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Information Technology In The Undergraduate Accounting Curriculum

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Abstract

This study examines the extent to which undergraduate accounting programs are integrating information technology (IT) across the curriculum. Based on responses from nearly 70 accounting programs, respondents believe that integrating IT into the curriculum is important, but (1) few departments have an IT policy, (2) coverage of general IT topics is minor to moderate, and (3) student usage of computer applications is fairly low. The main technical barriers to IT integration are inadequate lab personnel and continual changes in technology.

Introduction

The accounting profession increasingly is driven by information technology (IT). The AICPA's Vision Project cites technological advances as one of the major forces impacting the profession and states that "technology will rewrite the 'rules of business,' leaving those far behind who will not harness it and effectively integrate it" (AICPA, 1998, p. 5). Further, the AICPA lists technological adeptness as one of the CPA's core competencies (AICPA, 1998).

Despite the apparent importance of IT to accountants' career success, several critiques of undergraduate accounting education have questioned students' IT preparation (AAA, 1986; AA et al., 1989; Siegel and Sorensen, 1994). A common theme of these critiques is the need to increase accounting students' IT knowledge and skills.

Readers with comments or questions are encouraged to contact the authors via e-mail.

To help clarify and document the IT expectations of practitioners, the education committee of the International Federation of Accountants (IFAC) developed *Education Guideline No. 11: Information Technology in the Accounting Curriculum* (IFAC, 1995). This statement outlines the basic expectations of IT knowledge for accountants operating in various professional roles. The statement outlines both general IT knowledge and specific IT skills that would be expected in entry level accountants. The AICPA has endorsed the IFAC's description of IT knowledge and skills as "universally applicable" and has developed materials to help accounting programs in their efforts to incorporate the IFAC content into the curriculum (AICPA, 1996).

The purpose of the present study is to determine to what extent the IFAC's IT expectations currently are being addressed by U.S. undergraduate accounting programs. In other words, are accounting programs providing the IT background that students will need to function as

entry-level accountants? Further, we examine potential technical barriers to incorporating IT into the accounting curriculum.

The next section presents background information on the IFAC statement. Following sections present the research questions, method, results, conclusion, and future research.

Background

According to IFAC (1995, para. 2), “the term *information technology* encompasses hardware and software products, information system operations and management processes, and the skills required to apply those products and processes to the task of information production and information systems development, management and control.” Given the broad nature of this definition of IT, the IFAC statement divides IT knowledge into general knowledge, specific application skills, and additional application knowledge required based on the accountant’s professional role. Four roles are specified: user of IT, manager of IT, designer of IT, and evaluator of IT.

General IT Knowledge

At the entry-level stage, the IFAC lists several items of general IT knowledge which they consider to be the minimum coverage required for all accounting professionals. This knowledge includes (IFAC, 1995):

- **General systems concepts** such as the nature and types of systems, the attributes of information, and the role of information within business
- **Hardware concepts** such as processing units, input/output devices, processing speeds, and physical storage devices
- **System software concepts** such as operating systems, security software, programming languages/compilers, and data management systems
- **Application software strategy** such as package vs. custom software implementa-

tion, distributed vs. centralized processing, and end user computing

- **Data organization and access methods** such as access methods and types of data files
- **Networks and electronic data transfer** such as micro to mainframe links and data transmission options
- **Transaction processing in typical applications** such as application processing phases and processing modes (e.g., batch, on-line)
- **Risks and exposures in computer-based information systems** such as control and documentation of end-user computing applications
- **Cost effectiveness of information technology control procedures**
- **Controls over system selection and acquisition** such as requests for proposals and proposal evaluation techniques
- **Controls over system implementation** such as migration and emergency change controls
- **Continuity of processing/disaster recovery planning and control** such as software and data backup techniques and alternate processing facility arrangements
- **Information systems processing/operations** such as planning and scheduling, performance monitoring, and library management
- **Evaluation of computer based business systems** such as evaluation objectives, evaluation methods and techniques, and computer assisted audit techniques (CAATs)
- **System acquisition/development** such as life cycle phases, design and testing tasks, documentation practices, and maintaining control over system development processes.

Computer Applications

The IFAC also lists several application skills required by all practicing accountants. These skills include the ability to use:

- A word processing package
- A spreadsheet package
- A database package
- At least one basic accounting transaction

processing package

- E-mail
- At least one electronic research tool.

Further application skills are outlined based on the IT role of the accountant:

<u>Tool</u>	<u>Role</u>
Virus protection software	Manager
Operating system software	Manager
Presentation software	User/Manager
Internet access	User/Manager
Statistical analysis software	Evaluator
Specialized audit software	Evaluator
Tax preparation software	User-tax
Tax research software	User-tax
Flowcharting/ system design software	Evaluator/ Designer

Research Questions

We address several research questions concerning the integration of the IFAC’s IT concepts and applications into the undergraduate accounting curriculum.¹ The first question examines the importance placed on integrating IT into the accounting curriculum. We consider several factors, including the existence of an explicit policy on the usage of IT, the number of AIS courses offered and required, and the opinion of the respondents with respect to the accounting department’s responsibility for teaching technology.

RQ1: What importance is placed on integrating IT into the accounting curriculum?

The next research question addresses the extent to which the general IT topics listed by the IFAC are covered. It further addresses whether these topics are covered in the AIS course, other accounting courses, or in a required MIS course.

RQ2: What is the degree of coverage of *general IT topics* in the AIS course, other accounting courses, and in other required MIS courses?

The third research question considers

the usage of specific computer applications in a variety of accounting courses. The IFAC suggests that these applications ideally would be integrated into courses not specifically designated as IT courses and that actual examples of accounting uses of the applications would be most beneficial to students. For example, usage of an accounting system appropriately would be integrated into intermediate accounting, and email and word processing could be implemented beginning in the introductory accounting sequence. This echoes Raval’s (1989) call for an integrated, curriculum-wide approach to the teaching of technology. Raval (1989) points out that the absence of a systematic approach may lead to inefficient and ineffective use of resources and eventually frustration both for faculty and students.

RQ3: What is the degree of *computer application usage* across various accounting courses?

The fourth research question addresses potential technical barriers to teaching technology. A list of barriers was developed, in part, from those suggested in prior research (Abraham et al., 1987; Garceau and Bloom, 1996-1997; Cause/Effect, 1997) and from discussions with accounting faculty. Some of the potential barriers addressed were: the cost of hardware and software, the level of change in technology, technical support from lab personnel, access to computer equipment, software access and licensing, and the faculty’s computer skill set.

RQ4: What are the potential technical barriers to integrating IT throughout the accounting curriculum?

We are aware of only one other study that addresses IT issues across the undergraduate accounting curriculum, Garceau and Bloom (1996-97). There are several key differences between the present study and Garceau and Bloom: (1) this study uses the IFAC IT concepts and technologies, which differ from the technology items addressed by Garceau and Bloom; (2) this study focuses more heavily on *student* usage

of technology, as opposed to *faculty* usage of technology; (3) the data in the present study are from a more recent time period, and there have been significant IT advancements and cost reductions in the past few years; and finally (4) Garceau and Bloom thoroughly address faculty incentive issues (reward systems, etc.), while the present study focuses only on technical barriers to IT integration.

Method

Sample

A random sample mailing list of 400 accounting department chairpersons was obtained from Hasselback's *Accounting Faculty Directory* (1997). The chairpersons were asked to complete a survey addressing the coverage of a variety of information technology topics at their school. If the chairperson felt unable to respond, we asked that the survey be forwarded to the best informed faculty person with knowledge of the coverage of information technology topics.² The respondents were also asked to provide some demographic information.

The questionnaires were mailed in 1998, and the responses were received in a narrow time frame. Sixty-nine usable responses were received, a response rate of 17.3 percent. The response rate is comparable to the 18.8 percent received by Garceau and Bloom (1996-1997) who conducted a similarly extensive survey to address the usage of technology in various courses.

Questionnaire

The questionnaire was developed based on the IT concepts and applications listed by the IFAC (1995). The questionnaire was tested on several faculty members. Minor revisions were made based on the feedback received.

The respondents were asked to complete the questionnaire based on their department's coverage of various IT topics and applications. The respondents were given strict guarantees of

anonymity and were allowed to answer "don't know" or "not sure" to any question.

The questionnaire contained six sections as follows. Respondents first provided information on the department's general policy with respect to IT integration. The second section of the questionnaire requested information on the coverage of 15 general IT topics. Each topic was rated on a horizontal numerical scale from 1 = no coverage to 4 = heavy coverage (Alreck and Settle, 1985). The third section requested information on the usage of specific computer applications. The numerical scale used was 1 = not used to 4 = heavy usage. The fourth section addressed departmental and student issues related to integrating information technology throughout the accounting curriculum. The numerical scale used was 1 = strongly disagree to 5 = strongly agree. The fifth section addressed potential technical barriers to integrating information technology throughout the accounting curriculum. The numerical scale used was 1 = does not present a barrier to 4 = significant barrier. The final section of the questionnaire contained demographic questions.

Results

Demographic Information

The descriptive information on the survey respondents is presented in Table 1. The typical program has nine accounting faculty and approximately 200 accounting majors. The respondents are 58 percent public institutions, and 43 percent are AACSB accredited at the college level. The majority of the respondents have graduate accounting programs. The sample is very similar to that found in Garceau and Bloom (1996-1997), who had 58 percent public institutions and 42 percent AACSB accredited business schools.

Importance of Integrating IT (RQ1)

The first research question addresses the perceived importance of integrating IT into the

Table 1
Demographic Data

Size	Mean number of accounting faculty	9
	Mean number of accounting majors	208
	Mean number of students in the university	7,926
Institutional Characteristics	Public	58%
	College accredited by AACSB	43%
	Accounting department accredited by AACSB	24%
Degree Offerings	MBA or MS in Accountancy	59%
	Executive MBA program	18%
	Accounting doctoral program	6%

accounting curriculum (see Table 2). One signal of IT importance is the existence of a departmental IT usage policy. Only 18 of 69 (26 percent) of responding departments have a departmental policy on IT usage, and most of the policies that are in place are rather vague. Some of the policies include: IT should be taught in "all upper division" courses, IT should be taught in "certain courses," IT should be taught "college wide," IT should be taught "one application in each accounting class," "we encourage it," and the department has an "unwritten policy."

Another indication of the importance of

Table 2
Program Implementation and Opinions

Program Implementation Questions	Mean
Does your department have a general policy regarding the use of information technology in the accounting curriculum?	26% Yes
Number of accounting systems courses offered	1.22
Number of accounting systems courses required	.80
Number of systems courses (MIS/IS) outside the accounting department required for accounting majors	.93
Opinion Questions (1 = Strongly Disagree; 5 = Strongly Agree)	
Information technology integration into accounting classes is important even though technology is not highly tested on the CPA exam.	4.46
Information technology should be taught in accounting courses even when classes are offered in the MIS curriculum.	4.01
There is a common goal of information technology integration among our accounting faculty.	3.19

IT is the number IT-related courses (AIS or MIS) required of accounting majors. The mean number of MIS courses required is .93. The mean number of AIS courses *offered* is 1.22, and the mean number of AIS courses *required* is .80.

In addition to the actions which indicate the importance of IT, we asked three opinion questions regarding the accounting faculty's responsibility for teaching IT. The responses are shown in Table 2.³ Respondents agreed that integrating IT into the accounting curriculum is important, even though technology is not highly tested on the CPA exam and even though some IT topics are covered in MIS classes. Respondents were neutral on whether their faculty share a common goal of IT integration. The lack of a common goal can hamper efforts to integrate IT into the curriculum.

Coverage of General IT Topics (RQ2)

The results on the coverage of general IT topics are presented in Table 3.⁴ The AIS course or a required MIS course is where the general IT topics receive the greatest coverage. However, even in the AIS and MIS courses, the coverage is fairly light. The overall mean for the AIS class was 2.52, which is between minor and moderate coverage, while the mean for a required MIS course was 2.46, again between minor and moderate coverage. These general IT

Table 3
Coverage of General IT Topics

Topics	Accounting Systems Courses	Other Accounting Courses	Required MIS Courses	Mean
1 = No coverage				
2 = Minor coverage				
3 = Moderate coverage				
4 = Heavy coverage				
General systems concepts	3.24	2.16	3.20	2.87
Risks and exposures in computer-based information	3.23	1.87	2.41	2.50
Hardware concepts	2.51	1.47	3.27	2.42
System software concepts	2.61	1.52	3.02	2.38
Transaction processing in typical applications	3.10	1.58	2.47	2.38
Application software strategy	2.74	1.72	2.64	2.37
Data organization and access methods	2.96	1.37	2.76	2.36
Networks and electronic data transfer	2.42	1.40	2.77	2.20
System acquisition/development	2.16	1.48	2.42	2.02
Cost effectiveness of information technology control procedures	2.54	1.36	2.00	1.97
Continuity of processing/disaster recovery planning and control	2.20	1.32	2.14	1.89
Evaluation of computer based business systems	2.02	1.73	1.80	1.85
Information systems processing/operations	1.98	1.41	2.03	1.81
Controls over system selection and acquisition	2.13	1.26	2.00	1.80
Controls over system implementation	1.96	1.13	1.90	1.66
Mean	2.52	1.52	2.46	

topics are not covered in other accounting classes to any meaningful extent.

The most covered individual topics in the AIS course are general systems concepts, risks and exposures in computer-based information, transaction processing in typical applications, and data organization and access methods. Each of these topics receives moderate coverage. The required MIS course typically focuses on hardware concepts, general system topics, and software concepts.

General IT concepts receiving the least overall attention include controls over system implementation and system selection and acquisition. This result is somewhat surprising given the large IT expenditures being made by organizations today.

Usage of Specific Applications (RQ3)

The usage of specific IT applications is presented in Table 4. The most highly utilized general applications are word processing (2.59) and spreadsheets (2.42). These applications generally receive between minor and moderate usage across the accounting curriculum, arguably low usage given the prevalence of these tools in business. The tax sequence has the highest use of specific application software in that it has moderate usage of tax research software (3.07) and minor to moderate usage of tax preparation software (2.89).

The AIS course (2.68) has the highest overall usage of software, with minor to moderate coverage of all the general applications, plus minor to moderate coverage of flowchart/systems design software.⁵ The usage of applications is particularly low in the introductory sequence. The potential accounting majors taking these courses may never appreciate the role of IT in accounting profession. Overall, the usage of ap-

Table 4
Usage of Computer Applications in Various Accounting Courses

1 = Not used 2 = Minor usage 3 = Moderate usage 4 = Heavy usage	Introductory Sequence	Intermediate Sequence	AIS	Audit	Tax Sequence	Managerial	Mean
General Applications							
Word processing	2.34	2.58	2.76	2.76	2.53	2.56	2.59
Spreadsheet	2.04	2.71	2.74	2.21	1.95	2.87	2.42
Internet resources	1.94	2.12	2.67	2.14	2.40	2.04	2.22
E-mail	2.04	2.08	2.66	2.18	2.07	2.06	2.18
Presentation	1.67	1.80	2.38	2.14	1.78	1.96	1.96
Basic accounting transaction processing	2.02	2.24	2.97	1.57	1.29	1.44	1.92
Faculty Web pages for communication	1.76	1.88	2.28	1.91	1.71	1.87	1.90
Database	1.24	1.46	2.87	1.60	1.65	1.40	1.70
Specialized Applications							
Tax research					3.07		3.07
Tax preparation					2.89		2.89
Flowcharting/system design			2.81	1.85			2.33
Audit				2.18			2.18
Statistical analysis				1.95		1.67	1.81
Mean	1.88	2.11	2.68	2.05	2.13	1.97	

plications across the accounting curriculum is quite limited and may be cause for concern.

Perceived Technical Barriers to IT Coverage (RQ4)

Fifteen potential technical barriers to teaching IT were assessed by the respondents. The scale was 1 = does not present a barrier to 4 = significant barrier. The mean responses are presented in Table 5.

Despite the limited integration of IT into the curriculum demonstrated in Tables 3 and 4, only two of the fifteen potential barriers received a mean rating greater than 3 (some barrier), technical support by lab personnel (3.24) and the continual changes in technology (3.15).⁶ Eleven of the potential barriers received mean ratings between 2 and 3 (slight to some barrier). The availability of computer labs in the business

school and throughout the university was not perceived as a barrier to IT integration. Overall, it does not appear that technical barriers play a large role in accounting departments' limited integration of IT into the curriculum.⁷

VI. Conclusion

This study examines the extent to which undergraduate accounting programs are integrating IT concepts and computer applications across the curriculum. Based on responses from nearly 70 accounting programs, the primary results are: (1) respondents believe that integrating IT into the curriculum is important, but few departments have an IT policy; (2) coverage of general IT topics is minor to moderate, even in the AIS or MIS course; (3) student usage of computer applications is moderate in the AIS course and low in all other accounting courses, except for tax package use in the tax sequence; and (4) the main

Table 5
Potential Technical Barriers to Using IT

	Mean
1 = Does not present a barrier	
2 = Slight barrier	
3 = Some barrier	
4 = Significant barrier	
Technical support (lab personnel)	3.24
Continual changes in technology	3.15
Cost of hardware and software	2.91
Faculty computer skill set	2.67
Development of projects to use	2.50
Support of technology integration from college	2.44
Student access to computer equipment (home or office)	2.37
Support of technology integration from university	2.36
Coordination of operating systems versions	2.19
Coordination of software applications	2.18
Support of technology integration from department	2.18
Textbook publisher support	2.16
Software licensing agreements	2.00
Availability of computer labs in the business school	1.94
Availability of computer labs at the university	1.81

perceived technical barriers to IT integration are inadequate lab personnel and continual changes in technology.

These results should be considered in light of two limitations. First, the response in this study is fairly low, likely due to the extensive nature of the data collected from each institution. However, we believe the sample is representative because the demographics are similar to those of Garceau and Bloom (1996-1997). Second, the study relies on perception data gathered from chairpersons or other knowledgeable faculty, and these perceptions could be biased.

Despite the apparent importance of IT to accountants' career success, accounting departments appear to be doing little to integrate IT into the curriculum. Coverage of IT topics and usage of applications were both quite limited.

VII. Suggestions for Future Research

Future research in this area should ex-

plore the integration of IT in the *graduate* accounting curriculum. In addition, it will be important to further address the relation of faculty incentives with the propensity to innovate along the IT dimension. Finally, future researchers also should examine IT integration patterns across time. This study provides only a snapshot of IT integration as of 1998, and it will be important to monitor the actions of accounting departments over the coming years as the pace of technological change increases further.



Endnotes

1. Note that this study addresses IT integration across the entire accounting curriculum, rather than focusing solely on the Accounting Information Systems (AIS) course.
2. There were no significant differences in responses between accounting department chairs and other respondents; therefore, all responses are grouped together in the analyses.
3. Due to the large number of questions asked, Tables 2-5 present only the mean response to each question.
4. Not all respondents answered all questions in Tables 3 and 4. In Table 3, the n is smaller in the "Other Accounting Courses" column, once as low as 24. In Table 4, the lowest n is 40.
5. Similarly, Garceau and Bloom (1996-97) found that the AIS course had the greatest usage of decision support systems, expert systems, and hyper card.
6. The key disincentives found by Garceau and Bloom (1996-97) were lack of technical resources, lack of faculty resources, and excessive time.
7. We also examined whether responses in Tables 2-5 varied with institutional differences (size, public / private, etc.). We found very little evidence that institutional

factors were associated with variations in IT integration.

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Notes