



THE STATISTICS TEACHER NETWORK



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Issue #13

A newsletter published three times a year by the American Statistical Association-National Council of Teachers of Mathematics Joint Committee on the Curriculum in Statistics and Probability.

THIS COULD BE YOUR LAST ISSUE...

We would like to thank all of you who have shown an interest in this publication for your support. Since the first issue of the newsletter was mailed out in September of 1982, we have increased our circulation to almost 2,000 individuals from all parts of the United States and Canada, as well as a number of other countries. Subscribers include teachers of all levels, nonteaching statisticians, supervisors, administrators, etc. - all concerned about improving the teaching of statistics. In order to best serve those who read and use the newsletter, we have now reached the point that it is necessary for us to update our mailing list and obtain some background information on our subscribers. So, as of this issue, we are purging our files.

TO INSURE THAT YOU CONTINUE TO RECEIVE THE NEWSLETTER, YOU MUST FILL OUT AND MAIL IN THE FORM ON THE LAST PAGE OF THIS ISSUE. You need to return the form promptly in order to be included on the new mailing list in time to receive the next issue. Even if you recently sent in a subscription request or change of address, you must still return this form. There is no charge for subscribing. Please take the few extra minutes needed to fill out the questionnaire. We will be establishing a data base from your responses, and analysis of this demographic data will be helpful to us in attempting to produce a publication which will be valuable to all of you. As editor, I am particularly interested in your input. We need your continued support and contributions in order to maintain our progress!

-Beth Bryan (Editor)

THE SECOND INTERNATIONAL CONFERENCE ON TEACHING STATISTICS Victoria, British Columbia, Canada

The culmination of extensive planning and considerable effort on the part of a great many dedicated individuals occurred at the University of Victoria on August 11-16, 1986 when more than 500 teachers and statisticians from 40 countries convened for ICOTS II. Topics addressed included Teaching Statistics (6-11) and (12-18), Education and In-service Training of Statistics Teachers, Use of Computers in Teaching Statistics, Teaching Statistics in Developing Countries, and Statistics in Government, Industry, and Business.

In addition to the plenary addresses and the invited paper sessions, there were many splendid contributed papers and poster displays. Among these was a session on the history of teaching statistics chaired by John Bibby, U. of Edinburgh, and a talk by Judith Zawojewski, Nat. College of Education, who discussed a cross-disciplinary approach to statistics education. The pilot study included a clever lesson for 9th grade English classes using the sequence of events in Romeo and Juliet to illustrate probability concepts.

Anne Hawkins, University of London, discussed the Schools Statistics Competition held annually in the U. K. In one entry which involved constructing a questionnaire, the students used a novel approach to determine the sex of the respondents. Their question was phrased, "Are you a lady or a gentleman?"

These are highlights of but a few of the many excellent sessions. All who were fortunate enough to attend are anticipating ICOTS 3 in New Zealand, 1990.

LETTERS

PLEASE WRITE TO THE EDITOR IF YOU WOULD LIKE TO SHARE BOOKS, ARTICLES, IDEAS, OR LESSONS THAT HAVE BEEN SUCCESSFUL IN YOUR CLASSROOM.

Today I received the May 1986 issue of the Network, and I saw the question from John Detrick concerning the "standard error of the mean" in the HELP! section. According to the instructions, I am sending my answer to the newsletter so others may benefit.

My answer is based on my response to the same question when it was posed to me as a student about 50 years ago. My professor, the late Pal Veress, of Budapest (then Royal) University agreed that my answer was correct.

One of the main aims of using the sample mean is either to estimate the population mean or to draw a conclusion about a null hypothesis concerning the population mean. Occasionally the sample mean equals the population mean. In that rare case, our estimation is exact. Generally this will not be the case, and there will be a non-zero difference between the sample mean and the population mean, i.e. there is an error in the point estimation. Hence, the difference between the sample mean and the population mean is referred to as the error of the mean.

It is important to add that the difference between the values of a sample statistic (sample based estimator) and its target parameter represent the error of that estimator. The error of the sample statistic will then be compared to some standard value for the purpose of estimating the target parameter or making inferences about it. In the case of the mean, this standard value = σ / \sqrt{n} which is referred to as the standard deviation of the sample mean. By evaluating:

$$z = \frac{(\text{sample mean} - \text{population mean})}{\text{standard deviation of the sample mean}}$$

we can make decisions about the population mean based on our sample mean.

This standard value to which we

compare the error of the mean is thus called the standard error of the mean. Similarly, we can explain other expressions of the form "standard error of...".

I hope my comments are of some help to you and simultaneously serve as a modest memorial to Professor Pal Veress.

-Shraga Yeshurun
Department of Math & CSC
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As preparation for a unit on effective graphing, students in our statistics classes collect "interesting" graphs and tables. Most of the students gather illustrations from USA Today, Time, Newsweek, and local papers. Students also look at graphs from Tufte's Visual Display of Data and Wainer's article on "Displaying Data Badly" in the May 1984 issue of American Statistician. Some students prefer to make their own computer generated graphs. We discuss effective plots and misleading ones using overhead transparencies of the examples collected from students. This year we began to use William Cleveland's text, The Elements of Graphing Data, as our primary source of effective data display. Contact me if you wish to request copies of the transparency masters which we used this semester at Santa Monica High.

This summer I have shared the Network with interested teachers from the Phillips Exeter Academy Computer Conference, the California Math Project at UCLA, ICOTS II, and Project EQUALS UC Berkeley. Plans for this fall include promoting the Network at two conferences sponsored by the California Math Council. I appreciate the help this newsletter provides those of us who teach statistics to secondary students. There is no other area in mathematics that is as exciting to teach to high school classes. Statistics teachers never hear, "When are we ever going to use this?"

-Gretchen Davis
Santa Monica High School
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Santa Monica, CA 90405

The January 1986 issue of the newsletter contains Ann Watkins's review of the Tufte text referred to in Gretchen Davis's letter. Gretchen's review of the Cleveland text appears in the NEW PUBLICATIONS AND PRODUCTS section of the current issue. -Ed.

DON'T LET THIS PASS YOU BY...

...the April 1986 issue of DISCOVER magazine. The article, "Flying in the Face of Danger", discusses risk assessment for failures of space shuttle components. The use of probability trees to examine the Challenger disaster is especially interesting.

...Interested in statistics stamps? The Mathematical Study Unit is a philatelic group whose purpose is to acquire and disseminate knowledge of philatelic materials related to mathematics, mathematicians, and computers. Their checklist contains over 2,700 stamps, some of which are statistical. Contact Estelle A. Buccino, 135 Witherspoon Court, Athens, GA 30606 for more information.

NEW PUBLICATIONS AND PRODUCTS

Cleveland, William
THE ELEMENTS OF GRAPHING DATA
Wadsworth Advanced Books
Monterey, CA 93940
1985, 323 Pages, Paperbound Text, \$18.95

In his text on methods for displaying data effectively, Cleveland presents carefully constructed graphs so that students can concentrate on the numbers. He includes the newer graphs; i.e. stem and leaf plots, box plots, dot charts, and smoothing techniques. His explanations of the principles of graph construction stress the importance of drawing a graph which presents a clear picture to the viewer, both in terms of the visual display itself and the understanding and interpretation of the data.

In a one semester class, it would not be possible to cover all the illustrations in Cleveland's book. The following examples provide a nice cross section of illustrations which can be covered in one semester and which are motivating and interesting to the

students: "Death of 15-24 Year Olds", "Number of Compositions Played on WNCN During a Two Month Period in 1984", "CO2 Concentration", "Time of Origin and Bits of Information", and "Brain and Body Mass from Sagan".

A unit of statistical graphing should not be limited to showing students examples of lying with statistics. It is more important to offer suggestions which improve misleading graphs. In most popular magazines and newspapers, a clear understanding of the data is lost in the illustrations that embellish the graphs. Cleveland, however, focuses on the power and the beauty of the numbers.

-Gretchen Davis
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Weissglass, Julian, et al.
HANDS-ON STATISTICS
Wadsworth Publishing Company
Belmont, CA 94002
1986, 342 Pages, Paperbound Text, \$17.50
Text and Disks (Apple or IBM), \$54.00

More new statistics texts than ever are rolling off the presses these days, partly in response to the promotion of numerical literacy in the mathematics curriculum. With supplemental computer programs and a few exploratory data analysis techniques thrown in for a contemporary look, many of these texts are hardly more than minor rewrites of earlier editions in which most students became experts in number-crunching without attaining an understanding of intuitive statistical concepts. The authors of HANDS-ON STATISTICS have written a text and accompanying computer software which work in tandem, making number-crunching obsolete and the instillation of statistical concepts paramount. As implied by the phrase "hands-on", students using this package are active learners, constantly being asked to guess and then check via the 15 superbly written computer programs, several of which make extensive use of simulations. Although the authors intended that the software be used in conjunction with the text, the programs could be used alone for demonstration purposes.

HANDS ON STATISTICS covers the topics usually found in a one semester introductory statistics course: descriptive statistics, probability distributions, estimation, hypothesis testing, and bivariate regression and correlation. Each concept is discussed in the text, illustrated by running the software and data sets, and then reinforced by answering text questions regarding the results of the computer runs. Supplementary exercises provide the opportunity for additional practice.

The computer programs are dazzling in their use of graphics. Each program has a corresponding graphical display, and the design of the software allows a superimposition of theoretical results, wherever applicable. Forty interesting data sets ranging from airport traffic to body levels of cotinine (nicotine metabolite) are already on the disks, easily retrieved in seconds. The software design also provides for a novel and facile technique of user data input.

Inextricably intertwined, the text and computer software are the quintessence of CAI. The instructional flow cycles smoothly between text and computer. Adopters of the package receive an unprotected set of disks plus the right to copy them for student users of the text and for back-ups. Whether used as a primary or secondary statistics text, by a class of students or an independent learner, HANDS-ON STATISTICS splendidly conveys both the content and the spirit of statistics.

-Pamela Coffield
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HELP!

THIS SECTION OF THE NEWSLETTER IS FOR YOUR QUESTIONS. SEND YOUR REQUESTS TO THE EDITOR. IF YOU HELP ANYONE SOLVE A PROBLEM, PLEASE MAIL A COPY OF YOUR LETTER TO THE EDITOR SO THAT OTHERS WHO ARE INTERESTED MAY BENEFIT FROM YOUR REPLY.

Robert Boruch of Northwestern University has invited me to put together a symposium on surveys done by elementary school children for the 1987 ASA Joint

Statistical Meeting. Since it is unlikely that teachers I know will be able to obtain financial support for travel to this convention, it occurred to me that I might be able to contact interested teachers in the area through the newsletter.

WANTED: Middle and junior high school teachers who have had students conduct surveys as part of their classwork. You have an opportunity to be part of a symposium at the Joint Statistical Meeting in San Francisco, August 17-20, 1987. The topic of the symposium will be Children's Surveys. If interested, please don't delay. Contact me by phone at 312-541-3378 (home) or 312-256-5150 (work) or write:

-Judi Zawojewski
22 Stonegate Drive W.
Prospect Hts., IL 60070

I am currently teaching a course in the Consumer Mathematics area which I have upgraded to a real mathematics course. I would like to include statistics as part of the course, but I am having trouble finding material suitable for an introductory section that is not too involved with mathematics and the symbolism of math. I am looking for a practical introduction to statistics. If anyone has heard of such a course or knows where I can find material to develop my course, I would greatly appreciate any assistance. Thank you.

-Patrick D. Kent
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WHERE TO WRITE

Address all letters, announcements, questions, articles being submitted for publication, and requests to get on or off of the mailing list to the editor:

-Beth Bryan
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Augusta College
Augusta, Georgia 30910

Please share this newsletter with other teachers interested in statistics. You may photocopy anything in it.