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NOTES ON THE FIFTH INTERNATIONAL CONFERENCE ON TEACHING STATISTICS, ICOTS-5, SINGAPORE, JUNE 21 - 26, 1998

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The *International Conferences on Teaching Statistics* are part of the precious heritage of the *Task Force* on the subject that was formed in 1979 by the *ISI Education Committee*, chaired by Professor J. Gani. In particular we owe a special debt of gratitude to Professors L. Råde and V. Barnett who organised the first *ICOTS* that was held successfully in Sheffield (UK) in 1982. Since that time, the *Education Committee*, and more recently its successor the *IASE*, have organised the *ICOTS Conferences* throughout the world once every four years. Following the 1982 landmark, we have had *ICOTS-2* in Victoria (Canada) in 1986, *ICOTS-3* in Dunedin (New Zealand) in 1990, *ICOTS-4* in Marrakech (Morocco) in 1994. *ICOTS-5* has just been held this year in Singapore, since June 21 to June 26 and brought together several hundred statistics educators and practitioners, including those from schools, colleges and universities, industries and government.

The theme of the Conference "*Statistical Education: Expanding the Network*" has pointed out the relevance for statistical educators to cooperate both in developing and promoting statistical education around the world. The conference program has developed in eight main topics: 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.

The fields of interest addressed by the Conference are the concern of the world-wide professional community involved in statistical education, but they are also important for the statisticians belonging to the other international organisations within the *ISI* family (*IASC, IAOS, IASS* and *Bernoulli Society*).

The International Programme Committee, chaired by Brian Phillips prepared an interesting and well balanced programme and the Local Organiser Committee, chaired by Teck-Wong Soon solved many problems involved in hosting an international conference. The *International Statistical Institute* and in particular Daniel Berze helped in providing facilities and some financial assistance for a number of people from developing and transitional countries to attend the conference. The members of the Publication Committee, chaired by Lionel Pereira Mendoza have prepared the Proceedings of the Conference. *IASE* is grateful to all of them.

The proceedings: *Statistical Education: Expanding the Network. Proceedings of the Fifth International Conference on Teaching Statistics* (3 volumes), edited by L. Pereira-Mendoza, L. Sea Kea, W. Wing Keung, and T. Wee Kee, will be available through the ISI Permanent Office, 428 Princes Beatrixlaam, PO Box 950, 2270 AZ Voorburg, The Netherlands, E-mail isi@ac.vu.nl.

MODERN LUDDITES: PROFESSIONAL DEVELOPMENT FOR TEACHERS AT A DISTANCE

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Learning the Unlikely at Distance Delivered as an Information Technology Enterprise, abbreviated to *LUDDITE*, is the name of a three-year project funded by the Australian government and run under the auspices of the *Australian Association of Mathematics Teachers, Inc. (AAMT)* from mid-1994 to mid-1997. The purpose of the project was to deliver professional development in the chance and data part of the mathematics curriculum to teachers separated by distance across the country. In doing this, the project trialed various of the information technologies which were becoming available for use by distance educators. The title of the project, with its acronym *LUDDITE*, was chosen to draw attention to the challenge to use new technologies which is similar to that faced in England at the time of the indus-

trial revolution. The modern day Luddites did not wish to destroy the new technologies but to judge them on their success in distributing the message about teaching chance and data to teachers. At each stage of the project, decisions were made about the content given to teachers and about the technologies used to deliver it.

In the first year of the project, the content was based on existing material that had been written to support the national curriculum document which heralded the inclusion of chance and data in the school curriculum (Watson, 1994; Lovitt & Lowe, 1993). These materials formed the basis for four 1.5-hour live narrowcast television programs made available to schools in the south-eastern region of Australia that had access to the appropriate satellite television reception technology. Each program had a specific theme and several presenters, sometimes including four classroom teachers carrying out activities in the television studio. Teachers in their schools could communicate with the presenters in the studio via telephone or fax and in the middle of each program there was some time off-air for them to carry out experiments or discuss issues with their colleagues.While the teachers could see the presenters, the reverse was not true and this was seen as a major drawback of the medium. Advantages included the ability to show purposed-made video segments, extracts from television broadcasts, faxed input from teachers via a graphics camera, and computer-screen output through the studio equipment. Although the reaction of participants was positive, there was concern about limited visual interactions, geographical and content coverage.

These three aspects were specifically addressed in the second year of the project when a different medium of communication was tested. To address the visual contact and geographical coverage, video conferencing replaced satellite television as the mode of direct communication with teacher participants in the project. Six widely separated sites around the country were linked via video conferences which allowed all sites to see the site which was currently speaking. This enhanced the feeling of comradeship among the teachers themselves and with the presenters, but the slight delay in transmission of sound compared to video was distracting for some. To address the content coverage three additional media were introduced: A commercial text (Moore, 1991), video (Moore, 1992), and the computer software (Konold & Miller, 1992) and text linking the other materials. These three resources were the basis for five one or 1.5 hour video conferences which motivated the use of the package.

The reaction of participants to the package was very positive, although a few preferred printed text to screen-based text. The reaction to the video conference format was less uniformly positive. Some teachers appreciated the opportunity to get to know and exchange views with teachers across the country, as well as carry out hands-on tasks in the studio during the conference. Others considered this a waste of time and preferred to see the presenter talk about the mathematical topic of the day. The presenter felt that following the second path ran the risk of turning the sessions into lectures with a "talking-head" on the video screen. In a country the size of Australia there were also problems organising sessions in four different time zones. Although the geographical coverage was wider than with satellite television, it still was limited by the availability of video-conference sites.

The positive reaction of teachers to the attempt to provide a comprehensive package of materials led *LUDDITE* to further develop this aspect in the final stage of the project. It was felt that the availability of computer technology made it feasible to base professional development on a collection of material on CD-ROM, used in conjunction with the commercial text and video (Moore, 1991, 1992). The ability to place short digitised video clips on CD-ROM meant that presenters could be introduced in a fashion not dissimilar to the previous formats. Communication between teachers and the presenter could occur using the computer itself with electronic mail or via telephone or fax. Communication among teachers themselves was expected to be minimal unless teachers, say in a single school or region, decided to work together on the program.

The material provided on the CD-ROM included purpose-written material to link other resources or meet Australian context needs, digitised video of television snippets and students discussing chance and data tasks, down-loaded documents from other sources such as the NCTM, and the software for simulation and data handling (Konold & Miller, 1992). The material was structured and linked in five sections related to the content in the curriculum: data collection and sampling, data representation, chance and basic probability, data reduction and inference. Within each of the five sections there were 12 subsections reflecting teachers' potential interests in curriculum, teaching material, content, use of technology, applications in the media, student understanding, and cross-curriculum links.

Thirty-five teachers from around Australia trialed the final package and provided feedback. Most appreciated the opportunity to explore the package at times and paces of their own choice. A few experienced difficulty with equipment and browser software, and some preferred a linear learning style as in a book to exploring multiple pathways on the CD-ROM. Few took advantage of electronic mail options but generally the reaction to the package was positive. Used in combination with face-to-face introductory or continuing sessions, this mode of delivery may offer the greatest potential for teachers in a technological age, particularly if separated by distance.

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TEACHING STATISTICS IN COLOMBIAN PRIMARY AND SECONDARY EDUCATION (AN ACTION- RESEARCH EXPERIENCE)

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Describing The Problem

In the rare situation where statistics has been taught at the basic levels of Colombian education, it has been centred on developing computational abilities, which have been, in general, uncontextualised and separate from practical application. Following a reproductive model, statistics has been perceived as an arid, operational topic, isolated from the world that surrounds us, unrelated to other sciences or to research processes. To improve this situation, the authors started a research project designed to create a specific space for teaching statistics at school levels, and to change the teaching approach.

Although the new Colombian Law of Education (1995) implies some autonomy and freedom in curricular design, it suggests decreasing the number of subjects, which makes the goal of obtaining a statistics course within the curriculum difficult. This led us to investigate the possibility of creating spaces for introducing statistical concepts and methods within the curricula of other disciplines. Since 1995, actions directed towards this aim are being carried out, within the general Program RED in education, at the National University of Colombia.

The Program RED

The Program of Reinforcement of Scientific Capacity at Primary and Secondary Education-RED - is an interdisciplinary research project, started by the National University of Colombia and carried out in co-operation between University lecturers, primary and secondary teachers, schools and other educational institutions throughout the country. Its purpose is to transform the school culture, by promoting productive relationships with knowledge. There are currently 34 University lecturers and about 700 primary and secondary teachers from 50 educational institutions in different Colombian regions working in the Program RED. The programs' main objectives are: Generating and diffusing knowledge about the school culture and the possibilities of transformation; designing and developing alternatives to reinforce academic culture in schools; developing processes of continuous training for participants; creating co-operative networks between participant people and institutions; articulating research, teaching and extension processes, and widening the social impact of university research.

The Statistics Teaching Project

Within this general framework, the project *Alternatives for Teaching Statistics in Primary and Secondary Education* is directed towards using other disciplines' curricular spaces to investigate the adequate topics and teaching methodology to introduce statistical knowledge at these educational levels in Colombia. Its specific objectives include: Establishing interdisciplinary relationships between statistics and other disciplines; exploring curricular contents, methodologies and assessment processes for teaching statistics, that fit educational and disciplinary projects in the participant institutions; experimenting with self-training procedures in statistics for teachers trained to teach other subjects; analysing the changes introduced by statistical components in the school population's habits and attitudes; and strengthening the links between primary and secondary educational institutions and the statistical scientific community.

Framework

Educational framework: The educational experience is based on guidelines aligned with the "*Rogerian theory of education*", which is centred on learning, students, and experiential learning instead of centring on teaching, teachers, and root learning. Learning should be carried out by a relational act, where relevance and ownership of knowledge are essential for its acquisition and rediscovery. The theories of Vigostky, Bruner, Brousseau, and action-research also support this educational model.

Disciplinary framework: Following the epistemological and practical features of statistics, the following goals are listed: Statistics based on exploration and discovery; considering statistics as a tool for understanding and interpreting scientific and social phenomenon in daily life, and not as a set of diverse topics; visualising the discipline from different approaches and methodologies; using statistical language and reasoning within the context of research and applications.

Methodology: The program RED links teachers in primary and secondary institutions with university lecturers. Based on the

disciplinary projects, these collaborators develop a permanent study, a debate and innovation/ research process in classrooms, by means of activities such as seminars, consultation and classroom observation. A feature of this project is that the majority of teachers belong to disciplines different from statistics, tough their disciplinary proposals involve some statistical knowledge and learning processes.

A Teacher's Project

As an example, we will briefly describe the project developed by the teacher Gloria Amparo Torres, at the Colegio Departamental de la Merced (Mosquera; Cundinamarca), the year 1995 to teach LOTUS to a group of students (15 - 16 year olds). To assess the practical utility of this spreadsheet program, she agreed with her students, to investigate the problems that students face when entering the institution for the first time. This school has a quite liberal disciplinary and academic regime, with optional schedules, topics and students' tutors. The LOTUS students initial hypothesis was that this regime could cause some traumas to new students entering the school. Completing the project required the designing of instruments, determining the sample to be interviewed, obtaining information from those affected, classifying, organising, analysing and interpreting data, and finally socialising the results, which made the learning of some statistical concepts and methods experiential. There was no formal previous presentation of the concepts and statistical methods used. This and other experiences led to he following results:

(1) The learning environment favoured self learning, as students' confidence in their own potentialities to learn and solve problems increased when learning with familiar situations.

(2) Students worked from practice, facing concrete and immediate problems, without needing pre-established lectures for achieving the learning of concepts and methods. Participation involved both the students and the teacher, who also enlarged his knowledge through his students' creativity, initiative and requests.

(3) Compulsority is replaced by responsibility and self-assessment, self-discipline and self-criticism, which appear as natural elements associated to good problem solving.

(4) The teacher-student relationship changed from authoritarian to co-operative, friendly, relational.

(5) There was some resistance to giving up old schemes. The loss of "power" and the "central role in the process" affected the teachers in different ways, as they were sometimes overwhelmed by students' knowledge and initiatives. The working method was more difficult for teachers, as it required compromises (with the community and not just with a person), and confidence in their own capacities. Therefore, the teachers sometimes requested traditional methods.

(6) Statistical concepts, such as population, sample, variables, classification scales, tables and graphs, association and statistical summaries were discovered in a straightforward way, facilitating a later formal presentation and generating a post-established curriculum.

A First Conclusion

From the didactic point of view and in every curricular topic, it is possible to formulate many research problems leading to rediscover knowledge, and to analysis the own problems with experimental procedures. Statistic contributes to this work with concepts, methods, and techniques adapted to each discipline, art and creation being possible when required in particular situations.

Teachers in mathematics, statistics, and other field of knowledge, can propose to their students research processes framed within the school environment that are viewed as problematic. They can suggest that students solve these problems using statistics, which will allow students to learn and visualise this discipline as a relevant applied science.

Training of Researchers in the Use of Statistics IASE Round Table Conference Meiji University, Tokyo, Japan, August 2000.

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, after the International Congress on Mathematics Education (ICME 9). Carmen Batanero will be the Chair of the Scientific Committee of the Round Table. The Statistical Education Committee of the Japan Statistical Society, chaired by Professor Yuki Miura, will provide the local organisation. The following are possible topics and issues to be discussed at this the Round Table Conference:

(1) Statistical competencies that researchers in different disciplines should acquire in their postgraduate training; (2) Statistical training of researchers in specific fields; (3) Assessing/ identifying frequent errors in the use of statistics; (4) Consultation as a teaching/ learning process; (5) Researchers' attitudes towards statistics and its effect on the role of data analysis in experimental research; (6) Informal statistical learning from reading research literature; (7) Effects of technology on the statistical training of researchers; (8) Design/ evaluation of courses for training researchers in particular statistical topics and learning problems.

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