

## INTERNATIONAL ASSOCIATION FOR STATISTICAL EDUCATION

**EDITORIAL**

*In June 1998, in Singapore, the IASE organised the Fifth International Conference on Teaching Statistics, with over 400 delegates from some 40 countries.*

*Meeting together is always a time of great pleasure and interest for all the researchers working in the field of Statistical Education. Some of us tend to perform our activities alone within our departments and sometimes may be afraid of having opinions and interests which are not commonly shared by other colleagues.*

*The materials presented at ICOTS-5 from June 21 to June 26, 1998, illustrate how important the teaching of statistics is from didactic and pedagogic viewpoints, for furthering quantitative skills needed in a modern society. Some of the papers presented studies and research that reveal important new knowledge about how students come to learn and understand statistics in educational settings. There were important contributions made by all the keynotes speakers. It was particularly interesting to hear those from non-academic areas who showed the need for quantitative information and its increasing use by people working in the areas of governments and in economics. Each speaker showed in a different way that "Like any science subject, the theory of statistics is meant for a perfect or ideal world, which hardly exists in reality", and so when applied to reality the consciousness of the phenomenon under examination is needed to help the user in bridging the gap between theory and practice. Consequently two key issues emerge from the concerns of the Conference:*

***the demand for recognition in academic world that research in statistics education is a research discipline in its own right;***

***the problems in statistics training of those researchers and professionals who must then apply statistics to diverse substantive disciplines.***

*The first problem may be solved when the community of statisticians makes clear the awareness that the researchers in statistical education have their own particular and important role. As statisticians, they investigate statistical education using statistics as an instrument with which they can contribute at the same time to the development of theory and application of the discipline.*

*As regards the problem of the training of both researchers and professionals who have to use statistics, the IASE is fully aware of the importance of the subject and will respond, in a systematic and articulate way, to the theme of training researchers at the next Round Table on: "Training Researchers in the use of statistics", to be held in Japan in the year 2000.*

*Maria Gabriella Ottaviani*

**Executive Committee 1997-99****President*****Maria Gabriella Ottaviani***

Dip. di Statistica, Probabilità e Statistiche Applicate, Università "La Sapienza", P.le A. Moro 5, 00185 Rome, Italy [Tel: +39-06-49910561, Fax: +39-06-4959241] ottavian@pow2.sta.uniroma1.it

**President-elect*****Brian Phillips***

School of Mathematical Sciences, University of Technology, Swinburne, PO Box 218, Hawthorn 3122, Victoria, Australia [Tel: +61-3-9214-8288, Fax: +61-3-9819-0821] bphillips@swin.edu.au

**Vice Presidents**

*Promotion and "IASE Matters" editor*

**Carmen Batanero**

Dept. Didáctica de la Matemática, University of Granada, Campus de Cartuja, 18071 Granada, Spain  
[Tel.:+34-58-243950, Fax: +34-58-246359] batanero@goliat.ugr.es

*IASE section in "ISI Newsletter" editor*

**Joan B Garfield**

Dept. of Educational Psychology, University of Minnesota, Minneapolis, MN 55455, USA. [Tel: +1-612-625-0337, Fax:+1-612-624-8241] JBG@maroon.tc.umn.edu

*Promotion and national correspondents network*

**Michael J Glencross**

Research Resource Centre, Director, University of Transkei, Private Bag X1, Umtata, Umtata, South Africa ,5117 [Tel.: +27-471-302-2947, Fax: +27-471-302-2917] glencross@getafix.ut.ac.za

*Representative of the IASE at the Programme Co-ordinating Committee of the 53<sup>rd</sup> ISI Session*

**Lionel Pereira-Mendoza**

Division of Mathematics, School of Science, National Institute of Education, Nanyang Technology University, 469 Bukit Timah Road, Singapore 259756 [Tel: +65-469-5151, Fax: +65-469-8928] pereiraml@am.nie.ac.sg

IASE also depends on the continuing help of a number of other people, e.g. Terry Byron (IASE Archive), Rolf Biehler (IASE Editor for the International Statistical Review), Susan Starkings (ICME-9 contact facilitator). Gratitude must also be expressed to the International Statistical Institute and in particular to the staff of the Permanent Office.

## **UPDATE**

Since 1997 IASE membership has increased from 355 to 543 individual members, while the number of institutional members increased from 8 to 9. The considerable increase of the membership is largely due to the fact that the ICOTS-5 registration fee structure gave non-IASE members a one year membership of IASE. It is hoped that through their participation in events such as ICOTS, these new members recognise the value of membership and continue to be part of this important organisation which only exists because of its members.

There are surely more people who are deeply concerned about statistical education for whom the *International Statistical Review*, *Short Book Reviews* and the *Annual Review of International Statistics* along with *IASE Review* and the IASE section in the *ISI Newsletter*, meetings and contact with other like-minded folk are worth IASE's modest dues.

### **Subscription rates remain constant for 1999**

IASE dues for 1999 are 70 Dutch Guilders for members in developed nations and 38 Dutch Guilders for members in developing and transition countries. Amounts in other currencies may differ a little from 1998 level due to currency fluctuations. The package of benefits remains just as high. As well as receiving the ISI/IASE publications free, members can take advantage of reduced rates on conference registrations and on the purchase of ISI/IASE books and journals. For example *Teaching Statistics*, which includes "IASE matters", may be obtained at a 20% discount. For details email Peter Holmes (ph@pnm1.maths.nott.ac.uk).

**For new subscribers** (while stocks last) **a special offer is available** which consists of a free book worth US\$ 65: *The Assessment Challenge in Statistics Education* (Ed) I. Gal and J. Garfield, IOS Press, 1997, 294 pages, hardcover, ISBN 90-5199-333-1.

## **GETTING AND EXCHANGING INFORMATION**

News for publication in the IASE section of the ISI Newsletter, edited three times in a year, may be submitted to Joan B. Garfield (address given above) within the following 1999 deadlines:

February 1, June 1, October 1

The IASE web site: <http://www.stat.ncsu.edu/info/iase/> provides important information on our Association. Its link with the ICOTS-5 homepage allows to have the full list of participants to the Conference and their e-mail address.

## **HAPPY NETWORKING FROM ICOTS V!!!**

The idea behind the networking sessions at the Fifth International Conference on Teaching Statistics was to give substance to the conference theme: "**Expanding the Network**". Regular conference

participants have often remarked that the real benefits of attending are the contacts made informally, between sessions, with people who share their professional interests. This was, however, the first ICOTS at which it could safely be assumed that the majority of participants would have access to email on the internet. The idea from John Taffe was to capitalise on this fortunate state of affairs by sowing the seeds of some new ICOTS-generated email lists.

Six embryonic lists were drawn up at ICOTS-5. The group topics were:

- teaching statistics by distance education;
- teaching statistics to research workers;
- technology in teaching statistics;
- teaching statistics in post secondary settings;
- linking statistics teaching in schools with the outside world;
- linking official statistics with statistics teaching.

By October 1998, most of these lists had been launched as email lists. The first two may be joined by sending the message ‘subscribe tsdist-l’ or ‘subscribe tsres-l’ to majordomo@swin.edu.au. They are run from Swinburne University in Melbourne, Australia, by Glenda Francis and John Taffe, respectively.

The third and fifth lists, tstech-l and tsschl-l, are run from the University of Central Queensland (also in Australia), by Rex Boggs. To join send the message ‘subscribe tstech-l’ or ‘subscribe tsschl-l’ to majordomo@cq-pan.cqu.edu.au.

You will receive a welcoming message with instructions on how to post to the list, as well as messages that others post to the list after you join.

Please help to make the ICOTS-sponsored email networks a success by joining at least one of these lists and sharing your ideas.

The original list members are listed on the ICOTS-5 home page which is linked up with the IASE web site. Further developments will also be posted there. More information can be obtained by John Taffe, jtaffe@vic.bigpond.net.au, the “reference person” for all the groups on behalf of the IASE.

## UP-COMING IASE CONFERENCES

### IASE Sessions in the ISI's 52nd Biennial Meeting Helsinki (Finland), August 10-18, 1999

There are seven invited paper meeting planned for ISI-52. One is co-organised with IAOS.

<i>Statistical Education and the Significance Tests Controversy</i> , C. Batanero [batanero@goliat.ugr.es]	<i>Issues Involved in the Assessments and Evaluation of Student Learning of Statistics</i> J. Garfield [JBG@maroon.tc.umn.edu]
<i>Teaching and Training Multivariate Data Analysis</i> H. Bacelar-Nicolau [ulfphelb@cc.fc.ul.pt]	<i>Visualisation as an Educational Tool</i> L. Weldon [weldon@cs.sfu.ca]
<i>Statistical Education Using Flexible Learning Approaches</i> , A. Di Ciaccio [diciaccio@econ.uniurb.it]	<i>Statistical Training for People Working in and with Official Statistics</i> , C. Blumberg
<i>Statistical Education for Life</i> , B. Phillips [bphillips@swin.edu.au]	[wncarolj@vax2.winona.msus.edu] and R. Smulders [The Netherlands]

The indicative list of topics for contributed papers drawn up by the Local Programme Committee contains:

- Teaching basic statistics
- Educating statistical majors
- Statistical education
- Teaching statistics for non-statisticians
- Statistical Literacy
- Statistical consulting

The main deadlines are: January 10, 1999, to send the application for the Submission of the contributed paper; April 10, 1999, to submit paper in its final form. More instructions and information can be found at <http://www.stat.fi/isi99>

### IASE Round Table Conference on “Training Researchers in the Use of Statistics” Meiji University, Tokyo (Japan), August 7-11, 2000

**Scientific Committee:**

Carmen Batanero, Spain, Chair  
 Theodore Chadjipadelis, Greece  
 Joan B Garfield, USA  
 Anne Hawkins, UK  
 Yuki Miura, Japan  
 David Ospina, Colombia  
 Brian Phillips, Australia

**Local Organising Committee:**

Yuki Miura, Surugadai University, Chair  
 Kensey Araya, Fukushima University  
 Masakatsu Murakami, The Institute of  
 Statistical Mathematics  
 Toshiro Shimada, Professor Emeritus, Meiji  
 University  
 Mikio Eda, Meiji University, Secretary

2000 will be the year of the IASE Round Table in Japan on the topic: "Training Researchers in the Use of Statistics". This meeting will be held at the Meiji University which is located in the central area of Tokyo, 7-11 August, 2000, following ICME 9 which will held in Japan July 31-August 6, 2000. The goal of the Round Table Conferences is to bring together a small number of experts, representing as many different countries as possible, to provide opportunities for developing better mutual understanding of common problems, and for making recommendations concerning the topic area under discussion. A main outcome is the publication of a book containing a set of refereed conference papers and summaries of discussions, which presents a global overview of the conference subject. The following are possible topics and issues to be discussed at the IASE 2000 Round Table Conference:

- Statistical competencies that researchers in different disciplines should acquire in their postgraduate training;
- Needs and problems in the statistical training of researchers in specific fields;
- Main learning problems, misconceptions and errors concerning advanced statistical concepts and procedures;
- Design/ evaluation of courses for training researchers in particular statistical topics;
- Effects of technology on the statistical training of researchers;
- Assessing/ identifying frequent errors in the use of statistics by researchers;
- Researchers' attitudes towards statistics and its effect on the role of data analysis in experimental research;
- Consultation as a teaching/ learning process;
- Informal statistical learning from reading research literature.

More information can be obtained from the web page: <http://www.stat.ncsu.edu/info/iase/> or from Carmen Batanero

### **IASE Sessions in the ISI's 53<sup>rd</sup> Biennial Meeting Seoul (Korea) 2001**

Lionel Pereira Mendoza is the representative of the IASE within the Programme Co-ordinating Committee for the 2001 ISI Congress in Seoul (Korea). The Committee will meet during the 52<sup>nd</sup> ISI Session. Suggestions are being actively sought regarding session topics and organisers. There will be six or seven themes directly related to Statistical Education. Suggestions concerning any aspects of teaching statistics are welcome but preference will generally be given to topics of wide interest. Sessions that are organised in collaboration with IASE's sister Associations within the ISI family are strongly encouraged. Suitable names and contact information for organisers, speakers and discussants will also be appreciated.

Suggestions should be sent to Lionel Pereira Mendoza (address above).

### **ICOTS-6 Durban (South Africa) 2002**

Plan for ICOTS-6 in the summer of 2002 are already under way. The venue is Durban, in South Africa, during mid July. We will make a concerted effort to attract participation from African developing nations, in part offering funds to delegates as was the case at ICOTS-5.

The International Programme Committee (IPC) is formed at present by:

Maria-Gabriella Ottaviani (Italy) Chair  
 Brian Phillips (Australia) International Organiser  
 Dani Ben-Zvi (Israel) IPC Secretary  
 Delia North, (South Africa) Chair of the Local Organising Committee

IASE encourages members to submit suggestions for session topics, for organisational arrangements, or other areas. ICOTS is IASE's major conference; we want it to respond to members' wishes.

Any suggestions or other communication from interested members relevant to the activity of the IPC will be welcomed by Maria-Gabriella Ottaviani and Brian Phillips (addresses above)

#### **THE INTERNATIONAL STUDY GROUP FOR RESEARCH ON LEARNING PROBABILITY AND STATISTICS**

##### ***International Research Forum on “Statistical Reasoning, Thinking, and Literacy” (SRTL)*** **Kibbutz Be’eri, (Israel), July 18-23, 1999**

The International Study Group for Research on Learning Probability and Statistics is offering the first in a series of *International Research Forums*, to be held in Israel in July 1999. This forum offers an opportunity for a small number of researchers from around the world to meet for a few days to share their work, discuss important issues, and initiate collaborative projects. The topic of the first forum will be “Statistical Reasoning, Thinking and Literacy”.

Dani Ben-Zvi (Weizmann Institute of Science, Israel) and Joan Garfield (University of Minnesota, USA) are co-chairs of the International Research Forum. The Research Forum organizers invite anyone interested in participating in this forum to contact them as soon as possible. Initial expressions of interest are invited as well as brief descriptions of relevant work to be shared at the forum.

Please contact: Dani Ben-Zvi, at [ntdben@wicmail.weizmann.ac.il](mailto:ntdben@wicmail.weizmann.ac.il)

Joan Garfield, at [jbg@tc.umn.edu](mailto:jbg@tc.umn.edu)

More information on the Study Group and its list can be obtained from Carmen Batanero, Secretary of the Study Group (address given above).

#### **FORTHCOMING CONFERENCES OF PME**

**The annual Conference of 1999** is scheduled in Haifa, Israel, from July 25 to July 30.

Information may be obtained from the Conference Secretariat ([pme@netvision.net.il](mailto:pme@netvision.net.il)) or the home page of the conference: <http://edu.technion.ac.il/conference/pme23>.

**The annual Conference of 2000** is scheduled in Hiroshima, Japan, from July 23 to July 27.

Information may be obtained from Professor Masataka Koyama ([mkoyama@ipc.hiroshima-u.ac.jp](mailto:mkoyama@ipc.hiroshima-u.ac.jp))

#### **FORTHCOMING ICME-9 CONFERENCE**

##### **Tokyo/Makuhari (Japan), July 31-August 6, 2000**

Prof. Hiroshi Fujita, Chair of ICME-9 IPC, has invited Dr Susan Starkings, the ICME-9 contact facilitator, to be the chief organiser of the **Topic Study Group No. 4 on: “The Teaching and Learning of Statistics”**.

Contact: Susan Starkings, [starkisa@vax.sbu.ac.uk](mailto:starkisa@vax.sbu.ac.uk)

Other information may be obtained from the Web site: <http://ma.kagu.sut.ac.jp/~icme9/index.html>

#### **SESSIONS ON STATISTICAL EDUCATION IN ARGENTINA, 1999**

In 1999, in Argentina the “CLATSE 4 Congreso Latinoamericano de Sociedades de Estadística” will be held in Mendoza, from July 26 to July 30 organised jointly by the Sociedad Argentina de Estadística (SAE) and the Sociedad Chilena de Estadística (SOCHE). **Sessions on teaching statistics** at all levels will be organised by Ana Silvia Haedo, Vice-President of the SAE in collaboration with the IASE. Please contact: Ana Silvia Haedo, [haedo@qp.fcen.uba.ar](mailto:haedo@qp.fcen.uba.ar)

Other information may be obtained from the Web site: <http://fce.uncu.edu.ar/clatse4.htm>

## **PUBLICATIONS EDITED BY THE IASE**

### ***Proceedings of the Fifth International Conference on Teaching Statistics***

*Great appreciation is to be expressed by all the IASE members to the members of the Publication Committee, chaired by Lionel Pereira-Mendoza, who ensured an efficient co-ordination thus permitting the participants, as well as all IASE members, to have immediately at their disposal the best and most up-to-date findings of activity and research in statistical education*

#### Information on Ordering

The Fifth International Conference on Teaching Statistics was held in Singapore in June 1998.

The Proceedings cover the eight main topics of the Conference:

- 1. Statistical education at the school level;
- 2. Statistical education at the post-secondary level;
- 3. Statistical education for people in the workplace;
- 4. Statistical education and the wider society;
- 5. An international perspective of statistical education;
- 6. Research in teaching statistics;
- 7. The role of technology in the teaching of statistics;
- 8. Other determinants and developments in statistical education.

As these topics indicate, the proceedings cover the spectrum of issues for statistical education at all levels. There are in three volumes containing approximately 200 papers, with authors from 40 countries presenting the latest thinking in statistical education. The proceedings contain some papers that discuss general issues and others that contain practical suggestions for implementing ideas at the classroom level. The three volumes are an invaluable source of information for anyone who is concerned with statistical education.

For people wanting a list of the papers presented at the conference, a complete listing can be found at: [www.nie.ac.sg:8000/~wwwmath/THEFINAL.html](http://www.nie.ac.sg:8000/~wwwmath/THEFINAL.html)

To order please contact:

CTMA Pte Ltd

425A Racecourse Road

Singapore 218671

Tel.: (65) 299 8992, FAX: (65) 299 8983

Email: [ctmapl@singnet.com.sg](mailto:ctmapl@singnet.com.sg)

### **PME PUBLICATIONS: CALL FOR PAPERS**

#### *Teaching and Learning Statistics: Implications from Research*

There is a proposal by the PME Working Group for Stochastics Teaching and Learning to produce a publication that addresses the above theme.

Intended audiences are new and current researchers in statistical education in different areas such as Mathematics Education, Psychology and Education. It would also be directed to statisticians interested in the problems of statistical education, as well as to university lecturers and teacher educators.

The following are the proposed chapter headings:

0	Introduction	5	Assessment
1	Historical/Philosophical/Epistemological and Theoretical Issues, including Statistical Thinking	6	Model Fitting
2	Collection and Organisation of Data	7	Sampling/Estimation
3	Graphs	8	Hypothesis Testing
4	Averages and Dispersion	9	Computers
		10	Summary of the Book
		11	Forward Looking

Expressions of interest should provide a title and a brief abstract (from the proposed chapter headings) of the intended chapter (300-350 words). The abstract will focus on the topic of the chapter while keeping in mind the issues of audience and intent. Abstracts to arrive no later than 7th December, 1998, can be e-mailed to: [Kath.Truran@unisa.edu.au](mailto:Kath.Truran@unisa.edu.au) or a hard copy sent to: Kath Truran, School of Education, Magill Campus, University of South Australia Magill, South Australia 5072

## **ISI WORLD NUMERACY PROGRAMME**

Within the framework of the ISI World Numeracy Programme, national activities are promoted which aim at spreading quantitative skills as well as the development of statistical science and scientific data collection practices.

In Helsinki , at the ISI 52<sup>nd</sup> Session, Prof. Luigi Biggeri, the Chairman of the ISI WNP, will organise a Panel discussion on “Statistical Literacy”.

For more information contact: Luigi Biggeri [biggeri@stat.ds.unifi.it].

## **SCIENTIFIC ISSUES**

### ***ICOTS-5 REVIEW***

#### **KEYNOTE SPEAKERS**

One of the general themes discussed by a number of the keynote speakers at ICOTS-5 was the importance of bridging the gaps between statistical educators, practising statisticians and others who use statistics in their work. This point came through in talks by Dr Paul Cheung, the Singapore Statistician, Professor Richard Scheaffer from the University of Florida and Mr Roger Luk, of the Hang Seng Bank in Hong Kong (China). The importance of making constructive use of technology to help formulate hypotheses was highlighted in the keynote address by Dr William Cleveland from Bell Laboratories in the USA. Cleveland demonstrated how increased computing power and the use of visualisation using packages such as trellis graphics displays can be used to help uncover the structure of data even when complicated interactions might be present. In another keynote address, the importance of understanding our historical links was stressed by Professor David Vere-Jones from Victoria University of Wellington (New Zealand). Vere-Jones spoke about differences between countries in their approaches to statistics and how the histories of the countries had influenced the aspects of statistics they emphasised. Both Vere-Jones and Scheaffer addressed issues related to the question “Is the Statistical Profession Under Siege?” The motivation to address this question came in light of rapid advances in computing, the perceived down-grading of the quantitative sciences and shrinking enrolments in statistics majors, though not in statistics programs overall. They strongly advocated that, as most quantitative sciences have a need for statistical skills, appropriate statistical training should be given at all levels of education from primary school to university and continued statistical education encouraged once in the workforce. Furthermore, they felt that greater communication was needed between schools and universities, workplaces and across departments within institutions.

#### **MAIN TOPICS**

##### **Statistical Education at the School Level**

*Convener: Lionel Pereira-Mendoza (Singapore)*

There were two themes in this session, one focusing on Statistical Education at the primary level, organised by Carolyn Maher and Robert Speiser (USA) and the other focusing on the secondary level, organised by Janet Chaseling (Australia). There a wide variety of papers focusing on different issues associated with statistical education at the school level.

In the primary strand the authors reported on experiments which explored students understanding of probabilistic thinking. Their data gathering included videotaping children as they were talking, listening and explaining their ideas while they were involved in dice games. The discussion that followed showed how students construct probabilistic concepts. Of particular importance for classroom teachers are the roles of social influences and classroom organisation play in concept development.

In one theme of the secondary strand the authors explored activities that could be used within the school. For example, how a project based course in statistics can be used to create an interactive environment. Other authors described how a rich statistics learning environment could be established by use of interesting datasets such as from the Internet, enabling students to focus on the interpretation and analysis of meaningful data. A particularly exciting example of what can be done across countries was reported, in which students are experimenting with an international exchange of data. This strand also involved one of the themes of the conference, namely the use of technology.

Other papers within the secondary theme looked at different aspects of statistical education. One how described the development of a number of experiments to help students construct a realistic concept of variation and the difficulties it causes in the realm of statistical inference. A second paper looked at the ways in which organisations such as the Royal Statistical Society or the American Statistical Association can provide support for statistics teachers. A third paper explained how the teaching of probability and statistics in schools has increased dramatically in the past 30 years, especially as mathematics education has become more society-centred.

One aspect of education at the primary and secondary school that does not appear in the proceedings was the special session for local teachers. Selected speakers were asked to present their ideas to approximately 120 local teachers and Ministry of Education people who had come to the conference. There was also a demonstration lesson for teachers at the secondary level using graphics calculators. This aspect of the programme proved particularly useful to raising the awareness of the direction of statistical education among classroom teachers.

This short report cannot cover all aspects of the 13 papers that appear in the part of the proceedings. Overall it can be concluded that there has been an increased emphasis on teaching statistics in schools, with the focus moving from a computational orientation using formulas to more experimental basis in which students construct their own idea, use real data, and employ the power of technology in their analysis.

*L. P.M.*

### **Statistical Education at the Post-Secondary Level**

*Convener: Richard Scheaffer (USA)*

The three sessions on “Teaching Introductory Statistics and Probability”, organised by Allan Rossman (USA) presented a variety of issues from a range of perspectives, but some common themes emerged. Some presenters concentrated on active learning, demonstrating activities through which students can be engaged in the study of elementary statistical concepts. Others called for a somewhat radical rethinking of the standard introductory course with a focus on that elusive quality known as ‘statistical thinking’ and with an eye toward skills that employers want students to acquire. A third theme permeating several presentations concerned the use of case studies and collaborative learning. Virtually all of the presentations included genuine examples that audience members could take back to their own classrooms, as well as practical recommendations for implementing the ideas presented.

In the session on “Teaching Mathematical Statistics”, organised by Graham Wood (Australia) it was shown that computer algebra systems, such as Maple, can be used effectively in, but students must be given detailed instructions in their use so that they are aware of the types of problems these systems handle well and the kinds of errors that frequently occur. Just as statistical software relieves the drudgery of computation, these systems can relieve the drudgery of integration.

“Teaching Design and Analysis of Experiments”, organised by Robin Lock (USA), a theme becoming a more important part of introductory statistics education, should emphasise simulation and hands-on activities that engage the student’s attention and interest. Many such activities are available on the world wide web.

In “Teaching Regression and Correlation”, organised by Richard Thomassone (France), it was emphasised that statistical software is now easy to use and more powerful than ten years ago, and many procedures for regression which were difficult to apply because of computations are now readily available. Simulation methods, variable selection methods, and ways of detecting influential cases are examples of commonly used procedures that allow users to criticise the usual minimum squared error estimator and eventually choose an appropriate method that leads to better results.

In “Teaching Bayesian Methods”, organised by Jeffrey Witmer (USA), talks coalesced around the common theme that students have substantial problems interpreting frequentist confidence intervals and hypothesis tests; they tend to give Bayesian interpretations to these. For the most part the speakers advocated teaching both frequentist and Bayesian methods; students seem to have a much better understanding of frequentist methods after seeing the presentation of Bayesian ideas. During discussion it was emphasised that lack of software has stopped teachers from making greater use of Bayesian methods. It was noted, however, that software has been developed recently and more is currently being developed.

The session on “Teaching Sample Survey Design”, organised by Ann-Lee Wang (Malaysia), aimed at showing the different ways in which sample survey design and analysis can be taught. One speaker demonstrated how interesting ecological examples, that students have to carry out themselves, can be



used to teach sampling methods. He argued that it is through such hands-on experience that students “can properly understand statistical principles”. Another gave a comprehensive account of her view of an undergraduate course, mentioning web sites that may be used in the teaching of sample survey. Short courses are conducted by the Centre for Applied Social Surveys in the United Kingdom on social survey methods. The International Statistical Education Centre in India teaches sample survey design and analysis to government officials from the Middle East, Asia and Africa. The talks showed that much ingenuity can be found in the use of simple examples to teach sample survey design and analysis. It is possible to teach the topics using low technology. Institutions with access to newer and higher technology can make use of many freely available materials.

The session on “Teaching Statistics to Medical Students”, organized by Geoffry Berry (Australia) is an important process that should pay more attention to proper design of studies and categorical data analysis, especially logistic regression with its promise and pitfalls and the Mantel-Haenszel procedure. The web is an excellent tool for supporting the statistical education of these very busy but highly motivated students.

R.S.

### **Statistical Education for People in the Workplace**

*Convenor: Carol Joyce Blumberg (USA)*

The topic was divided into four sessions.

The first session was organised by Maria Ramalhato (Portugal) and Bovas Abraham (Canada) and concerned “Continuous Statistical Development for Employees in Technical Industries”. The first paper in that session described the results of survey of graduates of the City University of Hong Kong asking how well their studies in statistics prepared them for their careers in industry. The second paper explored the topic of Statistical Thinking from a quality control point of view. The third paper described an interactive teachware computer package that has been developed to teach elementary statistical quality control concepts.

The second session was organised by Carol Joyce Blumberg (USA) and contained six papers on various aspects of “Statistical Consultancy, A Basis for Teaching”. The first paper described year-long group consultancy projects done by second year undergraduates in Statistics at Sheffield Hallam University. The second paper described how an archaeological dig in Israel has become a statistical consulting experience for undergraduates. The third paper described how one instructor has turned his consulting experiences into case studies that are used in his graduate-level classes. The fourth paper was by the supervisor of a Statistics group at Hoechst Marion Roussel, Inc. It described how his company helps new hires become effective consultants. The fifth and sixth papers focused on the teaching aspects of consultancy. Both papers described the experiences that the authors and others have had when consulting, how these experiences can be used to teach clients statistical concepts, and what the consultants have learned from these experiences.

The third session was organised by Fred Smith (UK) and contained two papers on “Continuing Education of Statistical Professionals”. The first paper described the work of Eurostat in the international training of statistical professionals from Europe and developing countries. The second paper described the Chartered Statistician qualification programme of the Royal Statistical Society in the United Kingdom. The remainder of the session was devoted to an ISI Briefing Seminar for Chief Statisticians.

The fourth session on “Distance Education in Statistical Education” was organised by Daniel Lunn (UK). It began with an Overview by the organiser. There were then four papers presented. All four are very similar in that they described the development of distance education programmes using the World Wide Web and/or CD-ROMs. All of the programmes are using the cutting-edge of technology to deliver statistical education to audiences that would not have access otherwise.

C.J.B.

## **Statistical Education and the Wider Society**

*Convener: Anne Hawkins (UK)*

The Session consisted of four subsections.

In “Statistical Societies”, organised by Helen MacGillivray (Australia), the interest focused on how a Society may interact with Statistical Education. Particularly, one speaker spoke above the Royal Statistical Society’s initiatives in order to impact on society at large as well as on other discipline areas or other professional bodies, trying at the same time to make statistics itself more accessible. Actually the Societies play important role in the wider community and the educational issues can range from accreditation, all level of school and post-school education, national standards, interaction with business and industry. The Statistical Society of Australia’s way to face the above mentioned education challenges was illustrated by another speaker who described societies as differing widely due to the character of their membership. This causes a large difference in how they interact with educational opportunities. According to this idea, another speaker made a comparison among the activities of “strongly academic”, “numerically very much non-academic”, and “in the middle” Societies.

The session on “Statistical Literacy”, organised by Anne Sevin (USA), addressed the ultimate goal of creating a quantitatively literate citizenry. With this in mind a speaker proposed a list of statistical concepts which could serve as the knowledge base that affects the understanding of decisions and conclusions based on statistical evidence. From the point of view of education, another speaker said, statistical literacy may be an important aspect of educating students about risk to make informed decision, making use of data collection and handling. Statistical literacy implies to have a clear idea of statistical thinking. An exploratory study interviewing six professional statisticians on their perspective of the nature of statistical thinking and on how they approached statistically based projects allowed another speaker to emphasise some key features of statistical thinking nature.

“Statistical Education Publications” are concrete supports of statistical education. In this session, organised by David Green (UK), well known English journals were presented by different speakers. Teaching Statistics is an international journal which aims to provide materials of direct use in the classroom. The Statistics Teacher Network is a newsletter which played a role in informing the American teaching statistics community of their progress and encouraging other teachers to become involved in its development. This newsletter is now available on the web. The Journal of Statistical Education is the first electronic journal in statistics that, thanks to the electronic medium, is in a position to publish datasets and software that could not appear in paper journal. There are other non English journals related to statistics education. In Italy, for example, the launch of the journal *Induzioni* was a big challenge for the Italian academic statisticians involved with teaching statistics. The editorial policy, examined by a multivariate correspondence analysis, appears to be well-balanced among statistics, probability and applied statistics. In Estonia, the Journal of the Estonian Statistical Society was first published in 1993. It contains popular papers written in Estonian and is available also in bookshops. Today the web offers other possibilities and other services. In particular the characteristics of the Teaching Statistics Mailbase list were shown. This is a service which runs electronic discussion lists for the UK higher education and research community. The number of subscribers has grown and by March 1998 stood at 325, from over 30 countries with messages averaging about 25 per month.

The session on “Statistics Education for Legal Contexts”, organised by Peter Hawkins (UK), began by showing the growing need in the legal community for statistical education. The importance of statistical issues was illustrated by a speaker examining actual decisions. Obviously, as another speaker outlined, there is a need for statistical experts to teach judges enough about probability and statistics to convince them of the acceptability of the complete range of the evidence being presented. However, as another speaker showed, also lawyers need to be helped, as they have difficulties not only with probability and statistical inference, but also with percentages and ratios.

*Maria-Gabriella Ottaviani (Italy)*

## **An International Perspective of Statistical Education**

*Convener: James Ntozi (Uganda)*

To gain an international perspective of statistical education, these sessions gave speakers the opportunity to discuss issues confronting educators from a number of different cultures. It was seen that problems which occur in the developed countries were also often reported by speakers from the developing and transitional countries. These included problems of motivating students, showing the relevance of the subject and the need for statistical education at all levels. This was evident in the "Introductory statistics lecture" described by a speaker from Ghana, in which his aim was to help

motivate skeptical students in statistics by trying to convince them that statistics is a separate science from mathematics, using historical examples, explaining the main aim of statistics and giving cautions about the mis-use of statistics, issues common to statistical educators everywhere.

However statistical educators in these countries face many problems that people in the Western world usually do not have the deal with. A number of authors identified some of these factors including the lack of qualified statistics teachers at all levels, inadequate facilities, the lack of local learning materials and the influence of fast changing technologies. The economic development of some of these countries was reported as being strongly connected to the statistical education of the people.

In the session on Statistical Education in the African Region, organised by Vitali Muba (Tanzania), it was reported that lack of effective statistical information systems influenced many of the problems facing the sub-Saharan countries. A recommendation was that there is a need for a culture change to lead to greater stress being placed on numerical, statistical and computer aspects of education from the earliest levels. Another speaker reported that although South Africa was the most advanced country in the region as far as statistical education is concerned, it faced problems similar to those reported by speakers from countries with less developments in this area.

A South African speaker questioned how historically disadvantaged students, who have not experienced a study culture, may be helped in their statistics studies. Some of his suggestions included using bridging programs in mathematics, using local texts, having study manuals in place of texts and restructuring the syllabus into a modular system. One wrote that despite the existence of about 20 universities and technical colleges in South Africa which offer training in the medical sciences, most teach little to help avoid the pitfalls of incorrectly using statistical methods or appraising statistically based studies in these areas.

Ana Maria Tabunda from The Philippines organised the sessions on Statistical Education in the Asian Region. Unfortunately the representation from the this region outside Singapore was poor, due to the financial crisis. However among those who presented in this topic area was a speaker from Taiwan who reported that although a new descriptive statistics unit at high school was positively received by staff, students gave it a negative reaction due to lack of understanding of some concepts, dull materials and tedious computations since calculators were not encouraged. Many of these issues are being addressed in the revision of the courses. There was also a report from Korea on a study of computer aided instruction, CAI, for multimedia courseware in introductory statistics, found it is particularly effective with students who have diverse individual needs as well as being for distance education. Some participants from Singapore, considered how data analysis is best taught, and concluded that rather than teach mathematical proofs, there should be more concentration on practical applications and learning when they should consult a statistician.

In the section on statistical education in Spanish Speaking Regions, organised by Teresita Teran (Argentina), speakers from Spain described the Spanish stochastic curriculum for compulsory and optional education. One speaker from Argentina saw the need for a solid base in statistical theory as well recognising the importance of statistics in solving problems, for students in engineering and biological sciences. Another discussed how the current household survey in Argentina was used in statistics courses both for applied economic research and for training students in the handling and reconciliation of databases. Finally Teresita asked the question "Are we preparing teachers and pupils in statistics for the next century?" and gave examples of syllabi and exercises she uses to help increase understanding and interest in statistics at the school level.

Finally there was a session on statistical education in Other Developing Regions, organised by Alan Rogerson (Australia) and Manmohan Arora (India). Here speakers from Brazil described how their Government is making efforts to help educate the 21<sup>st</sup> century professionals to deal with problems facing this huge economy including providing statistical education at all levels. Another with experience in Kazakstan reported that although the teaching of statistics there after independence has been largely neglected, efforts are being made by the National Statistical Agency to reinforce the culture of statistics in the society. A report from Egypt described how statistics helps meet real life problems at primary level but is optional and 'cook-book' at secondary level. The speaker suggested that statistics might be better taught if integrated in other areas. Another sees there are specific problems for statistical education in transitional countries such as in Croatia where the preference of many teachers is for students to avoid using computers, which are not readily available anyway, so that they may better develop concepts. Also with a changing culture techniques such as survey sampling, which were not politically acceptable under communism, are now starting to play a part.

Summing up it was seen that the problems confronted by teachers of statistics in developing and transitional countries include many problems common to most statistical educators, but have the added problems of different cultures, lack of resources and trained staff. Some of the authors see that major changes will not be seen till the school system and other general socio-economic developments in their countries improve.

*Brian Phillips (Australia)*

### **Research in Teaching Statistics**

*Convener: Joan Garfield (USA)*

This main topic area was spread over four sessions.

The session on “Research in teaching statistics at school levels” was organised by Carmen Batanero (Spain). Two presentations dealt with student outcomes. The first paper discussed the development of the concept of weighted average in analysing the responses on a written test of three groups of students: 8th grade prior to instruction on the average, 9th grade at the moment of instruction and finally at the 11th grade. The second paper presented the findings of a survey with students in the sixth form (year 12) concerning the relationship between the students attitudes towards assessment and their past (1995) and present (1996) performance. In the same session, another study examined the topics of correlation and regression in 21 Spanish secondary school text books and reported that some students’ misconceptions could be induced by textbooks where 75% of exercises refer only to positive correlation. The authors remarked that very few tasks made reference to real data. Three papers dealt with curriculum materials. One emphasised the role of simulation as a key element in laying the conceptual foundation for thinking about inference at the senior level. Another reported the effect of an experimental graphing unit with students in grade 6 and 8 and gave evidence to support the existence of a sequence of reasoning strategies. The third described an innovative curriculum 'Exploratory Data Analysis' with middle school students.

The session on “Research in teaching statistics post-Secondary Levels”, organised by Gilberte Schuyten (Belgium), was clustered following the three themes: cognition and affection, graphics and learning aids and learning statistical concepts. Some papers dealt with research into the learning of specific statistical concepts. Focus was on student misunderstandings or missed understandings. Methodology used was mainly qualitative; concept maps and interviews were used as data gathering techniques. Several presentations emphasised the complexity of the concept of variability. Others focused not on student interpretations but on the development of efficient learning/teaching environments. In these presentations the reform of statistics teaching is linked with the reform of university teaching. Information and Communications Technologies (ICT) are key elements in these learning environments. Research findings concerning the relation between verbalisers (students who prefer verbal information) and the handling of graphical displays were given in two other papers. Other research studied the way that attitude and achievement in statistics interrelate and on cultural differences in those relationships.

The “Research in Teaching Probability” session, organised by Kathleen Truran (Australia), dealt with ages 5 to 12 and students in a first level course in probability and statistics at the under-graduate level. One author investigated basic concepts of probability with children aged 5 to 12 years and reported that these concepts are intuitive but that further development becomes dependent on the acquisition on fractional and proportional thinking. Evidence of strong beliefs in animism and in the relationship between luck and the outcome of dice with children aged from 7-12 years was made evident by another speaker. Another discussed the use of scratch cards for introducing many ideas and key concepts typically encountered by students in a first level course in probability and statistics at under-graduate level.

“Challenges in assessing statistical reasoning skills” was the theme of the fourth session, organised by Iddo Gal (Israel). A speaker described the development and validation of the SRA Statistical Reasoning Assessment that assesses basic reasoning involving probability and statistics without using technical vocabulary or requiring computational skills. Another presented the findings of a longitudinal study of students understanding of statistics presented in newspapers. Several groups of students were tested and retested in order to evaluate developmental changes in understanding, while controlling for curriculum changes and item recall. The third speaker brought an assessment approach in the teaching of applied statistical methods courses consisting of quizzes, midterm test and final examinations.

A very crowded Round Table Discussion on Research was chaired by Joan Garfield (USA). To provide a framework for the discussion, Flavia Jolliffe started with a series of questions : Is statistics education

a field of academic research ? Does statistics education fall within the wider field of mathematics education? What criteria should be used to evaluate research in statistics education? The discussion focussed on the role of research journals to promote statistics education as a research discipline. Journals such as *Teaching Statistics* and *Journal of Statistical Education* already provide a more visible means of communicating with other researchers in statistics education. Also the IASE section of the journal “*International Statistical Review*” was mentioned as a channel. Nevertheless participants expressed the need for a journal more focused on research than on reporting interesting classroom experiences. The response to all sessions was very positive. Many participants expressed a shared vision of the research that needs to be done and left the conference with enthusiasm for new collaborations and research networks.

*Gilberte Schuyten (Belgium)*

### **Use of Technology in Teaching Statistics**

*Convener: Rolf Biehler (Germany)*

The Session consisted of six subsections: “Software Designed for Statistics Education”, organisers Robin Boyle, Australia, Peter S. Mortensen, Denmark; “New Conceptions in Teaching Experiments Using Technology”, organiser: Mike Shaughnessy, USA; “The Use of Graphics Calculators in the Teaching and Learning of Statistics”, organiser: Peter Jones, Australia; “Multimedia, WWW, and Statistical Videos in Teaching Statistics”, organiser: Robin Lock, USA; “Visualisation as an Educational Tool - Statistical Graphics”, organiser Larry Weldon, Canada; “Research in Using Technology for Statistics Teaching”, organisers: Rolf Biehler, Germany and Cliff Konold, USA. Nearly 40 papers were presented. Moreover, the use of technology was also an issue in quite a few presentations in other sections. Papers focused on various aspects: presenting innovative software and WWW-based teaching and learning material and ideas of its use, reflecting on the design of software, comparing existing computer-based learning materials, discussing didactical conceptions and experiences with integrating software in whole courses or teaching units, studying cognitive effects and difficulties of students when using software. What was new or different as compared to earlier ICOTS? Certainly, the use of the WWW and the development of multimedia and hypermedia learning material and the integration of both has exploded during the last years. Some papers presented a structured and critical overview of a sample of existing resources. This is a difficult and ongoing task because of the dynamics of the WWW and because it is conceptually not easy and time consuming to find the pearls in the huge heap of different on-line resources reaching from context-bound lecture notes to excellent full hypermedia environments for learning statistics. Compared to the mass of available resources, we, however, know only a little about an adequate integration of WWW and multimedia resources into teaching. Some presentations of finished and ongoing multimedia and hypermedia projects made the high complexity (and high costs) of developing high quality products very clear, and the developers were not enthusiastic but moderately optimistic that some of the highly ambitious goals can be fulfilled. The WWW and the general concern for multimedia has stimulated a lot of research and conceptualisations concerning the design of such systems, which is not bound to the subject matter of statistics. Presentations relied on different bodies of such knowledge (CBL and CAL, hypertext design etc. ) and used them for designing or evaluating educational software in statistics. In this sense the practical software projects seem to become more theory based than they used to be, although most of them have to make large compromises because of limited resources for educational projects. Other fascinating software and teaching projects were mainly rooted in the research or study of misconceptions and learning difficulties in statistics and probability and in the intention to provide exploratory microworlds with multiple, dynamically linked representations to stimulate new kinds of visual and experimental learning. Another important goal was to provide cognitive tools for stimulating statistical reasoning, thinking and supporting the practice of exploratory statistics at an elementary level, especially at high school and in introductory statistics courses. Often, existing (professional) tools for statistical data analysis were not considered as adequate for supporting these purposes, and new tools were suggested. Although we were able to observe some overlap with regard to these two bodies of knowledge used, there is still a lot to do of integrating and combining these different traditions for a mutual benefit. As compared to earlier ICOTS, there was much more concern about evaluation and less naive enthusiasm concerning the benefits of the computing technologies. More interesting single study results were presented concerning the use of software in courses, and in teaching and learning processes and its influence on students thinking and attitudes. But this research domain is still in its infancy. A methodological reflection relating the benefits of traditional pre-and

post-test methods with more qualitative exploratory studies and clinical interviews with students has still to be done in our field. This has to be paralleled with an elaboration of a research program that would specify major goals in empirical research concerning the use of technology in classroom settings and with regard to individual learners and statistics users. Without that, it will remain difficult to compare, relate and integrate individual studies. Some presenters expressed their hope that using concepts and theories from research in mathematics education will lead to progress here. From a practical point of view of teachers, the set of presentations offered a very broad and interesting spectrum of software and ideas of their educational use. Moreover, several presentations were also concerned with the educational use of existing tools such as graphic calculators, EXCEL and professional statistics programs such as Statgraphics, SPSS or BMDP. As compared to the widespread use (and abuse) of such programs in educational and in practical settings, the number of empirical studies concerning the use of these tools and the number of more theoretical papers concerning the didactics of learning to use such tools adequately was surprisingly small at the conference. It is clear that a session about the use of new technologies will always have to present, analyse, and stimulate interest and enthusiasm in new technology based products. It has to keep up with the dramatic changes of technological possibilities. I think the section fulfilled these needs very well. On the other hand, however, the section also showed a growing maturity, concern and urgent need of a design and use of technology that is better informed by research, because we urgently need such deeper insights in order to improve our teaching and our students' learning. If this concern will as rapidly grow as the technological possibilities will grow until the next ICOTS, we can look forward to a stimulating and interesting future in our discipline of statistics education.

R.B.

### **Other Determinants and Developments in Statistical Education**

*Convener: Giuseppe Cicchitelli (Italy)*

The main topic was spread over four sessions.

The first session, organised by John Truran (Australia), was titled "Historical/Cultural Factors". At the Key-note address on Thursday morning, David Vere-Jones (New Zealand) had examined some aspects of the history of statistics, and emphasised the importance of individuals in influencing history. In the afternoon about 20 people from many countries attended a seminar where three papers were presented and a Round Table was held on aspects of the history of statistics education. The first paper on the many changes in statistics education in French schools in the last 40 years was summarised in absentia. The second paper provided an entertaining and well-illustrated history of the slow development and understanding of the idea of the arithmetic mean. The third paper explored the history of the idea of the null hypothesis and showed how it had rarely been accurately represented in textbooks. The Round Table was a lively and entertaining discussion which emphasised the value of a sound historical background for good teaching. This was one of the most amusing sessions of the Conference, but it addressed important issues of precision, language and the limitations of current academic procedures.

The session on "Learning factors" was organised by Robert C. delMas (USA). Five papers were presented in the session. The first presented a reflection on the use of a constructionist approach to help students deal with the uncertainty and ambiguity that are inherent in situations that involve statistical decision making. The speaker described the stress that students experience with a constructionist approach and the changes that can result. The second presentation concerned a computer microworld that helps students confront misconceptions about sampling distributions. Results showed how changes in the way students interact with the software can produce large differences in students' conceptual change. Another speaker looked at the relationship between first year students' conceptions of chance and probability and their approaches to learning statistics. The author's findings suggest that students have fragmented views of basic concepts that result from learning strategies based on rote learning and practice. Two other authors developed regression models to examine the relationships between students' incoming characteristics, their experiences as students in statistics, and their educational outcomes. The models demonstrate the important role students play as co-workers in introductory statistics instruction. In the final paper the authors demonstrate that students often have tacit understanding of probability concepts that may require "experimental tricks" to become activated and overt. Their results demonstrate the positive effect of cognitive activities in facilitating transfer to isomorphic problem situations.

The session on "Gender Factors" was organised by Megan Clark (New Zealand). The Gender Issues session had a very small but enthusiastic attendance. Three speakers described issues arising in past

ICOTS and the very different situations within statistics education of women in New Zealand and in Singapore. The speakers were followed by a general discussion of gender issues in the teaching of statistics (which included the student teacher assigned to assist with projector equipment). Of concern to the group was the fact that none of the keynote speakers at ICOTS-5 were women or schoolteachers and it was felt that a major issue in the teaching of statistics was the repeated failure of women or teachers to gain an established voice at international conferences such as ICOTS despite the prominence of individuals such as Anne Hawkins. General agreement was reached that at future ICOTS the group would like more keynote speakers to be women and /or practising teachers.

The "Project/competitions" session was organised by Linda J. Young (USA). The use of projects to advance statistical education was the focus of one session. One presenter discussed activities by the Irish Statistical Association to promote statistical projects and data analysis in the Irish secondary school system and to advance statistics in the Irish Young Scientist's Exhibit. Another described a Victoria University of Technology program that gives students in the final year of study on the Computer and Mathematical Sciences degree the opportunity to work on a real problem for an industrial, commercial or government organisation. Another surveyed statistical techniques used and errors committed in applied research projects completed as a requirement for the first degree in Nanyang Business School, Nanyang Technological University. The last speaker described incorporation of student-selected projects in introductory statistics subjects, particularly in engineering classes up to 400 students. The second session reviewed several statistical competitions. One speaker described the annual statistical project competition run by the Hong Kong Statistical Society. She also commented on common statistical mistakes made by students and how these had changed with time. Another compared statistical project competitions in Hong Kong, Pakistan, and the United Kingdom and discussed how projects can be incorporated into the statistical curriculum. The third speaker described the American Statistics Project and the American Statistics Poster Competitions, highlighting the process of developing statistics projects and posters.

G.C.

### ***A PERSONAL VIEW ON STATISTICS INTERESTING STATISTICAL EDUCATION***

The third 1997 issue of the ISI flagship journal, the International Statistical Review, which all IASE members receive, opens with an article by D R Cox, ISI Past President.

In "The Current Position of Statistics: a Personal View", Cox reviews some current aspects of statistical work under three broad headings, applied probability modellings, design of investigations and statistical analysis and interpretation of data. In particular he claims for some general principles that help to avoid the risk of fragmentation of the subject.

Following the article are discussions from a well distinguished group of people: M. Cameron, A. Hawkins, J.L. Teugels, with David Cox' comment.

*These make worthwhile reading.*



# INTERNATIONAL ASSOCIATION FOR STATISTICAL EDUCATION 1999

You are invited to join IASE, the newest section of the International Statistical Institute. IASE is devoted to the development and improvement of statistical education on a world-wide basis. Membership will appeal to those whose interests or professional activities include

- Teaching statistics at a primary or secondary school,
- Teaching statistics in a college, technical institute, or university,
- Teaching, or developing software for, statistical computing,
- Teaching statistics, including quality improvement methods, in business or industry,
- Training statistical staff for government statistical offices, or
- Developing statistical textbooks, audio-visual materials, or curricula.

Members receive the *International Statistical Review*, *Short Book Reviews*, *Annual Report of International Statistics*, the *ISI Newsletter* and occasional publications such as the *IASE Review*. They may subscribe at a reduced rate to statistical journals, for example *Teaching Statistics* (with includes *IASE Matters*) and may purchase IASE and ISI education publications, including the Proceedings from international conferences on teaching statistics, at a discounted price. Members also benefit from reduced registration fees for regular conferences such as IASE satellite meetings (associated with ISI and ICME congresses), and ICOTS.

**For new subscribers** (while stocks last) **a special offer is available** which consists of a free book worth US\$ 65: *The Assessment Challenge in Statistics Education* (Ed) I. Gal and J. Garfield, IOS Press, 1997.

To become a member of IASE, please complete and return this form to:

*ISI Permanent Office, 428 Prinses Beatrixlaan, PO Box 950, 2270 AZ Voorburg,  
The Netherlands [Tel +31-70-3375737, Fax +31-70-3860025, E-mail isi@cbs.nl]*

Title..... Forename.....Family Name.....Female/Male

Mailing Address.....

Tel: ..... Fax: .....

E-mail .....

Occupation .....Nationality.....

Areas of Interest.....

Signature and Date .....

- I wish to be a member and agree to pay US\$38 per annum.  
(UK£24, 208 FFr, 51 SFr, 62 DM, 70 Dutch Guilders)
- As a Developing Country Member, I agree to pay US\$20 per annum.  
(UK £13, 113 FFr, 28 SFr, 34 DM, 38 Dutch Guilders)
- I enclose a cheque or money order for my membership dues, as indicated above,  
made payable to the International Statistical Institute.
- I enclose UNESCO coupons for this amount.
- I wish to pay by credit card:                      Mastercard    Visa

Name on credit card account.....  
Credit card number ..... Date of expiry.....  
Signature on card.....

## ASSOCIATION INTERNATIONALE POUR L'ENSEIGNEMENT



## STATISTIQUE 1999

Vous êtes invités à rejoindre AIES, Association Internationale pour l'Enseignement Statistique. L'AIES est la plus nouvelle section de l'Institut International de Statistique. Son objectif est de contribuer au développement et à l'amélioration de l'éducation statistique dans le monde entier. L'adhésion à la nouvelle section concerne tout, particulièrement les personnes dont les intérêts ou les activités professionnelles comprennent;

- L'enseignement de la statistique à l'école primaire, au collège ou au lycée,
- L'enseignement de la statistique dans les instituts universitaires, écoles d'ingénieurs ou universités,
- L'enseignement, ou le développement de logiciels pour le calcul statistique,
- L'enseignement de la statistique, incluant les méthodes d'amélioration de la qualité, dans les entreprises, l'industrie et la recherche,
- L'enseignement de la statistique au personnel des offices gouvernementaux, ou
- Le développement de matériel pédagogique; manuels, didacticiels, vidéos.

L'adhésion permet de recevoir la *Lettre d'information de l'IIS*, *International Statistical Review*, *Short Book Reviews*, *Annual Report of International Statistics*, et *IASE Review* gratuitement, de s'abonner à tarif préférentiel à d'autres revues statistiques telles que *Teaching Statistics* (avec *IASE Matters*), et de se procurer à tarif réduit les publications de l'AIES et l'IIS au sujet de l'éducation, par exemple les actes de quelques conférences internationales sur l'enseignement de la statistique. Elle permet aussi de bénéficier de réductions sur les frais d'inscription à des conférences régulières telles que réunions satellites de l'AIES (qui accompagnent les conférences IIS et ICME), et ICOTS.

**Pour les nouveaux membres** (jusqu'à la fin des stocks) **une offre special est prévue** consistant dans une publication gratuite: *The Assessment Challenge in Statistics Education* (Ed) I. Gal and J. Garfield, IOS Press, 1997 ( valeur marchande: US\$ 65)

Si vous souhaitez devenir membre de l'AIES, veuillez compléter et renvoyer le coupon ci-dessous à:

*ISI Permanent Office, 428 Prinses Beatrixlan, PO Box 950, 2270 AZ Voorburg,  
The Netherlands [Tel +31-70-3375737, Fax +31-70-3860025, E-mail isi@bcs.nl]*

Titre.....Prénom.....Nom de Famille.....Sexe.....M/F

Adresse.....

Téléphone..... Télécopie.....

E-mail .....

Profession.....Nationalité.....

Domaines d'intérêt.....

Signature et Date.....

- Je souhaite devenir membre et accepte de payer 208 FFr (US\$ 38) par an.
  - En tant que membre d'un pays en voie de développement, j'accepte de payer 113 FFr (US\$ 20) par an.
  - Je joins un chèque ou un mandat d'un montant égal à ma cotisation comme indiquée ci-dessus à l'ordre de l'Institut International de Statistique.
  - Je joins des coupons UNESCO d'un montant égal à ma cotisation.
  - Je préfère payer par carte de crédit:                      Mastercard                      Visa
- Nom figurant sur la carte de crédit .....
- Numéro de la carte de crédit .....Date d'expiration.....
- Signature sur la carte .....