An Evaluation of an On-line Anatomy Course by Lab Instructors: Building on Instructional Design

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Abstract: On-line learning is becoming more popular and realistic with the development of distributed network technology. However, the methods that take advantage of technology and integrate on-line learning into conventional classroom teaching remain controversial. Laboratory instructors evaluated an on-line anatomy lab course at the University of Calgary through questionnaires and direct interviews. Four lab instructors and one professor participated in this study. Results showed that to effectively integrate technology into the curriculum, it was perceived by the instructors as important to set clear teaching objectives, an appropriate amount and depth of information for the level of the students, and teaching strategies related to students’ learning style and motivation. Laboratory instructors felt that the dynamic and interactive 3-D animation was motivating for students.

The Study

With the development of distributed internet technology, on-line learning is becoming more prevalent. However, the methods that can take advantage of the internet and integrate it with conventional classroom teaching remain controversial.

There are potential benefits of the Internet for teaching students. The Web:

- is a flexible, dynamic learning environment (Hackbarth, 1997; Ross, 2000)
- allows for multimedia presentations (Palloff & Pratt, 1999; Ross, 2000)
- provides students with access to a potentially rich, collaborative, and powerful learning environment (McGreal, 1997; Ross, 2000).

Kulik’s (1994) meta-analysis of the findings of 97 studies on effectiveness of computer-based instructions concluded that students usually learn more in classes that received computer-based instructions, especially in elementary and high school.

However, there are many reports of ineffective distance on-line learning programs (Horton, 1999). Technological possibilities do not automatically transfer into effective teaching and learning (Loveless, 1996; Zhao, 1999). Designing and delivering instruction on the web requires thoughtful analysis and investigation of how to use the Web’s potential in concert with instructional design principles (Ritchie & Hoffman, 1997).

There does not appear to be a consensus about the best method to evaluate on-line learning. Traditional evaluation models have concentrated on the empirical and quantitative procedures (Stufflebeam & Shinkfield, 1985; Worthen & Sanders, 1987; Simonsen, 1997). More recently, evaluators of distance
education programs have begun to propose qualitative models incorporated with naturalistic methodologies from more holistic perspectives.

Therefore, a qualitative study of the on-line anatomy lab course in the University of Calgary was conducted from the perspective of instructional design and teaching strategy. The on-line anatomy lab course, which was incorporated into the Kinesiology curriculum, was designed to offer students a wide range of learning media to supplement their study. The website of the program is: www.kin.ucalgary.ca/anatomy.

The on-line computer lab includes four labs (see Figure 1). Lab I is an introduction to the computer lab and includes procedures for using this material. Labs II, III, and IV follow the same five-part format (see Figure 2): introduction, surface anatomy, dissection, movement and testing. The dissection part is a completely separate program that has been incorporated into the Lab designed specifically for Kinesiology students.

![Figure 1: Labs Menu](image1)

![Figure 2: Lab2 Menu](image2)

Methods
Participants

Four lab instructors from the on-line lab course participated in this study.

Instruments and its validity

A five-point Likert scale and ten interview questions were used. The five-point Likert scale is based on Ross’ study where he used compared conventional teaching and on-line teaching (Ross, 2000). Some of the interview questions are selected from the reviewed literature and the study of the Integrated Learning system (ILS) in an Alberta middle school conducted by M. Jacobsen (1996). The interview questions were presented under the following four sections:

- demographic information
- comparison with the conventional cadaver laboratory teaching
- students’ interaction with other students and lab instructor
- teaching strategies

Procedure

After completing an informed consent form, participants were asked to answer a questionnaire on a five-point Likert scale and then interviewed. All interviews were recorded anonymously on tape.

Analysis of the results

A descriptive statistical analysis was performed on the questionnaires. The interview recordings were transcribed and cross-referenced for both common and unique responses.

Results

Demographic Information

The lab instructors taught both the computer lab and the cadaver lab. Of the four lab instructors that participated in the study, three taught two classes and one taught one class per week. Each class had an
average of 24 students per class. Students alternated between computer labs and cadaver labs every two weeks.

Results of Questionnaires

The first six questions assessed the lab instructors’ general impressions about the on-line course. The lab instructors were all satisfied with website navigation and exercises, three out of four were satisfied with the content and presentation, and two out of four were satisfied with course objectives.

The second part of the questionnaire asked the lab instructors for their opinions about students’ responses and activities in the on-line lab course compared with those in the cadaver lab. Lab instructors did not feel that the computer environment improved student communication and motivation and were undecided whether students learned more in the on-line environment. According to the lab instructors, students preferred the cadaver lab.

Results of Interviews

The lab instructors felt that the on-line course content was more detailed than what was necessary to meet student requirements. They saw their role in the computer lab more as that of facilitator than as instructor (e.g., answering questions and handling software problems).

In comparing the computer lab with the cadaver lab, lab instructors thought both had benefits and weaknesses. In the cadaver lab, students could watch the dissection process and could do it by themselves. But access time to the cadaver lab was limited, and students could not stay as long as they wanted. The large amount of information to be memorized in this course meant that the students needed more opportunities to review the course content. The computer lab was designed to provide students with new review material to supplement textbooks and class notes.

In terms of learning materials, the on-line course was more interactive than a textbook. Students liked the animation of surface anatomy. It showed structures underneath the skin when students pointed the mouse to the part (see Figure 3).

Another advantage of the computer program was that students could get an appreciation of movements and see a specific movement from a film clip (see Figure 4). But textbooks are still the students’ primary learning source since they are tangible and highly mobile. Diagrams in textbooks simplify the structures of the body which are clearly and precisely labelled. The on-line computer lab is dynamic and helpful, but it can not replace the textbook.

Other Issues

During the interviews, other issues raised included: learner characteristics, career relevance, and stability and quality of the software program. These factors may frustrate students’ enthusiasm if not handled properly. For instance, some lab instructors said that the learning style of students in this course was more kinetic, that is, they preferred to learn things by doing rather than by just reading and watching, and this maybe why students in the computer labs seemed more likely to get bored when sitting in front of the computer screen clicking and reading.
Conclusion

Computer technology has provided many new educational possibilities such as distance accessibility, and interactive, dynamic multimedia learning environments. Effective use of educational technology should take into consideration numerous elements. Results of this study highlight the need for instructional design, content, and teaching strategies that take into consideration learner characteristics as well as the classroom environment.

In this study, according to the lab instructors, the 3D animation and interactivity of web-based labs appear to have attracted student attention. Moreover, they suggested that the following factors be taken into consideration in order to develop World Wide Web tools to support classroom activities:

- course content should be current and relevant to learner needs
- expected learning outcomes must be clearly described
- too much text on one page should be avoided
- students should not be overwhelmed with information
- increased access to the Internet, and voluntary lab assignments should be encouraged.

Future study of student work-load and its impact on knowledge mastery, and student comfort with using technology as it relates to performance and attitude, is recommended.

References


