Giving Online Quizzes in Corporate Finance and Investments for a Better Use of Seat Time

Zhuoming "Joe" Peng, *State University of New York College at Oswego*

Abstract

The primary benefit of providing out-of-class online quizzes in a face-to-face class is to gain more in-class time. A study designed to investigate this issue was conducted during the Spring 2006 and Spring 2007 semesters. Thirty-one and 34 Corporate Finance undergraduate students from each semester, and 33 and 36 Investments undergraduate students from each semester participated in this study. Do students cheat whilst taking online versus in-class quizzes? Key results indicate no significant differences between online versus in-class administered quizzes. This finding alleviates concerns about student cheating and hence frees up in-class time for additional materials and interactions.

The process of administering an online quiz is discussed in detail. The monetary cost of using a test generator program to create an online quiz is nominal in comparison with the licensing fee of any online course management software. Giving online quizzes does appear to be a better use of class seat time, and this pedagogical method is recommended to faculty delivering courses using face-to-face instructional design, especially those who are teaching corporate finance or investments.

Thanks for helpful comments go to the two anonymous reviewers, Ronald Bremer, Bill Dukes, Matthew Elbeck (the editor), John Kane, Elizabeth Schmitt, and Zhong Ying. All remaining errors are my own.

Introduction

The process of using online quizzes in a traditional face-to-face (F2F) course has been in effect for several years. The education literature generally supports the premise that using online quizzes in the F2F course delivery contributes positively to students' learning experience and outcomes. Examples of such research include Norman *et al.* (2000), Brothen and Wambach (2004), Daniel and Broida (2004), Dunbar (2004), Bandy (2005), Bol *et al.* (2005), Marcus (2005), Schnusenberg (2005), Peng (2006), Brothen and Wambach (2007), and Waite (2007). As an earlier research in the area of online quiz taking, Norman *et al.* (2000) illustrated how online quizzes were programmed in JavaScript. *WebCT* was used in Dunbar (2004), Brothen and Wambach (2007), and Waite (2007); while *Blackboard* was used in both Marcus (2005) and Schnusenberg (2005).[1]

Online course management software has been used in many universities, and we also have seen the emergence of a new pedagogy in hybrid instruction with reduced seat time. However, online course management software, such as *Angel*, *WebCT*, or *Blackboard*, can be expensive.[2] Peng (2006) presents an alternative of how a finance course with traditional face-to-face instruction can be delivered with all the course materials online and with multifaceted applications of Internet-based technologies while no seat time is reduced. The monetary cost of this alternative either to the university or to the faculty is nominal. It is indicated in Peng (2006) that "any faculty with some basic know-how of *FrontPage*® or rudimentary *UNIX* operational skills can adopt or modify the method easily, Page 11." In addition, it is mentioned, "students comment that they like to take out-of-class online quizzes primarily because there would be more time in class to cover additional materials or have additional classroom interactions, Page 11."

Purpose

The aim of this paper is to extend Peng (2006) and explore several aspects of giving out-of-class online quizzes.

1. We try to explain the process of taking an online quiz without using any course management software. The test generator program used in the process is called *ExamView*®.[3] The author started using it because of the suggestion from a colleague at

another university. A test generated by the program can be readily exported to several leading course management software systems, such as *Angel*, *WebCT*, or *Blackboard*.[4] It is understandable that some might think that an online quiz is rather cheating-prone in comparison with the cheating possibly done in a quiz given in class.

2. We attempt to clarify the security issue of an online quiz by employing several statistical tests.
3. We present the potential benefits of this teaching method to students and faculty along with certain caveats of using it.

Data Descriptions

Data used in this paper were collected in the spring semester of 2006 and the spring semester of 2007 by means of online quizzes and in-class quizzes administered to students enrolled in;[5]

- **Corporate Finance**, a junior level introductory finance course offered to all business majors, and
- **Investments**, a junior level finance course offered to finance and accounting majors.

Additional data regarding students' opinions about taking online quizzes in the two F2F classes were collected by means of an end-of-semester survey. At the end of each semester, the professor announced in class that there would be an online survey available and encouraged students' participation. It was posted to the professor's website as a hypertext markup page so that it could be accessed through any of the standard web browsers.[6] A student submitted his or her response by clicking the "Submit" button at the bottom of the survey page after the questionnaire had been filled out online.

A Process of Administering an Online Quiz

How an Online Quiz Is Taken

Quizzes given in the author's classes are usually administered online. After a quiz is made up and posted to the Internet, an email notice is sent to the whole class.[7] First, students go to the author's main website and access the quiz through the hyperlink provided on the site.[8] Generally speaking, a quiz is multiple-choice in format. Each quiz is given out-of-class. For an online

quiz, students need to complete it within a pre-announced quiz-taking window, and the length of the window is usually set as 30 hours. Each quiz is timed, and the allotted quiz-taking time is usually set as the length of one class period (80 minutes).[9] Each student may take an online quiz only once. The test generator program generates individualized versions of the same quiz for each student randomly, i.e., Question 1 in Student A's quiz could be Question 10 in Student B's quiz.

How an Online Quiz Is Graded

After a student clicks the "Submit" button at the bottom of the webpage containing the quiz, his/her quiz score is stored by *ExamView*. A software called *ExamView Test Manager* is used to retrieve each student's quiz grade from the Internet soon after the quiz-taking window is closed.[10] In turn, each student receives an individualized email from the professor with his/her own quiz grade, along with the pertinent quiz statistics of the whole class.[11]

How Students Access the Quiz Already Taken Along with Its Solution

Within 24 hours after a quiz is taken, it is posted to the author's website as an *Adobe Acrobat*® PDF file along with its solution. Students who have enrolled in the class can access these course materials. See Peng (2006, p.3) for details of setting up a password-protected web page.

The Security Issue: Is There Any Difference in Grade Distribution between an In-class Quiz and an Online Quiz?

Quite a few graduate school admission tests or professional certification examinations have adopted the online format, such as GMAT or CPA Exam. Thus, business students can benefit from taking online quizzes or exams in a course with traditional face-to-face instructions. Although the precautionary measures mentioned in the previous section can reduce the occurrence of cheating to some extent, there may still be a security issue since an online quiz is taken out of class. It is understandable that some might think that an online quiz is rather cheating-prone. However, there is a proverbial saying, "In God we trust, for everything else we need data."

In the Spring 2006 semester, two undergraduate finance courses were taught by the professor. One was Corporate Finance (FIN 325), a junior level introductory finance course offered to all business majors; and another was Investments (FIN 354), a junior level finance course offered to finance and accounting majors. There were a total of six quizzes given in FIN 325 and FIN 354, respectively. The first five quizzes given in both courses were online in format. Before Quiz 6 was given, an announcement had been made that it would be taken in-class using scantrons. Thus, students took Quiz 6 in the classroom and it was proctored by the author and his teaching assistant. The allotted quiz-taking time of Quiz 6 was the same as that allowed in each online quiz. As mentioned earlier, for an online quiz, the test generator program generates individualized versions of the same quiz. However, different versions of Quiz 6 would need to be made manually, so five versions of Quiz 6 were created for FIN 325 and FIN 354, respectively.

The summary statistics of these six quizzes are provided in Table 1. If cheating was more prevalent amongst students taking online quizzes, the median or average scores of Quiz 6 would be significantly lower. However, it is not so indicated in the table.

TABLE 1: Summary Statistics of Each Online Quiz and the in-class Quiz, Quiz 6

	Average	Median	Standard Deviation	Max.	Min.
Panel A: Corporate Finance Class, FIN 325					
FIN 325, Quiz 1	63.33	66.67	12.62	80.00	33.33
FIN 325, Quiz 2	79.14	80.00	14.93	100.00	40.00
FIN 325, Quiz 3	76.90	80.00	10.61	100.00	53.33
FIN 325, Quiz 4	52.35	46.67	22.93	93.33	0.00
FIN 325, Quiz 5	69.33	70.00	15.64	93.33	40.00
FIN 325, Quiz 6	70.54	73.33	16.40	93.33	33.33
Panel B: Investments Class, FIN 354					
FIN 354, Quiz 1	75.17	73.33	14.32	100.00	26.67
FIN 354, Quiz 2	77.14	80.00	15.06	100.00	40.00
FIN 354, Quiz 3	82.41	86.67	16.04	100.00	40.00
FIN 354, Quiz 4	72.89	83.33	22.31	100.00	0.00
FIN 354, Quiz 5	72.69	73.33	16.01	100.00	26.67
FIN 354, Quiz 6	71.31	80.00	22.02	93.33	13.33

TABLE 2: Wilcoxon Signed Ranks Test

The difference between each student's first five quiz scores and his/her Quiz 6 score is taken, respectively. In turn, Wilcoxon signed ranks test is performed on these differences.

Panel A: Corporate Finance Class, FIN 325

Test of median = 0 versus median > 0

	Number of Students	Wilcoxon Statistic	*P-value*
Quiz1 - Quiz6	30	179.5	0.864
Quiz2 - Quiz6	30	335.5	0.018
Quiz3 - Quiz6	28	231.5	0.262
Quiz4 - Quiz6	30	42.0	1.000
Quiz5 - Quiz6	31	225.0	0.677

Panel B: Investments Class, FIN 354

Test of median = 0 versus median > 0

	Number of Students	Wilcoxon Statistic	*P-value*
Quiz1 - Quiz6	35	385.5	0.126
Quiz2 - Quiz6	35	442.5	0.019
Quiz3 - Quiz6	33	436.5	0.003
Quiz4 - Quiz6	34	272.0	0.672
Quiz5 - Quiz6	33	249.0	0.716

Table 2 reports the results of the test of the null hypothesis,

> ***H_0*:** students' cheating was not more prevalent in taking online quizzes than taking an in-class quiz on scantrons

against the one-sided alternative hypothesis

> ***H_1*:** students' cheating was more prevalent in taking online quizzes than taking an in-class quiz on scantrons

In the corporate finance class, FIN 325, except Quiz 2, the null hypothesis cannot be rejected with the level of significance of the test being at 5%. In the investments class, FIN 354, except Quiz 2 and Quiz 3, the null hypothesis cannot be rejected with the level of significance of the test

being at 5%. The few significant test results, i.e., they are indicated by a *p-value* less than 5%, are unlikely to be explained by students' cheating in these online quizzes. Rather, it may well be due to the fact that certain topics in either FIN 325 or FIN 354 being tested earlier in the semester appear to be easier for students to understand than those covered in the last quiz of the semester. Otherwise, it would be difficult to explain why students did not appear to be cheating on other online quizzes.

Quiz 6 had five versions, and the author used a seating chart and proctored the quiz with his teaching assistant. There were 31 students who took Quiz 6 in FIN 325 and 33 students who took Quiz 6 in FIN 354. No cheating activities were seen during the quiz. The quiz was open-book, open-notes, which was the same format used in each online quiz. Financial analysis is by its very nature quantitative, and spreadsheets are used in the author's classes to analyze most problems. The author suggests that the students use a computer equipped with spreadsheet software to take a quiz. Students had been told that they were not allowed to exchange any information by any means while taking a quiz either online or in-class.

However, the statistical test stated above may be a weak argument that it tests a cheating effect. The reason is that a student's scores on quizzes could differ because each quiz covers different topics. It would have been better if we had one group of students taking the quiz in-class and another group taking the same quiz online. In the Spring 2007 semester, the author was teaching the same two courses again. For the third quiz given in both FIN 325 and FIN 354, respectively, the professor randomly selected approximately half of the students to take it on scantrons in class while the remaining students taking it online. In FIN 325, there were 17 students taking the quiz on scantrons with another 17 students taking it online. In FIN 354, there were 19 students taking it on scantrons with another 17 students taking it online.[12]

TABLE 3: Two-Sample Tests

For the third quiz given in Spring 2007, roughly half of the class were randomly selected to take it on scantrons in class while the remaining students taking it online. In FIN 325, there were 17 students taking the quiz on scantrons with another 17 students taking it online. In FIN 354, there were 19 students taking it on scantrons with another 17 students taking it online.

Panel A: Corporate Finance Class, FIN 325

Two-Sample *T* Tests

Variable	Variances	DF	*t* Value	Pr > |t|
Score	Equal	32	-0.22	0.8239
Score	Unequal	30.9	-0.22	0.8239

Wilcoxon Two-Sample Test

Statistic	290.5000
Normal Approximation	
Z	-0.2263
One-Sided Pr < Z	0.4105
t Approximation	
One-Sided Pr < Z	0.4112

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0594
DF	1
Pr > Chi-Square	0.8074

Panel B: Investments Class, FIN 354

Two-Sample *T* Tests

Variable	Variances	DF	*t* Value	Pr > |t|
score	Equal	34	0.53	0.6028
score	Unequal	33.5	0.53	0.5981

Wilcoxon Two-Sample Test

Statistic	333.5000
Normal Approximation	
Z	0.5954
One-Sided Pr > Z	0.2758
t Approximation	
One-Sided Pr > Z	0.2777

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.3739
DF	1
Pr > Chi-Square	0.5409

The hypothesis testing is as follows,[13]

> ***H_0*:** students' cheating was not more prevalent in taking an online quiz than taking the same quiz in class on scantrons

against the one-sided alternative hypothesis

> ***H_1*:** students' cheating was more prevalent in taking an online quiz than taking the same quiz in class on scantrons

There is no statistically significant difference in the average or median score per student between the students taking the quiz online and those taking it on scantrons. This conclusion can be obtained by any of the test results reported in Table 3.[14] In the two-sample *t* tests, the *p*-value is 0.4120 for the FIN 325 class; and it is 0.3014 for the FIN 354 class.[15] In the Wilcoxon rank-sum tests, the *p*-value is 0.4105 for the FIN 325 class; and it is 0.2758 for the FIN 354 class. In the Kruskal-Wallis tests, the *p*-value is 0.4037; and it is 0.2705 for the FIN 354 class. In addition, there is no statistical evidence that the variability of the quiz scores of students taking it online in both classes is different from the scores of those taking it on scantrons. Therefore, there is again no evidence that online cheating is more prevalent.

In the professor's syllabus, it is stated that each student's quiz average during the course of the semester counts 10% of his/her final course grade.[16] For example, the following table contains the grading policy of FIN 354, Investments, in the spring 2007 semester:

Components of your course grade	Proportion of each component to your final grade
Attendance	5%
Quizzes	10%
Team Case Written Report	11%
Case Presentation	9%
Case Participation as Non-presenters	3%
Class Project	11%
1st Exam	17%
2nd Exam	17%
3rd Exam	17%

As stated earlier, the quiz average counts 10% of a student's final course grade. The remaining 90% of the grade is determined by the student's performance in the classroom, i.e., grades on the exams, presentations, the attendance, as well as the group written assignments. It is required that the students take each exam proctored in the classroom during the regular class meeting time, and each exam carries considerably more weight than the quiz average in determining a student's final grade. Thus, in addition to the aforementioned precautionary measures which can reduce the occurrence of cheating, the design of the grading policy appears to be a disincentive to a student's possible cheating behavior while taking an online quiz.

We can conclude that the online format of a quiz had nothing to do with how a student would cheat. In other words, if a student is a "cheater", it does not seem that the online format would make it easier for him/her to cheat. However, it would be amiss if we do not provide certain caveats. That is, we cannot categorically state that no student had ever cheated either online or in-class while taking a quiz.

Giving Online Quizzes: The Potential Benefits to Students and Faculty

In a semester with six online quizzes given, it is the author's estimation that the seat time of roughly three class sessions would be "saved" to cover additional materials. For example, in FIN 325 because of the "saved" seat time, students would be able to have an in-depth exposure of how to utilize *Excel* to construct a complete loan amortization schedule due to the fact that such a schedule would require using several *Excel* functions that are not seen in simpler time value of money problems. In FIN 354, the "saved" seat time was used to discuss how to use *Excel* to construct the Markowitz's efficient frontier, how to utilize the real-time data from *The Wall Street Journal* to compute the bond equivalent yield of an outstanding Treasury Bill, and to have additional discussions with regard to the class project and the group case that students will need to present in class. It is also our belief that the seat time would be better used to go over quiz questions that most students missed in lieu of having them taking the quiz in class, especially given the results reported in Table 3 of this paper.

As indicated earlier, students comment that they like to take out-of-class online quizzes primarily because there would be more time in class to cover additional materials or have additional classroom interactions. Students' other comments selected from the end-of-semester survey include,

- "All his online tests/quizzes are automatically timed; everyone has exactly the same amount of time to complete the test."
- "Dr. Peng's online testing system also gets students used to working in an online environment to conduct business (in this case taking the quiz)."
- "Conducting business via the Internet is growing everyday and is reality for all business small and large. Professor Peng's online testing environment helps familiarize students with an online "business" type environment which is becoming more prominent every day."
- "Within the quiz-taking window, I can choose a time slot that best fits my work schedule and my study habits."
- "I can have a cup of coffee on my desk while taking a quiz in my own bedroom."
- "I don't have to wait until next class to find out what I made on the quiz b/c I can know my quiz score hours after I took it, and I can view the whole quiz and the solution at the same time too."

All in all, from the faculty's perspective the saved instructional time permits the professor to cover certain topics in depth and additional course materials or invite guest speakers to class. In turn, the students' experiences in learning finance are enhanced. In the past, when giving an in-class quiz, certain issues were inevitable. These issues include: (1) there were always a few students who did not show up, thus, they missed the quiz. In turn, they requested a makeup quiz; (2) there were always a few students late for class. As such, in some cases, these students were also late for taking the quiz; (3) there were always a few students who refused to turn in the quiz when the allotted time was up. If the quiz was given at the beginning of the class, this would slow down the whole class. If it was given in the middle of the class, there were always a few students who insisted on working on the quiz "overtime" so that it gave inconvenience to the

faculty and students who would need to use the same classroom in the next time period, to say the least.

Besides these issues, it is very difficult, if not impossible, to time automatically each student's quiz taken on paper/scantron. However, students are keenly aware that most of the professional certification examinations or graduate admission tests, such as GMAT, GRE, CFA or CPA, are timed. Therefore, it is believed that students benefit from taking a quiz in a timed environment while being trained in college.

Conclusions

Online course management software has been used in many universities, and we also have seen the emergence of a new pedagogy in hybrid instruction with reduced seat time. It has been shown that an alternative of how a finance course with traditional face-to-face instruction can be delivered with all the course materials online and with multifaceted applications of Internet-based technologies while no seat time is reduced. This paper extends Peng (2006) in that, one pedagogical method, giving out-of-class online quizzes, is discussed along with the pertinent issues related to applying this method. The primary benefit of giving out-of-class online quizzes is that there would be more time in class to cover certain topics in depth as well as additional materials or have additional classroom interactions. Certain issues related to administering in-class quizzes in a traditional class with face-to-face instruction, which may be detrimental to students' learning experience, are discussed.

The security issue of an online quiz does not appear to be a big concern. It can be concluded that the online format of a quiz has nothing to do with how a student would cheat. However, we cannot categorically state that no student has ever cheated either online or in-class while taking a quiz.

The process of administering an online quiz is discussed in details. Any faculty with some basic know-how of *FrontPage* or rudimentary *UNIX* operational skills can easily create his/her own

webpage and post an online quiz with the test generator program. The monetary cost of using the software is nominal in comparison with the licensing fee of any online course management software. Giving online quizzes does appear to be a better use of class seat time, and this pedagogical method is recommended to faculty delivering courses using face-to-face instructional design, especially those who are teaching corporate finance or investments.

Endnotes

[1] On February 28, 2006, Blackboard Inc. (Nasdaq: BBBB) completed the acquisition of WebCT, Inc.

[2] One of the author's colleagues has said that the annual licensing fee of *WebCT* would be $50,000 in his university.

[3] It is provided by FSCreations, Inc, and the cost of the software is $79. On September 15, 2006, eInstruction Corp. announced the acquisition of FSCreations, Inc.

[4] Both *Blackboard* and *Angel* are leading providers of enterprise software and services to the education industry. FSCreations' core product, *ExamView*, is the leading test generator and assessment software because roughly 80% of all textbook publishers distribute it with their textbooks. Appendix I contains the comparisons of some online testing features amongst these three software providers.

[5] The business school enrolls approximately 1,200 students as part of a comprehensive, primarily undergraduate, public university of approximately 8,000 students in the Northeast. The school's undergraduate business program and the MBA program are both AACSB-accredited.

[6] For individuals interested in reading the questionnaire and the complete set of students' comments, please contact the author.

[7] A sample email notice is provided in Appendix II.

[8] At the beginning of a semester, each student picks a unique alphanumerical quiz-taking ID and password used for web confidentiality.

[9] Of course, students with documented disabling conditions are accommodated appropriately.

[10] The cost of this software is included in the purchase of *ExamView*.

[11] The author uses *Mail Merge* in *Word* to send each individualized email.

[12] One student was supposed to take it online, but his notebook computer was not working at the time. Thus, he requested to take the quiz on paper.

[13] The SAS program is provided in Appendix III.

[14] Although it is not reported in Table 3, the UNIVARIATE output of the SAS program indicates that there is no significant evidence of non-normality in the underlying distribution that we are sampling from.

[15] SAS always reports the *p*-value for the two-tailed test. Thus, we need to divide the *p*-value in half to find the *p*-value for the appropriate one-tailed test.

[16] A sample syllabus is available at the following website, http://www.oswego.edu/AFL/Peng/Spring 2006/FIN 354/FIN354.htm.

References

Bandy, D. (2005). In-Class Simulation of Pooling Safety Stock. *Decision Sciences Journal of Innovative Education*, 3(2), 375-380.

Bol, L., Hacker, D., O'Shea, P., and Allen D. (2005). The Influence of Overt Practice, Achievement Level, and Explanatory Style on Calibration Accuracy and Performance. *Journal of Experimental Education*, 73(4), 269-290.

Brothen, T., and Wambach, C. (2004). The Value of Time Limits on Internet Quizzes. *Teaching of Psychology*, 31(1), 62-64.

Brothen, T., and Wambach, C. (2007). Internet vs. Classroom Access in a Hybrid Psychology Course for Developmental Students. *Research & Teaching in Developmental Education*, 23(2), 15-22.

Conover, W. J. (1980). Practical Nonparametric Statistics. (2^{nd} edition), New York: John Wiley & Sons.

Daniel, D., and Broida, J. (2004). Using Web-based Quizzing to Improve Exam Performance: Lessons Learned. *Teaching of Psychology*, 31(3), 207-208.

Dunbar, A. E. (2004). Genesis of an Online Course. *Issues in Accounting Education*, 19(3), 321-343.

Marcus, S. (2005). Does Online Participation Matter? A Case Study of a Hybrid Theatre Arts Course. *Campus – Wide Information Systems*, 22(2), 77-87.

Norman, A., Chitra, G., Chou, J., Chowdhury, M., Dalal, A., and Fortson, K. (2000). Introductory Honors Economics on the Web. *Netnomics*, 2, 57-73.

Peng, Z. "Joe". (2006). Applying Internet-based Technologies to Teaching Corporate Finance and Investments. *Journal of Educators Online*, 3(1).

Schnusenberg, O. (2005). Time Is Money in Undergraduate Financial Management Courses. *SSRN* Working Paper, retrieved from the following URL on March 18, 2007: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=760986.

Waite, J. (2007). Weekly Quizzing Really Works. *Tech Directions*, 66(7), 16-21.

APPENDIX I: Comparisons of Some Online Testing Features amongst *Angel, Blackboard,* and *ExamView*

	Angel	Blackboard	ExamView
Can a multiple-choice quiz be graded automatically?	Yes	Yes	Yes
Is an online grade-book provided to each student?	Yes	Yes	No
Can the key to a multiple-choice quiz be changed so that it can be re-graded automatically?	Yes	Yes	No
Are there any statistics functions to determine the most-often-missed questions, the average, the median, and the standard deviation, etc., of a quiz?	Yes	Yes	Yes
Can an instructor download the detailed test results to his/her own personal computer?	Yes	Yes	Yes
Can a quiz be timed?	Yes	Yes	Yes
Can the accessibility of a quiz be limited to certain time?	Yes	Yes	Yes
Can a quiz be allowed/disallowed to be taken multiple times?	Yes	Yes	Yes

APPENDIX II: Copy of the Email Sent to Students

From: Joe Peng [mailto: zpeng@oswego.edu]
Sent: Wednesday, February 8, 2006 6:37 PM
To: 'fin354spring06-list@oswego.edu'
Subject: Quiz 1

All,

Quiz 1 may be taken ONCE between 6:00 p.m. 2/09/06 and 10:00 p.m. 2/10/06, and the allotted time is 80 minutes. You will need to submit your quiz for grading BEFORE 10:00 p.m. 2/10/06.

Some important reminders are in order here:

1. The allotted time for taking the quiz is 80 minutes. However, you will have an extra five minutes to wrap up everything and submit the quiz. As such, you may take up to 85 minutes to complete the whole quiz-taking process.

2. Financial analysis is by its very nature quantitative, and spreadsheets are used to analyze most problems. It is suggested that you use a computer equipped with spreadsheet software to take the quiz.

3. It is suggested that you always log in the sample quiz and submit it before taking an actual quiz.

4. Once you open an actual online quiz, do NOT click your web browser's "BACK" or "FORWARD" button to surf on any other web pages. If you do, you take the risk of being logged out from the quiz and you may not be able to get back into it. If you need to do some Internet searches while taking an actual quiz, always open another web browser window to do so.

Dr. Peng

APPENDIX III: The SAS Program Associated with the Results Reported in Table 3

For FIN 325,

```
OPTIONS NOOVP NODATE NONUMBER LS=70 PS=50;
TITLE;

DATA Quiz3;
INPUT format$ score @@;
DATALINES;

ON 53.33 ON 60.00 ON 53.33 ON 80.00 ON 53.33 ON 66.67 ON 86.67
ON 80.00 ON 40.00 ON 60.00 ON 73.33 ON 66.67 ON 53.33 ON 46.67
ON 80.00 ON 66.67 ON 46.67 P 66.67 P 40.00 P 66.67 P 60.00
P 33.33 P 73.33 P 93.33 P 53.33 P 66.67 P 80.00 P 46.67 P 66.67
P 46.67 P 66.67 P 60.00 P 93.33 P 73.33
;

PROC UNIVARIATE DATA=Quiz3 NORMAL PLOT;  VAR score;    BY format;

PROC TTEST DATA=Quiz3;  CLASS format;   VAR score;

PROC NPAR1WAY DATA=Quiz3 WILCOXON;   CLASS format;   VAR score;

RUN;
```

For FIN 354,

```
OPTION NOOVP NODATE NONUMBER LS=70 PS=50;
TITLE;

DATA Quiz3;
INPUT format$ score @@;
CARDS;

ON 93.33 ON 93.33 ON 73.33 ON 60.00 ON 86.67 ON 80.00 ON 86.67 ON
80.00 ON 80.00
ON 60.00 ON 93.33 ON 66.67 ON 80.00 ON 93.33 ON 80.00 ON 80.00 ON
80.00 Paper 73.33
Paper 66.67 Paper 93.33 Paper 93.33 Paper 60.00 Paper 100.00 Paper
73.33 Paper 80.00
Paper 86.67 Paper 73.33 Paper 66.67 Paper 100.00 Paper 60.00 Paper
60.00 Paper 86.67
Paper 66.67 Paper 93.33 Paper 80.00 Paper 73.33
;

PROC UNIVARIATE DATA=Quiz3 NORMAL PLOT;
  VAR score;    BY format;

PROC TTEST DATA=Quiz3;
  CLASS format;   VAR score;

PROC NPAR1WAY DATA=Quiz3 WILCOXON;
   CLASS format;   VAR score;  RUN;
```