

# INTERNATIONAL ASSOCIATION FOR STATISTICAL EDUCATION

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## THE FIFTH INTERNATIONAL CONFERENCE ON TEACHING STATISTICS: ICOTS-5

Statistical Education - Expanding the Network

### Key Information

**Place:** Nanyang Technological University, Singapore.

**Dates:** June 21 - 26, 1998.

**Chair IPC:** Brian Phillips (bphillips@swin.edu.au)  
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**Chair LOC:** Teck-Wong Soon  
(soon\_teck\_wong@singstat.gov.sg)

**Conference Organizer:** Allison Law  
(ctmapl@singnet.com.sg); Fax 65 299 8983

**Singapore contact:** Lionel Pereira-Mendoza  
(pereiraml@am.nie.ac.sg)

**WWW site:**  
www.nie.ac.sg:8000/~wwwmath/icots.html

http:  
//lucy.swin.edu.au/math/icots5/intro.htmlFrom

### Conference Fees:

Fees include admission to all conference sessions, official opening and closing ceremonies, gala dinner, conference luncheons and coffee/tea breaks and copies of all conference materials. The extra amount paid by the non-members gains them a one-year membership in IASE.

Non-Member Early bird (before January 31, 1998):  
Singapore \$550 (US\$ 400)

Non-Member Regular: Singapore \$590 (US \$430)

Non-Member On-site: Singapore \$630 (US \$ 460)

Members - Before (January 31, 1998): Singapore  
\$495 (US \$360)

Regular: Singapore \$535 (US \$390)

## THE BUDDY SYSTEM AND ICOTS-5

Are you interested in attending ICOTS-5 but are not sure about the problems you may face when traveling to Singapore? Are you new to the idea of attending a large international conference and uncertain about what will be expected of you when you get to ICOTS-5? Would it help if you had a particular person that you trusted to help answer your questions about ICOTS? Or, are you willing to share information you have obtained about ICOTS-related issues? In either case, you may want to join the buddy-system.

If you would like a buddy, please contact any of the National Correspondents for IASE listed in the Journal of Statistics Education Archive, or contact

one of the persons named at the top of this newsletter. If you would like to offer information you have gained or would like to be a buddy to someone who has questions, contact Anne Hawkins.

## THE ASSESSMENT CHALLENGE IN STATISTICS EDUCATION,

Edited by Iddo Gal, University of Haifa, and Joan Garfield, University of Minnesota, 1997, 294 pp., hardcover, ISBN: 90 5199 333 1

Published under the ISI and IASE logos, "this book discusses conceptual and pragmatic issues in the assessment of statistical knowledge, reasoning skills, and dispositions of students in diverse contexts of instruction, both at the college and pre-college levels," to quote from the preface. Written by internationally known researchers and educators, it is designed primarily for academic audiences involved in teaching statistics and in teacher education. The book is divided into four sections: Curricular goals and assessment frameworks, Assessing conceptual understanding of statistical ideas, Innovative models for classroom assessment, and Assessing understanding of probability.

IASE members receive a discount of 20% off the list price of \$65 (US). Anyone who registers to become an IASE member in 1997 will receive a complimentary copy of the book while supplies last. For ordering information please see advertisement on page 24.

## PAPERS ON STATISTICS EDUCATION, ICME-8

Edited by Brian Phillips, School of Mathematical Sciences, Swinburne University of Technology, PO Box 218 Hawthorn 3122, Victoria, Australia .  
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This book is a collection of papers on statistics education that were presented at the Eighth International Conference on Mathematical Education held in Seville, Spain during July, 1996. Some common themes found throughout many of the papers are:

Poor teaching of data analysis, even though it is in the curriculum,  
Lack of teacher preparation in both content and pedagogy,  
Too much emphasis on mechanics,  
Too little context and too few real examples,  
Confusion of probability with statistics,

Understanding statistics as a process,  
How to use technology effectively.

Copies may be ordered directly from Brian Phillips at \$20 (US) per copy, including postage and handling.

## ROUNDTABLE CONFERENCE FOR ICME-9

The next ICME is scheduled for Japan in the year 2000. IASE attempts to schedule a Roundtable meeting on a specific theme at a time and venue that allows participants to attend ICME as well. Suggestions for both the topic and venue are being requested. Please send your suggestions to Anne Hawkins.

## A REPORT FROM THE "GIORNATE DI STUDIO SULLA POPOLAZIONE," Rome (Italy), 7-9 January 1997

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A section of the meeting on Population Studies was devoted to "Teaching Demography and Statistics at Schools". In Italy, actually, the attention to teaching these themes has been a common patrimony both of demographers and statisticians for a long time because we deem that two subjects so akin. At least in their foundation, they could move synergically in spreading statistical ideas.

The following are the issues treated in the invited communications. Roberta Rossi in "European Experiences in Teaching Demographic Issues in Schools" analyzes the state of research undertaken by the European Observatory for Population Education and Information and refers to a survey on knowledge and attitudes of high-school students in Italy and in the European countries. Anna Maria Birindelli in her paper "Demographic Software for Schools" surveys the demographic software suitable and nowadays available for pre-university schools. Enzo Lombardo in "Is it Feasible and Realistic Teaching Demography in Italian Schools?" comes to the conclusion that demography could be more widespread in secondary schools - now it is present mainly in the geography syllabus - if the mathematics syllabus will put forward an insistent effort to use examples from demography as suggestions for didactic plans. Antonella Pinnelli and Annunziata Nobile in "Didactical Ways for

Demography in Secondary Schools" develop and propose some ideas on didactic methods in demography via well chosen examples. Antonella Pinnelli in "Gender and Population" continues in the same trace and explores the possibility of an appeal of this argument. Maria Gabriella Ottaviani in "An International outlook on Teaching Statistics" describes the background to the founding of IASE and how, especially in the United States, data are being given fresh consideration after a long period centered on mathematical statistics. The papers will be published, in Italian, in INDUZIONI.

### SHOULD WE GET RID OF STATISTICAL TESTING? THE SIGNIFICANCE TESTS CONTROVERSY

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Empirical sciences, in general, and particularly psychology and education, rely heavily on proving the existence of effects through the standard significance tests. The use of statistical inference dates back almost 300 years, but statistical tests were popularized through the works by Fisher, Neyman and Pearson and today most researchers implicitly use a mixture of the logic suggested by these three authors. However, because the logic of statistical inference is difficult to grasp, its use and interpretation is not always adequate and have been criticized for nearly 50 years. For example, Yates in a paper published in 1951 in the Journal of the American Statistical Association suggested that scientists were paying undue attention to the results of the tests and too little to the estimates of the magnitude of the effects they were investigating. Another example is the classical book by Morrison and Henkel (1970) who compiled an extensive review of critical papers on the erroneous research practice based on statistical tests.

Research results on the understanding of the philosophy and concepts implied in testing hypotheses have additionally shown widespread misconceptions among both university students and scientists who use statistical inference in their daily work. These misconceptions refer mainly to the level of significance, which is defined as the "probability of rejecting a null hypothesis, given that it is true." The most common misinterpretation of this concept consists in changing the conditional and the conditioned in this definition, that is, interpreting the level of significance as the "probability that the null hypothesis is true, once the decision to reject it has been taken." Another common error is the belief of conservation of the significance level value when successive tests are carried out on the same data set, which produces the problem of multiple

comparisons. More recent research have also shown confusion between the roles of the null and alternative hypotheses and misunderstandings related to the sample statistics and its distribution.

Falk and Greenbaum (1995) suggest as possible causes of the persistence in using significance tests, in spite of the errors described, the existence of profound psychological mechanism leading people to believe that they cope with chance and minimize their uncertainty when obtaining a significant result. They describe the illusion of probabilistic proof by contradiction, the erroneous belief that one has rendered the null hypothesis improbable by obtaining a significant result, based on a misleading generalization from logical reasoning to statistical inference where they are not valid. This unconscious generalization may be explained by the seemingly parallel arguments in proof by reduction ad absurdum and that of rejection of the null hypothesis. The statistical test controversy has recently increased within some professional institutions, which are suggesting important shifts in their editorial policies regarding the use of statistical significance testing. As an example, the American Psychological Association in a 1994 publication manual notes that neither of the two types of probability values reflects the importance or magnitude of an effect because both depend on sample size and encourage researchers to provide effect-size information. (APA, 1994, pg. 18). This discussion continues in different psychological journals, such as the American Psychologist where there has been suggested that psychologists completely discontinue the use of statistical significance testing in analyzing research data and instead employ point estimates of population parameters and confidence intervals. Within the American Educational Research Association, Thompson (1996) recommend better use of statistical language in reported research, emphasizing effect-size interpretation and evaluating a results replicability.

Whatever the conclusion of this controversy is, we, statistical educators, can not ignore the problems of finding the way of introducing the fundamental ideas of inferences to our students as well to the general public. Consequently, more research on statistical misconceptions from an educational point of view are needed. Also the teaching of these topics within university levels should be reinforced to contribute to the correct application of statistical inference in professional and scientific work.

#### References

- American Psychological Association. (1994). *Publication Manual of the American Psychological Association* (4th ed.). Washington, D.C.: A.P.A.
- Falk, R., & Greenbaum, C. W. (1995). Significance tests die hard. *Theory and Psychology*, 5(1), 75-98.
- Morrison, D. E., & Henkel, R. E. (Eds.). (1970). *The Significance Test Controversy - A Reader*. Chicago: Aldine Publishing.

Thompson, B. (1996). AERA editorial policies regarding statistical significance testing: three suggested reforms. *Educational Researcher*, 25(2), 26-30.

### ELECTION RESULTS

The ballots for the IASE Executive Committee elections have now been received. The IASE Executive Committee for the 1997-1999 period is as follows:

President: M.G. Ottaviani (Italy)  
President-Elect: Brian Phillips (Australia)  
Vice-Presidents: Carmen Batanero (Spain)  
Joan Garfield (USA)  
Michael Glencross (S. Africa)  
Lionel Pereira-Mendoza (Singapore)

