

**Request for Proposals for Innovations in Uses of Technology in Instruction
2007 – 2008****Title of Project**

Virtual Exercise Physiology Laboratory Activities

Introduction

Although our department has some of the finest exercise physiology instructors in the country, our large class sizes and limited space create some significant disadvantages for some of our students. More specifically, whereas most other undergraduate exercise physiology courses offered throughout the country have a laboratory component, our exercise physiology course (i.e. APK 3110) does not. While I am confident that everyone in our department agrees that we should have a lab to accompany our exercise physiology classes, we have neither the space, nor the teachers, to offer such a lab component. The only acceptable alternative we currently have is to incorporate virtual lab activities into these classes. Although our department is enthusiastic about using virtual lab activities (e.g. we use them in other courses), there is only one existing product that offers exercise physiology lab activities and this product is not nearly effective enough to justify the cost to the students.

Project Goals

The purpose of this project will be to develop a series of virtual exercise physiology lab activities to enhance teaching effectiveness and to provide students with invaluable experiences and information that are currently unavailable to them. The money from this grant will be used to develop between three and five (depending on the resources and time available) virtual lab activity simulations to explain selected physiological responses to exercise. These simulations will allow students to visualize and control: a) the function of exercise physiology lab equipment, b) the procedures used when collecting data in the lab and c) scenarios that demonstrate the “real world” significance of the data they have collected.

Improvements to learning

As with any science, exercise physiology is a discipline that utilizes complex equipment and techniques to gather data that must then be interpreted and applied. While the lecture portion of our exercise physiology class is clearly a vital component, many of the skills and abilities required to be a successful professional can only be gained through a process that involves observation and manipulation the lab equipment. Furthermore, many crucial physiological concepts are abstract and extremely difficult to simply describe to a student, but they may be communicated very effectively through lab activities. It is therefore rare to find an undergraduate exercise physiology course that does not have a lab component. Our APK 3110 course is an exception to this rule, not because we do not value lab experience, rather because it is simply not feasible for us to have a lab component at this time. Virtual lab activities, on the other hand, would be a practical way to enhance student learning by: a) introducing them to the basic operation of important lab equipment, b) allowing them to practice collecting and then interpreting relevant data and c) providing a interactive means by which they can apply the information they have gained and then visualize the real world consequences of their choices. These would all be new improvements to student learning that are simply not available with the current course structure.

Innovation

There are a number of very important exercise physiology concepts that are abstract, extremely complex and (therefore) much more effectively communicated with visuals and animation. Unfortunately, there is only one virtual exercise physiology lab product on the market, and it is too limited to justify the cost to students. This existing software does very little more than graph changes to selected physiological variables during different types of exercise. While this is an important piece of a virtual lab program, and I would like to include something similar in my own virtual lab activities, the problem with this existing software is that it does not do anything else. It does not teach the user anything about the equipment required to collect the data, nor does it provide any explanations as to why the selected variables change throughout the exercise, nor does it allow the user to apply the information that has been gathered. My proposed virtual lab activities will be innovative because they will also teach the user: a) how and why to select the equipment that will be used collect the data, b) why the selected physiological parameters change throughout exercise and c) how the information is typically applied using “real world” scenarios.

Student audience reached

The most direct audience for these virtual lab activities will be those students that are enrolled in our APK 3110 Exercise Physiology courses. Since all of our majors must take APK 3110, our direct target audience would therefore include roughly 250 students per year. Furthermore, since our undergraduate fitness courses (e.g. APK 4125 and PET 4906) and advanced exercise physiology courses (e.g. APK 4112, 4115, 41120, etc.), as well as our graduate exercise physiology courses (APK 6116, 6118, etc.), all cover very similar concepts to those in 3110, these virtual lab activities could benefit all the students that take those courses as well.

Portability

As I alluded to in the section above, the information that will be communicated using these virtual lab activities is relevant to any course that discusses exercise physiology lab techniques, acute and chronic responses to exercise, metabolic rate, fitness assessment and prescription, nutrition and weight management, etc. This includes most of the courses in our department, as well as selected biology, nutrition, physical therapy, medicine, nursing, etc. courses across campus. While I cannot (of course) speak for any of the professors that teach those other courses, I can say that I will be more than willing to share these virtual lab activities with any who are interested.

Potential for reducing costs

We currently have no lab component for our APK 3110 courses. Nevertheless, the department recognizes the tremendous benefits of lab experiences, and we have discussed the possibility of adding a lab portion to APK 3110 sometime in the future. The addition of such a lab would require either the reclamation of a lab space that is currently being used for some other purpose and/or the creation of a new lab space. We would also need to create, pay for and fill more than just a few new graduate assistant positions to teach the labs. There is also the good possibility that we would need to purchase new equipment for this lab. In summary, while the addition of a lab to APK 3110 would be the most thorough way to address our current problem, the costs of adding such a lab are currently prohibitive. A better solution (i.e. one with a more favorable cost to benefit ratio) would be to incorporate virtual exercise physiology lab experiences into the class. Since there are currently no acceptable virtual lab products on the market, the best chance we have for meeting our specific needs is to therefore create our own virtual lab activities.

Assessment

Each virtual lab activity will include specific instructions to help students perform the lab, collect the data and apply the information. Each activity will also include a number of questions about each phase of the process. Student learning will be measured with these associated questions; preferably with the aid of the WebCT assessment feature (if that is possible).

Sustainability

Every dollar of this grant will be allocated to the design and development of the virtual lab activities. Once the activities have been created, there should no additional costs and the activities will remain available for all students to use in the future.