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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.

### WHY OFFER A HIGH SCHOOL LEVEL STATISTICS COURSE?

Several teachers have written to ask for some help in presenting a case for offering a course in statistics and probability at the high school level. The arguments outlined below are not given in any particular order of priority. The point that scores in one situation may not necessarily be the most effective argument in another. The arguments are those that I have used in the past in one situation or another.

1. Statistics is an important alternative for students who would otherwise drop out of the mathematics field due to lack of ability or interest.

In British Columbia, the grade 11 Algebra is required for University entrance. Students who achieve a bare pass or other low passing grade are not likely to be able to complete the grade 12 Algebra course. Such students find that the Grade 12 Statistics course is more appropriate. Other students who benefit from this course are those going into Nursing, or Health or Social Sciences. These students are often advised to take a course in Statistics in their first or second college year. A high school course in Statistics stresses the intuitive, experimental, and project approach to the discipline and smoothes the way into this later work.

But the majority of high school students are not bound for College, and a similar case can be made for a Statistics course at the grade 10 or 11 level for these students who would otherwise drop out of mathematics. The probability content and the information-seeking content of the course offers motivation to those who see math as a dull exercise in letters and symbols. We should be trying to provide suitable courses for potential dropouts, and Statistics offers a way of tailoring the course to the individual interests of the students.

2. Statistics is an important application in a computer literacy program.

The ability of the computer to process information is an important item in most computer literacy programs. Provide access to a bank of interesting information about, for example, professional sports teams. Provide also, interactive programs that can get the information, perform the necessary calculations, and produce suitable graphics. Include a word processor to write a report on each investigation. Begin with some simple tasks (Which team had the largest number of points scored against them?) and students will not only have acquired some knowledge of the working of a computer, but, more important, how to use the information that the computer produces. Do not include statistics in the title of the course. Too many people think that they know what such statistics is all about. It is better to call it something like Information !!

3. Statistics is the part of mathematics that is most widely used in the daily newspaper.

There are very few places in the school curriculum where students learn how to read articles that use numbers. If your administration does not accept the fact that most people cannot effectively understand articles that contain numbers, the evidence should not be hard to find. Read *The New York Times* or *U.S. Today* and find some articles that draw conclusions from some data. Now think up some questions that occur to you about the data. Is the conclusion valid? What information did the writer have that was not included in the article? Is the numerical information reliable? Does the article make sense? Try out the questions on some of your better students and examine the results. Then see if the students themselves can formulate similar questions about a newspaper article.

4. Statistics is increasingly used in other subjects in the school curriculum.

One of the reasons for offering any mathematics course in high school is that students are required to know this mathematics if they are to succeed in other courses such as general science and physics. Now that statistical techniques are becoming more widely used in the biological and social sciences, it is becoming more important to cater to the needs of such courses.

5. Statistics is becoming an increasingly important discipline in our society and thus offers an alternative career choice.

Schools have the responsibility of giving students the opportunity to make informed career decisions. The school curriculum includes such disciplines as physics, chemistry, and biology. Among other things, this enables students to discover if they have an interest in this area. The National Science Foundation predicts that, for the next decade, there will be more job openings for statisticians than applicants with appropriate training. Students at the high school level should be given some opportunity to learn about the nature of this profession.

— Jim Swift

Nanaimo District Senior Secondary School  
Nanaimo, British Columbia

### **NSB FINAL REPORT RECOMMENDS MORE STATISTICS AND PROBABILITY**

Last September's final report of the National Science Board Commission on Precollege Education in Mathematics, Science, and Technology outlines a comprehensive plan to make the United States education in these fields the finest in the world by 1995. The report gives specific proposals to attack many parts of the current problems, including: teacher training, retraining, and retention; increased time for teaching scientific subjects; establishment of exemplary or "model" elementary and secondary schools; improved national, state, and local leadership; upgraded high school graduation and college entrance requirements; an expanded role for NSF in promoting curriculum development and evaluation in mathematics, science, and technology; methods to bring new information technologies into the classroom effectively; and improved informal scientific education for children.

The report is not just a vague wish list of things that would be nice. Instead, it is remarkably specific and includes projected costs for all the major proposals. This is not the place to summarize the entire report, but readers of this

newsletter may be especially interested in the report's statements on education in statistics and probability.

The Executive Summary recommends that colleges phase in entrance requirements of four years of high school mathematics, including a second year of algebra, course work covering probability and statistics, and four years of high school science, including physics and chemistry, and one semester of computer science.

In the body of the report, the section "Improving What Is Taught and Learned" recommends that mathematics instruction at the elementary school level be designed to produce six general outcomes. One of these is, "basic understanding of elementary data analysis, simple statistics and probability, and fractions." Others include understanding of and facility with basic number facts, skill in informal mental arithmetic and estimation, and ability to use calculators.

At the secondary level, the report states that "discrete mathematics, elementary statistics and probability should now be considered fundamental for all high school students." It suggests that some components of the current curriculum can be streamlined to leave room for these important new topics.

Further points made by the Commission are that student data-gathering and exploration of mathematical ideas by discovery are important in teaching all levels of mathematics. It is important to introduce practical problems which require the collection of data, the communication of results and ideas, and formulation and testing of solutions.

Readers of this newsletter might find these recommendations useful for convincing administrators, teachers, and parents that statistics and probability deserve a larger role in the curriculum. If you become involved in such discussions, please write the Editor about your experiences so that they can be shared with others through this newsletter.

The report is available free while supplies last from NSB, 1800 G. St., N.W., Washington, DC 20550.

— Jim Landwehr

AT&T Bell Laboratories  
Murray Hill, NJ

### **STATISTICS AND PROBABILITY IN NEW HAMPSHIRE SCHOOLS**

In the Spring of '83, we surveyed all 79 secondary schools in the State: 42 Senior High Schools serving grades 9-12 or 10-12 and 37 Junior/Senior High Schools enrolling grades 7-12.

Only five of the 42 Senior High Schools offer a course in probability and statistics. None of the 37 Junior/Senior High Schools offer a course in probability and statistics.

There are no statistics and probability requirements in our secondary school standards. We recommend that "an introduction to the ideas of elementary probability and statistics and their applications" be a part of all mathematics programs in high schools.

— Fernand J. Prevost  
Consultant, Mathematics Education  
NH State Dept. of Education  
64 North Main Street  
Concord, NH 03301

### STATISTICS AND PROBABILITY IN CONNECTICUT, FLORIDA, AND GEORGIA

Probability and statistics are part of the Problem Solving strand in Grades K-8 in Connecticut. Simple probability experiments begin in Grade 1. Predictions based on simple data, descriptive statistics, and probability measures are explored in subsequent grades.

In Florida, one of the standards of excellence in mathematics is, "The student will recognize and apply the concepts of probability and statistics." Simple probability experiments begin in Grade 3. Fractions are used for probability in Grade 5, and compound events are considered in Grade 8. Thirteen skills are listed for the Probability and Statistics standard. In addition, a probability and statistics course has been proposed for Grades 9-12.

There is a probability and statistics strand for Grades K-12 in Georgia. Data collection, sampling, and chance events are introduced in the early grades (K-4). Fifty-three concepts and skills are developed or reinforced in subsequent grades.

Thank you to Steven Leinwand (Connecticut), Karen Bennett (Florida), and Clare Neswith (Georgia) for sending this information.

— Claire Newman  
Queens College, CUNY  
Flushing, NY

### NEW PROGRAMS

#### Computers and Statistics

With the help of a grant from NSF/NIE, Walter Kastenschmidt of J. I. Case High School in Racine, Wisconsin, has designed a two-semester course which integrates statistics and

computer programming. The curriculum guide contains a course outline with day-by-day assignments, forty student worksheets, and answers for the worksheets. The guide was written to accompany the textbook *Statistics and Probability in Everyday Life* by Joseph Newmark and the assignments are from this text. Computer programs in the worksheets are written in BASIC and should be machine independent.

All of the material and topic sequencing was classroom tested. A copy of the 77-page curriculum guide is available from the editor of this newsletter. Please send \$4.00 for the costs of photocopying.

### LETTERS

Each issue of *The American Statistician*, a journal of The American Statistical Association, often has a considerable amount of material and information of use to teachers of probability and statistics. This includes specific articles in the "Teacher's Corner" and reviews of teaching materials (frequently audiovisual materials) in the "Accent on Teaching Materials" column.

— Harry O. Posten  
Chairman, Committee on Audiovisual  
Instructional Material (ASA)  
University of Connecticut  
Storrs, CT

(The November issue of *The American Statistician* contains a review of materials for probability experiments available from Creative Publications. *The American Statistician* is available in college and university libraries and is sent with the *The Journal of the American Statistical Association* to all members of the ASA. Yearly dues are \$43 (\$20 for students) and should be sent to the ASA at 806 15th Street, N.W., Washington, D.C. 20005. A subscription to just *The American Statistician* is \$16.)

### NEW PUBLICATIONS AND PRODUCTS

*Statistics at Work*  
S. Gubbins, D. A. Rhoades, and  
D. Vere-Jones, Eds.,  
New Zealand Statistical Assn.  
1982, 112 pages, paper.

This booklet is intended primarily to give high school teachers ideas for lessons involving practical applications of statistics. It contains eleven case studies, each of which is a real life problem with data, statistical analysis, and exercises. Sample titles include, "How to Calculate Your Earthquake Risk," "Bayes'

Theorem at Work" (in predicting delinquent children), and "A Visit to the Golden Kiwi (Lottery)." As only elementary statistics is used, many of the case studies can be inserted directly into the classroom.

*Statistics at Work* is similar in intent to *Statistics: A Guide to the Unknown* (Holden-Day), but written at a lower level.

Orders should be sent to Dr. B. P. Dawkins, Mathematics Department, Victoria University, Private Bag, WELLINGTON, New Zealand. Enclose US\$8.50 each for 1-4 copies, US\$7.00 each for 5-19 copies, or US\$6.50 each for 20 or more copies.

*Statistics as a Career: Women at Work*  
American Statistical Association  
1983, 7 pages, free.

This brochure was designed to introduce high school and college students to the career opportunities in statistics and to encourage women to enter the field. It includes pictures and job descriptions of six women statisticians in business, industry, government, teaching, and research. The booklet also has sections titled, "The Demand for Statisticians," "How Much Do Statisticians Earn?" and "How to Become a Statistician."

To order copies for your classes and career fairs, send your name, title, school, address, and the number of copies desired to Committee on Women in Statistics, American Statistical Association, 806 15th Street, N.W., Washington, D.C. 20005.

College Curriculum Support Project's  
*High School Supplement*  
Bureau of the Census  
1983, 4 pages, \$1.00.

The Census Bureau has a new high school supplement to help instructors and students use census information in their course work and classroom projects. The four page high school supplement highlights resources that are easy to use and inexpensive. It covers products that summarize findings from the 1980 census, reference volumes that should be in the school's library, curriculum resources that the Census Bureau offers instructors to make their work easier, and telephone numbers and addresses of census offices throughout the country.

You can order the *CCSP High School Supplement* for \$1.00 from Customer Services, Data User Services Division, U.S. Bureau of the Census, Washington, D.C. 20233. Make checks payable to "Commerce-Census."

## HELP!

I teach math at the City University of New York, and am developing software for the Apple microcomputer to aid in teaching statistics. Are you aware of anyone else working in this direction?

— Geoffrey Akst  
833 Lexington Avenue  
New York, NY 10021

I would deeply appreciate information concerning the use of computers in teaching statistics.

— Luke R. Moortgat  
De La Salle University  
P. O. Box 3819  
Manila 2800, Philippines

I teach at Bellows Free Academy in St. Albans, Vermont. At the present time I am trying to develop a half year statistics course for the college bound student. First I must convince the Curriculum Committee that such a course is valuable for our students. I would appreciate any information that you could send me about reasons for studying statistics, possible textbooks and topics to cover.

— Sylvia Lazarnick  
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Fairfield, VT 05455

## WHERE TO WRITE

Address all letters, announcements, questions, and requests to get on the mailing list for the newsletter to the editor,

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