Web-Based Learning and Its Impacts on Junior Science Classes

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INTRODUCTION

The past decade has seen significant improvements in the design and development of information and communication technologies (ICT). The Internet, for instance, has become more efficient, more affordable and more accessible. While the availability of these technologies in classrooms has created new opportunities, it has at the same time presented new challenges for teachers. Teachers have to find innovative methods of implementing these technologies in lessons that are not only effective and efficient but also fair to both sexes.

BACKGROUND

ICT in Education

Technological advances in the past decade have created teaching and learning opportunities of significant proportions that would have been a fantasy a few years ago (Dierker, 1995). Gomory (2001) pointed out that while in the past many were deprived of education due to reasons such as accessibility, affordability, and personal commitments, today technology has addressed some of these issues. Learning can now be blended in with lifestyles and integrated into the daily routines of learners.

Another significant factor is that young people of today are constantly interacting with multimedia, and the new technologies "speak their language." According to Eklund, Kay, and Lynch (2003), many students in Australian schools were more skilled in using computers than their teachers. Stager (2004, para. 12) argued that by correctly harnessing these skills in technology, teachers can "breathe life into the least effective teaching practices of yore." But is a technology-driven environment a fair learning medium for both sexes?

Gender Issues

Gender issues relating to science subject selections have been an issue for some time. In recent times, the widening gap between the academic performance of boys and girls has emerged as a significant issue for educators across all subjects. According to Biddulph (1997), these days, girls are much more confident, hardworking and motivated than boys. A recent Queensland Government report pointed out that girls were more likely to complete high school than boys (Wenham & Odgers, 2004). Matters, Pitman, and Gray (1997, p. 6) believed that the "original question of whether girls have equal educational opportunities has now been replaced with that of whether boys have equal educational opportunities."

Head (as cited in Cortis & Newmarch, 2000) suggested that the performance of boys was most probably due to their preference for different learning styles. Lerner and Galambos (1996) listed a range of factors, such as motivation, curriculum, student teacher and peer interactions, as some of the possible reasons for the disparity in the performance of the two sexes. Can computers and related technologies provide a level playing field for both sexes? How can the impact of such initiatives on students be studied?

Learning Environments

In the field of learning environments, the impact of such innovations on students can be effectively

measured. For more than 30 years, proven qualitative and quantitative research methods associated with learning environments have yielded productive results for educators. In this study, the perceptions of Web-based learning in a blended environment were measured using a modified version of the *Web-Learning Environment Instrument* (WEBLEI) (Chang & Fisher, 1998). The WEBLEI measures students' perceptions across four scales—Access, Interaction, Response, and Results. Theoretically, if students perceived their learning environments favorably, then this was more likely to be transformed into favorable learning outcomes.

THE RESEARCH PROJECT

Design, Development, and Implementation of *Getsmart*

The layout of the *Getsmart* Web site enabled students to engage in learning activities that included opportunities for modeling, coaching, articulation, scaffolding, reflection, exploration, questioning, performance feedback, and direction instruction. These paralleled the instructional methods of "electronic cognitive apprenticeship" (Bonk & Kim, 1998; Collins, Brown, & Newman, 1989; Wang & Bonk, 2001). These learning options were created though Web-based lessons, tests, online chats and interactive activities. Figure 1 shows the general layout of the Web site.

Figure 1. The general layout of Getsmart

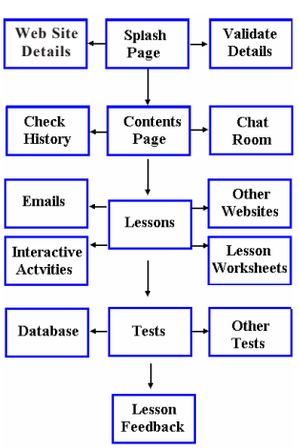
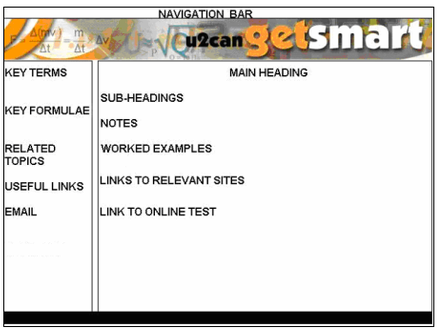


Figure 2. Key features of the lesson page



Students accessed the Web site through the *splash page* once their user login and password were verified. Upon a successful login, users were directed to the *contents page,* which listed all available lessons. Each *lesson page* highlighted key aspects of a topic or concept and was closely related to the work done in class. The page layout (Figure 2) was kept uniform throughout the Web site, thus ensuring that students did not have to rediscover the steps of using the Web pages each time they logged in.

Most pages were linked to either a multiple-choice or short-answers test. These tests provided instant feedback to the user. Feedback to the tests did not specify which questions were wrong, for two reasons. First, students had to understand that there was more to an answer than merely choosing an option. Second, a wrong answer was meant to encourage the student to find the correct answer. It was purposely designed in this manner to encourage interaction. The results of these tests were written in a database file that could be accessed by students and teachers.

Students were also issued with or able to download lesson worksheets. These fill-in-the-blanks worksheets served as notes for students. It also facilitated further discussion in the classroom and kept students on task.

Research Sample

This study was conducted at a state high school in Queensland, Australia. Lessons were designed for various topics in Year 10 Science and Advanced