Abstracts and Short Presentations

Teaching the Sums of the Squares and the Best Fitting Line

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Success with naive students is found by introducing linear regression early in the semester. In introductory courses the "sums of the squares" is stressed as a basic statistic before using it in other ways. The derivations for the normal equations in linear regression are stressed so that the logical development characteristic of statistics is maintained. Finally, correlation is developed out of linear regression.

The Complexities of Teaching Graduate Students in Educational Administration Introductory Statistical Concepts

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For those who have taught graduate students who work full-time and attend either evening or weekend classes, a real dilemma exists. As professionals in the field of education, we are confronted with the need to include all aspects of the curriculum in the same depth as we would include were we enjoying the luxury of teaching full-time students who had both the time and energy to devote to study. The conflicting situation is that most of our students come to us after a full day at work, tired and perhaps even frustrated by activities at work. These attitudinal issues can be handled better by some individuals than by others, depending to a great extent on their personality types.

In a previous paper (Belli and McCall, 1990) an analysis was conducted on 57 graduate students at Virginia Polytechnic Institute (VPI). During the summer months of 1990, an additional 50-60 students from Pepperdine University and the University of Phoenix were entered into the database for a comparative study.

Key findings include:

(i) None of the differences among personality types seem to relate to attitudes towards statistics.

(ii) Of the students in the databases, approximately 85% can be classified as Judgment-types (see Kiersey and Bates, 1984). In Belli and McCall (1990) the author is quoted as saying "The tendency is for J-types to have a stronger desire for closure, decision-making, and control. The very nature of the introductory statistics class, at least in the beginning, is probably contrary to their preferences."

Although data are not available, it is the authors' contention that our findings are not unique to educational administration and may well carry over into other non-hard science fields such as psychology and sociology. Such a situation is probably not true for the hard sciences and engineering.

Procedures: At both the Virginia and California sites, students were given a series of survey instruments, consisting of the Kearsey Temperament Sorter, a Statistics Attitude Scale (SAS), and an instrument on Graduate Statistics Courses and Background. Data were analysed using various statistical procedures with little being noted in the way of significant differences or correlations.

In addition to collecting information from students regarding statistics, a survey was conducted to review the attitudes regarding teaching of statistical methods in the graduate programmes in education. A sample of educational statisticians was selected from the AERA Special Interest Group. Responses, when coupled with the distinct nature of the personality types of approximately 85% of our combined student groups, have led to a review and eventual redesign of the statistics curriculum at Pepperdine.

Applied statistics curriculum: It is clear that the best approach in presenting descriptive and inferential statistics to "*OUR*" kind of student is to minimise derivations and the purely mathematical aspects of statistics while maximising the involvement of the student in an understanding of what statistics is, what it can do for him or her, and how to use statistical methodology as a vital management tool. With these thoughts in mind, the senior author is in the process of designing a modular computer-based curriculum which can be used in three, six, or nine unit programmes, depending upon what the overall curriculum will allow. (At Pepperdine, in our doctoral programme, three units of descriptive statistics are part of our admission requirements. During the doctoral programme three units of inferential statistics are followed by a four unit course in research methodology.)

The modules will consist of the following topics:

(i) Introductory overview of what statistics is and what it can do as a management tool.
(ii) A discussion of the unit of analysis, characteristics (both attributes and variables), and samples and populations.
(iii) Concepts of random, systematic, stratified, and cluster sampling.
(iv) Basic descriptive statistics: central tendency, dispersion, positional, relational.
(v) Concepts of distributions: binomial and normal.
(vi) Inferential concepts and sampling distributions: applied examples.
(vii) Once an understanding of the above concepts has been demonstrated, the curriculum will provide a modular approach to inferential statistics, both estimation and testing hypotheses. The technique being employed is referred to in "memorisation circles" as retrogressive chaining. It is anticipated that this

approach will be utilised on a pilot basis during the 1991-92 academic year at Pepperdine.

In all instances the personal computer becomes an integral part of the instruction.

References

Belli, G M and McCall, C H (1990) *Statistical Methods Classes Off-Campus to Non-Traditional Graduate Students : Student Profiles.* Paper presented at the annual meeting of the American Educational Research Association, Boston, MA, April.

Kiersey, D and Bates, M (1984) *Please Understand Me.* Prometheus Nemisis Book Company, Del Mar, California.

A Comparison of Station with CAI and SPSS : Discussion of the Results

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At the University of Utrecht, first-year students in the social sciences can follow one of three streams in 90-hour statistics courses. The contents of the streams are: descriptive statistics (up to linear regression and correlation), probability theory, and an introduction to testing and estimation. All students must meet the same requirements. The streams are:

Course "Nijdam" (400 students total): In this course, students study our textbook and use the statistical package Station. Besides introductory lectures there are workgroups in which students can do their problems and practical work with the computer (in total 8 hours of Station practical work). Students conclude this course with a written multiple-choice examination.

Course "Hays" (300 students total): This course is based on the American textbook Hays (the text is in English). Besides introductory lectures, students can practice with Computer Assisted Instruction on the computer. During this course, students take periodic examinations with the CAI-system (multiple-choice problems).

Course "SPSS" (20 students in total): This is an experimental course with SPSS/PC+ Studentware. Students can follow the theoretical statistical lectures of the course Nijdam or Hays. SPSS/PC+ Studentware is taught in 10 hours of lectures and 24 hours of practical work. Students conclude this course as they would the Nijdam stream: with a written multiple-choice examination. This experimental course is only open to 20 students.

To compare the results we followed all 20 students in the SPSS stream and 20 randomly-chosen students from each of the two other streams.

Some Experiences in Teaching Statistics Modules in a Course in Quantitative Methods in Social Science Research for Final Year Students

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The University of Waikato, New Zealand, offers a final year, inter-disciplinary course in Quantitative Methods in Social Science Research which is taught jointly by staff from Mathematics and Statistics, Politics, Sociology and Psychology. Students enrolling in the course usually have backgrounds in statistics that vary from nil to second year Statistical Methods; although students with the latter background are very much in the minority.

The major component of the course is a social survey which is designed and executed collectively; analysis and report writing is carried out individually. The statistical package SPSSx is used to analyse the data collected.

Statistics modules are taught at several different points in the course with the aim of having the material appear shortly before it is needed. The modules start at the level of calculating simple proportions and reading two-way contingency tables, and feed into the main framework of the course.