Students' Attitudes Toward Computer Technology in the Recreation and Leisure Studies Classroom

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Abstract

The purpose of this study was to determine students' attitude toward computer technology in recreation and leisure studies courses. Using the Computer Attitude Scale (Loyd & Gressard, 1984a), graduate students' (N=24) computer anxiety, computer confidence, and computer liking was measured during two computer-assisted courses. Post-test scores revealed a significant unfavorable overall change in attitude toward computers (p=.054). Pre- to post-test analysis for the confidence subscale produced a significant change (p=.019) indicating less computer confidence. Although not significant, pre- to post-test scores for the anxiety and liking subscales demonstrated increased computer anxiety and decreased liking. Explanations for the negative direction of attitude change include outside pressures, workload, increased individual responsibility, technology problems, and interference with the teacher-student and student-student relationship. Results underscore the value of considering students' attitudes toward computer use when designing and implementing computer-assisted instruction.

Keywords: computer attitudes, computer anxiety, computer-assisted instruction, web-based learning, distance education, higher education

Introduction

Students are experiencing an increase in computer use as part of the teaching and learning environment in higher education and a general acceptance of this technology that was unimaginable a short time ago (Boettcher, 2000). At the University of North Texas (UNT) during Spring 2003, approximately 560 courses used on-line instructional delivery, and accounted for approximately 33 percent of all courses offered. While pedagogical aims of incorporating technology into the classroom are important, pressure from institutions to embrace the virtual revolution often has little to do with learning (Ely, 2000; Ramsey, 1999). Questions concerning how students learn best are secondary to questions concerning how quickly these courses and programs can be implemented on-line and how much income can be gleaned from previously untapped resources. In 2004, the Society of Park and Recreation Educators "Web Courses Directory" revealed 12 colleges/universities offering 30-plus on-line recreation and leisure studies (RLS)

courses, with two universities listing web-based certificates and three universities offering their entire curriculum on-line (two master's and one bachelor's degree). The RLS literature addressing this topic has been limited. With few exceptions (e.g., Austin, Perry, Harnishfeger, & McCormick, 1999), the published literature and information presented at our professional meetings and conferences have represented primarily teachers' and administrators' concerns (e.g., Hill, 1996; Love, 1996). Student perceptions about the incorporation of technology into the classroom are rarely included and databased studies about student attitudes toward computer use are sorely lacking.

As the discussion about technology intensifies and computer-based instruction flourishes, educators and researchers should be aware of students' attitudes toward computer use. Newby and Fisher (1998) found significant associations between the attitudinal variables of anxiety and enjoyment (liking) and between anxiety and course achievement. Meltzer (1996) posited that one of the biggest obstacles to technology use in education is attitude. She maintained that instructors sensitive to the benefits of teaching with technology must incorporate strategies targeted toward enhancing students' attitudes about the technology utilized. Without this emphasis on ascertaining and improving attitudes, students may view computer use as just one more requirement in an already over-loaded course (Meltzer, 1996).

Woodrow (1991) asserted that student attitudes toward computers are critical in developing and evaluating computer-based courses and curricula. Students in Woodrow's study displayed positive attitudes toward computers, a fact that she considered vital to maximizing the use of computers. She concluded that monitoring students' attitudes toward computers should be a continuous process if the computer is to be used as a teaching and learning tool.

The purpose of this study, therefore, was to examine students' attitudes toward the use of computers as a mode of instruction. The study sought to measure students' anxiety, confidence, and liking in learning about and using computers and how these attitudes might be affected during a course.

Conceptual Framework

Computer attitude is most often viewed as a multifaceted concept (Bohlin & Hunt, 1995; Liu & Johnson, 1998). Attitudes may be defined as "learned predispositions to respond positively or negatively to certain objects, situations, concepts, or persons" (Aiken, 1980, p. 2). Attitudes toward computers are likely to exert an influence on future computer behavior (Campbell & Williams, 1990). Put simply, they matter. Negative attitudes toward computer use influence the learning process and may become a deterrent to learning (DeLoughry, 1993; Koohang, 1989; Ropp, 1999; Yildirim, 2000). Campbell and Williams (1990) stated that negative attitudes might dissuade a person from trying new things while positive attitudes tend to strengthen beliefs and promote productive behavior. Promoting positive attitudes promotes achievement and learning (Simonson, 1995). Common constructs that have been considered in relation to student attitudes toward and

learning with computers include: anxiety, confidence, and liking. These constructs are discussed in the following paragraphs.

Computer anxiety. Computer anxiety is defined by Loyd and Gressard (1984a, 1984b) as anxiety toward or fear of computers or learning to use computers. Fear or discomfort of technology is reported to be a growing problem in education as the computer becomes more predominant (DeLoughry, 1993). Anxiety or fear about computers (also referred to as "the comfort factor," see, Violato, Marini, & Hunter, 1989) is identified as one factor that underlies attitudes toward them and limits their use (Bozionelos, 1996). Of all the constructs related to computer attitudes, this factor is often accorded special attention because of its debilitating effects on achievement (Hakkinen, 1995; Ropp, 1999). Feelings of anxiety can include worries about embarrassment, looking foolish, or even damaging computer equipment (McInerney, McInerney, & Sinclair, 1994). Liu and Johnson (1998) found that convenient and adequate computer access contributed positively to freedom from anxiety and positively affected enjoyment and motivation. In their study of computer anxiety and social workers, Choi, Ligon,and Ward (2002), reported that study participants who had access to computers and who were frequent users of computer equipment had lower levels of computer anxiety.

Computer confidence. Confidence is an expectancy to succeed or to fail in a given situation (Martin & Briggs, 1986). Computer confidence is defined as confidence in one's ability to learn about or use computers (Loyd & Gressard, 1984a, 1984b). Feelings of confidence may influence computer learning behaviors, efforts expended, and persistence (Ropp, 1999). Lack of confidence can interfere with one's willingness or ability to use computers (Bohlin & Hunt, 1995; Rosen & Weil, 1995). Ropp (1999) reported that "students who feel anxious in their efforts to learn to use computers are less confident and have more negative attitudes toward technology and computers than their less anxious colleagues" (p. 415). This apparent relationship between confidence and anxiety is particularly problematic for teachers using computers in their courses as those students who perceive themselves to be less competent may also be the most fearful of using computers (Ropp, 1999).

Higher computer confidence, when measured by basic knowledge and skills of computer technology, and lower computer anxiety also appear to be related to students' abilities to independently direct and monitor their learning (Tsai & Tsai, 2003). In Gifford's study (1998), a majority of the graduate students taking an Internet course perceived that computer-based courses require more time, self-discipline, and self-motivation than courses taught in the traditional classroom.

Computer liking. Computer liking is defined as the enjoyment or liking of, or interest in, working with computers (Liu & Johnson, 1998; Loyd & Gressard,1984a, 1984b). Liu and Johnson (1998) proposed that the more one enjoys computers, the more effort will be made to learn about and use them. Their study of teacher education students concluded that enjoyment contributed to computer achievement more than motivation,

perceived importance of learning and using computer skills, and computer access. Violato et al. (1989), however, suggested that there is a distinction between computer comfort (expressions of enthusiasm and positive feelings about computers) and computer liking (the willingness to actually use computers). Students may perceive social or institutional pressure to state that they like working with computers, yet may feel anxious and express less positive statements about their own ability to work with computers (Violato et al., 1989). Paradoxically, in their study of attitudes toward computers, McKinnon, Nolan, and Sinclair (2000) reported that while students mastered a range of computer applications over three years, their attitudes toward computers became significantly less positive. They concluded that "computer use perhaps lost its fascination after the halo effect had worn off" (p. 334). In a study of a computer-supported collaborative learning course, pre- and post-tests indicated that preference for collaborative work was enhanced while attitudes toward information technology became less favorable (Klobos and Renzi, 2001) Therefore, computer liking must also be considered as a factor underlying computer attitudes.

The rapid growth of computer utilization in educational settings underscores the need to address college students' attitudes toward computers (Koohang, 1989). Students seeking careers in education and the humanities may be more hesitant and less likely to embrace computer technology than those seeking careers in fields such as business or marketing (Griswold, 1985; Paprzycki & Vidakovic, 1994). Determining student attitudes toward the increasing use of computers in RLS courses is thus a primary factor in their successful implementation.

Methods

Sample

Sample data for this study were collected from 24 RLS students, 10 master's students enrolled in the *Concepts in Therapeutic Recreation* course during Spring, 2000 and 14 master's students enrolled in the *Recreation Planning, Design, and Maintenance* course during Fall, 2000 in the RLS curriculum at UNT. Both courses are required in the RLS graduate curriculum core. The courses were partially conducted via the Internet using WebCT, as well as providing some face-to-face lecture sessions.

Courses

WebCT provides a secured on-line environment in which educational materials may be created and accessed by students (Morss, 2000). WebCT allows the students to access the course's content in terms of lessons or modules 24 hours per day, so students have an "ideal" learning opportunity in terms of convenience and their preferred learning pace. In addition, WebCT enables the instructor to create chat rooms where students can formally or informally discuss specific issues related to the course. A "discussion" feature allows the students to post assignments for all class members to review or to remain private, depending on the instructor's preference. Overall, WebCT allows the course

instructor to distribute course content and related materials, feedback, grades, testing, and communication utilizing the virtual classroom concept.

The *Concepts in Therapeutic Recreation* course featured four, 3-hour on-campus class sessions. The on-line portion of the course was divided into ten conceptual modules, each including an Introduction, Objectives, Key Terms, Assigned Readings, Outline, Review Questions, and References/Links. The outline highlighted key points from the assigned readings and required that students respond to three different situations: 1) *Things to think about,* 2) *Things to do,* and 3) *Reflections/responses to post to the forum.* Other features of the course included e-mail, on-line chats, and student web pages.

The *Recreation Planning, Design, and Maintenance* course featured three, 4-hour on-campus class sessions spread evenly throughout the semester, plus five off-campus site visits to various leisure, recreation, or sport facilities or areas. The on-line section of the course was divided into six lessons with each providing an Introduction, Lesson Objectives, Key Terminology, Outline, Review Questions, References, and Assignments. Assignments were linked to the lesson topic and students were required to post their work in the "Forum Area" for others to review. On-line chats were scheduled so students could discuss the previous week's assignments and current readings.

Instrumentation

Students were instructed to take the Computer Attitude Scale (CAS) on-line within the first week of the semester at their convenience, and again 15 weeks later within the last week of the semester at their convenience. Student demographic characteristics and background information were also collected at the beginning of the courses. Attitude data were collected using the three subscales version of CAS, with 10 statements in each of the subscales: computer anxiety, computer confidence, and computer liking, as presented by Lloyd and Gressard (1984a), (see Appendix). The order of the thirty items was randomly arranged and a 5-point Likert-type response format was used: 1 = Strongly Agree, 2 = Somewhat Agree, 3 = Undecided, 4 = Disagree Somewhat, 5 = Strongly Disagree (see Appendix). Consistent with previous studies involving the CAS, scores from negatively worded items were reversed, thus making a lower score indicative of lower levels of computer anxiety, and higher levels of computer confidence and computer liking. The students were informed it would take about fifteen minutes to complete the questionnaire each time, there were no correct or incorrect responses to the items, so their responses would not affect their grade for the course, and that human subjects approval had been granted for the study.

Loyd and Gressard (1984a) reported a coefficient alpha reliability for the computer anxiety, computer confidence, computer liking, and the total CAS score of .86, .91, .91, and .95, respectively. Intercorrelations between the subscales and the total score ranged from .64 to .91, accounting for a large amount of common variance. Loyd and Gressard (1984a, p. 504) concluded that the three subscales scores were stable and could be used separately, and that the total score "represents a general attitude toward working with

computers that reflects liking, confidence, and freedom from anxiety." Woodrow's (1991) analysis of the CAS corroborated many of the results of Loyd and Gressard. She concluded the instrument appears to give an excellent, reliable attitude measure. The CAS is becoming the measure of choice in research on computer attitudes (Gardner, Discenza, & Dukes, 1993; Nash & Moroz, 1997) and "may be developing into a standard measure of computer anxiety, liking, and confidence" (Gardner et al., 1993, p. 501). In a review of 14 computer attitudes scales, Christensen and Knezek (2000) reported that the CAS (total CAS and its subscales) exhibited good reliability coefficients, without excessive length, and warranted wider use.

Additional sources of data were reviewed to help interpret the results of the analyses. First, students were requested to provide verbal or written evaluative feedback and submit recommendations throughout the semester. Second, at the end of the course, students provided written feedback concerning their perceptions as a part of the required course evaluation. Additionally, in one of the courses, data were gleaned from written semester participation reports. Third, a convenience sample of six students was selected and informal interviews were conducted after the courses had ended. During these interviews, students were asked to reflect on their attitudes toward computers prior to participating in the course. Students were first asked to describe their attitude in general terms and were then asked to reflect on each variable measured by the CAS: anxiety, liking, and confidence. They were asked to consider changes that may have occurred in their attitudes during the course and why. Finally, at the end of the interview, the results of the study were reviewed with the students. Students were asked to share their ideas for interpreting the results.

Analysis

Statistical Package for the Social Sciences (SPSS) was used to analyze the pre- and post-course computer attitudes. Cronbach's alpha reliability coefficient was used to determine overall reliability of the CAS as well as for each of the CAS subscales. Two independent academic courses were combined to create the study sample; therefore, a t-test was used to determine if significant differences existed between pre- and post-test mean scores. Descriptive statistics were used to examine the data as a whole, while ANOVA with repeated measures was used to examine differences between the pre- and post-computer attitude scores as a whole and for each of the subscales. The null hypothesis in all cases was that the population means would be equal across all pre- and post-test comparisons. The alpha level was set to $p=.05$.

Results

Descriptive Analysis

The 24 students participating in this study ranged in age from 22 to 49 with a mean age of 30.26 years. The sample included 8 males and 16 females. Students reporting working for pay an average of 29.74 hours per week (range = 0 to 55 hours per week)

and were taking an average of 6.95 credit hours during the semester of enrollment in the course (range = 3 to 12 credit hours). Most of the students (78.9%) had never taken a web-based course before, while four students had previous experience with a web-based course. One of these four students had previous experience with two web-based courses. One other student was simultaneously enrolled in another web-based course, while three students indicated they had not been enrolled in a college course within the last 12 months. All students indicated they had access to a computer at home, or at work, that could be used for course assignments. The average GPA for the class was 3.62, with a range from 3.00 to 4.00, and 68.4% of students indicated they expected to receive a grade of A for the course.

Hypothesis Testing

T-test results indicated the pre-CAS mean scores between the two RLS courses were not significantly different, (p=0.20), nor were the pre-CAS subscale mean scores between the two courses significantly different: anxiety (p=.07), confidence (p=.81), and liking (p=.20).

Likewise, T-test results indicated the post-CAS mean scores between the two RLS courses were not significantly different, (p=0.79), nor were the post-CAS subscale mean scores between the two courses significantly different: anxiety (p=.99), confidence (p=.21), and liking (p=.65). Consequently, results from the pre- and post- t-test analyses indicated students in the two RLS courses responded similarly to the CAS and could therefore be combined for further analysis.

Use of the CAS produced a high Cronbach's alpha reliability coefficient of .95, with none of the 30 items marked for elimination in order to improve the reliability of the instrument. Similarly, the CAS anxiety subscale produced a Cronbach's alpha reliability coefficient of .93, with no items shown to improve on the reliability score if eliminated. The confidence subscale produced a Cronbach's alpha reliability coefficient of .92, with none of the ten items shown to improve the reliability score if eliminated. The liking subscale produced the lowest reliability coefficient with 0.82. As with the other subscales, the reliability coefficient was not improved by eliminating any of the ten subscale items.

After combining responses from the two RLS courses, the overall mean score on the CAS pre-test administration was 60.75, while the overall mean score on the CAS post-test administration was 67.21. Total scores on the CAS can range from a low of 30 to a high of 150. A low score indicates more positive attitudes and a higher score indicates less positive attitudes. Total subscale scores can range from a low of 10 to a high of 30. A low score indicates lower levels of computer anxiety and higher levels of computer confidence and computer liking. The mean score on the anxiety pre-test subscale was 19.00, while the mean score on the anxiety post-test subscale was 19.29. The mean score on the confidence pre-test subscale was 19.21, while the mean score on the

confidence post-test administration was 23.38. The mean score on the liking pre-test subscale was 22.54, while the mean score on the liking post-test administration was 24.54 (Table 1).

TABLE 1

Mean Scores and Standard Deviations on the CAS and the Three CAS Subscales

	Pre-Test		Post-Test	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
CAS Total Score	60.75[a]	19.16	67.21	19.65
Anxiety Subscale Score	19.00[b]	8.41	19.29	6.71
Confidence Subscale Score	19.21[b]	7.25	23.38	7.38
Liking Subscale Score	22.54[b]	5.90	24.54	8.48

[a]Overall scores could range from 30 -150 with lower scores indicating more positive attitudes and higher scores indicating less positive attitudes.

[b]Subscale scores could range from 10 - 50 with lower scores indicating less anxiety and more confidence and liking.

The CAS pre- to post-test ANOVA with repeated measures analysis was significant at the .05 level (p=.054) (Table 2). The post-test mean showed an increase, which indicated students' attitudes toward computers became less positive. The pre- to post-test analysis for the "anxiety" subscale showed no significant change (p=.836). It is noteworthy, however, that the post-test mean increased, indicating an increase in computer anxiety. Likewise, the pre-to post-test analysis for the "liking" subscale showed no significant change (p=.140). Once again, however, the post-test mean increased indicating a decrease in computer liking. The pre-to post-test analysis for the "confidence" subscale produced a significant change (p=.019). The post-test mean increased significantly indicating a decrease in computer confidence.

TABLE 2

ANOVA with Repeated Measures for Pre- vs Post- CAS Scores and Subscales

	Mean Square	**Df**	**F**	**Sig.[a]**
CAS Total	500.52	1.00	4.10	0.054
Anxiety Subscale	1.02	1.00	0.04	0.836
Confidence Subscale	208.33	1.00	6.38	0.019
Liking Subscale	48.00	1.00	2.31	0.140

[a]p=.05

Discussion

Students who have more computer experience generally express more positive attitudes toward computers (Koohang, 1989; Yildirim, 2000). Likewise, participants in the present study reported high computer usage prior to taking the courses and displayed generally positive attitudes regarding computer use at pre-test. Yet, as revealed in this study and supported by the work of other researchers (see, for example, McKinnon et al., 2000; Ropp, 1999), student attitudes toward computers do not always improve with computer experience and may actually become less positive. It is possible that the computer attitudes of students in this study were simply unrealistically high at the beginning of the courses. Based on student feedback and our own perceptions as instructors, the authors do not believe this was the case. In the authors' opinion, the overall decline in computer attitude indicated by students' post-test scores was an accurate reflection of reality. Five possible explanations for the unfavorable change in attitude are offered: 1) outside pressures, 2) perceptions of workload, 3) increased individual responsibility for learning, 4) problems with computer access, and 5) interference with the teacher-student and student-student relationship.

Outside pressures. The influence of outside pressures may be one reason that students' overall attitude toward computer use was less positive at the end of the course. Students may have felt social or institutional pressure to express an initial affinity toward computers. At the same time, students may have felt anxious and unsure about their ability to use computers successfully. Interestingly, improvement of students' computer skills during the course, did not necessarily enhance their attitude toward computer use. As one student revealed, "Even though my [computer] skill has gotten better, I would still avoid taking a computer-assisted course if possible."

Perceptions of workload. It is also possible that initial enthusiasm for the computer-assisted course waned as the course progressed and was replaced by the realities of the work required. As McKinnon and colleagues (2000), Gifford (1998), Metzler (1996) and others pointed out, after an initial fascination, using the computer may have been viewed as just one more challenge in a demanding course. In common vernacular, "the thrill was gone" - what was once novel was now just work. Statements such as, "I think I worked harder in this class than I ever did in any other class," and "I simply did not have the time to stay on the computer or to check it daily," indicated perceptions of workload. While these perceptions are also evident in other courses, they may be more pronounced in computer-assisted courses as indicated in this student response:

> It feels easier to get behind in an Internet course. And, I feel as if I work two to three times harder than in regular courses. I think your attitude has to do with if you keep up with everything or get behind.

Increased responsibility for learning. Perception of workload may be related to students' perceptions that individual responsibility is greater in computer-assisted courses than in other courses. A frequent response in the follow-up interviews was students might

not do well because the individual did not like the responsibility inherent in these computer-assisted courses. One student explained, "Because this was a web-course, it was going to be up to me as to how much I was going to learn from the individual assignments." Instructors could argue that increased perception of individual responsibility is desirable as evidenced by this student statement:

> I believe I learned a great deal more than I expected from this course. This has been one of the most active, most personally participated in courses I've ever taken. I believe this was due to the fact that I, the student, rather than the professor, was responsible at all times for everything I gained from the course.

Yet, perceptions of increased responsibility may also contribute to feelings of anxiety: "By virtue of this course being a web-course, I had to take the initiative on assignments, to speak up when I was confused, and to not be afraid to ask for help. It was vital to communicate during the course or one could easily fall behind." If students were not comfortable with or adept at these tasks, confidence might be undermined.

Problems with technology. As Austin et al. (1999) and Liu and Johnson (1998) indicated, problems with technology often negatively affect students' attitudes or satisfaction with distance learning. In this study, technology problems encountered by students pertained to their personal computer access and to perceived problems with the WebCT software platform. Comments such as "My computer, which is a bit dated, did not allow me to access any of the on-line chats" revealed personal access problems. In another example, a student explained how access problems limited participation in class discussions: "I was more concerned with the assignments and projects, so I lagged on my e-mail and class communication. I think if I had web access at work I would have been more inclined to click on and check out what the others were saying." While one student stated, "I became more comfortable with WebCT the more I used it," feelings of anxiety relating to this new environment existed for most students: "UNT's web-based course delivery system is a new format of learning for me as I'm sure it has been for my fellow classmates." Perceptions of not participating fully or meeting expectations may contribute to feelings of anxiety, may negatively affect self-confidence, and may ultimately negatively influence overall attitude.

Interference with the teacher-student and student-student relationship. As other researchers have noted (e.g., Austin et al., 1999; Ramsey, 1999) concerns that the computer-based course detracted from in- and out-of-class relationships also existed. One student captured the essence of this concern: "Although we had a common focus within the textbook, module readings, and assignments, WebCT lacked the face-to-face interaction and debate that typically occurs in the classroom." Another student expressed, "This was an informative class. I just missed having more personal contact with my fellow students and my very entertaining instructor." Since personal interaction is a desirable component in the graduate RLS classes, this aspect of the computer-assisted

courses may have led to feelings of uncertainty about course content that were expressed as dissatisfaction or tentativeness with computer use: "Since I am one of those students who learns a great deal from lecture and in-class discussions, I felt this course was a challenge."

Summary and Recommendations

There were a couple of issues related to limitations of this study that seemed noteworthy. Data collected for this study originated from two completely separate graduate level courses. Therefore, controlling for differences in instructors' teaching styles was not possible. In addition, the two courses were offered during different semesters, which made it impossible to control for seasonal or environmental factors that may have influenced the students' computer attitudes. Since t-tests results indicated no significant CAS score differences between courses, the respondents were combined to create a larger sample size, which was still relatively small.

This study demonstrated that even among students who self-identify as high-level computer users, computer anxiety, confidence, and liking can change during the course of a semester. Advanced knowledge of students' attitudes toward computers and tracking their changes in perceptions at the end of the course can give teachers insight into the unique challenges particular individuals are facing. Thus, it is recommended that recreation and leisure studies educators determine students' attitudes toward computer use prior to designing and implementing computer-assisted instruction. Pre-test data not only provide a standard against which to measure change, they also provide important baseline data so that educational results may be better quantified and understood. If a high degree of anxiety or lack of confidence exists among certain students, the instructor may need to focus on reducing computer anxiety and increasing confidence at the beginning of instruction. By assuring students' computer comfort levels, they can focus on content rather than technology. Pre-test information can also be used to approach students in ways that supplement their weaknesses in using technology and complement their strengths. Pre-test scores can also influence instructors' expectations and decisions about learning objectives and instructional design in the RLS computer-assisted classroom. Likewise, educators are encouraged to determine if computer-based instruction during a course maintains and/or changes the attitudes their students hold toward learning with technology.

With the emphasis to provide more Internet-based courses, whether for the students' convenience or for the potential economic benefit to the educational institution, research is needed to clarify and confirm the general question of whether students learn better in the traditional RLS classroom or over the Internet. Additionally, in light of the findings in this study related to perceptions of workload in computer-based courses versus traditional courses, research may need to focus on establishing a more equitable way to deliver courses via the Internet. Specific research should also be directed toward determining how computer attitudes are related to course performance. Additionally,

future research should investigate which aspects of course content, design, and delivery systems most positively affect attitudes and learning. Finally, future research should focus on whether attitudes toward and performance in computer-based courses varies by characteristics, such as age, gender, cultural background, prior computer experience and so on. Information related to computer attitudes and course performance would help to determine if more time and effort should be earmarked toward Internet course development.

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