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International Statistical Education Newsletter

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EDITORIAL

For seven years, since its inception as a medium of information on statistical education, ISEN has been warmly welcomed by ISI members and other readers. In spite of restrictions on its size, it has developed into a publication with an attractive format and remarkably wide coverage of pertinent material - thanks to the efforts of its long-time editor, Professor R.M. Loynes, and to Professor J. Gani who during the past year took on the editorship in addition to his responsibilities as chairman of the ISI Education Committee. The present editor, therefore, has little to do other than try to keep up a good tradition. This issue contains an article by Professor D. Vere-Jones, the new chairman of the Education committee. It also contains the conclusion of Professor O.D. Anderson's article, the first part of which appeared in the October 1987 issue.

EDUCATION COMMITTEE

From the Chairman

It is with considerable trepidation that one takes over any activity from Joe Gani, knowing full well his capacity for energetic and innovative direction. This is certainly my feeling in taking over his role as Chairman of the Education Committee. It has been no easy task building up the Education Programme to its present vigorous stage, and it will be hard to sustain, let alone augment, the range of activities initiated under his leadership.

At the same time there is still a great gap between the needs of statistical education, particularly in the developing countries, and ISI's ability to assist. In financial terms at least, we have a teaspoon with which to fill a lake. The uncertain role of the ISI in relation to statistical education in the developing countries was brought home to me rather clearly in the course of an ESCAP meeting in Bangkok which I attended last May. This I should like to briefly describe here, leaving until the next ISEN any discussion of the Tokyo meeting, with one exception - the gratitude of the Education Committee to Mary Regier for taking over the editorship of ISEN, from this issue on.

Returning to ESCAP and Bangkok, the task of the meeting was to survey recent developments in statistical education and training in the ESCAP region (Asia and the Pacific), and consider ESCAP's future statistical training programme there.

The first statistical requirement of the developing countries is the provision of basic information for government and for various international agencies. Correspondingly, the first educational task of ESCAP has been the training of statistical personnel to fulfil this need. To this end it has mounted regular statistical training courses, provides support for two international training centres, SIAP in Tokyo and ISEC in Calcutta, has prepared a regional statistical training manual, and undertakes a range of other activities in its own statistical division in Bangkok.

However, the development of tertiary education in the region, not to mention the changes in data-processing and statistical methodology, has been so rapid that the time seemed ripe for a review of its training activities. The meeting therefore brought together a combination of staff from university statistics departments in the region, staff responsible for the training of

statistical personnel within government statistical offices, and users of statistics (banks and economic agencies) to assess the current situation and likely needs for the future.

A number of rather clear impressions emerged from the necessarily brief treatment of this ambitious theme. One, no real surprise to anyone with some familiarity with the region, was of the extraordinary diversity of the countries in the region - from giants to pygmies. Another was of the rapid increase in the size and sophistication of many local university statistics departments; faced with a department in our host town some four times the size of my own in New Zealand, I began to wonder to which country the adjective "developing" really belonged.

In the rural areas of these countries, however, and in some of the smaller countries of the region, especially some of the tiny Pacific island countries, it is another matter. Literacy and numeracy levels are low, and collecting information, even for basic statistical returns, presents peculiar difficulties. Acute shortages of staff with even rudimentary statistical training are the rule. Local politicians often show little appreciation of the value or proper use of statistical information (a situation not entirely confined to developing countries!).

Under these circumstances the group had little difficulty in reaffirming the need for continuing help in the training programme for government statistical staff. It also recommended the revision of the ESCAP training manual and its supplementation by a new section on the uses of computers and microcomputers in statistical offices. The potential, as well as the need, for closer collaboration between the universities and in-house government department training programmes was one insight gained from the meeting. Overall, it was a stimulating and instructive session, of especial benefit to prospective chairmen of the ISI Education Committee!

Uneasily present in my mind throughout the meeting, however, was the question of the role of the ISI. Here were major issues of statistical education and practice, the very heart of ISI concerns. Yet what could I offer on behalf of ISI? Small contributions we can and do make, by way of the provision of information, compilation of lists of teachers or possible advisors on different aspects of statistics, lists of short courses, and of course the regular programme of meetings on statistical education, as well as the substantive areas of statistics.

The basic issue for the Education Committee, at least as I see it, is whether to stick to these relatively limited tasks, and to do them well, or to try to leap more boldly into the educational arena, seeking and undertaking major educational functions. It is not so obvious to me that an organization with the peculiar structure of ISI - partly an academy of distinguished scientists, partly an amalgam of its five professional sections, each with its own particular concerns, and, at the centre, a minuscule permanent office with budget to match - should seek to become a major director in such a field. Yet there are many important educational tasks to be done, and it ought to be that no organization should be better placed than ISI to initiate such activities. At the moment, I tend to feel that there is definite scope for development of the ISI publishing activities in the field of statistical

education, that it could play a particularly useful role in the transfer of teaching ideas material from one country to another, but that the long run, rather than undertaking too much of its own right, it should seek to interest other bodies in, for example, setting up an international statistical education centre in which it would be intimately associated as principal advisory body.

Whatever the merits of these or other suggestions, I would be delighted to receive readers' views, whether by way of letters to the editor of ISEN or to me personally, and will try to maintain some minimal contact with readers large through the columns of this newsletter.

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REPORTS FROM ROUND THE WORLD

Statistics Teaching in the U.S.A.: A Personal Perspective

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PART II

A final point. Textbooks of seven or eight hundred pages are common in Business Statistics. Such length seems inexcusable for one semester (15 week) courses, where a student is typically expected to have 45 hours of class and put in a further 90 hours of study. Rather than expect students to skim through 50 pages as part of their six hours of weekly study, give them something which will force them to think about the material they are studying. Textbooks should be dense in ideas, but short in length, and modest in coverage. The aim should be to cover selected material briefly and well the selection consisting of core concepts, filled out and reinforced by examples of their application.

I think most readers will recognize and appreciate the abuses I am trying to denounce, so the remainder of this article will describe the way I think statistics ought to be taught - through an outline example in the general area of hypothesis testing.

Problem. The following data were collected from students in a statistics class, who were then asked to obtain a 95% confidence interval for the difference in the population mean heights (measured in inches) for males and females: male heights (h_m) 72,73,74,73,69,69,74,70,72,72,66,67,75,69,67,71,71,71,69,69; female heights (h_f) 62,67,65,62,60,63,63.

Suggested Solution. $h_m \sim ?(\mu_m, \sigma_m^2)$ where the distribution " $?$ " is unknown, but a histogram of the sample data indicates that it is plausibly not too non-normal. So, assuming independent observations (which appears fairly acceptable in this context), $h_m \sim N(\mu_m, \sigma_m^2/n_m)$ for reasonably large samples of size n_m , by the central limit theorem. And, given the sample histogram, $n_m = 20$ seems sufficiently large for an acceptable approximation. Thus $h_m = 70.65$ is an observation on $N(\mu_m, 6.345/20 = .3172)$, approximately; where, for the present, we are replacing σ_m^2 by s_m^2 .

Similarly, $h_f = 63.143$ is approximately an observation

on $N(\mu_f, .7347)$, although more questionably, as $n_f = 7$ is rather small. So $70.65 - 63.143 = 7.507$ is (guardedly) an observation on $N(\mu_m - \mu_f (= \mu \text{ say}), .3172 + .7347 = 1.0519)$ approximately, assuming the two samples of male and female heights are independent of each other (which is reasonable).

Then $(7.507 - \mu)/1.0256$ is (guardedly) approximately an observation on $N(0,1)$. So a 95% confidence interval for μ would be roughly given by $[(7.507 - \mu)/1.0256] < 1.96$ (with some reservations), i.e. by 5.50 to 9.52 inches.

In fact, we should have really used a critical t value with appropriate degrees of freedom, which certainly lie between 6 and 25. So, instead of the 1.96 used in our calculation, a larger value between 2.45 and 2.06 is needed.

A homework question could then be: Obtain a 99% confidence interval for the sum of the mean weights for a (hypothetical) second class of 19 male and 11 female students, given the weights for all the students in the current class - and the results perhaps compared with observation on a companion class with these numbers of men and women.

It has been pointed out that the difficulties discussed in this article could be not so much an American problem as one of mass education. (Some 40% of the young people in the USA attend college.) But this may be rationalisation rather than justification; and I think we are settling for second best, if we accept it as an excuse for what is happening. As teachers, we cannot lightly abdicate responsibility for educating the numbers that attend our classes. Those of us with experience of more elitist systems can learn something from the New World philosophy of universities being open to students, not just on the basis of ability, but also on the basis of "ability to benefit". But, if we believe in the student's right to learn, surely we must provide a worthwhile learning experience. I believe it is arrogance to suggest that thought and reflection are beyond the capabilities of students. It is precisely these habits that we should be concerned with passing on to them. We should not settle for merely planting in a mass of potted facts.

I am most grateful for comments from Joe Gani and Jack Hayya which greatly improved this article - a longer version of which will be available as a working paper from the author. The views expressed here do not necessarily reflect those of anyone other than the author.

NEWS AND ANNOUNCEMENTS

ISI Round Table Conference on the Training of Teachers to Teach Statistics (Hungary, 23-27 July)

Preparations for this conference, previously announced in the February 1987 issue of ISEN, are well under way. Inquiries should be addressed to the organizer, A.S. Hawkins, at the Centre for Statistical Education, 20 Bedford Way, London WC1H 0AL, UK.

The conference is being held in association with the meetings of the 6th International Congress on Mathematics Education (Budapest, 27 July - 3 August). These meetings will include sessions specifically devoted to statistical education and organized by L. Rade, who has been for many years a member of the Education Committee and chairman of the task force for ICOTS (International Conferences on the Teaching of Statistics).

International Directory of Short Courses in Statistics

Two issues of this directory have been compiled and distributed by the task force on Tertiary and

Technical Education under the chairmanship of R. Loynes. The directory will continue to be revised and updated. Copies may be obtained from the Permanent Office. Information for inclusion in the Directory (on courses whose duration is up to 10 months) and comments from users may be addressed to its editor, Professor R.M. Loynes, Department of Statistics, University of Sheffield, Sheffield S3 7RH, UK.

International Directory of Workers in Statistical Education Primarily at School Level

An initial draft of this directory has been compiled by the task force on Teaching Statistics at School Level under the chairmanship of Barnett. Information was obtained by correspondence with individuals in about 20 countries around the world and could be of considerable value in initiating contacts between individuals who share this common interest. Inquiries may be addressed to the present chairman of the task force, Dr. G.E. Noether, Department of Statistics, University of Connecticut, Storrs, 06268, USA.