Session B4

Teaching Statistics for Technical and Engineering Students

Organiser: Kerstin Vännman (Luleå, Sweden)

Invited Speakers: Neil Barnett (Melbourne, Australia)
Mike Camden (Wellington, New Zealand)
Alexander Nagaev (Tashkent, USSR)
Brian Phillips and Peter Jones (Melbourne, Australia)
Kerstin Vännman (Luleå, Sweden)

Contributed Papers: Neil Barnett (Melbourne, Australia)
John Kinney (Terre Haute, Indiana, USA)
Marie-Jeanne Laurent-Duhamel (Jurancon, France)
Hugh Morton (Palmerston North, New Zealand)

Abstract: Stuart Hunter (Princeton, New Jersey, USA)

Introduction

During the latter years increasingly intensified discussions and concerns about the importance of statistics in industry have been going on. To a large extent, the discussions focus on improving quality and productivity. Since the fifties, Japan has had a tremendous improvement in quality, and the use of statistical methods is one important reason for this development. Industries in other countries have responded to the quality competition and begun to put a lot of emphasis on the use of statistical methods.

It is obvious that industry of today needs engineers with experience of statistical thinking who are capable of handling situations involving uncertainty and variability. It is important that all engineering students are taught the value of statistical ideas and applications. The phrase "engineering students" is meant to include both students at the university level and polytechnic level. How can we, as teachers of statistics, respond to the challenge to improve statistics education for engineering students? We cannot solve all problems during one conference, but we can all contribute with our share towards the common goal of making the progress in statistical education an ongoing effort.

The papers in this session cover many aspects of teaching statistics for engineering students. One is the use of computers. It is important not only to present

formulas and procedures to the engineering students, but to spend time on concept formation. The second paper gives us an insight into a course where the computer is not only used as a computational tool but also to develop statistical concepts. Camden's paper describes how a New Zealand polytechnic has succeeded in making a course which aims at building numeracy and graphic skills onto people's common sense and to give skills in using statistical software.

The use of real-world data is stressed in several papers. Barnett's first paper discusses the importance of data quality and the human factor, based on many years of consulting experience. Several papers highlight the use of exploratory data analysis and graphical methods, and one speaker especially considers methods for time-sequenced data. Another paper focusses on the encouraging effect that all these aspects has on the students and their involvement in the work with statistics.

Courses in statistical process control are often demanded from industry today. Barnett's second paper draws our attention to the importance of capability indices and what to take into consideration when teaching this area. Another important area in industrial statistics today is experimental design. How to teach response surface methods using simulation is discussed in Morton's paper. In Kinney's paper we are also given an example of how to teach some of the principles of sampling inspection to beginning students of statistics.

It is interesting to get an insight into how statistics can be taught in different countries under different conditions. In the final two papers we share the experiences from teaching a course in probability theory and mathematical statistics at Tashkent Motor Highway Institute, USSR, and we learn about teaching statistics in the tertiary institutes of technology in France.