the literature to design exercise prescriptions or testing. These learning goals will be central to the development of the course structure and content, the instructional methods, and the development of assessments when redesigning the course.

Currently, the course is mainly taught from an ITTF approach which is reflected in how the students are assessed with a final cumulative examination, two group research papers, and a number of quizzes. In redesigning the course with a CCSF approach, it is important to consider including more forward-looking assessments. One example of forward-looking assessment would be to require students to examine a future scenario using the knowledge they have gained in the course. This assessment will be open-ended and challenge students to demonstrate how they will implement their knowledge in a professional setting. The transition to a CCSF approach requires adjustments not just by the instructor, but also by the students. Therefore, it is imperative that the instructor provides clear instructions for the assessment and clear criteria by which the students will be evaluated.

It will also be important that instructors create some opportunity for students to engage in self-assessment. That can be done in groups and, eventually, individually. Students must develop and discuss criteria for assessing their own knowledge as self-reflection is a valuable skill for them to have after graduation when they are employed in settings that require them to apply their knowledge of exercise program design. Additionally, instructors should give constructive feedback when the student is engaged in self-assessment.

The final point of emphasis, teaching and learning opportunities, is one of great potential. As the course has been taught in an ITTF approach, this model and recent research suggest employing a more active learning environment. Active learning is sometimes described as students performing certain activities that are more engaging such as group problem-solving, having class debates on certain topics, role-playing, viewing films or videos with subsequent discussion, and completing more activities outside the classroom (Bonwell, 1991). There is ample opportunity to apply and utilize these techniques within the context of the *Exercise Program Design* course.

We believe that with a redesign of this course we can have a positive effect upon the learning outcomes of the students in Kinesiology. The feedback on the surveys indicate that some things appear to have a positive effect (e.g., research projects, in-class scenarios). However, it is also clear that teaching the course from an ITTF approach has resulted in a disconnect between the important information taught in the course and what the students actually learn. It may also be

advantageous if, at some point, a redesign of the prerequisite courses is undertaken, as this could have a significant effect on students' preparation for *Exercise Program Design*. Clearly changes to the assessment process within the course may also have a positive impact if more forward-looking assessments and student self-assessment are included. We hope to be able to redesign this course in the manner discussed, implement additional types of SoTL assessments, and collect additional data that provides

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