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Abstract

As more and more Extension educational content finds its way onto the World Wide Web, questions persist among Extension educators about the effectiveness of online delivery. Do Extension clients learn as much from online Extension educational programs as they do from classroom-based programs? And, are Extension clients with computer and Internet experience more likely to accept online educational programs and be satisfied with them? At Oregon State University, a team of Extension educators addressed those questions via a study of learners participating in the OSU Extension Service's Master Gardener program. The study compared online learners with traditional classroom learners and included pre- and posttesting, user surveys and correlation analysis.

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Research

instruction and to analyze characteristics and attitudes of the learners. Statistical analysis of pre- and post-test results indicated that both online and traditional classroom learners performed similarly in terms of amount of material learned. Correlation analysis did not indicate any linkage between experience with computers and the Internet and satisfaction with the online course. However, the analysis did indicate linkage between 1) college experience and satisfaction with the online course, and 2) convenience of taking a course online and satisfaction with the course and willingness to take another online course. The major implications of this research are that online delivery of Extension educational programs can be as effective as traditional delivery, and that convenience of access is significantly associated with learner willingness to take Extension educational programs online.

Introduction and Background

A team of Extension educators at Oregon State University has been using the World Wide Web to deliver the Extension Service Master Gardener Training program to clients for the past three years. During this time, the team attempted to learn as much as possible about the learners participating in the program online. Many Extension educators at Oregon State University are concerned that online delivery of the Master Gardener training program will lessen its effectiveness. This research project was conducted to examine this question. In addition, the researchers believe it is critically important to continually evaluate the educational program delivery process, particularly when it involves a new technology such as the Web, which continues to evolve rapidly.

In December 2000, the team completed the second learning module for the Master Gardener training Web site. Focusing on soils, this module was made available to participants in the Winter 2001 OSU Extension Master Gardener training program. This paper presents the results of research conducted with the initial users of this module.

Purpose of the Study

The purpose of this research project was two-fold. One objective was to employ pre-/post-testing to compare the learning performance of two groups of Extension clients. One group, working on computers in their homes, completed the Master Gardener training soils module delivered online via the World Wide Web. The other group completed the soils training module traditionally (face-to-face) in the classroom. The second part of the study involved only the online learner group. The second objective was to employ correlation analysis to look for statistically significant relationships between 1) learners' education levels and 2) experience with computers and the Internet, and their attitudes toward taking a Master Gardener training course online.

It is important to emphasize that a key aim of this study was to examine learners participating in an Extension educational noncredit program. As will be explained in the following section, there are studies in the literature similar to this one, but they focus on learners in for-credit courses. We take the position that for-credit and noncredit educational programs are not the same in terms of the motivation of the learners. For example, in a noncredit program learners are not concerned about achieving a certain level of performance in order to be awarded a credit. They simply desire information that is important to them and a quality learning experience.

The researchers developed two hypotheses to meet the study objectives.

1. Extension clients taking a Master Gardener training course online learn as much as clients taking the same course traditionally (in the classroom) as measured by the scores of pre- and post-tests.
2. Extension client acceptance of the online delivered Master Gardener training course is positively correlated with experience with computers and the Internet.

Literature Review

Many studies have employed the pre-/post-test tool to compare the learning performance of students in traditional courses (instructor and learners meet face-to-face) with the performance of students in distance education courses (Baker,

Research

Hale and Gifford, 1997; Moore and Thompson, 1990; Russell, 1998; Souder, 1993).

However, most of these studies focus on students taking for-credit courses in higher, or continuing, education situations. There appear to be relatively few distance education studies where the pre-/post-test tool has been used to compare performance of distance and traditional learners in an Extension educational program. For example, Sunnarborg, Bradley, and Haynes (1988) used pre-/post-tests to measure student learning in an Extension program on weight control and nutrition delivered via cable television. Also, Flaskerud (1994) used pre-/post-tests to compare the learning performance of distance and traditional learners participating in an interactive video workshop on commodities marketing. The authors are not aware of any studies that employed pre-/post-testing to measure and compare participant learning performance in traditional versus online delivery of Extension educational programs.

The second line of investigation in this study looks at the possibility of relationships between learners' acceptance of an online educational program and their college experience and experience with computers and the Internet. In Lim (2001), correlation analysis was used to show that acceptance of a Web-based courses was significantly related to experience with computers, which in turn was significantly related to level of academic achievement. However, the learners in that study were undergraduate, graduate and continuing education students taking a for-credit Web-based distance education course. This study focuses on learners in a noncredit Extension educational Web-based program.

Research Methodology

Thirty-eight participants in the 2001 statewide Master Gardener training program volunteered to participate in this study. They were divided into two groups. A traditional group, which consisted of 17 learners, completed the soils module in a traditional classroom setting. An online group (21 learners) used their home computers to complete an online version of the soils module delivered via the Web.

Both groups completed a pre-/post-test consisting of 25 multiple choice and 11 true/false questions relating to the topic.

The online participants also completed an attitudinal survey

Research

consisting of 27 items that covered user satisfaction with the content and organization and design of the module; and a demographics survey consisting of 15 items, including questions on education level achieved and computer/Internet use. The demographics and attitudinal surveys were developed by the researchers and tested with groups of Master Gardener program graduates.

User responses to selected survey items were included in the correlation analysis component of the study explained below.

The pre-/post tests were administered by county Extension agents to the classroom participants (N = 17, 100% response rate) prior to and subsequent to their completing the soils module at their local training sites.

Online participants received the pre-/post test, demographic survey and attitudinal survey for the online module via mail. They completed these items and returned them to the research team (N = 21, 100% response rate).

Correlation analysis was conducted to look for relationships among items from the demographics and attitudinal surveys for the online module (Phillips, 1996). Test scores from the traditional and online learner groups were analyzed using a T-test for significant difference between two means. Navarro and Shoemaker (2000) made similar use of correlation analysis and T-test to study the efficacy of online distance learning, although their comparative study focused on university students taking a for-credit course on introductory macroeconomics.

The correlation analysis tool employed was the Pearson Correlation coefficient. All data were processed using the SAS system for the statistical analysis (Cody and Smith, 1997).

Findings

Pre- and post-test score results

Table 1 shows the results of T-test analysis for pre/post test scores from the online and traditional learner groups. The pre/post-test score results were similar for the two groups.

Statistical comparison of the increase in test scores for both groups indicated no significant difference in the amount of improvement in pre- and post-test scores between the groups.

Research

Table 1. *Test Scores for Online (N = 21), and Traditional (N = 17) Learner Groups*

Online group

Pre-test mean score — 25

Post-test mean score — 31

Score increase 6.4 (T = 9.15, SD = 3.2, p = <.0001)

Traditional group

Pre-test mean score — 24

Post-test mean score — 29

Score increase 5.7 (T = 4.19, SD = 5.7, p = <.0007)

Selected Attitudinal and Demographics Survey Results

Tables 2 and 3 show some of the results from the demographics and attitudinal surveys administered to the online learner group. Several items on the demographics and attitudinal surveys addressed questions outside the scope of this research project. Therefore, only selected items are reported here. As shown below, learners in the online group valued the convenience of participating in the program via online delivery. Results from the demographics survey show that all online participants had some level of college education and most had some years of experience using computers and the Internet.

Correlation Results

As mentioned above, items selected for analysis from the attitudinal survey had to do with user acceptance of the online course and willingness to take another online course. Items selected for analysis from the demographics survey had to do with college experience and experience with computers and the Internet.

The analysis did not indicate a correlation between acceptance of the online course and experience with computers and the Internet. However, correlation coefficients did provide evidence of linkage between several of the survey items.

Table 4 shows the correlations between college/university experience; learner acceptance of the online course; learner willingness to take another online course, and selected attitudinal/demographics survey items.

Table 2. Results for Selected Items from Attitudinal Survey Administered to Online Learning Group (N = 21)

Statement	Mean level of agreement*
willing to take another online course	1.5 SD = .98
online course acceptable	1.6 SD = .71
convenience of online course important to me	1.6 SD = .98
online learning experience adequate	1.7 SD = .67

*On a scale of 1 to 5, 1 indicating strong agreement and 5 indicating strong disagreement.

Table 3. Results for Selected Items from Demographics Survey Administered to Online Learning Group (N = 20)

Survey item	Count	Percentage
attended college or university	20	100%
4-year or advanced degree	13	65%
computer owner for 5 years or more	17	85%
2 years or more experience with Internet	18	90%
Internet use 3 hours or more per week	16	80%
never taken an online course before	17	85%

Research

Table 4. Linking College Experience, Acceptance of the Online Course and Willingness to Take More Online Courses, with Selected Attitudinal and Demographics Survey Items ($N = 18$)

Survey item	Correlation coefficient with college experience*
online course acceptable	0.56
online learning experience adequate	0.66
willing to take another online course	0.48
$p = .05$	
Correlation coefficient with user acceptance of online course	
online learning experience adequate	0.78
convenience of online course important to me	0.60
willing to take another online course	0.79
$p = .05$	
experience using computers	0.12 ($p = .63$)
experience using the Internet	0.22 ($p = .39$)
Correlation coefficient with user willingness to take another online course	
online learning experience adequate	0.46
convenience of online course important to me	0.81
$p = .05$	

*experience as a college/university student, but not necessarily resulting in a degree earned

Discussion and Conclusions

The pre-/post-test component of the study showed statistically significant improvement in test scores for both online learner and traditional learner groups. There was no statistically significant difference in the amount of improvement on post-test scores between the groups, indicating that both delivery methods resulted in similar learning performance by

Research

both groups. This result was not entirely unexpected. Navarro and Shoemaker (2000) found that online learners actually performed better than traditional learners according to their test score analysis.

The correlation analysis revealed some interesting relationships. Willingness to take another online course was significantly correlated with 1) convenience of taking the course online and 2) adequacy of the online learning experience. Also, college/university experience was significantly correlated with 1) acceptability of the online course and 2) adequacy of the online learning experience. On the other hand, the correlation analysis didn't provide evidence to support the hypothesis that learner acceptance of Master Gardener training delivered online is correlated with experience with computers and the Internet.

Three conclusions can be drawn from this research. 1) Delivering not-for-credit Master Gardener training online can be just as effective as traditional delivery in terms of amount of course material learned by participants. 2) Convenience is an important contributor to Extension clients' acceptance of the online training course. And, 3) there appears to be significant linkage between learners' experience in college or university and their acceptance of online educational programs and willingness to participate in additional online programs.

The authors have long speculated that learner acceptance of Extension online educational programs would link to the convenience of participating online. These findings provide some validation. Given that time constraints are generally considered one of the top barriers to adults participating in educational programs, it is no surprise that adult learners value the convenience of online delivery of educational programs.

The linkage between learner acceptance of the online course and college/university experience is encouraging because surveys of Oregon Master Gardener program participants during the past 10 years indicate that more than 80 percent have college/university experience. This correlation helps support the authors' contention that Master Gardener training offered online will find a receptive audience that is very likely to grow, perhaps dramatically, over the next several years.

The absence of any indication of a correlation between learner acceptance of the online course and experience with

Research

computers and the Internet was a surprise (see Table 4). Additional study is needed in this area to more fully explore this relationship.

It may also be useful to study the correlation between user satisfaction with online educational programs and usefulness of online multimedia components such as animations, video clips and audio content. This would help developers of online Extension educational programs assess the value of investing resources in multimedia content for online programs.

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