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Impact of accounting software utilization on students' knowledge acquisition

An important change in accounting education

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Abstract

Purpose – This study investigates the impact that software utilization may have on students' knowledge acquisition of the accounting cycle. Differences in knowledge acquisition are examined between three groups of students: those who completed an accounting case manually using the traditional pencil and paper approach, using software, and first manually and then using software. The main research question is: "To what extent does using computers to study the accounting cycle lead to better knowledge acquisition?" This paper aims to inform changes in accounting education.

Design/methodology/approach – The survey method was employed to collect information from accounting students in a Canadian business school. A total of 1,053 usable questionnaires were returned. Declarative knowledge and procedural knowledge are the theoretical underpinnings.

Findings – The results indicate that students who first completed the case manually and then completed the same case using accounting software experienced the best knowledge acquisition. This suggests that the best manner for students to acquire concrete knowledge of the accounting cycle is by completing cases using both methods. The results also indicate that students who completed the case using only the software experienced better knowledge acquisition than did students who completed the case only manually. This suggests that software can be effectively utilized and integrated in class to improve knowledge acquisition of accounting information systems.

Originality/value – Little investigation has been performed on the usefulness and impact accounting software utilization may have on students' level of learning. The findings may benefit students and faculty members by helping in curriculum design changes, course design, and computer implementation decisions. The findings of this study have the potential to make a difference in the way that educators teach and business students learn. Business education may be improved by the judicious use of software in the classroom.

Keywords Accounting education, Organizational change, Knowledge acquisition, Accounting information systems, Software utilization

Paper type Research paper

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Introduction

Modern professional accountants employ a wide range of computer applications to perform their daily work. They use email to communicate, search engines to perform research, and accounting software to record and analyze financial transactions for decision-making. Computerized accounting systems have now replaced manual accounting systems in most organizations (McDowall and Jackling, 2006; Curtis *et al.*, 2009). In business schools, accounting students are increasingly exposed to the benefits and usefulness of computers, and are encouraged to utilize information technology. Accordingly, assignments using accounting software have been developed to assist students in their knowledge acquisition of the accounting cycle, a fundamental concept in business and accounting[1].

This study's main research question is:

RQ1. To what extent does using computers to study the accounting cycle lead to better knowledge acquisition?

Little investigation has been performed on the usefulness and impact software utilization may have on students' level of learning.

In this study, three groups of students are examined: those who completed an accounting case:

(1) manually, using the traditional pencil and paper approach;

(2) using accounting software; and

(3) first manually and then using software.

The study investigates the differences in knowledge acquisition between these three groups.

The objective of this paper is three-fold:

(1) to provide information on students' acquisition of accounting knowledge using software;

(2) to investigate the potential impact of factors such as gender, age, and student' status; and

(3) to provide professors and those involved in curriculum and course design changes with supplementary information to assist them in computer implementation decisions.

The survey method was employed to collect information from accounting students in a Canadian business school. A total of 1,053 usable questionnaires were returned. The survey results indicate that the group of students who first completed the case manually and then completed the same case using accounting software obtained the best knowledge acquisition. This suggests that the best way for students to acquire concrete knowledge of the accounting cycle is by completing cases using both manual and computer methods.

The results also indicate that students who completed the case using only the accounting software experienced better knowledge acquisition than did students who completed the case only manually. This suggests that integration of software in the classroom can provide learning benefits. In addition, utilization of accounting software is a more accurate reflection of the standard practices of most organizations, which may better prepare students for the business world. Since students who use software in class appear to learn more accounting and also leave the course with an important additional skill, course designers should consider significant the integration of software into the curriculum. As well, the results indicate that female students who utilized accounting software experienced better knowledge acquisition of the accounting cycle than did male students. Finally, results indicate that knowledge acquisition, using accounting software, does not depend on students' status (local vs international), nor traditional vs non-traditional (25 years old and older) category.

The findings of this study have the potential to make a difference in the way that educators teach, and business students learn. Business education may be improved by the judicious use of software in the classroom. In this study, the best knowledge acquisition was experienced when manual completion of the accounting case was immediately followed by the completion of the case using accounting software. Given that the students' background characteristics are reasonably representative of typical undergraduate business students, and that the cases utilized are extensively employed by several business schools across North America, these results may be useful to instructors. The accountancy profession has changed, moving from its traditional roots to a more forward-looking, information consultancy role, and accounting education has to adjusted and developed accordingly (Albrecht and Sack, 2001; Paisey and Paisey, 2010).

The next section presents the literature review and hypotheses, which are followed by a description of the research methodology, the study results, and finally a summary of the study's findings, limitations, and suggested directions for future research.

Literature review and hypotheses

Theoretical underpinnings and literature review

Knowledge may be defined as a collection of information and/or skills acquired through experience (practical understanding) and/or education (theoretical understanding). Knowledge may also be defined as a process to have access to information or certain ability (Nonaka, 1994). In the business world, knowledge is an asset that permits a firm to gain a competitive advantage. Knowledge can be examined and conceptualized in two different ways, say declarative knowledge that can be considered knowledge of facts such as definitions and rules, or procedural knowledge that is knowledge of how to perform a job, being inferred by behaviour such as hands-on experience and practice at solving problems (Rose *et al.*, 2007; Bonner, 2008)[2]. As an illustration, declarative knowledge would mean knowing that a bicycle has wheels, a seat, pedals, a steering wheel, and a horn, and when one is seated may use the pedals to turn the wheels holding on the steering wheel (theoretical understanding). Yet, knowing how to ride a bicycle falls into the domain of procedural knowledge (practical understanding)[3].

Knowledge acquisition is used in measuring the effectiveness of education and mostly practical exercises since procedural knowledge is a necessary prerequisite in the acquisition of skill, and in the end expertise (Anderson, 1982). Since expertise is a requirement to achieve professional stature (Libby, 1981), procedural knowledge is therefore critical in the professional development of accountants (Mascha, 2001), and sustenance of expertise (McCall *et al.*, 2008). Learning opportunities through education and adequate practical exercises will result in the development of procedural knowledge (Rose *et al.*, 2007). Therefore, training and practical exercises provides a basis for acquiring knowledge (Libby, 1989). As well, according to Anderson *et al.* (1976) and Anderson and Fincham (1994), knowledge acquisition is the result of a series of steps starting with the processing of information. Information processing affects knowledge acquisition since as the time spent processing increases, the probability of knowledge acquisition also raises (Mascha, 2001).

In short, we can measure knowledge acquisition of the accounting cycle by way of practical exercises, such as completing accounting cases (Libby, 1981). Moreover, knowledge acquisition increases with the time spent processing information, and acquisition of knowledge is significant for the development of professional accountants (Mascha, 2001). Other factors may also have an impact on knowledge acquisition such as student's gender, age, and local vs international status. For instance, Duff (2004) and Tickell and Smyrnios (2005) found, in their study on accounting students, no difference in knowledge acquisition between male and female. Mohrweis (2002) reports that non-traditional students (25 years old and older), may have better knowledge acquisition than traditional students (24 years old and younger). Lastly, McDowall and Jackling (2006) found that international students during their first year of study generally had weaker knowledge acquisition than local students. In the current study, these three factors will be examined.

Over the years, there has been lively debate at academic conferences and business schools as to the extent that accounting students should be exposed to information technology and how such exposure can best be carried out. Some educators believe that utilization of computers impairs students' ability to learn the fundamental principles of accounting theory. They argue that when completing a business case using software, students may only input data, not necessarily understanding the theory behind what they see on the screen, since the software itself does the job of posting transactions to the appropriate journals, ledgers, and financial statements. Arens and Ward (2006b), for instance, argue that learning could be better achieved through manual completion of an accounting case, i.e. using the traditional pencil and paper approach. They point out that:

> [. . .] a frequent criticism of accounting students by employers is their lack of understanding of basic documents and records (p. 4).

For Boyce (1999), exposure to computer accounting cannot replace the necessity of face-to-face teaching methods where accounting entries are lectured. Some suggest that computer-based accounting cases should only target technical and applied content, not theoretical and conceptual material. Gujarathi and McQuade (1998) examined problems in implementing software in accounting curricula and report that although general ledger software packages are good tools for exposing students to real-life business contexts, this type of ledger does not adequately address the underlying accounting principles. Peters (1999) reports that several instructors are unwilling to require intro-level students to use accounting software in class since they believe that it may cause them to learn less, leaving their first accounting course short of sufficient understanding of accounting cycle basic elements. In regard to the impact of computers on "accounting attractiveness", Lane and Porch (2002) found that software usage in accounting appears to have a negative effect since it may cause students to view accounting as a boring, overly technical field.

Some have significantly different views. Since accounting software is so widely utilized in organizations (Curtis *et al.*, 2009), Marriott (2004) argues that computer simulation provides students with concrete accounting experience similar to a real business environment. Parker and Cunningham (1998) previously reported the usefulness of computer-aided learning software packages in accounting education. In Hurt's (2007) opinion, software helps students to develop hands-on familiarity with general ledger packages and other software tools that cut across the traditional areas of accounting practice. According to Becker and Dwyer (1994), the utilization of computer technology in the classroom allows students to be more self-directed in a manner that supports dynamic learning. Similarly, Sangster (1992) observed an improvement in students' level of confidence after using computers. Bhattacharjee and Shaw (2001) indicated that the utilization of computers in accounting cases enhances students' competency in using information technology. In a pilot study, Peters (1999) compared two groups of intro-level students, one completing accounting problems manually ($n = 35$), the other completing them using accounting software ($n = 30$). Results suggest no difference between the two groups.

Successfully integrating accounting software into coursework tackle calls from both professional and academic accounting organizations for more active learning practices in using information technology. For instance, among CPA core competencies is the ability to use information technology in ways that improve performance for clients, customers, and employers and the most effective method of enhancing IT knowledge is through education (AICPA, 2009). Utilization of software in the classroom may also reduce concerns associated with the traditional accounting curriculum which is often considered too lecture oriented, with too little hands-on real world experience, or too focused on accounting rules and principles instead of their application to the business context (Albrecht and Sack, 2001).

In short, the literature above indicates that integration of accounting software in the classroom provides students with a more accurate reflection of what is actually going on in organizations, and may provide learning benefits (McDowall and Jackling, 2006). However, care should be taken to introduce computer-based accounting cases only once students have a good understanding of accounting' fundamentals (Gujarathi and McQuade, 1998). The following section presents the hypotheses developed.

Research hypotheses

Pencil and paper approach vs accounting software. The following quote summarizes supporters' arguments for using the manual method (pencil and paper) to learn the accounting cycle:

> [...] the advantage of learning by using a manual system is the greater depth of understanding gained by going through each step in the documentation and recording. Because you manually prepare the documents and financial information [...] you are able to observe the paths of information flow that are unobservable in computerized systems. These concepts of information flow may then transfer more easily to computerized systems where the processes done manually are automated (Arens and Ward, 2006b, p. 4).

These supporters of the manual system are not against utilizing software, but they emphasize the importance of first completing accounting cases manually for a better understanding of the accounting cycle. Their main argument is that:

> [. . .] students understand the concept of an information trail more clearly after seeing how transactions flow through a typical accounting system (transactions → source documents → journals → ledgers → trial balance → financial statements) (Arens and Ward, 2006b, p. 4).

Savage and Law (2003, p. 76) also observed this phenomenon stating:

> [. . .] students gained a greater understanding of accounting systems if they have done the manual steps before learning to use accounting software [. . .] students know what the software should be doing [. . .] the software handles the mechanics [. . .] it will make it less likely that students will think of computerized accounting as just hitting keys.

Accordingly, to have the best of the two worlds, students could be first assigned a manual accounting case, then assigned to redo the same case using accounting software.

This study aims to compare, in terms of knowledge acquisition, the differences between the manual approach and the computerized approach. As a reminder, learning opportunities through education and adequate practical exercises will result in the development of procedural knowledge (Rose *et al.*, 2007; Smedley and Sutton, 2007). Based on the above, we state the following hypotheses:

H1. Students who complete the accounting case manually (using pencil and paper), then complete the same accounting case using accounting software, experience better knowledge acquisition of the accounting cycle than both:

- students who only complete the case manually; and
- students who only complete the case using accounting software.

H2. There is no difference in knowledge acquisition of the accounting cycle between students who only complete the accounting case manually and those who only complete the accounting case using software.

Non-traditional students. The term "non-traditional students" refers to university students older than the typical undergraduate (i.e. over 25 years old), who may work full-time, categorized as part-time, may have children, and are mostly financially independent (NCES, 2002). Non-traditional students typically attend night classes. According to Wooten (1998), traditional and non-traditional students should not be considered one homogeneous group. Too often, research has disregarded non-traditional students because of the small percentage of the student body they represent. Interestingly, Mohrweis (2002) reports that non-traditional students may have better academic performance than traditional students. However, Mohrweis defines non-traditional students based solely on age. A limitation of using only age is that a student may be a parent and employed full-time, yet still categorized as a "traditional" student if he/she is under the age cut-off. To address this limitation and to provide a more complete definition and classification of non-traditional students, the questionnaire used in the present study asks, in addition to age, about full-time vs part-time category, and day vs night class attendance.

There is a lack of research whether non-traditional students are different from traditional students in their knowledge acquisition using software. We only found Savage and Law (2003) who report that non-traditional students, due to their work experience, generally prefer practical approaches to education and value software usage. Due to the lack of concrete evidence of differences in knowledge acquisition using software between traditional and non-traditional students, we state the following hypothesis:

H3. There is no difference in knowledge acquisition of the accounting cycle between traditional and non-traditional students using accounting software.

Gender and computer utilization. Gender differences in computer usage have been considered to be a relevant factor in students' academic performance. While prior research indicates that males may have greater self-confidence when it comes to computer usage, more recent studies suggest that gender differences have diminished. For instance, Landry (1997) and Katz and Aspden (1997) reported that males were more confident and more willing than females to utilize computer in class. According to Shumacher and Morahan-Martin (2001), the lack of contact and experience of females vs males with information technology could explain this difference. Increasing exposure to computers in courses may improve female students' attitudes toward computer usage, thus reducing gender differences (Bhattacharjee and Shaw, 2001).

Dix (2005) and McDowall and Jackling (2006) found indications that females' attitudes toward the utilization of computers for learning is positive. In short, the latest results suggest that gender differences in computer usage for learning are actually minor. In regard to the academic performance of accounting students, Duff (2004) and Tickell and Smyrnios (2005) found no relationship between gender and performance. Based on the above, we state the following hypothesis:

H4. There is no difference in knowledge acquisition of the accounting cycle between male and female students using accounting software.

Local vs international students. Few studies have examined local vs international students' preferences for computer learning environments, or the differences between the two groups in terms of performance. Boland (2004) investigated the impact of speaking English as a second language on the understanding and completion of computer-based requirements and found that international students favored learning with computers, as it permits them to work at their own pace. McDowall and Jackling (2006) found that international students during their first year of study generally had weaker academic performance than did local students. This weaker performance may be related to various factors such as language difficulties, housing and monetary issues, nostalgia, cultural adaptation problems, different previous learning methods, or gaps in background knowledge (Ballard and Chandry, 1991). In the subsequent years, international students' performance usually improves as they progress through their program. Straub (1997) pointed out that differences in computer usage among nationalities are a result of cultural differences. The students who participated in the current research are at the end of their program of study, thus the negative effect on performance observed with first-year international students should not manifest[4]. Based on the above, we state the following hypothesis:

H5. There is no difference in knowledge acquisition of the accounting cycle between local and international students using accounting software.

The next section covers the research method.

Research methodology

Context and overview of the assigned work

The study took place at an AACSB-accredited business school, part of a large Canadian university[5]. The business school has five departments, including the accounting department, which offers several programs at the undergraduate and graduate levels. The participating students were in the Bachelor of Commerce (BCom) program, most of them (91 percent) majoring in accounting, and the majority of them with the goal of obtaining a professional accounting designation. All students were enrolled in the accounting information systems (AIS) course[6]. Students mainly took this course in their final-year of the BCom program. The data collected covers the period from Winter 2006 to 2010. Courses were taught over several semesters during day classes and night classes. The course materials, topics, evaluations, and teaching format were relatively constant from semester to semester[7]. Only students who fully completed the course are included in the study.

The first group of students (Group 1) completed the manual accounting case (with pencil and paper) using the package *Systems Understanding Aid* developed by Arens and Ward (2006b). This is a comprehensive manual practice set designed to help accounting students to understand accounting transactions. It covers the entire accounting cycle. Students are presented with a firm and its related realistic-looking source documents (e.g. invoices and purchase orders), accounting records (e.g. sales and purchases), information flows, and internal controls. An instruction manual provides background information, step-by-step procedures, and a reference guide. The case helps students understand accounting transactions and the relationship of those transactions to different reports since students are required to produce the annual financial statements. The estimated completion time is 20 hours. This manual accounting case is widely utilized in North American universities for AIS courses.

The second group of students (Group 2) completed the same case as above, with the same transactions and other requirements, but instead of performing transactions manually, students performed transactions using accounting software. They utilized the package *Computerized Accounting Using Microsoft Business Solutions-Great Plains* developed by Arens and Ward (2006a). Great Plains is an accounting software that exposes students to automated transaction-processing features and procedures. The package contains a 120-day trial version of the software on a CD, an instruction and assignment book, and a reference book. Students had to first install the software on a computer, then complete the accounting case (which consists of recording accounting transactions with the software), and finally produce annual financial statements. The estimated completion time is 20 hours. The purpose of the case is to help students learn the accounting cycle using software[8]. This accounting case is also widely utilized in North American universities for AIS courses.

The last group of students (Group 3) completed the manual accounting case using *Systems Understanding Aid*, and then immediately began completing the same case using the accounting software, *Computerized Accounting Using Microsoft Business Solutions-Great Plains*[9]. A claimed benefit of assigning both cases is that students develop a better understanding of information flows, how transactions are posted in computerized systems, and the accounting cycle. Students who complete the case using software after having completed the same case manually already have a good idea of the results that the software should produce.

The instructor briefly lectured the students on the accounting case's objectives, presented the materials, provided instructions, and assigned the case as an out-of-class requirement. Students were motivated to perform the cases since it counts for 30 per cent of the final grade. Students worked in groups of two to four. Matherly and Ivancevich (2004) report that having students working in groups, vs individually, does not impact learning acquisition.

The questionnaire

A written questionnaire was employed to collect information. The questionnaire was administered in class to each student just after they submitted the completed accounting case. Section I of the questionnaire consists of nine items and uses a five-point Likert scale. It asks students to indicate the extent to which completing the case increased their understanding and knowledge of various aspects of the accounting cycle (see Appendices 1 and 2). Section II of the questionnaire asks how representative the assigned works were in terms of realism. The items in Sections I and II are based on textbooks, materials accompanying the accounting cases, and an adaptation of Peters (1999) questionnaire. Section III asks for background information about each student, such as gender, age, and working experience. The questionnaire ends with a blank page where students could provide comments about the case.

Students were encouraged to take their time to complete the questionnaire, to ask for clarification if necessary, and to provide feedback. Students had the option to complete the questionnaire anonymously, but were asked to consider providing their name in order to corroborate their self-evaluation of accounting knowledge acquisition with the marks they obtained for the assigned cases. The questionnaire was pre-tested by two professors and three students for readability and clarity. Changes were made as per their comments. Students took between 10 and 15 minutes to complete the questionnaires. As a reminder, the questionnaire method has its limits since the information gather on constructs is based on students' perception.

During the period of study, 1,513 questionnaires were distributed to students, and 1,053 were fully completed and collected, resulting in a response rate of 70 percent. Students reported that it took an average of 18.05 hours to complete the manual accounting case, compared to 21.24 hours for the accounting software case (i.e. 3 hours more or 18 percent more time).

Table I provides information on respondent demographics. Female students represent 63 percent of respondents and males represent 37; 74 percent are full-time student; only 15 percent were international students; 62 percent attended the class

Table I.
Respondent demographics

	Panel A					
Gender	63 percent female; 37 percent male					
Student category	74 percent full-time; 26 percent part-time					
Status	85 percent local; 15 percent international					
Business major	91 percent accounting; 9 percent other					
Class attendance period	62 percent day class; 38 percent night class					
	Panel B					
	Mean	*SD*	*Min.*	*Max.*	*Skewness*	*Kurtosis*
Student age (years)	25.8	5.5	18	59	1.90	5.03
Experience working in accounting (years)	2.4	3.2	0	24	2.73	10.09

during the day; and 91 percent were pursuing a major in accounting. Students had an average age of 26 and an average of 2.5 years of experience working in accounting. A comparison of business school student profiles and current respondent demographics suggests that we captured a representative sample of a typical North American population of accounting undergraduate students (CAUT, 2009)[10].

Construct validity of variables

Students' knowledge acquisition is measured with a questionnaire. Factor analysis using the principal component method was conducted on all items. Three components with eigenvalues greater than 1.0 emerged. The first component comprises the nine items evaluating students' knowledge acquisition of the accounting cycle (see Appendices 1 and 2, Section I of the questionnaires). Further factor analysis on these nine items indicates that this construct, named Knowledge acquisition, generates one factor representing 72 percent of the total variance in the data (Table II, Panel B). Cronbach's α is used to evaluate the reliability of the constructs validated by factor analysis. The α coefficient for the nine items evaluating students' knowledge acquisition is of 0.95. The second component comprises two items evaluating the perceived benefits of accounting

Table II. Descriptive statistics of variables, Cronbach's α, and factor analysis

Panel A[a]

	Mean	*SD*	*Min.*	*Max.*	*Cronbach's α*	*Skewness*	*Kurtosis*
Knowledge acquisition (nine items)	34	6.8	9	45	0.95	−0.72	1.19
Perceived benefits of the software (two items)	7.25	1.95	2	10	0.69	−0.59	−0.04
Relevance to accounting work (three items)	10.8	2.34	3	15	0.75	−0.66	0.83

Panel B: knowledge acquisition

Total variance explained

Component	*Initial eigenvalues*			*Extraction sums of squared loadings*		
	Total	*% of variance*	*Cumulative %*	*Total*	*% of variance*	*Cumulative %*
1	6.505	72.274	72.274	6.505	72.274	72.274
2	0.686	7.623	79.897			
3	0.487	5.413	85.310			
4	0.381	4.229	89.539			
5	0.234	3.599	93.138			
6	0.251	2.791	95.929			
7	0.174	1.933	97.863			
8	0.154	1.711	99.573			
9	0.038	0.427	100.000			
Panel C: perceived benefits of the software						
1	1.528	76.403	76.403	1.528	76.403	76.403
2	0.472	23.597	100.000			
Panel D: relevance to accounting work						
1	2.008	66.922	66.922	2.008	66.922	66.922
2	0.610	20.328	87.250			
3	0.382	12.750	100.000			

Notes: [a]$n = 1,053$; for perceived benefits, $n = 618$; extraction method: principal component analysis software to students (Table II, Panel C). Further factor analysis on these two items indicates that this construct, named perceived benefits of the software, generates one factor representing 76 percent of the total variance. These items are question nos 14 and 15 in Section II of the questionnaire (see Appendix 1 only). The Cronbach's α for this construct is of 0.69. The third and last component comprises three items evaluating the relevance to students of the assigned accounting works in terms of realism (Table II, Panel D). Further factor analysis on these three items indicates that this construct, named relevance to accounting work, generates one factor representing 67 percent of the total variance. These items are question nos 10, 11 and 12 in Section II of the questionnaire (Appendices 1 and 2). The Cronbach's α for this construct is of 0.75. Two items did not load on any factors (question nos 13 and 16). Table II provides descriptive statistics of the three constructs, their Cronbach's αs, and the factor analysis results.

Table III provides the correlation matrix of variables. The knowledge acquisition variable is presented for the three groups of students examined: Group 1 are students who completed the accounting case manually (using pencil and paper); Group 2 are students who completed the case using accounting software; and Group 3 are students who completed the case manually, then using accounting software. Knowledge acquisition correlates positively and significantly with relevance to accounting work, meaning that the understanding of the accounting cycle was obtained through a learning experience that was considered pertinent to and representative of the work performed by a professional accountant. Knowledge acquisition correlates very weakly, but positively with perceived benefits of the software. This suggests that students consider important to complete the case manually before using the software. The number of hours taken to complete the cases correlates positively, though very weakly, with knowledge acquisition, indicating that more time spent working on cases improves the understanding of the accounting cycle. Knowledge acquisition positively and significantly correlates with female gender. The dedication and perseverance argument is reinforced by the positive and significant correlation between female gender and the number of hours taken to complete the cases. These results indicate that female students learned more than male students, and allocated more hours to the cases. In regard to student age, a key variable to categorize non-traditional students (i.e. students aged 25 or older), there is a very weak positive correlation with knowledge acquisition. Savage and Law (2003) reported that non-traditional students, due primarily to work experience, value software usage. This observation is supported in the current study by the positive and significant correlation between age and perceived benefits of the software. Age also positively and significantly correlates with relevance to accounting work, suggesting that the accounting cases were considered realistic and representative by students with previous work experience in accounting. In regard to local vs international student status, there is no relationship with knowledge acquisition. Few studies have examined local vs international students' preferences in computer learning environments. McDowall and Jackling (2006) found that international students, in their first year of study, generally have weaker academic performance than do local students, but in the second year and after, this difference tends to fade. Most participating students in the current research are at the end of their program, thus, as anticipated, no effect on knowledge acquisition is observed. Finally, there is no relationship between knowledge acquisition and class attendance period, i.e. day class or night class (recall that the night class is composed of both full-time and part-time students, where part-timers are a minority).

Table III.
Correlation matrix of variables

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
Knowledge acquisition Group 3 (V1)	1	NA	NA	0.507**	0.071	0.075	0.164**	0.166**	0.017	0.086
Knowledge acquisition Group 1 (V2)	NA	1	NA	0.540**	0.038	0.106*	0.115*	0.070	0.009	−0.041
Knowledge acquisition Group 2 (V3)	NA	NA	1	0.456**	0.051	0.104	0.206**	0.096	0.006	−0.052
Relevance to accounting work (V4)	0.507**	0.540**	0.456**	1	−0.052	−0.012	0.046	0.091**	−0.034	−0.083
Perceived benefits of the software (V5)	0.017	0.038	0.051	−0.052	1	0.022	0.026	0.160**	0.077	−0.022
Hours to complete the case (V6)	0.075	0.106*	0.104	−0.012	0.022	1	0.089**	0.027	0.038	−0.078*
Gender: male vs female (V7)	0.164**	0.115*	0.206**	0.046	0.026	0.089**	1	0.071*	−0.015	0.001
Non-traditional; based on age (V8)	0.166**	0.070	0.096	0.091**	0.160**	0.027	0.071*	1	0.085*	0.059
Local vs intl. status (V9)	0.017	0.009	0.006	−0.034	0.077	0.038	−0.015	0.085*	1	−0.018
Class attendance: day vs night (V10)	0.086	−0.041	−0.052	−0.083	−0.022	−0.078*	0.001	0.059	−0.018	1

Notes: Correlation is significant at: *0.05 level (two-tailed) and Pearson correlation is significant at: **0.01 level (two-tailed); Group 1 are students who completed the accounting case manually (using pencil and paper), Group 2 are students who completed the case using accounting software and Group 3 are students who completed the case manually, then using accounting software; NA means there is no correlation between V1, V2 and V3, since they are three separate groups

To examine the convergent validity of knowledge acquisition – a subjective measure collected from students by questionnaire – we may corroborate the subjective measure with an objective measure. Convergent validity is present when the correlation between different measures evaluating a construct is positive and significant. As indicated earlier, when students completed the questionnaire, they were asked to provide their names to facilitate a comparison of their self-evaluation of knowledge acquisition (data from the questionnaires) with the marks they obtained for the cases they submitted for grading.

Of the 1,053 questionnaires received, 109 included student names, i.e. about 10 percent (recall that the questionnaire was anonymous, but students could provide their names if they wanted to do so). A correlation was performed between knowledge acquisition scores and the marks students obtained for the associated accounting cases. The result is positive and significant ($+0.38$, $p < 0.01$), suggesting the presence of convergent validity for the knowledge acquisition measure. There is no indication that only the best students provided their names.

Overall, the previous analyses indicate construct validity of variables.

Results

ANOVA was used to test the first two hypotheses. The knowledge acquisition means (i.e. the mean scores for the nine items evaluating knowledge acquisition) for the three investigated groups of students are reported in Table IV, Panel A, with ANOVA results presented in Panel B. Results are statistically significant, suggesting that students' knowledge acquisition depends on accounting software utilization. Panel C reports the differences in knowledge acquisition means between groups.

H1 states that students in Group 3, who first completed the accounting case manually (using pencil and paper), and then completed the same case with accounting software, experienced better knowledge acquisition than did both Group 1 (pencil and paper only) and Group 2 (accounting software only). Results indicate that Group 3 has a knowledge acquisition mean of 38.0, compared to Group 1 with 32.1 and Group 2 with 35.4. More importantly, Panel C indicates that the mean of Group 3 is significantly higher when compared to Group 1 (sig. = 0.001) and Group 2 (sig. = 0.008). Therefore, the results suggest that the best way to acquire concrete knowledge of the accounting cycle is to use both methods, i.e. by first completing the case manually and then completing the case using software. It appears that knowledge acquisition is reinforced when the same accounting case is completed by students using different AIS, i.e. manual and computer-based. Accordingly, *H1* is supported.

H2 states that there is no difference in knowledge acquisition between students who completed the accounting case only manually (Group 1; pencil and paper) and those who completed the case only using accounting software (Group 2). The results show that Group 1 has a mean of 32.1, while Group 2 a higher mean, at 35.4, and this mean is statistically different (sig. = 0.014). Therefore, the results suggest that completing the accounting case using software can be effective in improving knowledge of the accounting cycle. Students' hands-on experience with the software appears to provide additional benefits when compared to the manual, pencil and paper format. This result differs from the pilot study of Peters (1999) who found no difference between those completing accounting problems manually, vs using software. We may assign this to:

Panel A: mean knowledge acquisition; descriptives[a]

Knowledge acquisition	n	Mean	SD	SE	95% confidence interval for mean Lower bound	Upper bound	Min.	Max.
Group 3	424	38.01	5.880	0.267	37.45	38.50	9	45
Group 1	435	32.18	6.707	0.348	31.13	33.49	9	45
Group 2	194	35.38	6.305	0.452	34.82	35.87	9	45
Total	1,053	35.06	6.415	0.198	34.51	35.54	9	45

Panel B: ANOVA result

	Sum of squares	df	Mean square	F	Sig.
Between groups	2,124.111	2	1,062.056	27.086	0.000
Within groups	41,170.626	1,050	39.210		
Total	43,294.737	1,052			

Panel C: *post-hoc* Bonferroni test; multiple comparisons

(I)	(J)	Mean difference (I − J)	SE	Sig.	95% confidence interval Lower bound	Upper bound
Group 3	Group 1	5.169*	0.431	0.000	1.09	5.23
	Group 2	2.634*	0.531	0.008	−0.720	3.87
Group 1	Group 3	−5.169*	0.431	0.000	−5.24	−1.13
	Group 2	−2.575*	0.554	0.014	−3.94	0.780
Group 2	Group 3	−2.634*	0.531	0.008	−3.91	−0.710
	Group 1	2.575*	0.554	0.014	−0.79	3.93

Notes: The mean difference is significant at: *0.05 level; [a]Group 1 are students who completed the accounting case manually (using pencil and paper), Group 2 are students who completed the case using accounting software and Group 3 are students who completed the case manually, then using accounting software

Table IV. ANOVA showing the mean difference in knowledge acquisition between the three groups of students; to examine *H1* and *H2*

- the exploratory nature of Peters' study;
- the small sample used (65 observations, vs the current study with 1,053 observations); and
- participants in Peters' study are intro-level students, while in the current study students are at the end of their program.

H3 states that there is no difference in knowledge acquisition of the accounting cycle between traditional vs non-traditional students using accounting software. Previously, age has been the only measure utilized to classify traditional vs non-traditional students. In the current study, we aimed to enhance this classification by also collecting data about student full-time vs part-time category, and day vs night class attendance. Empirical results indicate that age does not correlate significantly with student category, nor class attendance. Accordingly, following previous research, traditional vs non-traditional classification will be based only on student age.

Table V reports *t*-test results showing the difference in the knowledge acquisition mean between traditional students (24 years old and younger) and non-traditional students (25 years old and older) when using accounting software. Panel A reports the knowledge

Table V. *t*-tests for *H3* (traditional vs non-traditional students) showing the mean difference in knowledge acquisition; cut-off for age set at 25 years old

Panel A: Group 3 – students who completed the case manually, then using accounting software									
Age	n	*Mean*	*SD*	*SE mean*					
≥24	219	36.53	6.157	0.420					
<24	205	34.85	5.580	0.394					
	Levene's test for equality of variances		t-*test for equality of means*						
								95% confidence interval of the difference	
	F	*Sig.*	t	*df*	*Sig. (two-tailed)*	*Mean difference*	*SE difference*	*Lower*	*Upper*
Equal variances assumed	0.105	0.746	2.896	414	0.004	1.672	577	0.537	2.807
Equal variances not assumed			2.906	413.6	0.004	1.672	0.575	0.541	2.804
Panel B: Group 2 – students who completed the case using only accounting software									
Age	n	*Mean*	*SD*	*SE mean*					
≥24	109	35.22	5.959	0.615					
<24	85	34.64	7.416	0.862					
	Levene's test for equality of variances		t-*test for equality of means*						
								95% confidence interval of the difference	
	F	*Sig.*	t	*df*	*Sig. (two-tailed)*	*Mean difference*	*SE difference*	*Lower*	*Upper*
Equal variances assumed	1.570	0.212	0.570	166	0.569	0.588	1.032	−1.449	2.625
Equal variances not assumed			0.556	138.06	0.579	0.588	1.059	−1.505	2.682

Notes: *t*-tests were also run with cut-off ages of 22, 23, 24, 26, 27 and 28; the results remain non-significant acquisition for Group 3 students, while Panel B reports the knowledge acquisition for Group 2. The results are not statistically significant, suggesting that knowledge acquisition does not depend whether students are classified as traditional or not. We examined the sensitivity of the 25-year cut-off by running *t*-tests with cut-off ages between minus three and plus three years (i.e. at 22, 23, 24, 26, 27 and 28 years of age) for Groups 2 and 3, but the results remain non-significant. We have identified only one study reporting non-traditional students with a better academic performance than traditional students (Mohrweis, 2002). Specific to software utilization, Savage and Law (2003) report that non-traditional students, due to their more extensive work experience, tend to prefer more practical approaches to education and value software usage, but the current study does not support this. Future research should examine whether non-traditional students differ from traditional students in completing cases using software.

H4 states that there is no difference in knowledge acquisition of the accounting cycle between male and female students using accounting software (Groups 2 and 3). Table VI reports *t*-test results showing the difference in mean between genders (i.e. male vs female). Panel A reports the knowledge acquisition for Group 3 students, while Panel B reports the knowledge acquisition for Group 2. The results for both groups are statistically significant, suggesting that students' knowledge acquisition is, in fact, influenced by gender. In Group 3, the mean for males is 32.6, compared to females at 36.7, and these means are significantly different (sig. = 0.000). In Group 2, the mean for males is 33.3, compared to females at 36.1, and these means are also significantly different (sig. = 0.004). Therefore, for the accounting cases using software, female students experienced higher knowledge acquisition than did male students.

Panel A: Group 3 – students who completed the case manually, then using accounting software

					95% confidence interval for mean			
Gender	n	*Mean*	*SD*	*SE*	*Lower bound*	*Upper bound*	*Min.*	*Max.*
Male	144	32.62	5.829	0.458	31.72	34.52	16	45
Female	280	36.67	5.876	0.333	36.02	37.32	9	45
	Sum of squares	*df*	*Mean square*	F	*Sig.*			
Between groups	447.907	1	447.907	13.045	0.000			
Within groups	16,206.900	422	34.337					
Total	16,654.806	423						

Panel B: Group 2 – students who completed the case using only accounting software

					95% confidence interval for mean			
Gender	n	*Mean*	*SD*	*SE*	*Lower bound*	*Upper bound*	*Min.*	*Max.*
Male	76	33.30	6.977	0.811	31.68	34.91	9	45
Female	118	36.09	6.198	0.571	34.96	37.22	9	45
	Sum of squares	*df*	*Mean square*	F	*Sig.*			
Between groups	355.519	1	355.519	8.394	0.004			
Within groups	8,047.434	192	42.355					
Total	8,402.953	193						

Table VI. *t*-tests for *H4* (male vs female students) showing the mean difference in knowledge acquisition

These results are consistent with research indicating that females' attitudes toward the utilization of computers in learning are positive (Dix, 2005; McDowall and Jackling, 2006). According to Bhattacharjee and Shaw (2001), exposure to computers in accounting courses improves female students' attitudes toward computer usage. Correlation analysis previously indicated the positive relationship between knowledge acquisition and female gender, a relationship that may be explained by the positive correlation between female gender and the number of hours invested to complete the cases. It does appear that the dedication of the female students to their work paid off. Knowledge acquisition increases with the time spent processing information.

Finally, *H5* states that there is no difference in knowledge acquisition of the accounting cycle between local and international students using accounting software (Groups 2 and 3). Table VII reports *t*-test results showing the difference in mean between local and international students. Panel A reports the knowledge acquisition for Group 3 students, while Panel B reports the knowledge acquisition for Group 2. The results for neither group are statistically significant, suggesting that students' knowledge acquisition is not influenced by local or international status. Correlation analysis previously indicated that there is no relationship between local vs international student, and knowledge acquisition. Prior research, such as McDowall and Jackling (2006), suggests that international students in their first year of study generally have weaker performance compared to local students, but in the following years, this difference disappears. The international students who participated in the current research were mainly at the end of their program thus, as expected, no effect on knowledge acquisition is observed.

Panel A: Group 3 – students who completed the case manually, then using accounting software								
					95% confidence interval for mean			
Status	n	*Mean*	*SD*	*SE*	*Lower bound*	*Upper bound*	*Min.*	*Max.*
Local	365	35.93	6.135	0.300	35.34	36.52	9	45
International	59	36.22	4.133	0.498	35.22	37.21	27	45
	Sum of squares	*df*	*Mean square*	F	*Sig.*			
Between groups	4.834	1	4.834	0.139	0.709			
Within groups	16,819.041	422	34.750					
Total	16,823.875	423						
Panel B: Group 2 – students who completed the case using only accounting software								
					95% confidence interval for mean			
Status	n	*Mean*	*SD*	*SE*	*Lower bound*	*Upper bound*	*Min.*	*Max.*
Local	170	35.09	6.993	0.530	34.04	36.13	9	45
International	24	34.95	1.465	0.320	34.29	35.62	12	36
	Sum of squares	*df*	*Mean square*	F	*Sig.*			
Between groups	0.336	1	0.336	0.008	0.931			
Within groups	8,502.659	192	44.055					
Total	8,502.995	193						

Table VII.
t-tests for *H5* (local vs international students) showing the mean difference in knowledge acquisition

Summary, limitations, and future research

This study examined the impact that software utilization may have on students' knowledge acquisition of the accounting cycle, a fundamental concept in business and accounting. The study was aimed at providing a better understanding of software utilization's suitability for enhancing knowledge, and at providing assistance in curriculum changes design decisions. Very little investigation has been previously performed in this area.

Three different groups of students were examined: those who completed an accounting case:

(1) manually, using the traditional pencil and paper approach;

(2) using software; and

(3) first manually and then using software.

The study investigates the differences in knowledge acquisition between these three groups.

Results indicate that the group of students who first completed the accounting case manually and then completed the same case using software experienced better knowledge acquisition. This suggests that the best way for students to acquire concrete knowledge of the accounting cycle is to complete cases using both methods. Learning is reinforced when students use both manual information systems and computer-based information systems.

Some educators believe that the utilization of software causes students to learn less about the fundamentals of accounting because the software does too much of the work. The results presented in this paper support the importance of the pencil and paper approach coupled with accounting software; both approaches together provide the best knowledge acquisition. The learning advantage of using a manual system first is the greater depth of understanding gained by going through each step in the documentation and recording process, and the ability to observe the paths of information flow that are not readily apparent in computerized systems (Arens and Ward, 2006b). This supports Savage and Law (2003) who states that students gain a better understanding of accounting systems when they perform the steps manually, before using accounting software.

The results also indicate that students who completed the case using software experienced better knowledge acquisition than students who completed the case only manually. This suggests that software can be effectively utilized and integrated to improve knowledge of accounting systems. Students' hands-on experience with software appears to provide benefits. Marriott (2004) argues that computer simulations provide students with concrete accounting experience in a realistic business environment. Bhattacharjee and Shaw (2001) found that the utilization of computers in accounting cases enhances students' competencies, while McDowall and Jackling (2006) reported students' positive perceptions of computers' usefulness in learning accounting concepts associated with academic performance. Utilization of software in the classroom may also reduce concerns associated with the traditional accounting curriculum, which is sometimes considered too lecture oriented, not hands-on enough, and too focused on accounting rules and principles instead of their applications to business (Albrecht and Sack, 2001). In the current study, the integration of software in accounting cases provided tangible learning benefits.

We also examined other factors that may impact students' knowledge acquisition when using accounting software. First, the results indicate that knowledge acquisition is not influenced regardless students are traditional (24 years old and younger) or non-traditional (25 years old and older). Second, the results indicate that knowledge acquisition is not influenced by local vs international student status. Third, the results indicate that students' knowledge acquisition is influenced by gender. The female students who utilized software experienced better knowledge acquisition of the accounting cycle than did their male counterparts. Correlation analysis indicated a positive relationship between knowledge acquisition and female gender, but also a positive relationship between female gender and the number of hours invested to complete the case. The number of hours spent could be interpreted as a sign of dedication at work, so it appears that dedication paid off for the female students.

In short, this research indicates that integration of software in the classroom does provide learning benefits. In addition, utilization of accounting software in class provides a more accurate reflection of the standard practices of most organizations, which may better prepare students for the changing business world and the accounting profession. Students may have perceived the completion of the case using accounting software to be more helpful and a more valuable learning experience than the traditional pencil and paper case. Since students using software appear to learn more accounting, and also leave the course with an additional important skill, course designers should accordingly integrate business cases using software. Hands-on, active learning experiences can significantly enhance the classroom experience.

The present study has limitations. First, we examined a specific sample of accounting undergraduate students from a single business school. Therefore, the results may not necessarily be generalizable. However, an analysis of the students' background characteristics suggests that the sample in this research is reasonably representative of typical undergraduate students enrolled in an AIS course with cases using software. Second, a questionnaire was utilized to gather information, and students' perception, and this method has its limits. Yet we collected 1,053 completed questionnaires, with a response rate of 70 percent, and obtained construct validity of the variables. Another limitation is students' receptivity of, and familiarity with, technology changes and software over the period of study. Today's business students are generally quite technologically savvy, and this may have positively influenced their motivation and preference for the case using software. Students' exposure to computers in other business courses may also have influence this preference. Lastly, students who performed the two cases, manual then using software, may have perceived to learn more due to the amount of time and effort spent in the learning process. Despite the limitations outlined here, this study may provide educators with a better understanding of software utilization benefits.

In the future, this study could be replicated with other cases using software, and in different business schools. This would increase the robustness of the current results and offer a stronger base for theory development on knowledge acquisition. Future research could also examine, through interviews and surveys, the extent to which prior exposure to information technology is relevant to students, and firms hiring business students, as well as the extent to which students' experience with accounting software may transfer to other accounting and business courses. The accountancy profession has changed to a more forward-looking, information technology consultancy role, and accounting education has to adjusted and developed accordingly (Albrecht and Sack, 2001; Paisey and Paisey, 2010).

Notes

1. The accounting cycle is a series of steps in recording business events from the time a transaction occurs to its reflection in the financial statements. The steps are: (1) collect and analyze data from transactions and events; (2) prepare documentation; (3) record transactions in journals; (4) post to ledgers; (5) prepare the unadjusted general ledger trial balance; (6) prepare and post adjusting entries; (7) prepare the adjusted trial balance; (8) prepare financial statements; and (9) prepare closing entries.
2. For a review of theories in knowledge development and knowledge acquisition.
3. This illustration has been borrowed from McCall *et al.* (2008).
4. There are different definitions of local and international students. In the current study, local students mean as either born in Canada, who previously studied in Canadian colleges, or are Canadian citizen. Those who do not fall into the definition of local are thus categorized as international students. The latter are mainly immigrants, who previously studied outside of Canada, with permanent resident status in Canada, or with a student visa for Canada. In the questionnaire, we asked each student whether he/she is an international student, or not.
5. This university is among the largest in Canada with more than 40,000 students.
6. A typical course description of accounting information systems (AIS) is as follow: "this course examines the role and function of computerized accounting information systems in recording, processing, and storing accounting data necessary for planning, decision-making, and control of organizations. Theory and practice are combined in a case-study approach, which includes 'hands-on' experience with computer software. This course helps to identify appropriates usages of information technology in specific accounting contexts". Students have been previously exposed to computer in one mandatory introductory course in MIS, taken in the first-year of the bachelor program. Exposure to computers in other business fields (e.g. marketing, management, and finance) was rather limited.
7. For instance, the textbook utilized during the period of study has always been "Accounting Information Systems" by Romney, M.B. and P.J. Steinbart, with different editions over the years. We observed that there were no major changes in content between the different textbooks' editions, topics examined being very stable.
8. This also includes performing maintenance, processing transactions, obtaining information from computerized data, preparing and printing reports and documents, and dealing with computerized internal controls.
9. The material utilized for the manual case was *Systems Understanding Aid* (Arens and Ward, 2006b), 6th ed., and for the computerized case *Computerized Accounting Using Microsoft Business Solutions-Great Plains* (Arens and Ward, 2006a), 3rd ed. In 2008, new editions of *Systems Understanding Aid* (a 7th ed.) and *Computerized Accounting Using Microsoft Dynamics GP 10.0* (a 4th ed.) were available, but not utilized in order to maintain consistency in the works performed by students, and the reliability of data collected. The new editions had minimal changes.
10. This comparison is based on the 2009-2010 *Canadian Association of University Teachers Almanac of Post-Secondary Education*, in which detailed statistics about students are provided such as full-time vs part-time category, gender, age, and national vs international status.

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Further reading

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Appendix 1. The questionnaire administered to students just after they submitted the manual (pencil and paper) accounting case

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Section I					
Completing the manual accounting case increased my understanding and knowledge of:					
1. The charts of accounts	1	2	3	4	5
2. Journal entries	1	2	3	4	5
3. Adjusting journal entries	1	2	3	4	5
4. The trial balance	1	2	3	4	5
5. The income statement	1	2	3	4	5
6. The balance sheet	1	2	3	4	5
7. Closing entries	1	2	3	4	5
8. The post-closing trial balance	1	2	3	4	5
9. The entire accounting cycle	1	2	3	4	5
Section II					
10. The casewas representative of the work I would expect to be performed by a professional accountant	1	2	3	4	5
11. Completing the case was an interesting and enjoyable learning experience	1	2	3	4	5
12. Completing the case increased my desire to be an accounting major	1	2	3	4	5
13. Completing the case was a difficult task	1	2	3	4	5
14. I would have preferred to complete the case using computer accounting software rather than manually	1	2	3	4	5
15. I would have been better prepared for employment if I had completed the case using computer accounting software rather than manually	1	2	3	4	5
16. Completing the case manually adequately prepared me for the computerized accounting case*	1	2	3	4	5

(continued)

How many hours did it take to complete the case? _______ hours

Section III

Sex: M F

Age: ____

Student status: Full-time Part-time

International student: No Yes

Major: Accounting Other___________ Undecided

Previous working experience in accounting: Number of years______

* This question was only asked of students in Group 3 (those who had to complete the accounting case manually, and then again using accounting software)

Appendix 2. The questionnaire administered to students just after they submitted the computerized (accounting software) accounting case

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Section I					
Completing the accounting case with the software increased my understanding and knowledge of:					
1. The charts of accounts	1	2	3	4	5
2. Journal entries	1	2	3	4	5
3. Adjusting journal entries	1	2	3	4	5
4. The trial balance	1	2	3	4	5
5. The income statement	1	2	3	4	5
6. The balance sheet	1	2	3	4	5
7. Closing entries	1	2	3	4	5
8. The post-closing trial balance	1	2	3	4	5
9. The entire accounting cycle	1	2	3	4	5
Section II					
10. The computerized accounting case was representative of the work I would expect to be performed by a professional accountant	1	2	3	4	5
11. Completing the computerized accounting case was an interesting and enjoyable learning experience	1	2	3	4	5
12. Completing the computerized accounting case increased my desire to be an accounting major	1	2	3	4	5
13. Completing the computerized accounting case was a difficult task	1	2	3	4	5
How many hours did it take to complete the computerized accounting case?	_______ hours				

(*continued*)

Section III

Sex: M F

Age: ____

Student status: Full-time Part-time

International student: No Yes

Major: Accounting Other___________ Undecided

Previous working experience in accounting: Number of years______

About the author

Professor Emilio Boulianne holds a PhD in management accounting (HEC-Montreal). Professor Boulianne has published in *Managerial Auditing Journal*, *Advances in Management Accounting*, and the *International Journal of Accounting Information Systems*. His works have been presented to the European Accounting Association Annual Congress (EAA), the American Accounting Association Annual Meeting (AAA), and the Canadian Academic Accounting Association Annual Conference (CAAA). His research interests are performance evaluation, MAS design, balanced scorecard, and contingency and stakeholder theories. In recognition of his exemplary service to the accounting profession, CGA-Canada granted to him the Fellowship Award FCGA. Professor Boulianne worked for ScotiaBank for several years in commercial credit. He teaches accounting information systems, MBA management accounting, and seminars in management accounting in the PhD program. Emilio Boulianne can be contacted at: Emilio@jmsb.concordia.ca