Editorial

Leveraging Online Learning Resources to Teach Core Research Skills to Undergraduates at a Diverse Research University

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ABSTRACT

Int J Exerc Sci 3(2) : 49-54, 2010. Today's students have unique learning needs and lack knowledge of core research skills. In this program report, we describe an online approach that we developed to teach core research skills to freshman and sophomore undergraduates. Specifically, we used two undergraduate kinesiology (KIN) courses designed to target students throughout campus (KIN1304: Public Health Issues in Physical Activity and Obesity) and specifically kinesiology majors (KIN1252: Foundations of Kinesiology). Our program was developed and validated at the 2nd largest ethnically diverse research university in the United States, thus we believe that it would be effective in a variety of student populations.

KEY WORDS: Learning Management System, Blackboard, Learning Game, Kinesiology

INTRODUCTION

It is well documented that today's college students lack a fundamental knowledge of the research process and the skills necessary to complete effective and impactful research (5, 9). Such skills are of critical importance to undergraduates who are interested in pursuing a graduate degree or medical professional degree (i.e. M.D., D.V.M., etc.). The concept of teaching undergraduates research skills has recently received renewed emphasis, as there is a critical shortage of students pursuing degrees in Science, Technology, Engineering, and Mathematics (STEM). It has been postulated that involving undergraduates in research from the beginning of their degree may represent one way to engage interest in STEM related degrees.

Despite the obvious need to expand undergraduate student exposure to research concepts, this is not always easy to accomplish due to the unique learning needs of today's student. Individuals born between 1980 and 2000 are generally referred to as Generation Y or the Net generation and have very different learning needs than Generation X students (2-4). For example students in the Net Generation are used to having instant access to information that they can customize to their expectations. As such the traditional linear, lecture-based approach to instruction, often fails to meet learning needs. One alterative to traditional classroom instruction is the use of online instruction. When properly

designed and implemented, we have demonstrated online learning modules are more effective than a traditional instructional approach at long-term maintenance of course content (6, 7). From these efforts, we have established a best-practice approach to the design and use of online instruction.

In this case report we demonstrate our approach to using online instruction to teach freshman and sophomore undergraduates about the key concepts of the research process. Students also had an opportunity to test their knowledge by completing a simulated research experiment. Our learning activities were developed to address the University of Houston's Quality Enhancement Plan (QEP) aimed at promoting research experiences among undergraduates on the UH campus. The ultimate goal of the QEP plan is to graduate students who are better prepared to pursue careers in STEM-related fields.

COURSE DESIGN TEAM

The learning activities described in this report were developed by a team lead by Dr. McFarlin. Dr. McFarlin has extensive experience in the design of engaging, effective online learning experiences (6, 7). His efforts were supported by HHP's Program Director (Weintraub) that assisted in the development and evaluation of learning module assessments. Breslin, Carpenter, and Strohacker are graduate students working under Dr. McFarlin's direction and assisted with the development and pilot testing of the online activities described in this report. We believe that another advantage of our approach is that the graduate students working on this project will eventually be able to use their newly developed instructional skills after they graduate and become professors themselves. Thus the reach of our approach is well beyond the UH campus.

COURSES TARGETED

The learning units described in this report were incorporated into two kinesiology (KIN) courses: KIN1304 (Public Health Issues in Physical Activity and Obesity) and KIN1252 (Foundations of Kinesiology). KIN1304 is a core social science course, which is available to students from across the campus and has an average annual enrollment >1,500 students. KIN1252 targets individuals who are specifically kinesiology majors and has an average annual enrollment >750 students. We selected these courses because they were primarily taken by freshman and sophomore students, had a large annual enrollment, and were already offered in a fully online format.

LEARNING MANAGEMENT SYSTEM

The research learning activities were administered using Blackboard Vista as a learning management system (LMS). Blackboard is the most common LMS used on college campuses nationwide, making it the ideal platform for demonstrating our approach. The LMS learning unit for this project included (Figure 1): 1) narrated, automated slide show, 2) downloadable text presentation, and 3) downloadable audio presentation. Student learning was demonstrated using self-test questions (Figure 2) that were embedded in the automated slide show and a formal, graded

Figure 1. Blackboard LMS. This figure demonstrates the presentation of the learning unit elements for the instruction of Basic Research Skills using Blackboard Vista.

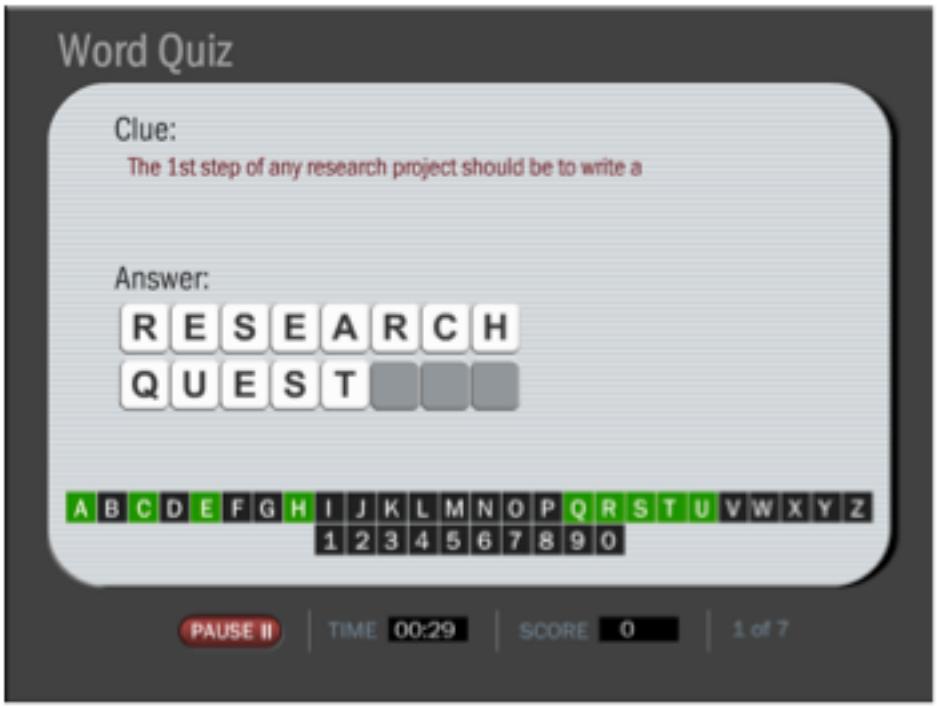

Figure 2. In-lecture Learning Game. This figure demonstrates the interactive aspect of the in-lecture learning games. Similar questions were embedded every 5-6 slides to aid students in learning key concepts. These questions were not formally graded.

quiz that students completed at the end of the module.

ONLINE LEARNING UNIT: BASIC RESEARCH SKILLS

The first learning unit we developed was designed to educate students about basic concepts associated with the research process and included the following elements: 1) developing a background, 2) research aim/hypothesis formation, 3) developing a research plan, 4) collecting data, 5) interpreting results, 6) writing a discussion, and 7) presenting/publishing the analysis. These concepts were demonstrated via a narrated, automated slide show that incorporated a series of self-test questions every 5-6 slides. Presentations were initially developed in PowerPoint 2007 (Figure 3A), narrated using Articulate Studio (Figure 3B), and published to a flash-media format (Figure 3C). The flash-media format was ideal because it produces a compact file that can easily be uploaded into Blackboard Vista via the SCORM-compliant feature. A formal, graded quiz (administered in Blackboard) was used as one outcome measure to track student learning of basic research concepts.

ONLINE LEARNING UNIT: SIMULATED RESEARCH PROJECT

Once students scored at least 70% correct on the quiz over Basic Research Skills, access was granted to a simulated research experience. We selected 70% as a benchmark because it meant that the students understood the majority of the Basic Research Skills material. The simulated research experience was also

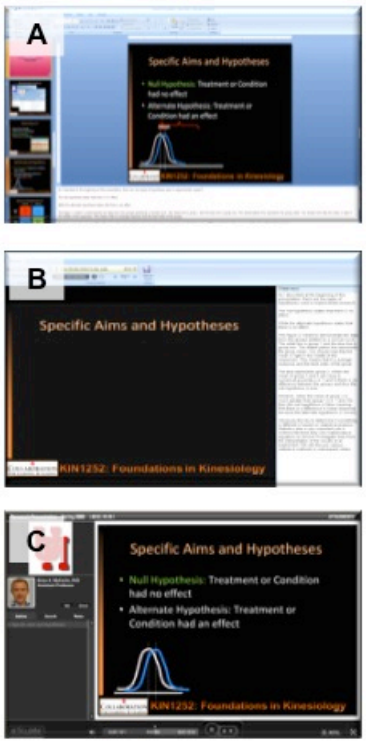

Figure 3. Online Lecture Development. This figure illustrates the steps associated with our approach to the development of online lectures: A) Slide decks are first developed in PowerPoint 2007 (PC version show), B) Voice narration is added using Articulate Studio, which works natively in PowerPoint 2007, C) The final published product is generated automatically by Articulate Studio into a Flash-media rich presentation.

developed using PowerPoint and Articulate Presenter; however, rather than a linear approach, students were allowed to progress through the simulation by answering a series of interactive questions. This approach is often referred to as decision-based learning (1, 8). Slide linking was accomplished using the hyperlink feature in PowerPoint 2007. Figure 4 demonstrates the key elements of a question and answer sequence for our simulated research experience. It is important to note that while only 15 slides are shown in Figure 4, it actually took the creation of 35 slides to ensure proper

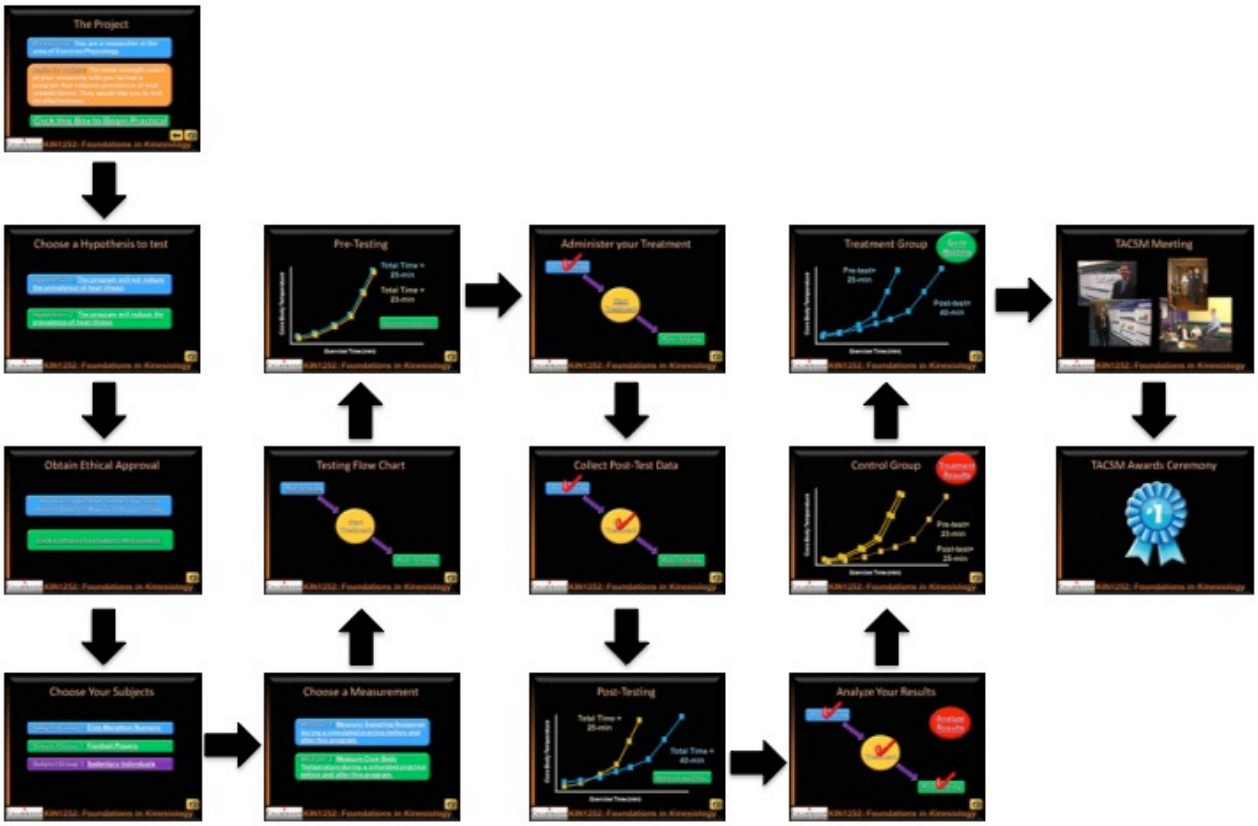

Figure 4. Simulated Research Project. This figure is a flow chart of the key slides that were used for our simulated research project. Students had the opportunity to progress through the completion of the project using a decision-based rather than a linear learning approach.

function of the simulation. Based on student feedback it is clear that our students view the simulated research experience as a valuable opportunity to apply the research skills that they have learned in a low-pressure environment.

EVALUATION

We used pre- and post-course evaluations to assess the effectiveness of our approach. We also collected monthly, anonymous feedback from the enrolled students to ensure that our approach is meeting their individual learning needs. Interpretation of this qualitative data indicated that students felt that our approach increased their knowledge of the research process and the ability to apply their knowledge in a practical simulation. In the future, we will complete a more comprehensive analysis of our approach.

FUTURE DIRECTIONS

Now that we have validated that our online learning modules are an effective way to teach undergraduates about the research process, the next logical step is to determine if our approach would be as effective at other undergraduate institutions. We are in the process of developing collaborations with other universities to implement and test our learning units. It is our ultimate goal to establish a best practice model for

using online instruction to teach undergraduates about the research process.

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