

January 2005

Web Courseware Usability and Tools for the Enhancement of Teacher Education

Horng-Ji Lai
Kun-Shan University of Technology

Melvin J. Pedras
University of Idaho

Follow this and additional works at: <https://pdxscholar.library.pdx.edu/nwjte>



Part of the [Education Commons](#)

Let us know how access to this document benefits you.

Recommended Citation

Lai, Horng-Ji and Pedras, Melvin J. (2005) "Web Courseware Usability and Tools for the Enhancement of Teacher Education," *Northwest Journal of Teacher Education*: Vol. 4 : Iss. 1 , Article 5.
DOI: <https://doi.org/10.15760/nwjte.2005.4.1.5>

This open access Article is distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License \(CC BY-NC-SA 4.0\)](#). All documents in PDXScholar should meet [accessibility standards](#). If we can make this document more accessible to you, [contact our team](#).

Web Courseware Usability and Tools for the Enhancement of Teacher Education



Horng-Ji Lai
Kun-Shan University of Technology



Melvin J. Pedras
University of Idaho

ABSTRACT

This article presents the findings of a study designed to investigate the effectiveness of the usability and tools in on-line course management packages. It also describes the challenges that teacher educators may face with respect to student use of on-line courses. Five research questions were formulated to explore the usability issues and the use of teaching tools in the on-line courseware, WebCT. The findings indicated that there was a significant difference between students' acceptance of on-line courseware, WebCT, based on their genders: female students were more satisfied than male students. Significant variance among academic status (Freshman, Sophomore, Junior, Senior, and Graduate) was observed in students' acceptance of WebCT, demonstrating that graduate students were more likely to prefer learning on-line than undergraduates. Two usability elements, perceptual limitation and learnability, were the most statistically significant predictors in the on-line courseware. No significant differences were observed among students' acceptance of WebCT in terms of their previous on-line experiences and computer skills. In addition, the qualitative results provided compelling evidence that learners did not use the Help tools as their primary aid when encountering difficulties. Some problems associated with the use of the discussion board, such as sending/viewing attachments, were revealed in the discussion section.

INTRODUCTION

When teacher educators decide to develop on-line courses, they will probably face a myriad of technical, management, and security problems. Even more challenging are the problems they will face with respect to student use of on-line courses. This article seeks to share research findings about usability and tools of on-line

courseware that may help teacher educators improve the design and delivery of on-line course instruction.

Currently, there are numerous on-line courseware available on the market such as WebCT, Blackboard, Learning space, Virtual-U, Tool Book, and so on. They fall into the system model category because generally they all provide templates and some default functions.

Mulligan (2002) indicated that most on-line courseware provides tools that allow instructors to define structures of a non-linear Web course. In general, the courseware structure imitates that of traditional classroom instruction, which all faculty and students are familiar (Harvey & Lee, 2001). While using courseware seems a more efficient way to design on-line courses, there are some questions as to how effective such a template-based approach is for learning on-line (Harvey & Lee, 2001).

In Harrison and Bergen's study (as cited in Harvey & Lee, 2001), they listed five common structures that were popularly adopted by courseware vendors. They are a standard welcome and announcements, syllabus and outline, weekly modules, discussion board, and testing/assessment. These features allow instructors to develop high quality and consistent course Web pages and decrease their workload. Kammerdiener and Smith (1998) noted that "the instructor need not wait until class time to make announcements, answer questions, or present assignments. This is especially important in the area of distance learning and in classroom environments with infrequent meeting times, such as once a week" (p. 7). In other words, students can go to the course Website to check assignments, post messages on the discussion board, and communicate with instructors at any time. Instructors have more time to answer individuals' questions and give feedback during their weekly discussions.

Interface design is one of the important factors that influence the effectiveness of an on-line courseware. Jones and Okey (1995) stated that the lack of consideration of interface design in the learning environment affects students' learning outcomes. Wade and Lyng (2000) commented that many key interface design concepts must be involved, such as "research facilities, presentation details, integration across various media, appropriate use of tools, and help facilities" (p. 569).

Recently, many studies have been conducted to evaluate the use of on-line courseware from either the students' and instructors' perspective or combinations of both. However, these studies tended to focus on the functionality of the

products (Halloran, 2001), not developing an understanding of what these products need to do or can do better. Thus, a thorough understanding of on-line courseware components, such as usability and teaching tools, is needed.

Due to the great demand for distance education, many institutions of higher learning are eager to offer on-line courses through the Internet. However, as more instructors begin to teach on-line, educators and students have many concerns. For example, recent research has shown a lack of familiarity with the characteristics of on-line learning which hinders student performance. Another issue is the lack of staff development for faculty wishing to use this form of teaching (Lai, 2004).

This study was designed to study the effectiveness of the usability and tools of on-line course management packages. Quantitative and qualitative methods were used to collect data which then provided users with information to optimize the courseware product, its use and understanding thereof.

The study was guided by three main research objectives:

1. To identify the relationship between students' satisfaction and site usability of on-line courseware.
2. To investigate practices for instructors to create a more suitable learner-centered on-line learning environment.
3. To determine the relative importance of interface design elements, such as ease of navigation, consistency, ease of learning, perception, and support.

WebCT was the product that was examined in this research. Five research questions were formulated to explore the usability issues and the use of teaching tools in on-line courseware. These questions were:

1. What are the relationships among the usability factors (navigation, learning, consistency, perception, and support) and the users' acceptance of courseware?
2. Does gender influence the users'

acceptance of on-line courseware?

3. Does amount of on-line course experience influence the users' acceptance of on-line courseware?
4. Does the level of computer literacy skills (poor, average, good, and excellent) influence the users' acceptance of on-line courseware?
5. Does students' academic status influence their acceptance toward on-line courseware?

These questions were addressed using standard research procedures which included students as the major study population. Students were selected because of their perception of on-line courseware and its applicability to good teaching.

METHODOLOGY

According to Horton (2000), two main areas of assessment should be included to make sure the site is effective. The two areas are the site's usability and its effectiveness as a teaching tool. This study adopted Reeve, Harmon, and Stephen's (1994) evaluation techniques for the questionnaire design to collect quantitative and qualitative data. A questionnaire was designed to investigate the user's acceptance toward the usability and teaching tools of on-line courseware. Six categories were addressed in the questionnaire. They were:

1. Ease of learning
2. Navigation
3. Perception
4. Support
5. Consistency
6. Acceptance of on-line courseware

Subjects

The targeted subjects for this study were students who took on-line courses at the University of Idaho. The web and E-mail were the primary means of response collection. An on-line courseware, WebCT, was adopted by this institution. One hundred and forty WebCT students participated in this study. All participants were enrolled in WebCT courses at the University of

Idaho in Spring 2004. Among them, 40 percent (N = 56) of students were male. Thirty five percent seven percents (N = 50) of respondents were freshman. One hundred and thirty five students reported their age. More than 80 percent (N = 107) of subjects were between the ages of 18 and 30, and 47.1 percent (N = 66) of students took at least one on-line course prior to this semester. Only 4.3 percent (N = 6) of participants rated their computer skills as below average. Participants reported that about 50 percent of their time on a computer was used for educational purpose in the past year. Only seven students took a course that was devoted to learning computers and applications.

Procedure

Based on a review of the literature, a questionnaire (Appendix) was developed. Part one of the questionnaire consisted of 27 items which were distributed into six categories: navigation, consistency, learnability, user guidance, perceptual limitation, and users' acceptance. The second part of questionnaire obtained students' demographic information. Four open-ended questions were asked in the last part of this survey. The validity of the questionnaire was established through a review by a selected jury of three on-line instructors. The reviewers evaluated each item for clarity and provided suggestions to improve the content and design of the questionnaire. The overall Coefficient alpha for the instrument was .93 which implies respectable reliability (Green and Salkind, 2003).

Data Analysis

Quantitative statistics procedure was used to analyze the data and answered the research questions underlying this study. In addition, the open-ended section provided qualitative information to support the quantitative findings. Followings are a list of research questions and the statistical analysis that were used to report the findings.

1. *What are the relationships among the usability factors (navigation, learning, consistency, perception, and support) and the users' acceptance of*

courseware?

Regression analysis was used to reveal the significant factors that influence users' acceptance. The outcomes of multiple regression analysis revealed the significant factors in predicting the users' acceptance of WebCT.

2. *Does gender influence the users' acceptance of on-line courseware?*

T-test was conducted to determine whether there was a significant difference existing in gender toward the acceptance of on-line courseware. The independent variable was gender (Male and Female). The dependent variable was the users' acceptance of on-line courseware.

3. *Does the users' on-line course experience influence their acceptance of on-line courseware?*

T-test was again used to determine whether there was a significant difference existing in the users' on-line course experience toward their acceptance of on-line courseware. The independent variable was their experience (Yes and No). The dependent variable was the users' acceptance of on-line courseware.

4. *Does level of computer literacy skills (poor, below average, average, good, and excellent) influence the users' acceptance of on-line courseware?*

The ANOVA method was used to answer the research question. The independent factors were students' computer literacy levels and the dependent factor was the users' acceptance toward on-line courseware.

5. *Does students' academic status (Freshman, Sophomore, Junior, Senior, and Graduate) influence their acceptance of on-line courseware?*

ANOVA with multiple comparison follow-up were administrated to answer

this question. The independent factors were students' academic status and the dependent factor was users' acceptance toward on-line courseware.

PRESENTATION OF DATA

Descriptive statistics revealed that two usability factors, consistency ($M = 3.85$, $SD = .77$) and perception ($M = 3.85$, $SD = .89$), obtained higher scores. Table 1 displays the details of each variable's grand mean and standard deviation. The mean value of the users' acceptance of on-line courseware was $M = 3.56$ with a standard deviation of $SD = 1.19$.

Table 1
Descriptive Statistics of Variables (WebCT)(N=140)

Variables	M	SD
Ease of Navigation	3.71	1.05
Consistency	3.85	.77
Ease of Learning	3.61	.98
Perception	3.85	.89
Support	3.15	.72
Acceptance of On-line Courseware	3.56	1.19

Results of research questions

Question one: What are the relationships among the usability factors (navigation, learning, consistency, perception, and support) and the users' acceptance of on-line courseware?

Correlation coefficients were calculated among the six variables from the survey result. The result of correlation analyses is presented in Table 2. Significant correlations were found among the variables. According to Urdan (2002), the Pearson correlation coefficient ranges from -1 to +1. A correlation of +1 means that there is a perfect positive linear relationship between variables.

Multiple regression was conducted to determine which independent variables—ease of navigation, consistency, ease of learning, perception, or support—were the predictors of stu-

Table 2
Correlations Among Six Variables (WebCT) (N = 140)

	Acceptance of On-line Courseware	Ease of Navigation	Consistency	Ease of Learning	Perception
Ease of Navigation	.56**				
Consistency	.48**	.69**			
Ease of Learning	.58**	.80**	.71**		
Perception	.61**	.66**	.46**	.70**	
Support	.36**	.48**	.48**	.49**	.41**

** Correlation is significant at the 0.01 level (2-tailed).

dents' acceptance of on-line courseware, WebCT.

The result of a multiple regression analysis ($R^2 = .438$, $F(5, 134) = 20.883$, $p < .001$) revealed that 43.8 % of the variability in the dependent variable, users' acceptance of WebCT, was explained by the predictor variables: ease of navigation, consistency, ease of learning, perception, and support. A summary of the regres-

sion analysis is presented in Figure 1.

Stepwise regression results showed that an overall model of two usability predictors (perception and ease of learning) significantly predict users' acceptance of on-line courseware, WebCT, $R^2 = .422$, $F(1, 137) = 10.774$, $p = .001$. This model accounted for 42.2 % of the variance in the significance of the users' acceptance

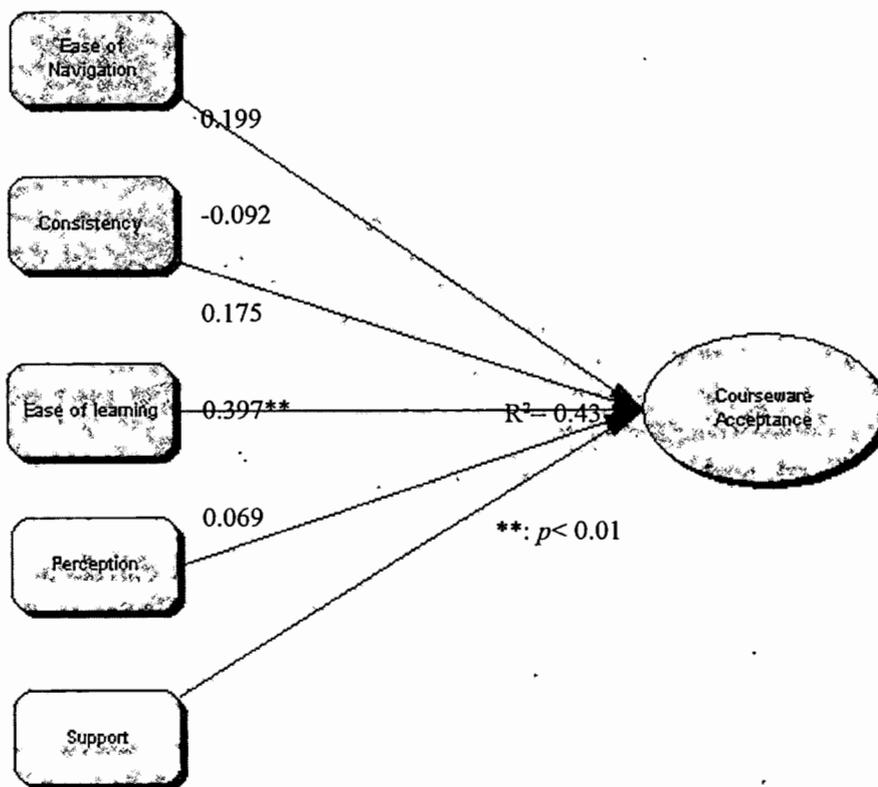


Figure 1
Regression Result of Usability Factors on Courseware Acceptance

of on-line courseware.

Question two: Does gender influence the users' acceptance of on-line courseware?

An independent-samples *t* test was conducted to evaluate if there was a significant difference between female and male students on their acceptance of on-line courseware.

The result was significant, $t(100.78) = -2.008$, $p = .047$, $h^2 = .03$. There was a significant difference between male and female students on their acceptance of on-line courseware, WebCT. The eta square index .03 showed a small effect size according to Green and Salkind's (2003) explanation – “ h^2 of .01, .06, and .14 are by convention interpreted as small, medium, and large effect size, respectively” (p. 153).

Question three: Does the users' on-line course experience influence their acceptance of on-line courseware?

An independent-samples *t* test was conducted to evaluate whether there is a significant difference between experienced and non-experienced students on their acceptance of on-line courseware.

The result was not significant, $t(137) = .924$, $p = .357$, $h^2 = .0061$. It showed that there was no significant difference between experienced and non-experienced students in their acceptance of on-line courseware.

Question four: Does the level of computer literacy skills (poor, below average, average, good, and excellent) influence the user's acceptance of on-line courseware?

A one-way analysis of variance (ANOVA) was conducted to evaluate the relationships between students' self-reported computer skills (poor, below average, average, good, excellent) and their acceptance of on-line courseware. The dependent variable was the users' acceptance of on-line courseware.

No students rated their computer skill as poor in the collected data. The ANOVA result was not significant, $F(3, 136) = .630$, $p = .597$,

$h^2 = .014$. The strength of relationship between students' computer skills and their acceptance of WebCT was weak according to eta square value.

Question five: Does students' academic status (Freshman, Sophomore, Junior, Senior, and Graduate) influence their acceptance toward on-line courseware?

A one-way analysis of variance (ANOVA) was conducted to evaluate the relationships between students' academic status (freshman, sophomore, junior, senior, and graduate) and their acceptance of on-line courseware. The dependent variable was the users' acceptance of on-line courseware.

The ANOVA was significant. The Browne-Forsythe test showed that students' academic status significantly influenced their acceptance of WebCT ($F = 3.145$, $p = .018$). Follow-up tests were conducted to evaluate pairwise differences among the means. Dunnett's C test revealed that there was a significant difference in the means between graduate students and both freshmen and sophomores. Figure 2 shows a graph of the means of users' acceptance of WebCT in different academic status.

DISCUSSION OF RESEARCH FINDINGS

Usability components

Consistency and perception were the two

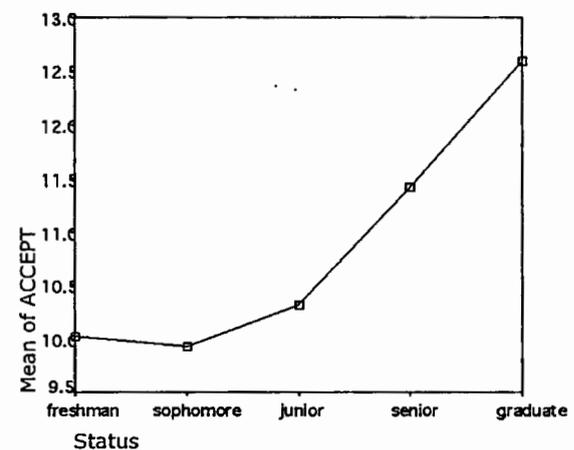


Figure 2
Means of WebCT Acceptance in Different Academic Status

components that received the higher scores from WebCT users. According to Geest (2001), consistency is the coordination of color, location logo, fonts, menu bars, and graphics in the web page design. Roy, Dewit, and Aubert (2001) stated that "in human computer interaction, consistency is recognized to be able to improve user performance and user satisfaction" (p. 390). They also contended that "a good interface design should embed the considerations of human perceptual organization limitations" (Roy, Dewit & Aubert, 2001, p. 391). In other words, information on the screen should be easy to read and use (Wang, Caldwell & Salvendy, 2003). The findings suggest that most users found the visual elements of the interface design to be standard and conventional, and the majority of students agreed that the information presented on the on-line courseware was clear and well-organized. The results further confirmed that template-based courseware did help instructors create a consistent and understandable interface, which means that on-line educators can, therefore, pay less attention to the interface design components and concentrate on presenting and organizing course materials.

Roy, Dewit, and Aubert (2001) described ease of navigation as "ease of finding what you want and knowing where you are in the Web site" (p. 390). Ease of learning refers to easy learning in a well-designed interface. Clear language, meaningful display, and logical grouping are the main approach (Roy, Dewit & Aubert, 2001). The mean values of ease of navigation and ease of learning in the WebCT survey was moderate. However, one question, "I do not need any instruction before I begin to use the courseware," obtained the lowest score of the two factors. From the open-ended questions, several students reported experiencing technical problems or were confused about use of some of the functions in WebCT. These results indicate that instruction on how to use on-line courseware might be needed.

Support (user guidance), which obtained the lowest score in the survey, was not up to the users' standards. Less than 20 percent of WebCT respondents agreed with the statement, "the help menu always has answers to my questions." This

might be due to the complexity of the help pages in WebCT. Qualitative data provides support for this conclusion. For instance, one WebCT user commented that "there is a 'Help', and I am awful because I seldom use it. I would rather sit there for 15 minutes to figure it out how it is done." These responses suggest that many on-line courseware users may not have looked up assistance from the help menu. Help tools in on-line courseware might not be interactive and user-friendly. To address this problem, instructors or courseware developers need to provide immediate support during the process of on-line instruction.

The results of regression analysis, which examined usability factors as predictors of the users' acceptance toward on-line courseware, were somewhat similar to Roy, Dewit, and Aubert's (2001) study. In their research, they found that the five usability components (ease of navigation, consistency, ease of learning, perception, and support) were good predictors for users' satisfaction with e-commerce Web sites (42% of the variance explained). In the WebCT results, the regression model showed that these usability elements play significant roles in predicting the users' acceptance of on-line courseware with 43.8 % of the variance explained. Only one component, perception, was significant in WebCT's regression model. These results suggest that perception contributes most to the users' acceptance of WebCT. It can be explained that the general presentation of course materials, such as information organization, color use, and readability, have great influence on the users' acceptance.

Furthermore, the analyses of stepwise regression revealed that 42 % of the variability in the users' acceptance of WebCT can be explained by the usability factors of perception and ease of learning. On the other hand, consistency and support were the two factors that did not appear to influence the users' acceptance of WebCT. Roy, Dewit and Aubert (2001) described that users might not be aware of the consistency issue although it is a crucial component for web usability. That is to say, on-line courseware users pay less attention to the consistency issue of the sites when courseware provide a well-defined

and consistent interface. Support (user guidance) was not significant in the regression models which can be explained by the qualitative findings – On-line learners seldom went to the help menu to look for assistance while encountering difficulties.

In fact, the variable of the users' acceptance of on-line courseware was correlated with all the dimensions of usability according to the Pearson correlation coefficients. It is evident from the results that usability has an absolute influence on learners' acceptance of on-line courses. These findings also concur with Huang's (2002) study that showed interface was the best predictor for interaction, course structure, and learner autonomy dimensions.

Gender Differences

The study also found significant differences between genders on their acceptance of on-line courseware, which is consistent with findings of Fredericksen et al. (2000) and Sullivan (2001). Female students were more satisfied with the use of on-line courseware. Sullivan (2001) found that the percentage of female students who had something positive to say about the on-line environment was higher than male students. Wheeler (2002) discovered that female students expected and received more support than male students in distance education courses. Bryson and de Castell (as cited in Care and Udon, 2000) described that women preferred collaborative learning by their nature or socialization. Their finding was supported by Garland's (2003) study in which she observed that females perceived the computer as a tool to facilitate learning and promote cooperation. Male students, in contrast, were concerned less about using computers for learning. Evidence from these studies further explains the results in this study. Since on-line discussion is one of the important parts of on-line learning, the findings of this study and existing research suggest that the collaborative learning that takes place on the discussion board is suited to the leaning preference of female students.

Related to this issue is Garland's (2003) finding that male students who communicated more in on-line courses were in favor of an abstract

conceptualization mode of learning, while the female students preferred a reflective observation mode of learning. Based on these findings, instructors who develop on-line courses may want to provide various activities or materials that correspond with the characteristics and learning preferences of male and female students, rather than just applying one model.

Academic Status

The relationship of students' academic status and their on-line courseware acceptance was significantly different in WebCT users. The post hoc results disclosed that significant differences existed between graduate students and freshmen/sophomores. This result is in agreement with a study conducted by Fredericksen et al. (2000) in which they discovered that younger students, especially age 16 to 25, were the least satisfied with on-line courses. This finding suggests that older students are more satisfied with their learning experiences from Web-based courses. That is, older students are more mature and self-motivated than younger students (first and second year college students) while learning on-line. This discovery may also imply that on-line instructors need to motivate and pay more attention to those younger students in order to achieve effective on-line learning.

Computer Skills and On-line Experiences

The level of computer skills and on-line experience did not affect learner's acceptance of the courseware. This indicated that courses created by courseware are easy to operate and no advanced computer skills are required. This result is in accordance with the findings by Hong (2002), which showed that students' on-line learning conditions were not related to their computer skills. In other words, most learners become acquainted with the interface, functions, and tools of the on-line courseware in a short period of time without a long learning curve.

Tools of On-line Courseware

Discussion board is a place for students to exchange their ideas, and it serves as a vehicle for both student-to-student and student-to-instructor interaction. Many users described that

threaded discussions allowed them to see what other people thought and that they were given plenty of time to think before posting their reflections on the discussion board. On-line courseware keeps all discussions permanent, and this advantage is useful not only for students but also for instructors because instructors can evaluate students' participation based on their postings and readings.

WebCT students believed the discussion board was an effective tool. For example, a WebCT student stated that "I really like the threaded discussion. I mean, if I just submit a paper, I would never see what other people think." However, there were some problems learners encountered when they used the discussion board. One of the problems with WebCT's discussion was related to a technical issue – some users had problems sending and opening the attachments. In addition to the discussion board, many WebCT students were frustrated about the on-line tests and quizzes, especially freshmen. "The online quizzes are also not convenient at all. I don't think that most new students (freshman) really know how the system works because they have never been forced to use anything like it before." These findings also suggest that there is a need to provide an orientation program for students who take on-line courses for the first time to boost their confidence.

Trainings for On-line Instructors

On the whole, most users' experience with the usability of the on-line courseware, WebCT, was positive. Comments with regard to instructors' familiarity with on-line courseware mentioned by several respondents revealed that many instructors did not completely understand how to use on-line courseware and this issue caused trouble for students. A WebCT student noted that "I found out, how much each instructor really knows about creating Web pages or using WebCT? How familiar with computers is the instructor? I think some of them are very unsure of themselves and are lacking in knowledge of using WebCT. That makes it more difficult for the student too." These comments reinforce that appropriate trainings should be given to instructors before they start to create their own on-

line course with an on-line course management package. Also, the trainings should be offered in a certain period of time after new updates have been introduced.

SUMMARY AND CONCLUSIONS

This study investigated the effectiveness of the interface design of courseware used to design and develop on-line courses. Specifically, the study was conducted to 1) explore the possible relationship between students' acceptance of courseware and demographic variables, 2) investigate the relationships between the usability elements and learners' acceptance of on-line courseware, and 3) determine learners' attitudes toward the teaching tools.

The findings suggest that site usability positively influenced students' acceptance of on-line courseware. Also, significant differences were found between gender and academic status in terms of users' acceptance. Finally, many concerns with regard to the tools and usage of on-line courseware were reported by students.

It is apparent that while on-learning teaching and learning is here to stay, numerous problems exist for educators. This suggests the need for staff development programs which help teachers develop the necessary expertise to use this tool in an effect manner. It also tells us that student learning differences will need to be considered as courses are developed, delivered and assessed. If courseware authoring is to become a viable pedagogical method much more work will need to be done to prepare teachers to use it effectively.

REFERENCES

- Care, W. D., & Udon, S. A. (1999). Women in distance education: Overcoming barriers to learning. *New Horizon in Adult Education, 14*(2), 4-12.
- Fredericksen, E., Pickett, A., Pelz, W., Shea, P., & Swan, K. (2000). Student satisfaction and perceived learning with on-line courses: Principles and examples from the SUNY learning network. *Journal of Asynchronous Learning Networks, 4* (2).

- Garland, D. (2003). Does gender affect on-line learning? Retrieved April 5, 2004 from http://www.findarticles.com/cf_0/m0KSO/11_12/111170554/p1/article.jhtml.
- Geest, T. M. (2001). *Web site design is communication design*. Philadelphia, PA: John Benjamin's Publishing Company.
- Graham, I. (2003). *A pattern language for Web usability*. London: Addison-Wesley.
- Green, S. B., & Salkind, N. J. (2003). *Using SPSS for Windows and Macintosh: Analyzing and Understanding Data* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- Halloran, M. E. (2001). Evaluation of web-based course management software from faculty and student user-centered perspectives. Retrieved Sep. 18, 2003, from <http://www.usafa.af.mil/iita/Publications/CourseManagementSoftware/cmseval.htm>
- Harvey, D. M., & Lee, J. (2001). The impact of inherent instructional design in on-line instruction. *The Quarterly Review of Distance Education*, 2(1), 35-48.
- Hong, K. (2002). Relationship between students' and instructional variables with satisfaction and learning from a Web-based course. *Internet and Higher Education*, 5, 267-281.
- Horton, S. (2000). *Web teaching guide*. New Haven, CT: Yale University Press.
- Huang, H. (2002). Student perceptions in an on-line mediated environment. *International Journal of Instructional Media*, 29(4), 406-419.
- Jones, M. G., & Okey, J. R. (1995). Interface Design for Computer-based Learning Environments. Retrieved September 25, 2003, from <http://www.hbg.psu.edu/bsed/intro/docs/idguide/>
- Kammeridener, T. & Smith, L. (1999). Supporting a Web-based curriculum with a diverse mix of authoring competency. *ERIC*, 432229.
- Mulligan, B. (2002). *Courseware*. Retrieved September 20, 2003, from <http://staffWeb.itsligo.ie/bmulligan/on-line/courseware.htm>
- Lai, H. (2004). Evaluation of WWW on-line courseware usability and tools. Unpublished doctoral dissertation, University of Idaho, Moscow.
- Newby, T. J., Stepich, D. A., Lehman, J. D., & Russell, J. D. (1996). *Instructional Technology for Teaching and Learning*. Englewood Cliffs, NJ: Prentice-Hall.
- Nielsen, J. (2000). *Designing web usability*. Indianapolis, IN: New Riders Publishing.
- Roy, M. C., Dewit, O., & Aubert, B. A. (2001). The impact of interface usability on trust in web retailers. *Internet Research: Electronic Networking Applications and Policy*, 11(5), 388-398.
- Sullivan, P. (2001). Gender difference and the online classroom: Male and female college students evaluate their experiences. *Community College Journal of Research and Practice*, 25, 805-818.
- Urdan, T. C. (2001). *Statistics in Plain English*. Mahwah, NJ: Lawrence Erlbaum Association.
- Wade, V. P., & Lyng, M. (2000). An automated evaluation service for educational courseware. In WebNet 2000, world conference and internet: proceedings. *ERIC*, 448764.
- Wang, E., Caldwell, B. S., and Salvendy, G. (2003). Usability comparison: similarity and differences between e-commerce and World Wide Web. *Journal of the Chinese Institute of Industrial Engineer*, 20(3), 258-266.
- Wheeler, S. (2002). Student perceptions of learning support in distance education. *The Quarterly Review of Distance Education*, 3(4), 419-429.

APPENDIX

On-line courseware evaluation survey (WebCT)

1-strongly disagree 2-disagree 3-neutral 4-agree 5-strongly agree

Ease of Navigation

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1 | I can easily select the content or section I want to view. | 1 | 2 | 3 | 4 | 5 |
| 2 | I've never felt lost while using the on-line courseware. | 1 | 2 | 3 | 4 | 5 |
| 3 | Each page of this on-line courseware is clearly identified by the same logo/title/banner. | 1 | 2 | 3 | 4 | 5 |
| 4 | I am always able to go easily back to the pages that I had previously visited. | 1 | 2 | 3 | 4 | 5 |
| 5 | The structure of this on-line courseware seems logical to me. | 1 | 2 | 3 | 4 | 5 |

Consistency

- | | | | | | | |
|----|--|---|---|---|---|---|
| 6 | I am satisfied with the courseware's use of color. | 1 | 2 | 3 | 4 | 5 |
| 7 | The location of navigation buttons/links/menu is consistent across pages. | 1 | 2 | 3 | 4 | 5 |
| 8 | The display format of content information is consistent. | 1 | 2 | 3 | 4 | 5 |
| 9 | The title is clearly indicated on every page. | 1 | 2 | 3 | 4 | 5 |
| 10 | Symbols/icons for graphic data clearly represent the logo/title/banner/navigation buttons. | 1 | 2 | 3 | 4 | 5 |

Ease of Learning

- | | | | | | | |
|----|--|---|---|---|---|---|
| 11 | I do not need any instruction before I begin to use the courseware. | 1 | 2 | 3 | 4 | 5 |
| 12 | The content arrangement is reasonable for easy learning. | 1 | 2 | 3 | 4 | 5 |
| 13 | I've found that the various functions in this courseware are integrated. | 1 | 2 | 3 | 4 | 5 |
| 14 | The order of menu options is logical. | 1 | 2 | 3 | 4 | 5 |
| 15 | The names of menu/navigation buttons are accurate. | 1 | 2 | 3 | 4 | 5 |

Perception

- | | | | | | | |
|----|--|---|---|---|---|---|
| 16 | Background color and text color are easily distinguishable. | 1 | 2 | 3 | 4 | 5 |
| 17 | The course material is easy to read on the screen. | 1 | 2 | 3 | 4 | 5 |
| 18 | Menus are distinct from other displayed information (e.g., content). | 1 | 2 | 3 | 4 | 5 |
| 19 | Groups of information are well organized. | 1 | 2 | 3 | 4 | 5 |
| 20 | I like the design of this on-line courseware. | 1 | 2 | 3 | 4 | 5 |

Support

- | | | | | | | |
|----|---|---|---|---|---|---|
| 21 | A Help option is always accessible. | 1 | 2 | 3 | 4 | 5 |
| 22 | The Help instructions are easy to understand. | 1 | 2 | 3 | 4 | 5 |
| 23 | Error messages are clear and useful. | 1 | 2 | 3 | 4 | 5 |
| 24 | The Help menu always has answers to my questions. | 1 | 2 | 3 | 4 | 5 |

Acceptance of the on-line courseware

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1 | I am satisfied with the learning conditions. | 1 | 2 | 3 | 4 | 5 |
| 2 | I am satisfied with the use of on-line courseware as a teaching resource. | 1 | 2 | 3 | 4 | 5 |
| 3 | The use of WWW courseware is effective for learning. | 1 | 2 | 3 | 4 | 5 |

Please check the box that applies.Gender: Male Female

Age: _____

What year are you in school? Freshman Sophomore Junior Senior Graduate

What is your major? _____

Do you have a BA/BS MA/MS Ph. D. Other?

In the past year, what percent of your time on the Internet was used for educational purposes?
_____ %

Have you taken any courses exclusively on-line? Yes No

If yes, in the last year, how many on-line courses did you take? _____

In the last year, how many computer courses did you take that were devoted to learning about using computers and their applications? _____

How do you rate your level of computer literacy? poor below average average good
 excellent

Open-ended questions

What were the most useful or attractive features of the website?

When did web design obstruct your learning?

In terms of the courseware design, what would have been better for you and in what way?

Please list additional comments here.

Dr. Horng-Ji Lai received his Ph.D. in Education in 2004 from the University of Idaho. After completing his study in the States, he returned to his home country--Taiwan. He is now an Assistant Professor of Visual Communication Design at Kun-Shan University of Technology in Tainan, Taiwan. His current research activities include studies of Web-based learning/teaching strategies and various issues of the interface design and usability of multimedia and On-line instruction courseware. Email: horngji@yahoo.com

Dr. Melvin J. Pedras is a professor of education in the Department of Teaching, Learning and Leadership at the University of Idaho, Moscow, Idaho 83844-3082. He is also the executive editor of this journal. Email: mpedras@uidaho.edu