Panel Discussion

Using the Computer in an Introductory Statistics Course at Tertiary Level

Chair: Eric Sowey
Panel: Adrian Bowman, Robin Boyle, John Iacono, Robin Lock, Gordon Smyth

This discussion was organised by B3 and B5 streams.

An audience of about 40 participated in the discussion, which was focussed successively on two different modules, in each of which specific themes were proposed for discussion.

This report was prepared by Lucette Carter.

Module I: *How have computers changed the curriculum in the introductory course?*

(a) The course as problem-driven rather than technique-driven.
(b) Using exploratory Data Analysis.
(c) Using computer simulation for theorem verification.
(d) Real-time use of the computer in lectures by the lecturer.
(e) Problems for non-English native speakers in using programs written for English speakers.

John Iacono remarked that extending the use of computers from small tutorial groups to the lecture room raises various obstacles (lecturers are more comfortable with traditional approaches, students are more conditioned to the technique-driven approach, most textbooks emphasise the traditional approach, absence of support staff to deal with the various technical aspects). So far, impact of computers is focussed on presentation of the topics (e.g. use of EDA) rather than on their content. The only relevant theorem verification at elementary level would concern the distribution of $\overline{X}$ or correlation or regression.

Adrian Bowman analysed the contrast between the traditional approach and the computer-based approaches for three important aspects of the teaching of statistics: aims (technique-driven versus problem-solving approaches), methods (the computer approach is based mainly on project work), assessment (written examination versus continual assessment). Computer-based teaching influences mainly the methods of teaching and of

assessment; the main advantages over traditional methods are the emphasis on challenge, motivation, and student participation, and the clarification of techniques and concepts by animation (e.g. exploratory data analysis) and by simulation.

Audience discussion: The difficulty of finding an appropriate method of assessment was put forward and some suggestions by lecturers with some practical experience (mainly with the software MINITAB) were made (interpretation of an output, manipulation of a data set, ...). It was suggested that students should be given a proper training in report writing. The main difficulty which must be overcome in the context of computer use in the class are lack of funds and of proper technical assistance. Student attitudes (too high expectation or a hostile attitude) may also be a source of difficulty. Packages must allow a better interaction with the screen (all comments should appear on screen before the output) and put more emphasis on modelling and the global problem-solving strategy (identifying the problem, data analysis, formal analysis, conclusions, ...).

Module II: *On statistical packages.*

(a)   Pros and cons of developing a specific package in-house.
(b)   Pros and cons of particular commercial packages for statistical analysis.
(c)   Menu-driven packages versus command-driven languages.
(d)   Working with the IBM PC versus with the Macintosh.
(e)   Using a teaching package (e.g. MINITAB) versus using (and scaling down) an advanced package for beginners' use.

Robin Boyle analysed the pros and cons of writing large-scale (multi-task) packages in-house; the various cons (particularly the need of funds, the considerable time consumed, the difficult task of programming data handling) outbalance the obvious advantages; but most of these cons do not apply for small packages (single-task).

The obvious pros of commercial packages (powerful and available!) are opposed by various cons (cost, time consuming to learn, syllabuses redesigned around the package, once a package is adopted it is hard to get out of it, ...); but some of these (particularly decay of knowledge) are less important in menu-driven language packages than in command-driven language packages (although these are more powerful and flexible).

Robin Lock stressed the difficulty of evaluating a commercial package and the risk that availability of a specific statistical package will define the structure and content of the course. There is an advantage in using teaching packages with good student text-books like MINITAB.

Audience discussion: The little time left was mainly devoted to an exchange of information on various technical points (comparison of site licences and package prices). The availability of packages compatible for both IBM PC and Macintosh diminishes the possible disadvantage of using Macintosh. The GLIM package was praised for its pre-requisite of understanding the underlying theory, and STATGRAPHICS was recommended as a sequel to MINITAB (which has limited graphics capabilities).