

Group Learning, Contextual Projects,
Simulation Models and Student
Presentations in Enticing Engineering
Statistics Students

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ASA Annual Conference
Toronto, Canada
August 2004

Outline

- Objectives, goals and material problems
- Group Work (cooperative learning)
- Weekly Homework and Presentations
- Support Tools (Minitab and GPSS programs)
- Support Materials (Web Readings)
- Group Final (Contextual) Projects
- Testing and Grading Schemes
- Examples of Course Work

Problem Statement

- One course to teach everything in stats
 - As prerequisite for all other MS courses
- Lack of interest on the student part
 - Stats is not their main college interest
- Weak student stats background
 - Most never took stats, or did so long ago
- Stats has a bad reputation among students

Solution: Teaching Approach

- Problem
- Poor Background
- Weak Students
- Mathophobia
- Extensive Material
- Lack of Interest
- Passive attitude
- Solution
- Tutorials (STARTs)
- Learning Groups
- Stats Software
- Division into Classes
- Contextual Projects
- Student Presentations

Course Goals and Objectives

- Learn applied engineering statistics
 - Theory (why) and practice (how to)
- Multidisciplinary, team work environment
- Other Specific work skills
 - Problem solving using statistics
 - Oral/written presentation skills
 - Synthesis/summarization skills

Course Content

- Part I: Descriptive and Probability
 - Data, EDA, distributions, transformations
- Part II: Inferential
 - Confidence intervals, hypothesis tests, SPC
- Part III: Modeling
 - Regression and ANOVA
- <http://web.syr.edu/~jlromeu/Syllabus.html>

Creation of Study Groups

- Size: four to six students
- Selected by assignment on first day
- Internal democracy: elected leader
- Division of labor within the group
- Constant email communication among all
- Homework presentation every week
- Final Project at end of the course

Group Role and Procedures

- Group work is the basis of the course
- Select own final project, leader, etc.
- Meet weekly (in cyberspace and real)
- Divide homework among them
- Put it back together for the presentation
- Group members learn from each other
- <http://web.cortland.edu/romeu/groups.html>

Division of Topics into Classes

- Too many topics with too many parts
 - Divide into classes (of “equivalence”)
 - E.G. the class of confidence intervals
- Each group works on a class element
 - All groups cover the entire waterfront
 - E.g. one group works on CI for the mean
 - Another, for CI for the proportions, etc.
- Then, present in class and share materials

Assignment of HW to Groups

- Sent by email to students and groups
- Tutorials (STARTs) and case studies
 - Readings in the internet, as examples
- Students learn to decompose problem
 - Each works on a task individually
 - Then, puts problem tasks together
- Power point presentations in class

Cooperative Learning Objectives

- Learn to work in groups
 - Learn to get along with others
- Learn to scope/divide a problem into parts
- Learn communication skills:
 - Use of Power point and Excel software
 - For the oral and written presentations
- Summarizing their results

Contextual Projects

- Students own interests are the key
 - Raises the level of interest in assignments
- Students have subject matter knowledge
 - The tasks have meaning for them
- Students have personal interest in topic
 - Probably will reuse the material
 - In their other courses or in real life

Weekly Mini-Projects

- Different project to every group
 - Permits cooperation among students
- Use STARTs and other materials
 - As tutorials and examples for their work
 - Alleviates the instructor from detail work
 - Leaves time for higher level consulting
- Project topics complement each other
 - <http://web.cortland.edu/romeu/ecshw.html>

Minitab work: Macros

- Learning Stats SW, another course goal
- Preferred software: Minitab
 - Available, easy to learn and use
 - Macros easy to write and execute
- Other software also taught
 - SAS, Excel, examples sent via Email
- Extra Class/Lab to initiate students

Data Analysis/Monte Carlo

- Data collected in class surveys
 - Height, weight, years of experience
 - Nominal, ordinal, interval, ratio
- Monte Carlo generated data
 - For “feeling” about stats distributions
 - For estimation and testing from “known”
- Exercises reinforce/follow curriculum

GPSS work: Programs

- GPSS simulation system (student version)
 - Provided to every student group
 - Just taught how to “run” the programs
- Provides realism (mimics systems)
 - Simulates factory, shop, transportation, etc.
- Allows students & groups to work together
 - Different “seeds” and Performance Measures

Systems Analysis Assignments

- Provides the “big picture” of problems
 - Recognize a problem
 - Define the data required
 - Define the stats procedure
 - Collect and process the data
 - Obtain statistical results
 - Conclude in practical terms

Homework Presentations

- Weekly, all groups are given a HW
 - Power point presentation w/highlights
 - Word document with the explanations
- Students, instructor ask questions to Groups
 - Expand on the subject during presentation
- Students study material constantly
 - Presentations are 20% of their final grades

Support Materials (Readings)

- START sheets are practical tutorials
 - Enough theory to understand background
 - Numerical examples to illustrate it
- Available in the Web Site
 - And also as inexpensive reader
- Used throughout the course
 - STARTs follow the curriculum
 - <http://web.syr.edu/~jlromeu/ecschedul.html>

The Role of Email/Internet

- Constant access to course Instructor
- Constant contact among group members
- Class materials are all in the Web
 - <http://web.syr.edu/~jlromeu/urlstats.html>
- Weekly assignments, materials, etc.
 - All are sent via the internet (email)
- Student groups work in cyberspace
 - Facilitating easy, fluid interaction

The Final Project

- Contextual: each group chooses topic
 - Many times a real life problem (work)
 - Otherwise, instructor provides GPSS program
- Covers all material given in the course
- Applied: problem-solving approach
- From Problem Statement to Conclusions
 - <http://web.syr.edu/~jlromeu/FinProEx.html>
- Provides 20% of student Final Grade

Testing and Grading

- Two “Mid Term” tests
 - Three parts each: in-class, group, take-home
 - Individual work (in-class and take-home)
- All tests are open book, open notes
- Take home, long and thought-provoking
- Group work, computer-based
- Each test: 30% of Student’s Final Grade

Examples of GPSS HWs

- GPSS simulation of a job shop
 - Different seed to each group (assigned)
- Different Parameters of Job Shop
 - Input and production rates, buffer sizes, etc.
- Different PM to each group member
 - Throughput, utilization, costs, buffer size, etc.
- Comparison, minimization, optimization

Grading for the Final Project

- 10% Problem Definition
- 10% Statistical problem re-statement
- 10% Data collection/description
- 25% Testing and CI work
- 25% Modeling (regression/ANOVA)
- 10% Statistical/Management Conclusions
- 10% Quality of presentation and material

Conclusions

- A Pleasure to teach and work in
- Work more, but work less ...
- Get great student evaluations
- Can cover all course material
- Group presentations, best feature
- Student interest raised and sustained
- Final Project usually excellent

HTML Projects for Engineering Students. The term HTML stands for Hypertext Markup Language. This language is a very famous coding language, especially used in Web development. This language plays a key role in designing websites by adding CSS (Cascading Style Sheets). In real-time, HTML based projects will help the CSE students to test their practical knowledge, and sharpen their coding skills as well. For beginners, selecting the HTML based project is difficult. So here we have listed out some HTML projects. Being an engineering student is tough. Not only do we have the stresses of exams and assignments to contend with, but many of us are broke for the most part, meaning we can't afford to drop several thousand dollars on engineering software licenses. Well, fret no more, because, in this article, we are going to take a look at what free software packages you can get your mitts on. Yes, I said free. Although we have covered student versions on ENGINEERING.com in articles before, it should be pointed out that not all student versions are free (I'm looking at you, SOLIDWORKS). So this article will f

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The Modeling & Simulation thread is intended for students interested in developing a deep understanding and appreciation of how natural and human-generated systems such as weather, biological processes, supply chains, or computers, can be represented by mathematical models and computer software. Such models are widely used today to better understand and predict the behavior of such systems.Â The student who pursues Modeling & Simulation can combine it with Intelligence to become a data miner, or with Media to build visualizations of large amounts of scientific data, or People to build work flow systems for scientists who aren't computing experts to use. The possibilities are endless. Early Preparation.