

Auditors' Academic and Firm Training Regarding Current Information Technology Issues

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Abstract

This study explores auditors' perceptions of their college exposure to and training by their firms on the Top Ten Technology Issues for the Year 2000 as identified by the AICPA Technology Committee. Participants are staff and senior auditors currently employed by Big-5 accounting firms. The results indicate that the auditors received only limited exposure to the emerging technology issues while pursuing a college degree. Results indicate that audit staff had significantly more exposure to technology in college than audit seniors had. This finding confirms that accounting educators have included technology topics in accounting curricula. Even so, auditors appear to obtain most of their knowledge on information technology through accounting firm training. Findings of this study imply that accounting educators need to continue developing technology-relevant curriculum. Moreover, educators and practitioners should work closely in the future to enhance accounting graduates' competency in information technology.

Introduction

The rapid evolution of information technology (IT) during recent years has changed the business environment as well as college education. While discussions are still underway, there has been considerable agreement among industry leaders, employers, and educators that accounting graduates need IT-related knowledge and skills to survive and prosper in the ever-changing business environment (Deppe et al.; 1991, Tsay, 1992; Goldsworthy, 1996; Long, MacGregor, & Willett, 1998; Fremgen, 1999; Jordan, 1999; Searfoss, 1999). As Theuri and Gunn (1998) stated, the need for changes in accounting education stems mainly from the rapid development of information technology. To cope with these changes, it is important that universities/colleges constructively adjust accounting curricula to continue providing business communities with qualified employees.

To be proactive in providing IT-related education, both educators and practitioners have been persistent in seeking avenues to enhance accounting graduates' knowledge and skills in IT to meet the industry needs. For example, a research report issued by the AICPA in May 1999 states findings from the CPA vision project: The AICPA views the future success of the accounting profession as being largely dependent on whether accounting graduates have the ability to use information technology effectively to provide leading edge services. According to Bob Elliott, KPMG, Vice Chair of the AICPA, the convergence of the disciplines of accounting and information systems provides accountants with opportunities to transform businesses and provide enhanced value of their services to clients. Elliott's comments shed insight on how the AICPA envisions the education and training of future accounting professionals. Moreover, the AICPA Special Committee's Action Plan for Academics (1997) pointed out that accounting students need to prepare for a new world of assurance services.

Readers with comments or questions are encouraged to contact the authors via email.

To accomplish this goal, the committee calls for accounting educators to revise the curriculum and perform research that will accelerate the move. The committee indicated that, if adaptation progresses ideally, a greater level of syn-

ergy could be developed between college campuses and public practitioners that will keep the accounting curriculum current and strengthen it as a solid academic discipline.

Since the Accounting Information Systems (AIS) course is a typical placeholder for undergraduate accounting students to gain a basic understanding of emerging issues in information technology, it is crucial to address the AIS course design and related curriculum issues to assure that accounting graduates obtain a reasonable amount of exposure to various IT-related topics. To this end, several attempts have been made to present practical guidance in designing AIS courses. For example, the Committee on Contemporary Approaches to Teaching Accounting Information Systems (AAA, 1987) issued a report that described what an AIS course should contain. The committee also sought to suggest a common body of knowledge that would be appropriate for an AIS course. Furthermore, several models also have been proposed that call for fundamental changes in technology education to properly prepare graduates to cope with rapidly changing IT environments (Fordham, Bryant, & Benke, 1997; Badawy, 1998). The AIC-PA Special Committee for Academia (1997) also identified several research topics they believe would serve practitioners' and classroom needs while expanding the frontiers of the accounting profession. These topics include criteria for assessing integrity and security of electronic commerce, systems design and reliability, and continuous systems assurance.

From a practical viewpoint, it is not realistic to expect the accounting information systems faculty to teach all IT topics and to meet the expectations of all constituencies. For example, some specific components critical to auditors may not be so important to management accountants. Recognizing the differing needs among accountants, Tsay (1992) pointed out that it is impossible to be an expert on every emerging technology. However, accountants should at least be aware of new developments so they can communicate effectively with systems specialists on the subject matters. That is, it may be necessary to make a trade-off between the breadth and the depth of exposure on various IT topics, because of the limited hours available to the AIS and other IT-relevant course(s) in overly crowded accounting programs.

To provide insightful information to both accounting educators and practitioners, this study explores auditors' perceptions on college education and accounting firm training in preparing them to be IT competent professionals. This study also investigates the potential impacts of IT on audit fieldwork. Answers to the following questions could provide information that would be useful to accounting educators and accounting firms' management in designing and delivering IT-related education in college and accounting firms:

1. Are accounting educators increasing the amount of coverage on IT-related topics in the accounting curriculum?
2. Do auditors receive adequate IT education from accounting programs?
3. Do auditors receive adequate IT training from accounting firms?
4. To what extent, has IT influenced audit fieldwork?

Results of this study suggest that staff and senior auditors received limited exposure to IT-related topics during their college years. The participants appear to have had significantly more exposure to IT via accounting firm training programs than from their college educations. In addition, audit staffs had significantly more IT exposure in college than seniors had. This finding confirms that accounting educators exerted substantial effort to cover IT topics more thoroughly in accounting courses.

The remainder of this paper is organized as follows. Next section presents the background and hypotheses of this research. The research design, including the survey instrument and data collection processes, are provided in the third section followed by research findings. The last section summarizes and concludes the study.

Background and Research Hypotheses

The list of technology issues

In September 1999, the AICPA Top Technologies Task Force invited a group of CPAs and professionals who are recognized as technology leaders to meet at the University of Arizona campus. The purpose of this gathering was to discuss, list, and rank the technology topics that are most critical to the accounting profession in Year 2000. To facilitate the meeting, participants used group decision support system (GDSS) technology in a laboratory to interact and vote on the rankings through the networked computers. Each participant assigned two values from one to four to measure (1) the usefulness of and (2) the maturity of each technology. According to the value assigned to each IT area, the list of Top Ten Technology Issues of Year 2000 is derived (Tie, 2000). Table 1 on next page lists the detailed definitions of these technology areas.

Improvement in Accounting Curriculum

During the past two decades, several studies have focused on the design of accounting curricula (Kullberg et al., 1989; IFAC, 1995; May, Windal, and Sylvestre, 1995; AICPA, 1996; Gujarathi and McQuade, 1998). As one of the pioneers in accounting education, Walton (1917) reports the need for accounting programs to provide students with the basic skills needed to adjust and continue learning during their employment years. The American Accounting Association (AAA) Committee on the Future Structure, Content, and Scope of Accounting Education (AAA, 1986) presented the elements of change it sees as necessary in an expanding profession. The Accounting Education Change Commission (AECC, 1990) also provided leadership in calling for necessary innovations in the accounting curricula.

Table 1
List of Year 2000 Top Ten Technology Issues

<p>1. E-Business Current and evolving technological business processes that allow the accessing, updating, and communicating of information in a purely digital format, which can be used more efficiently and effectively, thereby creating a competitive advantage.</p>	<p>6. Technology Management and Budgeting The processes used by organizations to design, implement, monitor, and update information technology strategically.</p>
<p>2. Information Security and Controls The software applications, processes, procedures, and physical hardware in place to ensure information resources are available only to those people authorized to access it.</p>	<p>7. Electronically-based financial reporting The evolving processes and technologies that will allow financial information to be delivered in a digital format.</p>
<p>3. Training and Technology Competency The methodology and curriculum by which personnel effectively (and continuously) learn to understand and utilize technology.</p>	<p>8. Net Issues As E-Business evolves to amalgamate the connectivity of all networks (LAN, WAN, Internet, Intranet), issues such as security, authentication, authorization, bandwidth, and ethical utilization of the Internet need to be addressed and standards determined.</p>
<p>4. Disaster Recovery The development, monitoring, and updating of the process by which organizations plan for continuity of their business in the event of a loss of business information resources due to impairments such as theft, virus infestation, weather damage, accidents, or other malicious destruction.</p>	<p>9. Virtual Offices The technologies, processes, and procedures that allow personnel to work effectively, either individually or in conjunction with other parties, regardless of physical location.</p>
<p>5. High Availability and Resiliency of Systems The equipment, applications, and processes to ensure the information systems have the maximum amount of uptime under any circumstances.</p>	<p>10. Privacy As more information and processes are being converted to a digital format, this information must be protected from unauthorized users and from unauthorized usage by those with access to the data.</p>

Previous studies have stressed the importance of including IT components in accounting/business curriculum (Goldsworthy, 1996; Theuri & Gunn, 1998; Fremgen, 1999; Jordan, 1999; Searfoss, 1999). For example, Theuri and Gunn (1998) indicated specifically that the main reason why accounting education needs to change is the rapid development of information technology. In their article, Theuri and Gunn further their stance by stating that colleg-

es/universities must constructively adjust accounting curricula if they are to remain a relevant force that provides business communities with better qualified employees. As highlighted in the 1997 AICPA Special Committee Action Plan for Academics, accounting students should learn the strategic implications of information technology and understand the impacts of IT on the conduct of transactions, business structure, and cost control. They should also be able to access the specific information technology knowledge needed to provide new attestation and consulting services.

In spite of efforts made by faculty to respond to the mandate for more IT education to accounting graduates (e.g. Heagy and McMickle, 1988, Badawy, 1998, Jordan, 1999), to our knowledge, there is little evidence to support that efforts made by the accounting faculty have indeed paid off. To answer this question, I examine auditors' perceptions of their exposure to IT during their college educations. If accounting faculty have indeed covered IT-related topics more thoroughly in accounting courses, staff auditors who recently graduated from college should perceive themselves as having more IT exposure in college than is perceived by senior auditors who completed their college education a while ago. Thus, I hypothesize that: staff auditors would perceive themselves having a higher level of IT exposures while in college than senior auditors would perceive for themselves.

Accounting Firm Training Programs

While educators have been making efforts to modify the accounting programs, certain difficulties exist. For example, Long and MacGregor (1996) point out that educators may face certain critical factors in incorporating IT into the accounting curriculum. These factors include the faculty's attitude toward changes, the administration's commitment to a significant curriculum development budget, and a joint decision by faculty and administration to integrate computer applications into course content. As Long and MacGreger (1996) state, to add additional IT courses into an already overcrowded accounting programs is not an easy task. Moreover, there can be a great deal of resistance to purchasing equipment and developing faculty so that IT-related subjects can be effectively delivered. Compared to the situations encountered by the faculty members, major accounting firms have more resources available to design and deliver training programs. These firms can invite external IT experts or schedule their own IT specialists to deliver training courses. Since many audit clients have implemented information technology in their daily operations, auditors have no choice but to become proficient in information technology to conduct audits. As Lenza (1998) states, auditors who are competent to function in the IT environment can actually reduce the cost of engagements and enhance audit quality. Hence, major accounting firms should choose to design and deliver the most up-to-date training programs available to enhance auditors' competency in IT. Accordingly, I predict: auditors have more exposure to IT in firms' training programs than in college education.

Major accounting firms, in general, provide sufficient training to their auditors at all levels so that they have current knowledge and skills to carry out required audit tasks and make proper audit judgment. This is particularly important in terms of the IT area because of its ever-changing nature. Therefore, no matter what level of IT exposure audit professionals received in college, both audit staff and audit seniors should have a similar level of IT knowledge through continuous training programs offered by their firms. Hence, I hypothesize: both staff and senior auditors would have similar levels of exposure to IT after they have gone through the accounting firms' training programs.

Research Design

Survey instrument

Based on the AICPA Top Ten Technology list, I design a survey instrument that includes two parts. Part I comprises ten issues in the list. There are two sub-questions of each technology issue: (1) What is the level of exposure received from college education? (2) What is the level of exposure received from the accounting firm training programs? Participants are asked to mark his/her perception of each question on an 11-point scale, where 1 is labeled

as “none” and 11 is labeled as “sufficient.” Questions in Part II relate to the respondents’ demographic information such as gender, age, level of education, his/her current position, years’ of professional experience, and years’ of experience with current employers. In addition, three questions are included at the end of Part II to find out how participants perceive the impacts of these IT issues on their audit assignments and audit quality. These questions are: (1) To what extent are technology specialists needed to conduct audits, relative to the last audit cycle? (2) To what extent is audit quality impacted by auditors’ lack of adequate technology skills and knowledge? (3) What is the level of competency an auditor needs in the ten emerging technology skills in order to assure audit quality? Participants indicated their perceptions on an 11-point scale.

To assure a reasonable response rate to our survey, I limited the questionnaire to four pages and addressed only the most critical issues and concerns raised by the AICPA that relate to auditors’ work in an IT environment. According to a pilot study and comments made by participants, the questionnaire is properly worded and can be completed in less than ten minutes.

Data collection processes

A list of Big-5 accounting offices in Southern California, Arizona, and Nevada was generated based on the AICPA member directory and the contact information posted on Big-5 accounting firms’ web sites. Then, after each office had agreed to participate, the contact persons were asked to identify their audit associates who qualified for this study. A package containing questionnaires equal in number to the qualified audit associates was mailed to the contact person for distribution. A cover letter that explains the nature of the survey was enclosed with each questionnaire. Each participant was also supplied with a stamped return envelope addressed directly to one of the researchers.

A total of 276 questionnaires were distributed to the targeted audit professionals. Follow-up phone calls were made to the contact person in each office two weeks after the questionnaires were mailed. In turn, the contact person sent a reminder email to encourage the participants to respond to the survey. By the end of the fourth week, a total of 94 questionnaires were received, which yielded a response rate of 34.05 percent. Twenty responses were excluded from the analysis due to various reasons (i.e., 74 usable questionnaires).¹ Since the response rate is in line of a typical survey research and the questionnaires were received within a reasonable time period,² there should be no concerns regarding potential non-response bias.³

Research Findings

Descriptive statistics

For a total of 74 useful responses, 39 (52.7%) are female and 35 (47.3%) are male. Among all the respondents, 65 (87.8%) have a bachelor’s degree and nine (12.2%) a master’s degree; 41 (55.4%) are audit seniors, and 33 (44.6%) audit staff. On average, the respondents are 26 years old (standard deviation = 2.85 years) with 2.03 years audit experience (standard deviation = 1.25 years) and 1.93 years experience (standard deviation = 1.27 years) with their current employers. These statistics suggest that the participants can provide informative responses to the survey.

Hypothesis tests

¹ Returned questionnaires that were blank, incomplete, or had been filled out by non-targeted professionals (e.g., interns, consultants, partners, etc.) were excluded from the analysis.

² The overall return rate of our study (34.05%) is much higher than the usual mail survey response rate of 10 to 20 percent (Kanuk and Berenson, 1975; Biner and Kidd, 1994).

³ Whenever responses are obtained from only part of the sample, there is the potential for the respondents to be non-representative of the sample as a whole. Survey studies often assess the severity of this problem by comparing the answers in early versus late responses. I did not conduct such a comparison because all of the responses were received within a four-week window.

Referring to Table 2, I compared the educational exposure received by the audit staff to that received by the audit seniors. As stated in the first hypothesis, I predicted that the audit staff would perceive themselves as having a higher level of IT exposure in college than the senior auditors would perceive themselves as having. Based on the mean rating in Table 2, the result showed audit staff indicated that they had a high level of exposure in all ten areas. To test the level of significance of these differences, a t-test for each topic was performed. Our results indicate that the audit staff had significantly more exposure to the “E-Business,” “Net Issues,” and “Virtual Office” categories in their college education (at one-percent level). In addition, to a less extent (at five-percent level), the audit staff also had a higher level of IT-exposure in “Systems Availability and Flexibility,” “Technology Management and Budgeting,” and “Electronically-based Financial Reporting.” Hence, the first hypothesis is confirmed.

Table 2
Comparison of Staff and Senior Auditors’ Educational exposure to Top 10 Technology Issues

Technology Issues	Staff (N = 33) Mean (SD)	Senior (N = 41) Mean (SD)	t-value	p-value
E-business	5.42 (3.28)	3.46 (2.64)	2.78	0.007
Information security and controls	6.03 (2.66)	5.17 (2.50)	1.42	0.161
Training and technology competency	6.58 (2.87)	6.15 (2.41)	0.69	0.495
Disaster recovery	5.70 (2.78)	4.96 (2.96)	1.10	0.277
Systems availability and flexibility	4.64 (2.75)	3.39 (2.31)	2.08	0.042
Technology management and budgeting	4.76 (2.62)	3.35 (1.97)	2.55	0.013
Electronically-based financial reporting	3.24 (2.76)	2.01 (1.58)	2.28	0.027
Net issues	7.76 (3.18)	5.38 (2.80)	3.37	0.001
Virtual office	5.85 (3.11)	3.15 (2.42)	4.09	0.0001
Privacy	4.67 (2.90)	3.66 (2.61)	1.55	0.125

Since accounting firms have more resources and a high level of flexibility in the design and delivery of their training programs, I predict, as stated in the second hypothesis, that participants, as a whole, would have more extensive IT exposure in accounting firms’ training than in college. Table 3 reports the respondents’ perceptions on their levels of exposure to the ten IT areas identified by the AICPA during college and through accounting firm training. The respondents were asked to indicate individual perceptions on an eleven-point scale, with point 6 representing the mid-point of our measurement. Combining all respondents, the rating is not very high when they were asked about college exposure to the ten areas listed. Only “Training and Technology Competency” and “Net Issues” received more than a mid-point rating. When they were asked about the extent of coverage of these ten IT areas in accounting firms’ training, the ratings were higher. Four out of ten areas scored more than six, with the “Net Issue” being the highest and “Information Security and Controls” as the first runner up. Comparing the ratings of coverage for each topic in college coursework with professional training, I found that the ratings for the accounting firms training out-scored college coursework in all categories. Additionally, the results based on paired t-tests suggest that, except for “Training and Technology Competency,” “Disaster Recovery,” and “Systems Availability and Flexibility,” ratings were significantly different between college preparation and professional training programs in the other seven categories ($p < 0.01$). These statistical results strongly suggested that accounting firms do provide much more training in IT than is offered by college accounting programs. This result supports the second hypothesis. Although there is no direct evidence to indicate what factors contribute to these differences, as stated earlier, the better financial resources and flexibility of accounting firms’ training programs may explain these empirical results.

Table 3
Comparison of Auditors’ Educational Exposure to and Professional Training on Top 10 Technology Issues

Technology issues	Mean (SD) of Educational ex- posure	Mean (SD) of Professional training	t-value	p-value
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E-business	4.34 (3.08)	5.91 (2.75)	-4.35	0.0001
Information security and controls	5.55 (2.59)	7.61 (2.51)	-5.53	0.0001
Training and technology competency	6.34 (2.62)	6.64 (2.76)	-0.83	0.409
Disaster recovery	5.29 (2.88)	5.80 (2.71)	-1.58	0.120
Systems availability and flexibility	3.95 (2.58)	4.43 (2.57)	-1.72	0.090
Technology management and budgeting	3.98 (2.37)	5.32 (2.59)	-3.86	0.0001
Electronically-based financial reporting	2.56 (2.25)	3.89 (2.84)	-4.35	0.0001
Net issues	6.44 (3.19)	7.79 (2.80)	-3.28	0.002
Virtual office	4.35 (3.05)	6.32 (3.44)	-5.00	0.0001
Privacy	4.11 (2.77)	5.91 (3.13)	-4.88	0.0001

Table 4 provides insights as to whether audit staff and seniors have attained the same level of IT exposure once they had gone through the firm training programs. Except in the area called “Virtual Office”, I did not observe a significant difference in any of the other nine categories listed in the questionnaire. Therefore, the statistics support our assertion that audit staff and audit seniors receive similar levels of IT training in accounting firms’ training programs.

Table 4
Comparison of Staff and Senior Auditors’ Professional training on Top 10 Technology Issues

Technology issues	Staff Mean (SD) (N = 33)	Senior Mean (SD) (N = 41)	t-value	p-value
E-business	5.88 (2.55)	5.94 (2.94)	-0.09	0.925
Information security and controls	6.97 (2.77)	8.12 (2.17)	-1.96	0.055
Training and technology competency	6.24 (2.63)	6.95 (2.85)	-1.11	0.271
Disaster recovery	5.91 (2.60)	5.72 (2.82)	0.30	0.765
Systems availability and flexibility	4.73 (2.38)	4.20 (2.72)	0.90	0.372
Technology management and budgeting	5.27 (2.61)	5.35 (2.61)	-0.13	0.895
Electronically-based financial reporting	4.27 (2.65)	3.57 (2.97)	1.07	0.289
Net issues	7.97 (3.08)	7.65 (2.58)	0.48	0.631
Virtual office	7.24 (3.28)	5.57 (3.43)	2.13	0.036
Privacy	6.03 (3.21)	5.81 (3.09)	0.31	0.761

Two implications can be made based on these statistical results. First, they imply that AIS instructors have devoted attention to the emerging technology issues and that accounting graduates do indeed, perceive the benefits of that attention. Secondly, in spite of the fact that audit seniors may not have received sufficient IT education while in college, accounting firms appear to have effectively designed and delivered their training programs to prepare these front line auditors for handling the challenges posted in the new IT era.

IT issues in Fieldwork of Audit

As mentioned in prior sections, three additional questions were included at the end of the Part II. The purpose of these questions is to explore the potential impacts of technology issues on audit fieldwork. To answer these questions, participants were asked to mark their perceptions on these questions separately on an 11-point scale, with six as the mid-point. When the participants expressed their perceptions of the extent to which technology specialists are needed when conducting audits now compared to the last audit cycle, the mean score is 5.71, with a standard deviation of 2.51. In addition, I am interested in finding out whether auditors are concerned about the potential impacts on audit quality when auditors lack adequate technology skills and knowledge. The result indicates that auditors are somewhat concerned about this particular issue (mean = 5.97, s.d. = 2.65). Finally, participants specified their perceptions on whether a competent auditor needs knowledge/skills in the ten emerging technology areas to assure audit quality. The participants seemed to be in agreement that IT is a core competency needed by auditors to

perform effectively in today's business environment (mean = 7.88, s.d. = 1.90).

Summary and Conclusions

The challenges posed by the IT have profound impacts not only on accounting practitioners but also on accounting educators. Warren Allen, the Chair of the Education Committee, International Federation of Accountants, states that the world we inhabit is experiencing great changes as we enter a new millennium (Allen, 1999). One of the crucial items in the agenda for the accounting profession is to find ways and means to incorporate more IT-related topics into accounting curricula. Thus, it is critical that accounting educators work closely with practitioners to modify existing accounting programs.


Realizing that the IT needs of accountants who work in different accounting fields will differ, the purpose of this study is to explore auditors' perceptions of college exposure and of their training in accounting firms on the IT issues identified by the AICPA Technology Committee as being critical in the Year 2000. Participants of this study are staff and senior auditors currently employed at Big-5 accounting firms who have earned at least a four-year college degree. The overall results suggest that the participants received only limited exposure to IT issues during their formal college education. Even so, when separating the participants by professional rank, I found that the staff auditors received significantly more IT exposure in college than did the seniors. This result suggests that accounting educators have included more IT topics and intensified students' IT exposure in current accounting curricula. Although the coverage may not be at an ideal level, this study provides empirical evidence that recent accounting graduates do have more exposure to IT in college than those who graduated a few years ago.

While there are notable differences between staff and senior auditors' perceptions of their exposure to IT in college, all auditors apparently have been receiving similar levels of training by their firms in all of the IT topics recently identified by the AICPA. In addition, I found some impacts of information technology on auditors' fieldwork. In spite of the fact that the auditors did not indicate much of an increased requirement for IT specialists' assistance in conducting audits, they did agree with the AICPA that auditors are able to perform higher quality work if they have sufficient knowledge of and skills related to the top 10 technology issues.

This study has made a two-fold contribution to accounting education literature. First, it is difficult for accounting educators to provide all the necessary knowledge/skills needed by accounting professionals. Examining auditors' perceptions of their college education provides educators with critical insight about how existing accounting programs can better confer the IT knowledge/skills accounting graduates will need in the business world. For example, the AICPA ranks E-business as the most important issue to the accounting profession, but this topic has not been covered much in college education (see Tables 3 and 4). Similarly, topics regarding disaster recovery plans and system availability/flexibility deserve more coverage in accounting courses. From the educational viewpoint, while accounting educators agree that they should continue modifying the accounting curriculum to meet the industry needs, the difficult issue they face is how to incorporate information technology into the already overcrowded accounting curriculum. To find acceptable solutions, accounting educators who teach in various areas (e.g., financial accounting, managerial accounting, auditing) have to work hand-in-hand. Instead of creating new courses, IT topics can be covered in various accounting courses. For example, faculty teaching financial accounting can expand course materials to include electronically-based financial reporting. Similarly, in managerial accounting, topics like virtual offices and technology management and budgeting can be covered. In addition, it is critical for college administrators to make stronger commitments to faculty development, for instance, by providing resources to attend technology conferences and workshops.

Second, it is costly for accounting firms to design and deliver training programs. Findings of this study provide an important piece of information for accounting firms to evaluate the content and quality of their training programs, particularly those related to information technology. For instance, accounting firms may want to focus more on electronic financial reporting, E-business, disaster recovery, and systems availability/flexibility (Table 4). In addition, results of this study indicate that auditors do consider more exposure to IT can better equip them to perform higher quality audits. Consulting groups in accounting firms must have even stronger concerns. Since most account-

ing firms generate more revenue from consulting than from audit services, an extension of this study, obtaining responses from consultants at major accounting firms on the Top Ten Technology Issues, could be beneficial.

There are several research directions that warrant further investigation. First, since the participants of this study were drawn from Big 5 offices, the results of this study may not be applicable to local and regional accounting firms, because such firms may have relatively limited resources available for training their professionals. Therefore, it may be beneficial to broaden the research by including professionals who are employed in smaller firms, so empirical results obtained may be more generalizable. Second, as discussed in prior sections, accounting professionals working in different fields may need different types of IT-related training. Future studies could survey accounting professionals, such as management accountants, tax professionals and internal auditors, to compare their perceptions to those of external auditors. Results from such a study could be helpful to accounting educators in modifying their accounting courses to provide the general IT knowledge needed in all accounting fields. Finally, to gain an in-depth understanding on the current status and future direction of IT education, it is imperative that we understand how educators perceive the need for and directions of IT education. Comparing and contrasting the perceptions of AIS educators to those of accounting professionals would provide information on how to strengthen IT education in business curricula to assure accounting graduates' future success. 

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