

ANNOTATED BIBLIOGRAPHY: TRAINING STATISTICIANS

Allen, Rich (1987). "Preparing for Careers in Government Statistics". Unpublished article.

This publication reviews a report by Eldridge, et al., noted below, *Preparing Statisticians for Careers in the Federal Government*, which provides recommendations to colleges concerning the structure of their Bachelors and Masters programs in statistics. This paper updates information about the profile of federal statisticians including race, geographic location, and employing agency. It also recommends changes in the employment standards for hiring federal statisticians.

Armstrong, Sir William (1973). "Management Training for Statisticians and Opportunities to Enter Top Management". *Journal of the Royal Statistical Society*. Vol. 136:95-99.

This article describes the skills required to move statisticians into the role of management and decision making. The author explains the need for early training and experience in management for statisticians. The article gives examples and concentrates on the issues within the British Civil Service.

Bailar III, John C. (1994). "A Larger Perspective". *The American Statistician*. Vol. 49:10-11.

This article describes the need for change in how statistics is taught in academic settings. The author feels that too much theory is being taught and that academia should be concentrating on contributing to the problems of society including violence, unemployment, racial tensions, etc. He recommends that college programs offer a supervised work internship in government or industry, and calls for the hiring of statisticians who are proficient at conducting applied research as well as teaching.

Bartholomew, D.J. (1973). "Post Experience Training for Statisticians". *Journal of the Royal Statistical Society*. Vol. 136: 65-70.

This article points out some of the problems in the statistics profession due to rapid growth in recent years and the need for post graduate educational training. The article presents solutions through academic involvement, based on an interchange between university faculty and applied statisticians.

Bickel, Peter J. (1995). "What Academia Needs". *The American Statistician*. Vol. 49:5-6.

This article focuses on how best to train the next generation of statisticians for government, academia, and industry. The author lists specific topics that should be taught in a statistics program and explains why they should be included. He presents some of the concerns associated with including all of these topics in a curriculum and offers some solutions.

Bishop, H.E. (1964). "The Training of Government Statisticians". *Journal of the Royal Statistical Society*. Vol. 127: 211-215.

This article provides an overview of government statisticians using the British Civil Service as a reference. The author describes the nature of government statistical work and the need for training of government statisticians in four areas: administrative skills, practical work training,

computer training, and economics. Discussion also focuses on the shortage of government statisticians and some solutions to the problem.

Boardman, Thomas J.; Hahn, Gerald J.; Hill, William J.; Hocking, Ronald R.; Hunter, William G.; Lawton, William H.; Ott, R. Lyman; Snee, Ronald D.; and Strawderman, William E. (1980). "Preparing Statisticians for Careers in Industry: Report of the ASA Section on Statistical Education Committee on Training of Statisticians for Industry". *The American Statistician*, Vol. 34, No. 2: 65-75.

This report provides guidelines for universities to consider in developing programs for training statisticians who will work in industry. The recommended programs focus on real problems and the statistical theory and methodology that are useful to their solution. For example, the educational experience should include statistical knowledge, practical problem solving, consulting practice, and the ability to communicate orally and in writing with nonstatisticians. Comments by George E.P. Box, Paul D. Minton, Emanuel Parzen, and Geoffrey S. Watson follow the article.

Clark, Cynthia, and Schuchardt, Richard (1995). "Technical Academic Training for Employees of Survey Organizations". *Proceedings of the Section on Government Statistics*, American Statistical Association.

This paper presents the National Agricultural Statistical Service's program that supports academic training for their employees in statistics, survey methodology, and computer science. The authors provide a history of the development of the program and a profile of the program participants. The selection process for entering the program is described and specific programs are mentioned including the Joint Program in Survey Methodology and the Master's program in Applied Social Research at the University of Michigan.

Currie, S.G.; Gough, J.H.; Hole, G.J.C.; Drotki, K.P.; Lussier, R.; and Maranda, F. (1986). "Preparing Mathematical Statisticians for Statistical Agencies". *Journal of Official Statistics*, Vol. 2: 315-328.

This paper outlines the need for universities to more effectively prepare students for working in statistical agencies, specifically Statistics Canada. It starts out with an outline of the required work of a mathematical statistician at Statistics Canada. The recruitment process of Statistics Canada and the differences between their recent candidates and their ideal candidates is discussed. The authors offer specific suggestions to universities on how to better prepare their students for employment in the federal sector.

DeMets, David; Anbar, Dan; Fairweather, William; Louis, Thomas; and O'Neill, Robert (1994). "Training the Next Generation of Biostatisticians". *The American Statistician*. Vol. 49: 280-284.

This article presents an overview of the current biostatistical profession, including the need for an official database to monitor the supply and demand for biostatisticians. It calls for larger training support for biostatistics graduate students. An overview of a biostatisticians work environment and the skills and training necessary for a current biostatistician are also discussed. Proposals on how properly to train the next generation of biostatisticians are described.

Eldridge, Marie; Wallman, Katherine; Wulfsberg, Rolf; Bailar, Barbara; Bishop, Yvonne; Kibler,

William; Orleans, Beatrice; Rice, Dorothy; Schaible, Wesley; Selig, Seymour; and Sirken, Monroe (1982). "Preparing Statisticians for Careers in the Federal Government: Report of The ASA Section on Statistical Education Committee on Training of Statisticians for Government". *The American Statistician*. Vol 36(2): 69-89.

This detailed report provides a profile of statisticians employed in the U.S. Federal statistical system, including education and training requirements. Opportunities for in-service education and training programs are discussed. The report outlines specific recommendations to colleges and federal agencies on how to structure their statistical education programs are described. Comments to the report are added by Lincoln Moses and Ronald Snee.

Garfield, Joan B. (1994). "Respondent". *The American Statistician*. Vol. 49: 18-20.

This paper provides findings from educational research on how students most effectively learn statistics. Based on these findings, suggestions are offered about specific ways statistics should be taught.

Hoerl, Roger W., and Snee, Ronald D. (1995). "Redesigning the Introductory Statistics Course". Center for Quality and Productivity Improvement, University of Wisconsin-Madison, Report No. 130.

This report suggests that traditional introductory statistics courses do not meet the needs of customer groups such as students and their future employers. The authors argue that if statistics is to have broad impact, then the traditional statistics course must be completely overhauled — not incrementally improved. Principles to guide the redesign are presented and then applied to the design of the introductory statistics course for business students.

Hole, Geoff; Lee, Geoff; and Jones, Tim (1995). "Development of Mathematical Statisticians in Statistical Agencies". *Proceedings of the Section on Government Statistics*, American Statistical Association.

This paper presents an overview of the practices of Statistics Canada, the Australian Bureau of Statistics, and the United Kingdom Government Statistical Service. Policies, type and range of work, and training and recruitment programs are outlined for each organization.

Kettenring, Jon R. (1995) "What Industry Needs". *The American Statistician*. Vol. 49: 2-4.

This article describes the need for more holistic education approaches for statisticians who are employed in industry. The author gives background information on interdisciplinary statistics research and education. He offers suggestions for academic statistics programs including hands on experience in the classroom, computer science training, and communication skills training. He presents the need for a closer interaction between academia and industry.

Killion, Ruth Ann (1995). "Developing the Affective Side of Technicians: Consulting and Managing Skills". *Proceedings of the Section on Government Statistics*, American Statistical Association.

This paper talks about the need to develop consulting and managerial skills for statisticians. The first section offers suggestions on how to effectively train statisticians in the area of consulting.

The author presents three models for technical management development including the Pray as you go, Pay as you go, and Play as you go models. To preserve these consulting and managerial skills, the author suggests working closely with a group of co-learners.

Lethoczy, John (1995). "Modernizing Statistics Ph.D. Programs". *The American Statistician*. Vol. 49: 12-17.

This paper presents some insights into modernizing Ph.D. programs in statistics by offering cross-disciplinary training. The program at Carnegie Mellon University is described, and strengths and weaknesses are pointed out.

McCulloch, C.; Boroto, D.; Meeter, D.; Polland, R.; and Zahn, D. (1985). "An Expanded Approach to Educating Statistical Consultants". *The American Statistician*. Vol. 39: 159-167.

This article describes a comprehensive curriculum on statistical consulting that is currently being implemented at Florida State University. The authors discuss their general philosophy on statistical consulting and outline the key parts of the program: (1) a preconsulting course; (2) a supervised consulting course; and (3) an evaluation of competence at each stage of the program. Results of their initial evaluation of the program are included.

Morris, Carl N. (1994). "Respondent". *The American Statistician*. Vol. 40: 21-23.

This paper suggests looking at a statistical student in two dimensions, verbal as well as mathematical. He points out that statistics students must be trained in both theory and application in order to be successful. He stresses that academia must do what benefits the field of statistics, not just their own department.

Petroni, Rita (1983). "Teaching Sampling Methodology to Third World Government Statisticians Using an Agricultural Survey". *Proceedings of the Statistical Education Section*, American Statistical Association.

This article outlines a sampling and statistical methods program run by the International Statistical Programs Center of the U.S. Bureau of the Census. The program is designed for government employees of developing country who will return to their own countries to be practicing sampling statisticians. The program includes the areas of sampling and statistical methods, agricultural statistics, demographic statistics, economic statistics, computer data systems, and survey methods.

Ross, N. Phillip (1995). "What Government Needs". *The American Statistician*. Vol. 49: 7-9.

This paper presents an overview of issues that need to be addressed for training government statisticians. The author talks about training in the area of communicating in a team setting to solve real problems. He suggests that statisticians be trained to use statistical thinking on the job and to be open to new ideas and methods. He recommends that students have experience using real data.

Smith, Nancy D. (1995). "Staff Development at the FDA — Transforming Newly Hired Statisticians Into Regulatory Statistical Reviewers". *Proceedings of the Section on Government Statistics*,

American Statistical Association.

This paper outlines the training program at the FDA for a newly hired statistician to move into the role of a regulatory statistical reviewer. Aspects of the job of a regulatory reviewer and the hiring practices are presented. The four phases of the New Reviewer Training Initiative are outlined in detail. The paths to obtain the positions of “expert reviewer” and “team leader” are explained.

Snee, Ronald D. (1993). “What’s Missing in Statistical Education?” *The American Statistician*. Vol. 47:149-54.

This article presents the need for significant changes in statistical education. The author suggests that “value” (fun, enthusiasm) for statistics needs to be created. He offers insight into changing the content and delivery of a statistical education including “learning by doing”, using real data and solving real problems. He proposes that a variety of different teaching styles be used.

Snee, Ronald D. (1996). “Nonstatistical Skills That Can Help Statisticians Be More Effective”. Center for Quality and Productivity Improvement, University of Wisconsin-Madison, Report No. 140.

This report discusses the variety of new work situations for statisticians arising from a new economic era. The paper argues that the current work environment often places statisticians on interdivisional teams representing different organizational functions. Statisticians are also asked to work with nontechnical groups who have less experience with data-based problem solving methods. These opportunities require new skills in addition to statistical skills.

Statistics Canada (1993). “Methodologists’ Training and Development: A Handbook”. Ottawa, Canada.

This handbook provides the framework for the training and development of a methodologist at Statistics Canada. A set of principles governing the training and development are given. The handbook outlines the framework for a training and development program and lists a description of relevant courses that are offered from Statistics Canada as well as universities.

Teekens, Rudolf (no date). “Continuous Vocational Training: Staying Ahead of the Future”. Unpublished article.

This paper presents the training and development of European statisticians in a project titled “Training of European Statisticians” (TES) initiated by Eurostat. It starts out with strategic issues in training statisticians and gives an overview of the project from 1990 to 1995. A new TES programme structure is proposed consisting of four subject areas: Data collection and Survey Methodology, Economic Statistics, Social Statistics, and Publication and Dissemination.

Williamson, G. David, and Betts, Donald R. (1995). “The Quantitative Methods Enhancement Program: CDC’s Innovative Career Development Opportunity”. *Proceedings of the Section on Government Statistics*, American Statistical Association.

The Centers for Disease Control and Prevention (CDC) have created the Quantitative Methods Enhancement Program (QMEP). Its purpose is career enhancement training for statisticians and other scientists interested in statistical methods. The program allows employees to temporarily

relocate into another department within CDC to obtain new skills. A description of the program is outlined as well as the process of applying for admission.

Woodward, Mark (1995). "Training Government Statisticians in Zimbabwe". *Journal of Official Statistics*. Vol. 1:79-82.

This article begins with an overview of the Central Statistical Office (C.S.O.) of Zimbabwe. A review of the past manpower supply and the current manpower needs is presented. The C.S.O.'s In-Service Training Course program for employees is described. Included in this program are courses in practical and theoretical statistics, mathematics, economics, and computer science.

Wulfsberg, Rolf M., and Eldridge, Marie D. (1982). "Preparing Statisticians for Careers in Government". *Proceedings of the Section on Statistical Education*, American Statistical Association.

This report provides a demographic and geographic profile of U.S. government statisticians. Various job duties for statisticians at various service grades are described. Education and experience requirements are outlined. A number of in-service training opportunities from different agencies are presented. The article lists specific recommendations to colleges and universities for their statistics programs.

Zahn, Douglas (1982). "Comment". *The American Statistician*. Vol. 36: 88-89.

This paper comments on the report, "Preparing Statisticians for Careers in Government," by Wulfsberg and Eldridge. The author focuses his discussion on the recommendation for hands on consulting courses in statistical education. He lists on-going programs in statistics at various universities that offer courses in consulting with subject-matter specialists. He offers his own views and suggests that a newsletter be started to stimulate interest in statistical consulting.

