

An Online Course in Cost Accounting: Development, Performance & Perceptions

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ABSTRACT

The design and development of an online course in cost accounting is described and then evaluated on the basis of student performance and student perceptions about the course, its elements and its design. Student performance in the online course does not differ significantly from student performance in the traditional course, as measured by course average, course grade and final exam score. Students valued the usefulness of demonstration videos and problem assignments more than lecture videos, homework and quizzes, although all elements were deemed useful by most students. Students also were mostly satisfied with the design of the course.

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Introduction and Motivation

The movement to create online learning options for students in traditional majors caused professors at a traditional brick-and-mortar university to consider whether any upper level accounting courses could be delivered effectively in the full online format. Introductory accounting courses were offered online occasionally but most accounting faculty seemed to prefer traditional or hybrid courses. Faculty were reluctant to consider online upper level accounting course.

Faculty had a number of concerns with creating an online upper level accounting course including: Can it be done? Can it be done well? Will student learning/performance be comparable to traditional courses? What unforeseen challenges and opportunities will arise?

Cost accounting was chosen as the first upper level course to develop fully online because of the computational nature of the course and the willingness of the professor to try the online format and commit to the training required. The professor completed a university sponsored month long training in online learning, course development, and using Blackboard CE 8 course management system (CMS), as well as a brief course on Camtasia videos.

The following sections describe the development of the course and course enrollment. Then, the course is evaluated based on student performance and student perception of the course and its elements. The implications are then discussed. Finally, conclusions are reached.

Literature Review

Popular opinion amongst the professoriate suggests that many believe online learning is not as efficacious as traditional face-to-face instruction. Published studies have provided mixed results, particularly for mathematical and problem-based courses. Arbaugh et al. (2009) reviewed the online and hybrid learning literature in the business disciplines and concluded that online courses are at least comparable to traditional courses with regard to learning outcomes. Carrol and Burke (2010) found little difference in performance between an online section and a face-to-face section of an otherwise identical course in organizational behavior. Tseng and Chu (2010) concluded that an online environment can enhance learning performance in economics. Interestingly, Gratton-Lavoie and Stanley (2009) reported that online learners performed better than traditional learners in introductory economics, but differences were explained more by the age than by the delivery mode.

In accounting and finance, the literature is limited. Dunbar (2004) described the transformation of a graduate tax accounting course from a traditional format to an online format and reported on student satisfaction. Bryant et al. (2005) reviewed the distance education literature and identified best practices.

Wells et al. (2008) found that students in a second-year accounting course embraced the use of a virtual learning environment. Marriott (2008) reported that an online summative assessment in a first year accounting course not only played a significant role in the learning process, but also was perceived by students as beneficial.

With regard to particular online elements, Anakwe (2008) found no significant differences in exam performances for accounting students taking exams online and on paper. Hadsell (2009) found that timely use of quizzes was more important to exam performance than quiz feedback. Whether students

perceive an online accounting homework system is useful is likely affected by their individual intrinsic motivation and computer efficacy (Peng 2009).

The caveat that goes with almost all of this body of research is that results vary across many variables, including characteristics of the course material, the professor and the student population. Few studies describe online courses in accounting, much less required major courses, and none have compared performance of online students to traditional course students.

The accounting-related literature is very small, so more research on delivery methods in accounting courses is needed. Accordingly, this article describes the development and implementation of an upper level required course in cost accounting, student perceptions of the online course, and comparison of performance to students completing the same course in a traditional instructional setting.

Course Development

Via the university sponsored online learning training, the professor developed the first module of the course under the supervision of the campus Director of Instructional Support and an Instructional Designer. After mastering the necessary elements of the CMS, the professor proceeded to develop a total of 12 modules, roughly equivalent to chapters. Some research supports the effectiveness of instructor created online learning resources (Li et al. 2011). While many publishers provide some similar material for instructor use, such as voice over power point slides for each chapter, publisher provided material was not utilized other than the online homework environment and testbank questions.

Almost every module has similar elements.

- Objectives
- Reading assignment
- Lecture video(s)

- Example problem(s)
- Demonstration video(s)
- Homework
- Problem assignment
- Quiz

After every three modules, students take a traditional, paper-based exam, in the campus testing center.

Therefore, students have four exams, as well as a comprehensive final.

Students entering a module first see the module title and a list of learning objectives for the module.

The next item on the menu is the reading assignment for that module. This is usually a chapter or a portion of a chapter.

The next items are the lecture videos. Each module has one to four lecture videos. The majority of videos were limited to 20 minutes to promote student learning and attention. Shorter videos also allow students more control over time management as well. The lecture videos were created using the Camtasia add-in to PowerPoint.

Following a lecture, most modules have at least one example problem available as a PDF file. Each of these is followed by a demonstration video that shows the problem being solved, step by step. Students are encouraged to attempt the example problem before watching the demonstration video. Some modules have as many as three example problems and associated demonstration videos. The demonstration videos were created using Camtasia, OneNote and a tablet PC. The professor settled on this method as the most useful to the students and the most similar to how such information is delivered in a live classroom.

The balance of a module includes the assignments: homework, problem assignment and quiz. The homework is completed in an online system provided by the publisher. Problem assignments were

mostly originals created by the professor. Partly, this was done to avoid using problems in the text, which was coming out in a new edition very soon, and partly this was done to avoid having solutions available online or from former students.

The problem assignments are PDF files of an assigned problem that students may print for easy use. Students solve the assigned problem and then scan their solution to PDF (or print to PDF if they used Excel) and attach it to the assignment to turn it in. The professor hand grades (and marks up) these assignments with comments and corrections and scans them and returns them to the students individually. In addition, for some problem assignments a video was produced either demonstrating the solution or discussing common pitfalls students encountered and how to deal with them. For all problem assignments, a two example solutions, generally those created by students who scored perfectly (names removed), were posted for students to view after the problem assignment was graded. Students whose solutions were posted seemed every happy about this recognition (even though they were anonymous to other students).

The quizzes include 10 mostly objective questions created from pools averaging 40 questions. Questions are designed by the professor as topical sets and actual quizzes include random questions from each set. Students may retake quizzes as many times as they like up to the due date, receiving the highest score earned. Students are encouraged to view attempts after they are scored and learn from their mistakes as well as the provided explanations of calculation questions. Quizzes are a learning tool, rather than an assessment tool.

Course Enrollment

The full online course was first offered Spring 2011 and 30 students enrolled. The course normally has a enrollment limit of 25 but this was raised because of demand. Nine students ultimately dropped the

course by the drop deadline. This drop rate of 30% is slightly higher than in traditional courses. A few of the students, in fact, never actually engaged in the online course material in any significant way.

Of the 21 students who completed the course, 95% had previously taken an online course and 81% had taken two or more online courses. Only one student had not taken an online course previously.

Evaluating the Course

The success (or lack of it) of the course can be evaluated two ways. First, the performance of the students can be measured and compared to a traditional course. Second, the course itself can be evaluated by asking students for their input with regard to the usefulness and success of various aspects of the course.

Student Performance

Student performance in the online course was compared to the same course the previous semester.

Three overall performance measures are compared: final exam, course average, and letter grade.

First, the same comprehensive final exam given was given both the traditional and online courses.

Online students averaged 74% and traditional students averaged 72%. As shown in Table 1 Panel A, these differences are not statistically significant ($p=0.450$). Therefore, online students performed on the final exam similarly to traditional students.

Second, student course averages also did not differ significantly ($p=0.729$) by method of course delivery.

The online students averaged 75.8% and the traditional students averaged 76.7%. Since the online course was designed with more graded elements than the traditional course, a difference might have been expected. These additional elements (quizzes and problem assignments) were designed to engage

the students with the course material in the online environment. In the traditional environment, the (live) professor can enable and gauge that engagement differently, of course.

Table 1. Comparison of student performance by course type

Panel A: Two-sample t test with equal variances (Final Exam)

<u>Class</u>	<u>Obs</u>	<u>Mean</u>	<u>Std. Err.</u>	<u>Std. Dev.</u>	<u>[95% Conf. Interval]</u>	<u>t</u>	<u>df</u>	<u>P</u>
Trad'l	32	71.81	1.64	9.29	68.46 75.16	-0.761	51	0.450
Online	21	74.10	2.74	12.55	68.38 79.81			

Panel B: Two-sample t test with equal variances (Course Average)

<u>Class</u>	<u>Obs</u>	<u>Mean</u>	<u>Std. Err.</u>	<u>Std. Dev.</u>	<u>[95% Conf. Interval]</u>	<u>t</u>	<u>df</u>	<u>P</u>
Trad'l	32	76.72	1.55	8.76	73.56 79.88	0.348	51	0.729
Online	21	75.80	2.24	10.27	71.13 80.48			

Panel C: Two-sample t test with equal variances (Letter Grade)

<u>Class</u>	<u>Obs</u>	<u>Mean</u>	<u>Std. Err.</u>	<u>Std. Dev.</u>	<u>[95% Conf. Interval]</u>	<u>t</u>	<u>df</u>	<u>P</u>
Trad'l	32	2.59	0.17	0.98	2.24 2.95	2.208	51	0.273
Online	21	2.29	0.22	1.01	1.83 2.74			

Third, student letter grades for the course were compared by calculating a course GPA (grade point average) out of 4. The online course GPA was 2.29 and the traditional course GPA was 2.59. These results do not differ significantly (p=0.273).

Clearly, the online course and the traditional course, from a student performance perspective, produce similar results. This fact may help alleviate some professors' concerns about online courses resulting in worse student performance and other outcomes.

Course Evaluation

The course was evaluated by surveying the students after the end of the semester. Students completed an online survey inside the CMS. Several questions examined each element according to student ratings of usefulness and how frequently students used each element. These are discussed first. Then,

questions about the design of the online course are addressed. Finally, questions about student satisfaction are described.

Course elements

The major course elements that are designed to promote student learning include lecture videos, demonstration videos, quizzes, homework, and problem assignments. These are first discussed separately and then compared.

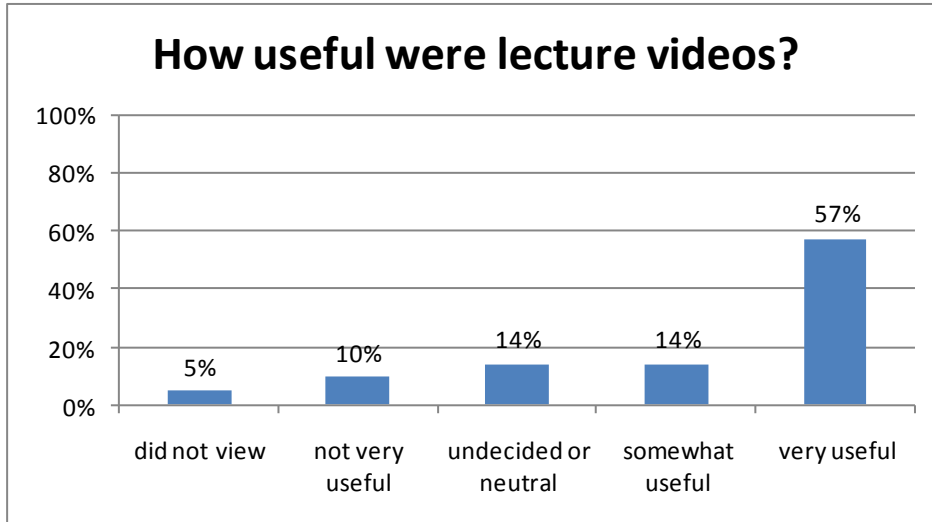
Lecture videos

Students were asked to rate the usefulness of the lecture videos and to identify how frequently they watched lecture videos more than once. Results are illustrated in Figure A. A majority of students rated the lecture videos as *very useful*. Curiously, one student did not actually view the lecture videos. Further investigation revealed that this particular student made the highest grade in the course. Clearly, this student moved on to the demonstration videos and performed very well without the lectures. This strategy is probably not workable for most students, of course.

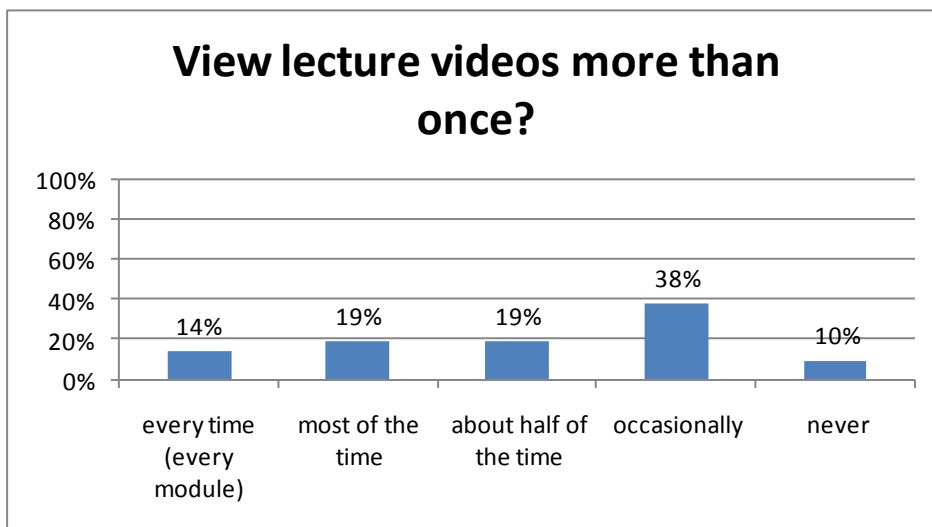
One third of students viewed lecture videos more than once most or all of the time. The largest group of students (just over a third) occasionally viewed lectures more than once. Only 10% of students never viewed lectures more than once. The lecture videos easily allow the students to fast forward or reverse to find segments they want to view again. This function is potentially quite useful to students who want to listen to a portion of a lecture on a particular subtopic again. However, some research suggests that students who use the pause feature too much may be using an ineffective surface strategy of learning (Le et al. 2010).

Figure A. Post course survey: Lecture videos

Panel A. *How useful did you find the video lectures?*



Panel B. *How often did you view video lectures more than once?*

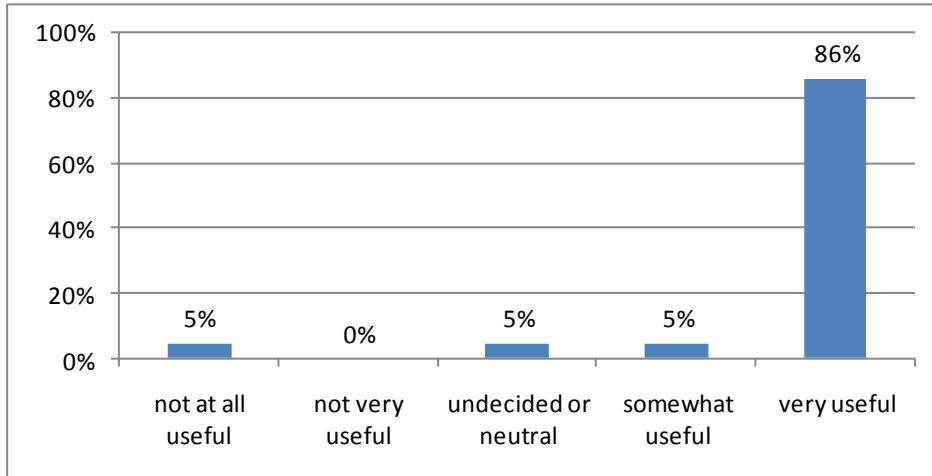


Demonstration videos

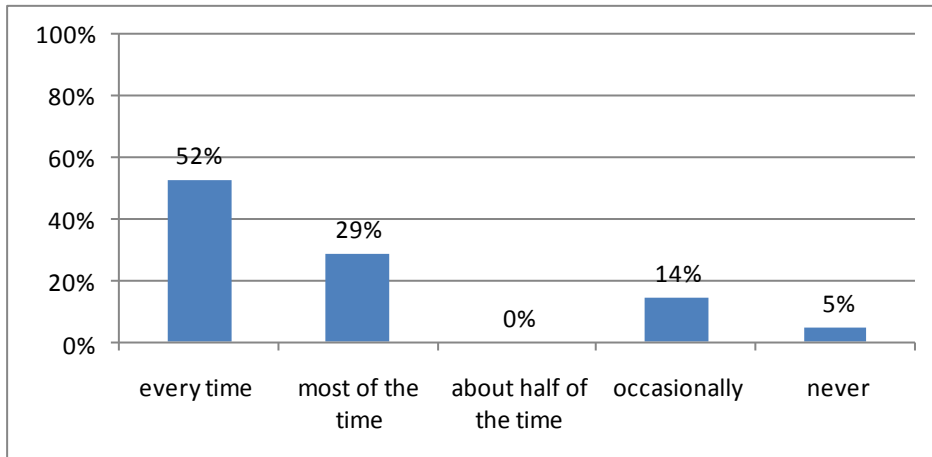
A large majority (86%) rated the demonstration videos as very useful as shown in Figure B Panel a. Over 90% of students found them very or somewhat useful. Since the demonstration videos were the professor’s attempt to bring the sort of live classroom problem solving and examples to the online course, this result is good news.

Figure B. Post course survey: Demonstration videos

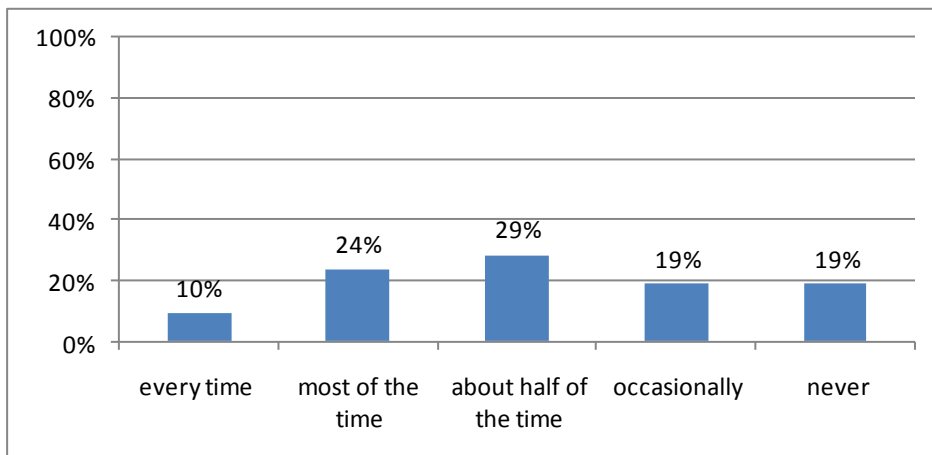
Panel A: *How useful did you find the example demonstration videos to your online learning?*



Panel B: *How often did you print the example PDF before viewing the demonstration video?*



Panel C: *How often did you attempt the example before viewing the demonstration video?*



Students were encouraged to print the example PDF before viewing the demonstration videos so they would have all the given information in front of them while the problem was demonstrated. More than half of the students printed the PDF every time. Over 80% of students printed the example PDF most or all of the time.

Students were also encouraged to work the example problem before viewing the demonstration. The professor's traditional classroom experience suggests that students who attempt the problem before watching the professor solve the problem learn more than students who just watch the professor solve the problem. One-third of students attempted the problem most or every time before watching the demonstration video. Just under one-third of students attempted the example problem about half of the time before watching the demonstration video.

Quizzes

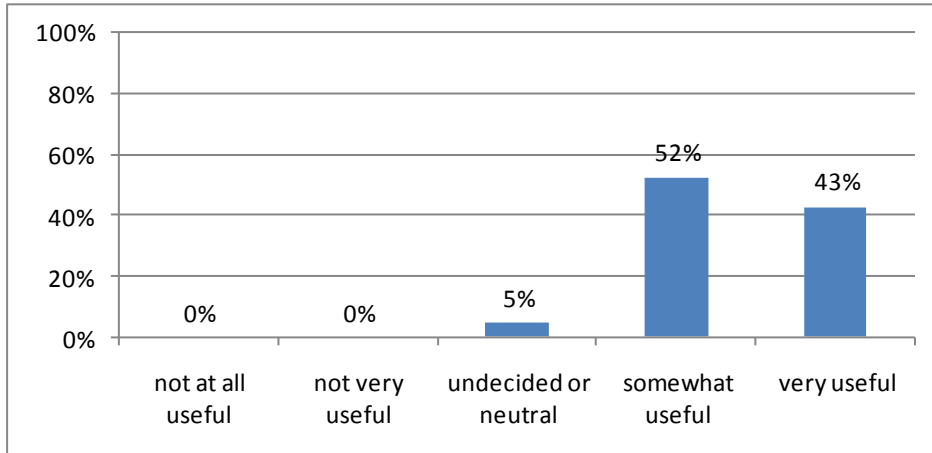
Almost all students found the quizzes useful as shown in Figure C. The quizzes were rated very useful by 43 of students and either very useful or somewhat useful by 95% of students. Given the amount of time the professor spent on entering questions and designing question sets, this is good news.

All of the students took at least some of the online quizzes multiple times to increase their score. Almost half of students took the online quizzes more than once every time, and 91% of students repeated quizzes most or every time.

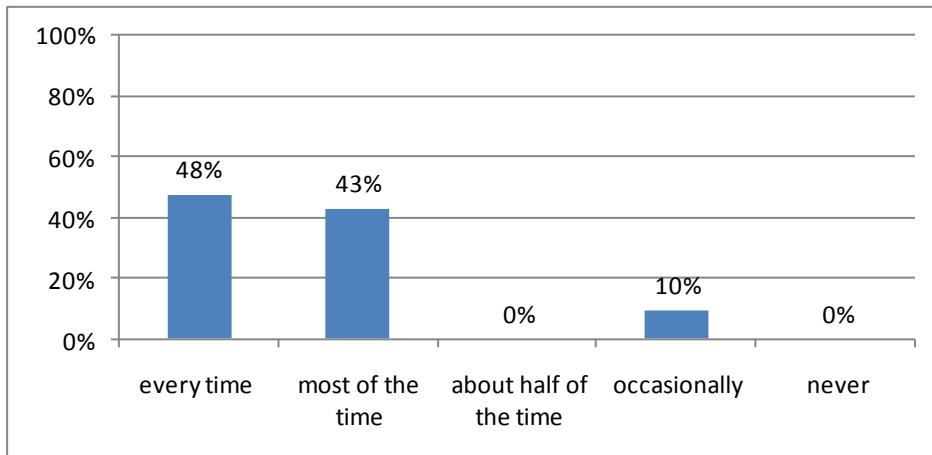
Students were also asked to rate the usefulness of this repetition of quizzes. Two-thirds of students found this repetition very useful to their learning. All students found the repetition somewhat or very useful.

Figure C. Post course survey: Quizzes

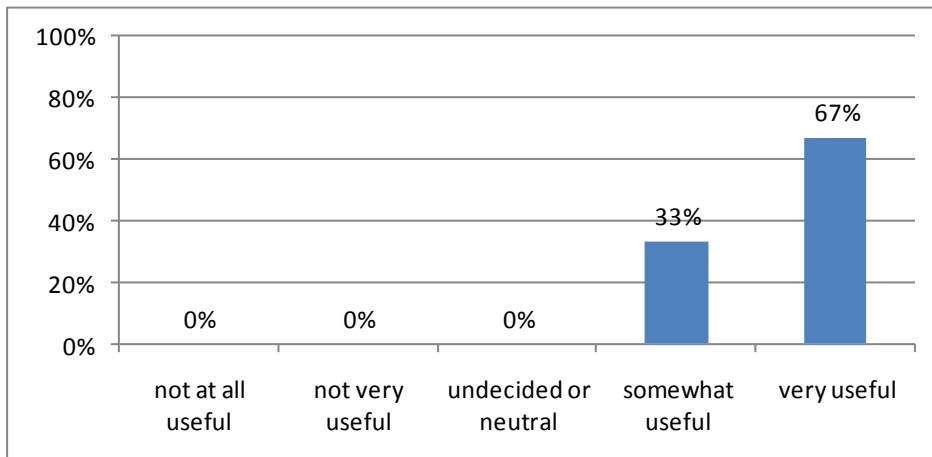
Panel A: *How useful were online quizzes?*



Panel B: *Did you take online quizzes multiple times to increase your score?*



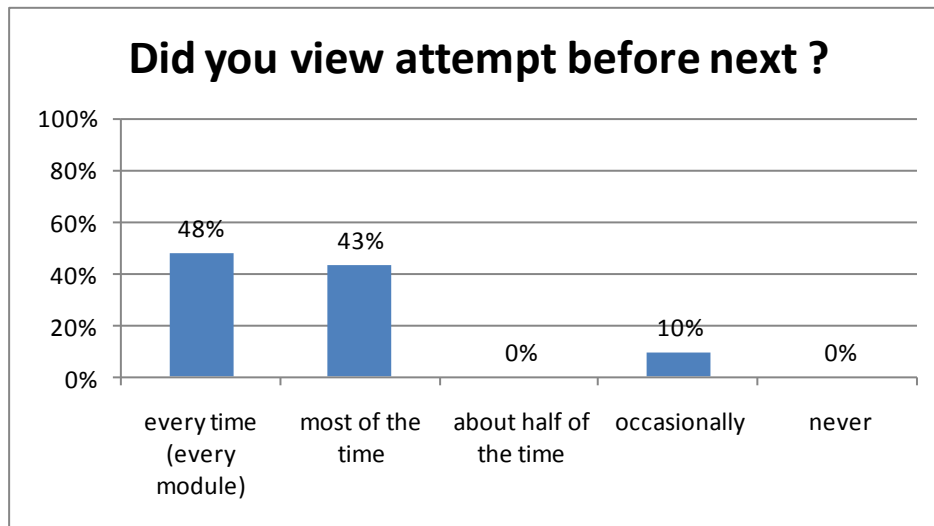
Panel C: *How useful did you find these online quizzes repetition to your learning?*



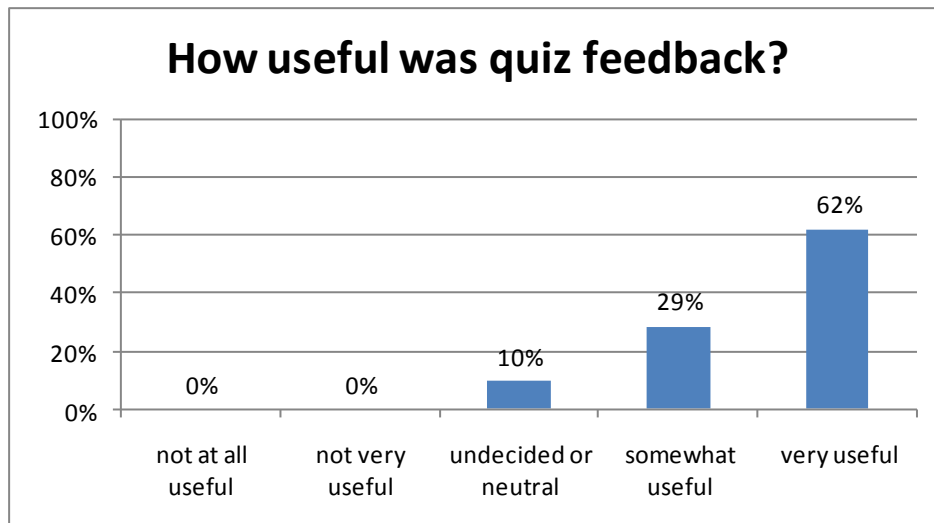
Students were allowed to view a quiz attempt after it was scored (See Figure D). The views included explanations for all computational questions. The presumption was that viewing the attempt would help the student learn by showing them the right answers and the correct steps to calculate results. Almost

Figure D. Post course survey: Quiz attempts and feedback

Panel A. *How often did you view the finished attempt before taking the quiz again?*



Panel B. *How useful was the quiz feedback (particularly on calculation questions)?*



half of students viewed every quiz attempt before moving on to another try at the quiz. Over 90% of students viewed the attempt most of all of the time.

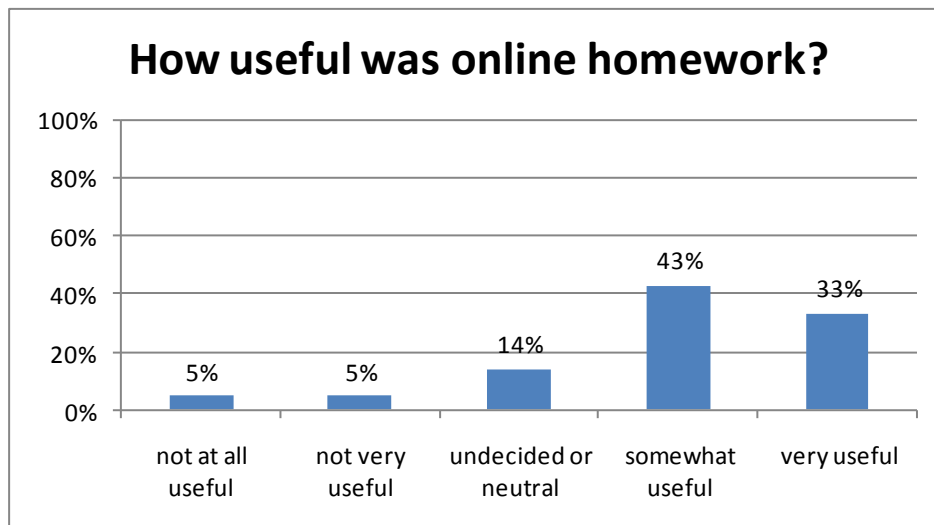
Furthermore, almost two-thirds of students described the quiz attempt feedback as very useful. Over 90% described the feedback as somewhat or very useful. This ability for the student to view attempts and for the professor to embed feedback in the quiz results may be a very useful function in online courses.

Homework

One third of students described online homework as very useful as shown in Figure E. Three fourths of students described homework as somewhat or very useful. Given the amount of homework often assigned in accounting courses, having a majority of students find it useful is good.

Figure E. Post course survey: Homework

How useful did you find the online (MAL) homework to your learning?



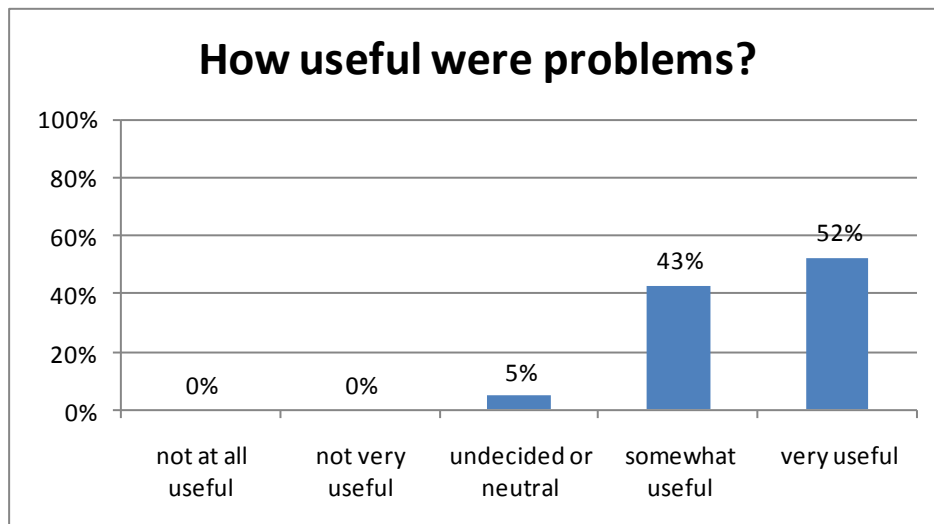
Problem assignments

The majority (52) of the students thought the problem assignments were very useful (see Figure F).

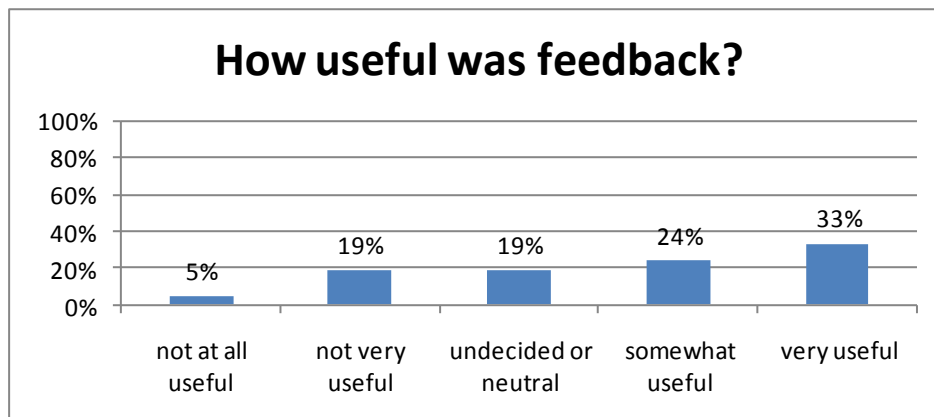
Almost all (97%) describe the problem assignments as somewhat or very useful. One-third of the students found the professor's handwritten feedback very useful and another quarter described the feedback as somewhat useful.

Figure F. Post course survey: Problem Assignments

Panel A. *How useful did you find the problem assignments in your learning?*



Panel B. *How useful did you find the professor's feedback on problems assignments?*

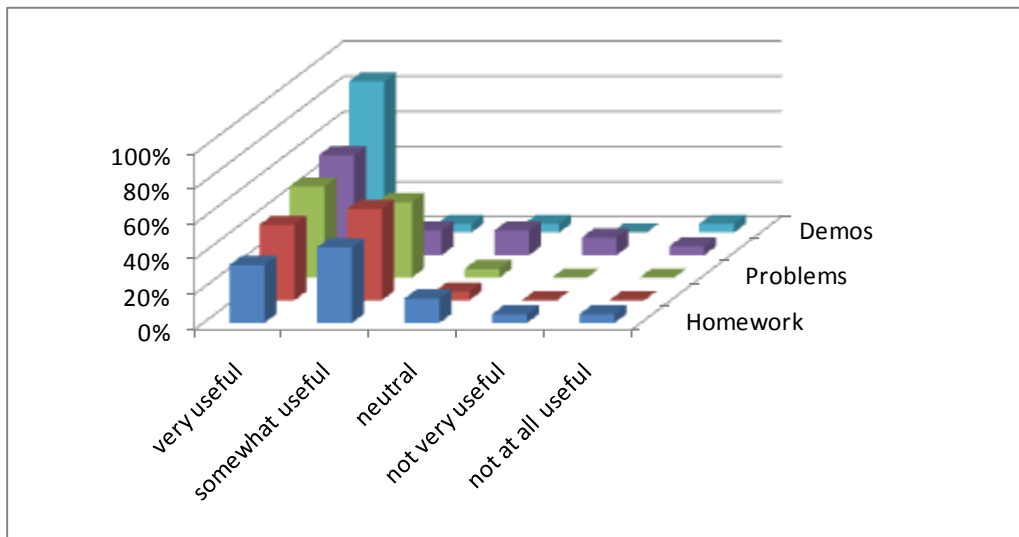


All elements

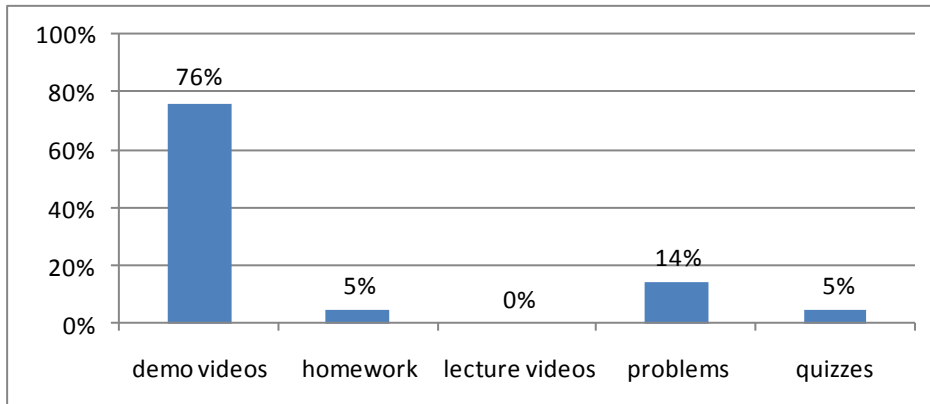
A comparison of the usefulness rankings for each element is provided in Figure G. The demonstration videos were rated the most useful by students. Lecture videos had the next most votes for very useful, but problem assignments had more votes combined in *somewhat /very useful* than lecture videos. All of the elements received some level of positive usefulness rating from the majority of students.

Figure G. Post course survey: Comparison of course elements.

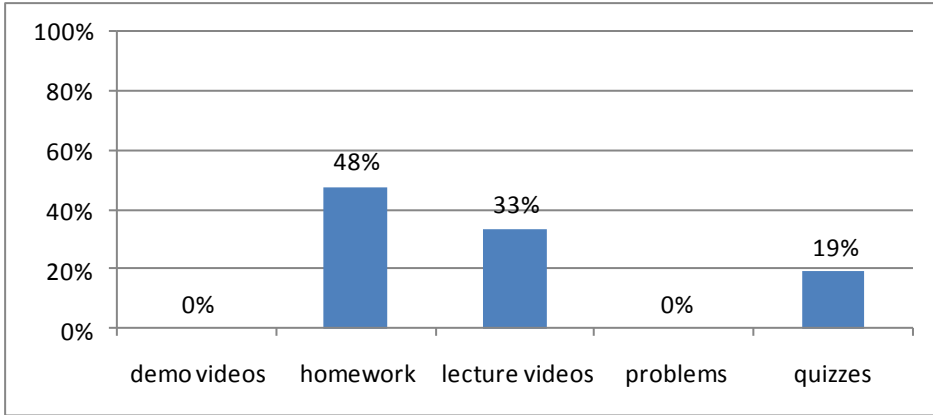
Panel A. *How useful was <course element>?*



Panel B. *Which element contributed most to your learning?*



Panel C. *Which element contributed least to your learning?*



To compare the elements more directly, students were asked which element contributed the most to their learning and which element contributed the least. The demonstration videos were chosen as the most effective by three quarters of the students. Problem assignments were a very distant second place at 14%. No students chose lecture videos as the most effective.

In contrast, almost half of students chose homework as contributing least to their learning. Of course, this might just reflect their unhappiness with having the usual heavy load of homework in an upper level accounting course. One third of students chose lecture videos as contributing least to their learning and 19% chose quizzes as contributing least to their learning. No students chose demonstration videos or problem assignments as contributing least to their learning.

Course design

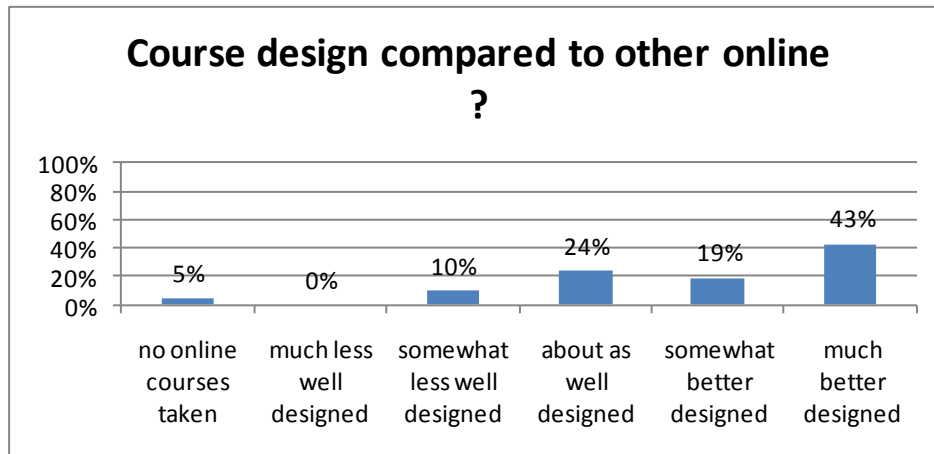
Students were asked how this online course's design compared to other online courses they had taken (see Figure H). Of the students who had previously taken online courses, 45% believe this course is much better designed than other online courses and 20% said it was somewhat better designed. A quarter of students said this course was about as well designed as other online courses they have taken.

Students also indicated their satisfaction with the course design. A majority (57%) of students strongly agree that they are satisfied with the course design. A further 29% somewhat agree that they are satisfied with the course design. Only 10% of students somewhat or strongly disagreed with the statement, I am satisfied with the design of this online course.

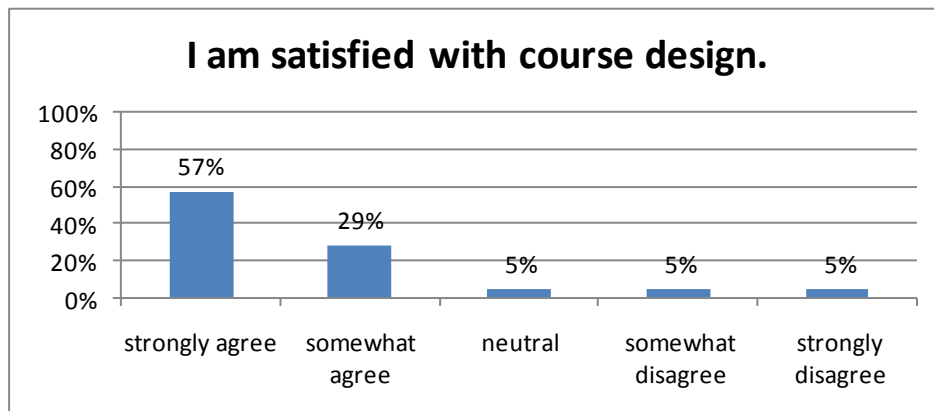
Given this experience with an upper level online course, students were asked if they would take another online upper level accounting course if one were offered. Almost 60% indicated they are somewhat likely (10%) or very likely (48%) to take another upper level accounting course if offered online.¹

Figure H. Post course survey: Course design issues

Panel A. *This accounting course's online design compared to other online courses was...?*

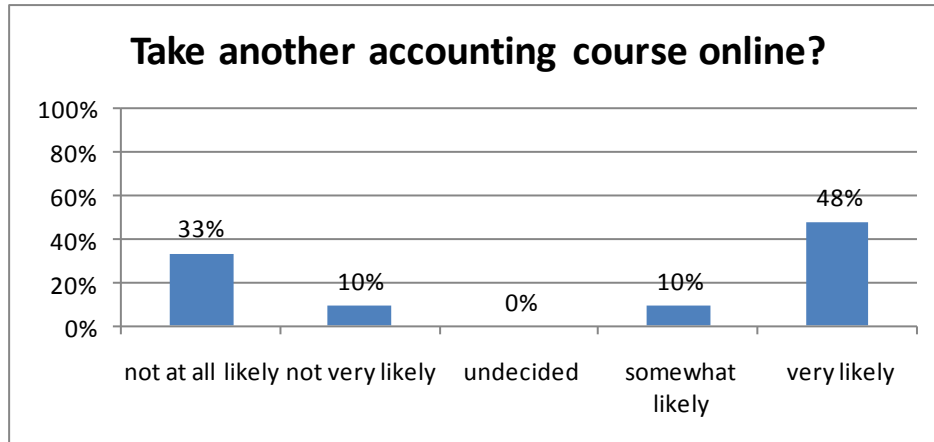


Panel B: *I am satisfied with the design of this online course.*



Panel C. *If another upper level accounting course is offered online, how likely are you to take it?*

¹ Interestingly, the upper level course the most students thought would be amenable to online development was accounting information systems.



Discussion

Every online course development, design and experience will be different. However, some general lessons have been learned from this online course experience that may apply to other upper level accounting courses or similarly quantitative courses in other disciplines.

First, developing an effective online course from scratch will almost always take more time and energy than the professor thinks a priori. The number of hours spent learning the CMS, designing the course structure, and creating all the course elements. While the hours spent creating this content were not tracked, the amount of principle output gives a general idea of the scope of the effort:

- About 8 hours of lecture videos recorded, edited, produced and uploaded
- About 15 example problems created and tested
- Over 6 hours minutes of demonstration videos recorded, edited, produced and uploaded
- Over 400 quiz questions programmed (for 12 module quizzes)
- A dozen problem assignments created and tested

These, of course, are in addition to the usual time spent developing the syllabus, setting up the publisher provided online homework system, and creating and grading exams, all of which is part of the related traditional live course. From a workload perspective, the time spent developing a quality online

course is not wasted effort. Most materials and elements developed can be reused in subsequent semesters' (online or hybrid or web-enhanced) courses and time spent mastering the CMS will pay off in reduced workload in later semesters.

Second, drop rates may be higher in an online course. This was not a surprising result and the 30% drop rate was not deemed worrisome by university administration in the context of the usual drop rates in such courses at this university. The professor regularly attempted to contact any students who were not logging in regularly and turning in assignments when due. Some of these attempts were appreciated by students who simply needed encouragement. A few students never responded to any efforts at email contact and subsequently dropped the course. Clearly, some increase in email contact may be appropriate when teaching an online course. Research supports the need for higher levels of interaction and support to assist in retention in online courses (Ludwig-Hardman and Dunlap 2003). Because high procrastinators are less successful online learners (Michinov et al. 2011), frequent email interaction may also help encourage them keep up.

Third, using a tablet PC to create demonstration videos worked well as a method for delivering online explanations of problem solving in a manner that is similar to a traditional live course. This required the purchase of a tablet PC but was not technologically difficult. This may be a worthwhile purchase for professors or accounting departments considering online course development.

Fourth, some elements of the online course will be perceived by students to be (and may actually be) much more useful for promoting learning. In this course, the most effective element for promoting learning was the demonstration videos. However, different students will value different elements, as shown by the usefulness ratings of the various elements. Every element was described as very useful by at least some students. No elements were described as not useful at all by a majority of students.

Fifth, the elements of the online course apparently valued by the largest number of students are the demonstration videos and the problem assignments. The demonstration videos, as previously mentioned, allow students to watch and hear the professor solving example problems. The problem assignments required student problem solving but also provided direct individual feedback from the professor. Similar courses may also benefit from elements like these.

Conclusion

While the development of an online course is a major endeavor, a well-designed and well-received course can be a pleasure to deliver. Students appreciate thoughtful design of elements that are likely to assist them in learning. A well-designed online course will result in student performance similar to a traditional course.

In a quantitative problem-based course such as cost accounting, elements that demonstrate problem solving should be emphasized. In this course, these include problem demonstration videos and problem assignments with individual feedback. Standard supporting elements, such as lecture videos, online quizzes (with feedback), and homework, will also support student learning.

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