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Oh, What A Tangled Web-Site We Weave When First We Practice

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ABSTRACT

Current emphases on computer technology have prompted a naive desire to use whatever is new regardless of its appropriateness to educational outcomes. Use of College level Web-based instruction has unearthed a variety of problems: misapplication of software, misplaced attempts to adapt traditional instruction to the Web, lack of teacher support, access and time difficulties, financial barriers, spatial/gender differences, and counterproductive approaches to learning that are unsystematic and independent versus organized, social, and cultural. The present study examined technological barriers to college student's achievement as well as student preferences regarding an optional Web-based ancillary designed to promote student achievement in an Educational Psychology course.

INTRODUCTION

Attitude

Recent research addresses achievements gained through the use of computerized study plans in a variety of fields (Cauble & Thurston, 2000; Inglis, 1996; Ritter & Lemke, 2000; Montelpare & Williams, 2000; Ruth, 1997). Albeit, several studies describe shortcomings and poor results using the same computerized techniques (Faux & Black-Hughes, 2000; Healy, 2000; Menon & Coe, 2000; Raths, 2000). Described difficulties are many and varied. Some researchers believe that the problem lies in the attitudes of the people within the culture. "The technical part is easy; it's the attitudes and culture that are hard". "You can write a beautiful program, but it doesn't count if nobody uses it" (Raths, 2000, p. 81). Furthermore, critics have suggested that current interest in technology reflects a rather unschooled urge to use whatever technology is "state of the art" with little regard for the appropriateness relative to the educational objective in question.

Educational Criticisms of Ways Computers are Used

Others posit that it is the way software is used that is problematic.

"Web-based training material is often pulled from traditional teaching tools, such as slide presentations or videos, that were meant to accompany a lecture. Taking those teaching tools out of context and sticking them on the Web does not make for engaging, interactive content" (Faux & Black-Hughes, 2000, p. 458). Abbeduto (2000) summarizes several complaints by educators regarding the computer explosion. He suggests that critics posit that computers may be antithetical to the goals that most educators hope to achieve and cites the Internet as an example of a superficial, unsystematic approach to studying rather than one that is focused, goal-directed and self-reflective. Others argue that technology tends to isolate learning as something individual versus social and cultural. Another criticism involves computer mediated instruction which depends critically on a student's ability to monitor his or her own progress, thereby increasing the gap between more capable and less capable students; independent learners will benefit, while those students requiring teacher support will flounder. Burniske (1998) further suggests that the greatest threat facing education today is the death of dialectical discourse and that today's adolescents are gravely lacking this ability and there is little in popular culture that encourages them to think but rather to "just consume". He states that computers are "persuasive" and discourage public debate and says that if there are no opposing views, then where's the dialectical tension necessary to discover the truth? Samuel Sava (head of the National Association of Elementary School Principals) observed before the start of the 1997-98 school year, "If computers make a difference, it has yet to show up in achievement. We must have the courage to resist sexy hardware and argue for the funds necessary to train our teachers." (In Abbeduto, p. 271)

Time/Access

On-demand access to computers has been deemed a major obstacle in some instances. High demand for computer time in computer labs and limitations in off-site connections both contribute to limiting access (Faux & Black-Hughes, 2000; Menon & Coe, 2000). Off-campus students face barriers of time. They may have young children or employment that prevents them from using community resources, including university or community library resources (Faux & Black-Hughes, 2000).

Financial Barrier

Financial limitations may be another barrier that students face using Internet course material. The increasing amount of computer technology required to access Internet courses may present a financial barrier to learners who do not otherwise have access to a computer. The initial expense of the hardware and the continual expense of Internet access and software can be prohibitive to off-campus students (Brent, 1999). The cost of technology is not important only to the students, but also impacts professors and instructors (Healy, 2000).

Lack of Knowledge/Discomfort With Computers

Another area for examination is student lack of knowledge and general discomfort with computers and the Internet. Primary and secondary students have increasing access to computers in elementary schools and high schools. This does not mean that all college students are entering post secondary education with a competence or comfort level with computers that support their use of the Internet as a learning tool (Mowrer-Popiel, Pollard, & Pollard, 1994). Many students from the study indicated that they were not able to learn well using the computer and/or the Internet. Students felt that they did not receive any feedback to reinforce learning and that discomfort with the computer led to getting lost on the Internet while engaged in studies. Students were very direct about not enjoying learning from the Internet or from the computer. Researchers have found that learning takes place in both traditional classroom and on-line formats, but performance on a posttest of knowledge gained was best in the lecture section (Faux & Black-Hughes, 2000). Students also stated a preference for teacher contact over Internet instruction. "The typical things we do to infuse enthusiasm and life into our lectures cannot be done as readily via distance learning. Simple examples such as adding a point to our overheads with a marker, gesturing and moving around, and walking to the blackboard all serve to keep students oriented in live classrooms and, as much as we prefer not to admit it, sometimes keep them awake" (Menon & Coe, 2000, p. 499).

Gender/Spatial Ability

A final area for examination deals with the widening gap between males and females with respect to access and the use of technology (Linn, 1998). "This is becoming the new boys club - this is where the gender gap is going to be."

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(Janice Weiman, executive director of AAUW Educational Foundation, 1998). A study at MIT in 1995 examined the disparity in the ratio of male and female engineering and computer science majors. According to that report, women were half as likely as men to major in computer science at MIT. Surveys found that both women and men characterized the environment as more competitive than other majors and women generally felt less prepared for the major. Cornelia Brunner (associate director and media designer for the Center for Children and Technology, Education Development Center in New York) says that girls and boys have different perceptions of computers with girls focussing more on the function of computers and boys more likely to concentrate on computers as machines. For example, she says in computer programming classes, girls are inclined to be less interested in the material than the boys.""If the technology is introduced as a means to an end, as a tool for research or making a multimedia presentation, young women are as likely to take to it as young men." Part of the problem may also stem from long established gender differences in spatial performance (Casey & Brabeck, 1990; Greenfield, Brannon, & Lohr, 1994; Subrahmanyam & Greenfield, 1994). Skills in utilizing two-dimensional representations of hypothetical space are important in a variety of computer applications, including word processing, programming, and computerized video games (Subrahmanyam & Greenfield, 1994). As determined by these researchers, those with superior spatial skills (significantly more males) demonstrate superior computerized video game performance and those who experience greater video game practice (significantly more males) also demonstrate improved spatial performance. Training through video game performance was significant for improving spatial performance and most effective for those who started out with relatively poor spatial skills (significantly more females). Greenfield, Brannon, & Lohr (1994) tested whether video games would contribute to the development of spatial representational skills necessary for people to effectively utilize computer technology and found that long-term development of video game expertise yielded advanced spatial skills as measured by a mental paper- folding task. They further suggest that the anthropological study of games has shown that a culture's games socialize children relative to the needs and adaptational requirements of their own society. Vygotsky (1962) and Bruner (1965) posited that the internalization of cultural tools or symbol systems stimulate cognitive development. This notion as applied to media, was expanded by Bruner and Olson (1973) as they were the first to recognize communication media as a distinct symbol system. People engage with these cultural symbol systems everyday of their lives and the cognitive activity that ensues leads to representational competence. For most children, video games are one of the first opportunities to interact with computer technology. As demonstrated by Greenfield, Brannon, & Lohr, (1994) this form of cognitive socialization is predominately male.

Relationship to Study

There are many stakeholders concerning escalating use of computer technologies in the college classroom (Chung & McLarney, 2000). "Just because everyone's going there, doesn't mean it will be easy to get to or worth the trip" (March, 2000, p. 55). In light of the aforementioned variables, the present study sought to investigate use of an optional on-line ancillary for a course in Educational Psychology and to explore student preferences for such a site relative to gender and spatial ability. By generating surveys to determine student preferences for what they consider to be most beneficial to their learning and then using that information to construct an online site for optional student use, we hoped to gain insights into what students consider to be the greatest technological barriers to effective achievement as well as what they considered to be most advantageous.

METHOD

Subjects (pilot study)

The subjects for the pilot study conducted during the Fall semester of 2000 consisted of 130 pre-service educators from a 300 level Educational Psychology course at the University of

Idaho. Surveys were administered to gather student preference information that was then utilized to construct an online-ancillary for use in the next semester's Educational Psychology course.

Subjects

The 86 subjects were 59 females and 27 males enrolled in an Educational Psychology course at the University of Idaho. The study took place during the Spring Semester of 2001. Forty-eight percent of the students lived in a campus residence. Eighty-three percent of the students had Internet available in their homes. Ninety-three percent reported that they had adequate access to a computer while on campus. One hundred percent reported that they used e-mail. Sixty-five percent of the students reported they have a NOVELL account. Sixty-five percent of the students reported that they had on-line ancillaries associated with other classes. Subjects participated on a voluntary basis.

Test Materials

A pre-class computer survey and a Group Embedded Figures Test (GEFT) (permission secured for use) were administered to the subjects. The computer survey was used to assess subject demographics and student likes/dislikes regarding feature of online ancillaries. The GEFT was administered to examine gender differences in spatial performance and possible relationships between spatial performance and preferences on the computer survey. Scores ranged from 0-18 with 18 as the highest possible score.

Procedure

During the Fall semester of 2000, 130 students from a 300 level Educational Psychology course at the University of Idaho were administered a pre-class computer survey to determine preferences regarding an online ancillary for the course. Results were used to generate an online site for optional student use. Spring semester 2001, a modified survey was administered to that semester's Educational Psychology class which was used to verify student preferences for online ancillary components, increase the demographic information, and also to assess student attitudes toward computers and online ancillaries. Additionally, students were administered a Group Embedded Figures Test (GEFT) to determine levels of spatial performance. Anecdotal information was gathered.

RESULTS

Table 1 reports means, standard deviations, and percentages by sex relative to norm quartiles for the GEFT, standardized by the number correct for women.

Table 1
Means, Standard Deviations, and Percentages by Gender per Quartile on the GEFT

Number Correct Test Norms	Males n=21 M=11.71 SD=5.24	Females n=62 M=10.55 SD=5.33
1-8	23%	39%
9-11	29%	13%
12-14	10%	21%
15-18	38%	27%

A one-way analysis of variance for total group showed no significant effects for gender on the GEFT. Figure 1, however, shows that when categorized by number of correct items, an inverse relationship exists for percentages of males and females obtaining correct number of responses. The greatest percentage of males (38%) scored in the top category (15-18 correct) and the greatest percentage of females (39%) scored in the lowest category (0-8 correct).

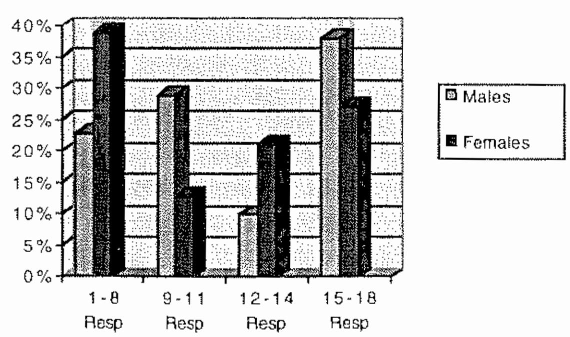

Figure 1 Percentage of females (n =62) and males (n =21) falling within the ranges of 1-8,

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9-11, 12-14, or 15-18 correct responses on the GEFT.

Table 2 reports results from the computer survey ranking the ancillary components from most preferred to least preferred and their associated mean scores.

Table 2
Ancillary Components Ranked from Most Preferred to Least Preferred by Students

Ancillary Components	Mean	SD
Practice Questions	2.67	1.81
Class Notes	3.15	2.33
Assignments	3.39	1.76
Examples of Applications	4.04	1.87
Syllabus	4.48	2.57
Study Groups	6.42	2.02
Related Readings	6.44	1.99
Discussion Board	6.74	2.23
Links	6.81	2.04

Anecdotal reports from the survey revealed the majority of comments about computer usage were negative (n=94) versus positive (n =70). Eighty percent of the positive replies addressed the benefits of having access to material for review and course notes from missed lectures. The negative responses addressed (1) the amount of time needed to interact with the computer when using online ancillaries (40%), (2) technical problems with software or hardware (26%), and (3) feelings of confusion, inability, frustration and discouragement (24%).

DISCUSSION

Reviewing the anecdotal comments, one student said, "Computers can have problems. I feel safer without them." Three people found professors to be more accessible than computers. Thirteen said that optional ancillaries are good but mandatory ancillaries are bad. Another stated that readings and lectures always seemed adequate to him. Views regarding computer usage are as varied as their applications. Generally, students feel that computers are worthwhile tools, however they don't always agree with how they are used within the educational arena. Their sentiments echoed many of those found within the literature in that there does not appear to be adequate support nor should they supplant the live classroom teacher. They appreciate ancillaries in as much as they support and extend learning and if they are not thrust upon students as yet another task to be accomplished. Some of our colleagues suggest that students need to be placed into "zones of discomfort" in order to progress to higher levels of intellectual understanding and familiarity with computers. Based upon the results of this present study, it is suggested that we attempt to reach common ground. Realizing that some students encounter difficulties that other students may not, we need to provide equalizing support for all areas of difficulty experienced by users. In order to empower students we need to involve them when constructing online ancillaries and perhaps Web-based instruction, in spite of the arguments by our colleagues that students don't know what is best for them. We must also remain cognizant that gender differences have emerged within this realm as well as spatial differences. Both have been shown to relate to varying levels of computer expertise. Individual differences in learning styles extend into the technological environment. Educators must pay attention to the needs of the students and learn from them how best to accommodate technology if we wish for all students to embrace this mode of instruction and meet the expectations of our rapidly changing culture.

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