Statistics Education Research Journal

The Statistics Education Research Journal (SERJ) is a peer-reviewed electronic journal of the International Association for Statistical Education (IASE) and the International Statistical Institute (ISI). SERJ is published twice a year and is free.

SERJ aims to advance research-based knowledge that can help to improve the teaching, learning, and understanding of statistics or probability at all educational levels and in both formal (classroom-based) and informal (out-of-classroom) contexts. Such research may examine, for example, cognitive, motivational, attitudinal, curricular, teaching-related, technology-related, organizational, or societal factors and processes that are related to the development and understanding of stochastic knowledge. In addition, research may focus on how people use or apply statistical and probabilistic information and ideas, broadly viewed.

The Journal encourages the submission of quality papers related to the above goals, such as reports of original research (both quantitative and qualitative), integrative and critical reviews of research literature, analyses of research-based theoretical and methodological models, and other types of papers described in full in the Guidelines for Authors. All papers are reviewed internally by an Associate Editor or Editor, and are blind-reviewed by at least two external referees. Contributions in English are recommended. Contributions in French and Spanish will also be considered. A submitted paper must not have been published before or be under consideration for publication elsewhere.

Further information and guidelines for authors are available at: http://www.stat.auckland.ac.nz/serj

Submissions

Manuscripts must be submitted by email, as an attached Word document, to co-editor Tom Short <tshort@iup.edu>. These files should be produced using the Template available online. Full details regarding submission are given in the Guidelines for Authors on the Journal’s Web page: http://www.stat.auckland.ac.nz/serj

© International Association for Statistical Education (IASE/ISI), November, 2005

Publication: IASE/ISI, Voorburg, The Netherlands
Technical Production: University of New England, Armidale, NSW, Australia

ISSN: 1570-1824

International Association for Statistical Education

President: Gilberte Schuyten (Belgium)
President-Elect: Allan Rossman (United States of America)
Past-President: Chris Wild (New Zealand)
Vice-Presidents: Andrej Blejec (Slovenia), John Harraway (New Zealand), Christine Reading (Australia), Michiko Watanabe (Japan), Larry Weldon (Canada)
SERJ EDITORIAL BOARD

Editors
Flavia R. Jolliffe, Institute of Mathematics, Statistics and Actuarial Science, University of Kent, Canterbury, Kent, CT2 7NF, United Kingdom. Email: F.Jolliffe@kent.ac.uk
Iddo Gal, Department of Human Services, University of Haifa, Eshkol Tower, Room 718, Haifa 31905, Israel. Email: iddo@research.haifa.ac.il

Co-editor-elect, entering 1 Jan 2006
Tom Short, Mathematics Department, Indiana University of Pennsylvania, 210 South 10th St., Indiana, Pennsylvania 15705, USA. Email: tshort@iup.edu

Assistant Editor
Christine Reading, SiMERR National Centre, Faculty of Education, Health and Professional Studies, University of New England, Armidale, NSW 2351, Australia. Email: creading@une.edu.au

Associate Editors
Andrej Blejec, National Institute of Biology, Vecna pot 111 POB 141, SI-1000 Ljubljana, Slovenia. Email: andrej.blejec@nib.si
Carol Joyce Blumberg, Department of Mathematics and Statistics, Winona State University, Winona, MN 55987-5838, USA Email: cblumberg@winona.edu
Joan B. Garfield, Educational Psychology, 315 Burton Hall, 178 Pillsbury Drive, S.E., Minneapolis, MN 55455, USA. Email: jbg@umn.edu
John Harraway, Dept of Mathematics and Statistics, University of Otago, P.O.Box 56, Dunedin, New Zealand. Email: jharraway@maths.otago.ac.nz
M. Gabriella Ottaviani, Dipartimento di Statistica Probabilità e Statistiche Applicate, Università degli Studi di Roma “La Sapienza”, P.le Aldo Moro, 5, 00185, Rome, Italy. Email: Mariagabriella.ottaviani@uniroma1.it
Lionel Pereira-Mendoza, National Institute of Education, Nanyang Technological University, 1 Nanyang Walk, Singapore 637616. Email: lpereira@nie.edu.sg
Maxine Pfannkuch, Mathematics Education Unit, Department of Mathematics, The University of Auckland, Private Bag 92019, Auckland, New Zealand. Email: m.pfannkuch@auckland.ac.nz
Mokaeane Polaki, School of Education, National University of Lesotho, P.O. Box Roma 180, Lesotho. Email: mv.polaki@nul.ls
Dave Pratt, Centre for New Technologies Research in Education, Institute of Education, University of Warwick, Coventry CV4 7AL, United Kingdom. Email: dave.pratt@warwick.ac.uk
Ernesto Sanchez, Joaquin Romo # 68 – 9, Col. Miguel Hidalgo; Del. Tlatpan, 14260 México D. F. Email: esanchez@cinvestav.mx
Richard L. Scheaffer, Department of Statistics, University of Florida, 907 NW 21 Terrace, Gainesville, FL 32603, USA. Email: scheaffe@stat.ufl.edu
Gilberte Schuytten, Faculty of Psychology and Educational Sciences, Ghent University, H. Dunantlaan 1, B-9000 Gent, Belgium. Email: Gilberte.Schuytten@UGent.be
Jane Watson, University of Tasmania, Private Bag 66, Hobart, Tasmania 7001, Australia. Email: Jane.Watson@utas.edu.au
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editorial</td>
<td>2</td>
</tr>
<tr>
<td>New Co-Editor</td>
<td>4</td>
</tr>
<tr>
<td>New Associate Editor</td>
<td>4</td>
</tr>
<tr>
<td>Maxine Pfannkuch</td>
<td>5</td>
</tr>
<tr>
<td><em>Characterizing Year 11 Students’ Evaluation of a Statistical Process</em></td>
<td></td>
</tr>
<tr>
<td>Randall Groth and Jennifer Bergner</td>
<td>27</td>
</tr>
<tr>
<td><em>Pre-service Elementary School Teachers’ Metaphors for the Concept of a</em></td>
<td></td>
</tr>
<tr>
<td><em>Statistical Sample</em></td>
<td></td>
</tr>
<tr>
<td>John Harraway and Richard Barker</td>
<td>43</td>
</tr>
<tr>
<td><em>Statistics in the Workplace: A Survey of Use by Recent Graduates with Higher Degrees</em></td>
<td></td>
</tr>
<tr>
<td>Ana Serrádo, José Mª Cardeñoso and Pilar Azcárate</td>
<td>59</td>
</tr>
<tr>
<td><em>Los Obstáculos en el Aprendizaje del Conocimiento Probabilístico: Su Incidencia desde los Libros de Texto</em></td>
<td></td>
</tr>
<tr>
<td>Claudine Mary and Linda Gattuso</td>
<td>82</td>
</tr>
<tr>
<td><em>Trois Problèmes Semblables de Moyenne pas si Semblances que Ca! l’Influence de la Structure d’un Problème sur les Réponses des Élèves</em></td>
<td></td>
</tr>
<tr>
<td>Past IASE Conferences</td>
<td>103</td>
</tr>
<tr>
<td>Other Past Conferences</td>
<td>105</td>
</tr>
<tr>
<td>Forthcoming IASE Conferences</td>
<td>107</td>
</tr>
<tr>
<td>Other Forthcoming Conferences</td>
<td>111</td>
</tr>
<tr>
<td>Statistics Education Research Journal Referees</td>
<td>112</td>
</tr>
</tbody>
</table>
EDITORIAL

In this second issue of 2005 we start with a reflection on some of the issues we face at SERJ, and follow up with updates about changes and plans.

As an international journal, SERJ seeks both to report on research in diverse contexts in which teaching and learning of statistics is being studied, as well as to contribute knowledge relevant to researchers and practitioners across many countries and contexts of educational work. This dual task presents many challenges to members of SERJ’s editorial board and to reviewers. We have to be aware of diversity and accommodate variations in many aspects of scientific reporting, from seemingly technical but non-trivial things such as terminology or writing styles, to understanding the nuances and impact of differences in systems of education or teaching/learning contexts, all the way to conceptions of what constitutes “current knowledge”, “research”, and equally important, “good research”.

However, our conception of “current knowledge” is limited, not only by the small (though growing!) number of researchers interested in statistics learning and teaching, but also by language barriers. While English is the dominant language for scientific reporting, we as a research and practice community are hampered because many prospective authors and researchers, as well as practitioners, cannot read or communicate well in English. Potentially important research being carried out in countries where English is not spoken or read well cannot gain broad exposure. It is therefore not surprising that a disproportionate number of the papers being submitted to SERJ come from English-speaking countries. We hope to see this situation change over time.

The above serves as a backdrop for an important aspect of the present SERJ issue. In addition to three papers in English, we also publish a paper in French (the first in French that SERJ has published) and a paper in Spanish, yet with an important twist. The international standard used by journals that accept papers in more than one language is to publish the paper in its original language, with a brief abstract of 100-150 words in English. We find that such an abstract, while giving English readers a general idea of the issues addressed, is too short to be of much value in terms of the paper’s contribution to scholarly and applied knowledge for a wide audience. Hence, for this issue we asked authors whose papers were not written in English to add an extended summary in English. Of course, this new feature places an extra burden on authors and on our editorial board and it also makes for a slightly more complicated structure of the elements which precede the paper itself (i.e., title, keywords, and abstracts in two languages, and an extended summary in English). Yet, we hope that this new feature can give all readers better and deeper access to new research findings. Please give us your feedback.

We now turn to a report of changes and future plans at SERJ. We are happy to announce that Tom Short (Indiana University of Pennsylvania, USA) will be the next SERJ co-editor and will start his four-year tenure in January 2006. Tom will replace Flavia Jolliffe, whose term is coming to an end in December, and joins Iddo Gal, who will continue as co-editor until the end of 2007. Tom was warmly nominated by the Search Committee appointed by the IASE president, Gilberte Schuyten, consisting of Chris Wild (chair), Iddo Gal (continuing editor), and Mike Shaughnessy (IASE member). The IASE Executive has unanimously approved this nomination. Tom brings with him, in addition to high motivation and interest, a strong background in the area of statistics

© International Association for Statistical Education (IASE/ISI), Nov, 2005
education and a substantial editorial experience. He has already worked successfully in the past with a diverse editorial board and with many referees and authors as editor of the Journal of Statistics Education, and has been involved both in applied work as a statistician as well as in various projects focused on statistics education and teacher training. In our next issue Tom will share his ideas and intentions regarding the Journal.

There are other changes in the SERJ editorial board. We welcome Carol Joyce Blumberg who joins us as an Associate Editor for a 3-year term. She has been involved with SERJ from the beginning in her role as IASE vice-president responsible for IASE publications. Chris Reading, who has been our trustworthy Assistant Editor in charge of editing and producing each issue ever since SERJ’s first issue was published in 2002, will cease to take this role at the end of this year and instead continue as a regular Associate Editor. Please see more information and messages regarding Carol and Flavia later on this page, as well as a Call for Nominations for a new Assistant Editor.

Finally, we have started to process papers submitted for our special issue on research on “learning and reasoning about distributions”, planned for November 2006. We are thinking about topics for other Special Issues later on, and encourage SERJ readers to propose relevant topics which can benefit from a focus by researchers. We also look forward to ICOTS7 in July 2006, where SERJ will arrange a workshop for prospective authors, similar to that which took place at ISI55 in Sydney in April 2005. There will also be a session on statistics education journals at ICOTS7 similar to one organised by Carol Joyce Blumberg at the Joint Statistical Meetings in August 2005. At this meeting Flavia presented a paper jointly written with Iddo which describes lessons learned at SERJ regarding typical problems with submitted papers and provides advice for prospective authors. This paper, along with other papers and presentations from JSM, is available at http://www.stat.auckland.ac.nz/~iase/publications.php?show=jsm and on the SERJ website.

IDDO GAL AND FLAVIA JOLLIFFE

Thanks from the SERJ editorial Board to Flavia Jolliffe: Our departing Co-Editor, Flavia Jolliffe, has been a founding editor of SERJ since 2001. Flavia has tirelessly devoted time and energy to SERJ as she handled incoming submissions and managed a continuous flow of correspondence with authors, reviewers, and associate editors. We thank Flavia for giving several years for work on behalf of SERJ and IASE.

Call for Nominations - New Assistant Editor: The Journal is looking for someone to join its Editorial Board as Assistant Editor starting in January 2006 for a 3-year term. The Assistant Editor is in charge of copy-editing and preparation of manuscripts accepted for publication, and for producing each issue in PDF format. Work is intermittent during the year and increases during the weeks leading to the publication of a new issue each May and November, when communication with authors and editors is also needed. Depending on qualifications, the Assistant Editor may also be involved in managing the SERJ website or take part in other activities of the SERJ editorial board. The ideal candidate will have excellent command of the English language, interest in editorial work, familiarity with basic desktop publishing or PDF-producing software, and some familiarity with research in statistics education.

Interested colleagues should send a letter of intent and a short curriculum vitae to Tom Short <tshort@iup.edu>, to whom any queries about the position may be addressed.
NEW CO-EDITOR

SERJ welcomes the following new Co-Editor who has joined the Editorial Board for a 4-year appointment 2006-2009.

Thomas H. Short is an Associate Professor in the Mathematics Department and Coordinator of the Applied Research Lab at Indiana University of Pennsylvania. From 1991 through to 2002 Tom was in the Department of Mathematical Sciences at Villanova University. Tom earned his B.S. in Mathematics from John Carroll University, and his M.S. and Ph.D. in Statistics from Carnegie Mellon University. He was Editor of the Journal of Statistics Education from 2001 through to 2003, and served on the JSE editorial board both before and after his term as editor. From 2000 through to 2005 Tom was a member of the American Statistical Association Advisory Committee on Teacher Enhancement, serving as Vice-chair (2003) and Chair (2004 and 2005). Tom is a Fellow of the American Statistical Association and received the 2005 Mu Sigma Rho National Statistics Honorary Society Statistical Education award.

NEW ASSOCIATE EDITOR

SERJ welcomes the following new Associate Editor who has joined the Editorial Board for a 3-year appointment 2005-2007.

Carol Joyce Blumberg is a Professor in the Department of Mathematics and Statistics at Winona State University. She was a Vice-President of IASE 2001-2005 and has been a Member of the ISI Publications Committee since 2004. Her current interests include survey research and statistics education, and she presently coordinates for IASE the International Statistical Literacy Project (course1.winona.edu/cblumberg/islplist.htm).

© International Association for Statistical Education (IASE/ISI), Nov, 2005