

Experiences with Internet-Based Quizzes in an Introductory Applied Statistics Course

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1. Introduction

The introduction of a laptop Windows-based computer requirement at Babson College has caused us to explore new techniques for assessing and improving the student-learning experience. Before the introduction of laptops on a trial basis in late 1990s, the Probability and Statistics course class meetings typically used a lecture format with students taking notes. When exams required students to analyze data sets, they were either given formulas or computer output and were asked to interpret the results. One of the authors gave students data sets and required them to go to the computer center to analyze the data and bring the results to the exam. Computer exercises were sometimes given special as laboratory sections, but because the size of the computer rooms were smaller than typical classes this always caused scheduling problems.

2. Current Paradigm

Since all Babson College undergraduate students are required to own a laptop computer, the author has been experimenting with classes in which students use their laptop computers to analyze and interpret data. At the end of each ninety-minute class, students are given a short five-to-ten minute quiz in which they are tested on material covered in that day's class. Each quiz requires the use of a laptop computer. The purpose of these quizzes is to focus the student's attention on key concepts, to monitor the understanding of the class, and to allow both the instructor and the student to assess each individual's progress.

The first author has experimented with several formats: quizzes have been administered in class, out of class, on paper, and using the Internet. The marginal overhead to the students in taking an on-line quiz is very close to zero. The major limitation is that students can not sketch diagrams or easily write equations and symbols. Although there are several commercial packages that help in administering such quizzes, we construct our web pages using a combination of Microsoft FrontPage and Visual Studio.NET.

Occasionally multiple choice or true/false questions are used, but the majority of the questions require either numerical or a short verbal answers. We are experimenting with automated grading. Currently the majority of questions are graded by placing the answers in columns in a flat file. The instructor opens the file and scans all the answers to each question. Each quiz is graded on a ten point scale and each answer is either right or wrong. If an answer is wrong, it is selected. When the

bottom of a column is reached, all the selected cells are shaded yellow. After all columns have been graded, the number of yellow cells for each student is determined and this value is subtracted from ten to determine the student's grade for that quiz.

Student surveys have indicated that they would like to retake the quizzes to improve their grade. Clearly this is a desirable goal because it allows students to master the material. When we have automated the grading, we will make this an option.

One disturbing fact has emerged; there is a modest amount of inappropriate behavior on the quizzes. Student report that about 16% of the class has violated the student code of ethics while taking the quizzes. This compares with about 6% of the class violating the code while taking an exam. We are experimenting with steps to minimize this problem such as generating individual data sets and randomizing the questions. However more important opportunities are emerging from our exploratory studies.

The use of laptops provides students with numerous potential distractions: instant messaging, e-mail, games, other assignments, and browsing the web. While some instructors limit students' Internet access, we don't think this is the answer except possibly during exams. We feel that the answer is to educate the students about the importance and usefulness of being fully engaged in class activities. We have experimented with collecting a copy of each day's class work. This monitoring is causing students to show more attention and allows us to study the relationship between class attention and learning.

We have found that their performance on the quizzes is a good predictor of progress in the course. Previously we had only make use of this knowledge once. After the halfway point, students who were failing were given a warning. Our exploratory work suggests that continuously monitoring and reporting student progress is helpful.

3. Results

In our talk we present several quizzes and the files used for grading. After showing an example of the web form used to solicit student opinions, we report on some of the more interesting findings. Next we illustrate how the grades on the quizzes are a good indicator of performance in the course and suggest how this can be used to enhance student learning. We conclude by making recommendations useful to those who are considering the adoption of on-line quizzes.

RESUMÉ

Dans notre entretien nous présentons plusieurs examens et les dossiers utilisés pour les évaluer. Après avoir montré un exemple de la formulaire pour solliciter les avis d'étudiants, nous rendons compte de certains des résultats plus intéressants. Le format montrer est celui qu'il possède à l'internet. Prochainement, nous illustrons comment les résultats des épreuves sont un bon indicateur d'efficacité de l'exécution des cours et suggérons comment ceci peut être employé pour augmenter les bénéfices des étudiants. Nous concluons en rendant des recommandations utiles à ceux qui considèrent l'adoption des épreuves en ligne.