Note: a paper copy of this newsletter is sent to you either by request or because we did not have your current e-mail address.

NEWSLETTER OF THE INTERNATIONAL STUDY GROUP
FOR RESEARCH ON LEARNING PROBABILITY AND STATISTICS

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THE NEW ERA: AN ELECTRONIC NEWSLETTER AND NEW EDITORS

This newsletter is the first to be distributed electronically using email. We are still providing hard copies to those who do not have e-mail addresses. Please be patient as we experiment with this new form of the newsletter. If there are any corrections or additions to the newsletter, please post them to the entire list of members by using the email address alias: StudyGrp_List@Maroon.tc.umn.edu.

I am pleased to announce that after eight years as secretary and editor I have found a replacement. Carmen Batanero with the help of her colleagues Juan Godino and Angustias Vallecillos will take over this work beginning in January, 1996.

This fall Carmen is a visiting scholar at the University of Minnesota and we are writing this issue of the newsletter together. Please send all the information you would like to include in the following issues to her address:

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PUBLICATIONS BY MEMBERS

Note: Throughout the newsletter, members names are highlighted in capital letters.

ESTEPA, Antonio & BATANERO, Carmen (1995). "Concepciones iniciales sobre la asociacion estadistica " (Students' naive conceptions on statistical association). _Ensenanza de las Ciencias_, 13(2), 155-170.

In this paper the results of an experimental study of students' strategies when performing a judgment of association are presented. The questionnaire included

contingency tables, scatter plots and comparison of a numerical variable in two different samples. Qualitative analysis of strategies and factor analysis of the correct/incorrect judgments of association served to identify and describe four different misconceptions concerning association.

BEGG, Andy (1995). "Statistics and the mathematical processes". _Teaching Statistics, 17(2), 40-43.

The increasing emphasis on what mathematicians do as distinct from what they know in the development of school mathematics curricula presents some interesting possibilities for teachers of statistics. This article looks at these processes and suggests the kind of influence that they may be having on schools.

GAL Iddo (1995). "Statistical tools and statistical literacy: the case of the average"._Teaching Statistics_, 17(3), 97-99.

This article is intended to serve as a starting point for a dialogue regarding the goals of teaching students about averages and how to assess their emerging knowledge.

GARFIELD, Joan (1995). "Reflections on the past 15 years". _Teaching Statistics, 17(2), 77-78.

This "Research Report" presents an overview of developments in research on teaching statistics during the lifetime of the journal _Teaching Statistics_.

KONOLD, Clifford (1995). "Confessions of a coin flipper and would-be instructor". _The American Statistician, 49(2), 203-209.

Simulation data are used to test a student's beliefs about the relative probabilities of two sequences obtained by flipping a fair coin. The episode is used to illustrate general issues in using simulations instructionally.

METZ, Kathleen, E. (1994). "Development of the concept of randomness". In D. Kirshner (Ed): _Proceedings of the Sixteenth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education_ (pp. 307-313). Baton Rouge: Louisiana State University.

The study analyzed the development of the concept of randomness, from kindergarden to third grade to adulthood from the standpoints of: (a) the extent to which subjects evoke chance or determinism in the context of a physical phenomena with a significant aspect of randomness; and (b) the particular interpretation underlying judgments of chance or determinism. Thirty-six subjects, even divided by age-level and gender, participated in the study. We used a modification of Piaget's marble till box problem, which he posited as a relatively transparent example of randomness. All sessions were videotaped to enable three levels of microgenetic analysis. Just 33% of the kindergartners evoked chance, as compared to every third grader and undergraduate. However, with frequencies increasing with age, subjects at all ages evoked determinism as well. Finer level of analysis revealed interpretations, at radically different levels of sophistication, underlying both chance and determinism.

Moore, D. S., COBB, George, W., GARFIELD, Joan and Meeker, W. Q. (1995). "Statistics Education fin de siecle". _ The American Statistician-, 49(3), 250-260.

Higher education faces an environment of financial constrains, changing customer demands, and loss of public confidence. Technological advances may at last bring widespread change to college teaching. The movement for education reform also urges widespread change. What will be the state of statistics teaching at the university level at the end of the century? This article attempts to imagine plausible future as stimuli to discussion. It takes the form of provocation by the first author, with responses from the others on three themes: the impact of technology, the reform of teaching and challenges to the internal culture of higher education.

ROUNCEFIELD, Mary (1994). "Recent changes in Statistics at A-level. Personal reflections". _Teaching Mathematics and its applications, 13(3), 97-100.

This paper describes some recent changes in the curriculum for Statistics at A-level, so as four curricular project that have contributed to these changes in both style of teaching and content: SMP, Wessex Project, MEI and Advanced Level mathematics Scheme.

Yu, Chong Ho and BEHRENS, John T. (1994). "Identification of misconceptions in learning statistical power with dynamic graphics as a remedial tool." _Proceedings of the ASA Section on Statistical Education_. ASA, Alexandria, VA, 242-246.

The objective of this study was to catalog undergraduate and graduate students' misconceptions regarding power analysis and to examine the efficacy of a computer simulation to remediate these misconceptions.

JOURNAL OF STATISTICS EDUCATION

Listed below are the Table of Contents and Abstracts for Volume 3, Number 1, of the electronic Journal of Statistics Education.

Abstracts

Carolyn M. Keeler and R. Kirk Steinhorst, "Using Small Groups to Promote Active Learning in the Introductory Statistics Course: A Report from the Field" (28K)

ABSTRACT: Over several semesters, we changed from the traditional lecture approach to cooperative learning. After some initial difficulty, we found procedures that work in classes of 40 to 100 students. Data consist of final grade distributions, the number of students retained in the class, and responses on a questionnaire that asked students' attitudes towards the group activities. Working in cooperative groups resulted in higher final scores in two experimental sections than in a comparison course section. A higher percentage of students successfully completed the course in the experimental sections, and student attitudes toward the cooperative group experience were positive. --CMK

KEY WORDS: Cooperative learning; Teaching statistics.

Allan J. Rossman and Thomas H. Short, "Conditional Probability and Education Reform: Are They Compatible?" (23K)

ABSTRACT: We demonstrate that one can teach conditional probability in a manner consistent with many features of the statistics education reform movement. Presenting a variety of applications of conditional probability to realistic problems, we propose that interactive activities and the use of technology make conditional probability understandable, interactive, and interesting for students at a wide range of levels of mathematical ability. Along with specific examples, we provide guidelines for implementation of the activities in the classroom and instructional cues for promoting curiosity and discussion among students. --AJR

KEY WORDS: Bayes' Theorem; Active learning; Technology.

Eric R. Sowey, "Teaching Statistics: Making It Memorable" (28K)

ABSTRACT: An overriding goal of teaching is to stimulate learning that lasts. A way to achieve this is, surely, to make teaching memorable. By asking "what makes teaching memorable?", this paper identifies a number of fundamental characteristics of statistics teaching that will assist students in long-term retention of ideas. It structures these attributes of memorable statistics teaching and then shows, with examples, how they can be realized. The author's reflection on his extensive teaching experience underpins this paper. --ERS

KEY WORDS: Deep learning; Long-term learning.

Bruce E. Trumbo, "Some Demonstration Programs for Use in Teaching Elementary Probability and Statistics: Parts 3 and 4" (60K)

ABSTRACT: In this second paper of a series, two programs for EGA-equipped IBM-PC compatible machines are included with indications of their pedagogical uses in the teaching of elementary probability and statistics. Concepts illustrated include the coefficient of correlation, the expectation of a discrete distribution, the concept of a fair game, and the hypergeometric distribution. Three datasets useful for illustrating correlation are also documented and appended. --BET

KEY WORDS: Bivariate normal distribution; Correlation; Expectation; Hypergeometric distribution; Gambling; Keno; Pedagogy; Simulation.

Teaching Bits: A Resource for Teachers of Statistics (28K)

ABSTRACT: This column features "bits" of information sampled from a variety of sources that may be of interest to teachers of statistics. Joan Garfield abstracts information from the literature on teaching and learning
statistics, while Laurie Snell summarizes articles from the news and other media that may be used with students to provoke discussions or serve as a basis for classroom activities or student projects. --JG

W. John Braun, "An Illustration of Bootstrapping Using Video Lottery Terminal Data" (18K)

ABSTRACT: The video lottery terminal dataset contains observations on the three windows of an electronic slot machine for 345 plays together with the prize paid out for each play. The prize payout distribution is so badly skewed that confidence intervals for expected payout based on the central limit theorem are not accurate. This dataset can be used at the graduate or upper undergraduate level to illustrate parametric bootstrapping. The dataset can also be used in a graduate course to illustrate tests of independence for two and three-way contingency tables involving random zeroes, or these tables may be collapsed and used as examples in an introductory course.

KEY WORDS: Simulation; Contingency tables; Elementary probabilities.

Mary Rouncefield, "The Statistics of Poverty and Inequality" (10K)

ABSTRACT: This paper describes a case study based on data taken from the U.N.E.S.C.O. 1990 Demographic Year Book and The Annual Register 1992 giving birth rates, death rates, life expectancies, and Gross National Products for 97 countries. Suggested activities include exploratory graphical analyses to answer several central questions. These include an investigation into the wealth and life expectancies of different country groups and their population growth. Inequalities in the life experiences of different groups become readily apparent. Students are stimulated to generate their own questions and to find possible solutions. --MR

KEY WORDS: Boxplot; Scatterplot; Life expectancy; Population growth.

Thomas H. Short, Helene Moriarty, and Mary E. Cooley, "Readability of Educational Materials for Patients with Cancer" (15K)

ABSTRACT: The American Cancer Society and the National Cancer Institute bothdevelop pamphlets and booklets to inform patients with cancer and their families about the nature and treatment of the illness. Written materials are often given to patients to reinforce verbal instructions, or in some cases, given in place of verbal instructions. Unfortunately, published materials may be written at a reading level that is difficult for many patients to understand.
The data presented here represent the readabilities of 30 booklets about cancer and the reading levels of 63 patients with cancer. A number of elementary but important statistical issues must be resolved before conclusions can be drawn. To analyze the data, students must be familiar with the notions of scales of measurement, data reduction, measuring center, constructing and interpreting displays, and reaching conclusions in real problems. --THS

SPECIAL ISSUE OF THE SPANISH JOURNAL "UNO"

Last July this journal published a monograph issue on Probability and Statistics, in which some members of the Research Group contributed papers. Here is the translation into English of the titles of papers included in this issue:

J. B. GARFIELD: "Assessing students' learning of statistics".

J. M. SHAUGHNESSY & C, BATANERO: "A visual approach to teach binomial probabilities".

C. BATANERO and L. Serrano: "Randomness, its meaning and teaching implications".

C. Torno: "Students' difficulties with averages".

A. OJEDA: "Students' difficulties with conditional probability".

J. D. GODINO: "Computers and teaching statistics".

C. Espinel, A. Bruno & J.A. Garcia: "Diagrams and representations".

A.ESTEPA: "Teaching statistical association"

A. VALLECILLOS: "Epistemology of statistical inference and implications for teaching".

P. Perez: "Probability activities for primary education".

The audience of the Journal "UNO" is mathematics teachers. Submission of papers concerning the summary and application of research in mathematics or statistics education are invited. Copies of this special monograph issue and information about the editorial policy may be obtained from the following address:

Editorial Grao
Direccion Editorial (Rosa M. Guitart)
C. Francesc Tarrega 32
08027 Barcelona
Tel: (3)4080464
Fax: (3)2657799

OTHER PUBLICATIONS OF INTEREST

Arnold. T. (1995). "Networking innovations and resources: the internet as toolbox". _Teaching Statistics, 17(3). IASE matters central pages.

Summary of the session held on this topic in the IASE meeting in Beijing.

Madsen, R. W. (1995). "Secondary students' concepts of probability". _Teaching Statistics_, 17(3), 90-93.

Students develop concepts of probability without formally studying the discipline and some of their concepts are at variance with those taught in the classroom.

A survey of 200 students in five schools in Missouri was undertaken in an attempt to learn about pre-conceptions, whose results are discussed in the article.

Korithoski, T. P. & Korithoski, P. A. (1993). "Mean or meaningless?" . _The Arithmetic Teacher_, Dec, 194-197.

This article explores some learning activities that helped intermediate-grade students to develop an understanding of the arithmetic mean.

Ullman, N. R. (1995). "Statistical or quantitative thinking as a fundamental intelligence". Paper presented at the American Statistical Association meeting, Orlando, Florida, August, 1995.

This paper discusses four major topics: a) The problem of the general acceptance of statistics as a result of what and how we teach statistics; b) the idea that statistical thinking is one of the family of intelligences; c) the suggestion the statistical thinking process as a hierarchy, and d) some ideas regarding teaching and curriculum changes which need to take place.
Neil R. Ullman, County College of Morris, Randolph, N.J. 07869.

Wilensky, U. (1995). "Paradox: Programming and Learning Probability: Connected Mathematics Framework". _Journal of Mathematical Behavior_, 14(2), 253-280.

Formal methods abound in the teaching of probability and statistics. In the Connected Probability project, we explore ways for learners to develop their intuitive conceptions of core probabilistic concepts. This paper presents a case study of a learner engaged with a probability paradox. Through engaging with paradoxical problem, she develops stronger intuitions about notions of randomness and distribution and the connections between them. The case illustrate a Connected Mathematics approach: that primary obstacles to learning probability are conceptual and epistemological, that engagement with paradox can be a powerful means of motivating learners to overcome these obstacles, that overcoming these obstacles involves learners making mathematics-not learning a "received" mathematics and that, through programming computational models., learners can more powerfully express and refine their mathematical understandings.

"Annual report on international Statistics", v.2, 1995.

This report published by the International Statistical institute contains the following sections: Perspectives on Statistics, ISI and its associations (including information concerning IASE), International and national statistical associations, Private sector bodies, and data archives.

The "Proceedings of the 1994 Annual Meeting of the American Statistical Association, Section on Statistical Education"

These proceedings contain many papers on topics related to teaching statistics at the undergraduate and graduate level, including a collection of papers on the topic "Demonstrating Statistical Concepts using Computers, Graphics, and Geometry" and another set on the topic "Improved Methods for Statistical Instruction, Teacher Training, and Evaluation" . This book can be obtained from the America Statistical Association. 1429 Duke Street, Alexandria, VA 22314, USA.

"Newsletter of the American Statistical Association Statistical Education Section".

The first two issues of this newsletter were published last year. These issues contain short descriptions and references to resources of interest to teachers of statistics including relevant publications, organizations, conferences, and related materials.

Contact: Carol Joyce Blumberg whose email is in the membership list at the end of this newsletter.

INTERNET RESOURCES OF INTEREST

Check out this web site maintained by one of our member, John Behrens:
http://seamonkey.ed.asu.edu/~behrens/

This web site provides access to materials for thinking about, conducting, and teaching research methods as used in applied social/psychological/educational disciplines. Resources are organized into several broad areas including:

Resources for Teaching Statistics

A full range of internet pointers and ASU-developed materials for teaching statistics including Dr. B's Wide World of Web Data and Dr. B's Data Gallery.

Resources for conducting/learning more about data analysis

Annotated pointers to programs, data, and demonstrations aimed at providing resources to improve your thinking about, and conducting, data analysis. Current materials focus on Scientific Visualization.

The AERA Educational Statisticians Page

The WWW page for this august group that meets annually at the meeting of the A.E.R.A. Currently holds pointers to AERA spots, contact info and past newsletters. Eventually we hope to provide abstracts of papers to be presented, as well as text, programs, and data that were presented.

FORTHCOMING CONFERENCES

"Computational Statistics and Statistical Education", Tartu, Estonia, 2-6 June 1996. Co-sponsored by IASE. Information available from Rolf Biehler, Universitat Bielefeld, Institut fur Didaktik der Mathematik, Postfach 1001131, D-33501 Bielefeld, Germany. E-mail: rolf.biehler@post.uni-bielefeld.de

Three statistical conferences are being held in Sydney in July 1996 under the umbrella of SISC'96 (Sydney International Statistical Congress). More details of this and registration forms can be obtained from
http://www.dms.csiro.au/sisc/index.html

One session at the congress is to be on Statistical Education with

the title Broadening Horizons This will include information retrieval and long term objectives in teaching statistics.

Prior to the conference there is to be a workshop on statistical education, 5-7 July 1996. There will be four sessions:
I. Graphical perception and other psychological aspects of learning statistics.
II. Multimedia
III.Teaching statistics at tertiary and secondary levels - where are the interactions?
IV. Applied statistics - bringing 'gown ' and 'town' together.

Up to date information on the workshop and the education session at SISC'96 can be obtained by subscribing to the e-mail list StatEd_List. This can be done by sending the one line message

subscribe StatEd_List to maiser@efs.mq.edu.au

This list has been primarily set up to aid in planning for the workshop but also to foster discuss of statistical education primarily, though not exclusively, at the tertiary level.

"20 PME": International Group for the Psychology of Mathematics Education, Valencia, Spain, July 9-12, 1996. Organized by the Department of "Didactica de la Matematica" at the University of Valencia. A call for papers has been submitted with the first anouncement, including the following deadlines for different types of personal presentations: Research forum (November, 30th, 1995), research reports (January, 15th, 1996), short oral communications and poster presentations (March, 1st, 1996). Information is available from the Conference Chair, Angel Gutierrez, Universitat de Valencia, E.U. Magisterio, Apartado 22045, 46071 Valencia (Spain), E-mail: angel.gutierrez@uv.es

In addition to individual presentations there are also some working and discussion groups at the PME Conference. At the time been there is not a group related to stochastical thinking and learning, although such a group could provide a forum for discussing and sharing perspectives on specific issues about research on learning probability and statistics. If a group is interested in forming a discussion group on this topic, a proposal is due March, 1, 1996. If the proposal is accepted, our group would be allotted two 60-minutes time slots during the Conference.
****If you are planning to attend PME and you would like to participate in such a group, please contact to Carmen Batanero: cbatanero@goliat.ugr.es

"8th International Conference on Mathematical Education", Seville 14-21 July 1996. Brian Phillips is organizing ICME-8 topic group 9 comprising two sections on "Statistics and Probability at the Secondary Level". Two parallel meetings are scheduled for the first session: "Children's understanding of basic concepts of probability and statistics", and "Focus on data analysis' . The second session will deal with "General issues in teaching probability and statistics", with short presentations on Assessment, Teacher-training and Research followed by a forum discussion on "How statistics and probability can best be incorporated in the overall school program.
Further details can be obtained from Brian Phillips. E-mail: brp@swin.oz.au.

"ISI 51st Biennial Session", including IASE meeting, Istanbul, Turkey, August 1997. Information is available form the ISI Permanent Office: 428 Beatrixlaan, P.O. Box 950, 2270 AZ Voorburg, The Netherlands.

"ICOTS-5", June 1998. The next International Conference on Teaching Statistics will be held in Singapore. Information is available from Brian Phillips, School of Mathematical Sciences, Swinburne University of Technology, PO Box 218 Hawthorn, 3122, Australia. E-mail: brp@swin.oz.au.

Our newsletter concludes with a current email list of all members who have email addresses and a reminder to send articles, abstracts, and news items to Carmen Batanero for inclusion in the next issue.

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