EVIDENCE THAT INDEPENDENT RESEARCH PROJECTS IMPROVE ACCOUNTING STUDENTS' TECHNOLOGY-RELATED PERCEPTIONS AND SKILLS

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ABSTRACT

Advances in technology require that accountants possess skills to obtain information from various sources, complete computer-based projects, and use computers as a tool to achieve other business-related objectives. Students not only need to develop skills to access information, but, more importantly, they also need to improve their perceived ability to utilize computers successfully. This paper describes a project in which accounting students were required to independently analyze a publicly traded company using text- and Internet-based resources. The goal was to concurrently develop students' computer-based skills and improve perceptions toward technology. In addition, since research using non-accounting students has shown that self-efficacy and confidence in the use of technology differs between the genders, this study also analyzed gender-related differences in perceptions towards computers.

Our results show that the project enhanced students' Internet knowledge and skills to access information from multiple sources. Students also improved their perceived ability to use computers to analyze technical problems, their computer-based project completion skills, and their understanding of the Internet. Furthermore, while female students indicated lower perceived ability to work on technology-related projects before the assignment, participation in the project elevated their confidence levels. In general, this paper demonstrates the value of designing assignments to improve students' perceived computer-related abilities, and provides insight into gender differences in perceptions towards technology.

Evidence that Independent Research Projects Improve

Accounting Students' Technology-Related Perceptions and Skills

Advances in information technology require accountants to access and assimilate timely information (AICPA, 1996a; IFAC, 1996; Elliott, 1997; IMA, 1997a; ICAEW, 2000), analyze relevant input, and solve unstructured problems commonly found in various consulting and strategic decision making situations (AECC, 1990; AICPA, 1996a; IMA, 1999). Educationally, these developments suggest that accounting students should use technology to obtain information from various sources. Less obvious, but more crucial are students' perceptions of their abilities to use computers effectively (Angelo & Cross, 1993). Positive perceptions of one's technological ability is essential to the successful utilization of computers (Mills, 1997; Igabaria et al., 1990), while negative perceptions may prevent an individual from gaining access to or effectively using computers in the workplace (Walters & Necessary, 1996). The goal of this paper is to demonstrate that simple enhancements of existing teaching tools (like a financial analysis of a company project) can not only develop students' skills in accessing information, but, more importantly, enhance their perceived ability to work on computer-based projects.

Efforts to develop students' skills and positive perceptions of technology should take into account any gender differences in perceptions and attitudes toward computers. Substantial research shows that female students indicate lower self-efficacy and confidence with the use of computer technology than do male students (Betz & Schifano, 2000; Landry et al., 1997; Busch, 1996; Gilroy & Desai, 1986).[1] These gender differences appear to be the result of less computer exposure for females than to differences in opinion between the genders on the functionality of computers (Shashaani, 1997). In fact, greater exposure to technology appears to narrow

differences in perceptions between male and female students in business and other programs (Shashaani, 1997; Woodrow, 1994). Most of this research, however, has been conducted on non-accounting students. It is important to determine if gender-related technology differences exist in accounting students given that women are entering the profession in equal numbers to men (Flynn et al., 1997), and the use of computers is now an important aspect of most accounting tasks (Elliott, 1997). Consequently, this paper also looks at gender differences in accounting students' perceptions toward computer-based tasks.[2]

For this study, 56 advanced accounting students from an urban private university participated in a financial analysis project to further develop their computer-related information search skills and perceptions. Students were asked to look beyond traditional hard copy sources of information used in many financial analysis projects (e.g., annual reports), and apply technology to incorporate cutting-edge data in their reports (e.g., analysts' projections found on the Internet). Results indicate that students improved their Internet skills during the project and accessed information from multiple Web-based and text-based sources in their analysis. In fact, students who used more Web-based and text-based sources in their written reports achieved a higher grade for their papers. Moreover, female students cited more Web-based sources in their written reports than did male students. Evaluation of perceptions indicate that all students improved their perceived abilities to use the computer and analyze technical problems, their project completion skills, and their understanding of the Internet. These are some of the very competencies called for by accounting recruiters (AICPA, 1996a; IFAC, 1996; Elliott, 1997). Furthermore, while female students indicated lower initial perceived abilities to work on technology-related projects, participation in the project eliminated these differences. In fact, by

the end of the project, females' self-perceived abilities were equal to, or greater than, those of males.

Clearly, assignments such as our annual report project are not unique since today's students rely heavily on information acquired through the Internet. However, the main contribution of this study is to demonstrate the importance of improving students' perceived abilities to work on computer-related assignments. This, in turn, should improve students' ability to access and synthesize information from multiple sources, an important skill necessary for future accounting professionals' success (e.g., AICPA, 1996a; ICAEW, 2000). Based on the results of this study, we also see a need for further research on identifying and improving the types of computer-based skills and perceptions that are difficult to teach in the traditional classroom, and exploring ways in which gender differences towards technology can be narrowed for accounting students.

The remainder of the paper is organized as follows. Section II provides the background and motivation for the project. Section III contains a description of the project and its implementation. Section IV and Section V describe results of the study, discuss its implications, and conclude the study.

BACKGROUND AND LITERATURE

The ability to obtain and analyze information from various sources and the skills to solve unstructured problems are some of the attributes that have been specifically identified as requirements for future accounting graduates (AECC, 1990; IFAC, 1996; IMA, 1999; ICAEW, 2000). With greater focus on the analysis, interpretation, and evaluation of information that enters into decision processes, accountants need to become more knowledgeable of the data

needs of end users (AICPA, 1996a). For instance, accountants are being asked by management to use technology to develop and present up-to-the-minute predictive data used for various strategic decisions (IMA, 1997b). Furthermore, accountants are expected to add value to an organization's decision making by understanding the complex interrelationships involved in information systems, and by using their thinking skills to apply the knowledge to new situations (Laudon & Laudon, 1998; Bateman, 1996). In fact, an ability to use technical knowledge and problem-solving skills tends to characterize auditors with superior performance evaluations as they move up the firm hierarchy (Tan & Libby, 1997).

Enhancing Skills and Perceptions through Technology

The changes in the accounting profession require accountants to possess both the skills to access information and the perceived and actual ability to use computers and to work independently on unstructured tasks. Enhancing existing teaching tools through the use of technology in the classroom can facilitate the development of computer-related competencies. Technology such as the Internet conveniently allows individuals to seek out relevant items of information and go back and review sections of the information they wish to examine. This enables students to build upon existing knowledge structures and permits them to interact freely with information (Patterson & Yaffe, 1993). Moreover, technology allows students to be self-directed and have control over their learning environment, promoting more active learning (Becker & Dwyer, 1994). In fact, in a recent study ranking students' preferences for research sources, Web sources of information were ranked highest in terms of enjoyment, trustworthiness, currency, and relevancy (Morrison, 1998).

While today's student population may acquire proficiency in technology from a variety of educational and work-related resources, we believe that improving their perceived ability to use computers for project completion enhances their actual competencies to use technology. Increasing self-confidence with technology is crucial since computer anxiety and self-efficacy are important predictors of attitudes towards computers and willingness to learn about computer systems (Stone et al., 1996). Research has shown a relationship between individuals' perceptions of the importance of technology and their proficiency in using technology (Walters & Necessary, 1996). It appears that attitudes towards computers have a significant influence on the effective use of computers, with these attitudes being molded by individuals' positive or negative experiences with computers (Davis, 1989; Igabaria et al., 1990). Negative attitudes towards computers may prevent individuals from gaining access to or effectively using computers in their workplaces and may even limit their chances of getting or holding employment (Walters & Necessary, 1996). Given the importance of information technology in the accounting profession, enhancing perceptions of confidence towards technology is vital to ensure successful utilization of technology, including computers and related software (Mills, 1997).

Research also suggests that when used as a supplement to traditional methods of teaching, technology can improve certain skills and perceptions that are otherwise difficult to acquire (Bouwman, 1998). Moreover, it can free up class time for other learning experiences (Fordham, 1996). The use of technology (as in this study) gives students a degree of control over the pace of work and the flexibility to choose information sources. As students work independently and access information from many sources, technology allows them to develop skills for obtaining data from multiple sources. This format also provides an opportunity to

develop students' perceived ability to use computers to complete complex unstructured projects, and their ability to assimilate and use relevant information from many sources.

Technology and Gender

A substantial body of research identifies gender differences in the usage of computers, comfort with technology, and attitudes towards the importance of computers. Although these differences can be the result of several factors, it is important to recognize the well-documented fact that male students tend to have greater self-efficacy in the area of computers and technology. For example, Landry et al. (1997) compared the amount of computer usage and the psychological characteristics of accounting students. They found that males were more positive and less resistant towards increased computer usage in accounting classes than females. These results are significant given that females have been graduating with accounting degrees in equal numbers to men since 1986 (Flynn et al., 1997). Furthermore, the use of technology has now been integrated into all aspects of accounting and assurance service functions (Elliott, 1997; AICPA, 1996b).

These results of gender differences are consistent with earlier studies of non-accounting undergraduate and graduate students indicating that female students have greater computer anxiety than male students (Gilroy & Desai, 1986; Rosen et al., 1990). Studies also show that females are less likely to enter computer-related courses due to greater computer anxiety, which can result in lower levels of satisfaction from tasks that involve technology (Cronan et al., 1989; Clark et al., 1989; Premkumar et al., 1993). Busch (1996) assigned students a financial analysis assignment using a spreadsheet program. Self-reported perceptions indicated that, relative to male students, female students had significantly lower self-efficacy in computing as a result of

less previous computer experience and less encouragement to work with computers. Studies have also shown lower self-efficacy for women in the area of computers and technology. For example, Compeau and Higgins (1999) found that women have low self-efficacy, outcome expectations, and higher anxiety on computer usage. Their findings strongly confirm that both self-efficacy and outcome expectations impact on one's reactions and interactions with information technology. Other studies show lower self-efficacy in females in regard to technology, math skills, and areas of strategic management (Tompson & Dass, 2000; Bong, 1999).

Additional research suggests that lack of exposure to technology may be the reason for females' attitudinal differences towards computer tasks (Shashaani, 1997; Woodrow, 1994). Recent surveys show that men use computer technology such as the Internet much more than do women (Katz & Aspden, 1997), and women report less experience and higher levels of trait anxiety for such tasks (Heinssen et al., 1987). Using non-accounting business majors, Shashaani (1997) showed that males enjoy learning about computers and working with computers more so than females. This may be the result of more computer exposure and greater encouragement to study computers for men from an early age. Interestingly, even though females had less exposure to and comfort with computers, those surveyed agreed on its overall value to society. Furthermore, after taking a one-semester computer course, female students' attitudes toward the importance of computer skills and their confidence with computers improved consistently. In fact, females' computer literacy was equal to that of males' by the end of the course. Similarly, Woodrow (1994) reported that male high school students had more technology experience and confidence than females at the start of a computer-related course. However, testing students before and after the course confirmed that female students' attitudes and abilities with computers were at par with male students' by the end of the course.

It appears that less computer exposure and lower computer self-efficacy in female students may account for differences in attitudes towards computers between the genders. In fact, assignments designed to incorporate technology in the classroom appear to narrow such gender difference in perceptions towards computers. This study provides an opportunity to analyze gender differences in perceptions toward computer-based tasks for accounting majors. The type of project that students worked on for this study may show that, even if female students start the assignment with lower perceived computer-related abilities, participation in the project could eliminate any gender differences. Given the widespread use of technology, assignments designed to produce higher perceived computer abilities for all accounting students, regardless of gender, would be valuable for their careers.

PROJECT

For this study, students participated in a financial analysis project (see Figure 1 for an outline) to determine if simple enhancements of an existing assignment can lead to improved

[INSERT FIGURE 1 ABOUT HERE]

computer-related skills and perceptions. Similar to traditional assignments involving the financial analysis of a business, students were required to access and analyze financial and non-financial information. However, they were also required to look beyond traditional sources of information used in many company analysis projects and seek out more timely information from the Internet to provide a more complete analysis of the company. The project format was kept simple and flexible to ensure that students could work independently with limited faculty support.

Before the semester, the instructor prepared a project outline (see Appendix 1) containing a detailed description of the goals of the project, company selection instructions, suggestions for the types of information to be included in the analysis, time-lines for completion, and the evaluation criteria. The description of the project clarified the requirements of the written paper and the oral report that each student needed to complete by the end of the semester to receive a satisfactory project grade. The project grade counted for 20% of the overall course grade. In addition, since students required technical familiarity with the Internet for their company research, a one-hour training session was presented on basic Internet usage in the second week of class. The instructor gave a brief overview of the Internet, including its history and some of its key technological features. The lecture covered Internet terminology, ways to navigate the World Wide Web, and demonstration of resources specifically relevant for the accounting field. An Internet assignment was also provided which included exploring the course and project Web pages, visiting several accounting related sites, and using search engines.

After the training, students responded to various pre-project questions on their Internet skills and perceptions. Thereafter, students worked independently on their projects throughout the semester. This involved virtually no class time, other than an occasional reminder of the project. The instructor periodically generated in-class excitement about the project by interjecting current events related to students' selected companies. Students utilized the instructor's office hours or e-mail to get help or direction on their information gathering, analysis, and project write up. Project presentations were scheduled for the last week of class at which time students also responded to various post-project questions. Students were evaluated on their knowledge of the company, their presentation skills, and their ability to evaluate their companies intelligently. Written reports were graded based on a number of criteria, including

substantial analysis of and conclusions about the company, grammatical correctness, appropriate format and writing style, and proper bibliography and citations.

STUDY DESIGN AND RESULTS

The 56 students (26 males and 30 females) from two different sections of an advanced accounting course participated in the project.[3] The same instructor taught the sections in two different semesters. Since no significant differences were observed between the two classes for any of the variables in the study, the combined results of the two sections have been reported. Table 1 compares the demographic information of male and female students who participated

[INSERT TABLE 1 ABOUT HERE]

in the study. The results show no differences in the overall GPA between the male (mean = 3.00; SD= .56) and female (mean = 3.03; SD= .50) students (t = - .259; p = .796). Furthermore there were no gender differences in the age and the accounting GPA of the students.

The project was evaluated on two dimensions: 1) by testing students' Internet-based skills and 2) by apparent changes in perceptions towards computer-based assignments. A comparison was also done to see if improvements in self-perceptions affected actual use of the Internet. Additionally, gender effects were analyzed for each variable. The variables were measures at both pre- and post-project stages. The pre-project scores were obtained after students went through the one-hour training session on basic Internet usage. The post-project measures were obtained at the end of the semester. Therefore, any changes in scores from the pre- to the post-project stage reflect the impact of the project on the variables.[4]

Students' technical skills were determined by evaluating improvements in their Internet knowledge at the pre- and post-project stage. Written assignments were evaluated to see if

students acquired the skills to access information from multiple sources. Additionally, several self-reported measures tested students' perceptions before and after the project. Students reported on their perceived ability to use computers to solve complex problems, their ability to complete problems independently, their knowledge of searching the Internet for information, and the perceived usefulness of the Internet for analysis. Finally, a comparison was made between students' perceptions and actual Web usage. Since the Kolmogorov-Smirnov Goodness of Fit Test showed a normality violation for the skills and the self-perception variables ($p < .05$), appropriate non-parametric tests were used for the analysis.

Students' Internet Skills

Separate multiple-choice tests were conducted before and after the project to evaluate students' basic Internet skills and understanding of the Internet. Students responded to ten questions concerning World Wide Web address formats, definitions of Web terminology, ways of maneuvering around the Web, and types of search engines available. The responses were recorded (out of ten) to obtain separate pre- and post-project scores. Students were not graded based on these results. The Internet skills quiz was designed to evaluate students' rudimentary levels of understanding of utilizing the Internet. In order to evaluate success of the project's goals, we thought it was necessary to establish this baseline level of Internet knowledge. Furthermore, it is clear from the range of scores that many students lacked even this basic knowledge. Before the start of the project, the Internet knowledge questions were tested to determine if the pre-project questions were similar in difficulty to the post-project questions. The pre- and post-project questions were combined into another questionnaire, in random order, and administered to twenty-two additional accounting students who did not participate in the study.

Each student's responses were graded to obtain a separate score (out of ten) of their performance in the pre-project and the post-project questions. The results indicate no differences the students' performance in the pre-project (mean = 7.18; S.D. = 1.96) and the post-project (mean = 6.73; S.D. = 1.80) questions (p = .429). This indicates that the pre- and post-project Internet knowledge test questions were of similar difficulty level.

Table 2 presents the Internet knowledge scores for all 56 students combined, and separately

[INSERT TABLE 2 ABOUT HERE]

for male and female students. Panel A of Table 2 indicates that the post-project Internet knowledge scores (mean = 7.82; S.D. = 1.73) were significantly higher than the pre-project (mean = 7.12; S.D. = 1.92) scores (z = -2.98; Wilcoxon Matched Paired Signed Rank test p = .003).[5] These results indicate that this project improved students' Internet skills.

The scores were computed separately for male and female students to get a finer measure of Internet knowledge (Panel B of Table 2). There were no significant differences between the scores of male and female students at the pre-project and the post-project stage (p > .05). The post-project Internet knowledge scores of male students were significantly higher than their pre-project scores (mean = 8.19 vs. 7.42; p = .025). Similarly, female students also had significantly higher post-project scores than pre-project scores (mean = 7.50 vs. 6.86; p = .045). It appears that students of both genders have similar Internet knowledge coming into the study and both improved these skills as a result of working on the assignment.

Skills to Access Information from Multiple Sources

Two independent coders evaluated the text and bibliography of each student's written assignment to determine the number of Web-based information sources (e.g., analysts' projections from the Internet) and text-based information sources (e.g., annual report) used in the analysis. The coders evaluated each student's written assignment and counted only those sources that were used substantially in the analysis. Since they demonstrated a high degree of agreement with each other (correlation = .928; $p < .001$), the average of the two coders was used in the analysis.

Panel A of Table 3 shows that students, on average, cited approximately the same number

[INSERT TABLE 3 ABOUT HERE]

of text-based sources (4.11) as Web-based sources (4.16) in their written report ($p = .884$). However, a more detailed analysis showed interesting patterns in students' information access from text- and web-based sources. Students had the option of accessing the annual report and The Wall Street Journal both in text form (i.e., hard copy) and on the Internet. However, it appears that more students received the annual report in print form from the company and subscribed to The Wall Street Journal than accessed this information from the Web. On the other hand, students used the Web more frequently for accessing information from other financial press and sources such as analysts' reports and financial Web sites. This suggests that that students did look beyond the traditional information sources used in many company analysis projects (i.e., annual report) and used the Internet when they wanted to access information from additional sources to get a more in-depth evaluation of the company.

We performed an additional analysis to determine if accessing greater amounts of information from multiple sources improved the grade that the students received in the project.

The results indicate a Pearson Correlation of .294 ($p < .05$) between the number text-based sources used in students' report and their project grade, and a correlation of .481 ($p < .01$) between the number Web-based sources used and their project grade. This suggests that incorporating data from several sources improved the quality of the students' reports. In addition, Panel B of Table 3 indicates there was a gender difference in the types of information sources cited. Specifically, while female and male students used the same number of text-based sources (4.50 vs. 3.66, respectively; $p = .460$), female students used significantly more Web-based sources than did male students (5.26 vs. 2.87, respectively; $p = .008$).[6]

Perceptions towards Computer-Related Tasks

A questionnaire was administered both pre- and post-project to assess students' perceptions of their project completion skills, ability to use computers to solve problems, and their understanding of the Internet as an information source. The questions were formulated utilizing a five-point Likert-type of scale. Similar methodology has been used in Basu and Cohen (1994) and Sergenian and Pant (1998) to examine the impact of a course assignment on students' perceptions. Table 4 contains the means and standard deviations of students' pre-project and

[INSERT TABLE 4 ABOUT HERE]

post-project responses to each question. In addition, Wilcoxon Matched Paired Signed Rank test compared the pre-project and post-project scores for each question.[7] Panel A of Table 4 reports three questions that measure the assignment's influence on students' perceptions of technology applications and information search skills. The internal consistency of these three questions was calculated to determine if they were testing similar constructs (Cronbach's α: 0.72). One common metric for evaluating internal validity is that the Cronbach's Alpha should exceed .50

(Ebel & Frisbie, 1991). Since the internal consistency measure exceeds this threshold, the three questions, taken together, provide a valid indication of perceived project completion and information search skills. Panel A of Table 4 reports that students claim to have improved their ability to successfully complete an unfamiliar project (question 1), their perceived ability to use the computer to analyze a technical problem (question 2), and their perceived knowledge of searching the Internet for information (question 3). As students worked independently (with guidance from the instructor) on this type of assignment and accessed information from various sources, they appear to have improved their perceptions of working with computers to solve complex assignments. Given the importance of information technology in the accounting profession, enhancing of students' attitudes towards computers and their willingness to learn about computer systems is crucial for their professional development (Stone et. al., 1996; Mills, 1997).

Panel B of Table 4 reports other perceptions of the general usefulness of the Internet in providing information that the students may use for various types of tasks. The variables in Panel B are independent of one another. The results indicate that students report an improved understanding of the utility of the Internet (questions 4 and 5), and felt that using the Internet should be an important aim of an upper-level accounting class (question 6). This suggests that, in addition to improving students' perceptions of working on computer-related projects, such an assignment can increase their perceived familiarity with the Internet and improve the understanding of the medium's functionality.[8]

Additional analysis tested gender differences in perceptions towards the project and information search skills. Table 5 shows that at the pre-project stage female students had

[INSERT TABLE 5 ABOUT HERE]

lower perceived ability to use technology to work independently (question 1) than did male students (mean = 3.41 vs. 3.80; p = 046). This is consistent with prior research showing that females have greater anxiety and less confidence in completing computer-related tasks (Busch, 1996; Gilroy & Desai, 1986). However, the assignment narrowed the gap between female and male students with no significant differences in perceptions between the genders at the post-project stage (mean = 4.00 vs. 4.23; p =. 157).

Similarly, females' perceptions of their ability to use computers to solve complex issues (question 2) was lower than that of male students at the start of the assignment (3.46 vs. 3.92; p = .038), but this gap was narrowed by the end of the study (4.20 vs. 4.19; p = .941). Additional analysis indicates that the change in perceptions from the pre-project to the post-project stage was greater for female students than for male students (.74. vs. .27; p = .046). Finally, students' understanding of the Internet as an information source (question 3) was not significantly different at the pre-project stage between female and male students (3.26 vs. 3.65; p = .145). However, female students' perceptions were marginally higher than that of male students at the post-project stage (4.38 vs. 4.63; p = .082). Once again, for this variable, the change in the perceptions from the pre-project to the post-project was greater for female than male students (1.37. vs. .73; p =. 028).

These results indicate that, while students of both genders had similar pre- and post-project technical knowledge of the Internet (Table 2), female students indicated lower perceived ability for completing computer-related tasks at the start of the study. However, similar to prior studies (Shashaani, 1997; Woodrow, 1994), exposure to this type of Internet project improved females' perceived ability to a greater extent than for males.[9]

CONCLUSIONS AND IMPLICATIONS

This paper provides evidence that enhancing an existing teaching tool like a company analysis research project can not only develop computer-based skills, but, more crucially, improve perceptions toward technology. The project assessment indicated that students improved their Internet skills over the course of the semester and showed strong interest in the project. Written assignments indicated that students utilized skills to access information from multiple sources by using both Web-based and text-based sources, which improved the quality of the submitted reports. Female students used more Web-based sources in their written project reports than did male students. Analysis of perceptions indicated that students improved their perceived ability to use the computer to analyze a technical problem, to successfully complete an unfamiliar project, and to increase their understanding of various Internet sources. Furthermore, female students showed greater improvements than did male students on their perceived ability to use the computer to conduct research, solve problems, and complete unstructured tasks.

While today's students have many opportunities to develop their technology-related skills, improving their perceived abilities to use technology is vital to insure the successful utilization of computers in the workplace. The main contribution of this study is to demonstrate the value of using specifically designed assignments to develop students' perceived computer-related abilities that seem difficult to teach in the classroom. By using minimal class time the project provides a relatively simple way of building key competencies of tomorrow's accountants. The higher perceived abilities, combined with the necessary skills, should allow students to access, synthesize, and analyze timely information from various information sources when working on an appropriate independent assignment, the very competencies that are being called for by accounting recruiters (AICPA, 1996a; IFAC, 1996; Elliott, 1997; ICAEW, 2000).

This paper also extends existing research by providing findings of gender differences in accounting students' perceptions toward computer-based tasks, and suggests that the differences can be narrowed through exposure to technology. The results show that this type of assignment not only helps develop vital skills, but also ensures that female accounting majors improve their perceived ability and self-efficacy in performing computer-based tasks. Since women comprise over half of the accounting graduates entering the profession, any educational tool that reduces gender-based differences in attitudes towards computers can be valuable.

One limitation of the study is that perceived benefits from the project might not actually translate to changes in learning. That is, the increases in perceptions could simply result from students' overall positive impressions of the Internet. However, testing on several dimensions of students' perceptions, improvements in skills, and project interest provide support for the findings. Another concern is that the sections used to evaluate the project were taught by the same instructor in two different semesters. The results however show that there were no differences in the pre- or post-project scores between the two sections, suggesting that both classes received the same type of instruction.

While developments in technology provide unique opportunities for educators, research suggests that the benefits of technology may be dependent upon the learning situation and the characteristics of the students (Kozma, 1991; Butler & Mautz, 1996). This paper shows that some types of technology can be used effectively to supplement the traditional education process and help teach skills and perceptions needed by future accountants. However, important characteristics such as a student's gender may mediate the benefits of computer-based teaching tools. Therefore, research needs to further explore ways in which the use of technology in the classroom can benefit students with different psychological and other characteristics. Studies

also need to investigate additional ways in which the classroom can be used to improve technology-related skills that are in demand in the workplace. The findings of such research can greatly facilitate the development of effective pedagogical tools.

ENDNOTES

1. Consistent with Bandura (1977), self-efficacy is described as personal judgments of one's capability to organize and execute courses of action to achieve goals.

2. While other variables such as ethnic, racial, or socio-economic differences may also impact perceptions towards computers, this study restricts itself to analyzing gender differences.

3. The participants consisted of traditional full-time students and part-time evening students. There were no differences between the results of the part-time and full time-students.

4. One potential concern is that Internet usage experienced by students during the semester in other courses may have driven the observed results. We identified nine students (four males and five females) who were enrolled in an Accounting Information Systems (AIS) course at the time they participated in the project. The AIS course also provided students exposure to computers. The results for all variables were analyzed by removing the nine students from the sample and yielded findings similar to those reported in the study. Therefore, the full sample was used in the paper.

5. The results indicate that students started with reasonably high scores at the pre-project stage and improved upon them during the project. The high pre-project scores could be because students went through some training on basic Internet usage before the project. This was done to ensure that all students had some baseline knowledge of the Internet before the project.

6. Note that there are significant differences between the post-project and pre-project Internet knowledge scores for male students (mean = 8.19 vs. 7.42) as well for female students (mean = 7.50 vs. 6.86) [Wilcoxon Matched Paired Signed Rank test $p < .05$].

7. Additional analysis was done to determine if the pre-project perceptions of the students were representative of other accounting seniors. The pre-project questionnaire was administered to another group of eighteen accounting seniors who did not participate in the study. Comparisons between the two groups indicate no significant differences in the mean perceptions for any of the questions. This suggests that the pre-project perceptions of students in the study are similar to the perceptions of other accounting seniors from the same institution.

8. Four additional questions tested students' general perceptions of how pleased they were at having chosen accounting as a major, if they expected and found the overall course to be interesting, and the usefulness of other data sources. There were no significant pre- and post-project differences in students' perceptions for these questions (all $p > .1$).

9. Students' also rated their overall interest in the project on a five-point scale (5 = Very Interesting; 1 = Not at all Interesting) and indicated a mean interest level of 4.18 (S.D. = 0.77). In fact, an overwhelming 85.7% (n = 48) of the students rated the project a four or five, suggesting their approval for such an assignment. No significant differences in the mean interest level were observed between the male and female students.

Appendix 1

Excerpts from Company Analysis Project Description

Your report must be based on the *most recent information available* on your company, its industry, and the economic environment. In order to access this information, you must rely only on sources that are up-to-date and accurate. Keep in mind that you will be evaluated based on how effectively you are able to incorporate the most "cutting edge" information on your company into your report. *This type of information is readily available over the Internet.*

You could use the following information to gather information on your company:

The company's annual report
The company's 10-K Report to the SEC**
The company's last few Quarterly Reports
Recent articles in The Wall St. Journal, other newspapers and business publications
The company's web site
Fortune 500 (from Fortune Magazine)
Fortune 500 (a listing of companies with annual reports on-line)

Your project should include, but is not limited to, the following information:

The name of the company
The year of the annual report and other sources
What comparative years are given?
Is this a consolidated financial report?
Who is the auditor?
What type of opinion is given?
What method of inventory valuation is used?
What method of depreciation is used?
What are the primary products of services provided?
What is interesting about the management letter?
Describe a footnote disclosure you found interesting
Where is the company located?
How are the company's securities currently performing?
Is there anything noteworthy about the company since its most recent financial report?
Is there any recent event that might impact the future of the company?
Provide some information about the company that is not presented in the financial statements or the Annual Report
What do financial analysts think about your company, its performance and its future prospects?
Ratio analysis:
Compare to prior years and to industry standards
Include at least two ratios from each category
Explain what the ratios indicate about your company
Conclusion:
Is this company positioned well? Why?
Is this company a good investment? Why?
Other comments

(**Underlining denotes hyperlink)

Table 1

Analysis of Students' Demographic Details by Gender[1]-
Means (Standard Deviation) and T Test P Values

	Males (n = 26)	**Females (n = 30)**	**P Values**
GPA	3.00 (.56)	3.03 (.50)	.796
Accounting GPA	2.98 (.61)	3.14 (.47)	.259
Age[2]	24.6 (4.72)	24.3 (2.68)	.797

1. This table analyzed if there are any difference in the overall GPA, Accounting GPA, and age between the male and female students who participated in the study.
2. The participants consisted of traditional (full-time) undergraduate students and part-time evening students, who tend to be older than full-time students.

Table 2

Students' Pre- and Post-Project Internet Knowledge Scores- All Students (n = 56)

Panel A: Internet Knowledge Scores[1]- Means (Standard Deviation) and Wilcoxon Matched Paired Signed Rank Test

Variable	Pre-Project[2]	Post-Project	Z Statistic	P Values[3]
Internet Knowledge Scores (out of 10)	7.12 (1.92)	7.82 (1.73)	-2.98	.003

Panel B: Internet Knowledge Scores Split by Gender- Means (Standard Deviation) Mann-Whitney Test P Values

Variable		Male (n = 26)	Female (n = 30)	P Values[4]
Internet Knowledge Scores (out of 10)	**Pre-Project**	7.42 (1.90)	6.86 (1.84)	.183
	Post-Project	8.19 (1.32)	7.50 (1.99)	.252

1. Internet Knowledge Score was based on responses to ten questions concerning World Wide Web address formats, definitions of web terminology, ways of maneuvering around the web, and types of search engines available.
2. The pre-project Internet Knowledge score was obtained in the second week of the semester after the students went through some basic training on Internet usage. The post-projects scores were obtained at the end of the semester.
3. Wilcoxon Matched Paired Signed Rank test was used to analyze differences in the pre and post project scores.
4. Mann-Whitney tests were used to analyze differences in male and female scores.

Table 3

Information Items from Different Text-Based and Web-Based Sources Used in Written Analysis[1]

Panel A: Means and (Standard Deviation) of the Number of Text-Based and Web-Based Sources-All Students (n = 56)

	Annual Report[2]	Wall St. Journal	Financial Press (other)	Industry Data	Other Sources	Total
Text Sources	0.90	1.30	0.67	0.74	0.75	**4.11 (3.11)**
Web Sources	0.55	0.42	1.34	0.60	1.25	**4.16 (3.48)**

Comparison of Total Text (4.11) vs. Total Web (4.16): Mann-Whitney Test p = .884

Panel B: Total Number of Text-Based and Web-Based Sources by Gender- Mann Whitney Test P Value

	Male (n = 26)	Female (n = 30)	P Values[3]
Text Sources	3.66 (2.79)	4.50 (3.36)	.460
Web Sources	2.87 (2.87)	5.26 (4.08)	.008

1. Different text and Web-based sources were determined independently by two coders who evaluated the text and bibliography of each student's written assignment. Only those sources that were used substantially in the students' analyses were counted.
2. Students accessed the annual report and The Wall Street Journal both in text form (i.e., hard copy) and on the Internet. Other financial press sources cited included newspapers and periodicals such The Financial Times, Economist, and Barron's. Students accessed industry data from sources such as Moodys and S&P. Other sources of information used included reports from brokerage houses, Value Line analysis, and financial Web-sites.
3. Mann-Whitney tests were used to analyze differences in male and female scores.

Table 4

Students' Pre- and Post-Project Perceptions- All Students (n = 56)
Means (Standard Deviation) and Wilcoxon Matched Paired Signed Rank Test

Panel A: Project Completion and Information Search Skills[1]-
(1 = Very Poor; 5 = Very Good)

	Question	Pre-Project[2]	Post-Project	P Values[3]
1.	Ability to use technology to work independently and complete unfamiliar projects	3.59 (0.72)	4.11 (0.62)	.000
2.	Ability to use computers to analyze information and evaluate technical issues	3.67 (0.91)	4.20 (0.64)	.000
3.	Knowledge of searching the Internet for information	3.44 (1.06)	4.52 (0.57)	.000

Cronbach's α: 0.72

Panel B: Other Perceptions of Students[4]
(1 = Strongly Disagree; 5 = Strongly Agree)

4.	Internet provides an easy way to find out company information	4.28 (0.90)	4.61 (0.67)	.032
5.	Internet search for company information is more time-consuming than going to the library	2.21 (1.24)	1.89 (1.18)	.042
6.	Learning to use the Internet to access information should be an aim of an advanced accounting class	4.23 (0.93)	4.49 (0.85)	.044

1. Panel A indicates the changes in pre- and post-project perceptions of students' project completion skills, ability to use computers to solve problems, and their understanding of the Internet as an information source. Taken together, these perceptions provide an indication of students' project completion and information search skills.
2. The pre-project Internet Knowledge score was obtained in the second week of the semester after the students went through some basic training on Internet usage. The post-project scores were obtained at the end of the semester.
3. Wilcoxon Matched Paired Signed Rank test was used to analyze differences in the pre- and post-project scores.
4. Panel B indicates the changes in perceived pre- and post-project improvements in students' understanding of the utility of the Internet and whether learning to use the Internet should be an aim of an advanced accounting class. The variables in Panel B are independent of one another.

Table 5

Gender Differences in Pre- and Post-Project Perceptions – Means (Standard Deviation) and Mann-Whitney Test P Value

Perceptions of Information Search and Project Completion Skills[1]
(1 = Very Poor; 5 = Very Good)

Variable		Male (n = 26)	Female (n = 30)	P Values[2]
Ability to use technology to work independently and complete unfamiliar Projects	**Pre**[3] **Project**	3.80 (.80)	3.41 (.61)	.046
	Post Project	4.23 (.65)	4.00 (.58)	.157
Ability to use computers to analyze information and evaluate technical issues	**Pre Project**	3.92 (.97)	3.46 (.81)	.038
	Post Project	4.19 (.63)	4.20 (.66)	.941
Knowledge of searching the Internet for information	**Pre Project**	3.65 (1.01)	3.26 (1.08)	.145
	Post Project	4.38 (.57)	4.63 (.56)	.082

1. This table indicates differences in perceptions for males and females at the pre-project and post-project stages. The variables measure perceptions of students' project completion skills, ability to use computers to solve problems, and their understanding of the Internet as an information source. Taken together, these perceptions provide an indication of students' project completion and information search skills.
2. Mann-Whitney tests were used to analyze differences in male and female scores.
3. The pre-project Internet Knowledge score was obtained in the second week of the semester after the students went through some basic training on Internet usage. The post-projects scores were obtained at the end of the semester.

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