

THE IASE AND PROBLEMS OF  
STATISTICAL EDUCATION IN DEVELOPING  
COUNTRIES

*Invited paper*

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## THE IASE AND PROBLEMS OF STATISTICAL EDUCATION IN DEVELOPING COUNTRIES

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### 1. Introduction

I have chosen this theme, despite the near impossibility of treating it in anything beyond platitudes, for two main reasons.

The first is personal. When I first came into the role of Chairman of the ISI Education Committee, it was after several years of effort to build up a self-sustaining East Asian and Pacific Regional Committee of the Bernoulli Society, essentially a regional statistical grouping. This brought me into direct contact with statisticians in many Asian countries who were trying to establish the role of statistics in their educational programmes. I had hoped to promote similar ends through the Education Committee, but addressing the problems of statistical education in the developing countries proved to be as intractable from this vantage point as it had been earlier. Still, I do not want to leave my present position without trying to draw something from these efforts.

The second reason is a more practical one. In the past the ISI Education Programme had as one of its earliest and continuing motives the need to increase the number of statistically trained staff for governments in the developing countries. Out of its responsibilities in this direction derive both its UNESCO grant and its special link with the International Statistical Education Centre in Calcutta (ISEC). A crucial policy question for the IASE is how far it will wish to pick up responsibilities of this kind from the old Education Committee. The Association has come into being, as I see it, primarily to represent the interests of a newly recognised professional group, the teachers of statistics. Through its historical links with the ISI, and its continuing membership of the ISI family, there comes an additional responsibility, to further the educational objectives of the parent organisation. The two directions are not necessarily opposed, but as a member of the ISI family the IASE will face issues that would not have come its way had it been set up as an independent professional body outside that family. Insofar as both the UNESCO funding and the ISEC link are currently in doubt for

other reasons, the questions are urgent as well as fundamental. Indeed, they are already down for discussion at the Florence Meetings, and the attitude taken by the IASE is likely to be crucial to the way in which they are approached by the parent body.

In this paper I shall try to join together elements from both motivations. The next section (§2) is a summary of a more extended history of the ISI Education Committee that I have given recently (Vere-Jones, 1993). Its purpose here is to show how the ISI Education Programme itself developed, and something of its immediate objectives at the time the IASE was formed and the old Education Committee disbanded. In the following three sections (§3-5) I have tried to represent, in a very generalised way, some of the characteristic difficulties of "furthering" statistical education in the developing countries. While doing so I have noted some possible strategies that the IASE might take in trying to overcome them, and in the final section I have collected these suggestions together.

## 2. The historical legacy

The ISI Education Programme has been reviewed, critically and otherwise, on at least five previous occasions (Nixon, 1960; Goudswaard, 1964; Zarkovich, 1976; Gani, 1979; Gani, 1987), listed in detail from bibliography, and also in Vere-Jones (1993), which attempts to bring the record up to the date when the IASE was formed. I summarise a few key points here to provide a basis for considering the role of the IASE in relation to the ISI's own educational objectives.

Up until the time of the Second World War, the ISI had something of the character of a club for government statisticians, "a semi-official organisation, collecting international statistics for government use, drafting conventions and the like" (Nixon, 1960). Its membership consisted of the government statisticians, *ex officio*, and a small number of highly distinguished scholars and civil servants from a broad spectrum of occupations loosely related to statistics: economics, agriculture, the social sciences, mathematical statistics, etc. From its inauguration in 1885 education had figured among its concerns, but not in a systematic way.

In 1948, with the formation of the United Nations and its agencies, Dr Stuart Rice, then President of the ISI, called for a reexamination of its objectives and a reorganisation of its functions. He argued forcefully that statistical education should be a major function. "Relieved of its direct responsibilities for inter-governmental action, the Institute is now freed for ancillary services of an advisory or contractual character to the United

Nations, its specialist agencies, or member governments. The proposed international programme for education in statistics is of this character". (Rice, 1948). Changes to the ISI Statute which, among other things, recognised this increased role of statistical education were implemented in 1948, and a major paper by Rice, on "The Furtherance of Statistical Education" (Rice, 1949) was adopted by UNESCO and the ISI as the basis for future development. Among the specific objectives proposed at that time were the creation of international statistical training centres, development of a fellowship programme, dissemination of reference materials, a survey of existing facilities, etc.

A key reason for the support of UNESCO and the UN agencies was the recognised need to increase the number of statistical staff in developing countries. Such staff were required to furnish appropriate statistical summaries for UN purposes. As an operating responsibility, statistical education was regarded as a function of the UN; the ISI was recognised as the preferred agency for promoting statistical education throughout the world.

The Education Committee itself was also set up in 1948, first meeting in 1949. Rice himself was the first chairman, a role which he continued to carry even after his term as President of ISI had ended. He was succeeded by the famous Indian statistician, Mahalanobis, who was also Director of the Indian Statistical Institute. Through his influence, the first ISEC was set up in Calcutta in 1950, with funding provided by the Indian Government and by UNESCO through the ISI. Later the funding was largely taken over by the Indian Government, one part of the funding being channelled through the ISI for the selection and support of visiting teachers. A second centre was opened in Beirut in 1953, and several other centres have opened since then, but the ISI has not had direct links to these centres.

The funding from UNESCO, initiated in 1949, has continued to the present time in the form of an annual subvention for the promotion of statistical education. The Indian Government funding for ISEC Calcutta via the ISI has also continued. However both grants are now under serious threat. The Statistical Division of UNESCO is no longer able to continue the subvention at its earlier rate of around \$ 20,000 per annum and may be obliged to cut it completely. Payments from the Indian Government have been extremely irregular and the ISI Executive has set up a subcommittee, to reexamine the basis for these arrangements. In both cases the IASE is likely to be plunged into negotiations which may have a crucial influence on both its own and the ISI finances, and on the direction of its future activities.

Returning to the Education Programme, with the passing of the years,

its emphasis shifted from training statistical staff in developing countries towards the promotion of statistical education in universities and schools. These changes reflected both changes in the ISI membership, which has now come to be dominated by academic and professional statisticians, and the growing prominence of statistics in university and school programmes. They were particularly pronounced in the final phase of the Education Committee, which in Vere-Jones (1993) I date from Zarkovich's reappraisal (1976) of the Programme, and covers the many initiatives taken during Joe Gani's energetic chairmanship of the Committee (1979-1987).

Among the most important aspects of its recent activities, I would place first the continuing programme of international meetings, both special-purpose Round-Table Conferences, and the series of ICOTS Meetings, of which the 4th is scheduled to be held in Morocco in 1994. This programme was directed by the Committee's "Task Force on Conferences", led initially by Lennart Råde and more recently by Kerstin Vännman, and has been carried on by the Interim Executive pending its further evolution under the auspices of IASE.

Another important aspect has been in publications. One of Gani's initiatives was the implementation of the two small books on "Teaching Statistics Around the World", one in schools and the other in universities and technical institutes (Barnett, 1982; Loynes, 1987). The "Totsas" newsletter entered new territory in providing for the first time a newsletter specifically directed at teachers of statistics at school level. Currently, newsletter material from IASE appears in two places, the centrefold in the journal "Teaching Statistics", and the IASE section of the overall ISI newsletter.

I see no real difficulty in transferring these and other initiatives taken by the Education Committee in recent years to the IASE and its Executive.

The one aspect which does not seem to me to have been fully thought through is the fundamental one relating to the educational objectives of the ISI itself. It is clear that setting up an international association for statistical education is entirely consistent with these objectives. The difficulty comes in the need to clarify to what extent and by what mechanism the ISI intends to delegate to the IASE its overall responsibilities for statistical education. As we have seen, these form a major part of the ISI's own objectives. The IASE is in the first instance a professional organisation representing the interests of those concerned with Statistical Education. It is not immediately clear that such an organisation is the most appropriate body for discharging the ISI's own responsibilities. Such a debate would hardly have arisen if the IASE had

been formed outside the ISI family. Being inside the family, the IASE inherits certain family obligations, which may well make its role richer and more interesting, but also more difficult.

At a practical level, the IASE Executive may need to initiate discussions with the ISI Executive, and also with the other international organisations in the ISI family (IASC, IAOS, IASS and the Bernoulli Society) as to how it should seek to take up, and then discharge, these more general responsibilities. Since these other sections may well have educational programmes of their own, the IASE could consider starting a cycle, aimed at holding one joint meeting each year with one of the other sections. Projects of an educational character could also benefit from joint sponsorship by IASE and one of the other ISI sections; for example, projects relating to the training of statistical staff could well be taken up jointly with IAOS or IASS.

In the past, representatives of the UN agencies most closely concerned with the ISI Education programme had *ex officio* status on the Education Committee. The IASE Executive has suggested that they be invited to accept observer status on the IASE Executive, with the right to receive agenda notices and minutes, and to contribute to discussions of policy issues.

### 3. The Developing Countries: some general cautions

Although my main purpose is to consider ways the Association may assist in the promotion of statistical education in developing countries, it may be appropriate to start off by cautioning against too simplistic an approach. It is important to appreciate some of the major reasons why progress has not been easy in the past, and may be just as hard in the future.

The first important point is the extraordinary diversity among the developing countries, and their individual complexities. Doyle and Brown (1991), in their vivid account of the problems facing statistical trainers working with the South Pacific Commission, assert bluntly that "the biggest difficulty encountered in providing statistical training to the SPC's member countries can be summed up in one word – diversity". The Pacific Islands may evoke a uniform image of tranquil atolls, but the reverse is the more common rule. They are diverse, and individually complex. For some years I had some contact with Fiji as an external assessor in mathematics for the University of the South Pacific, visiting in that capacity not only the main campus in Suva but also its offshoots (now independent institutions) in Western Samoa and Tonga. Talking with staff about the students' performance in different subjects, one became dimly

aware of the difficulties that they faced, the totally differing stocks of experience, expectation, mental images, reasoning patterns, etc., that they brought with them to their studies; of the cultural minefields that could be set off by the most innocent of statistical examples; of their prospects for employment in an environment dominated by political intrigues, social and racial pedigrees, large discrepancies in wealth and influence. And I am sceptical that Fiji is exceptional in this regard; rather, I suspect, representative of what one might find in many smaller countries of Africa, South America, Asia, the Middle East.

In such a context, one should not expect to find the arguments in favour of increasing the statistical component in the university or, more particularly, the school programme, as persuasive as they seem to us in the West. Even in Western countries, this is a recent development, none too secure in many cases, the current end-point of a long evolutionary process in mathematical education. In Vere-Jones (1993) I have argued that it represents a break from an elitist view of the role of mathematical education to a more democratic one. The developing countries are only just starting this evolutionary path, and their routes may end up taking quite different directions, or they may need to wait as long as we have for the arguments in favour of change to outweigh more immediate concerns of economic development or personal advancement within the existing system.

Nor can one afford to overlook the political climate. Florence Nightingale was one of the first to recognise the force of political arguments backed up by hard statistical facts. Unfortunately this is no guarantee that the statistician has an influential political role. More likely it will be just the reverse. The statistical profession is likely to be at the bottom of the heap, well below the economists and maybe even the scientists, though influential jobs for scientists are not a common phenomenon among developing countries either. Nor do all regimes want to be reminded of hard statistical facts, however salutary they may seem, and necessary for future national progress.

Two of the ICOTS 3 papers present eloquent pleas to recognise the political impact of statistics, though from very different points of view. Tulya Muhika (1991), looking towards a renaissance of statistical services in Africa, decries the influence of Western style economists on African governments, in frequently leading them away from policies of benefit to their own people. He sees the quality and integrity of a country's statistical services as essential to its progress and long-term viability.

Jain (1991), in her plenary address emphasises the danger of bias in the selection of indices used to describe a country's economic and social situation. Current usage of Western countries, and also international

organisations such as the World Bank and the IMF, emphasises cash transactions and commercial indicators; in doing so they may force the pattern of development into the hands of Western business interests and away from the interests of the local people. In particular the value of womens' work, frequently unpaid, may be grossly undervalued in this process.

Just how this impacts on statistical education is not clear, but it may be as well to admit that statistics as a school and university subject is not so politically neutral as one might assume.

Finally one should bear in mind the limitations of the IASE itself. Its strengths, like those of the ISI, are likely to derive from its ability to bring together leading educators from many different regions, to examine problems, suggest remedies, initiate new developments – what Joe Gani (1987) jocularly and almost disparagingly refers to as the “gadfly” role. Yet it is just this role, in the seeding of new developments, and the timely identification of potential problems and new issues, that it may have greatest value. When it comes to the operational role, on the other hand, its possibilities are severely limited by its being largely dependent on the voluntary efforts of a dispersed membership with other preoccupations. Its lack of a physical base (the ISI Permanent Office in the Voorburg is a modest suite of rooms in the building of the Dutch Statistics Bureau, which it occupies by courtesy of the Bureau) and lack of significant financial resources are further problems. For funding, IASE is almost totally dependent on grants and the minuscule revenue generated by members' dues. Even as a lobbying group its resources remain to be developed.

Notwithstanding these difficulties, there are bound to be opportunities to set useful actions in train if the Association is poised to take advantage of them. Like the Boy Scouts, it has to “be prepared” for opportunities turning up. In this regard it might consider setting up a group, like the Education Committee's Task Force on Conferences, to receive or canvass suggestions for assisting the developing countries, to assess the suggestions, and to pass them on to the Executive with considered recommendations.

#### 4. Working with the least developed countries

As mental preparation, picture a small, probably tropical, country, where the material standard of living is very low for the great majority of the population; where education, even at primary level, is not universal, while passing into a secondary school represents a substantial social and financial step; where a small elite captures most of the wealth, and



controls much of the government apparatus; where local money has no significant exchange value, so international travel is impossible for most of the population; where communications are slow, fax and E-mail facilities exist only in one or two centres, and are in any case unreliable.

Where does statistical education impinge on such an environment, and in what ways could the IASE, or any similar organisation, become involved?

I shall mention three possibilities.

In the first place, it is just in such small countries that problems of recruiting and retraining suitable statistical staff are at their most acute. It is likely that local "country courses", such as those described by Doyle and Brian (1991), are run there from time to time by the nearest International Training Centre, or by other inter-governmental organisations with their own interests in seeing that at least the most basic statistical data is compiled.

Putting on such courses is a highly professional task, and IASE's first step could be to investigate whether IASE membership could be of value to the staff involved in such work. It might also consider approaching the International Training Centres themselves to see whether they might join as Institutional members. In the past, the ISI education Committee has from time to time attempted to bring together the directors of International Training Centres for joint meetings and exchange of views. It has also published lists of institutions providing courses suitable for trainee staff from developing countries, though my impression is that little use was ever made of these. However, since such training activities are managed through UN or similar agencies, IASE/ISI does not have any clear role in their work. It starts off on the outside and will need to show itself to be of value and relevance. My impression is that there is some need for international links at the professional level, so that a vehicle to foster such links, giving staff the opportunity to meet and exchange experiences and evaluate different approaches, could be of value.

A second possibility for the IASE concerns the development of basic teaching material, at school level or higher. During the ICOTS 3 Meeting, Nasim Ahmad, at that time the headmaster of a mission schools in the Gambia, outlined a proposal for developing a common basic text for high schools in a group of neighbouring anglophone countries. As he explained, the cost of a regular Western text might be the equivalent of several months' wages to the parents of a child going on to secondary education. The need was for cheaper material which gave more prominence to statistical concepts within the secondary mathematics curriculum. Statistics recommended itself not only for the usual reasons of practical relevance etc., but also because junior statistical staff were

commonly recruited directly from school and so were helped by some contact with notions of economic indices, survey methods, etc. Although the idea clearly had merit, it was not easy to see whether IASE/ISI could do anything to help.

It seemed to me at the time that three basic components had to be linked together. The first was a group of local teachers or educators backing the idea and with local knowledge of what was needed. The second was a physical location where one or more from the group could have access to advice and library resources, and could spearhead the writing task, while taking time off from their regular teaching duties. The third was access to a funding body willing to cover the costs of these preparations. These are, of course, familiar problems to anyone developing statistical education elsewhere in the world, but made more difficult by the lack of local funding and expertise, and the special problems of producing low-cost material, either in English as a second language, or in the vernacular.

The historical record suggests that such tasks are not easy for a body such as IASE to undertake. The fate of the ISI Video Project (see Bryson, 1991) provides a salutary lesson in this regard. This was a strongly-backed scheme for using a video approach to reduce the costs of training primary staff (interviewers etc.) for a nutritional survey. It successfully passed a pilot study stage, but failed at the substantive stage through the inability to find a relatively small residual amount of funding. Perhaps the IASE should take one step back from direct involvement in such projects and restrict its efforts to providing support at a more personal level to the teachers and others already engaged in such efforts. However, I would be reluctant to rule out the possibility of a more direct involvement.

A third possible route for the IASE is through support to individual staff in universities or other teaching institutions, who can be encouraged in their attempts to initiate teaching and curriculum change. Again with ICOTS 3, we obtained support from the Commonwealth Foundation to bring a 2-person team of "key teachers" from selected commonwealth countries to New Zealand, to participate in the conference and take part in an auxiliary programme of lectures and visits to New Zealand schools. Unfortunately the funding came very late, and we met insuperable difficulties in trying to locate suitable teachers at a distance. We did not want to be fobbed off with government-selected educational bureaucrats, and ultimately had to give up the attempt.

While such examples are not encouraging, the more IASE can do to recruit members from the developing countries, the better chance it will have of working out more effective strategies. In this regard the range of countries already represented on the IASE membership list is highly

gratifying, and an important task is to keep their needs very firmly in mind. In the long run it has to be through individuals, on site, working within the local context, that real progress will depend.

##### 5. Working with countries in transition

Here I have in mind a wide spectrum of countries, from many different parts of the world, which are evolving rapidly, in some cases even surpassing Western countries in terms of economic growth. A typical country in this category is likely to have substantial historical and cultural traditions of its own; a number of universities, including one or two of international standard; a widespread programme of mass education, reaching even into the rural areas at primary level, and with a broad entry into secondary education. Even so there is likely to be great disparity of wealth between rich and poor, with racial and economic tensions leading to unstable political regimes.

My experience of working with the Asian countries suggests that while resources remain an underlying background problem (but where is this not so?), the most difficult obstacles may be cultural and attitudinal ones. Here also, there is little that is not present in the Western countries, but the problems are more acute because of economic pressures and political instability.

To give a rather hackneyed and probably unfair example of possible cultural problems, Asian cultures are often accused of a rather "mandarin" attitude to practical work. Social standing is demonstrated by how far one can remove oneself from the need to undertake physical labour. Since statistics is at root a "hands-on" practical subject, in trying to promote statistics one may find oneself struggling against an uphill cultural gradient. Pure mathematics and even probability theory may have a more attractive image, while statistics remains a poor man's option.

Whether or not this is really a factor, in Asian countries, as elsewhere, it is very common to find a traditional, non-statistical mathematics programme firmly entrenched within the upper school, and especially in the university entrance examinations.

It is at this point that economic factors start to play a role. In many countries in transition, entry into a university programme is the critical step out of a poverty trap in which families may have suffered for generations. Entry is therefore fiercely competitive, far more so than in most Western countries, where progression beyond the secondary level is becoming the norm rather than the exception. Statistics in the schools, at least as it is now conceived in the Western countries, is not intended as a

vehicle for selecting the elite. It forms a major plank in a new programme of "mathematics for all". In a highly competitive examination environment one is faced with a dilemma. Either statistics is taught as an academic subject, suitable for filtering out the selected few from the masses, or it drops out of the syllabus for the entrance examination and thereby loses its ability to influence the school programme.

In such an environment progress is clearly not going to be easy. The pragmatic arguments in favour of teaching statistics (its uses in business, engineering, medicine, agriculture, etc.) may be more persuasive than the ideological arguments ("mathematics for all"). Ultimately, one may expect the same kind of evolution to occur which is affecting mathematics education in the West, but it may have to await larger-scale social and economic changes.

As far as the IASE is concerned, the problems of promoting statistical education are different in degree rather than in kind to those in Western countries. Individual teachers, even at university level, are likely to be more isolated, and face even greater difficulties and prejudices than their Western colleagues. At school level, the problems of influencing the curriculum and tackling the massive problems of teacher training and retraining are rendered just that much more difficult because of the overall economic fragility and social novelty of any kind of mass education programme.

The first task of the IASE, therefore, should be to try and provide professional and moral support for teachers in a basically difficult environment. The Interim Executive, with the help of Anne Hawkins and Lionel Pereira-Mendoza, recently put forward a funding application to UNESCO to help set up a network between teachers in such situations. This initiative should be maintained even if application is not immediately successful. The newsletter and other material could also be of assistance.

Dues may be a problem because of difficulties with the exchange rate and non convertible or only partially convertible currencies. At present the IASE has reduced subscription to members from developing countries, but even so the cost to an individual compared to the benefits obtained may deter many potential members in such countries. Other possibilities, such as institutional membership for university departments, may be worth exploring. The ISI in the past has investigated a number of schemes for assisting statisticians facing such problems. Typically, these involve paying dues in local currency, collecting them locally, and then using them to cover local expenses for international meetings which can be held in their countries, a publications which can be printed there.

The advantages of holding international meetings in such developing

countries should be emphasised. It may be the only way a substantial number of teachers, at whatever level, will have the opportunity of participating directly in an international programme, and the experience clearly has a great potential for encouraging local development and emancipation from past problems.

Publications are more difficult but at least the IASE Executive could be alert to the possibilities of saving dollar funds by printing material outside the Western countries with locally generated subscriptions.

#### 6. A summary of suggestions

The following is a summary of points made in the text, which the Association may like to consider as suggestions for possible future actions and activities. Of course, they represent only a preliminary list and are not meant to inhibit the exploration of other possibilities.

1. The Association should discuss with the ISI the extent to which it is expected to take responsibility for the ISI's own objectives in regard to statistical education, and how those might best be discharged.
2. The Association should consider the possibilities of imitating joint activities or projects with the other ISI sections, for example a cycle of joint meetings.
3. Such points may need to be clarified as a basis for future negotiations with bodies such as UNESCO and the Indian government, which currently provide educational funding to ISI.
4. Representatives of specific international organisations could be invited to have observer status on the IASE executive.
5. The IASE Executive should consider setting up a Task Force to solicit and review suggestions for assisting with statistical education in the developing countries.
6. The Association should approach the International Statistical Education Centres to examine the possibilities of assisting them and their staff in their professional roles.
7. The IASE should keep under view the possibility of participating in direct projects to provide resource material, include cheap texts, for teachers and educational groups in developing countries.

8. The IASE should seek opportunities for increasing its membership from developing countries, including institutional membership for university and other teaching departments, and should investigate special arrangements for payment of dues in local currencies.
9. IASE should also consider the opportunities for promoting statistical education in developing countries by holding international meetings there when suitable opportunities arise.
10. The idea of setting up a network for teachers of statistics in developing countries should be endorsed and explored further.

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