

TEACHING STATISTICS ONLINE – *Logging in with me*

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Abstract

Online classes are becoming an increasingly popular alternative to classroom based, face-to-face learning due to the tremendous opportunities they offer, such as flexibility, convenience and increased individual attention. This paper outlines the author's journey through the development and execution of an introductory level online statistics course.

First, a description of the course is given. Second, the course content development and instructional design is presented. The structure of the course website is next illustrated and implementation of the course assignments and assessments is described. Finally, some lessons so far learned are given.

Keywords: *Statistics; distance learning; online courses.*

Introduction

Classroom-based learning has great value but online classes are becoming quite popular in the academic world because of the tremendous opportunities offered, including flexibility, convenience and increased individual attention. This paper outlines my journey through the planning, development and execution of an introductory level online statistics course.

Last year, I took advantage of an opportunity to develop and deliver an online introductory level statistics course for Montana Tech. This required a great deal of planning, organization and development prior to teaching the course in the Fall of 2007. Further refinements were made to improve the course for Spring 2008 and the current semester (Spring 2009).

About the Course

The title of the course is *MATH 1326: Elementary Statistics and Probability*. It is an introductory level, three-credit semester-long course. Students enrolled in this class are

from all majors (e.g. Chemistry, Biology, Mathematics, Liberal Studies, Industrial Hygiene, Computer Science, General Engineering, Business & Information Technology, Pre-Nursing, Occupational Safety & Health, Network Technology, Professional & Technical Communication). Most of these students take the course to fulfill a general education requirement. Upon completion of this course, it is expected that a student will have developed an understanding of the central concepts in statistics and probability, as well as an appreciation of the role statistics has in science.

The topics covered in this course include basic statistical terminology, summarization and data graphing, location and variation measures, normal distributions, basic concepts of probability, sampling distributions, point estimation, confidence intervals, hypothesis testing, correlation and simple linear regression.

Course Content Development and Instructional Design

In this online course, Blackboard software is used as the course management system. Students enrolled in the course have access to the software through the university website. The software is sufficiently user-friendly that no special training is required. All course information such as syllabus (with detailed course objectives and course requirements), assignments, and projects are available on the course website. The course is constructed using modules, each of which introduces the students to a new topic. Detailed directions are included to guide them through the completion of each module.

In this course, students are also required to learn and use the statistical software package Minitab 15. Students can access the software in the computer labs on campus, or buy or rent the software if they choose.

Getting Started with the Course

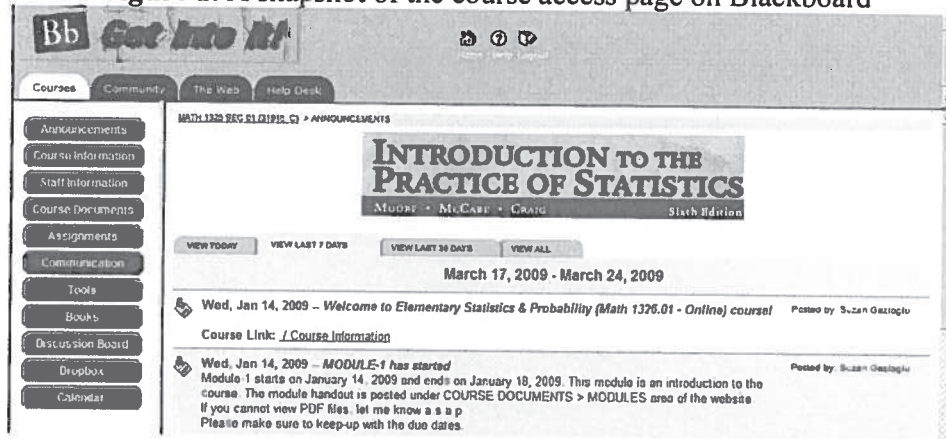
On the first day of class, an e-mail is sent to the students welcoming them to the course, briefly explaining how the course is designed, specifying the textbook being used and directing them to the course website. In the first module, the students are asked to introduce themselves to the class on the discussion board of the course website. They are also asked to complete and submit an attitudinal survey. This survey supplies very helpful information, including the students' background, course expectations, perceptions concerning math classes and their confidence in their ability to perform in an online math course. Completing and submitting this survey initiates the use of the Digital Dropbox for each student. The Digital Dropbox is a means of transferring files between students and the instructor.

In this first module, the students are also provided with information on online resources such as Blackboard User Manual and the Introductory Guide to Minitab.

Structure of the Course Website

When students log in to Blackboard and enter the course website, the first screen they see is the Announcements for the course. To access the course content, the students select the appropriate tab in the left-hand navigation frame. Figure 1 shows a snapshot of the initial screen of the course website.

Figure 1. A snapshot of the course access page on Blackboard



For instance, through the Course Documents tab, students can access module material, additional resources, quizzes, Minitab practical handouts, Minitab data files and so on.

Each student is expected to complete each module within a set time frame to develop the specific learning objectives for each module. In a typical module, sections from the textbook are assigned and detailed PowerPoint lecture notes with solved examples are provided for the students to study along with the assigned reading. Regular homework assignments are given from the textbook. The students are encouraged to participate in online class discussions on the reading assignment and homework before an online quiz is given. Students complete eleven modules during the semester.

Assignments & Assessments

In each module, homework assignments are collected and graded. The students submit their homework electronically. Hard copies of these assignments are corrected, then scanned and sent back to the students electronically.

An online quiz is posted on the course website three days into each module. Each student must then complete the quiz within four days. Once the student launches a quiz, it must be completed within 30-45 minutes (depending on length and difficulty level). Multiple attempts are not allowed.

At the end of each module, complete solutions to the homework and quiz are posted on the course website.

Additionally, in three of the eleven modules, projects are assigned for the students to complete. They are required to use Minitab to complete these projects. Detailed Minitab handouts explain how the software works and describe the tasks to be performed by the students in each project. The Minitab projects are submitted electronically, corrected by the instructor and returned to the students with feedback.

The course includes three 50 minute midterm exams and a two hour final exam. All four exams are in written format and are proctored.

A menu of exam dates and times is provided, from which each student can schedule his or her exam by contacting the instructor. For in-town exams, a proctor at Montana Tech is arranged. For out-of-town exams, each student must make special arrangements.

The out-of-town student submits an application containing the name, contact information and credentials of his or her proposed proctor. The proposed proctor is contacted by the instructor to insure that the proctor understands and agrees to carry out the responsibilities of an examination proctor, and that the proctor and the student are not relatives or otherwise unduly close. If the proctor is accepted by the instructor, an exam package, including a proctor agreement and instructions for administering the exam, is sent to the proctor in time for each exam.

All out-of-town exam arrangements, including proctor approval must be completed within the first three weeks of the course.

Managing Online Interactions

Students learn through participation and positive involvement in class discussions and activities. The Blackboard includes a Discussion Board which is used for such interactions. A new Forum is started on the Discussion Board for each module where students can post their questions or comments. They are encouraged to initiate discussions about the topic(s) covered in the modules, homework assignments, and quiz and exam questions.

Students also receive questions from the instructor that require a response by a given due date. Participation and involvement is graded based on the following criteria:

1. Meets expectations for each module, including participation in discussions and activities and answering questions as required.
2. Values time commitment and respects others' time commitments; meets deadlines.
3. Uses clear communication.
4. Demonstrates respect to the class, does not cause disruption to class activities and discussions.

5. Prepares for class, shows evidence of reading assigned materials.
6. Interprets and analyzes reading material rather than simply memorizing text.
7. Shows enthusiasm and interest.

Lessons learned so far

Both teaching and learning statistics concepts in an online environment are quite challenging. From the instructor's point of view, explaining statistical concepts or providing feedback to students in an online environment is much different than in a face-to-face environment. Students, on the other hand, must demonstrate higher levels of discipline and self-evaluation than are required for a classroom course.

I encountered a steep learning curve in teaching this online course. Among other things, I have learned:

- Even though the size of this online class is smaller than a regular face-to-face section of the same course (20 students compared to 60), teaching the course online requires a surprisingly large time commitment. This online class requires at least two online hours of my time per day punctually replying to students' e-mails, answering/asking questions about the current topic and monitoring class discussions.
- While convenient, online courses are not for everyone. Students who do well in this course tend to be comfortable with technology, possess good study skills, manage their time well and complete module tasks early or at least on time, and are self-motivated and independent learners.
- Students like timely communication with the instructor. They also value course/module organization and consistent content presentation. Students appreciate prompt feedback provided on the submitted assignments and the exams.
- Online discussion assignments are a fine way to learn more about student difficulties and/or misconceptions. After the first semester, I made participation and involvement in class discussions part of the grades. This resulted in more students being engaged in class discussions and forced them to ask/answer questions, which helped them to stay on top of things and not fall behind in the course.

Despite all the challenges and a few disappointments that I have encountered, my experience has been that teaching statistics online can be as effective as teaching in a face-to-face environment. Proper design is essential to promote a learner-centered approach to the course.