Integration of Online Resources in the Traditional Classroom: A Discussion of Strategies and Comparison of Student Performance on Online vs. In-Class Quizzes

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Over the last two decades, accounting educators have responded to the profession's call for the integration of computer, teamwork, communication, and leadership skills in the accounting curriculum. However, since face-to-face class time has not expanded, faculty members face the challenge of adding content to develop these important skills on top of technical content with which many students struggle. Technology offers one possible solution to this dilemma. This paper describes an evolution in teaching the introductory accounting class by introducing online content to supplement the traditional in-class experience. After a brief literature review focused on expansion of the accounting curriculum and the use of online education in business courses, the paper describes the methods used to develop online content for an introductory financial accounting course and discusses the instructor's perceptions of the costs and benefits of developing the online content. The use of online quizzes is explored in more depth, with discussion of academic honesty issues and an analysis of student performance before and after the adoption of online quizzes.

Introduction

Accounting education has changed significantly during the last two decades in response to changes in the business environment, accounting profession, and technology. A curriculum that was once focused primarily on developing technical competence has expanded to meet the

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needs of a changing profession. However, accounting faculty must deal with the challenges of incorporating material and activities designed to develop "soft" skills in the curriculum while continuing to address a growing body of technical accounting literature.

This paper discusses the use of technology to address this challenge. Specifically, it focuses on the integration of online content to supplement the introductory accounting course. The paper is organized as follows. First, we present a brief literature review, summarizing the significant publications that advocated for change in accounting education and some of the literature on technology in education and online learning. Next, we describe the types of online resources that were added to a traditional introductory accounting course at a small, private university in the northeastern United States. We discuss online quizzes in particular detail, identifying potential concerns with online quizzes. We also present an analysis of student performance in sections offered before and after the adoption of online quizzes, which provides some insight into issues surrounding the use of online quizzes. Finally, we identify issues to consider in adopting online resources and areas for future research.

LITERATURE REVIEW

Changes in Accounting Education

Although there is a long history of cooperation between accounting profession and academia, there has also been considerable tension over the years, as those in the profession have believed that the accounting curriculum should be designed primarily to train future accounting professionals, while those in academia have struggled to establish themselves as a legitimate academic discipline by pursuing research that is not always directly related to accounting practice. Nevertheless, the majority of students pursuing a degree in accounting intend to work in the profession, so academics need to offer a curriculum that enables graduates to make a successful entry in the profession.

Members of the accounting profession and the academic community have collaborated in several efforts to redesign accounting education

since the mid-1980s. The American Accounting Association created a special committee, which published "Future Accounting Education: Preparing for the Expanding Profession" (AAA, 1986). This report, commonly referred to as the Bedford Report, named after the Chairman of the special committee that drafted the report, called for an expanded curriculum and revised delivery process, emphasizing the importance of instilling ethical standards, creating a sense of commitment to the accounting profession and developing communication and interpersonal skills in accounting students. This was the first of several documents to criticize the traditional focus on technical accounting skills and suggest that attention be shifted to a more general education.

The "Big 8 White Paper," published by the then-Big 8 Accounting Firms, stressed the importance of developing communication, intellectual and interpersonal skills through the accounting curriculum (*Perspectives*, 1989). This report suggested changes in the delivery of accounting education through seminars, simulations, extended writing assignments and case analyses, stating that the "textbook-based, rule-intensive, lecture/problem style should not survive" as the primary means of delivering accounting education. This position paper also encouraged the creative use of information technology in revising accounting education to meet the needs of students and their future employers.

Perhaps the most ambitious effort to reform accounting education occurred in 1989, when the American Accounting Association, with the support of the Big 8 firms, formed the Accounting Education Change Commission (AECC), a group intended to be a catalyst for change in accounting education. This group reviewed the Bedford Report and the recommendations of the Big 8 White Paper in developing its recommendations. The AECC published two Position Statements and six Issues Statements from 1990 to 1995, recommending an increased emphasis on teaching and providing guidance for revising the first course in accounting to better convey the nature of the profession and attract qualified students to accounting. The Commission also encouraged a focus on "learning to learn," and the development of communication, problem-solving and teamwork skills. Finally, several initiatives were funded

through AECC grants, which sought to expedite the adoption of new approaches to accounting education and share innovations with a broad audience.

In the late 1990s and into the 2000s, there have been efforts to continue to assess and modify educational practices to ensure that today's students are well prepared for careers in accounting. The CPA Vision Project (Anonymous, 1998) identified the core competencies of certified public accountants, suggesting that a curriculum that is designed to develop these competencies will provide a strong foundation for students interested in pursuing a career in public accounting. The core competencies include communication and leadership skills; strategic and critical thinking skills; focus on client, customer and market; interpretation of converging information; and [the skills and knowledge to be] technologically adept. Thus, only the last core competency is addressed through technical accounting material. Most of the core competencies are developed through a broader educational focus.

Impact in the Classroom

The movement toward change in accounting education has had a striking impact on the accounting curriculum at many colleges and universities, particularly in the first course in accounting. There has been a definite shift toward a focus on the "user approach," which teaches introductory accounting students how to be informed consumers of accounting information. This contrasts with the traditional "preparer approach," which focuses on teaching students to prepare journal entries and financial statements. There has also been increased emphasis on communication, teamwork, leadership and technology skills. Many introductory textbooks facilitate this by including specific end-of-chapter assignments to develop these competencies.

However, embracing these changes in accounting education comes with significant challenges for accounting professors. The technical material in accounting is very difficult for many undergraduate students. Since the introductory level course is typically taught to a diverse group of students, including many who are not accounting majors, the technical

material alone can be overwhelming. In addition, recent developments in the business environment, including the rise of international accounting standards, increased reliance on sophisticated financing techniques, and changes in accounting disclosures have expanded the technical content even further. The expectation that the introductory course will also integrate exercises focusing on communication, teamwork, leadership and technology skills may seem unreasonable to a professor who is struggling to cover all of the technical material in the limited time available.

Accounting instructors thus face the dilemma of how to choose what material to cover and what skills to emphasize in the introductory accounting course. One way to use class time efficiently is to use technology to supplement instruction in the traditional classroom. While it requires additional planning, technology offers the potential to free up valuable class time so that the accounting professor can focus on those topics that require face-to-face interaction, while incorporating exercises that contribute to the development of other important skills. However, before investing time in creating technology-based supplements, it is important to consider students' perceptions of technology-supported learning.

Student Response to Technology

Technology has enhanced accounting education in numerous ways, through the use of presentation software, electronic spreadsheets, web-based research assignments, textbook web sites with supplemental materials, and many other resources that are available in electronic form. While technology has affected the delivery of education in most disciplines at most levels, it has literally transformed the educational experience for those engaged in online (distance) education.

Online education has grown very quickly over the last decade to the extent that approximately two-thirds of all postsecondary institutions offered distance education courses in 2006-07 (U.S. Department of Education, 2008). This mode of education has many benefits to both faculty and students, most notably the flexibility afforded by online courses (Lei and Gupta, 2010). While there is a growing body of literature

regarding online education, there are few studies within the accounting discipline. Further, the limited research on student preferences is mixed (Bryant et al., 2005), but suggests that accounting students are not embracing online education. Some studies have found that students prefer the traditional classroom setting (Vamosi et al., 2004) and others have found that students prefer a hybrid model, a mix of online and traditional classroom learning, over online education (Gutierrez and Russo, 2005). Interestingly, online education may not be well-suited to accounting courses. Some faculty members engaged in online teaching have noted that it is particularly difficult in subjects that are quantitative, as students benefit from face-to-face interaction in which they can follow along as the instructor solves a problem on the board (Koenig, 2010). This might explain why at least one study has also found that accounting (and business) students show a lower preference for hybrid (versus traditional) courses than students in other disciplines (Gutierrez et al., 2004).

A study by Flynn et al. (2005) emphasizes the importance of using technology to enhance student learning and not just for the sake of using technology. They found that undergraduate accounting students used online materials, such as lecture notes, discussion boards and class announcements, and that students generally responded favorably to online quizzes. However, students did not use optional materials, and reacted negatively to a perception of information overload associated with excess online materials.

Despite the growth in online (and hybrid) education, most students are still taking introductory accounting classes in a traditional setting. Technology-supported learning offers many opportunities for enhancing the educational experience in this setting. The selective integration of such online resources in a traditional setting can supplement the course, potentially freeing up class time for more value-added activities.

Online Resources in Introductory Accounting

There are numerous technology solutions for the traditional classroom. While some of the experiences are similar to those offered with online and hybrid courses, it is important to make the distinction between

courses in which the technology is a primary means of delivering the course material and those in which the technology serves to supplement a traditional classroom experience. Our focus is on the latter. With the widespread use of Blackboard, WebCT, moodle, and other classroom management systems, instructors do not need to have sophisticated technology skills to integrate technology in a traditional course.

In the introductory accounting course at a small private university in the northeastern United States, we posted lecture notes, homework assignments and solutions, and test review materials. We also established a homework help forum (through a discussion board), provided links to textbook supplements, and conducted online quizzes. Each of these uses of technology is briefly described in the following paragraphs.

Posting lecture notes has two important advantages. It ensures that students have access to accurate notes and it enables a quicker lecture pace. Students are told that the pace of the class is conducted with the assumption that they have printed the lecture notes in advance. However, there is a potential downside. If complete lecture notes are posted, students may perceive this as an indication that class attendance is not required. To discourage this view, the instructor posted a student version of the lecture notes for each chapter. The student version is an outline of the full lecture notes, with key information that is missing. (For example, definitions, numbers in journal entries or lists of items might show up as blank spaces in the student version of the notes.) While the posted notes have most of the content, these key missing items are identified and explained during the lecture. Thus, the amount of writing required during class is reduced significantly, but students who do not attend class have incomplete notes, with several key pieces missing.

Homework assignments and solutions were also posted to the course site. Posting the homework assignments facilitates long-term planning and allows students to check the homework assignments at any time. Selected weekly assignments had to be prepared electronically and uploaded by the students to the website for grading. These assignments were retrieved and graded electronically by an upper-level accounting student who worked as a lab assistant. This encouraged communication between the students

and an upper-level student and enabled the instructor to include graded homework without having to use class time for collection of homework or out-of-class time for grading. Solutions to all assignments (both graded and ungraded) were posted after the due dates; thus students could review homework independently. Test review materials were posted about 7–10 days before each exam. These materials included review sheets and practice tests, and were accessed by most of the students in the course. Posting practice tests enabled the instructor to "level the playing field" so that all students had access to the same review materials. Posting these materials also reduced the amount of class time devoted to questions about the format and topical coverage of the test.

A homework help forum was also created in the course to allow students to post questions on the homework and collaborate with one another in completing assignments. Unfortunately, there were very few posts to the forum. There were probably two reasons for this: first, the class met three times a week, with homework assigned for each class. As a result, questions were often last minute questions, in need of very quick responses, and students tended to contact the instructor directly for guidance. Further, in an introductory level class, most of the students are unsure of their grasp of the material, and may therefore be unwilling to expose any gaps in their understanding by trying to respond to classmates' questions on the homework. This might work better in an upper-level course or in a course that meets less often, allowing more time between questions and answers on the forum.

Links on the course page to text supplements were also available. The supplements included practice multiple choice questions, detailed chapter notes, and optional learning aids. The use of these supplements was limited. While a sizeable minority of students took advantage of the practice multiple choice questions available on the text website, most other resources were ignored. This is consistent with findings in the literature regarding optional materials (Flynn et al., 2005).

Finally, there were online (open-book) multiple choice chapter quizzes for each chapter covered during the semester. Students were given a limited time frame during which to complete each chapter quiz

(usually 3–5 days), and a time limit for each attempt (30 – 45 minutes). Students were therefore encouraged to study before taking the quiz. Students were allowed two attempts at each quiz (although the questions, and the order of the questions and responses, could change between attempts). The recorded grade for the quiz was the highest score earned on the two attempts. The objectives of the online quizzes were to (1) save class time by administering the quizzes outside of class; (2) provide immediate individual feedback on students' strengths and weaknesses; and (3) encourage targeting studying by students after the first quiz attempt. While the first and second objectives were certainly met, it is difficult to determine whether students' study strategies were influenced by their performance on the online quizzes. However, some students commented that they used the quizzes in preparing for exams, providing anecdotal evidence that the quizzes were used by at least some students to meet the third objective. The analysis discussed in the section analyzing quiz performance also suggests that students benefitted at least to some extent from the online quiz format.

Online Quizzes: Academic Honesty Issues

The use of online quizzes raises the potential for academic honesty concerns. Although some of these can be addressed by careful selection of quiz options on the course management software, the instructor must be aware that there is no way to guarantee that students do not share answers and/or receive other assistance in completing online quizzes. Academic honesty issues are discussed in this section.

The first question with respect to online quizzes is whether students will collaborate in completing the online quizzes. A major step taken to discourage this was to design quizzes to be constructed using a random selection of questions. Thus, students sitting side by side and completing the quiz at the same time would be presented with different questions. Further, both the order of the questions and the order of the choices were randomized, thus making similarities in the quizzes more difficult to identify. Additionally, the time limit on the quizzes precluded students from spending significant time comparing their

questions, as there was a visible clock ticking down once the quiz was opened. Finally, the quizzes were given in "secure mode," which is designed to disable the print screen and copy and paste functions, making it difficult to print out the quizzes. This setting was not changed until the quiz had closed. Although technologically savvy students can find a way around this last control, many students did not know this. (This became clear when students reminded the instructor to change the quiz settings after the quiz had closed so that they could print out the quizzes for their notes.)

Another concern with respect to online quizzes is that there is no way to ensure that students actually take the quizzes themselves. A student could have someone else access their account and take the quiz for them. While there is no easy way to address this issue, there is not great incentive for students to do this. The quizzes represent a relatively small percentage of the total grade and the potential penalty for cheating (if discovered) is steep. Since the students take tests in a traditional closed-book in-class setting, the students must eventually learn the material. Thus, although there is a potential risk here, in our opinion, the benefits of online quizzes outweighed this risk.

A final concern that might arise with online quizzes is that the quiz scores will be inflated. Will all students get high quiz scores when the quizzes are online? Two features of the online quizzes as implemented in this course made higher scores very likely: first, the quizzes were open book; and second, students were allowed two attempts at the quiz. From our perspective, this is an issue only if the instructor wants to use quizzes to differentiate student performance. Since the quizzes in our courses represented a relatively small portion of the total grade (10%), this was not a major concern. Further, the intent was to use the quizzes primarily as a measure of effort and a formative tool, to enable students to identify their strengths and weaknesses and target their studying to improve learning. Thus, the instructor anticipated relatively high quiz scores. However, we analyzed data to consider the question of whether online quiz scores are higher than traditional quiz scores. As shown in Table 1, all quiz scores are significantly

Table 1. Quiz Performance: Mean % of Questions Correct & Significance of Difference Between Means.

	2007 (Traditional) (n = 58)	2008 & 2009 (On-line) (n = 61)	p-value
Quiz 1	61.5%	86.9%	< 0.001
Quiz 2	71.1%	82.7%	< 0.01
Quiz 3	61.5%	82.7%	< 0.001
Quiz 4	63.3%	79.9%	< 0.001
Quiz 5	53.9%	81.5%	< 0.001
Quiz 6	62.6%	79.2%	< 0.001
Quiz 7	60.0%	76.9%	< 0.001

higher for the online quizzes as compared to traditional closed-book, paper and pencil quizzes given in the same course taught by the same instructor in 2007.

If instructors are concerned about the high quiz scores (and wish to use the quizzes as an evaluative measure), the quizzes can be structured to more closely mimic closed-book in-class quizzes. This can be accomplished by limiting the number of attempts to one, by restricting the time allowed to take the quiz to make it impossible for students to look up answers within the time constraints, and by limiting the amount of time that the quiz is open, thus restricting students' ability to share information with one another while the quiz is still open.

Online Quizzes: Impact on Learning

Arguably the most important issue is whether student learning is affected by the use of online quizzes. The instructor used very similar technology tools in 2007, 2008, and 2009 for the introductory accounting course. However, the instructor administered in-class paper and pencil quizzes in 2007, and moved to online quizzes in 2008 and 2009. This affords us an opportunity to compare student performance in the traditional quiz (Traditional) format versus the online quiz (Online) format.

Since the quizzes were used primarily as a formative tool, the desired outcome is that students demonstrate improved understanding of the material. Since students were not randomly assigned to the Traditional and Online conditions, it is not possible to provide conclusive evidence on this issue. However, we compared student performance on the exams for these two different groups (Traditional and Online) who took the same course from the same instructor using the same text during three different semesters. Specifically, we examined student performance on three types of questions on the exams: true/false, multiple choice, and problems. Both groups took similar closed-book, in-class exams. The results are summarized in Table 2.

Interestingly, although the quizzes were comprised primarily of multiple choice questions, the students in the Online group outperformed those in the Traditional group on both the true/false questions and the problems on the exams. There was no statistically significant difference between multiple choice scores of the two different groups on the exams. These results suggest that at best, the online quizzes may have enhanced student learning and at worst, they did not impede student learning. This is an important finding, as some instructors may fear that open book quizzes will lead to poor exam performance since the students will not have experienced a closed-book test setting prior to the exams.

We also compared overall performance in the course for the two groups, as measured by grades achieved. The average grade point average of the students in the Traditional course was 2.49, while that of the

TABLE 2. Test Performance: Mean % of Questions Correct & Significance of Difference Between Means.

Type of question	2007 (Traditional) (n = 58)	2008 & 2009 (On-line) (n = 61)	p-value
True/False	74.2%	80.4%	< 0.001
Multiple choice	70.2%	71.6%	n.s.
Problems	67.2%	73.7%	< 0.001

students in the Online course was 2.70. Thus, the students who took the course with online quizzes earned somewhat higher grades than those who took the traditional paper and pencil closed-book quizzes.

Conclusions and Recommendations

This paper described the efforts of one introductory accounting instructor to integrate technology supplements in a traditional face-to-face course. The purpose for using online resources was to free up class time for the integration of "soft" skills and to enhance student learning. From the instructor's perspective, the use of online supplements has improved the course. There is more class time available for questions and answers, as well as more class time devoted to solving exercises individually and in small groups. These types of activities engage the students and allow the instructor to give some emphasis to teamwork, communication and leadership skills.

The use of online quizzes frees up substantial class time. Over the course of the semester, a total of seven in-class quizzes were administered in 2007, each requiring approximately 15 minutes of class time. Switching to online quizzes in 2008 and 2009 effectively freed up two additional 50-minute class periods. Although student scores were higher for online quizzes than for traditional in-class closed-book quizzes, instructors could modify online quiz settings to more closely parallel the closed-book quiz experience. Importantly, students who took online quizzes outperformed those who took closed-book paper and pencil quizzes on the exams and earned somewhat higher grades in the course, suggesting that the online quizzes were beneficial to student performance.

The results of this research may not be generalizable due to a few important limitations. The data analysis was based on a single institution and one instructor's classes over a three year period. Other instructors at other institutions may have different experiences. Further, in an ideal situation, students would be randomly assigned to the Online and Traditional groups and take the course during the same semester. The quizzes administered to the students in different semesters were similar, but not

identical. Further, while the same text was used for all three semesters, the edition of the text changed in 2009; thus, students who took the course in 2009 used an updated book with slightly modified content. The results of this study should therefore be interpreted with caution. However, the findings offer evidence that technology supplements, especially online quizzes, have the potential to enhance teaching in a traditional setting. This offers opportunities for future research. Instructors might experiment with different types of technology supplements to determine which are most effective. Research could also examine more directly the relationship between the use of technology supplements by individual students and performance. While it seems logical that those students who take advantage of the supplements are most likely to demonstrate higher performance, empirical evidence on this issue would be very helpful. Further, there may be individual student characteristics that affect the boost from using technology supplements. Future research could examine whether certain types of learners are more likely to benefit from technology supplements than others.

As accounting instructors face increased demands to cover both technical and skill-based materials in class, technology offers a viable solution. Careful selection of technology supplements can enable professors to increase the material covered in class without overwhelming the students or themselves. This study provides some suggestions for integrating technology in the introductory accounting course and offers preliminary evidence that the technology can support improved learning outcomes.

References

American Accounting Association, Committee on the Future, Content, and Scope of Accounting Education (The Bedford Committee) (1986). Future Accounting Education: Preparing for the Expanding Profession. *Issues in Accounting Education* (Spring). 168–195.

Anonymous. (1998). The CPA Vision Project: 2011 and Beyond. *Journal of Accountancy* (December). 3–14.

Bryant, Stephanie M., Jennifer B. Kahle and Brad A. Schafer. Distance Education: A Review of the Contemporary Literature. *Issues in Accounting Education* (August). 255–272.

Flynn, Antionette, Fiona Concannon and Caoilfhionn Ni Bheacháin. 2005. Undergraduate Students' Perceptions of Technology-supported Learning: The Case of an Accounting Class. *International Journal on ELearning* (Vol. 4, Issue 4). 427–444.

Gutierrez, Daniel, Jane Wiese, Patricia Lopez, Nancy Portello and Anthony Beninati. 2004. Student Perceptions of Computer Hybrid Courses Across Three Disciplines: What Students Think About Hybrid Courses and What Type of Delivery Format They Prefer. *Journal of College Teaching and Learning* (Vol. 1, Number 8). 1–6.

Gutierrez, Daniel, and Storm Russo. 2005. Comparing Student Performance, Attitudes and Preferences in an Introduction to Business Course: Online, Hybrid and Traditional Delivery Methods—Who Makes the "A" Grade? *The International College Teaching Methods & Styles Journal* (Quarter 3).

Koenig, Robert J. 2010. Faculty Satisfaction with Distance Education: A Comparative Analysis on Effectiveness of Course Delivery Modes. *Journal of College Teaching & Learning*(February). 17–24.

Lei, Simon A. and Rajeev K. Gupta. 2010. College Distance Education Courses: Evaluating Benefits and Costs from Institutional, Faculty and Students' Perspectives. *Education* (Summer). 616–631.

Perspectives on Education: Capabilities for Success in the Accounting Profession (The White Paper) (1989). Arthur Andersen & Co., Arthur Young, Coopers & Lybrand, Deloitte Haskins & Sells, Ernst & Whinney, Peat Marwick Main & C0, Price Waterhouse, and Touche Ross. New York, NY.

U.S. Department of Education. 2008. *Distance Education at Degree-Granting Postsecondary Institutions: 2006-07.* Accessed at http://nces.ed.gov/fastfacts/display.asp?id=80 on June 11, 2010.

Vamosi, Alexander R., Barbara G. Pierce and Michael H. Slotkin. 2004. Distance Learning in an Accounting Principles Course—Student Satisfaction and Perceptions of Efficacy. *Journal of Education for Business.* (July/August). 360–366.