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AN ANALYSIS OF THE PERCEIVED BENEFITS AND AFFORDANCES OF COURSE WEBSITES BY ON-CAMPUS AGRICULTURAL STUDENTS AND FACULTY MEMBERS

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Abstract

Many institutions are now delivering online classes to on-campus students (NCES, 2002). In this study, survey research methods were employed to examine the benefits and useful components or affordances of on-campus course websites. A census of teaching faculty in a land grant college of agriculture was surveyed, and a stratified sample of students was drawn to represent the college population in their class standing and academic major. The final sample population, faculty and students, numbered 1,567. Students and faculty did not perceive the same benefits from course websites, in either amount or type. Course websites were perceived as benefiting students more than faculty. Students and faculty also failed to agree on the usefulness of the components of course websites. In general, faculty members were more optimistic than students regarding the usefulness of course website components. The findings of this study suggest that the most useful components of course websites, as perceived by both faculty and students, are also the easiest to implement. The findings suggest a diminishing returns relationship exists between the amount of additional effort expended by faculty members to implement a website component and the students' perceptions of its usefulness.

Introduction

In a recent report to the Congress of the United States, a national blue-ribbon panel, the Web-based Education Commission, (2000) stated:

> The question is no longer *if* the Internet can be used to transform learning in new and powerful ways. The Commission has found that it can. Nor is the question *should* we invest the time, the energy, and the money necessary to fulfill its promise in defining and shaping new learning opportunity. The Commission believes we should. The issue before us now is *how* to make good on the Internet's promise for learning. It is time we support education's new trailblazing heroes. It is time we collectively move from promise to practice (p. 143).

There are people who need numbers to be convinced. Abundant quantitative evidence exists in support of the Commission's conclusions. According to the National Center for Educational Statistics, an estimated 1,661,100 students were enrolled in distance education courses, progressing through 1,230 degree programs, and 340 certificate programs offered in the 1997-98 school year *exclusively* through distance education (NCES, 1999). John G. Flores, executive director of the United States Distance Learning Association, predicts that distance learning will surpass $10 billion per year by 2005. "The market is growing at 100% a year with improved technology" (Roberts, 2000, p. 15). Home schooling is growing at an explosive rate, in large part due to web-based educational programs. The number of home-schooled students, K-12, in 1994 was 345,000. This number grew to 636,000 by 1996, and was expected to surpass 1.5 million in 1999 (United States Department of Commerce, 1999). The number of distance courses offered by postsecondary institutions and the number of enrollments in those courses doubled between the 1994-95 and 1997-98

academic years (NCES, 2000). Educational delivery strategies making use of the Internet may have been only marginally important in the American educational delivery system, but they are clearly becoming mainstream.

These on-line classes and programs constitute new environments for teaching and learning, yet little research has been done to determine their characteristics. If instructors are to affect positive change in their teaching in these new settings, more research into the nature of effective and efficient learning and teaching in these new environments will be necessary.

Theoretical Framework

Delivery strategies in agricultural education have been described as the appropriate application of instructional design principles, needs and learner analysis, curriculum development, delivery, and evaluation within a particular mix of technological delivery systems. In effect, what are appropriate instructional designs for use in a videoconferencing course designed to reach mid-career professionals in the Cooperative Extension Service? What instructional designs are appropriate for use in a WWW delivered course for on-campus college students? These types of questions have often been answered without either a research or literature base. Clearly the development of appropriate delivery strategies will include some analysis of learner and faculty expectations. What is it that students and faculty perceive to be possible within a particular delivery strategy like a course website used to enhance an on-campus course? What capabilities do these websites afford?

A body of knowledge exists to assist with understanding these perceived capabilities. The term "affordance" was coined by the perceptual psychologist J. J. Gibson (1977, 1979) to refer to the relationships between objects (things) and actors (people or animals). Simply put, affordances are the set of possible actions one may perform on or with an object. All objects possess affordances. Affordances do not have to be determined (visible, known) to exist. They are not all necessarily desirable. For any given object, some--if not most--affordances are yet to be discovered. No one can imagine all of the affordances of even everyday objects.

More recently, Don Norman applied the theory of affordances to the design process in his book, "The Design of Everyday Things" (1990). Norman contends that affordances can be real and or perceived, and the two need not be the same. A button on a course Webpage may say "Home," and the perceived affordance may be that clicking on that button would return the user to the homepage of the class. If clicking on the button, in fact, takes one to the homepage of the university, or to an error page, or does nothing at all, then the real affordance does not match the perceived affordance. Real affordances can be tested. If a user perceives that some action is possible, whether or not it actually is, then that is a perceived affordance. If a user perceives that some action is not possible, even if it actually is, then that is a perceived non-affordance. The action will, in fact, never occur, because the user will never attempt it. The real question, then, is almost always about perceived affordances. Do actors or users perceive that clicking on a particular button is a useful action? The usability of an object is, in part, a measure of its perceived affordances and, to a lesser extent, the correlation between perceived and actual affordances.

Many faculty members question the effectiveness of on-line learning environments. Oliver, Omari and Herrington (1998) reported that the advent of relatively easy-to-use web course development systems like WebCT (www.webct.com) and Blackboard (www.blackboardcompany.com) encouraged many instructors to assume the role of course designer without adequate preparation. They found that in many instances the two roles are not interchangeable, and that the end result for the student is a poorly designed learning environment. They concluded that instructors should become familiar with ways to organize content, navigation strategies, guidelines for interface design, ways to provide the best forms of text presentation, improving document readability, and designing effective

interactions before attempting to place a course on-line (p. 124).

Best practice in the design and development of course websites is a developing area of knowledge. This researcher was not able to locate any research-based information, but several authors, apparently relying on anecdotal evidence, suggested some common components be included in course websites (Cooper, 2000; Kaplan, 1998; Polichar & Bagwell, 2000; Rosenblum, 2000; Zirkle & Guan; 2000). The suggested components were categorized by the author into three groups by level of learner involvement. The three categories were as follows: 1) static course components (e.g. course syllabus, presentations, readings, study guides, and old exams), 2) interactive course materials (e.g. links to other WWW resources, interactive practice exams or quizzes, multimedia course content), and 3) opportunities for electronically-mediated synchronous and asynchronous instructor-student and student-student interaction (e.g. e-mail, threaded discussion boards, chat areas).

Communication has long been considered an important, even essential, component of successful learning environments. Cooper (2000) suggested that Web-based courses are not exempt from this rule. Cooper identified three types of communication that should take place in web courses: instructor-to-student, student-to-instructor, and student-to-student. Electronic mail, threaded discussions, and on-line chat rooms were all described as ways to facilitate and maintain discussion.

The contribution of gender, as a variable in learner achievement in on-campus as well as technology-mediated learning environments, is poorly understood and remains a contentious issue (American Association of University Women, 1999; Bromley & Apple, 1998; Gray, 1992; McHaney, 1998). While many studies in this area have been criticized, the sheer weight of the accumulating evidence is difficult to ignore. In a recent study of 2,381 junior high and high school students in Texas, McHaney (1998) found that "Males have a higher personal affect for technology than females, but their understanding of technology's importance is very similar" (p. 161).

The Internet continues to grow as an instructional delivery system. Course websites possess perceived affordances, and these affordances have perceived effects, both desirable and undesirable in the instructional process. In order to begin to optimize the design of these instructional delivery strategies, the perceived benefits and affordances of course websites must be identified, described and evaluated.

Purpose and Objectives

The purpose of this study was to identify and describe the perceived benefits and affordances of course websites held by both students and instructors in agriculture. Four objectives were formed to accomplish this purpose.

1. Describe the demographic and experiential characteristics of the students and instructors utilizing course websites.
2. Examine any differences in the perceived benefits of course websites between faculty and students.
3. Examine any differences in the perceived value of selected course website components between faculty and students.
4. Examine any differences in the perceived benefits or components of course website between males and females.

Methods

Population

The population of interest for this study was all students and faculty in the college of agriculture at a land grant university. A stratified sample of the student population was surveyed. The sample was comprised of intact courses randomly selected from different departments to provide a population indicative of the College population in their class standing (e.g. freshmen, sophomore . . .) and academic major (e.g. agricultural education,

economics, biophysics . . .). A census of the college of agriculture faculty was surveyed.

Instrumentation

Survey research methods were employed to accomplish the objectives. A survey instrument, designed by the researchers after a review of the available literature, was developed by a team of researchers from the Department of Agricultural Education and an interdisciplinary center devoted to research in distance learning. The instrument was pilot tested on both students and faculty members. Minor adjustments in the wording and structure of questions were made to improve internal consistency. The instrument used to collect data for this study was a two-part questionnaire designed to be read by an OCR scanner. Part I of the questionnaire was designed to collect selected demographic variables, including gender, age, and indicators of experience using course websites. Part II provided an opportunity for the students to select perceived benefits of course web pages, and to identify the components of the course web pages they found most useful. A panel of five experts made up of faculty members from the Department of Agricultural Education and the Department of Educational Human Resource Development established content validity of the instrument. Selected students from agricultural education provided input on face validity and completed a pilot test of the instrument.

Collection of Data

Student data were collected over a three-week period during regular class sessions. The survey instrument was distributed with #2 pencils as students entered the selected classes and was collected afterward. The survey was anonymous and completely voluntary. Students absent from class were randomly sampled without replacement until 30 had been contacted by telephone. The non-respondents' data were compared to respondents', and no significant differences were found, so the non-respondents' data were included for the analysis. The official enrollment in these classes was 1,558. The final sample contained 1,304 usable instruments for an effective response rate of 83.7%.

All teaching faculty in the college of agriculture were surveyed. Department heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, a total of 315 faculty members with teaching appointments were identified in 1999-2000. Of these, 263 survey instruments were returned for a final response rate of 83.5%. The relatively high response rate was attributed to rigorous survey and follow-up procedures in accordance with those outlined by Dillman (1978).

The final sample, faculty and students, numbered 1,567. Inferences were drawn to the population from which this sample was collected. The reader may want to draw inferences to other similar populations, but because of the sampling techniques employed, the reader is cautioned against drawing inferences to populations from significantly different institutions.

Analysis of Data

Data were analyzed using SPSS® for Windows version 9.0 software. Descriptive statistics were calculated for each variable. Reliability was established by calculating Cronbach's alpha. The alpha for the 11 items in Part II was calculated on the pilot instrument prior to collecting data and found to be .91. Post hoc reliability was calculated using the same techniques and found to be .86.

SPSS was used to generate cross tabulations. Cell frequencies and percentages were used to summarize faculty-student and male-female agreement or disagreement with statements. Chi-square statistical procedures were conducted to test the null hypothesis that there would be no difference between the responses of faculty and students, males and females.

Findings

Objective I: Demographic Data

The 1,304 students in the sample were 53% male and 47% female. Over 75% of the students were 18-21 years old. The 263 faculty members were 87% male and 13%

female, and over 77% of them were more than 41 years old.

Objective One: Experience With Websites

In general, about half of the students and faculty reported having some experience using course websites in the learning and teaching process. Over half (52.9%) of faculty reported that they have a course website. Most of these (84.3%) were designed to enhance the course and were not perceived as required components of the course by the faculty. Some 15% of faculty members (21) reported that their websites were required components of their courses. Student numbers were somewhat different with 24.8% of students (324) reporting that they were required to use course websites to access some assignments and 31.4% (410) reporting that some required course materials and assignments were available only through the course website. Still, 38.6% (503) students reported that the course website was not required at all.

Objective Two: Benefits of the Course Websites

Students and faculty were asked to choose from among six statements following the question, "How do you benefit from course webpages?" Respondents were encouraged to choose all the benefits they believed applied. These data are summarized in Table 1.

Table 1
Percentage Agreement on Benefits of Course Websites by Faculty and Students

Statement	% Faculty*	% Student*
None	35.0%	13.2%
Saves me time.	22.4%	41.6%
More convenient for me.	21.3%	47.9%
More efficient or effective communication between the faculty and students.	45.2%	36.3%
Increases my awareness of current technology.	24.0%	28.1%
I gain practical experience in using current technology.	25.9%	38.6%

*Totals may exceed 100% as respondents could select more than a single item.

While nearly half (47.9%) of the students believe that course websites make learning "more convenient for me," only 21.3% of faculty thought course websites made teaching more convenient. Far more students (41.6%) than faculty (22.4%) reported that using this technology saves them time. Students more often (38.6% vs. 25.9%) perceive that they "gain practical experience in using current technology" from these websites. Faculty more often (45.2% vs. 36.3%) felt that the website facilitated "more effective or efficient communication between faculty and students." A relatively small percentage of both groups agreed that course websites "increase my awareness of current technology." Slightly more than one third of faculty members (35%) and a minority of students (13.2%) perceived no benefit at all from course websites.

In comparing these differences, all but one of the contrasts were statistically significant at the .01 level. The chi-square statistic exceed the tabulated value at the alpha established *a priori* ($p<.05$), thus the null hypothesis (that the populations would show a homogeneity of distribution) was rejected. Faculty and students perceive different benefits from the use of course websites. These data are summarized in Table 2.

Table 2
Chi-Square: Agreement On Benefits of Course Websites by Faculty and Students

	Faculty		Student			
Statement	*f*	%	*f*	%	χ^2	*p*
None.	92	35.0	172	13.2	74.18	.000
Saves me time.	59	22.4	542	41.6	33.88	.000
More convenient for me.	56	21.3	624	47.9	62.85	.000
More efficient/effective communication between faculty and students.	119	45.2	474	36.3	7.37	.008
Increases my awareness of current technology.	63	24.0	366	28.1	1.86	.197
I gain practical experience in using current technology.	68	25.9	503	38.6	15.56	.000

Part Three: Useful Components of Course Websites as Perceived by Faculty and Students

In general, the static course components (e.g. course syllabus, presentations, readings, study guides, and old exams were perceived as the most useful by both faculty and students. Faculty members were more optimistic about the usefulness of course website components than were students. These findings are presented in Table 3.

Table 3
Percentage of Faculty and Students Identifying Website Components as Useful

Item	% Faculty*	% Student*
Course syllabus.	85.2%	***59.3%
Lecture notes.	66.9%	**59.7%
Additional information (background) about the instructor.	40.3%	***18.7%
Old tests.	50.2%	55.4%
Practice exams and quizzes.	55.1%	58.4%
Study sheets, review materials, handouts that may be printed from the website.	71.1%	***53.7%
E-mail links to the instructor.	65.0%	***54.9%
Links to other on-line information sources.	64.3%	***22.9%
Presentation materials used in class presentations/ demonstrations (e.g. PowerPoint Slides).	59.3%	***24.8%
Multimedia course materials (e.g. audio, video, graphics, and or animations).	41.1%	***11.0%
Access to student grades.	48.7%	***59.8%
Class discussion group or chat area.	39.2%	***7.4%
Contact information/links for the students in the class.	30.8%	***8.7%

*Totals may exceed 100% as respondents could select more than a single item.
** Significant at alpha .05. *** Significant at alpha .01.

Part Four: Male and Female Perceptions of Course Websites

There were 924 males included in the sample and 643 females. Of the 924 males, 696 were students and 228 were faculty members. Of the 643 females, 608 were students and 35 were faculty members. While only a minority of males or females perceived that course websites offered no benefits, only females identified a single benefit with a frequency greater than 50%. These data are summarized in Table 4.

Table 4
Percentage Agreement on Benefits of Course Websites by Gender (*N*=1,567)

Statement	% Males*	% Females*
None.	20.8%	11.2%
Saves me time.	36.8%	40.6%
More convenient for me.	38.4%	50.5%
More efficient or effective communication between the faculty and students.	34.7%	42.3%
Increases my awareness of current technology.	27.6%	21.1%
I gain practical experience in using current technology.	34.0%	40.0%

*Totals may exceed 100% as respondents could select more than a single item.

Males and females differed in their perceptions of the benefits of course websites. More females than males perceived that course websites made the learning environment more convenient (females 50.5%; males 38.4%), and provided more efficient or effective student-faculty communication (females 42.3%;

males 34.7%). More females than males perceived that course websites offered them the opportunity to gain practical experience in using current technology. In comparing these differences, the chi-square statistic exceed the tabulated value in all but two of the contrasts at the alpha established *a priori* ($p<.05$), thus the null hypothesis (that the populations would show a homogeneity of distribution) was rejected. These findings are summarized in Table 5.

Table 5
Chi-Square: Agreement On Benefits of Course Websites by Gender

	Female		Male			
Statement	*f*	%	*f*	%	χ^2	*p*
None.	72	11.2	192	20.8	24.85	.000
Saves me time.	261	40.6	340	36.8	2.31	.139
More convenient for me.	325	50.5	355	38.4	22.69	.000
More efficient/effective communication between faculty and students.	272	42.3	321	34.7	9.22	.003
Increases my awareness of current technology.	174	27.1	255	27.6	.06	.863
I gain practical experience in using current technology.	257	40.0	314	34.0	6.49	.039

On the individual course website components, a majority of both males and females agreed that the course syllabus, lecture notes, old tests, practice exams and quizzes, study sheets, review materials, handouts, and e-mail links to the instructor were useful. They disagreed on the usefulness of links to other on-line information sources, presentation materials (PowerPoint), multimedia course materials, access to student grades, class discussion group or chat areas, and the posting of contact information/links for the students in the class. These findings are summarized in Table 6.

Table 6
Percentage of Males and Females Identifying Website Components as Useful (*N*=1567)

Item	% Males*	% Females*
Course syllabus.	65.2%	61.4%
Lecture notes.	62.3%	58.9%
Additional information (background) about the instructor.	23.8%	20.2%
Old tests.	54.0%	55.4%
Practice exams and quizzes.	56.6%	59.6%
Study sheets, review materials, handouts that may be printed from the website.	57.8%	54.9%
E-mail links to the instructor.	54.8%	59.3%
Links to other on-line information sources.	32.3%	***26.3%
Presentation materials used in class presentations/ demonstrations (e.g. PowerPoint Slides).	33.2%	***26.9%
Multimedia course materials (e.g. audio, video, graphics, and or animations).	18.9%	***11.8%
Access to student grades.	55.4%	***62.8%
Class discussion group or chat area.	14.5%	***10.3%
Contact information/links for the students in the class.	15.0%	***8.7%

* Totals may exceed 100% as respondents could select more than a single item.
*** Significantly different at the .01 level.

Males and females were not different in their perception of many of the useful components of course websites. In fact, among the components that more half the respondents found useful, the only disagreement was the emphasis they placed on accessing their grades online, with females finding this component useful more often.

Females less often agreed that a class discussion group or chat area was a useful component of a course website, and slightly more than half as many females as males wanted contact information for other students, and by extension, their own contact information, included on course websites.

Conclusions and Recommendations

Clearly, the benefits of course websites were not the same for students and faculty. With the single exception of providing more efficient or effective communication between faculty and students, course websites were perceived as benefiting students much more than benefiting faculty. Neither faculty nor students generally perceived that using course websites increased their awareness of current technology, but significant numbers of both (one quarter of faculty and over a third of students) believed they gained practical experience in using current technology through the use of course websites. This supports Murphy and Karasek's (1999) finding.

Students and faculty also failed to agree on the usefulness of all but two of the course website components examined. In general, faculty members were much more optimistic regarding the usefulness of course website components than were students. Perhaps predictably, more students (59.8%) than faculty members (48.7%) found online access to student grades to be a useful component. While 64.3% of faculty members believe that links to other online information sources are a useful component of course websites, only 22.9% of students found them useful.

The findings of this study suggest that the most useful components of course websites, as perceived by both faculty and students, were also the easiest to implement. Posting the static course components identified in this study (the course syllabus, lecture notes, study sheets, review materials, old tests, etc.) is relatively easy. The findings suggest a diminishing returns relationship existed between the amount of additional effort expended by faculty members to implement a website component (e.g. multimedia course materials, course chat areas, etc.) and the students' perception of its usefulness.

While learner satisfaction is important, additional research assessing the instructional value of the various course website components identified here using some measure of learner performance or knowledge acquisition as the dependent variable should be conducted.

More females than males in this study perceived course websites as a useful addition to the learning environment. This finding appears to contradict McHaney's (1998) conclusion that males had a higher affect for technology. In this study, male and female data were aggregated across faculty-student roles. The author recognizes that the differences found here could be influenced by interaction between gender and role. The non-parametric tests used in this study do not provide separate estimates of statistical interaction. While the number of female faculty members has increased markedly at this institution over the past five years, the low number (35) present in this study indicates that we have a long way to go to achieve numerical parity with the number of female students enrolled in the college. As the number of female faculty members continues to increase, the effect of role within gender will become easier to estimate.

Females and males tended to evaluate equally the most popular components of course websites. This finding supports McHaney's (1998) conclusions that male and female high school students had similar understandings of the importance of technology.

While neither gender afforded multimedia capabilities to course websites, females perceived these components as less useful than males. This could be due to the relatively poor quality of most instructional multimedia materials currently delivered via the web. As the technology continues to mature, and additional resources are applied to create worthwhile multimedia materials, these materials may be perceived as more valuable.

Interestingly, those components that would be used to provide additional student-student channels of communication (chat areas, contact information) were not perceived as useful by the majority of students in this study, and females found them less useful than males. More than half of the faculty members, on the other hand, thought these components were useful. The student results contradicted the prevailing, although not research-based, conclusions in the current literature (Cooper, 2000; Kaplan, 1998; Polichar & Bagwell, 2000; Rosenblum, 2000; Zirkle & Guan, 2000). Certainly, the fact that all participants in this study were collocated with their instructors and were, therefore, able to interact in person would influence this result, and additional research should be conducted into the differences between on- and off-campus students' perceptions of the value of particular course website components.

While many people considering online course design automatically think of off-campus students, the latest information would indicate that far more online classes are delivered to on-campus students (NCES, 2002). This study suggests that too little is known about these on-campus students' perceptions of the benefits and affordances of course websites. These on-line courses require substantial resources in terms of faculty time and commitment and additional research should be conducted to determine when, that is in what particular educational delivery strategies, specific course website components are perceived as valuable to the learners.

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