The effect of web course tools on students' attitudes toward social work research and technology

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SUMMARY. Evidence conflicts as to whether students of social work hold positive attitudes

toward research utilization and toward technology as a research aid. For this prospective

observational study, Web Course Tool™ (WebCT) sites were developed to supplement a graduate

course on research methods. MSW students were surveyed to measure the extent to which their

attitudes toward research and technology changed over the semester. Students' utilization of the

WebCT site was also measured, both electronically and through the survey. In general, students

began the course with a surprisingly positive disposition toward the subjects; their attitudes

further improved by the end of the course; and they gave the WebCT materials substantial credit

for bringing about this change.

KEYWORDS: WebCT, Distance learning, Research attitudes, Computer attitudes, Social work

education.

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There is conflicting evidence as to whether social work students hold positive attitudes toward the subjects of research methods and statistical methods and about the importance of research in social work practice (Rosenblatt and Kirk, 1981; Rosenthal and Wilson, 1992). Similarly, it is unclear whether social work students have positive or negative attitudes toward computers and technology. The teaching of research methods and statistical methods increasingly involves the use of technology (Cauble and Thurston, 2000; Stocks and Freddolino, 2000; Wernet, Olliges, and Delicath, 2000.) Students are expected to demonstrate skills in using computerized databases to search the literature in conducting a literature review. They also must learn to apply statistical methods using computerized statistical packages such as SPSS and SAS. Incoming students' skills in the use of computer technology vary; those with more limited skills might be expected to show negative attitudes or exhibit anxiety about the subject matter of the research and statistics courses. The use of Web-based instruction and materials to teach these subjects could therefore be doubly problematic.

In a study by Olsen (1990), MSW students participated in a survey designed to measure their attitudes toward the importance of research and its usefulness in social work practice. The survey was administered at the beginning of the first semester, at the end of the semester, and before and after completion of the Masters' research project. Students' attitudes toward the overall importance of research were positive initially and became slightly more positive after completion of the program; more significant positive changes were observed in the students' perception of research as 1) producing valid results and 2) being useful to them in their own practice. The author suggests that students who enter graduate training recognize that research is important.

Lazar (1991) surveyed the research attitudes of social work students, faculty, and practicing social workers. His findings suggest that all three groups demonstrate positive attitudes toward the importance of research. However, faculty and practitioners tend to perceive students as not favorably disposed toward the incorporation of research into practice. Lazar speculates that this low expectation may affect the messages that faculty convey in their teaching and might influence the students to take a more constrained view after they participate in research courses.

Stone (1999) conducted a quasi-experiment with 45 undergraduate students of social work, focusing on attitudes toward technology. The study combined Internet training, training in SPSS statistical software, and an emphasis on cooperative learning. The author found that the program both boosted students' technology attitudes (measured by the Computer Attitudes Scale) and increased their use of computers relative to those who did not go through the program. Cauble and Thurston (2000) conducted a similar study using an interactive Web program known as BFF IM: as measured by the Technology Rating Scale, students in the experimental group displayed greater confidence and a higher comfort level with technology, as well as increased knowledge.

Stocks and Freddolino (1998, 2000) have presented two reports on a graduate research methods course taught entirely over the Internet, which they have compared to the same course taught in a traditional classroom setting. They found that the educational experience for students in the two sections were comparable, and that performance, as measured by grades, was the same. In the second report, new features were added to enhance the interactivity of the Internet course; students reported more positive attitudes with these additional features. Interestingly, students with weaker computer skills at the outset eventually performed comparably to those reporting higher skills; the former tended to use the interactive features of the course more frequently.

A study by Wernet (2000) evaluated the effectiveness of WebCT, a course management software application, in presenting a research methods course to undergraduate and graduate

students. Student expressed a high degree of satisfaction with WebCT as a means of presentation of course materials and communication tools. Graduate students, particularly those balancing work, family, and school, appreciated the accessibility of the WebCT-based delivery. Those students tended to use the features more frequently than others, and they reported a higher perceived importance of WebCT as well as a higher degree of satisfaction with the Web-based approach.

Background to Project

At Boston College Graduate School of Social Work (GSSW), two required courses comprise the research sequence for Master's degree students. These two courses, Research Methods (Fall) and Statistical Methods (Spring), are offered to 150 students per year. The librarians at the GSSW Library receive frequent requests from students for assistance and resources related to these two courses. Students have also appeared anxious and stressed about the subject matter and assignments.

Two instructors of the Statistical Methods course worked with the social work librarian to set up WebCT course sites to supplement their courses in Spring 2001. They reported good feedback from students on their use of the discussion tool and on their posting of lecture notes and full-text journal articles related to course content. Discussion between faculty and librarians led to the idea of applying for a Boston College Teaching and Mentoring Grant to develop comprehensive WebCT sites for the two courses in the research sequence. Course sites would ensure that all students have 24/7 access to all of the necessary resources and would assist all the instructors in providing support for their students. A proposal was submitted; funding was awarded in May 2001.

Two graduate students were hired during the Summer of 2001. They were trained in the use of WebCT and collaborated with the social work librarian and the research faculty at GSSW to

evaluate existing resources and develop new materials for the websites. Regular meetings were scheduled with the instructors of the two courses to obtain their input into site development and to familiarize them with the WebCT sites and the resources available through them.

The websites were made available in Fall, 2001, for 8 course sections taught by 7 different instructors. Instructors were not required to use the sites. The librarian offered additional technical assistance to instructors on request. Students were informed about the availability of the sites through the student listserv and on each course syllabus. All required readings from journal articles were posted on the sites; these readings were also available as both paper and electronic reserves through the usual library procedures. The sites also included the course syllabus, Web-based tutorials, instructional modules, links to relevant online research databases, and a discussion board.

Purpose and Methods

The purpose of this study was to evaluate the effectiveness of the WebCT sites in reducing the students' anxiety toward research and technology and in promoting a positive attitude toward the subject matter. The social work librarian and one of the research assistants who developed the sites acted as researchers in this study. A questionnaire (see Appendix for full text) was designed to measure students' attitudes toward the subject matter, both before and after the course, as well as their perceptions about the sites. It was distributed directly to most of the students on the last day of class.

Utilization of the sites was measured using the internal tracking and "hit count" functions provided with the WebCT software, as well as by a survey question asking students how many times per week they used the site, from "0" to "4 or more." In addition, the researchers retroactively classified each of the eight course sections by the extent of the professor's site development, in

order to check for any relationship between this variable and attitude change. Instructors of some sections used the standard set of WebCT tools and resources provided to them, while other instructors customized their sites with additional links, lecture notes, content modules, or discussion board assignments.

The plan for statistical analysis was to use multiple regression to analyze the relationship between attitude change scaled scores and each of several predictors: 1)professor's extent of site development; 2) WebCT use, indicated by reported frequency of use as well as by electronically-obtained hit counts, discussion board messages read, and discussion board messages posted; and 3) students' appraisal of the website's importance in promoting positive attitudes.

For each regression predictor, the null hypothesis was one of no relationship, with alpha set at .05. Regression was also performed for the individual attitude questions; each was tested with the same set of predictors, with alpha adjusted for the multiple comparisons. In addition, factor analysis was used to investigate the dimensionality of the attitude change scale, which was formed by combining August-December differences for each of the questions (once reversals were taken care of).

Results

Subjects

One hundred forty-seven Boston College MSW students were enrolled in the Fall 2001 Research Methods course (their demographic characteristics were not recorded). We succeeded in contacting 126 with the survey. Of these, 98 (78%) responded. Participation was close to 100% for students contacted in person, but was only 4 of 26 (15%) for those reached by mail. Participants were treated in accordance with the ethical standards of the APA and of Boston College.

Missing Data

Students seemed to answer the survey questions thoughtfully and thoroughly. "Undecided"

was not a dominant response option on any of the 18 scale items, which were scored from 1

(Strongly Disagree) to 5 (Strongly Agree). Nor did respondents skip many questions—only 17 out

of 1764 items were left blank. For the purposes of regression, we replaced nonresponses with a

value of 3, "Undecided." On the non-scale survey questions regarding site use and site importance,

only a single response was missing.

For information collected outside of the survey, percentages of students missing data for each

variable were as follows: hits, 12%; discussion board messages read and messages posted, 55%

and 78%, respectively (some professors did not set up discussion boards on their sites); and

professor's level of site development, 2% (three survey forms could not be matched with a

professor).

Descriptive Statistics

Table 1 provides descriptive statistics for all predictors as well as for the outcome variable,

attitude change.

Table 1. Descriptive statistics for all major variables.

	N	Min.	Max.	Mean	St. Dev.	Median
frequency of site use per week	98	0	4 or more	n/a	n/a	1
importance of site in improving attitudes	97	0	4	1.97	1.07	2
hits on site	129	0	321[2]	46.49	44.48	38
messages read	66	0	76	16.38	25.03	14
messages posted	32	0	5	1.59	1.27	1
attitude change	98	-6	22	5.27	4.67	4.5

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[2] This outlying value, over six standard deviations above the mean, was treated as missing to avoid biasing regression coefficients. The next highest value was 187.

Frequency histograms for key variables are shown in Figures 1-4.   Ninety-five percent of

respondents reported using the site at least once a week (Fig. 1).   Ninety-one percent attributed at

least some importance to the site in improving their attitudes, and 67% rated it a "2" or greater on

the 0-4 scale (Fig. 2). The attitude change variable was positively skewed (Fig. 3); apparently,

many students experienced little or no change, and at higher levels of change we see fewer and

fewer students. Nevertheless, 71% reported an overall change of at least 4, equivalent to an

average gain of at least 0.5 per 1-to-5 Likert item. Hit counts (Fig. 4) also showed a skewed

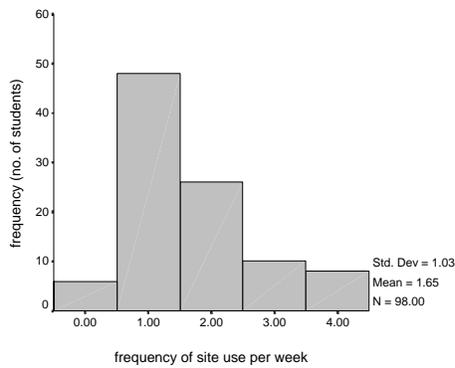distribution, with a high number of students registering no hits at all.

Fig. 1 Reported Site Use

Fig. 2 Importance of Site
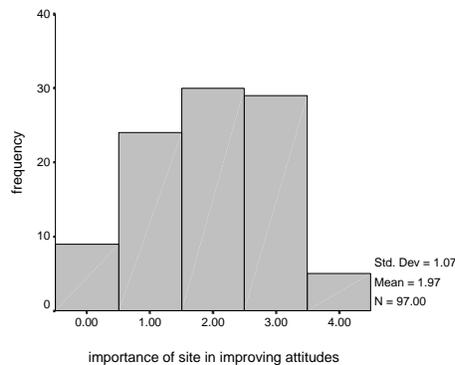
Fig. 3 Attitude Change Scale
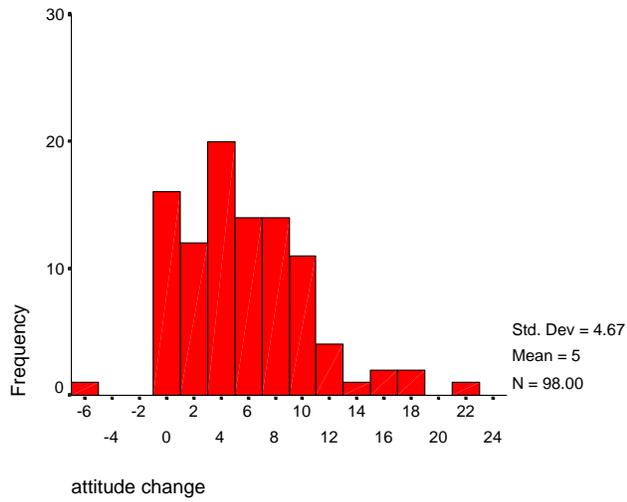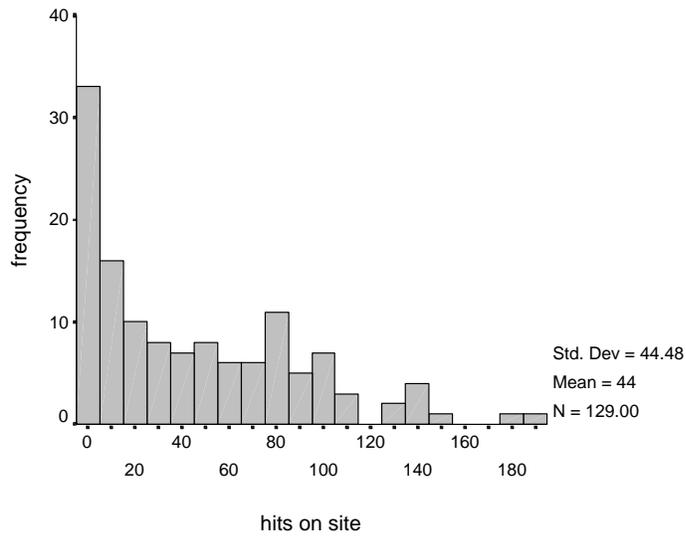

attitude change

Fig. 4 Electronic Hit Counts

hits on site

Student answers to the research and technology attitude questions were generally quite

positive, averaging 3.24 for August and 3.91 for December (Table 2). They answered most

positively for question # 6, on the importance of research utilization. They were least positive for #7, on feeling able to contribute to research.

The highest amount of change from August to December, in order, was seen in #8, on acquiring skills to plan and execute a research project; #9, on acquiring skills as a consumer of research; and #7, on feeling able to contribute to research. The least amount of change occurred with #2, on reading nonrequired research articles. For all items the mean change from August to December was significant with $p < .005$.

Table 2. Results for each of the 18 questions on research and technology attitudes.

Item (see Appendix for full text)	Min.	Max.	Mean	St. Dev.	Mean Change, Aug.-Dec.	St. Dev. of Change
1. Technology aids my work — Aug.	1	5	3.80	1.00		
1. Technology aids my work — Dec.	1	5	4.51	.74	.71	1.06
2. Read outside articles — Aug.	1	5	2.96	1.21		
2. Read outside articles — Dec.	1	5	3.32	1.19	.36	.91
3. Worthwhile to follow findings — Aug.	2	5	3.53	.78		
3. Worthwhile to follow findings — Dec.	2	5	3.95	.74	.42	.70
4. Use databases and websites — Aug.	1	5	3.71	1.18		
4. Use databases and websites — Dec.	1	5	4.30	.85	.58	.92
5. Understand technical reports — Aug.	1	5	3.11	1.17		
5. Understand technical reports — Dec.	1	5	3.64	.86	.53	.90
6. Utilization is important — Aug.	2	5	3.98	.87		
6. Utilization is important — Dec.	2	5	4.46	.66	.48	.74
7. Can contribute to research — Aug.	1	5	2.63	1.15		
7. Can contribute to research — Dec.	1	5	3.40	1.05	.77	.93
8. Have skills to plan, execute — Aug.	1	5	2.66	1.20		
8. Have skills to plan, execute — Dec.	2	5	3.81	.77	1.14	1.06
9. Have research consumer skills — Aug.	1	5	2.77	1.00		
9. Have research consumer skills — Dec.	1	5	3.76	.69	.99	1.05
August totals	1	5	3.24	.52		

December totals	1	5	3.91	.44	.67	.56

Scale Makeup and Reliability

   The scale was designed to capture several different aspects of research/technology attitudes

using as short a questionnaire as was possible in order to minimize interruption of class meetings.

Of the 9 variables comprising overall attitude change, all but one functioned well as part of the

scale, with corrected item-total correlations ranging from .43 to .64. (For the first question, on

technology as an aid to work, this value was only .25, leading us to drop the item from subsequent

analysis.) These correlations and the resulting Cronbach alpha of .80 indicated that the

components were sufficiently interrelated for the scale to reliably measure our construct without

being overly redundant.

   We were also interested to see whether student responses grouped together along such lines as

technology vs. research methods proper, or "active" aspects of research vs. "passive" ones (e.g.,

conduct of research vs. its use and interpretation). A principal axis factor analysis was conducted

to ascertain whether the scale was more uni- or multidimensional. The scree plot and eigenvalues

obtained clearly pointed to a one-factor solution.

Table 3. Correlations for Key Variables* **

	attitude change	prof's site development	hits	site use
prof's site development	.13			
hits	.22	**.64**		
site use	*.07*	*.02*	*-.02*	
site importance	*.34*	*.25*	*.21*	*.52*

*Figures in *italics* are computed using Spearman's r_s; others with Pearson's *r*.
Figures in **bold are significant with a familywise alpha of .05 and a per comparison alpha of .05/10 = .005.

Regression

An initial look at the scatterplots of attitude change vs. both messages read and messages posted showed little association between these predictors and the outcome (r = .13 and .03, respectively). Moreover, few professors established discussion boards for their courses, and so the sample sizes for these two predictors were both small. Accordingly, attitude change was only regressed on the remaining four predictors: professor's level of site development (low or high); hits (interval-level); site use (ordinal); and site importance (ordinal).

Table 4. Initial results of the regression:

# of Predictors	R	R²	Adj R²	F	N	sig. (2-tailed)
4	.407	.165	.120	3.67	98	.009

Predictor	b	t	sig. (2-tailed)
prof's site development	-1.21	-.90	.37
site use	-.91	-1.66	.10
hits	.02	1.60	.11
site importance	1.76	3.19	.002

For all predictors, tolerance was above .5 and VIF was below 1.9, indicating no collinearity problems. The residuals from this regression also indicated no serious problems: they were slightly skewed, as expected with a skewed outcome variable, but not enough to seriously affect the regression's efficiency. In addition, there were no problems with serial correlation (lag-1 r = -.03) or with heteroscedasticity across the levels of predicted attitude change.

Discussion

Influential cases

Site importance was the only predictor significantly associated with attitude change. The regression results listed in Table 4 required a substantial amount of correction because of the

disproportionate influence exerted by two cases.[3] Table 5 gives results that correct for these effects by excluding the two influential cases.

Table 5. Corrected regression results.

Model	R	R^2	Adj R^2	F	N	sig. (2-tailed)
Excluding 2 cases	.327	.107	.057	2.15	96	.083

Predictor	b	t	sig. (2-tailed)
Prof's site development	-.35	-.25	.80
Site use	-.61	-1.06	.29
Hits	.015	.99	.33
Site importance	1.39	2.42	.02

Removing these two cases from the analysis considerably reduces the apparent role played by *all* predictors. For these 96 students, site importance is the only variable whose association with attitude change is even remotely significant. Typically, the greater the student's attitude change, the greater the influence he/she attributed to the website (as opposed to other factors) in bringing about that change. Site importance would constitute just as reliable a predictor if used alone (b = 1.17, β= .28, t = 2.80, p = .006,   Adj R^2 = .07).

Since the observed relationship was so limited, we might have profited by asking students additional, quantifiable questions about their experience with the site. Perhaps we would have found a connection between attitude change and factors such as ease of WebCT connection; quality

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[3] For professor's level of site development, one case showed a high residual and high leverage and was responsible for a full 74 percent of the value of the coefficient. In addition, the coefficient for site use was considerably affected by another case that had high leverage and accounted for 38 percent of the slope.

and difficulty level of the material; or relevance to the syllabus, to particular kinds of assignments, or to students' areas of special interest.

Just as with the overall scale, for the individual items none of the August-to-December changes showed significant correlations with any predictor except site importance.

Validity of Measurements.

The observed correlation between hits and reported site use was essentially zero ($r_s = .02$). Also, 95% of the students reported using the site at least once a week, but this result is almost certainly inflated, for only 77% of respondents amassed 12 or more hits during the 12-week semester (Fig 4). It should be noted that WebCT registers multiple hit counts when students visit different organizer pages within the site. Accordingly, we concluded that hits probably reflect the tendency to "surf," or the style of website use, at least as much as the quantity of use.

Baseline scores. We noted a mild negative correlation between August attitudes and website hits ($r = -.24$, p = .03). Students who recalled less positive initial dispositions toward research and technology tended to amass more hits than others did. The mild correlation between hits and attitude change ($r = .22$) implied that a low August score might be linked with a high attitude change score. This turned out to be exactly the case: this relationship was stronger than expected, with $r = -.68$. In part, this result can be attributed to the mode of measurement used: with a five option scale, respondents who strongly agreed to a statement about their August attitude had no way to express a positive change as of December. But some component of the relationship is likely to reflect an educational reality as well, as it is generally difficult to bring about sizable attitude change in those who are already very positively disposed toward a subject.

We found no meaningful correlations between August scores and professor's site development ($r_{pb} = -.08$), reported site use ($r_s = .11$), or site importance ($r_s = -.13$).

Limitations

Statistical power

As Fig. 3 shows, the attitude change variable was skewed, which probably limited the precision of regression estimates and thus statistical power. We were unable to transform this variable in a way that would produce a more normal distribution.

Relying on memory

We would no doubt have obtained more accurate baseline measures by surveying students in August; practical reasons forced us to use a single survey administration to measure both August and December attitudes.

Response sets

Student attitudes turned out to be quite positive. This fact, and the extent of attitude change observed, might be partly explained by three common survey response styles. First, since the researchers were themselves part of GSSW, some student answers may have been affected by a desire to please the researchers and to contribute to positive results. Second, despite virtual anonymity, students may have colored their responses in order to make them seem more socially desirable. Finally, cognitive dissonance may have come into play, for those who worked hard to succeed in Research Methods may have had some unconscious incentive to believe that they must have attained greater confidence, comfort, and skill as a result.

Response rate and selection bias

We guessed that the 98 students who responded to the survey would show higher WebCT participation than the 49 who declined or could not be reached. Based on hit counts, discussion board messages read, and messages posted, this certainly was the case. Table 6 summarizes these differences.

Table 6. Survey nonrespondents vs. respondents.

	Total n	Hits		Messages Read		Messages Posted	
Group		mean	n	mean	n	mean	n
Survey nonrespondents	49	25.7	49	7.8	22	1.3	10
Survey respondents	98	55.7	80	20.7	44	1.7	22

   T-tests of these differences produced significant 1-tailed results for both hits and messages read
(t = -4.26 and –2.35; p < .0005 and p = .01, respectively). Respondents averaged 30 more hits than
nonrespondents and about twice as much WebCT participation overall. If these results reflected a
reliable underlying difference between the groups, this would substantially undermine our effort
to generalize survey results to all Research Methods students in the program, let alone to a wider
population. However, the relationship between survey response and website use was highly
confounded with professor's site development. The latter correlated very highly with hits: r_s = .64,
and websites customized by the professor averaged 56 more hits per student than basic sites did.
When we controlled for this variable, respondents' and nonrespondents' average hit counts still
differed, but only by 18 (CI_{95} = [4,33]).

   The fact that we found few substantial correlations between the site use variables and the
attitudinal variables constitutes another reason to question the importance of these observed
differences. And, as noted above, hit counts probably reflected the tendency to "surf" as much as
they indicated frequency of website use. Thus we have little empirical basis to support the
intuitive notion that the observed group differences imply some attitudinal difference. All in all,
with the limited data available on the 49 nonrespondents, it is difficult to accurately estimate either
their attitudes or the extent of their attitude change during the semester.

Conclusions and Recommendations for Further Research

- About two-thirds of the 147 MSW students enrolled in the Research Methods course utilized the features of the WebCT site developed for that course. Future studies will need to develop more accurate ways of measuring website use.

- The extent to which each professor developed his/her site correlated highly with electronic hit counts (r = . 64).   However, it had no association with students' *reported* site use. This seems to indicate that highly developed sites encouraged more extensive exploration during a given session, though not necessarily more frequent student use.

- As measured by the survey, baseline attitudes toward research and technology were fairly positive (August average per item = 3.24). This is consistent with the findings of Olsen (1990) and Lazar (1991) reported above.

- Every attitude item showed a significant increase from Aug. to Dec. (mean change = .67). Students reporting less positive attitudes in August showed considerably greater gains than those with more favorable initial attitudes (a finding that corroborates those of Stocks and Freddolino [1998, 2000]). Future survey studies on this topic would do well to include some means of controlling for response sets.

- Students generally reported that use of the WebCT site played an important role in improving their attitudes: the greater the change, the more the student viewed the website as an important reason for it. However, attitude change did not show significant associations with any other predictor. More informative results might have come about by expanding the quantitative portion of the survey to include questions about other perceptions of the WebCT site.

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Appendix: Questionnaire

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Instructions: The following questions relate to possible ways in which your attitudes may have changed during this semester. There are no right or wrong answers.

A. For each statement, please mark the two choices that seem to fit best — first, as the statement applied to you in August, and second, as it applies to you now.

1. Web-based technological tools can be a great aid in my work.

In August:	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
...Now:	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

[The format used in item 1 was repeated for items 2 through 9. To save space, only the items themselves are reproduced here.]

2. I avoid research articles unless they are required for my courses.

3. It is worth taking the time to follow research findings.

4. I shy away from technological information sources such as databases and websites.

5. I am able to understand technical research reports.

6. Research utilization is vital to effective social work practice.

7. I am a long way from being able to contribute to research.

8. I have developed the skills to plan and execute a research project that contributes to social work knowledge and practice.

9. I have developed analytical skills as a consumer of research that enable me to use existing social work research to determine the best interventions for my professional practice.

B. The last four questions ask about your experience with the SW 747 WebCT site.

10. Which features of the site did you find especially helpful? (check all that apply)

☐discussion board ☐course readings   ☐endnote material ☐research methods study guide

☐literature review guide   ☐bibliographies and lists of resources   ☐links to other sites

☐other (please describe):

11. This semester, about how many times per week did you use the site?

0	1	2	3	4 or more

12. Consider all the factors that may have positively influenced your attitude toward research and technology this semester. Of these factors, how important a role has the WebCT site played?

0	1	2	3	4
none				has been the most important factor

13. Please write a few brief comments about the usefulness of the site.

_____