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Joint Committee on the Curriculum in Statistics and Probability.

Quantitative Literacy Workshops 1989

The Quantitative Literacy Project will sponsor five workshops for teachers in the summer of 1989. Each workshop will follow the model developed at Lake Forest College in the summer of 1988. Here is a tentative schedule of locations and dates:

Towson State College
Towson, Maryland
Dates: June 19-23

Virginia Commonwealth College
Richmond, Virginia
Dates: June 26-30

Washburn University of Topeka
Topeka, Kansas
Dates: June 26-30

John Carroll University
University Heights, Ohio
Dates: to be announced

Oregon State University
Corvallis, Oregon
Dates: June 19-23

Participants must have a commitment from their supervisors allowing them to teach the material presented in the workshop during the 1989-1990 school year. Participants must also be provided with opportunities to inservice other teachers in their building, department, or district. When possible, teams of teachers are encouraged to apply.

For more information, contact

Gail Burrill
5000 South 116 Street
Greenfield, WI 53228

or

Kathryn Rowe
American Statistical Association
1429 Duke Street
Alexandria, VA 22314-3402

Please do not contact the colleges and universities serving as sites for these programs.

- Gail Burrill

Quantitative Literacy - 1988

During the summer of 1988 a model Quantitative Literacy workshop was held at Lake Forest College, Lake Forest, Illinois for 42 Chicago area secondary teachers. The participants used exploring data techniques to analyze data, simulated probability problems, explored the notions of sampling and surveys, interpreted information contained in tables and learned some of the fundamental principles of experimental design. One of the outstanding components of the program was the involvement of 10 local statisticians who were consultants to the participants as they worked on group projects and served as hosts and speakers for the four follow-up sessions which were held during the fall 1988 school term. The projects ranged from an analysis of the typical tennis shoe worn by Lake Forest residents to investigating characteristics of the participants.

The follow-up meetings were held at Amoco Corporation, Abbott Laboratories, G.D. Searle and Co. and the Evangelical Lutheran Church in America. Participants shared class projects, teaching techniques and related successes and failures as they began to implement the ideas from the summer workshop in their classes. The Lake Forest workshop staff consisted of Richard Scheaffer, University of Florida, Gainesville, FL, Ann Watkins, Los Angeles Pierce College, Los Angeles, CA, Gretchen Davis, Santa Monica High School, Santa Monica, CA and Ken Sherrick, Berlin High School, Berlin, CT. The project was coordinated by Gail Burrill, Whitnall High School, Greenfield, WI who also conducted the follow-up sessions assisted by Pat Hopfensperger, Homestead High School, Mequon, WI and Chris Olson, Washington High School, Cedar Rapids, IA. The participating statisticians were James Mellon, Dr. Harold Sargent and Dr. Wayne Taylor of Baxter Health Care Corporation, Jessica Coe of Dupont Critical Care, Ruth Ann Killion of Evangelical Lutheran Church in America, Dr. Richard Bittman of G.D. Searle and Co., Robert Carlson and Dr. Jay Chmiel of Abbott Laboratories, Susan Groshong of Statistical Research and Dr. Vincent Hodgson of Amoco Corporation.

The Lake Forest Quantitative Literacy workshop was sponsored by the Quantitative Literacy II grant from the National Science Foundation.

- Gail Burrill

Texas Forum on Quantitative Literacy

On March 2-3, 1989, Texas A & M University will host a conference on teaching statistics. This full two-day forum will replicate the 1988 ASA/NCTM Forum on Quantitative Literacy conducted in Minneapolis, Minnesota.

The Texas Forum will seek answers to these questions: Why is data analysis important for the school curriculum? What should be taught and when? What materials are available? How does data analysis fit into the school curriculum? How does data analysis affect teacher preservice and inservice? and How are data analysis skills developed on the job in industry and government?

Several presentations will be used to highlight the Quantitative Literacy Series materials on *Data Analysis* (the display and interpretation of data), *Simulation* (modelling techniques to solve probability and statistical problems) and *Sampling* (methods of sampling, reliability of data and the relation of a sample to a population). Participants will examine and review on site exemplary classroom materials, texts, videos, computer software and other instructional materials.

The target audience for the forum are school district mathematics supervisors and curriculum coordinators, state department mathematics consultants, classroom teachers, college and university professors, industrial statisticians, and training specialists from government and industry.

For additional information on the Texas Forum on Quantitative Literacy, contact Professor James F. McNamara, Department of Educational Psychology, Texas A & M University, College Station, Texas 77843.

- James McNamara

Illinois Institute for Statistics Education

The Illinois Institute for Statistics Education (IISE) summer workshop program at the University of Illinois, Urbana-Champaign, has been funded by the National Science Foundation in response to national and state initiatives to include significant amounts of statistics and probability in the school curriculum.

The IISE workshop program calls for the identification and preparation of teams of 3-5 teachers from a school district who will work together with a district team coordinator for a sustained period of time to strengthen the teaching of statistics and probability at the school level. The district team coordinator is an individual, such as a mathematics supervisor or resource teacher, who works at the school district level to assist the team of teachers in implementing statistics in the school curriculum.

Teacher team members will attend a three-week summer workshop on the UIUC campus, July 10-28, 1989, to learn the essential concepts of modern statistics and methods of teaching statistics to grade 6-12 students of all ability levels. District team coordinators attend a 2-day Fall workshop to learn about the program and to discuss district plans for statistics education. The teams of teachers and the district coordinators meet together in a Spring workshop during the school year following the summer workshop to evaluate their efforts and to develop further district plans for statistics.

Applications are accepted from school district teams only. Graduate credit, housing, meals, transportation, and stipend are provided for summer participants. Transportation, meals, and housing are provided for Fall and Spring meetings. For details and application materials, contact: Dr. Janny Q. Travers, IISE Program Coordinator, UIUC Department of Statistics, 101 Illini Hall, 725 S. Wright Street, Champaign, IL 61820. Phone: 217/244-7284. The deadline for applications is March 15, 1989.

- Janny Q. Travers

Council of Chapters Slide/Video Show

A Big Success

At the ASA Annual Meeting in Chicago, 1986, the Council of Chapters unveiled a slide presentation entitled "Statistical Science: The Profession." The purpose of the slide show was to reach out to high school students, college students, or others who may be naive about the importance of statistics in many aspects of government, industry, and academia. Toward this end, the slide show was intended to be both a recruiting tool and an educational device.

In the Fall of 1986, the slide presentation and accompanying script was promoted for sale to universities and ASA chapters. Since that time 111 copies have been sold to various groups and individuals around the world. The slide presentation is now on every continent, except Antarctica, in such countries as Canada, South Africa, Malaysia, Chile, Australia, New Zealand, and 5 different countries in Europe, as well as extensive distribution in the U.S. (from New Hampshire to Florida to California). The purchasers include notable universities (Iowa State, North Carolina State, Purdue, SMU, Washington, and Wisconsin to name a few), Fortune 500 companies (Dow Chemical, DuPont, Eli Lilly, Shell Development, Upjohn, and others), and government agencies (IRS, Bureau of Labor Statistics in Chicago, WHO in Malaysia, and the Forestry Service). Purchasers represent Departments of Statistics/Biostatistics, Mathematics, Business/Information Systems, and Medicine. A number of ASA chapters have also purchased a copy as well as several high schools or local community school districts.

Because of the versatility of the slide format, many have been able to adapt the presentation to local or individual needs.

The show is also available in $\frac{1}{2}$ " video tape.

Slides may be purchased at \$65 per set; the video tape is \$50. Rental is \$10 (which may be applied to the purchase price). Contact the American Statistical Association, 1429 Duke St., Alexandria, VA 22314-3402

- Steve Ruberg

Some Thoughts on Surveys

Two articles in *Science* about a year ago dealt with the thought processes and mental details that people go through in responding to questions in sample surveys; this is research in an area called cognitive science. Clearly sample surveys and opinion polls are important and widely used in industry and government, but it is neither easy nor inexpensive for professionals to run a survey. Some high school teachers have their classes design and perform a sample survey as a statistics project. Thus, insights about how people actually respond to survey questions should be interesting to everyone who designs, evaluates, or even responds to surveys.

Bradburn, Rips, and Shevell (April 10, 1987, pages 157-161) report that not much is really known. That is, "despite the importance of (large-scale surveys) (and despite the large costs associated with such surveys), researchers have given relatively little attention to the mental processes that take place when people answer survey questions. The nature of these processes ultimately determines the accuracy of the resulting population estimates."

These authors are especially concerned with questions about autobiographical events, for example, "During the past 12 months, about how many visits did you make to a dentist?" Not surprisingly, they found that "survey accuracy may decline when too many questions are asked within the limited time period that respondents are willing to devote to a survey." Asking for more information may actually produce less if the subjects' tolerance levels are reached.

People often do not recall specific information very well, even if they consult their records. "A study in the Netherlands, for example, found that only 47% of respondents who consulted records gave the correct balance in their savings account, a modest increase over the 31% accuracy rate for respondents who did not examine records." One way to achieve better level of recall, the authors report, is to begin with the most recent item in a series and work backward, rather than to begin at the beginning. However, in practice "most survey designs pay little attention to respondents' strategies for ordering recall of such series as doctor visits, hospitalizations, crimes, or spells of unemployment."

Although it has conventionally been thought that respondents answer questions simply by retrieving relevant incidents from memory and counting them, the authors claim that it is not that simple. For example, "in a recent telephone survey that asked how many times the respondent had eaten at a restaurant within the last 2 months, only a quarter of the sample reported using a recall-and-count procedure; when the reference period was extended to 6 months in a new random sample, the proportion fell to less than 10%." Instead, most respondents decomposed the problem into subparts, first determining a rate of occurrence and then multiplying the rate to arrive at a quantity for the requested time period. The lesson for survey design is that, if people are producing their answers using this kind of thought process, then greater accuracy might be obtained if the questions were developed in such terms directly in the survey. There is no point in asking for more detail than people can really give.

The authors also note that people have trouble dating events. "[Experimental results demonstrate] that people give public events too recent a date if they can remember many details about them and too early a date if they recall relatively little."

In summary, the authors state that "survey researchers are often after the kind of quantitative, autobiographical information that taxes even the most cooperative respondents' mental abilities. Recall is not dependable. Inference, which helps fill in details that respondents cannot recall, is at best inexact and at worst misleading." They believe cognitive research that studies respondents' strategies can help to understand errors and lead to improved methods for posing questions.

An article by Schuman and Scott (May 22, 1987, pages 957-959) deals with the use of "open" and "closed" survey questions to gauge public opinion. They discuss difficulties with both types of questions and state that the "the unexamined question is not worth asking," which is hardly encouraging advice to someone planning a survey. Several experiments are described in which the precise way in which the question is worded affects the results; this can be true for both open and closed questions. "Respondents tend to choose among the alternatives offered to them, even where they are explicitly instructed that this is not necessary. If an investigator wishes to know how the public ranks all alternatives that come to mind, the initial rank-

ing must be provided in a free answer situation."

The authors conclude that "there is one practical solution to the problems pointed to in this report. The solution requires giving up the hope that a question, or even a set of questions, can be used to assess preferences in an absolute sense . . . and relies instead on describing changes in responses over time and differences across social categories." In other words, you can't be exactly sure what the responses to any question mean in an absolute sense, but if you ask the exact same question at different times, or to different groups, then you can interpret the differences in the responses.

I hope that the accounts of these articles do not make it appear so difficult to run a decent survey as to discourage teachers from having their classes do surveys as statistics projects. However, it is worthwhile to realize that even professionally done surveys are hardly perfect, that researchers are trying to better understand how people actually generate their responses to survey questions, and that this knowledge can (we hope) lead to more informative surveys.

— Jim Landwehr

Software For Use in Teaching Statistics

TITLE: STATGRAPHICS

DATE: 1986

COST: \$795

PUBLISHER: STSC, INC

2115 East Jefferson St.

Rockville, MD 20852

HARDWARE: IBMPC XT or AT 512K with
Graphics Display

There are 6 main categories of functions:

1. Data Management and System Utilities
 - A. Data Management
 - B. System Environment
 - C. Report Writer and Graphics
Replay
 - D. Plotter Interface
2. Plotting and Descriptive Statistics
 - E. Plotting Functions

- F. Descriptive Methods
- G. Estimation and Testing
- H. Distribution Functions
- I. Exploratory Data Analysis
3. Anova and Regression Analysis
 - J. Analysis of Variance
 - K. Regression Analysis
4. Time Series Analysis
 - L. Forecasting
 - M. Quality Control
 - N. Smoothing
 - O. Time Series Analysis
5. Advanced Procedures
 - P. Categorical Data Analysis
 - Q. Multivariate Methods
 - R. Non-parametric Methods
 - S. Sampling
 - T. Experimental Design
6. Mathematical and User Procedures
 - U. Mathematical Functions
 - V. Supplementary Operations

Comments:

The scope of the software is obvious from the list of covered topics. Each of the 22 sections is broken down into other options. This coverage is much more than is needed in the high school environment, but it is the only package seen so far that make the graphics the main feature of the software. The graphics are EXTENSIVE and included the complete range of EDA plots developed by John Tukey and other at Bell Labs. The inclusion of a report writer that can incorporate graphics is a feature that would be a vital part of any EDA package designed for high school use.

This is an advanced statistical package as seen from the cost of the package. But of all the packages seen, this one, more than any other, contains many features that would be desirable in a high school stats package. Its biggest drawbacks in this regard are the cost and the speed of execution. With some exclusion of unnecessary options, and with the resulting increase in speed, a high school version of this package would be very impressive.

— Jim Swift

Woodrow Wilson Institutes

The Woodrow Wilson National Fellowship Foundation will sponsor a series of institutes on statistics during the summer of 1989. For more details, contact Janet Gnall, WWNFF, Box 642, Princeton, NJ 08542. The location and local contacts are:

June 26-30

Mary Ann Murray
Berea College
Berea, KY
606-986-9341

Mark Spikell
George Mason University
Fairfax, VA
703-764-6088

July 10-14

Barbara Stoehr
SUNY at Oneonta
Oneonta, NY
607-432-7530

Arthur Kovacs
Rochester Institute of Tech.
Rochester, NY
716-475-2421

July 17-21

John Haubner
Plattsburgh State Univ. College
Plattsburgh, NY
518-564-5000

Stuart Mills
LSU-Shreveport
Shreveport, LA
318-797-5377

July 24-28

James F. McNamara
Texas A&M University
College Station, TX
409-845-7588

George Olson
Roosevelt University
Chicago, IL
312-341-3500

August 7-11

Betsy Sakata
University of Hawaii
Honolulu, HI
808-948-7221

William Juraschek
University of Colorado-Denver
Denver, CO
303-556-4355

August 11-18

Olympia Boucree
New Orleans, LA
504-522-2585

Letter

Dear Editor:

There is in Italy an increasing interest on statistical education. Due to this fact the Italian Statistical Society (SIS) and a few Departments of Statistics are setting a project for the constitution of a Centre for Statistical Education. Of the aims of the Centre, one is to be a source of information on the teaching of statistics both on a national and international basis.

We are therefore interested in having information on institutions, projects, materials, etc., related with statistical education at the primary and secondary level in those countries in which statistics is present in the school curriculum.

We would appreciate very much your collaboration in helping us to build up a good reference source.

Dr. Maria A. Pannone
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Universita di Perugia
Via A. Pascoli
06100 PERUGIA - ITALY
Email PNN at IPGUNIV

International Statistical Institute's Round Table Conference

The International Statistical Institute's Round Table Conference, "Training Teachers to Teach Statistics", took place last summer in Budapest, Hungary, 23-27 July. The conference was attended by forty delegates and observers from sixteen countries, and was convened by Anne Hawkins from the Institute of Education, London University, UK.

Contributions and discussions were made under the broad headings. The (Changing) Nature of Statistics, Evaluation of Training Needs and Some Solutions, Defining Problem Areas, and The Evaluation of Existing Programmes. Delegates were conscious of the need to find ways to teach the teachers statistics, as well as to find ways to train them to pass on their skills and knowledge.

The Conference was a working forum, intended to review the current situation and to identify examples of good practice. There have been a number of international conferences on the subject of teaching statistics, but this was the first to concern itself exclusively with training teachers. Consideration was given to teacher training for primary, secondary and tertiary teachers, and to the needs of teachers of statistics in the context of a variety of "user"-disciplines as well as in mathematics. It is the intention that the Proceedings, to be published this year, will provide some guidelines for those involved in training teachers of statistics in both developing and developed countries.

The nature of the conference ensured that strong links were forged for future cooperation between the participants. In addition, during the course of selecting participants, a network of researchers and practitioners was compiled, comprising some 200 names from all over the world. It is hoped that this will provide an on-going channel of communication for facilitating the development of statistics teaching and teacher-training.

Statistics is a subject which is both cross- and multi-disciplinary. The growing need for statistically literate members of society is accompanied by the growth in the need for competent teachers of statistics in all parts of the curriculum. However, certainly at the school level, there are not enough teachers with formal training in statistics. There are even fewer who have any training in the pedagogy of teaching statistics. Indeed, the pedagogy

is not yet well defined and research in this area is fairly new.

Two further problem areas justify the need for debate and collaboration as in this conference. The pace of technological development, changing the way in which statistics is practiced and by whom, is putting further pressures on classroom teachers who are looking to the trainers for help. There was much discussion about the growth in Exploratory Data Analysis techniques and graphical methods, and the merits of these for conveying sounder intuitive bases about statistics and statistical arguments.

In the UK, as elsewhere, changes in assessment methods, placing more emphasis on practical course-work, are also changing the types of skill which teachers must exercise. Even those teachers with formal qualifications in mathematical statistics may find themselves in difficulty when teaching more applied areas.

In short, this Conference was a timely meeting of trainers from many different countries, some of whom may be relatively isolated in their own institutions. It enabled ideas to be shared, and examples of good and bad training practice to be subjected to scrutiny. Comments from delegates would suggest that this encounter was enjoyable, and both intellectually stimulating and also of immediate practical value in their own teacher-training work.

- Anne S. Hawkins