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## **A MULTIMEDIA COURSE ON STATISTICS FOR AT DISTANCE TRAINING OF SOFTWARE ENGINEERING**

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One crucial problem in small and medium-sized enterprises is the training of their staff. Traditional teaching methods often require the company staff to leave the workplace for some days to follow pre-programmed courses with a fixed time-table. On the other hand, it is difficult to attend regular pre-programmed courses, and maintain the learning rate of the course, without affecting the company's daily activities. Small and medium-sized enterprises require, therefore, radical changes in traditional teaching methods which provide flexible (not constrained to fixed dates) and accessible (on-site and independent) ways to increase the knowledge and skills of company staff.

The purpose of this note is to describe our research and development work concerning training in statistical methods in the TRAPSP project (Advanced Multimedia and Distance Training for small and medium-sized enterprise teams using the Personal Software Process). The main objectives of the TRAPSP project were to investigate the peculiarities of these enterprise training necessities and to evaluate the potential effectiveness of information technologies for delivering interactive courses to a remote audience. The project was sponsored by the European Software and Systems Initiative program of the European Community. The participating organisations were Labein as the project co-ordinator, two other enterprises (ECNA and ESBI Computing) as partners and European Software Institute as the subcontractor.

As a result of the project, an architecture has been defined to develop applications based on multimedia and distance training techniques. This architecture has been used to generate a course to train professionals involved in programming tasks in the effective use of processes and methods for software development and project management. The Personal Software Process (PSP) is a learning vehicle used to introduce process concepts and it provides some measurement and analysis methods that these professionals need to improve their personal performance. It provides them a way to improve the quality, predictability, and productivity of their work. PSP has been designed at the Software Engineering Institute by Watts S. Humphrey.

As knowledge of statistical techniques is required for the effective use of PSP, SESAME application has been developed. SESAME (Software Engineering StAtistical MEthods) covers the statistical methods used in the PSP and in the PSP training assignments. SESAME was designed to train the end-users of the system in statistical methods. It is a quality training package, employing different didactical methods such as lecturing, demonstration and practice. Various multimedia techniques such as texts, graphical presentations, animation and audio, and facilities for communication with the instructor and with other trainees have been incorporated on to the system. All these functionality allow trainees to learn statistical methods needed for applying PSP at their own pace under the guidance of an on-line tutor. The system provides users flexible class schedules that allow them to meet their goals without sacrificing professional commitments; with access to course materials 24 hours a day, 365 days a year, learning at their own pace, and reviewing materials as often as necessary.

A formal evaluation process of the system has been carried out by the TRAPSP project partners and other interested parties. The overall conclusion that can be drawn from the evaluation data is that the perception of the application was positive for the vast majority of referees. This is an indicator for the appropriateness and usefulness of the course and the feasibility of the adopted approach of computer based multimedia used in distance training. With respect to the course content, all the

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referees considered that a high statistical knowledge is needed to understand and apply PSP. At the same time they felt that the support given by SESAME is sufficient.

## A BRAZILIAN RESEARCH GROUP IN STATISTICAL EDUCATION

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The CEMPEM (Círculo de Estudos, Memória e Pesquisa em Educação Matemática) at the Faculty of Education, University of Campinas, Brazil, is responsible for teaching mathematics education to students majoring in Mathematics and Pedagogy, post graduates in Mathematics Education and in-service teachers (kindergarten, primary and secondary school levels). A National Documentation Centre and the mathematics education journal *Zetetiké* are also managed from the group.

Within CEMPEM the group PRAPEM (Prática Pedagógica em Matemática) was started in 1995, and is devoted to research and teaching, curricular development and teachers' professional development, with a subgroup working in statistics, probability and combinatorial analysis. Permanent members of this group are the Professors Anna Regina Lanner de Moura, Dario Fiorentini and Dione Lucchesi de Carvalho at the Faculty of Education and João Frederico Meyer and Vera L. Figueiredo at the Institute of Statistics and Computer Sciences. There are about 40 additional temporary members, including doctoral and master students, secondary teachers and undergraduates.

The idea of establishing the group arose from teachers and students dissatisfaction with two dominant tendencies in mathematics education research and practice. There has been a technical-instrumental bias towards objective causal scientific explanations, following the technical rationality model used in empirical-analytical sciences. Pedagogical practice has been superficially described, with a practical-pragmatical tendency, and without deep theoretical-epistemological and ethical-political reflection.

Consequently the starting of the group was devoted to the extensive work of organisation and to reading national and international bibliography on topics such as research-practice relationships, relationships among students' and teachers' beliefs, conceptions and social representations, the role of theory in education research, and new methodological alternatives. Research on the epistemology of pedagogical practice in mathematics, that is, about the process of emergence of school and didactic-

pedagogical knowledge is also a focus of their interest. Members of the group are currently developing the following research:

- Celi Aparecida E. Lopes has carried out a Masters Thesis on *Probability and Statistics in Compulsory Education: A curricular analysis* and is starting her doctoral dissertation on the topic *Theoretical and practical training of teachers to teach probability and statistics at Primary Education*.
- Wilton Sturm is finishing his Masters Thesis on *Some alternatives for teaching Combinatorial Analysis*.
- Paulo César Oliveira is starting his Doctoral Dissertation on the topic: *Teachers' representations on the teaching and learning of statistics*.
- Prof. Dione Lucchesi de Carvalho is starting her doctoral dissertation on the topic: *The use of statistics projects related to their class mates profile as a means to recover the identity of migrant students*.

## THE PSYCHOLOGY OF MATHEMATICS EDUCATION PROJECT GROUP ON THE TEACHING AND LEARNING OF STOCHASTICS

This Project Group continues to bring together the three disciplines of psychology, mathematics, and education to enhance the teaching of stochastics at all levels. The 1998 conference in Stellenbosch, South Africa listened to a keynote presentation on data handling from a constructivist perspective. There was also a research forum on data handling with two presentations, two reactions, and substantial discussion. Several members of the group presented research papers.

As a result of planning over two years now, writing has started for a book to be entitled *Teaching and Learning Statistics: Implications for Research*, and a publisher is being sought. There is not a well-received model of sound pedagogic practice for any part of stochastics at the moment, and a lot of concern for finding ways of improving it has been expressed by teachers at all levels. We believe that good solutions to this problem are most likely to come from linking research and pedagogic practice, and we hope that the book will be a major contribution to finding good solutions. Potential authors who are willing to contribute are invited to contact Kath Truran:

(Kath.Truran@unisa.edu.au)

The next PME conference is being held in Haifa, Israel, in July 1999. The Project Group will continue work on the proposed book. Information may be obtained from the Conference Secretariat (pme@netvision.net.il) or

some new ICOTS-generated email lists. Six embryonic lists were drawn up at ICOTS-5:

- 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.

The first two may be joined by sending the message *subscribe tsdist-l* or *subscribe tsres-l* to [majordomo@swin.edu.au](mailto: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](mailto:majordomo@cq-pan.cqu.edu.au).

The list members are listed on the ICOTS-5 home page which is linked up with the IASE web site. More information can be obtained from John Taffe ([jtaffe@vic.bigpond.net.au](mailto:jtaffe@vic.bigpond.net.au)), the *reference person* for all the groups on behalf of the IASE. In addition there is another list on research: The International Study Group for Research on Learning Probability and Statistics, which was started at ICOTS I. Those interested in joining this group please contact Carmen Batanero ([batanero@goliat.ugr.es](mailto:batanero@goliat.ugr.es)).

#### IASE 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 increase of the membership is 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. 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 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. Teaching Statistics, which includes *IASE matters*, may be obtained at a 20% discount.

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* (Eds.): I. Gal and J. Garfield, IOS Press, 1997.

#### FORTHCOMING CONFERENCES

##### **(MCOTS-2): Second Biennial Midwest Conference on Teaching Statistics Oshkosh, Wisconsin, June 25-27, 1999**

This is a conference for teachers of statistics organised by Department of Mathematics, at the University of Wisconsin. Featured Speakers will be Carl Lee, Central Michigan University, Rick Nordheim, University of Wisconsin, Madison, Richard Scheaffer, University of Florida, and Stephen Vardeman, Iowa State University.

The purpose of the conference is to share the latest ideas and information on issues related to teaching statistics at all levels. The papers presented at the conference will be published in the conference proceedings. More information is available from the MCOTS-2 home page:

[http://www.uwosh.edu/faculty\\_staff/gunaward/mcots2.html](http://www.uwosh.edu/faculty_staff/gunaward/mcots2.html) and from Professor K. L. D. Gunawardena ([gunaward@uwosh.edu](mailto:gunaward@uwosh.edu)).

##### **Sessions on Statistical Education in CLATSE IV, Mendoza, Argentina, July, 26-30, 1999**

In 1999, in Argentina the *CLATSE IV* (Congreso Latinoamericano de Sociedades de Estadística) will be 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. More information can be obtained from Ana Silvia Haedo, [haedo@qp.fcen.uba.ar](mailto:haedo@qp.fcen.uba.ar) or from the Web site: <http://fce.uncu.edu.ar/clatse4.htm>

##### **PRESTA: Programme de Recherche et d'Enseignement en Statistique Appliquée. An Experiment in the Teaching of Statistical Methods Using a Videoconference Network. Expressions of Interest**

The five-year interuniversity co-operation PRESTA Programme was set up in 1994 by the Laboratoire de Méthodologie du Traitement des Données of the Université Libre of Brussels, Belgium in co-operation with other European Universities, and with the support of the European Union. PRESTA is now organising a Conference on the Teaching of Statistics with the help of IASE, which will be held at the Universidade Federal de Santa Catarina (UFSC),

Florianópolis, Brazil in September, 20-22, 1999. The Conference Theme is: *Experiences and Perspectives on Teaching Statistics Challenges for the XXI Century*. The International Programme Committee is formed by:

- Eduardo Crivisqui, PRESTA Programme, Université Libre of Brussels, Belgium, Chair;
- Gabriella Ottaviani, IASE President, Università La Sapienza, Rome, Italy;
- Carmen Batanero, IASE Vicepresident, Universidad de Granada, Spain;
- Brian Phillips, IASE President-Elect, Swinburne University of Technology, Australia;
- Lucio J. Botelho, Vicepresident of the Universidade Federal de Sao Carlos, Brazil;
- P. Ferreira Filho, Universidade Federal de Sao Carlos, Brazil;
- Pedro A. Barbetta, Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Anyone interested in being involved in the conference should contact the Chair of the Local Organising Committee, Professor Pedro Alberto Barbetta, Departamento de Informática e de Estatística /CTC, Universidade Federal de Santa Catarina, 88-040-900. Florianópolis, SC, Brazil, E-mail: [barbetta@inf.ufsc.br](mailto:barbetta@inf.ufsc.br), or the Chair of the Programme Committee Dr. Eduardo Crivisqui, Avenue Jeanne, 44B-1050, Bruxelles, Belgium., E-mail: [ecrivisq@ulb.ac.be](mailto:ecrivisq@ulb.ac.be). More information on the PRESTA Programme is available from the website: <http://www.ulb.ac.be/assoc/presta>.

#### **Training of Researchers in the Use of Statistics IASE Round Table Conference, Meiji University Tokyo, Japan, August 7-11, 2000.**

Since 1968 a number of Round Table Conferences have been organised on topics in statistics education. These conference were initially organised by the Education Committee of the International Statistical Institute and since 1988 by IASE. 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, since August 7th to 11. More information can be obtained from the web page: <http://www.ugr.es/~batanero/iasert.htm> or from Carmen Batanero, [batanero@goliat.ugr.es](mailto:batanero@goliat.ugr.es)

#### **ICME 9 Topic Group TG4: Teaching and Learning Statistics**

The forthcoming ICME-9 Conference will be held at Tokyo/Makuhari (Japan), from July 31st to August 6th, 2000. Susan Starkings will be the organiser of the Topic Study Group 4: *The Teaching and Learning of Statistics*. The Session theme will be: *Statistics and Statistical Education for the year 2000 plus*. Papers are particularly invited that fall into one of the following categories:

- i) Research on students learning statistics and how this can help the statistical educators of tomorrow.
- (ii) New innovations in the statistics teaching environment.
- (iii) Practical examples of statistical work carried out in developing countries and the way forward for these countries.
- (iv) Work related to statistical education and its relationship to the classroom.
- (v) How future statistical education can be enhanced and global statistical education for the future.

Those interested in submitting a paper, can contact to Susan Starkings, Mathematics Support, Caxton House, South Bank University, Borough Road, London SE1 OAA, England. E-mail: [starkisa@vax.sbu.ac.uk](mailto:starkisa@vax.sbu.ac.uk)

#### **IASE Sessions in the ISI 53rd Session, 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). 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 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 ([mendoza@singnet.com.sg](mailto:mendoza@singnet.com.sg)).

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

Plans 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 being 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 ([ottavian@pow2.sta.uniroma1.it](mailto:ottavian@pow2.sta.uniroma1.it)) and Brian Phillips ([bphillips@swin.edu.au](mailto:bphillips@swin.edu.au)).