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Student Attitudes Towards Computers Before And After Taking An Introductory AIS Course

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Abstract

Computer attitudes are measured before students take an introductory AIS course. Attitudes are positive, regardless of gender or traditional vs. non-traditional student status. No difference is noted by gender, but non-traditional students have more positive attitudes. Prior computer experience appears to explain these findings. Attitudes are measured again at semester end. Attitudes either remain the same or slightly improve for respective subgroups studied. Little if any gender difference exists, but the gap by student status is slightly greater. Impact of findings on AIS education is discussed.

Introduction

The accounting profession and accounting academia long recognize that those entering the profession must be knowledgeable of various aspects of computers and information technology (IT) (AAA, 1985; AAA, 1987; AAA, 1988). This recognition has grown tremendously over time due to the continuing proliferation of computers and IT in business. AIS courses are an integral means for providing needed computer skills to those entering the profession. No prior study focuses on determining the direct impact of AIS courses on student attitudes towards computers. Any course should strive to impact its students in a positive manner. An introductory course should especially be intended to impact students positively. Prior studies show direct relationships between computer attitudes and both 1) motivation to use and 2) performance with computers (examples include: Shneiderman, 1979; Eason and Damodaran, 1981; Igabaria et al., 1990; Ferguson and Nevell, 1996). Coupling these relationships with the accounting profession's emphasis on computer skills, studying the impact of an introductory AIS course on computer attitudes is important for helping ensure that those entering the profession are successful in their careers and meet the needs of the business community.

Another important issue is whether differences in computer attitudes exist amongst accounting students based on gender. Many gender studies report that males generally have more favorable attitudes towards computers than females, whether in primary, secondary or higher education (examples include: Eining et al., 1992; Shashaani, 1997; Bhargava et al., 1999; Butler, 2000; Sax et al., 2000; Young, 2000). Considering 1) the majority of current accounting students are female, 2) the profession's emphasis on computer skills, and 3) the relationships between computer attitudes and both motivation to use and performance with computers, any difference in computer attitudes amongst accounting students based on gender should be recognized and sought to be minimized so that all entering the profession have an equal opportunity for career achievement and advancement.

Another important issue is whether differences in computer attitudes exist between traditional and non-traditional accounting students. Students 25 years of age and older currently comprise 40% of all postsecondary students (U.S. Department of Education, 2002). There is a common assumption that traditional students "grow up" with computers and are therefore less likely to be intimidated by computers (Orr et al., 2001). However, the results of studies that focus on the relationship between age and computer attitudes are mixed (examples include: Al-Jabri and Al-Khaldi, 1997; Shaw and Giacquinta, 2000; Seyal et al., 2002). Because the current non-traditional student population is substantial, this issue is important to study amongst accounting students.

This study provides the first formal look at measuring student attitudes towards computers both before and after taking an introductory AIS course, as well as whether attitudinal differences exist by either gender or traditional versus non-traditional student status. Such a study can be beneficial to AIS educators as they consider topical coverage and computer usage in their courses. Students in an introductory AIS course at four universities are surveyed at the beginning of semester with respect to their attitudes towards, and experience with, computers and then again at the end of semester for their attitudes.

Survey results show that attitudes, both overall and by each subgroup of interest, are positive before the course. No gender differences are noted at the beginning of semester. Non-traditional students, however, have more positive computer attitudes than traditional students. Numerous studies find a direct relationship between computer experience and computer attitudes of students (examples include: Loyd and Gressard, 1984a; Koohang, 1989; Walters and Necessary, 1996; Mitra and Steffensmeir, 2000). Computer experience reported by those surveyed appears to explain beginning of semester computer attitudes. Those surveyed had substantial prior computer experience, both overall and by subgroup of interest. While each gender had similar levels of computer experience, non-traditional students report more computer experience than traditional students surveyed.

End of semester survey results show that computer attitudes marginally increased on an overall basis, and either marginally increased or remained the same for each respective subgroup of interest. Little if any attitudinal difference exists by gender at the end of semester, but the gap between non-traditional and traditional students is marginally greater. In summary, the introductory AIS course at each of the four universities in this study mainly reinforced already positive attitudes held by students surveyed towards computers, with some slight improvement for non-traditional students over a semester. These results should be useful to AIS educators for helping students better appreciate concepts covered in AIS courses. AIS educators should consider that their students very likely have substantial computer experience and positive attitudes towards computers before taking an introductory AIS course. AIS educators should not be inhibited in covering computer-related concepts and actually should leverage the use of computer technology to help students learn AIS subject matter important for their future careers. Providing more computer experience should not be an end unto itself, but should be used to help students further appreciate AIS course material.

The next section of this paper provides literature review and research questions. Later sections present methodology, results, and conclusions as to the impact of this study on AIS courses development. The final section provides suggestions for future research.

Literature Review and Research Questions

Student Computer Attitudes Before and After Taking an Introductory AIS Course

Accounting professionals must have strong computer and IT skills to be successful in their careers because of the pervasiveness of IT in all business activities (Elliot, 1997). Examples of this professional recognition are shown by the coverage of various computer-related concepts on respective Uniform CPA, CMA and CFM examinations (AICPA, 2004; IMA, 2004). Accounting programs recognize this, too, and provide coverage of a variety of computer-related topics in AIS courses (Davis and Leitch, 1988; Heagy and Rakow, 1991; Smith and Bain, 1993; Groomer and Murthy, 1996; Bain et al., 2002).

The impact of AIS courses on computer attitudes of students is very important to study because an individual's attitudes towards computers may affect job performance and job satisfaction. Both Ferguson (1997) and Mills (1997) find this relationship to exist specifically amongst accounting professionals. Applying this relationship to students in AIS courses, an unfavorable attitude towards computers may lead to poor course performance and dissatisfaction with course material, which could lead some well-qualified students to 1) not reach the level of success desired in the profession, 2) try to focus on an area within the profession that minimizes computers, or 3) choose a different major.

As previously noted in the previous section, many studies report a direct relationship between computer attitudes of students and computer experience. Some studies focus specifically on measuring the impact of an introductory college computer course on student attitudes towards computers. Both Omar (1991) and Harris (1992) report an improvement in student attitudes while taking an introductory computer course. While Torkzadeh and Koufteros (1993) reports mixed results, most studies report that as one acquires more computer experience, one's attitudes towards computers typically become more positive.

Despite the expectation that computer exposure improves attitudes, both Raval (1991) and Dunn and Grabski (1998) provide the concern that accounting students tend to have unfavorable attitudes towards AIS courses, especially compared to other traditional accounting courses. This concern is based on AIS course content typically emphasizing subjective, abstract concepts such as systems, processes, controls, design, and evaluation, as opposed to the majority of accounting courses emphasizing objective procedures, rules, and precision. Both Ravel (1991) and Dunn and Grabski (1998) warn that unfavorable attitudes towards AIS lead to frustration and alienation with course subject matter, which includes more and more computer-related material as IT continues pervading business activities.

One study focuses on measuring computer attitudes of accounting students. Orpen and Ferguson (1991) surveyed 155 graduating accounting students at two universities. They report a direct relationship between computer experience and computer attitudes, and that the majority of those surveyed had positive attitudes towards computers. However, the applicability of these results with current students may be difficult for two reasons.

First, Orpen and Ferguson's (1991) survey instrument only included one experience question ("time spent with computers," which was rated on a seven-point Likert Scale ranging from "very little" to "very much") and only nine attitude questions. A more extended questionnaire is likely needed to capture more detailed measures of experience and attitudes of respondents. As an example of the likely need for more detailed measures, their study fails to find a difference in computer attitudes of accounting students based on socioeconomic background, which was measured through one demographic question ("social class, given by father's occupational status," which was based on a five-point Likert Scale ranging from "unskilled worker" to "professional"). However, Gibson and Hunton (1996) use an experimental design and report that accounting students from lower socioeconomic backgrounds (including measures of ethnic origin and regional effects) have higher computer anxiety, lower computer performance levels, and higher stress when using computers than accounting students from higher socioeconomic backgrounds.

A second reason Orpen and Ferguson's (1991) study may not be currently applicable is because of the possibly limited amounts of computer exposure of those surveyed. No mention is given as to what computer concepts those surveyed had been exposed to. Computer-related coverage in accounting curriculums has dramatically increased in the last decade. With the introduction of a variety of computer-related topics in AIS courses (such as enterprise resource planning systems, electronic commerce, and IT auditing, to name a few), Orpen and Ferguson's (1991) results may not be applicable for determining the computer attitudes of current accounting students.

Research is definitely needed for measuring student attitudes towards computers both before and after taking an AIS course. Current accounting student attitudes towards computers may be unfavorable before and/or after taking an AIS course, based on both Ravel's (1991) and Dunn and Grabski's (1998) concerns. However, considering that computers are being used extensively in many aspects of business, education, and daily life, current accounting students may be very familiar with computers before taking an AIS course. Current accounting students may therefore have favorable attitudes towards computers before taking an AIS course, and with further exposure, have even more favorable attitudes. If attitudes are at least favorable after taking an AIS course, AIS educators can use this knowledge to ensure that computer-related coverage is provided in courses as it relates to specific AIS topics. If attitudes are not favorable or even decline, AIS educators should consider redesigning courses that make students more amenable to computers and computer-related topics as related to AIS concepts because of their importance in business. The following research questions are therefore asked:

R1: Are student attitudes towards computers positive before and/or after taking an introductory AIS course?

R2: Do student attitudes towards computers change after taking an introductory AIS course?

R1 is an exploratory research question, with no directional expectation of results. For R2, because many studies report that computer exposure improves one's attitude towards computers, student attitudes are expected to become more positive after taking an introductory AIS course.

Computer Attitudes Based on Gender

Numerous studies focus on whether gender differences exist in computer attitudes. As previously stated, a number of studies report that males generally have more favorable attitudes towards computers than females. Other studies, however, fail to find a difference (examples include: Loyd and Gressard, 1984a; Houle, 1996; Ayersman and Reed, 1996; Orr et al., 2001; Seyal et al., 2002).

The American Association of University Women (AAUW) continually studies whether gender differences exist in a variety of areas and levels of education. Focusing on computers, the AAUW published in 2000 a study entitled "Tech-Savvy: Educating Girls in the New Computer Age." This study reports that females view computers as "tedious," "sedentary," and "antisocial." Further, females typically "denigrate (computer) activities." Negative attitudes expressed in this and other studies are used to explain why females comprise less than a third of IT jobs, while making up approximately half the general workforce (White House Council of Economic Advisors, 1999).

Two studies that focus on accounting students, however, report results contrary to many gender study findings. Previously cited, Orpen and Ferguson (1991) fail to find a difference in attitudes amongst graduating accounting students towards computers based on gender. Daigle and Morris (1999) simultaneously surveyed students in four courses across a particular university's accounting curriculum at the beginning of semester. They did not find a difference in either experience or attitudes based on gender later in the curriculum, after finding some minor differences early on. They also did not find a difference based on gender amongst those who had selected to emphasize their studies in AIS. These results suggest that gender differences with respect to computers may not exist for accounting students because of a self-selection bias when choosing either to major in accounting or emphasize AIS in their studies.

This study seeks to add to previous research by comparing computer attitudes of students based on gender before and after taking an introductory AIS course. Because numerous studies conflict in their results, it is still unclear whether differences in computer attitudes exist based on gender, in general. Although Orpen and Ferguson (1991) and Daigle and Morris (1999) fail to report a difference amongst accounting students, studies report that males outperform females in accounting (Lipe, 1989; Buckless et al., 1991; Carpenter, et al., 1993). It is therefore important to further study through a different methodology if computer attitude differences do exist by gender amongst accounting students. The following non-directional research question is therefore asked:

R3: Do attitudes towards computers differ by gender of students before and/or after taking an introductory AIS course?

Computer Attitudes Based on Traditional Versus Non-Traditional Student Status

Student status based on age is a variable of interest in many studies of computer attitudes. Traditional students are typically assumed to "grow up" with computers and therefore not as intimidated of them as non-traditional students. Past studies, however, provide mixed results regarding the relationship between age and computer attitudes:

- A negative relationship (Jay and Willis, 1986; Nickell and Pinto, 1987; Kay, 1990; Rosen and McGuire, 1990; Harrison and Rainer, 1992; Igbaria, 1993, Shaw and Giacquinta, 2000).
- A positive relationship (Massoud, 1991; Pope-Davis and Twing, 1991; Klein et al., 1993; Orr et al., 2001; Seyal et al., 2002).
- No relationship (Woodrow, 1991a; Busch, 1995; Al-Jabri and Al-Khaldi, 1997).

Orpen and Ferguson (1991) report that non-traditional accounting students are more likely to have negative computer attitudes than traditional accounting students. Because of the mixed results of prior studies, this factor needs to be studied more in-depth with regard to accounting students. This study seeks to add to previous research by comparing attitudes of students towards computers based on traditional versus non-traditional student status before and after taking an introductory AIS course. The following non-directional research question is therefore asked:

R4: Do attitudes towards computers differ between traditional and non-traditional students before and/or after taking an introductory AIS course?

Methodology

Instrument

Table 1 – Experience Questions at Beginning of Semester and Overall Mean Responses

Item	Experience Question	Mean	Note[1]
E6	Please enter the length of time in years that you have used computers.	9.98	A
E7	If you have access to a personal computer at home, how often do you use it?	4.58	B
E8	How often do you use the college computer labs?	3.26	B
E9	If you have access to a computer at work, how often do you use it?	3.50	B
E10	In primary and secondary school, how many semesters of computer-related courses have you taken?	2.60	A
E11	In college, how many semesters of computer-related courses have you taken?	2.76	A
E12	Through work, how many days (1 day = 8 hours) of formal computer training have you had?	13.39	A
E13	Do you have experience using the computer for playing games?	1.08	C
E14	How often do you use the computer for playing games?	3.13	B
E15	Do you have experience using the computer for data entry?	1.04	C
E16	How often do you use the computer for data entry?	3.74	B
E17	Do you have experience using the computer for word processing?	1.00	C
E18	How often do you use the computer for word processing?	4.06	B
E19	Do you have experience using the computer for spreadsheets?	1.06	C
E20	How often do you use the computer for spreadsheets?	3.35	B
E21	Do you have experience using the computer for programming?	1.65	C
E22	How often do you use the computer for programming?	1.39	B
E23	Do you have experience using the computer for statistical analysis?	1.43	C
E24	How often do you use the computer for statistical analysis?	1.81	B
E25	Do you have experience using the computer for database management?	1.63	C
E26	How often do you use the computer for database management?	1.68	B
E27	Do you have experience using the computer for email?	1.02	C
E28	How often do you use the computer for e-mail?	4.71	B
E29	Do you have experience using the computer for internet searching?	1.02	C
E30	How often do you use the computer for internet searching?	4.54	B
E31	Do you have experience using the computer for preparing slide/photo presentations?	1.28	C
E32	How often do you use computer for preparing slide/photo presentations?	2.08	B

[1]Explanation:

A: The actual amount of time (in years, days, or semesters depending on the question).

B: A scale of 1 to 5.

5 – Almost every day
4 – At least once a week
3 – Every one or two months
2 – Once or twice a year
1 -- Never

C: A binary response of 1 or 2.

1 -- Yes
2 – No

A pre- and post-test survey is used to gather data for this study. The survey instrument uses a combination of 1) five demographic questions, 2) twenty-seven computer experience questions and 3) thirty computer attitude statements. Experience questions are from Qureshi and Hoppel (1995) and from Lowe and Krahn (1989) and are listed in Table 1. Attitude statements are referred to as the "Computer Attitude Scale" (CAS), a validated survey instrument (Loyd and Gressard, 1984b; Woodrow, 1991b; Gardner et al., 1993). The CAS has been widely used with college students (examples include: Massoud, 1991; Pope-Davis and Twing, 1991; Busch, 1995; Orr et al., 2001).

Table 2 – Statements for Each Subscale of the Computer Attitude Scale

Item Number	Item
	Computer Anxiety
1	Computers do not scare me at all.
4	Working with a computer would make me very nervous.
7	I do not feel threatened when others talk about computers.
10	I feel aggressive and hostile towards computers.
13	It wouldn't bother me at all to take computer courses.
16	Computers make me feel uncomfortable.
19	I would feel at ease in a computer class.
22	I get a sinking feeling when I think of trying to use a computer.
25	I would feel comfortable working with a computer.
28	Computers make me feel uneasy and confused.
	Computer Confidence
2	I'm no good with computers.
5	Generally, I would feel OK about trying a new problem on the computer.
8	I don't think I would do advanced computer work.
11	I am sure I could do work with computers.
14	I'm not the type to do well with computers.
17	I am sure I could learn a computer language.
20	I think using a computer would be very hard for me.
23	I could get good grades in computer courses.
26	I do not think I could handle a computer course.
29	I have a lot of self-confidence when it comes to working with computers.
	Computer Liking
3	I would like working with computers.
6	The challenge of solving problems with computers does not appeal to me.
9	I think working with computers would be enjoyable and stimulating.
12	Figuring out computer problems does not appeal to me.
15	When there is a problem using a computer application that I can't immediately solve, I would stick with it until I have the answer.
18	I don't understand how some people can spend so much time working with computers and seem to enjoy it.
21	Once I start to work with the computer, I would find it hard to stop.
24	I will do as little work with computers as possible.
27	If a problem is left unsolved in a computer class, I would continue to think about it afterward.
30	I do not enjoy talking with others about computers.

The CAS is based on factor analysis, with the thirty statements loading onto one of three factors (subscales): 1) Computer Anxiety (fear of computers), 2) Computer Confidence (ability to use or learn about computers), and 3) Computer Liking (enjoy working with computers). Loyd and Gressard (1984b) report Alpha reliability coefficients of .86, .91, .91 and .95 for each subscale and in total, respectively. As shown by the statement numbers in Table 2, subscale statements are mixed throughout the instrument. Some statements are positively worded while others are negatively worded for ensuring the seriousness of responses. Responses on a five-point Likert Scale are recoded so they can be summed to give a particular subscale response. Any summation of a subscale can have a score between 10 and 50, with a 30 denoting a neutral attitude. The higher a particular subscale

score, the less computer anxiety and the more computer confidence and computer liking a respondent has, and therefore, the more positive their attitudes towards computers.

Participants

Students in introductory AIS courses at four universities completed the survey. All are located in the southern part of the United States, with student bodies of approximately 13,000 (University A), 16,000 (University B) 30,000 (University C), and 30,000 (University D), respectively. The accounting department at each university states as part of its mission the emphasis of giving students the opportunity to acquire knowledge and skills necessary for successful accounting careers. All four universities seek to accomplish this mission by offering an undergraduate degree in accounting and a master's degree that allows individuals to meet the 150-hour rule in most states for taking the CPA examination. The introductory AIS course is required of all accounting majors at each university, and can also be taken as an elective by non-accounting majors. Students at each university are required to take an introductory computer course at the college level before taking the introductory AIS course.

Though material covered was slightly different between the four universities, the introductory AIS course at each university covered a number of similar computer-related AIS topics, including transaction cycles (business processes), information systems structure and design (including flowcharting, data modeling and database design), e-commerce, internal controls, and computer fraud and security. Courses at each university emphasized the use of IT in assignments:

- University A included specific assignments using Excel and Oracle
- University B included specific assignments using the Internet and Excel
- University C included specific assignments using Microsoft Great Plains Dynamics, Access, and Excel
- University D included specific assignments using Microsoft Great Plains Dynamics and Excel

Because course coverage is slightly different, results are provided and discussed by both university and in total for a better understanding of the impact of an introductory AIS course on student computer attitudes.

Procedures and Descriptive Statistics

Students completed the survey during the first week of the semester. Students provided responses again to the attitude statements during the final week of the semester. Students were asked to provide the last six digits of their Social Security number at both times so the beginning and end of the semester surveys could be matched. The researchers assured the students that the confidentiality of their responses would be protected. Only matched surveys from students who completed surveys at both beginning and end of semester are used in this study, resulting in a useable sample of 252 matched pairs. The breakdown of survey responses by university, gender and traditional versus non-traditional student status is provided in Table 3.

Of the 252 matched pairs, 175 (69%) were traditional students (under 25 years of age) and 77 (31%) were of non-traditional students (25 years of age and older). Approximately 66% of all non-traditional students surveyed were from University A and University B, with approximately 53% of respondents from University B being non-traditional students. University B is located in a major metropolitan area, makes special admission considerations specifically for non-traditional students and offers numerous night courses, thereby attracting many non-traditional students. University A is within an hour's drive of an even larger metropolitan area, and also attracts many non-traditional students. University D, which is also located in a major metropolitan area, also had a high proportion of non-traditional students (approximately 28%). Females completed 158 (63%) matched pairs while males completed 94 (37%).

Table 3 – Breakdown of Survey Numbers by University and Subgroup of Interest

University A:	**Matched Pairs**	**Percentage of Grand Total**		**Matched Pairs**	**Percentage of Grand Total**
Female	42	16.67%	Traditional	45	17.86%
Male	28	11.11%	Non-Traditional	25	9.92%
Total	70	27.78%	Total	70	27.78%
University B:					
Female	35	13.89%	Traditional	23	9.13%
Male	14	5.56%	Non-Traditional	26	10.32%
Total	49	19.45%	Total	49	19.45%
University C:					
Female	41	16.27%	Traditional	63	25.00%
Male	31	12.30%	Non-Traditional	9	3.57%
Total	72	28.57%	Total	72	28.57%
University D:					
Female	40	15.87%	Traditional	44	17.45%
Male	21	8.33%	Non-Traditional	17	6.75%
Total	61	24.20%	Total	61	24.20%
Grand Total:					
Female	158	62.70%	Traditional	175	69.44%
Male	94	37.30%	Non-Traditional	77	30.56%
Total	252	100.00%	Total	252	100.00%

A total of 93 surveys from either the beginning or end of the semester were not used because:

- Some students who took the survey at the beginning of semester dropped the course,
- Some students who stayed in the course the entire semester were present one of the times the survey was given but not the other, and
- Some students failed to provide sufficient identifying information on both beginning and end of semester surveys to allow matching.

Of the unmatched surveys, 27 were from University A, 24 were from University B, 31 were from University C, and 11 were from University D. Of students who officially withdrew from the course, 14 withdrew at University A, 8 withdrew at University B, 14 withdrew at University C, and 5 withdrew at University D.

It may be assumed that many of the students who withdrew did so because of an inability to grasp course material, and therefore may have more negative attitudes towards computers at the time of withdrawing from the course than those who did not. No specific or formal conclusions can be drawn from students who withdrew, however, because a student could have withdrawn for some other reason, as well as the lack of measuring their attitude at the time of withdrawal.

Results

Attitudes and Experience Before Taking Course

A three-way analysis of variance was run for each subscale to test all research questions. The factors are Time (beginning versus end of the semester), Gender (male versus female) and Traditional (traditional versus non-traditional students). Tables 4 through 6 provide various mean attitude subscale scores at both the beginning and end of semester. Table 4 presents individual university totals, as well as responses combined. Table 5 provides detail by gender at both the university level and in total, while Table 6 shows detail by student status at both the university level and in total. Note that in all three tables, all subscale mean scores are well over the neutral score of 30, with none lower than 34 and the majority over 40. These mean scores indicate that with respect to R1, computer attitudes of those surveyed, both overall and by subgroup of interest, are generally positive both before and after taking an

introductory AIS course. Considering the concerns expressed by both Ravel (1991) and Dunn and Grabski (1998), the students surveyed are likely amenable to AIS concepts incorporating computers and IT.

Table 4 –Overall Beginning Versus End of Semester by University and All Combined (Results for Testing R1 and R2)

Subscale[1]	Mean for Beginning of Semester Overall	Mean for End of Semester Overall	one-tailed p-value[2]
University A:			
Computer Anxiety	**42.725**	**44.186**	**0.0415**
Computer Confidence	**41.174**	**42.329**	**0.0870**
Computer Liking	37.826	38.443	0.2836
University B:			
Computer Anxiety	44.082	45.021	0.1954
Computer Confidence	42.980	42.702	0.4272
Computer Liking	40.857	40.255	0.3546
University C:			
Computer Anxiety	41.556	42.694	0.1320
Computer Confidence	39.578	40.208	0.2630
Computer Liking	35.667	34.708	0.2003
University D:			
Computer Anxiety	41.450	42.833	0.3654
Computer Confidence	40.695	41.017	0.3956
Computer Liking	38.167	37.950	0.4104
All Combined:			
Computer Anxiety	**42.348**	**43.586**	**0.0099**
Computer Confidence	40.960	41.470	0.1436
Computer Liking	37.880	37.586	0.3345

[1]Each subscale contains ten questions on a five-point Likert Scale, with a score of 30 denoting a neutral attitude

[2]Bolded results are significant ≤ 0.10

As previously discussed, many studies show a direct relationship between computer experience and computer attitudes. Strong prior computer experience could explain why student attitudes were positive before taking the AIS course. Table 1 provides overall mean responses for all computer experience questions asked at the beginning of semester. Those surveyed report substantial computer experience. For example, the average student surveyed reports 9.98 years experience using computers, 2.60 semesters of computer-related training in primary and secondary school, 2.76 semesters of computer-related training in college, and 13.39 days of formal computer training through work. Most have experience with word processing, spreadsheets, data entry, email, Internet searches, and playing games. Considering the well-documented relationship between computer experience and computer attitudes, results indicate that the positive computer attitudes at the beginning of semester are due to the substantial prior computer experience reported by those surveyed.

Impact of Course on Attitudes

Tables 4 through 6 provide results for testing R2, the impact of an introductory AIS course on student computer attitudes. A number of positive marginal and significant changes (p-value ≤ 0.10) are noted, with most at University A and specifically for the Computer Anxiety subscale. At University A, females (Table 5) report greater computer confidence while traditional students (Table 6) report less computer anxiety (the interpretation of an increase in this subscale mean) after taking the course. Overall means for these two subscales also increased at University A (Table 4). Females at University D also report less computer anxiety than before the semester (Table 5).

Although only University A reports a significant decrease in computer anxiety (Table 4), note that each university in total reports an increase in this subscale mean (Table 4), as well as by most subgroups (Tables 5 and 6), except for males at University D. These increases result in each total subgroup reporting significantly less computer anxiety after taking the course (Tables 5 and 6), except for males, which still has an increase in its Computer Anxiety mean from the beginning of the semester (Table 5). Computer anxiety also declines significantly on an overall basis (Table 4). These results suggest that attitudes became slightly more positive while taking the course, and at least did not decline. The substantial prior computer experience reported appears to explain these results. Those surveyed generally already had strong positive computer attitudes before taking the course. With already

strong positive computer attitudes existing before the semester, attitudes only marginally improved, with the introductory AIS course mainly reinforcing the already existing strong positive attitudes of those surveyed.

Table 5 –Beginning Versus End of Semester by Gender (Results for Testing R1 and R2)

Subscale[1]	Mean for Beginning of Semester Males	Mean for End of Semester Males	one-tailed p-value[2]	Mean for Beginning of Semester Females	Mean for End of Semester Females	one-tailed p-value[2]
University A:						
Computer Anxiety	42.536	44.250	0.1286	42.854	44.143	0.1119
Computer Confidence	41.821	42.500	0.3197	**40.732**	**42.214**	**0.0900**
Computer Liking	38.607	39.393	0.3459	37.293	37.810	0.3645
University B:						
Computer Anxiety	44.000	45.692	0.2365	44.114	44.765	0.3149
Computer Confidence	43.500	44.308	0.3406	42.771	42.088	0.3212
Computer Liking	42.929	42.846	0.4840	40.029	39.265	0.3391
University C:						
Computer Anxiety	42.484	43.097	0.3443	40.854	42.390	0.1327
Computer Confidence	40.667	40.935	0.4310	38.780	39.659	0.2461
Computer Liking	36.161	35.097	0.2958	35.293	34.415	0.2684
University D:						
Computer Anxiety	43.850	43.095	0.3537	**40.250**	**42.692**	**0.0685**
Computer Confidence	42.300	41.762	0.3772	39.872	40.615	0.2952
Computer Liking	40.800	40.000	0.3419	36.850	36.846	0.4991
All Combined:						
Computer Anxiety	43.022	43.807	0.1839	**41.949**	**43.455**	**0.0147**
Computer Confidence	41.804	42.065	0.3757	40.462	41.115	0.1604
Computer Liking	38.914	38.581	0.3790	37.268	36.994	0.3678

[1]Each subscale contains ten questions on a five-point Likert Scale, with a score of 30 denoting a neutral attitude

[2]Bolded results are significant ≤ 0.10

Comparison of Attitudes by Gender

Table 7 provides mean subscale scores for testing R3, whether computer attitude differences exist by gender before and/or after taking the introductory AIS course. All mean scores at both university level and in total show that both genders report positive computer attitudes both before and after taking the course. Focusing first on beginning of semester, University D is the only university to report either marginal or significant differences by gender. Males at University D had less computer anxiety and liked computers more than females.

Just as prior computer experience appears to explain positive attitudes in total before the semester, experience results by gender appear to explain the failure to find any overall differences by gender before taking the course. Table 8 lists the mean responses for experience questions that differ by gender before taking the course. Males report more experience related to programming, statistical analyses, and slide/photo presentations than females, while females report more data entry experience. Although more experience questions favor males to females (five to one), this difference is not significant considering their content, with the conclusion that no substantial computer experience differences exists between males and females surveyed at the beginning of semester.

Table 6 –Beginning Versus End of Semester by Traditional And Non-Traditional Student Status (Results for Testing R1 and R2)

Subscale[1]	Mean for Beginning of Semester Traditional Students	Mean for End of Semester Traditional Students	one-tailed p-value[2]	Mean for Beginning of Semester Non-Traditional Students	Mean for End of Semester Non-Traditional Students	one-tailed p-value[2]
University A:						
Computer Anxiety	**41.750**	**43.244**	**0.0853**	44.440	45.880	0.1424
Computer Confidence	40.250	41.667	0.1063	42.800	43.520	0.2885
Computer Liking	36.273	36.756	0.3735	40.560	41.480	0.2971
University B:						
Computer Anxiety	43.043	43.652	0.3603	45.000	46.333	0.1957
Computer Confidence	41.348	40.565	0.3340	44.423	44.750	0.4086
Computer Liking	39.652	38.391	0.2934	41.923	42.042	0.4735
University C:						
Computer Anxiety	41.429	42.524	0.1456	42.444	43.889	0.3580
Computer Confidence	39.339	39.937	0.2778	41.222	42.111	0.4011
Computer Liking	35.079	34.111	0.2068	39.778	38.889	0.4130
University D:						
Computer Anxiety	42.023	42.674	0.3213	40.000	43.235	0.1316
Computer Confidence	40.857	40.628	0.4235	40.294	42.000	0.2413
Computer Liking	37.953	37.605	0.4094	38.706	38.824	0.4822
All Combined:						
Computer Anxiety	**41.873**	**42.897**	**0.0497**	**43.416**	**45.187**	**0.0453**
Computer Confidence	40.216	40.638	0.2419	42.610	43.400	0.1980
Computer Liking	36.705	36.224	0.2649	40.520	40.747	0.4184

[1]Each subscale contains ten questions on a five-point Likert Scale, with a score of 30 denoting a neutral attitude
[2]Bolded results are significant ≤ 0.10

Focusing next on end of semester results in Table 7, the gap in attitudes between males and females at University D is much less after the course course. No significant difference is noted by gender for computer anxiety at University D, with females less anxious after the semester (Table 5). Similar to the beginning of semester, no other differences are noted for any other university after the course. However, males on an overall basis report liking computers slightly more than females. Note that although the difference in gender means at semester end (1.59) is now less than at beginning (1.64), respective standard deviations for males and females decreased from 6.19 and 6.62 to 5.65 and 5.51, respectively, thereby making the smaller difference marginally significant. While this one subscale is marginally different after the course, results by university suggest little if any difference in computer attitudes by gender after taking an introductory AIS course.

Table 7 – Comparison of Attitudes: Male Versus Female (Results for Testing R3)

Subscale[1]	Beginning of Semester Mean for Males	Beginning of Semester Mean for Females	two-tailed p-value[2]	End of Semester Mean for Males	End of Semester Mean for Females	two tailed p-value[2]
University A:						
Computer Anxiety	42.536	42.854	0.8469	44.250	44.143	0.7374
Computer Confidence	41.821	40.732	0.4525	42.500	42.214	0.7488
Computer Liking	38.607	37.293	0.3571	39.393	37.810	0.2301
University B:						
Computer Anxiety	44.000	44.114	0.9585	45.692	44.765	0.6375
Computer Confidence	43.500	42.771	0.6626	44.308	42.088	0.3714
Computer Liking	42.929	40.029	0.1813	42.846	39.265	0.1895
University C:						
Computer Anxiety	42.484	40.854	0.6539	43.097	42.390	0.8939
Computer Confidence	40.667	38.780	0.4974	40.935	39.659	0.6409
Computer Liking	36.161	35.293	0.1846	35.097	34.415	0.8946
University D:						
Computer Anxiety	**43.850**	**40.250**	**0.0342**	43.095	42.692	0.5090
Computer Confidence	42.300	39.872	0.1645	41.762	40.615	0.4295
Computer Liking	**40.800**	**36.850**	**0.0771**	**40.000**	**36.846**	**0.0819**
All Combined:						
Computer Anxiety	43.022	41.949	0.3332	43.807	43.455	0.6603
Computer Confidence	41.804	40.462	0.3988	42.065	41.115	0.2728
Computer Liking	38.914	37.268	0.2475	**38.581**	**36.994**	**0.0623**

[1]Each subscale contains ten questions on a five-point Likert Scale, with a score of 30 denoting a neutral attitude

[2]Bolded results are significant ≤ 0.10

Comparison of Attitudes by Traditional Versus Non-Traditional Student Status

Table 9 provides results for testing R4, whether differences exist between traditional versus non-traditional students before and/or after taking an introductory AIS course. All mean scores indicate that both traditional and non-traditional students report positive computer attitudes both before and after taking the course. While both groups report positive attitudes, non-traditional students report more positive attitudes at both the beginning and end of semester. At the beginning of the semester, non-traditional students at University A report more positive attitudes on all subscales, while non-traditional students at University C report liking computers more. On an overall basis, non-traditional students surveyed report significantly more computer confidence and computer liking than traditional students at the beginning of the semester.

Differences in computer experience are also noted between traditional and non-traditional students at the beginning of semester. Table 10 lists all experience questions which significantly by student status. Non-traditional students report more experience with respect to ten questions while traditional students report more experience with respect to five questions. Non-traditional students report a longer history of using computers, more use of computers at work, and more semesters of computer-related courses in college. Non-traditional students report more experience doing data entry, word processing, spreadsheets, statistical analysis, and database management than traditional students.

Table 8 – Experience Questions that Differ By Gender at Beginning of Semester

Experience Question	Mean for Male Students	Mean for Female Students	Significant two-tailed p-value[1]	Note[2]
Questions where Male Students Have More Experience:				
E21. Do you have experience using the computer for programming?	1.5213	1.7025	0.0037	C
E22. How often do you use the computer for programming?	1.5851	1.3038	0.0057	B
E23. Do you have experience using the computer for statistical analysis?	1.3298	1.4367	0.0941	C
E24. How often do you use the computer for statistical analysis?	2.0000	1.7089	0.0202	B
E32. How often do you use the computer for preparing slide/photo presentations?	2.2872	2.0506	0.0490	B
Questions where Female Students Have More Experience:				
E16. How often do you use the computer for data entry?	3.5054	3.8038	0.0722	B

[1]Significant ≤ 0.10

[2]Explanation:

A: The actual amount of time (in years, days, or semesters depending on the question).

B: A scale of 1 to 5.

5 – Almost every day
4 – At least once a week
3 – Every one or two months
2 – Once or twice a year
1 -- Never

C: A binary response of 1 or 2.

1 -- Yes
2 – No

Table 9 – Comparison of Attitudes: Traditional Versus Non-Traditional Students (Results for Testing R4)

Subscale[1]	Beginning of Semester Mean for Traditional	Beginning of Semester Mean for Non-Traditional	two-tailed p-value[2]	End of Semester Mean for Traditional	End of Semester Mean for Non-Traditional	two-tailed p-value[2]
University A:						
Computer Anxiety	*41.750*	*44.440*	*0.0320*	*43.244*	*45.880*	*0.0271*
Computer Confidence	*40.250*	*42.800*	*0.0793*	41.667	43.520	0.1345
Computer Liking	*36.273*	*40.560*	*0.0134*	*36.756*	*41.480*	*0.0054*
University B:						
Computer Anxiety	43.043	45.000	0.6927	43.652	46.333	0.2873
Computer Confidence	41.348	44.423	0.3046	*40.565*	*44.750*	*0.0600*
Computer Liking	39.652	41.923	0.7986	38.391	42.042	0.1304
University C:						
Computer Anxiety	41.429	42.444	0.6555	42.524	43.889	0.5220
Computer Confidence	39.339	41.222	0.3805	39.937	42.111	0.3126
Computer Liking	*35.079*	*39.778*	*0.0461*	*34.111*	*38.889*	*0.0573*
University D:						
Computer Anxiety	42.023	40.000	0.4095	42.674	43.235	0.6243
Computer Confidence	40.857	40.294	0.6371	40.628	42.000	0.4267
Computer Liking	37.953	38.706	0.9422	37.605	38.824	0.6244
All Combined:						
Computer Anxiety	41.873	43.416	0.1204	*42.8966*	*45.187*	*0.0031*
Computer Confidence	*40.216*	*42.610*	*0.0159*	*40.6379*	*43.400*	*0.0005*
Computer Liking	*36.705*	*40.520*	*0.0004*	*36.2241*	*40.747*	*<0.0001*

[1]Each subscale contains ten questions on a five-point Likert Scale, with a score of 30 denoting a neutral attitude

[2]Bolded results are significant ≤ 0.10

In comparison, traditional students surveyed report using college computer labs more often, more semesters of computer-related courses in primary and secondary school, and more experience playing games and preparing slide/photo presentations. Comparing the content of these questions, non-traditional students surveyed have more computer experience, likely gained through work. Computer experience from work is specifically identified as an important factor in shaping computer attitudes (Houle, 1996). Greater amounts of computer experience gained through work appear to explain why non-traditional students surveyed report more positive attitudes before the course.

Table 10 – Experience Questions that Differ Between Traditional and Non-Traditional Students

Experience Question	Mean for Traditional Students	Mean for Non-Traditional Students	Significant two-tailed p-value[1]	Note
Questions where Non-Traditional Students Have More Experience:				
E6. Please enter the length of time in years that you have used computers	9.1860	12.2890	<0.0001	A
E9. If you have access to a computer at work, how often do you use it?	3.3295	3.9221	0.0521	B
E11. In college, how many semesters of computer-related courses have you taken?	2.7081	3.6104	0.0307	A
E12. Through work, how many days (1 day = 8 hours) of formal computer training have you had?	2.3970	31.7700	0.0347	A
E16. How often do you use the computer for data entry?	3.5230	4.0779	0.0013	B
E18. How often do you use the computer for word processing?	3.9486	4.2597	0.0019	B
E20. How often do you use the computer for spreadsheets?	3.1771	3.7273	0.0017	B
E24. How often do you use the computer for statistical analysis?	1.7257	2.0260	0.0380	B
E25. Do you have experience using the computer for database management?	1.6057	1.3896	0.0017	C
E26. How often do you use the computer for database management?	1.5805	2.2078	0.0007	B
Questions Where Traditional Students Have More Experience:				
E8. How often do you use the college computer labs?	3.5434	2.7532	<0.0001	B
E10. In primary and secondary school, how many semesters of computer-related courses have you taken?	3.2601	1.5658	<0.0001	A
E13. Do you have experience using the computer for playing games?	1.0457	1.1429	0.0265	C
E14. How often do you use the computer for playing games?	3.2457	2.8312	0.0105	B
E31. Do you have experience using the computer for preparing slide/photo presentations?	1.1886	1.3506	0.0088	C

[1]Significant ≤ 0.10

[2]Explanation:

A: The actual amount of time (in years, days, or semesters depending on the question).

B: A scale of 1 to 5.

5 – Almost every day
4 – At least once a week
3 – Every one or two months
2 – Once or twice a year
1 -- Never

C: A binary response of 1 or 2.

1 -- Yes
2 – No

At the end of semester, a number of marginal and significant differences are noted in Table 9, all showing that non-traditional students report a more positive attitude. No difference in confidence is noted after the course at University A, but differences continue for anxiety and liking. Non-traditional students report more confidence at University B and liking computers more at University C at the end of semester. The overall difference in computer anxiety mean scores, while not significant at the beginning, is at the end of semester. Non-traditional students

surveyed in total report significantly better attitudes on all three subscales at the end of semester. With multiple universities and all combined showing significant differences, results indicate that attitude differences between traditional and non-traditional students surveyed marginally grew while taking an introductory AIS course. These results are interesting considering that students were exposed to the same material in their respective AIS courses.

Summary and Conclusion

This study provides the first formal look at measuring the impact of an introductory AIS course on student computer attitudes, including by gender and traditional versus non-traditional student status. Results indicate that those surveyed tend to already possess strong positive attitudes towards computers before the semester, with a marginal improvement in attitudes at most while taking the course. Those surveyed report substantial computer experience before the course. With many past studies reporting a direct relationship between experience and attitude, prior computer experience appears to explain the strong attitudes reported. The introductory AIS course appears to have mainly reinforced already existing positive attitudes.

No differences are found in attitudes towards computers between male and female students surveyed before taking an introductory AIS course, and little if any difference is found afterwards. Both males and females report a very positive attitude towards computers and very similar levels of computer experience before the course. The similarity in experience of those surveyed very likely explains why no attitudinal differences are noted by gender.

While both non-traditional and traditional students surveyed report positive computer attitudes, non-traditional students report a better attitude both before and after, with evidence suggesting the gap marginally increased over the semester. Non-traditional students in this study report more prior computer experience, gained through work. Once again, prior computer experience likely explains beginning of semester attitude differences between traditional and non-traditional students. Given that students surveyed are exposed to the same computer concepts in their respective courses, it is interesting that attitudinal differences between the two subgroups increased over the semester.

This study has implications for AIS educators and their courses. Results indicate that AIS educators should have little if any concern about students, whether as a whole or by subgroups of gender or traditional vs. non-traditional student status, having negative computer attitudes before taking an introductory AIS course. Further, AIS educators may reasonably assume that students will generally have very positive computer attitudes and possess substantial computer experience at the beginning of the semester. This knowledge provides a signal that the use of computer technology should not be constrained in AIS courses and should be leveraged as it fits within the coverage of specific topics chosen by AIS educators.

AIS educators may consider surveying students at the beginning of a semester as to their computer experience and computer attitudes. Data collected can alert AIS educators as to how computer savvy incoming students are, as well as what attitudes they possess. This suggestion does not imply that AIS educators should let poor computer attitudes or lack of computer experience drive course content, but awareness of such conditions can alert AIS educators of potential differences between their expectations for the course and how successful students are at actually learning computer-related concepts. However, positive attitudes and strong computer experience measured at the beginning of a semester may serve as a signal that the rigor and depth of computer-related assignments might be increased for that particular semester. AIS educators may consider performing this survey over a number of semesters for getting a sense of the makeup of students taking AIS courses. This data can be used by AIS educators to help assess whether prerequisite computer-related courses are sufficiently preparing students for AIS courses.

AIS educators should also assess topics chosen to be covered and determine how computers and IT can be used to help students appreciate them even more. For example, AIS educators may consider using an accounting software package to help complement the teaching of typical business processes such as revenue, expenditure, human resources, and general ledger and reporting. Accounting software packages can also be used to help students learn about implementing computerized internal controls. As another example, database software exercises can be

used to help reinforce concepts regarding data modeling. As a further example, AIS educators may consider using spreadsheet software, XML, and/or XBRL to help students appreciate effective and efficient business reporting and data analysis.

Such considerations can also help accounting educators better meet the needs of the accounting profession, as evidenced by the profession's desire that the coverage of computers and IT be increased in accounting curriculums (Albrecht and Sack, 2000; Hastings et al., 2003). Increasing the use of computers as it directly enhances the teaching of AIS concepts should therefore help accounting students to 1) continue having positive computer attitudes, as well as 2) gain positive attitudes towards greater amounts of AIS course material than if computer usage were absent or minimal. Positive attitudes towards both computers and AIS course material will help ready students as they enter the accounting profession.

This study has certain limitations. Results may not be generalized to students at other universities and colleges. While the content of each introductory AIS course was similar, differences in concepts covered and computer-related assignments did exist. Instructor differences could impact results reported. Surveys only gather self-reported perceptions. Only those students who completed the course and were in attendance when surveys were administered were considered in the study. Despite these limitations, this study provides insights useful to AIS education.

Suggestions for Future Research

Further studies are needed for determining the impact of computers on accounting students because of the emphasis of computers within the accounting profession. Future studies can focus on the relationship between self-reported experience and attitudes and actual grades earned in AIS courses. Differences may exist between self-perception and performance. Laptop computer programs are being implemented at numerous universities. Research insights may be gained from determining the impact of laptop computer programs on accounting students. Internet-based courses are common within the accounting programs at numerous universities. The impact of Internet-based courses on accounting students can provide educational insights and guidance into their usage and development. These and other studies can provide useful insights for helping shape accounting education and ensuring that those studying to enter the accounting profession have positive computer attitudes, can meet the needs of the business, and excel in their careers.

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