Delivering Health Education via the World Wide Web: An Investigation of Collaborative Learning Environments

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Abstract

This paper presents the experiences and outcomes of a project which sought to investigate the efficacy of using Web-based learning within pre-service teaching health education. The study involved the pedagogical re-conceptualisation of the course; the design, development and formative evaluation of a prototype Web site to support the learning activities; and the design and implementation of experiments that explored the strengths and weaknesses of each of face-to-face and Web-based learning environments in facilitating collaborative health education learning activities.

The findings suggest Web-based learning environments with embedded collaborative activities effectively foster health-related knowledge, attitude and behaviour change. The nature of interaction among learners in different environments suggests that Web-based environments might best facilitate health education activities that explore controversial or confronting issues. Learners perceive great value in aspects of face-to-face tutorials that are not easily transferred to the Web æ particularly immediate interaction with the lecturer. Nevertheless, students perceive Web-based learning to be effective in facilitating their understanding of health education issues as much as or more than face-to-face situations.

Background

The pedagogical strategies proven to achieve health education objectives and outcomes have traditionally focused on exploration of health attitudes, beliefs, values and behaviours through small group work, cooperative learning, peer teaching, open-ended questioning, role plays, idea sharing and reflection (Greene and Simons-Morton, 1984; Hendry, Shucksmith and Philip, 1995; O'Connor and Parker, 1995). Pre-service teaching programs designed to developed physical and health education teachers profess the need for such techniques in teach -- yet often are unable to model such strategies.

In the higher education setting, increasing student enrolment and declining proportions of tenured academic staff the problems associated with implementing exemplary practice in teaching has been intensified. Where the theoretical inclination is to utilise flexible, student-centred strategies, the reality of mass lectures and didactic tutorials is often the practice.

It has been argued that information and communication technologies (ICTs) offers teacher educators the opportunity to rethink traditional approaches and take advantage of the features of learning technologies by creating learning experiences that model and extend the

proven approaches which have become more and more difficult to implement in the face-to-face settings of higher education.

Online technologies, specifically Web-based applications, are increasingly being utilised as a delivery mechanism in higher education. The suggested educational benefits are many and consistent with the elements of effective health education learning environments:

- direct access to a variety of international resources on a broad range of topics;
- access that is not limited to scheduled lecture and tutorial hours;
- opportunities for a variety of learning activities including small group discussion and collaborative projects;
- exposure to and a forum for expressing and discussing different beliefs and attitudes.

It is the capability of the Web to facilitate communication and collaboration between/among students and instructors that could prove to overcome the increasing barriers to effective teaching and learning in higher education. Research in computer-mediated communication -- specifically in asynchronous modes -- has demonstrated outcomes such as active participation, equity of participation, peer interaction, multiple perspectives, research, analysis, reflection and divergent thinking (Laurillard 1993; Harasim, Calvert and Groeneboer, 1997; Romiszowski and Mason,1996). Thus, indicators suggest that Web-based learning environments that include communication-based activities can effectively enhance health education.

Pedagogy before technology

Health and Health Behaviour, an introductory subject within a Bachelor of Education (Physical and Health Education) degree program, was chosen to be the focus of an investigation of the use of Web technologies for health education. The subject served as the precursor for a sequence of subjects which examined the major issues inherent in health and society and was traditionally delivered face-to-face with a weekly two-hour lecture and a one-hour tutorial. The tutorial component of the subject involved a classroom-based seminar format in which groups of two or three students worked on one specific topic related to the subject content for presentation during the scheduled tutorial. Typically, students actively investigated only their assigned topic area and were less involved in the exploration of the topics presented to them by other student groups.

It is not possible to move directly from the face-to-face teaching and learning environment to an online situation without careful re-conceptualisation of how the pedagogy can be adapted and implemented using the most appropriate technology. As such, the redesigned strategy for the subject consisted of activity-based collaborations undertaken by learning groups which consisted of four or five students. For each tutorial activity, learning groups were presented with material designed to stimulate discussion and collaboration (e.g., a survey to be answered, questions to be considered, etc.). The objective for the learning groups was to develop a consensus or shared understanding that was then communicated to the larger class during the subsequent lecture period.

Once the pedagogical model was adapted, the Web learning environment was designed and developed. A formative evaluation of the prototype Web site, with embedded activities, was undertaken and involved usability testing and expert review of interface issues; clarity and quality of information and external links; and, perceived pedagogical effectiveness of the learning activities.

The implementation version of the Web site structure included four main components:

- the subject outline which provided information such as the rationale, objectives, content, presentation, assessment, and participation expectations for the subject;
- the subject schedule which provided, in table format, the week-by-week timetable of lecture topics and tutorial activities;
- resources and Web links which included links to a number of Australian and international Web sites related to the topics covered in the subject; and, most importantly,
- the Activity Centre which facilitated the learning activities for the students who were participating in Web-based tutorials.

In the Activity Centre each learning activity was associated with five main areas:

- This Week's Task Into page introduced the student to the activity, related the activity to the specific lecture, provided additional conceptual information and stimulus into the group activity by asking the student to respond to some initial, topical questions
- The Individual Responses page allowed students to view their responses and the responses of the other members in their group to these initial questions.
- The Group Tasks page provided a detailed description of the group task for that particular learning activity.
- The Discussion Area provided an asynchronous discussion forum with an abbreviated description of the group tasks at the top of the page.
- Groups submitted their final product though the Submit Page form.

The navigation was structured such that all areas of the activities were available to the student at all times (i.e., students were not forced to follow a particular page sequence when engaging in the activity).

A similar structure was developed for students engaged in face-to-face activities such that they attended a short introduction session to the task, completed an individual activity and then received their group task. Groups then had a one week period in which to develop a group product based on the task and submit it to the tutor in their paper-based group folder.

Implementation

The subject was implemented with the revised pedagogical model and supporting Web site -- 62 students were enrolled in the subject.

A research investigation was overlaid to measure the effectiveness of this teaching and learning innovation. Specifically the focus of the study was to determine:

- How effective is the use of a Web-based learning environment in delivering health education relative to that of the traditional face-to-face environment in terms of knowledge, attitude and behaviour change?
- How do learners participate in and contribute to collaborative health education learning activities within Web-based and face-to-face learning environments?
- What are learners' perceptions of the effectiveness of Web-based learning environments for health education?

Students were randomly assigned into two tutorial groups and each group then randomly assigned to one of two learning environments (face-to-face or Web) for the first half of session. In the second half of session, groups crossed over to engage in their tutorials within the alternate learning environment. Both tutorial groups were further, randomly, divided into working groups (seven working groups in each of the two tutorial groups) consisting of four or five students.

Pre-tests and post-tests for: knowledge, attitude, and behaviour related to the health topics covered by the learning activities, and computer literacy and computer comfort were administered to all students. Additional post-test items included perception of the learning environments. The collaborative learning activities were recorded (via audio tape and electronic Web logs). Once learning activities were complete, a randomly chosen representative of each working group engaged in an in-depth interview regarding their experience and perceptions of the face-to-face and Web learning environments.

Outcomes

The analysis of data collected during implementation of the revised pedagogical model in both the face-to-face and Web-based environments produced positive results.

How effective is the use of a Web-based learning environment in delivering health education?	• Statistically significant improvements across the domains of knowledge, attitude and behaviour change suggested activity-based collaborative learning activities were an effective pedagogical strategy for topics related to health education. • Both Web-based and face-to-face learning environments facilitated health-related knowledge construction and attitude and behaviour change. • When comparing face-to-face and Web-based learning environments, one environment did not prove to be consistently and significantly more effective than the other in terms of facilitating knowledge construction and attitude and behaviour change related to health education. However, descriptive indices suggested Web-based environments may be more effective.
How do learners participate in and contribute to collaborative health education learning activities?	• Learners contributed fewer individual inputs to groups discussions related to the collaborative tutorial activities within the Web-based learning environment as opposed to similar face-to-face situations. However, learners' individual contributions within Web-based discussion spaces were far more detailed than those that were provided when learners engaged in the face-to-face. • The nature of learning group collaborations differed in face-to-face and Web-based learning environments: • Learners tended to elaborate on ideas and challenged their group members with requests for clarification in collaborative tutorial activities within the face-to-face more so than Web-based learning environments. • Learners tended to refer to sources (whether personal experience, subject material or external resources) in collaborative tutorial activities within the Web-based more so than face-to-face learning environments. • The Web-based learning environment provided non-confronting learning experiences for learners as evidenced by their tendency to contribute more references to personal experiences in Web-based tutorials than in face-to-face tutorials. • Learners overcame obstacles of reduced visual cues within

	the Web-based learning environment and tended to contribute more socio-affective comments toward their learning group members within Web-based tutorials than in face-to-face situations.
What are learners' perceptions of the effectiveness of Web-based learning environments for health education?	• Learners perceived the Web-based learning environment to be more effective or as effective as face-to-face tutorials in facilitating their understanding of the health education concepts. • Learners appreciated the flexibility and opportunity for independent inquiry and reflection offered by the Web-based learning environment. • Learners felt that the interaction with both lecturer and a larger number of peers was an integral aspect of the face-to-face tutorials. • Groups who experienced consistent cohesion in terms of motivation and participation among group members reported positive learning experiences regardless of the learning environment. Similarly, those who experienced group process difficulties reported that these difficulties arose in both environments.

The findings led to the development of recommendations for the use of online and Web-based learning for health education.

- Instructional designers should consider the selection of appropriate pedagogical strategies and design of learning activities as essential components in the development of effective Web-based learning environments.
- Formative evaluation of learning activities and learning environments prior to implementation (or re-implementation) should be undertaken where possible.
- Learners' should be supported in developing group management and process skills when collaborative strategies are employed within both face-to-face and Web-based learning environments.
- Learners should be supported in the development of studentship skills that are specific to engaging in technology-supported learning environments.
- Developing structure around the group process and task may facilitate the development of shared group decision-making.
- Web-based environments should be considered for the facilitation of non-confronting, personalised learning contexts particularly for disciplines such as health education where expression of attitudes and values is a key component of the learning experience.
- Web-based learning environments should ensure adequate involvement of and access to the lecturer.

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