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# Research in statistical education – planning of an international survey

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As announced in the November 2000 issue of *MathStats&OR* [1], one of the projects supported by the Maths, Stats & OR Network funds is an international survey of research into pedagogic issues in statistics and OR. I am taking the lead on this and report here on the progress that has been made during the first year. A paper giving some background to the project and describing initial thinking on how it might be implemented was presented at the 53<sup>rd</sup> session of the International Statistical Institute in Seoul, Korea, in August 2001 in a session on *The future of statistics education research* [2].

It sounded easy. I considered that I was something of an expert on surveys having lectured on the topic for many years and having helped students and others who were doing surveys, particularly with the design of their questionnaires. Surely all I had to do was to draft a few questions, send them electronically to colleagues in statistical education who would be only too happy to respond, and summarise their responses? I should have learnt from my experience of advising all those students who thought that doing a survey was easy and to whom I had to explain that their ideas were too ambitious.

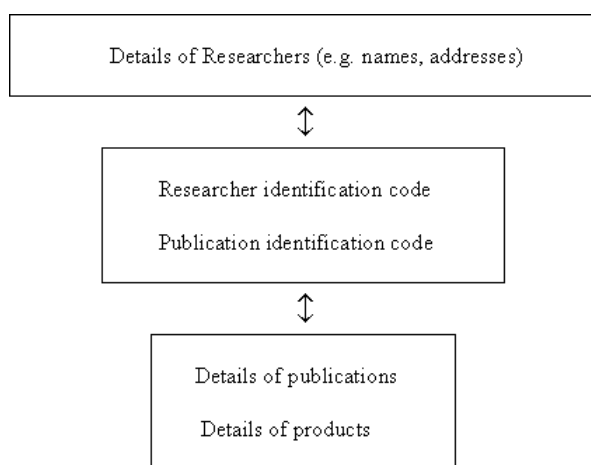
There are several inter-related stages in survey research and it is important to think about these before rushing into the collection of data. In the case of the survey in question, this planning stage revealed several challenges. Surveys are usually done for a purpose so even before planning how to do them, it is advisable to think about the final product and the dissemination of results. This is the route I followed.

## ***The aim of the project***

Pedagogy is the science of teaching. Teaching and training go hand in hand with learning, and neither teaching nor learning can be completely separated from assessment. Statistics education researchers are concerned with all of teaching, learning, and assessment, so a survey of research into pedagogic issues in statistics can be considered as a survey of statistical education research. However, statistical education research is an emerging discipline not yet well defined [3] and to date there have been relatively few outlets for publication and presentation of research activities and results<sup>1</sup>. An electronic data base with good search facilities and which gave details of researchers and research in statistical education would be a very useful outcome of the survey and producing such a data base has become the main aim of the project.

The intention is that the database will be a useful resource for practising teachers of statistics as well as for the smaller community of statistical education researchers and that it will be placed on the LTSN Maths, Stats & OR Network website. Users might want to search the database by the topics of the research, by the educational stage with which the research is concerned, by the research methods used, and by the name of the researcher. Users might also want to search for specific products such as software or assessment instruments arising from research, and they are likely to require contact details of researchers and publication details (hard copy and/or electronic) of the research or products. It should be emphasised that no evaluations of the quality of the research are envisaged, nor, initially, are descriptions of the research apart from key words. In this sense the database would be a kind of directory. A broad definition of research will be taken.

Consideration of users' likely requirements suggests that the information collected would best be stored in a relational database having two main tables, one for researchers and one for publications, and these would be linked through a table containing only pairs of unique researcher and unique publication identification codes, as shown in Figure 1. The design should allow for the addition of details of new researchers and new research, and of details relating to past research as they come to light, and needs to take account of updating, for example of changes of address and of the need to retain historical data.



**Fig 1 The form of the relational database**

### ***Finding statistical education researchers***

Ideally anyone who is currently undertaking or planning statistical education research or who has done such research in the past is a potential contributor to the survey, but there are no ready-made lists of statistical education researchers. Lists of persons with an interest in statistical education include lists of members of the International Association for Statistical Education (IASSE)<sup>2</sup> and participants in the International Conferences on Teaching Statistics (ICOTS), and these are useful starting points. Announcements on email discussion lists such as Allstat and Ed-stat and in publications such as the on-line Journal of Statistical Education, Teaching Statistics, and MSOR Connections asking those interested in contributing details of their research to get in touch is another way of obtaining contact details. Published research is yet another way of finding out who the researchers are. Most of these sources are biased towards the English speaking world, appropriate for a LTSN project, but this could mean that some important research is excluded.

The majority of those who are visible in doing research in statistical education are university teachers or

researchers, and it is relatively easy to access lists of these, although such lists are sometimes out of date and are unlikely to indicate statistical education researchers. Many school teachers probably engage in research-like activities, although they do not necessarily realise this and for various reasons do not bring their work to the attention of the larger community of statistical education researchers. Finding members of this group will be even more of a challenge.

A first step could be to amalgamate lists thought to contain a high proportion of researchers in statistical education. Some people will be on more than one list, but sorting names into alphabetical order and a little detective work will make it relatively easy to find and eliminate duplicates. The combined list would then be screened to find out who on the list are researchers in statistical education by contacting those for whom this is not already known and asking them. Some non-response might occur at this stage, for example because the person has moved from the address given or because the person is too busy to respond.

A further stage of building up a list of statistical education researchers is to use snowball sampling [4] as follows.

1. Contact known statistical education researchers for names and contact details of other statistical education researchers.
2. Ask the additional researchers found for names and contact details of other statistical education researchers.
3. Repeat the process until the number of "new" researchers found is negligible.

### ***Capturing the data***

It is intended to capture the data electronically either by a Web-based survey or by email. The final choice has not yet been made. In theory it should then be relatively easy for researchers to provide details as many are likely to have lists of their publications in electronic form and to have access to the internet. However, different people will list their publications in different ways and the plan is that the proposed database will include classification of research into predefined categories. Researchers might be unwilling to standardise their lists and classify their work into categories unless there is some incentive to do so. Would inclusion on the database as a service for the communities of researchers and teachers be sufficient reward?

Proceeding in stages might be the answer – first getting names and contact details, then publications, and lastly classifications of the publication. At each stage work

might be needed to put the responses into the form required and even classifying publications at the last stage. Respondents would be given feedback on how the information they had provided had been changed and in what form it was to be made available to others. Once the database was in existence they would be encouraged to look at this. Hopefully this would encourage them to update and provide more details concerning their own entries.

### What has been achieved to date?

The main activity during the first year of this project has been in planning, starting from the end product of a database and working back to consider how to get the information to put in it. A skeleton classification scheme for statistical education research which would provide key-words for searches on the database has been designed, the relative merits of different kinds of electronic surveys have been considered, and thought has been given as to how to find contact details of statistical education researchers. All that remains now is to do it. Watch this space for further reports - and do please contact me with your comments.

### Footnotes

1. The new electronic *Statistics Education Research Journal* (first issue due May 2002) will help to fill this gap. The Web page is <http://fehps.une.edu.au/serj>
2. For details of IASE see <http://www.cbs.nl/isi/iase.htm>

### References

- [1] Towards an electronic learning community for statistics and OR, *Maths, Stats&OR*, November 2000, p3.
- [2] Jolliffe, F. (2001) An international survey of research in statistical education. In *Bulletin of the International Statistical Institute*, 53<sup>rd</sup> Session Proceedings, Tome LIX, Book 2, p201- 4. Electronic version of this paper is at <http://134.75.100.178/isi2001/>
- [3] Jolliffe, F.R. (1998) What is research in statistical education? In Pereira-Mendoza, L. Kea, L.S., Kee T.W., Wong, W-K (Eds.) *Proceedings of the Fifth International Conference on Teaching of Statistics*, International Association for Statistical Education. Singapore, p801-806.
- [4] Kalton, G. & Anderson, D.W. (1986) Sampling rare populations. *Journal of the Royal Statistical Society Series A*, Vol. 149, p65-82.

## Careers information on the internet

The Royal Statistical Society is developing a major careers information facility on its web site.

Sections have been written for people at various stages - such as prospective undergraduates (aimed mainly at sixth formers, of course), prospective postgraduates and mature adults seeking a career change.

Sections have also been written describing statistical careers in the many sectors where statisticians work professionally.

While the site is obviously concerned primarily with statistical careers, a lot of the material has been deliberately designed with a wider audience in view. For example, the section for prospective undergraduates contains much detailed information on how the UCAS system works and how funding for undergraduate study is organised. This should be useful for prospective students in any discipline. Corresponding information about the application and funding processes is also contained in the section for prospective postgraduates.

The site is very much under development. New sections are being added as they are written. But it is already a good resource and you may well find it useful to visit it. The web address is <http://www.rss.org.uk/careers/>.

The Society also has printed careers booklets and leaflets, which can be requested by post to The Professional Affairs Officer, The Royal Statistical Society, 12 Errol Street, London EC1Y 8LX, or by email to [careers-info@rss.org.uk](mailto:careers-info@rss.org.uk).

RSS careers web site is at:  
<http://www.rss.org.uk/careers/>

