Examining the Role of Information Technology in Support of Business Students' Knowledge Acquisition

Emilio Boulianne, PhD, FCGA
Associate Professor of Accounting
Director, CGA Research Center
John Molson School of Business - Concordia University
1455 de Maisonneuve Blvd. West
Montréal, Québec, Canada, H3G 1M8
Tel: 514-848-2424 ext. 2754
E-mail: Emilio@JMSB.Concordia.ca

ABSTRACT

This study investigates the impact that software utilization may have on students' knowledge acquisition of the accounting cycle, a fundamental concept in business. Differences in knowledge acquisition are examined between three groups of students: those who completed a business case 1) manually using the traditional pencil and paper approach, 2) using software, and 3) first manually and then using software. The research question is: "To what extent does using computers to study the accounting cycle lead to better knowledge acquisition?" Preliminary results indicate that students who first completed the case manually and then completed the same case using software experienced the best knowledge acquisition. 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 information systems.

INTRODUCTION

Professional accountants employ a wide range of computer applications to perform their daily tasks. 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 (Curtis et al., 2009; Nelson et al., 2008). In business schools, students are increasingly exposed to the benefits and usefulness of computers, and are encouraged to utilize information technology (Grandzol and Ochs, 2010). 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. 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. This study's main research question is "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' learning (Kao, Chen and Lee, 2012).

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 twofold: 1) to provide information on students' acquisition of accounting knowledge using software; 2) to provide professors and those involved in curriculum and course design 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. 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 the integration of software into the curriculum.

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 same 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 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 and limitations and suggested directions for future research.

LITERATURE REVIEW AND HYPOTHESES

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 (2006a), 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. 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 an overly technical field.

Other educators 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 (Banham, 2010). 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. McDowall and Jackling (2006) reported that students' positive perceptions of computers' usefulness in learning accounting concepts is associated with academic performance.

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; Grandzol and Ochs, 2010).

In short, prior research 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. However, care should be taken to introduce computer-based accounting cases only once students have a good understanding of the fundamentals of accounting. The following section presents the hypotheses developed.

Research Hypotheses: A Pencil and Paper Approach versus Accounting Software

The following quote summarizes supporters' arguments for using the manual method (pencil and paper) to teach 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, 2006a, 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, 2006a, p. 4). Savage and Law (2003) 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" (p. 76). 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.

In light of these opinions and previous work, this study aims to compare, in terms of knowledge acquisition, the differences between the *manual* approach and the *computerized* approach. 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:

1. students who only complete the case manually and
2. 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.

The next section covers the research method.

METHOD

Context and Overview of the Assigned Task

The study took place at an AACSB-accredited business school, part of a large Canadian university. This university is among the largest in Canada with more than 40 000 students. 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 (B. Com.) program, most of them majoring in accounting,

and the majority with the goal of obtaining a professional accounting designation. All students were enrolled in the Accounting Information Systems course. A typical course description of Accounting Information Systems (AIS) is a course that "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. AIS course helps to identify appropriates usages of information technology in specific accounting contexts". The data collected covers the period from Winter 2006 to Winter 2010. The course materials, topics, evaluations, and teaching format were relatively constant from semester to semester. For instance, the textbooks utilized during the period of study have always been "Accounting Information Systems" by Romney and Steinbart (2009), with different editions over the years. We observed that there were no major changes in content between the different textbooks editions. 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 (2006a). This is a comprehensive manual practice set designed to help 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 Accounting Information Systems 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 (GP)* developed by Arens and Ward (2006b). Microsoft GP 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. Tasks also include performing maintenance, processing transactions, obtaining information from computerized data, preparing and printing reports and documents, and dealing with computerized internal controls. This accounting case is also widely utilized in North American universities for Accounting Information Systems courses. The package is now called *Computerized Accounting Using Microsoft Dynamics GP*. Surveys suggest that students prefer to use Microsoft GP over SAP, the user interface of the latter being less user-friendly than most PC-based software packages (Chen, Lee, and Yang, 2010).

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-GP*. The material utilized for the manual case was *Systems Understanding Aid* (Arens and Ward, 2006a), 6th Edition, and for the computerized case it was *Computerized Accounting Using Microsoft Business Solutions-GP*(Arens and Ward, 2006b), 3rd Edition. In 2008, new editions of *Systems Understanding Aid* (7th Edition) and *Computerized Accounting Using Microsoft Dynamics GP 10.0* (4th Edition) were available but were not utilized in order to maintain consistency in the tasks performed by students, and the reliability of the data collected. The new editions have minimal changes. 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 worked in groups of two to four.

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. Section II of the questionnaire asks how representative the assigned tasks 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, student' status, 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. 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. 1 053 were fully completed and collected, resulting in a response rate of 70%. 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., three hours more or 18% more time).

Female students represent 63% of respondents and males represent 37%; 74% had full-time student status; only 15% were international students. 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. This comparison is based on the Canadian Association of University Teachers Almanac of Post-Secondary Education in Canada 2009–2010 (CAUT, 2009), in which detailed statistics about students are provided, such as full-time vs. part-time status, gender, age, and national vs. international status. A factor analysis using the principal component method was conducted, resulting one component, with eigenvalues greater than 1.0, and consists of the nine items evaluating students' knowledge acquisition. This construct, named *Knowledge acquisition,* represents 72% of the variance. Cronbach's alpha is used to evaluate the reliability of the constructs validated by factor analysis. The alpha coefficient for the nine items evaluating students' knowledge acquisition is 0.95.

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 1, 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 32.2 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. = .001) and Group 2 (sig. = .008). Therefore, the results suggest that the best way to acquire concrete knowledge of the accounting cycle is by completing cases using both methods, i.e., by first completing the case manually and then immediately completing the case using accounting software. It appears that knowledge acquisition is reinforced when the same accounting case is completed by students using different accounting information systems, i.e., manual and computer-based. Accordingly, H1 is supported.

Table 1. ANOVA showing the mean difference in knowledge acquisition between the three groups of students

Panel A: Mean knowledge acquisition; descriptives

Knowledge acquisition	n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Group 3	424	38.01	5.880	.267	37.45	38.50	9	45
Group 1	435	32.18	6.707	.348	31.13	33.49	9	45
Group 2	194	35.38	6.305	.452	34.82	35.87	9	45
Total	1053	35.06	6.415	.198	34.51	35.54	9	45

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.

Panel B: ANOVA result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2124.111	2	1062.056	27.086	.000
Within Groups	41170.626	1050	39.210		
Total	43294.737	1052			

Panel C: Post Hoc Bonferroni test; multiple comparisons

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Group 3	Group 1	5.169*	.431	.000	1.09	5.23
	Group 2	2.634*	.531	.008	-.720	3.87
Group 1	Group 3	-5.169*	.431	.000	-5.24	-1.13
	Group 2	-2.575*	.554	.014	-3.94	.780
Group 2	Group 3	-2.634*	.531	.008	-3.91	-.710
	Group 1	2.575*	.554	.014	-.79	3.93

* The mean difference is significant at the 0.05 level.

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 32.2, while Group 2 a higher mean, at 35.4, and this mean is statistically different (sig. = .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. In view of that, the engagement of students in computer-based practical learning experiences seems to create sound educational outcomes (Fulford, 2011).

SUMMARY AND LIMITATIONS

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 design decisions. The paper is in line with the many calls to better understand teaching with information computer technology (Fulford, 2011). 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, 2006a). According to Savage and Law (2003), 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 that students' positive perceptions of computers' usefulness in learning accounting concepts is 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; Grandzol and Ochs, 2010). In the current study, the integration of software in accounting cases provided tangible learning benefits.

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 business world and for the accounting profession. Students 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.

Some may bring up here the concept of *opportunity cost*, say the cost of an alternative that must be forgone, or stated otherwise, the benefits that could have been received by taking an alternative action. Here, we have to acknowledge that the group of students who performed the case manually then using software spent around 20 hours more course time on these cases than the other two groups. Accordingly, this group spent less time on other possible learning activities, reducing further potential useful learning opportunities.

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. Another limitation is students' receptivity of and familiarity with technology 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. 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 the benefits of software utilization.

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 important to firms hiring business students, as well as the extent to which students' experience with accounting software may transfer to other accounting and business courses, having in mind an ERP approach.

REFERENCES

Albrecht, W.S., and R.J. Sack (2001). The Perilous Future of Accounting Education. *The CPA Journal*, 71 (3), 16–23.

American Institute of Certified Public Accountants (AICPA) (2009). *CPA Vision: Focus on the Horizon, 2011 and Beyond*. New York, NY: AICPA.

Arens, A.A., and D.D. Ward (2006a). *Systems Understanding Aid*, Instructor's Guide and Solutions-Instructions, Flowcharts, and Ledgers Booklet, 6th edition. Okemos, MI: Armond Dalton Publishers.

Arens, A.A., and D.D. Ward (2006b). *Computerized Accounting Using Microsoft Business Solutions-Great Plains*, 3rd edition. Okemos, MI: Armond Dalton Publishers.

Banham, R.L. (2010). Dynamics as a Teaching and Learning Tool: The First Step—Restructure the AIS Course, *Proceedings of Microsoft Dynamics Academic Preconference 2010*, 1(1), 7-16.

Becker, D.A., and M.N. Dwyer (1994) Using Hypermedia to Provide Learner Control. *Journal of Educational Multimedia and Hypermedia*, 3 (2), 155–172.

Bhattacharjee, S., and L. Shaw (2001). Evidence that Independent Research Projects Improve Accounting Students' Technology-related Perceptions and Skills. *Accounting Education: An International Journal*, 10 (1), 83–103.

Boyce, G. (1999). Computer-assisted Teaching and Learning in Accounting: Pedagogy or Product? *Journal of Accounting Education*, 17 (2/3), 191–220.

Canadian Association of University Teachers (CAUT) (2009). *CAUT Almanac of Post-secondary Education in Canada 2009–2010*. Ottawa, ON: Canadian Association of University Teachers.

Chen, K.L., Lee, H., Yang, J. (2010). Using Microsoft Dynamics in the Supply Chain Management Curriculum, *Proceedings of Microsoft Dynamics Academic Preconference 2010*, 1(1), 25-30.

Curtis, M.B., J.G. Jenkins, J.C. Bedard, and D.R. Deis (2009). Auditors' Training and Proficiency in Information Systems: A Research Synthesis. *Journal of Information Systems*, 23 (1), 79–96.

Fulford, R. (2011). Effective Education Using Information Systems as Cognitive Tools, *Proceedings of Microsoft Dynamics Academic Preconference 2011*, 2(1), 8-14.

Grandzol, J.R., Ochs, J., (2010). Bridging the Gap between Business and Information Systems ERP-based Curricula to Achieve Improved Business Process Learning Outcomes, *Proceedings of Microsoft Dynamics Academic Preconference 2010*, 1(1), 17-24.

Gujarathi, M.R., and R.J. McQuade (1998). Problems and Considerations in Implementing Technology-based Solutions to Address Changes in Accounting Curricula. *Advances in Accounting Education*, 1(1), 1–23.

Hurt, B. (2007). Teaching What Matters: A New Conception of Accounting Education. *Journal of Education for Business*, 82(5), 295–299.

Kao, F.J., Chen, K.L., Lee, H. (2012). The Impact of Video Clip Instruction on Understanding Customer Relationship Management (CRM) Software for Brand Management, *Proceedings of Microsoft Dynamics Academic Preconference 2012*, 3(1), 21-27.

Lane, A., and M. Porch (2002). Computer Aided Learning (CAL) and its Impact on the Performance of Non-specialist Accounting Undergraduates. *Accounting Education: An International Journal*, 11 (3), 217–233.

Marriott, D.N. (2004). Using Computerized Business Simulations and Spreadsheet Models in Accounting Education: A Case Study. *Accounting Education: An International Journal*, 13 (Supplement 1), 55–70.

McDowall, T., and B. Jackling (2006). The Impact of Computer-assisted Learning on Academic Grades: An Assessment of Students' Perceptions. *Accounting Education: An International Journal*, 15(4), 377–38.

Nelson, I.R., V.P. Vendrzyk, J.J. Quirin, and S.E. Kovar (2008). Trends in Accounting Student Characteristics: Results from a 15-year Longitudinal Study at FSA Schools. *Issues in Accounting Education*, 23(3), 373–389.

Parker, J.E., and B.M. Cunningham (1998). Using an Electronic Tutorial to Enhance Students' Knowledge of Advanced Tax Accounting. *Issues in Accounting Education*, 13(2), 395–407.

Peters, J.M. (1999). A Study Focusing on the Use of Peachtree Software in Introductory Accounting: Performance Differences. *Working paper, College of DuPage*. Glen Ellyn, IL.

Romney, M.B., and P.J. Steinbart (2009). *Accounting Information Systems*. 11th edition. Upper Saddle River, NJ: Prentice Hall.

Sangster, A. (1992). Computer-based Instruction in Accounting Education. *Accounting Education: An International Journal*, 1(1), 12–32.

Savage, H.M., and D.B. Law (2003). The Practice Set: A New Spin on an Old Idea. *Journal of Education for Business*, 79(2), 75–79.

Biographical Notes

Professor Boulianne holds a MBA in MIS and a PhD in Accounting. He published in journals such as Managerial Auditing Journal, Advances in Management Accounting, and International Journal of Accounting Information Systems, as well as in professional journals. He presented his works in various North American and European academic conferences. His research`s interests include performance evaluation, information system design, and sustainability accounting, using contingency and stakeholder theories. He taught Accounting and Information Technology, Management Control in the e-Business Environment, Managerial Accounting for MBAs and EMBAs, and Doctoral Seminars. Previous to his academic career, Professor Boulianne worked several years in the banking industry. He is a member of the Certified General Accountants' Association of Canada (CGA) and in recognition of his exemplary service to the accounting profession, CGAs granted to him the Life member and Fellowship awards. Professor Boulianne is currently director of the CGA Research Center at the John Molson School of Business.

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