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**Statistical Policy  
Working Paper 27**

**Training for the Future: Addressing Tomorrow's  
Survey Tasks**

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Prepared by  
*Subcommittee on Survey and Statistical Training  
in Federal Statistical Agencies  
Federal Committee on Statistical Methodology*

Statistical Policy Office  
Office of Information and Regulatory Affairs  
Office of Management and Budget

September 1998

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# **TRAINING FOR THE FUTURE:**

## **ADDRESSING TOMORROW'S SURVEY TASKS**

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A Report of the Subcommittee on  
Survey and Statistical Training  
in Federal Statistical Agencies

September 1998

Washington, D.C.

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# THE FEDERAL COMMITTEE ON STATISTICAL METHODOLOGY

THE FEDERAL COMMITTEE ON STATISTICAL METHODOLOGY  
(September 1998)

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## PREFACE

The Federal Committee on Statistical Methodology was organized by the Office of Management and Budget (OMB) in 1975 to investigate methodological issues in Federal statistics. Members of the committee, selected by OMB on the basis of their individual expertise and interest in statistical methods, serve in their personal capacity rather than as agency representatives. The committee conducts its work through subcommittees that are organized to study particular issues and that are open to any Federal employee who wishes to participate in the studies. Working papers are prepared by the subcommittee members and reflect only their individual and collective ideas.

Several members of the Federal Committee on Statistical Methodology proposed that a subcommittee be organized to investigate training programs for statisticians working in federal agencies. There was interest among committee members in different approaches used by the agencies, feeling that a study would provide insights and ideas for other organizations. Several members of the FCSM met to clarify the topic — conceived as "Training Received by Statisticians in Federal Agencies." They developed a charter for a subcommittee, identifying objectives, audiences, data needs, data collection strategies, qualifications for subcommittee members, and preliminary issues to be addressed. A subcommittee was convened, the membership of which included a combination of agency managers, practicing statisticians, agency training officers, and academic statisticians. The goal of the subcommittee was to clarify the issues, investigate the topic, and prepare a report for publication in the FCSM Working Paper Series.

After much initial discussion, the subcommittee re-named itself and focused its efforts on investigating training in survey methodology and statistics offered to employees of federal statistical agencies. This report provides the results of the study — information on courses currently funded by agencies, measures of employee satisfaction with their training opportunities, exceptional career development programs offered at some agencies, future needs, opportunities for collaboration, findings and recommendations.

The Subcommittee on Survey and Statistical Training in Federal Statistical Agencies was chaired by Cynthia Z.F. Clark of the Bureau of the Census, Department of Commerce.

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## ACKNOWLEDGMENTS

This study was suggested and championed by several members of the Federal Committee on Statistical Methodology — Maria Gonzalez, David Williamson, Monroe Sirken, and Daniel Kasprzyk. Three of the members of the FCSM — Cynthia Clark (Chair), Monroe Sirken, and David Williamson — were asked to serve on the subcommittee. The subcommittee first convened in November 1995.

This report is the result of the collective work and many meetings of the Subcommittee on Survey and Statistical Training in the Federal Statistical Agencies. All subcommittee members made significant contributions to the conception of the research and studies, to the implementation of the studies in their agencies, to the analysis of the data and information compiled, and to the preparation of the written report. Each agency representative prepared a case study of training at their agency. Several committee members took lead roles in preparing chapters of the report. Cynthia Clark (BoC) organized a session at the November 1996 COPAFS-sponsored conference on the Subcommittee's work. The paper she presented at the session introduced the work of the Subcommittee; it became the basis of Chapter One. Linda Raudenbush (NASS) prepared a description of Human Resources Management that set the context for the study in Chapter One. Nancy Mathiowetz (JPSM faculty) worked with Nancy Bates (BoC) to design the data collection, taking the lead in the analysis and presentation of the data. Nancy Bates served on the JPSM Practicum Survey Advisory Board and developed the presentation and analysis of the data on employee satisfaction with training. Carol French and Renee Miller (both EIA) edited the COPAFS seminar presentations on career development programs to prepare Chapter Four. All subcommittee members contributed to the report and to the findings and recommendations presented in Chapter Six. Linda Raudenbush provided overall critique and guidance for the entire report.

The subcommittee also thanks the following individuals — Denice Myers (NASS) for serving as secretary/coordinator of the subcommittee from November 1995 to June 1996 while serving as FCSM secretary; Jeremy Morton (NCHS JPSM Student) for annotating the bibliography under the direction of Nancy Mathiowetz; Theresa Hall-Marvin and Joan Hill (BoC JPSM students) for assisting with the collection, analysis, tabulation, and preparation of written documentation of the data collection under the direction of Nancy Mathiowetz; Mick Couper (JPSM faculty) for assistance in planning and tabulating employee training data from the JPSM 1996 Practicum Survey presented in Chapter Three; Fred Barrett (NASS), Charles P. Pautler, Jr. (BoC), and David Williamson (CDC) for developing the descriptions of the respective agency career development programs in Chapter Four; Robert Graham (NASS) and Angel Broadnax (BoC) for preparing Chapter Five on interviewer training under the direction of Linda Raudenbush and Nancy Bates; Susan Moberly (NCHS) and Elizabeth Lloyd (CDC) for assisting in preparation of agency case studies; William Arends, Virginia McBride, Lawrence Gambrell (NASS) for assisting in editing the entire report under the direction of Linda Raudenbush and Nancy Bates.



## **SUBCOMMITTEE CHARTER: TRAINING RECEIVED BY STATISTICIANS IN FEDERAL STATISTICAL AGENCIES**

The objectives of the working paper are to:

- N Describe and compare survey and statistical training programs of federal agencies.
- N Assess the strengths and weaknesses of survey and statistical training received by the federal workforce.
- N Provide guidelines for agency self-improvements of their survey and statistical training programs and for interagency coordination and collaboration in providing survey and statistical training.

The major stakeholders and audiences for the report are:

- N The Office of Management and Budget's Office of Statistical Policy, the Federal Committee on Statistical Methodology (FCSM — chaired by OMB), and the Committee on National Statistics (CNSTAT) using summary information on the "state" of survey and statistical training in the Federal Statistical System as they review and assess such training for the federal workforce and develop strategies to meet current and emerging training needs.
- N Federal agencies using cross-agency comparisons of survey and statistical training programs to help plan their training programs.
- N The Joint Program in Survey Methodology (JPSM - a collaborative effort of the University of Maryland, the University of Michigan, and Westat), supported by the National Science Foundation and other academic institutions and professional societies using information about survey and statistical training providers to plan their curricula and programs.

The analysis requires three kinds of information about agency statistical training programs:

- N Descriptions of agency training programs, including summary information about budgets, policies, special training initiatives, types of training provided, etc.
- N Aggregate information on consumption of different types of survey and statistical training by the workforce of these agencies with demographic characteristics of that workforce.
- N Opinions and perceptions of survey and statistical training including those of the management and workforce of these agencies regarding strengths, weaknesses, and quality of existing training courses, and unmet training needs.

Two methods are proposed for obtaining the required information:

N A survey to collect general information from all statistical agencies.

N Case studies to collect specialized information from specifically selected agencies.

The working group is to be composed of members exercising the following functions:

N Agency training officers to address the availability and accessibility of agency training information and to assist in making data collection arrangements.

N Agency statistical managers to provide experience from those proposing and approving training requests.

N JPSM and other university faculty to consult on all phases of the study and on the plan and preparation of the report.

Investigation of several issues is required prior to analysis and data collection, including:

N Clarification of "who are statisticians" and "what qualifies as survey or statistical training."

N Determination of what survey or statistical training information is available and accessible from federal agencies.

N Determination of the resource requirements needed to compile this information and the federal agency support forthcoming for this task.



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## EXECUTIVE SUMMARY

The federal statistical agencies conduct many large and complex surveys to provide official statistics relevant to issues of public policy. These agencies require a highly technical staff to design and conduct these surveys and censuses and to produce information of high quality. Although the agencies have recruiting efforts to hire technically well-qualified individuals, many of the skills needed in statistical and survey methodology are not routinely taught in college and university programs. Thus, these agencies frequently find it necessary to provide on-the-job and other training to develop statistical and survey skills among their employees.

The Federal Committee on Statistical Methodology (FCSM) chartered a subcommittee to investigate the different agency approaches to providing training for their statisticians. The subcommittee determined early in its deliberations that the workforce under investigation should be more inclusive than mathematical statisticians, the primary constituency of the parent FCSM. The subcommittee also concluded that information focusing exclusively on survey and statistical training for this workforce would be uniquely relevant for agencies to use in their human resource development plans. The subcommittee thus chose to focus broadly on survey and statistical training for the technical workforce composed of mathematical statisticians, statisticians, statistical assistants, operations researchers, computer specialists, economists, and social science researchers (sociologists, psychologists, anthropologists) collectively referred to as the "statistical" workforce at the group of eighteen federal statistical agencies represented on the FCSM or on the Interagency Council on Statistical Policy (ICSP).

The subcommittee reviewed training and development at its six member agencies — Bureau of the Census, Bureau of Labor Statistics, Centers for Disease Control and Prevention, Energy Information Administration, National Agricultural Statistics Service, National Center for Education Statistics, and the National Center for Health Statistics. The information gleaned was thought to be relevant for a broader audience; it is provided, in Appendix A, in the form of case studies. To provide more comprehensive and consistent information on the topic of its investigation, the subcommittee conducted a survey of the eighteen federal statistical agencies referenced above from data maintained by them. Data items for the survey were suggested by the subcommittee's review of agency programs. The subcommittee developed a set of questions on the employee's perception of training at their agency for use in an organizational climate survey conducted at nine of the federal statistical agencies.

Three other work products emerged from subcommittee review and discussions. (1) A literature review on survey and statistical training was conducted, resulting in an annotated bibliography appended to this report. (2) A review of agency programs highlighted employee development programs at NASS, the Bureau of the Census, and the Centers for Disease Control and Prevention. These programs, documented in the report, provide models for employee development. (3) This review of agency programs took note of the fact that statistical agencies also provide training to individuals who are not their own employees (including interviewers, data users, data providers, and employees of international,

state, and local government organizations). A description of these training initiatives — thought to be informative to other statistical agencies — is included in the report also.

From its survey of eighteen federal statistical agencies, the subcommittee discovered that:

- N The "statistical" workforce at the eighteen federal statistical agencies is composed of computer specialists (32%), statisticians (26%), economists (22%), mathematical statisticians (9%), and other related job categories (11%).
- N The number, type, and length of survey and statistical courses taken by employees varied greatly by agency. The majority of courses involved statistical analysis and statistical computing. Many courses were common between the federal statistical agencies. Twenty-four percent of the courses were offered by JPSM, 31 percent by other universities, 19 percent by SAS Institute, and 26 percent by other institutions or organizations.
- N Obtaining uniform data on statistical training proved to be difficult. Agencies measure and define statistical training differently and many agencies do not maintain a training database. Because of these inconsistencies, the subcommittee was not able to obtain good training cost estimates for the purposes of comparing and contrasting training expenditures across agencies.
- N Employee satisfaction with their overall training opportunities varies among the agencies. The organizational climate survey of nine federal statistical agencies indicates that while the majority of employees believe they receive training necessary to do their jobs, there is some sentiment that training opportunities are unfairly allocated or given a low priority in individual agencies.
- N An assessment of employee career development at three agencies revealed both similarities and differences in the approach to human resource development. The NASS utilizes Individual Development Plans (IDPs) as a means of planning and monitoring employee continued learning. The Census Bureau supports several programs that are voluntary and competitive — one for any individuals in the "statistical" workforce; the other exclusively for mathematical statisticians. The CDC recently implemented a quantitative career enhancement program that offers mathematical statisticians temporary reassignments as a way to acquire new analytical skills.
- N The review of interviewer training highlighted the emerging needs for interviewer training on new technologies such as CATI, CAPI, CASI and its impact on training delivery and costs and interviewer skills.

The subcommittee concluded that improvement of survey and statistical training requires both (1) actions by individual federal statistical agencies and (2) enhanced collaboration between them. Its four recommendations are:

1. Elevate the priority given to training within the federal statistical agencies.
2. Assess training needs and opportunity within these agencies.

3. Create a formal approach to employee career development.
4. Enhance statistical literacy outreach to agency clientele.

## **CHAPTER ONE: INTRODUCTION**

The federal statistical agencies conduct many large and complex surveys to provide official statistics relevant to issues of public policy. The agencies require a highly technical staff to design and conduct these surveys (including censuses) to produce information of high quality. Although agencies have recruiting efforts to hire technically well-qualified individuals, many of the skills needed in statistical and survey methodology are not routinely taught in college and university programs. Thus, agencies frequently find it necessary to provide on-the-job and other training to develop these skills among their employees. Approaches to this skill development vary among agencies.

### **1. Mission of the Subcommittee**

The subcommittee was charged with documenting and comparing survey and statistical training programs of federal agencies. The subcommittee was asked to provide baseline measures of these programs and to assess the strengths and weaknesses of these programs. The group was directed to establish guidelines for agency self-improvement regarding these programs and for interagency coordination and collaboration in providing them. It was expected that the group would discover ideas that were worth sharing and identify areas of future need or improvement.

The subcommittee was asked to look toward the future by defining expected needs, resources to meet those needs, and potential for collaborations between agencies. It was also asked to identify areas where the Joint Program in Survey Methodology (JPSM)<sup>1</sup> might enhance its contributions to the federal statistical agencies. The group was directed to prepare a final report documenting its findings and making recommendations to improve survey and statistical training for statisticians.

This working paper provides information to executives of federal statistical agencies for planning individual agency programs and collaborating with sister agencies. It endeavors to stimulate critical thinking and provide for an increased exchange of ideas and information; the subcommittee desires that its report lead to increased collaboration and sharing of resources.

### **2. Methodology for the Subcommittee Study**

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<sup>1</sup>The Joint Program in Survey Methodology is a collaborative undertaking of the University of Maryland, the University of Michigan, and Westat in response to the Boskin initiative to improve economic statistics.

The first issue the subcommittee faced was to define its scope. The group was directed to address training received by statisticians employed by federal agencies. Several questions immediately arose. Who are statisticians? What training is relevant to statisticians? What federal agencies were interested in training received by statisticians?

The subcommittee undertook two initial review processes to address topics relating to its scope. Each agency representative gave a presentation discussing the agency's respective training program. These presentations at subcommittee meetings provided background for the subcommittee's future efforts. The subcommittee conducted a literature review to find relevant research and evaluation studies. Additionally the subcommittee applied concepts of the Human Resource Development model to its investigation. These initial reviews provided direction for the research described later in this chapter.

This section begins with a description of the Human Resources Development model that sets the context for an understanding of workforce training and presents an overview of relevant aspects — concepts, purposes, benefits, activities, and participants. This is followed by a brief summary of the training programs at the seven agencies represented on the subcommittee and a description of the literature review. The section concludes with a summary of initial findings from the agency and literature reviews.

**Human Resources Development Model.** "Workforce training" relates to the field of human resources management (HRM) — more specifically to human resources development (HRD). HRM is generally defined (*Robbins and Coulter*) as encompassing the areas of human resources utilization, development, and environment. The purposes of an organization's human resource development activities (*Nadler*) are to provide further information leading to:

1. Improved performance on the individual's present job.
2. Advanced preparation of an individual for an identified job in the future.
3. General growth not related to any specific job.

The three definitive purposes of HRD are achieved by distinct and separate sets of learning activity areas — training, education, and development. Each activity area has its own unique definition, focus, and time when the learning will likely be utilized. Table 1 describes and characterizes these activity areas. Although the primary focus of this study is on training, the report addresses some education and development programs. Due to the scarcity of academic programs preparing students for the range of survey and statistical skills needed in survey organizations, all three activity areas are particularly relevant.

An organization benefits when it conducts HRD activities through:

- N** Increased Productivity - by enhancing the job performance of competent employees.
- N** Reduced Turnover - by managing a career development process through which qualified employees progress in a planned and orderly movement to fill key functional roles.
- N** Enhanced Employee Satisfaction - by giving employees opportunities to develop their skills and knowledge; also, by providing the perks and rewards of certain off-site HRD programs.



- N Attainment of Organizational Goals - by increasing employee understanding of the organization's strategic plan and the manner in which particular jobs contribute to achievement of its mission and resulting benefit to society.
- N Enhancement of the Quality of Work Life - by enabling employees to adjust intellectually and psychologically to changes in the work environment.
- N Sustained Employee Competitiveness - by maintaining a level of employee currency with technological changes.
- N A Climate of Organizational Growth - by refreshing employees' learning skills with frequent developmental activities.

**Table 1: Training, Education, and Development Model of HRD**

<b>HRD Activity Area/Definition</b>	<b>Focus / Purpose</b>	<b>Time Focus</b>	<b>Financial Resource</b>	<b>Fiscal Risk</b>	<b>Learners</b>	<b>Support System</b>
<p><b>Training</b></p> <p><b>All learning related to the present job</b></p>	<p>Present job</p> <ul style="list-style-type: none"> <li>- Acquire new competencies</li> <li>- Enhance present skills</li> <li>- Learn new technology</li> <li>- Solve specific learning-related job problem</li> </ul>	<p>Now</p> <p>(when the learner returns to the job)</p>	Expense	Low	Learners are selected by supervisors and managers who are aware of the learning need or problem	<ul style="list-style-type: none"> <li>- Learners, supervisors, managers and HRD staff all agree on specific learning goals.</li> <li>- Supervisors ensure that learning will soon be used on the job.</li> </ul>
<p><b>Education</b></p> <p><b>Specific learning to prepare individual for a different but identified future job</b></p>	<p>Future job</p> <ul style="list-style-type: none"> <li>- Learn about a different job in the same organization</li> <li>- Increase career development and enhancement opportunities</li> <li>- Get a promotion (upward mobility)</li> <li>- Enhance internal staff mobility (lateral mobility)</li> <li>- Reduce turnover</li> </ul>	<p>Soon</p> <p>(usually one week to one year)</p>	Short term investment	Medium	Learners are those being considered for new or different jobs or promotions	<ul style="list-style-type: none"> <li>- When the new job and supervisor are known, HRD staff can provide reinforcing processes and materials to transfer of learning.</li> <li>- When the new job and/or supervisor are unknown, HRD staff can provide some reinforcement to minimize learning loss.</li> </ul>
<p><b>Development</b></p> <p><b>Learning for the growth of the individual; unrelated to specific present or future jobs; leads to greater organizational readiness for future changes.</b></p>	<p>Individual/ Organization</p> <p>Individual growth opportunities through challenging learning</p> <p>Organizational climate of learning, growth, vitality, and readiness to create positive futures and manage change</p> <p>No sharp focus on need or subject matter</p>	Sometime	Long term investment	High	More developmental opportunities are available for upper level employees and leaders. All employees should enjoy some development.	<ul style="list-style-type: none"> <li>- Because there is no intention to support specific learning on present or future jobs, no support system is needed.</li> <li>- There should be a generally positive cultural value placed on learning, growth, and managing change.</li> </ul>

Because providing HRD experiences requires financial resources, each activity area can be described as either an expense (with the expectation of immediate organizational benefit) or as an investment (with the hope of organizational benefit at some unspecified time). As with any financial transaction for goods or services, HRD activities have an inherent element of risk; i.e. what, when, and how much will the organization gain from paying for HRD activities? Federal statistical agencies will have to assess the most effective ways to obtain a workforce with the required skills for producing official statistics.

**Review of Agency Programs.** The HRD model sets the stage for investigation of the training programs of the seven agencies represented on the subcommittee. The presentations informed the committee of the full range of HRD activities occurring in the individual agencies that encompassed training, education, and career development. The presentations elicited many good ideas to which the subcommittee wanted to give broad visibility. This, because of their potential applicability to other organizations. Thus, case studies of these seven agency training programs are provided in Appendix A. Subcommittee knowledge of these agency training programs led to recommendations for agency collaboration presented in Chapter Six. Highlights of each agency review are given below. Staff numbers are from FY 1996.

*Bureau of the Census (Department of Commerce).* The Census Bureau has a staff of over 3,000 professionals — including statisticians (e.g., economic, demographic, survey), computer programmers, and individuals classified in other series. The Census Bureau supports academic training for staff on an individual course basis and for JPSM students on a half-time basis. It has also sponsored in-house statistical courses on topics such as variance estimation, time series and categorical data analysis, taught by Census Bureau staff experts in these topics. Four years ago a mathematical statistician career development program was initiated. In 1986, the Census Bureau developed a several day orientation program and a six week course entitled Professional Skills Development. All professional employees took the course during their first year of employment at the Census Bureau. During the course the employees designed and conducted a survey, giving them hands-on experience in all aspects of a survey. The orientation and Professional Skills Development courses have not been held in the past three years for lack of a sufficient number of entry-level employees. Plans are currently being made to revise the overview course.

*Bureau of Labor Statistics (Department of Labor).* The Bureau of Labor Statistics has a staff of 2,500, of whom 1,620 are in quantitative series — mathematical statisticians, statisticians, economists, computer specialists, statistical and computing assistants, and psychologists. BLS has a training plan for mathematical statisticians based on six technical items of "Knowledge, Skills, and Abilities" (KSAs). BLS identified three KSAs for supervisory positions and three more for management positions. For all of these KSAs, requisite training was also identified. BLS has set priorities for different levels of training. Training needed to perform the current job had first priority; training that was expected to have an impact on how the current job was done had second priority; training expected to have an impact on future jobs had third priority. Priorities are considered in determining training eligibility. BLS provides or supports both in-house (taught by employees or contractors) and academic training. BLS supports employees attendance in JPSM courses and degree programs as well as other academic course training.

*Centers for Disease Control and Prevention (Department of Health and Human Services).* CDC has approximately equal numbers of statisticians (52) and mathematical statisticians (67) and a large number of computer specialists (289). Its professional work force also includes sizable numbers of psychologists and sociologists. These staff numbers are exclusive of one of the CDC centers, the National Center for Health Statistics (described below). Apart from the Applied Statistics Institute managed by the NCHS, CDC offers courses specific to its program area (e.g. Introductory Biostatistics, Epidemiology for the Non-Epidemiologist, Introduction to Methods for Public Health Program Evaluation, Utilization of Data by the Public Health Manager, Marketing Information to Policymakers: How Statisticians can produce what Politicians Want). CDC also offers more standard survey and statistical courses (e.g. Basics of Survey Research, Introduction Small Area Analysis). CDC has recently developed a Quantitative Methods Career Enhancement Program to develop the capabilities of their mathematical statisticians.

*Energy Information Administration (Department of Energy).* The professional workforce at EIA includes industry specialists, operations research analysts, economists, survey statisticians, mathematical statisticians, computer specialists, and others. EIA participates in formal classroom training at universities (including JPSM) or from outside vendors. Special training courses, provided by the Statistics and Methods Group, addresses specific needs of individuals working in the energy industry (e.g. Determinants of Long-Run Energy Demand, Intermediate Econometrics, Commodity Pricing of Natural Gas), and needs of survey statisticians.

*National Agricultural Statistics Service (Department of Agriculture).* The professional staff at NASS are classified as agricultural statisticians, mathematical statisticians, or computer scientists. NASS has designed several career development programs and training programs for all its employees. All employees have Individual Development Plans (IDPs). IDPs are standardized for each professional series but allow for individualized training and development opportunities. The agency offers a formal week long orientation program and a series of agricultural survey and estimation training programs for all its statisticians. These courses cover specifics of agricultural survey design, data collection, and processing at several experience levels. NASS has long supported a program of full-time academic training at the graduate level in mathematical statistics, computer science, and survey methodology. An administrative record of the training provided by the agency is maintained in a training database (referred to as TRAI) at the USDA's National Finance Center, a computer processing facility.

*National Center for Education Statistics (Department of Education).* The workforce at NCES is primarily composed of educational statisticians and mathematical statisticians. NCES has a training program for staff to provide skills in statistical design, analysis, and project management. These courses are either taught by agency staff with a particular expertise or by outside experts. The agency also supports staff attendance at JPSM and WSS short courses. To promote effective and correct use of NCES data, NCES has developed a unique program of training for external data users. Data users often are also data providers; thus, the training also assists in improving data quality. Instructors are internal experts or known experts in a field.

*National Center for Health Statistics (part of CDC in Department of Health and Human Services).* The NCHS professional workforce includes health statisticians, computer specialists, and

mathematical statisticians. The Applied Statistics Training Institute sponsors short-term (2 1/2 day) training courses across the country focusing on data issues related to current public health concerns. NCHS supports academic programs for its staff, including participation in the JPSM courses and degree program. NCHS also conducts in-house training by bringing in vendors to teach technical courses. The agency has developed its own training database and has systematically collected information on training costs since 1995.

**Literature Review.** The literature review of workforce training of statisticians drew on resources available from members and from the Internet. It encompassed training within industry as well as training for government statisticians. Statistical agencies in other countries were contacted and their resources were received, e.g., the training and development handbook for methodologists developed by Statistics Canada. The subcommittee also learned that the Washington Area Alliance for Education in Survey Methods periodically prepares a consolidated List of Graduate Course Offerings at American University, George Mason University, Georgetown University, George Washington University, University of the District of Columbia, JPSM, and the USDA Graduate School. This report's annotated bibliography abstracts the papers and documents that were reviewed. References to these papers are given in the report. Several themes emerged from the literature review, including: a need for changes in the academic training programs that facilitate internships with government and industry; appropriate settings for both undergraduate and graduate programs; broad-based training in theoretical as well as applied statistical skills; and training in oral and written communication with non-statisticians. The authors suggest interdisciplinary training for statisticians that would include training in computer science, project direction, general management and supervision, and consulting.

**Findings from Initial Reviews.** The review of selected agency training programs led the subcommittee to conclude that the training relevant to its charter included both survey and statistical training for the collection, estimation, and publication of official statistics. The audience for survey and statistical training included quantitative agency employees in a broad set of professional classification series (henceforth referred to as "statisticians") and the statistical assistant series. The subcommittee's agency and literature review also identified needs for training "statisticians" in areas such as general computer software — word processing, spreadsheet, database; general office skills — writing, presentations, teamwork, project management; personal development; and management. Because these general categories of training would not differ intrinsically for "statisticians" from other members of the professional workforce, the subcommittee did not include these types of training within its purview. Training in statistical computing was deemed to be relevant for "statisticians" when the statistical content was an important factor in the course material.

The review indicated that the focus of the subcommittee's effort should be the primary federal statistical agencies. These were defined to include those agencies represented on either the OMB chaired Interagency Council on Statistical Policy (ICSP) or the Federal Committee on Statistical Methodology (FCSM). Table 2 provides a list of the federal statistical agencies referred to in this report, indicating their relationship to the ICSP, the FCSM, and the Subcommittee on Survey and Statistical Training for Federal Agencies. Information from the final report might also be relevant for other federal agencies with a smaller contingent of statisticians.

Several of the agency presentations described career development programs for statisticians, including two specifically designed for mathematical statisticians. These career development plans included aspects of all three HRD activities — training, education, and development. Because these programs have been effective at their respective agencies (and might well be adapted to other agencies), the subcommittee felt that other agencies might benefit from knowledge about these career development programs and their integration of HRD activities. A description of three specific programs is provided in Chapter Four.

**Table 2: Federal Statistical Agency Representation**

	Member, Interagency Council on Statistical Policy (ICSP)	Member, Federal Committee on Statistical Meth- odology (FCSM)	Representation, FCSM Subcommittee on Survey and Statistical Training
Agency for Health Care Policy & Research (AHCPR)		X	
Bureau of the Census (BoC)	X	X	X
Bureau of Economic Analysis (BEA)	X	X	
Bureau of Justice Statistics (BJS)	X		
Bureau of Labor Statistics (BLS)	X	X	X
Bureau of Transportation Statistics (BTS)	X	X	
Centers for Disease Control & Prevention (CDC)		X	X
Economic Research Service (ERS)	X		
Energy Information Administration (EIA)	X	X	X
Environmental Protection Agency (EPA)		X	
Federal Reserve Board (FRB)		X	
Immigration and Naturalization Service (INS)			
Internal Revenue Service Statistics of Income Division (IRS)	X		
National Agricultural Statistics Service (NASS)	X	X	X
National Center for Education Statistics (NCES)	X	X	X
National Center for Health Statistics (NCHS)	X	X	X
National Science Foundation Division of Science Resource Studies (NSF)	X	X	
Social Security Administration Office of Research and Statistics (SSA)	X	X	
Smithsonian Institution		X	

Subsequent review and discussion of the material presented by the agencies identified a need for a common data set to make comparisons between agencies. Subcommittee members compared their agency training databases, discovering that their ability to extract data varied widely. Nevertheless, the subcommittee felt that it would be desirable to attempt to collect as similar information as possible on the scope and cost of agency survey and statistical training for employees, and on the number of agency participants.

Information on agency survey and statistical training programs conducted for a broader audience -that of data collectors, data providers, and data users — was an initially unexpected aspect of the agency presentations. The recipients of this training were individuals who were at some agencies federal employees; at others, nonemployees. The audience was characterized as individuals who participated in the agency survey or statistical processes or received agency statistical products. They included interviewers (either employees or nonemployees), collaborators (clients), data providers, data users, researchers, employees of other government (local, state, federal, international) organizations. The subcommittee felt that more information on these training activities could be of interest to the federal statistical agencies in designing and developing their broad survey and statistical training curriculum.

### **3. Study Approach**

The subcommittee recognized that it needed to know more about agency training databases to determine what information might be collected to compare agency programs. A subgroup next investigated agency training databases to determine what information was available. The NASS Training Information Database (TRAI), in particular, is quite extensive. It includes participant data elements: name, social security number, classification series, grade/level, position title, duty location and phone number, home address and phone number, organizational unit; and course data elements: title, course objective, course start/end dates, duty hours, non-duty hours, tuition cost (registration fees, books and materials, other), vendor (name, address), course address, training purpose code, training type code, training source code, training special interest code, payment method, indirect costs. Other agency training databases were less comprehensive. On the basis of the information thought to be available at most agencies, the group specified measures relevant for comparisons between agencies — average training costs and average number of training opportunities per employee; amounts and kinds of training provided and to whom; total cost and cost as percent of program budgets.

The group developed a survey questionnaire (Appendix B) to send to the previously identified list of federal statistical agencies to collect information on agency training. Each agency was requested to provide FY 96 data on training costs, survey and statistical course attendance, and numbers of attenders for "statistical" employees. "Statistical employees" were defined as:

- N** mathematical statisticians (GS-1529),
- N** statisticians (agricultural, economic, demographic, health, education — GS-1530),
- N** survey statisticians (survey methodologists — also GS-1530),
- N** quantitative social scientists (economists, sociologists, psychologists, anthropologists),



- N operations researchers (GS-1515),
- N computer specialists (GS-334),
- N student assistants (GS-1599).
- N statistical assistants (GS-1531).

Survey and statistical courses were grouped into six categories:

- N statistical analysis (e.g. Analysis of Complex Survey Data),
- N sampling (e.g. Applied Sampling),
- N other statistical courses (e.g. Probability),
- N statistical computing (e.g. Introduction to SAS),
- N survey methods not otherwise classified (e.g. Questionnaire Design),
- N other (e.g. Survey Management).

Information on course attendance was obtained and categorized by course type, participants' classification series, and grade.

The subcommittee recognized that the data in agency training databases would not provide information on employee satisfaction with training opportunities — for present work assignment, for keeping up with technology, and for career development — or employee's perception of the value of the training. Agency databases would only document what courses had been taken. An opportunity to collect information on employee perception arose in connection with the 1996-97 JPSM Practicum, Organizational Climate Survey of Federal Statistical Agencies, conducted at nine of the federal statistical agencies. Through an interagency process, the subcommittee proposed questions for this survey that would provide insight into employee satisfaction with training.

To highlight the subcommittee's initial findings, the subcommittee organized a session at the November 1996 conference jointly sponsored by the FCSM and the Council of Professional Associations on Federal Statistics (COPAFS). The session included a paper on the initial activities of the subcommittee, presentations on several agency career development programs, and a panel of senior agency executives discussing statistical training needs in the future. The documentation for this session was incorporated into the report.

As a follow-up to the panel presentation on statistical training needs in the future, the subcommittee sought additional agency executive insights on these needs. As a result of these two efforts, insights were obtained from BoC, BLS, NASS, and NSF from panel participation, and from EIA, NCES, and NCHS through response to an interview questionnaire.

Information was prepared on interviewer training. Federal agencies have different arrangements for securing an interviewer workforce. Some agencies directly employ their interviewers (BoC, BLS); some agencies contract for their interviewer workforce (NASS, other federal agencies). NASS has an arrangement with another organization, the State Departments of Agriculture, who supply NASS with interviewers. The information on interviewer training by three agencies — BoC, NASS, and BLS —

was included to provide information on statistical components of this training that were desirable in the conduct of surveys. This information would provide a model for agencies contracting for data collection with BoC, NASS, BLS, or a private organization.

Information was also requested on training of nonemployees. This information helped to provide a total picture of each agency's survey and statistical training programs. Additionally, it would provide insight on the outreach efforts of agencies in quantitative and survey literacy. Committee members thought that sharing of this information between agencies might provide ideas for more effective federal statistical system quantitative literacy. Agency survey and statistical training programs directed toward employees might thus be augmented.

While the study approach was multi-faceted, each facet had limitations that presented challenges. The survey questionnaire collecting information on agency training was self-administered, for example, and respondents had only limited opportunity to clarify the information request. Both training and training costs are defined differently across the agencies, leading to inconsistencies in the reported data. In addition, for nine of the nineteen agencies reporting on agency training, the information on employee perception of training (information obtained from the Organizational Climate Survey of Federal Statistical Agencies) covered all types of training for all employees, not just statistical training and training for statistical employees — the focus of this report. Details on the limitations are presented in these chapters.

#### **4. Organization of Study**

The major component of the report consists of the two formal survey data collection efforts — the survey conducted by the subcommittee discussed in Chapter Two and the analysis of the training questions contained in the JPSM Practicum Survey presented in Chapter Three. Chapter Two includes information on training for both agency employees and nonemployees. Chapter Three reports on agency employee perceptions about the training they currently receive (all training, not just statistical). Chapter Four presents information on three statistical career development programs. Chapter Five describes interviewer training at the Bureau of the Census, the National Agricultural Statistics Service, and the Bureau of Labor Statistics. Chapter Six highlights the recommendations and findings of the subcommittee, including potential uses of the survey results, recommendations to improve training opportunities, identification of areas of collaboration across the statistical system, and training to address future needs.

The report's annotated bibliography abstracts the material collected in the course of the agency literature review. Appendix A has case studies of seven federal statistical agency training programs. Agencies represented include: the National Agricultural Statistics Service (NASS), the Bureau of the Census (BoC), the National Center for Education Statistics (NCES), the Energy Information Administration (EIA), the National Center for Health Statistics (NCHS), the Center for Disease Control and Prevention (CDC), and the Bureau of Labor Statistics (BLS). Appendix B contains the Federal Statistical Agency Training Survey Questionnaire. Appendix C contains the training questions included on the 1996-97 JPSM Practicum Organizational Climate Survey of Federal Statistical Agencies. Appendix D provides the Questionnaire on Future Training at Federal Statistical Agencies used to solicit insights from Senior

Agency Officials at selected statistical agencies. This information was used in conjunction with comments made at the November 1996 COPAFS Seminar to profile future training needs.

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## CHAPTER TWO: SURVEY OF FEDERAL STATISTICAL AGENCY TRAINING

It became clear in the early deliberations of the subcommittee that little was known about the composition of the workforce within statistical agencies and the spectrum of training opportunities within those agencies. While members of the subcommittee could provide information related to their particular agency, the subcommittee decided that a data collection effort targeted at the larger statistical agencies would provide a baseline for understanding the composition of the workforce, the funds spent on statistical training, and the nature of the courses taken by employees within those agencies.

To the best of the subcommittee members' knowledge, this is the first time that there has been an attempt to collect data on educational and training opportunities across federal statistical agencies. Having learned from the individual case studies of the vast differences among agencies with respect to the organization and storage of training information, the subcommittee was concerned with the feasibility of obtaining this information and, no less, the quality of the data. The limited resources available for the data collection effort compelled the subcommittee to rely on a self-administered data collection effort. As with any self-administered questionnaire, respondents had limited opportunity to obtain clarification with respect to the survey questions. Accordingly, the subcommittee views this effort as a demonstration project, one which is subject to issues of consistency and potential measurement error. Concerns with consistency of responses, potential measurement error, and other concerns that may limit inferences drawn from these data are highlighted throughout the discussion below.

### 1. Methodology

The data collection effort was targeted at statistical agencies that were either members of the Office of Management and Budget's Interagency Council for Statistical Policy or the Federal Committee on Statistical Methodology. In limiting the data collection to these nineteen agencies, the subcommittee recognizes that the entire population of statistical agencies or agencies which employ statisticians is not represented. The choice of the population of interest was based on several factors, including a desire to target the subcommittee's efforts at agencies employing the largest number of statisticians, given limited time and budget to collect the data. (See Table 2 in Chapter One for a list of agencies included in the data collection.)

For the purposes of this data collection, the subcommittee chose to broadly define "statistician" as individuals classified in any of ten different federal job series. Profiles of the education requirements for the mathematical statistician and statistician series are readily available. (*Eldridge, et al.*) Information was collected dealing with the following ten quantitative employment series:

- P mathematical statisticians (Series 1529)
- P statisticians (Series 1530)
- P statistical assistants (Series 1531)
- P student assistants (Series 1599)
- P operations research (Series 1515)

- P computer specialists (Series 334)
- P economists (Series 110)
- P sociologists (Series 101)
- P psychologists (Series 180)
- P anthropologists (Series 190)

The questionnaire was designed to be a self-administered form, mailed to each of the agencies. Its content and structure were subjected to several rounds of revisions within the subcommittee and, prior to finalization, was pretested with two agencies using cognitive interviewing techniques. The content of the questionnaire included questions concerning:

- " The number and distribution by grade of employees within each of the job series enumerated above for FY 1996;
- " The statistical courses taken by employees of the agency during FY 1996. These courses were categorized by content type, length, vendor type, and cost per participant. In particular,

*type of course:*

- N statistical analysis (e.g., analysis of complex sample data, categorical data analysis, applied time series analysis)
- N sampling (e.g., applied sampling, introduction to survey sampling, complex sampling designs)
- N other mathematics and statistics courses (e.g., elements of statistics, introduction to biostatistics, small area estimation, applied probability and statistics)
- N statistical computing (e.g., introduction to SAS, fundamentals of SUDAAN and Wesvar, getting the most out of SAS)
- N other survey methods (e.g., questionnaire design, nonsampling error in surveys, cognitive and communicative aspects of survey methodology, conducting focus groups)
- N other (e.g., survey management)

*the length of the course:*

- N one day
- N two days
- N three or more days
- N college credit-bearing course

*course vendor:*

- N in-house trainer
- N private vendor or consultant

- N USDA graduate school
  - N Joint Program in Survey Methodology (JPSM)
  - N other university
  - N SAS Institute
  - N other (e.g., professional organization)
- " Whether the agency conducted statistical training for individuals outside their agency and if so, a brief description of the type of courses;
- " Whether FY 1996 was in any way anomalous with respect to the amount of training taken by employees and, if so, a description of how the year differed from other years; and
- " Operating expenditures, total training expenditures, and statistical training expenditures.

A copy of the questionnaire is included in Appendix B. Given the variety of topics covered by the questionnaire, the subcommittee expected that multiple respondents would be involved in the completion of the instrument.

Questionnaires were mailed in mid-March of 1997 to the director (administrator or commissioner) of the respective federal statistical agency, with a request that the questionnaire be returned in the self-addressed, stamped envelope by the end of April 1997. Telephone nonresponse follow-up began in early May and continued until early June at which point eighteen of the nineteen agencies had completed the questionnaire and one agency, the Environmental Protection Agency, responded by indicating the information was unavailable.

The questionnaire was not designed to distinguish between the three types of human resource development, that is, training, education, and development. To do so would require that federal statistical agencies maintain information as part of their training data bases which distinguishes among these three types of human resources development. Although some agencies clearly have career development programs, information maintained at the course level by the agencies does not distinguish between courses taken as part of those development programs as compared to courses taken as part of general training or education.

## **2. Findings**

As noted above, the committee members see this data collection effort as a first attempt to document the composition of the statistical workforce, both by job series and grade, and examine the diversity of "statistical" courses being taken by staff at the various agencies. The findings suggest that the federal statistical workforce is composed of professionals that come from a diverse set of educational backgrounds. Composition of the workforce varies by agency, for example, the large number of economists employed at the BLS is unique among the agencies included in the study. The courses taken by staff at the different agencies varied on all the dimensions measured by the study: course content, the

provider of the course, and the length of the course.

**Agency Composition.** Agencies were requested to report the total number of statistical employees by series number and grade for fiscal year 1996. The list of occupational series is by no means an exhaustive list of all series in which individuals may be engaged in statistical activities, as defined by the committee. For example, the Energy Information Agency utilizes a number of Energy Industry Specialists to collect and analyze survey data; other agencies most likely employ individuals classified according to substantive specialty whose duties, nonetheless, involve the types of statistical activities of interest to the committee. Therefore, these figures are most likely an underestimate of the total workforce involved in “statistical” activities. It is also important to note that some agencies reported these figures for the beginning of the fiscal year while others indicated the counts as of the end of the fiscal year. Therefore, the number and distribution of employees displayed in Table 1 should be viewed as an approximation of the statistical workforce within the eighteen responding agencies at various points during the fiscal year.

It is probably useful to clarify the distinction between mathematical statistician (Series 1529) and statistician (Series 1530) before examining the findings from the table. To qualify as a mathematical statistician, an employee must have a minimum of 24 hours of courses in and statistics, of which at least twelve are in mathematics and six in statistics. The twelve hours of mathematics must be “advanced,” that is, for which elementary calculus is a prerequisite. Statisticians must have completed either fifteen hours in statistics or six hours in statistics plus nine hours of math; regardless of the number of hours of statistics, statisticians must also have completed at least nine hours of course work in business, social science, physical science, or biological science.

As can be seen from the table, mathematical statisticians (Series 1529) account for only 8.6 percent of the “statistical” staff within the eighteen agencies represented in Table 1. The majority of these mathematical statisticians (91.1%) were Grades 12 to 15 with 62.0 percent classified as Grade 12 or Grade 13. Statisticians (Series 1530) make up 26.0 percent of the statistical work force within the participating agencies; the majority of statisticians (88.8%) were Grades 12 to 15, with 67.6 percent classified as Grade 12 or Grade 13.

Computer specialists, of which there are over 2,200 in the federal statistical workforce, form the largest group of “statistical” employees (32.3 percent). This is the only professional series that does not uniformly require a Bachelors degree. Like mathematical and other statisticians, the majority of computer specialists, economists, sociologists, psychologists and operations research employees were classified as Grade 12 or Grade 13.

The majority of the statistical and student assistants were classified in the Grades 5 through 7 range; the requirements for these jobs do not minimally require a Bachelors degree.



**Table 1: Number and Distribution of Employees by Statistical Job Series and Grade:  
FY 1996**

<b>Statistical Job Series</b>	<b>Total Employees (Grades 5-15)</b>	<b>Grades 5-7</b>	<b>Grades 9-11</b>	<b>Grades 12-13</b>	<b>Grades 14-15</b>
<b>Mathematical Statistician</b>	610 (8.6%)	3	51	378	178
<b>Statistician</b>	1844 (26.0%)	22	184	1246	392
<b>Statistical Assistant</b>	521 (7.4%)	450	69	2	0
<b>Student Assistant</b>	13 (0.2%)	10	3	0	0
<b>Operations Research</b>	78 (1.1%)	0	2	39	37
<b>Computer Specialist</b>	2283 (32.2%)	82	351	1503	347
<b>Economist</b>	1526 (21.6%)	24	219	802	481
<b>Sociologist, Psychologist, Anthropologist</b>	204 (2.9%)	5	14	112	73
<b>TOTAL</b>	7079 (100%)	596 (8.4%)	893 (12.6%)	4082 (57.7%)	1508 (21.3%)

**Note:** The figures given for Total Employees exclude 29 statistical assistants grade 4 or lower and 16 employees in the seven other statistical series who hold grades higher than grade 15. These 45 employees are included in the individual cells of Table 2.

**Source:** FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating agency organizations.

Table 2 provides the detailed distribution of total agency employees for all grades by statistical job series within each agency for FY 1996. The number of employees within a given job series at a particular agency is shown directly, while the corresponding percentage (within the agency) is shown in parentheses.

In FY 1996, across the 18 agencies shown in Table 2, computer specialists represented the highest proportion of statistical series employees, with 2,286 employees in this series out of a total of 7,124 “statistical” employees. Computer specialists formed the largest cohort of statistical series employees within the CDC, FRB, IRS, and the Smithsonian.

Of the 612 mathematical statisticians shown in Table 2, 45.4 percent of these employees worked at BoC in FY 1996. However, these 278 mathematical statisticians comprised only 11.4 percent of BoC’s statistical series employees. An additional 36.8 percent of the mathematical statisticians were employed by the BLS, CDC, and NASS. Of 1,846 statisticians, 54.1 percent were at BoC; 24.2 percent at NASS; 7.9 percent at NCHS. In addition, statisticians comprised the highest proportion of the statistical series employees within each of seven agencies, specifically BoC, BJS, BTS, INS, NASS, NCES, and NCHS. Note, from Table 2, that there were almost as many statistical assistants (550) as there were mathematical statisticians (612) in FY 1996. The bulk of these assistants (78.7%) were employed by BoC and NASS.

Of the 1,529 economists shown in Table 2, 43.4 percent worked at BLS in FY 1996. An additional 22.3 percent were employed by ERS. Economists formed the largest cohort of statistical series employees within AHCPR, BEA, BLS, and ERS. Economists and the pooled series of sociologists, psychologists, and anthropologists made up an equally high proportion (40.6 percent) of the NSF’s statistical series employees. Sociologists, psychologists, and anthropologists (pooled) and operations research employees formed the largest cohort of statistical series employees within SSA and EIA, respectively.

**Funds for Training.** Although the questionnaire was designed to collect information on the total operating budget (appropriations and reimbursable receipts funding), total training expenditures, and total statistical training expenditures for each of the responding agencies, examination of the data suggested that quality of the reports was questionable and that inclusion of the findings may lead to inappropriate comparisons among agencies. For example, many of the agencies provide “in-house” training which may be paid from funds earmarked for specific programs or divisions, rather than from funds allocated specifically for training. Such funds are not necessarily recorded as training or educational expenditures.

**Training Course Opportunities.** The primary charge of this FCSM subcommittee was to examine the training and educational courses taken by statistical employees throughout the federal statistical system. This section examines the course-level information provided by fourteen of the agencies and divisions. No statistical courses were taken by staff at three agencies (AHCPR, BTS, and IRS) during FY 1996. A fourth agency, the Smithsonian, did not provide course level information. Note that for this section, the information is limited to courses paid by agency training funds and does not include

educational opportunities that individuals pursued on their own.

Keep several caveats in mind when examining the distributions concerning the number of courses, type of course, and vendor. Note: “Training” is variously defined across the statistical agencies.

**Table 2: Number and Distribution (Percentage) of Employees by Statistical Job Series and Statistical Agency: FY 1996**

Statistical Job Series	AHCPR	BoC	BEA	BJS	BLS	BTS	CDC	ERS	EIA	FRB	INS	IRS	NASS	NCES	NCHS	NSF	SSA	SMTH
<b>Mathematical Statistician n=612</b>	2 (9.1)	278 (11.4)		1 (3.1)	84 (7.9)		67 (13.6)		33 (14.3)	5 (0.9)		23 (16.5)	73 (9.3)	14 (16.9)	25 (10.0)		6 (7.5)	1 (0.4)
<b>Statistician n=1,846</b>	5 (22.7)	998 (41.1)	4 (1.7)	27 (84.4)	30 (2.8)	2 (40.0)	52 (10.6)	4 (0.9)	37 (16.0)	2 (0.4)	9 (52.9)		446 (56.6)	64 (77.1)	146 (58.6)	5 (15.6)	13 (16.3)	2 (0.8)
<b>Statistical Assistant n=550</b>		269 (11.1)	22 (9.1)	3 (9.4)	8 (0.8)		20 (4.1)	22 (5.2)		2 (0.4)	8 (47.1)	17 (12.2)	164 (20.8)	3 (3.6)	10 (4.0)		2 (2.5)	
<b>Student Assistant n=13</b>		3 (0.1)								5 (0.9)			5 (0.6)					
<b>Operations Research n=82</b>		1 (0.0)			5 (0.5)	1 (20.0)	1 (0.2)	2 (0.5)	72 (31.2)									
<b>Computer Specialist n=2,2826</b>	3 (13.6)	818 (33.7)	46 (19.0)	1 (3.1)	264 (24.8)	1 (20.0)	289 (58.9)	48 (11.3)	36 (15.6)	335 (61.4)		52 (37.4)	100 (12.7)	1 (1.2)	66 (26.5)	1 (3.1)	15 (18.8)	210 (84.7)
<b>Economist n=1,529</b>	10 (45.5)	13 (0.5)	169 (69.8)		663 (62.3)	1 (20.0)	3 (0.6)	341 (80.2)	53 (22.9)	197 (36.1)		47 (33.8)		1 (1.2)	1 (0.4)	13 (40.6)	17 (21.3)	
<b>Sociologist, Psychologist, Anthropologist n=206</b>	2 (9.1)	50 (2.1)	1 (0.4)		10 (0.9)		59 (12.0)	8 (1.9)							1 (0.4)	13 (40.6)	27 (33.8)	35 (14.1)
<b>Total Across Job Series n=7,124</b>	22 (100)	2430 (100)	242 (100)	32 (100)	1064 (100)	5 (100)	491 (100)	425 (100)	231 (100)	546 (100)	17 (100)	139 (100)	788 (100)	83 (100)	249 (100)	32 (100)	80 (100)	248 (100)

**Note:** Numbers in parentheses represent the percentage share of that agency's total number of statistical employees falling within the identified job series. Empty cells indicate that no employees of that agency fell within that particular job series.

**Source:** FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating statistical agency organizations.

Some agencies include attendance at professional conferences as a training cost and therefore recorded courses such as “American Statistical Association” as one of the courses taken by staff. Although these could have been edited from the list of courses, in many cases, they represent legitimate training or educational costs, especially if the attendee has participated in short courses offered as part of the conference. These represent less than 5 percent of all of the courses listed.

Agencies differ as to whether training costs processed by means other than SF-182s (Request, Authorization, Agreement and Certification of Training) were included in the list of courses reported by the agency. Most agencies included only those courses for which SF-182 records existed; however, both ERS and FRB reported courses taught by “in-house trainers” for which no fee per participant was assessed. Most agencies, however, did not include courses taught by in-house trainers in the list of courses; for this reason the subcommittee has not included these courses in the description of training opportunities taken by statistical staff. Hence, the total number of courses listed for each agency should be viewed as a lower-bound estimate. To the degree that agencies vary in their offering of in-house training, comparisons of the number of courses taken by staff at the respective agencies should be interpreted cautiously.

Responses for type of course and vendor (shown in Tables 3 and 4) were reviewed and edited by members of the committee. This editing most likely resulted in a reduction in classification differences across agencies, but did not eliminate measurement error for these two dimensions. Classification of the type of course was often based solely on the name of the course; editing across the agencies resulted in consistent classification of courses which appeared to be the same course taken by staff at various agencies. Most agencies maintain information on the name of the organization or individual (and his or her affiliation) paid to deliver a course. After the data was collected the subcommittee realized that several courses classified as “other university” were in fact JPSM courses; the problem arose since the SF-182s indicated payment to the University of Maryland. When it could be determined that the course was clearly a JPSM course (either short course or semester course), due to the uniqueness of the course title, the course was reclassified as a JPSM course. However, for several courses with titles such as “Statistical Methods” it was not possible to determine whether the course was a JPSM course or an offering at another university. Accordingly, the total number classified as JPSM offerings may be understated.

Table 3 shows the distribution of type of statistical courses taken during FY 1996 by agency and type of course. The table indicates the total number of *different* courses taken by staff at the respective agencies as well as the total number of employees enrolled in the courses. The data do not permit one to make a statement concerning which staff took a specific course. As noted earlier, statistical courses were defined as courses in statistics, mathematics, statistical computing, and survey methodology (including both short courses offered by professional groups or universities, and credit-bearing college courses).

Overall, the largest number of statistical courses taken by employees of the fourteen agencies were statistical analysis courses (25.8%), while statistical computing courses were the second most popular type of course (23.0%). It is clear that employees from some agencies (e.g. BoC, BLS, NASS, and

NCHS) take courses across the full spectrum of statistical offerings; employees of other agencies tend to concentrate on specific types of courses (e.g. statistical computing courses for BEA and FRB).

**Table 3: Number and Distribution of Statistical Courses by Agency and Type of Course: FY 1996**

Agency (Number of Employees Enrolled)	Number of Courses	Statistic al Analysis	Sampling	Other Math. and Statistica l Courses	Statistical Computing	Other Survey Methods	All Other
<b>BoC (1,008)</b>	52 (15.8%)	11	10	11	9	9	2
<b>BEA (74)</b>	13 (3.9%)	3			10		
<b>BJS (25)</b>	4 (1.2%)	2	1		1		
<b>BLS (180)</b>	65 (19.8%)	10	10	21	12	12	
<b>CDC (666)</b>	42 (12.7%)	13	2	13	12	2	
<b>ERS (19)</b>	12 (3.6%)	4	2	2	2	2	
<b>EIA (34)</b>	20 (6.1%)	2	1	1	1	11	4
<b>FRB (154)</b>	25 (7.6%)	4		6	11	3	1
<b>INS (8)</b>	3 (0.9%)	1			2		
<b>NASS (50)</b>	45 (13.6%)	21	3	6	6	5	4
<b>NCES (88)</b>	9 (2.7%)	4		2		3	
<b>NCHS (280)</b>	28 (8.5%)	5	1	4	7	11	
<b>NSF (17)</b>	6 (1.8%)	4				2	
<b>SSA (14)</b>	6 (1.8%)	1	2		3		
<b>TOTAL</b>	330 (100%)	85 (25.8%)	32 (9.7%)	66 (20.0%)	76 (23.0%)	60 (18.2%)	11 (3.3%)

**Note:** AHCPR, BTS, and IRS are not included (no statistical employees took courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type take by staff. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

**Source:** FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for complete list of participating agency organizations.



Table 4 shows the number and distribution of courses taken by each agency's employees by the type of vendor offering the various statistical courses. Overall, the largest portion (30.6%) of the courses taken by employees of the 14 agencies listed in Table 4 were university-based courses other than those offered by the USDA and JPSM. Almost 24 percent of the courses taken by statistical employees were offered by JPSM. These comprise a mix of short courses and semester-long credit bearing courses. Although not shown in Table 4, the majority (54%) of the statistical courses taken by agency employees in FY 1996 cost less than \$500 per participant. About 35 percent of these courses cost \$500 to \$1,000 per participant and approximately 11 percent exceeded \$1,000 per participant.

University courses (other than JPSM) comprised the highest portion (41.5% to 55.6%) of the survey/statistical courses taken by BoC, BJS, BLS, and NASS employees. The majority of the statistical courses taken by employees from EIA, NCES, and NCHS were JPSM offerings; JPSM courses also represent a large proportion of the courses taken by staff from BoC, FRB, and NASS. The largest portion of statistical courses taken by BEA, CDC, FRB, INS, and SSA employees were courses offered by the SAS Institute.

Although not shown in any of the tables, the subcommittee also examined the distribution of type of course by type of course provider. As one would expect, the SAS institute was the primary provider of statistical computing courses. For all other types of courses, the majority were University-based courses, including those offered by JPSM.

Table 5 shows the number and distribution of statistical courses taken by each agency's employees by course length. The number of courses is shown directly with the corresponding percentage in parentheses. Based on the 330 statistical courses listed, 36.1 percent were taken for college credit, 29.1 percent of the courses lasted three or more days, 26.6 percent were two-day courses, and 8.2 percent of the courses lasted for one day or less.

The majority of statistical courses taken by BoC and EIA employees (75.0% and 55.0%, respectively) were taken for college credit. Although not representing a majority, the larger portion (42.2%) of courses taken by NASS employees were also college credit-bearing courses. Courses taken by BEA, BLS, and CDC employees lasting three or more days represented the most frequent course length while the larger portion of courses taken by NCES and NCHS employees were two-day courses.

**Table 4: Number and Distribution of Statistical Courses by Agency and Course Vendor: FY 1996**

Agency	Number of Courses	Vendor, Consultant	USDA Grad School	JPSM	Other University-Based	SAS Institute	Other
BOC	52 (15.8%)	6		18	24	4	
BEA	13 (3.9%)		1		2	10	
BJS	4 (1.2%)	1			2		1
BLS	65 (19.8%)		2	8	27	10	18
CDC	42 (12.7%)	14		2	6	15	5
ERS	12 (3.6%)	4	1	2	1	2	2
EIA	20 (6.1%)	1	1	11	3		4
FRB	25 (7.6%)	2		7	6	9	1
INS	3 (0.9%)					3	
NASS	45 (13.6%)			10	25	4	6
NCES	9 (2.7%)	3		5	1		
NCHS	28 (8.5%)	5	1	14	3	2	3
NSF	6 (1.8%)	1		2			3
SSA	6 (1.8%)	2			1	3	
<b>TOTAL</b>	<b>330</b> <b>(100%)</b>	<b>39</b> <b>(11.8%)</b>	<b>6</b> <b>(1.8%)</b>	<b>79</b> <b>(23.9%)</b>	<b>101</b> <b>(30.6%)</b>	<b>62</b> <b>(18.8%)</b>	<b>41</b> <b>(11.6%)</b>

**Note:** AHCPR, BTS, and IRS are not included (employees took no courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type taken by staff at the respective agency. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

**Source:** FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating organizations.

**Table 5: Number and Distribution of Statistical Courses by Agency and Course Length: FY 1996**

<b>Agency</b>	<b>Total Courses</b>	<b>1 Day or Less</b>	<b>2 Days</b>	<b>3+ Days</b>	<b>College Credit</b>
<b>BoC</b>	52 (15.8%)		10	3	39
<b>BEA</b>	13 (3.9%)		3	7	3
<b>BJS</b>	4 (1.2%)	1	1	1	1
<b>BLS</b>	65 (19.8%)	5	15	24	21
<b>CDC</b>	42 (12.7%)	5	13	17	7
<b>ERS</b>	12 (3.6%)	1	3	5	3
<b>EIA</b>	20 (6.1%)	4	1	4	11
<b>FRB</b>	25 (7.6%)		11	8	6
<b>INS</b>	3 (0.9%)			3	
<b>NASS</b>	45 (13.6%)	6	8	12	19
<b>NCES</b>	9 (2.7%)	2	4		3
<b>NCHS</b>	28 (8.5%)	2	15	5	6
<b>NSF</b>	6 (1.8%)		2	4	
<b>SSA</b>	6 (1.8%)	1	2	3	
<b>TOTAL</b>	330 (100%)	27 (8.2%)	88 (26.6%)	96 (29.1%)	119 (36.1%)

**Note:** AHCPR, BTS, and IRS are not included (employees took no courses during FY 1996); data for the Smithsonian were not provided. Empty cells indicate no courses of that type taken by staff at the respective agency. The table does not include 31 courses reported by ERS and 5 reported by FRB that were provided by in-house trainers.

**Source:** FCSM Survey of Federal Statistical Agency Training; See Chapter 1, Table 2 for list of participating organizations.

**Statistical Training for Non-employees.** Six of the agencies — BoC, BLS, ERS, NASS, NCES, and NCHS — indicated that they provide survey or statistical training to persons outside their agency. This encompasses training for data collectors (non-agency employee interviewers); data providers or collectors (establishment respondents or other government producer); data users (researchers or program sponsors); collaborators (reimbursable survey clients); and other statistical organizations (other government, international agencies, or private organizations).

Three agencies — BoC, NASS, and BLS — provide survey and statistical training for interviewers. The interviewers for BoC are agency employees; those for NASS are contract employees; those for BLS include federal agency, contract, and state employees. The training for interviewers is discussed in Chapter Five. In addition, EIA provides some limited training for interviewers (see Appendix p. A-12).

The NCHS sponsors training for state employees who collect vital statistics data and for state mortality medical coders of administrative data used in NCHS programs and provides training for state employees who collect educational administrative data used in NCES data programs.

Five agencies were identified that provide survey and statistical training for data users — BoC, BLS, ERS, NCES, and NCHS. BLS provides training for data users of the National Longitudinal Survey through a contract with Ohio State University. NCES also provides training for school district staff and state education agency staff (who act as both data providers and data users). Training is also offered to the universities and professional associations where graduate students, researchers, and analysts learn how to use NCES data. These courses cover general statistical aspects of using agency data products, e.g., data analysis, survey operations, and the use of data for decision making. These courses are targeted to researchers and program sponsors. The NASS provides survey and statistical training for its reimbursable survey clients. For these survey data collections, NASS invites clients to participate with state office statisticians in survey training.

Three statistical agencies provide ongoing training for individuals from other countries — BoC, BLS, and NASS. The Census Bureau provides international training seminars of three to eight weeks in duration, both overseas and at its training facilities in Washington, D.C. These seminars are designed to meet the needs of the participants with an overall goal of strengthening the participants' ability to collect and analyze economic, labor, and social data and to use data in the formulation of policy. Examples of courses include sampling and statistical methods, building an integrated data dissemination system, improving organizational effectiveness, and planning for the 2000 round of population and housing censuses. (*Petroni*)

The National Agricultural Statistics Service provides an annual four-week course for agricultural statisticians from other countries. This course provides instruction in basic agricultural statistics and methods. NASS statisticians teach practical uniform principles for all phases of sample surveys and censuses. Participants learn to apply those principles to sampling, planning, management, training, questionnaire design, data collection, processing, and dissemination. Visits to a NASS State Statistical Office and a farm are included.

Each year the Bureau of Labor Statistics conducts several seminars that are designed to collect and analyze economic and labor statistics. Examples of courses are Measuring Wages, Salaries and other Benefits, Constructing Price Indices, Measuring Employment and Unemployment. The seminars include trips to BLS regional offices. The BLS also offers a short program on Training of Trainers as an optional component for these seminars.

### **3. Discussion**

For these eighteen agencies the majority of the statistical workforce — defined for this survey as employees within the ten job classification series noted — consisted of computer specialists (32% of the statistical employees), statisticians (26% of the employees), and economists (22%). Within CDC, FRB, IRS, and the Smithsonian, computer specialists comprise between 34 and 85 percent of the statistical employees, although the largest number of computer specialists were employed by the BoC.

Statisticians (GS-1530) account for 26 percent of the statistical workforce across all agencies; within several agencies (BoC, BJS, BTS, INS, NASS, NCES, and NCHS) statisticians are the most prevalent statistical employee. As noted above, economists account for 22 percent of the statistical workforce within these eighteen agencies, the majority of whom are employed by BLS or ERS. More than half of the statistical staff at BEA, BLS and ERS are economists.

Mathematical statisticians (GS-1529) comprise a small percentage (less than 9%) of the statistical workforce among the eighteen responding agencies. Across agencies, that percentage varied from a low of less than 1 percent (Smithsonian and FRB) to over 15 percent (NCES and IRS). In most statistical agencies, mathematical statisticians make up between 7 and 15 percent of the statistical workforce. Of the 612 mathematical statisticians employed by the eighteen responding agencies, the majority are employed by four agencies — BoC, BLS, CDC, and NASS.

The number, type, and length of courses taken by statistical employees varied greatly from agency to agency. Looking at the distribution of courses taken by employees across all of the agencies included in the study, one sees that the majority of courses were statistical analysis courses (26% of all classes), followed by statistical computing classes (23%), other statistical courses (20%), other survey courses (18%), sampling courses (10%) and other courses (3%). Four agencies, BLS, BoC, CDC, and NASS, account for over half of all of the courses taken by statistical employees. Three agencies, AHCPR, BTS, and IRS, indicated that no statistical training was paid for with agency funds in FY 1996.

As noted earlier, the discussion of courses taken by statisticians within the federal statistical system does not include those courses offered by in-house trainers. Most agencies included only those courses for which SF-182 records existed; therefore, the subcommittee focused its attention on courses paid for by agency funds. Hence, the training opportunities discussed in this chapter should be viewed as a low estimate of training opportunities for statisticians.

In FY 1996, almost a third of statistical courses taken by relevant employees were university-based courses, other than those offered by the USDA and JPSM. The second-ranking vendor was the JPSM,

offering both credit-bearing and two-day short courses. More than a third of the courses in statistical analysis, sampling, and survey methods were taken for college credit (even though a considerable number were two-day JPSM short courses). Statistical computing courses were somewhat evenly distributed among the offerors of courses of one-, two-, and three-day duration. The majority of these classes were offered by the SAS Institute.

Obtaining cost data proved to be particularly problematic. There was no common interpretation of the operating budget. The agencies measured survey and training costs differently, particularly in relation to inclusion or exclusion of conference related training. Also agencies provided a number of training courses for which total costs or costs per participant were not easily accessible to the respondent of the FCSM survey.

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## **CHAPTER THREE: SURVEY OF EMPLOYEE ATTITUDES ABOUT TRAINING PROGRAMS**

Using data from an interagency organization-climate survey, this chapter examines employee opinions about training as the basis for a training performance measure. While the climate survey has certain limitations (most notably that it includes opinions of employees in non-statistical functions and asks about training in general), the subcommittee concludes that perceptions and attitudes about training currently vary by agency. Overall, a majority of employees agree that they receive the training necessary to perform their jobs, but just over one-third believe that training is given high priority at their agency. In the recommendations section the subcommittee explores ways to heighten awareness and communication of training.

### **1. Attitudes/Opinions as Performance Measures**

Chapter Two provided a quantitative benchmark of the volume, variety, cost, and enrollment of training courses offered by each agency. This chapter examines training from a different perspective — that of performance measurement.

One of the principles recommended by the Committee on National Statistics (CNSTAT) for adoption by the statistical agencies is that the agencies devote resources to the professional advancement of staff. A key element of this policy is the continuing education and training of staff. (*Martin and Straf*) To monitor whether goals like these are being met, a set of performance measures should be established and maintained over time. (*NPR; Kirkendall and Staller; Sink and Tuttle*) In this case, the performance method is straightforward: Ask employees about their experience with training.

Performance measures are a valuable addition to the assessment of training because they serve as agency “barometers” of how employees perceive training opportunities. They also act as benchmarks for evaluating efforts to improve training. Although performance measures are more subjective than data from the training inventory survey, they are still critical if we wish to understand differences in training among the statistical agencies and identify recommendations for improvement. If, after all, an agency has an outstanding training curriculum, but its employees are either not aware of it or feel that they are not given a chance to participate, how effective can it really be?

### **2. Methodology**

To report on training from the employee’s perspective, the subcommittee used performance measures from an organizational climate survey of federal statistical agencies. As part of the 1996-1997 Survey Practicum, the Joint Program in Survey Methodology (JPSM) at the University of Maryland conducted an organizational climate survey of employees in nine federal statistical agencies. One of the Practicum objectives was to help agencies comply with the Government Performance and Results Act (GPRA) by supplying first-time measures that federal statistical agencies could replicate and then use as benchmarks. Prior thereto, there was no existing database of employee perceptions by which a statistical organization could measure its comparative performance.

In the five largest agencies, the data were collected under a split panel design using a combination of mail survey (paper and pencil) and electronic mail (e-mail) questionnaire that went to all employees of the participating organizational units. The census data collection methodology included a pre-notice letter from the agency head, a pre-notice letter from the JPSM, the survey questionnaire (mail or e-mail), a follow-up postcard (or e-mail), and finally, a telephone follow-up reminder. Data collection occurred between January and April of 1997. (*University of Maryland Survey Research Center*)

The agencies participating in the survey included: Bureau of the Census, National Agricultural Statistics Service, Energy Information Administration, Bureau of Transportation Statistics, Bureau of Justice Statistics, National Science Foundation Division of Science Resource Studies, National Center for Education Statistics, Bureau of Economic Analysis and Economic Research Service. With the exception of temporary workers and field interviewers, the survey attempted to deliver a questionnaire to every employee in each agency. Consequently, the design was closer to a census than a sample of agency employees. This is important to note since the rest of the subcommittee's report concentrates more specifically on employees who perform statistical functions.<sup>2</sup>

Response rates varied from agency to agency (BoC=51.6%; NCES=52.8%; BJS=61.0%; BTS=61.9%; NSF=62.2%; EIA=64.1%; BEA=65.6%; ERS=67.2% and NASS=71.8%). All agencies combined, 4,834 employees responded, for an overall response rate of 56.9 percent. The e-mail response rate was significantly lower than the mail panel (42.9% versus 70.2%).

### **3. Limitations**

Several limitations are noted before discussing the climate survey results. First, it is important to emphasize that an organizational climate survey differs greatly from factual or event-based surveys typically carried out by statistical agencies (many of which routinely achieve response rates of 90 percent or more). Typically, opinion surveys have a higher perception of sensitivity and thus, more potential for nonresponse than non-opinion based data collections. Further, even though the survey was administered by an outside organization, it is likely that some employees were still concerned about the confidentiality of responses.

There were also technical problems with the e-mail panel that hampered the data collection. The e-mail respondents at both EIA and BoC had great difficulty viewing, editing and returning the e-mail questionnaires. As a result, the e-mail response rates at these agencies were lower than others.

These factors contributed to the overall response rate (56.9%) being somewhat below some climate/attitude surveys conducted previously at federal statistical agencies. For example, NASS climate surveys achieved 66 percent in 1990, 63 percent in 1993 and 77 percent in 1994. At the Census Bureau, employee attitude surveys had a 73 percent response rate in 1989, 62 percent in 1991 and 56 percent in 1993. None of these surveys included e-mail as a response mode.

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<sup>2</sup> For confidentiality reasons, we were prevented from limiting the climate survey analysis to those in statistically-related job series.

Because of the low response rate, the measures reported in this chapter are not likely to be representative of the entire agencies' population and in fact, may be biased due to nonresponse. For example, employees who decided to participate in the climate survey may have a greater trust in their agency and been less concerned about confidentiality of their responses. These employees may also have an overall higher opinion of their agency compared to those who chose not to respond. Conversely, it is possible that those who responded were motivated to do so because they were unhappy with conditions at their agency and wanted the opportunity to voice these opinions. The climate survey did not conduct any type of nonrespondent debriefing, therefore the subcommittee does not know if the opinions of nonrespondents differ significantly from respondents. Consequently, all inferences in this chapter reflect only the subpopulations within each agency that chose to respond. However, the results do not have sampling or random error as the survey was a census of the agency employees.

Another limitation concerns the climate survey questions themselves. The survey asked questions on a range of topics related to organizational climate. One of these topics dealt with employees' perception and attitudes toward their agency's training and career development. Members of the FCSM Training Subcommittee provided several questions pertaining to training and were allowed to review and comment on them during the questionnaire design process. However, it is very important to note that the questions about training were general rather than specific to statistical training. Thus, the findings in this chapter are broader than those in the previous chapter — which focus specifically on survey and statistical training.

#### **4. Data and Results**

Since the survey was intended to measure organization-wide concepts, respondents were instructed to answer questions based on the experiences of the overall climate in their agency rather than from an individual perspective. For the purposes of our analysis, both the mail and e-mail responses are combined.<sup>3</sup>

The section on training had five questions addressing the respondents' perception of agency training. In order to avoid response set biases, the third question was intentionally worded in the reverse direction of the other questions. That is, a high score indicated a *negative* perception of training. This item was appropriately recoded before conducting the analysis. An additional question addressed the respondent's individual satisfaction with their training. This last question was at the end of the questionnaire with other questions addressing respondent satisfaction with their work environment. The questions are stated in Figure 1.

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<sup>3</sup> The subcommittee found little evidence that responses differed significantly by mode of response. For the Bureau of the Census, of the 14 questionnaire topic mean scores, half of the topic scores differed by mode of response while the other half did not. Of those that were significantly different, the e-mail mean responses were significantly higher for half of the topics while the mail mean scores were higher for the other half.



Figure 1. Questions on Employee Satisfaction with Training

On the following scale, circle the number to indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
Employees receive the training necessary to do their jobs.	1	2	3	4	5	
Employees receive needed training about new technologies.	1	2	3	4	5	
Training opportunities are unfairly allocated across employees or work units.	1	2	3	4	5	
Supervisors/team leaders support employee efforts to learn outside the job (e.g., conferences, cont. education, membership in trade or prof. org.).	1	2	3	4	5	
High priority is given to providing appropriate training.	1	2	3	4	5	

	Very Dissat.	Dissat.	Neutral	Satisfied	Very Satisfied
Overall, how satisfied are you with the training you have received at the agency?	1	2	3	4	5

Tables 1 through 6 contain survey results for the training questions, by agency. The table columns are arranged in descending order by number of employees responding to the particular question. There is a large variability in the size of the agencies in the survey and consequently, in the number of survey participants. The size of the organization may be a factor in the development and delivery of training to its employees.

**Table 1. Employees Receive Training Necessary to do their Jobs**

	BoC	NASS	ERS	BEA	EIA	NCES	BJS	NSF	BTS	Total
<b>Disagree</b>	29.4%	20.4%	19.4%	18.7%	21.1%	26.3%	20.0%	7.1%	15.4%	25.7%
<b>Neutral</b>	17.0	15.5	22.5	18.7	24.5	15.8	22.9	10.7	7.7	17.7
<b>Agree</b>	52.3	64.0	56.9	61.9	53.2	57.9	54.3	82.1	69.2	55.6
<b>D.K.</b>	1.3	0.0	1.1	1.0	1.1	0.0	2.9	0.0	7.7	1.0
<b>N</b>	2892	847	355	278	278	57	35	28	13	4783

More than half of those surveyed (55.6%) believe that they receive the necessary training to perform their jobs (responses of ‘agreed’ and ‘strongly agreed’ are combined, likewise responses of ‘disagreed’ and ‘strongly disagreed’ are combined). The BoC had the lowest agreement with this sentiment (52.3%) while the NSF had the highest (82.1%).

**Table 2. Employees Receive Training to Keep Up with New Technologies**

	BoC	NASS	ERS	BEA	EIA	NCES	BJS	NSF	BTS	Total
<b>Disagree</b>	36.7%	22.1%	17.7%	14.5%	24.2%	21.0%	20.0%	7.1 %	15.4%	30.1%
<b>Neutral</b>	18.1	19.1	17.4	17.4	22.0	15.8	14.3	7.1	15.4	18.3
<b>Agree</b>	43.3	58.2	64.0	67.7	51.6	63.2	65.7	85.6	69.2	50.2
<b>D.K.</b>	1.9	0.6	0.8	0.4	2.2	0.0	0.0	0.0	0.0	1.4
<b>N</b>	2892	847	355	278	278	47	35	28	12	4783

Again, half (50.2%) agreed that the training they receive allows them to keep up with new technologies. The percent of agreement was lowest for employees at the BoC (43.4%) and highest at the NSF (85.6%).

**Table 3. Training Opportunities are Unfairly Allocated**

	BoC	NASS	ERS	BEA	EIA	NCES	BJS	NSF	BTS	Total
<b>Disagree</b>	36.6%	50.8%	55.0%	50.9%	48.6%	52.6%	48.6%	71.4%	76.9%	42.6%
<b>Neutral</b>	23.1	20.3	17.1	22.8	20.7	12.3	14.3	7.1	15.4	21.7
<b>Agree</b>	29.9	25.2	18.8	15.0	21.5	22.8	20.0	10.7	7.7	26.6

<b>D.K.</b>	10.4	3.8	9.0	11.4	9.5	12.3	17.1	10.7	0.0	9.1
<b>N</b>	2892	849	356	281	275	57	35	28	13	4786

Just over one-quarter of the combined responses (26.6%) express a belief that opportunities for training are unfairly allocated across employees or work areas. This was most evident at BoC, where 30% agreed with the statement. Conversely, at BTS, fewer than 10% believed that training opportunities are not uniformly available.

**Table 4. Supervisors Support Employee Learning Outside the Job**

	<b>BoC</b>	<b>NASS</b>	<b>ERS</b>	<b>BEA</b>	<b>EIA</b>	<b>NCES</b>	<b>BJS</b>	<b>NSF</b>	<b>BTS</b>	<b>Total</b>
<b>Disagree</b>	26.7%	13.6%	18.5%	16.0%	14.9%	29.8%	14.3%	0.0%	7.7%	22.2%
<b>Neutral</b>	23.3	18.6	14.9	20.2	23.3	14.0	5.7	0.0	7.7	21.2
<b>Agree</b>	43.0	64.8	65.2	59.2	60.0	52.6	77.2	100	84.6	51.3
<b>D.K.</b>	7.0	3.1	1.4	4.6	1.8	3.5	2.9	0.0	0.0	5.3
<b>N</b>	2895	849	356	282	275	57	35	28	13	4790

Table 4 shows employee opinion of agency support for external learning opportunities such as conferences, continuing education classes, and participation in professional associations. Just over half (51.3%) feel that their agency supports off-the-job learning. At the NSF, there was unanimity on this point (100%); at the BOC, fewer than half agreed (43%).

**Table 5. High Priority is Given to Training**

	<b>BoC</b>	<b>NASS</b>	<b>ERS</b>	<b>BEA</b>	<b>EIA</b>	<b>NCES</b>	<b>BJS</b>	<b>NSF</b>	<b>BTS</b>	<b>Total</b>
<b>Disagree</b>	39.4%	22.9%	30.4%	23.8%	32.3%	47.4%	28.6%	21.4%	23.1%	34.3%
<b>Neutral</b>	26.0	24.6	31.8	29.8	29.8	19.3	14.3	14.3	38.5	26.4
<b>Agree</b>	30.5	50.4	35.2	42.6	36.7	28.1	48.6	60.7	38.5	35.7
<b>D.K.</b>	4.2	2.1	2.5	3.9	1.1	5.3	8.6	3.6	0.0	3.5
<b>N</b>	2897	846	355	282	275	57	35	28	13	4788

Respondents were somewhat ambivalent whether they perceive training at their agency to have high priority: over one-quarter (26.4%) marked the “neutral” category. Just over one-third of those surveyed (36%) believe that their agency places a high priority on training. At the extremes were NSF and NCES. NSF employees were most likely to say that training is given high priority while those at NCES were least likely.



**Table 6. Overall, how satisfied are you with the training you have received?**

	BoC	NASS	ERS	BEA	EIA	NCES	BJS	NSF	BTS	Total
<b>Dissatisfied</b>	25.8%	17.8%	14.4%	17.4%	19.9%	25.0%	22.9%	7.4%	0.0%	22.5%
<b>Neither</b>	22.7	19.5	26.8	23.8	25.3	35.7	34.3	22.2	30.8	22.9
<b>Satisfied</b>	51.6	62.6	58.9	58.7	54.9	39.3	42.9	70.4	69.2	54.6
<b>N</b>	2900	851	355	281	277	56	35	27	13	4795

In response to the overall satisfaction question, more than half the combined sample (55%) indicated that they were satisfied with the training they have received at their agency. Employees at the NSF and BTS had the largest percentage of satisfied employees, 70.4 percent and 69 percent, respectively, while NCES and the BJS had the two lowest percentages, 39.3 percent and 42.9 percent, respectively.

The individual questions provide detail about training perceptions as measured in the organizational climate survey. In order to make summary comparisons across agencies, a training “score” was created. Scores to the six training questions (i.e., Strongly Disagree=1, Disagree=2, Neutral=3, etc.) were summed together and divided by 6. Answers of Don’t Know were excluded while missing values were recoded to the overall mean scale score. Higher scale scores in Table 7 reflect a positive perception of training and career development while lower scores reflect a less positive outlook.

**Table 7. Training Mean Scale Scores, by Agency**

	BoC	NASS	ERS	BEA	EIA	NCES	BJS	NSF	BTS
<b>Mean Scale Score</b>	3.08	3.46	3.41	3.48	3.34	3.19	3.46	3.88	3.76
<b>N</b>	2449	799	316	238	247	49	29	25	12

The NSF had the highest absolute mean training score (3.88) and BoC the lowest (3.08). To gain some perspective on these scores, we compared the combined agency training mean score to that of the other climate survey topic areas (e.g., rewards, job security, innovation, etc.). The training score ranked near the middle, that is, there were seven topics that received a higher mean rating and six that received a lower rating. The combined agency mean training score was 3.2, which is slightly above the neutral rating of 3 on the 5 point scale.

## 5. Summary and Conclusions

For a training program to be effective, it must be perceived as useful and available by employees who seek it. By examining the training questions from the JPSM organizational climate survey, one can study the current attitudes about the statistical training opportunities across agencies and use them as performance measures. However, the design and content of the climate survey place certain limitations on our conclusions because first, the survey reflects all types of employees, not just statisticians and, second, because the questions about training refer to all types of training, not just statistical. Moreover, the results must be interpreted in the context of a somewhat low response rate that reflect only a subgroup from each agency. These findings cannot be inferred to the nonrespondent population within each agency.

There was a fair amount of variation among some agencies, but, overall, roughly half of the respondents perceive that employees are receiving the training necessary to do their jobs and keep up with new technologies. Similarly, over half view their agency as being supportive of external training opportunities offered through conferences and professional associations. However, less than half of those surveyed perceive training to be a high priority at their agency or to be fairly allocated across work units or employees.

What are the implications? The subcommittee's performance measures of employee satisfaction suggest a need for improvement at some agencies. Findings from the previous chapter indicate that the number, type, and length of courses offered to statistical employees varies across agencies, but that, overall, statistical training opportunities are fairly abundant. The subcommittee's findings from the employee survey suggest that employee perception of training availability does not reflect the real abundance of offerings. Perhaps the agencies that reflect this discrepancy need to elevate the visibility of their training opportunities, encourage more employees to participate, and communicate that training is a high priority.

To explore this further, the subcommittee inquired about the training program at the NSF since they consistently scored high in employee training satisfaction. We found that in 1993, an NSF training committee developed a policy with training principles and procedures. The recommendations contained guidelines to ensure that training is distributed wisely and equitably. For example, the policy recommends adherence to three principles: (1) that all training be deemed useful to the employer, (2) that training be directly related to an individual's job, and (3) that training not be taken too far in advance of the time when it is likely to be used. The policy also recommends that both staff and management share in the development, planning, conduct, and evaluation of training strategies. Although NSF represents one of the smaller statistical organizations, their principles may be relevant to other statistical agencies.

The committee also recommended that quarterly training reports on all training and conference activities be produced. These summaries allow NSF staff to see where they are relative to others and to generate ideas on the types of training they want to take. They keep information "out in the open," thus assuring staff that training resources and opportunities are being allocated equitably. NSF reports that since the

training policy was put into effect, visibility in training activities has increased. This is encouraging, but its largest impact is on lower level employees. It is unclear what its training implications are for "statistical" employees.

Perhaps some agencies should consider conducting focus groups with different subpopulations of employees in order to explore their awareness of training (where and how they get their information), what kinds of training they want more or less of, and why they may fail to take advantage of the opportunities available. Sometimes these simple exercises can help expose weaknesses in the communication chain between those who plan and provide for training and those for whom it is intended.

While measures of employee satisfaction may be useful in some aspects of planning for training, these measures are subjective, relating largely to the employee's most recent training experience. Objective measures (e.g., evaluations of program, performance and product) provide a better (albeit more difficult) gauge of the payoff from training. A standard measure of average per-employee training cost would have been useful in comparing training-perception scores with training expenditures. The subcommittee discovered that a valid measure of training cost is not available across agencies (due to differences in accounting practices, training classifications, and training definitions). An interagency training database with standardized definitions and variables could provide the basis for measures to test work performance. Ideally, these measures would correlate — to work performance — both the type and extent of training received and some objective measure of employee satisfaction with training opportunities.

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## **CHAPTER FOUR: EDUCATION AND CAREER DEVELOPMENT PROGRAMS**

This chapter discusses programs for employee career development at three agencies: the National Agricultural Statistics Service, the Bureau of the Census, and the Centers for Disease Control and Prevention. Career development programs provide a structured approach to human resource development. These programs are designed to address a broader set of skills than those necessary for a specific work assignment. Often the career development programs combine training, on-the-job work assignments, and education. The NASS program has components of all three HRD activity areas: training, education, and development. Two BoC programs are discussed; one is an education program, the other combines training with career development. The CDC program's primary focus is career development. Participation in some of the programs provides employees with a competitive promotion advantage.

A career development program may be broad-based, as is the NASS program, or may be designed for specific groups of employees. Such programs are generally targeted to employees in the first five to eight years of their career. The three programs examined have the goal of preparing their employees to be more effective in performing the work of the survey organization — work for which traditional academic study provided no adequate preparation. Although intern programs have been in existence for many years, the programs examined here were the only career development programs at federal statistical agencies on which the subcommittee received information,

### **1. National Agricultural Statistics Service**

NASS has designed a formal program of career development and training for all its professional statisticians and computer programmers. All employees have Individual Development Plans (IDPs). IDPs are standardized for each professional series, but afford an opportunity to provide individual training options. The agency has developed a formal week-long orientation program and a series of agricultural survey and estimation training programs for all its statisticians. These courses cover specifics of agricultural survey design, data collection, and processing at several experience levels. Since 1960, NASS has long supported a program of full-time academic training at the graduate level for mathematical statisticians, computer scientists, and survey methodologists.

NASS recruits and trains entry level professionals mostly in its 45 State Statistical Offices (SSOs). Its career development and training program is designed to progress entry level statisticians (GS grades 5-7-9) to Senior SSO Statisticians (GS-12) in a substantially noncompetitive environment.

NASS is the primary statistical agency in the Department of Agriculture. The agency needs employees who have broad agricultural experience combined with special skills in survey design and administration, knowledge of data analysis and estimation procedures, and computer data processing. NASS's training program is designed to develop and improve the individual's knowledge, skills and abilities while enhancing the overall agency performance. All professional employees participate in a broad-based training and work program that introduces them to several disciplines and possible career paths. NASS expands this broad-based training with a number of competitive formal training opportunities designed to fill highly technical and specialized positions critical to the organization.

NASS has tailored its program to the skills of the majority of individuals recruited and the NASS career path opportunities available. NASS employees are hired either as a GS-7 with a Bachelors degree or as a GS-9 with a Masters degree, and classified in one of three job series: agricultural statisticians, mathematical statisticians, or computer specialists. All employees must meet the minimum requirements of a Bachelor of Science degree. Agricultural statisticians must have at least 15 semester credits of mathematics and statistics, of which 6 credits must be statistics, plus 9 additional credits in other physical or social sciences. Experience in agriculture is very desirable. Mathematical statisticians must have at least 24 semester credits in mathematics and statistics, of which 12 must be mathematics and 6 statistics. A Masters degree in mathematics or statistics is preferred. Computer specialists must have 30 semester credits in computer science and mathematics.

Each new employee has a non-competitive career path to the GS-12 journeyman level. The length of the training from entry to journeyman is about 6 years. Generally, progression to a grade 12 position requires reassignment to a second office. Once the GS-12 journeyman level is reached, statisticians are expected to have a working knowledge of agriculture, an understanding of statistical concepts and applications, the ability to conduct surveys, be skilled in the use of basic computer software, and be able to operate in a LAN environment. They are also expected to have the ability to write and speak effectively, be able to plan assignments, and delegate work. During this training period each person will be offered the opportunity to be cross-classified in either of the other two job series.

**Noncompetitive Career Development Program.** The NASS training program consists of a non-competitive core training program and competitive training programs available for employees seeking a GS-13 or higher career level. A description of each of the chronological steps for *noncompetitive career development and training* for new professionals at NASS follows.

*Office Orientation.* Each office conducts a basic job orientation during the first two weeks of employment. The employees study materials on the agency mission and its history. They review agency and office policies and administrative procedures and they are trained to use their computer workstation as well as getting acquainted with the LAN operations. They are given their first work assignments and their performance elements and standards on which they will be evaluated.

*Individual Development Plan (IDP).* Each individual starts with a generic IDP that prescribes all the basic elements required to reach GS-12 — along with the career goals and aspirations of the individual. In addition, the supervisor and employee are to specify training and development needs that meet the employee's objectives and are in accord with the agency goals and staffing needs.

*Headquarters Training and Orientation.* Groups of new employees come to Headquarters for a week of training. This generally occurs sometimes between the sixth and fifteenth months of employment. The employees receive an overview on all aspects of NASS survey and estimation procedures, and participate in an Agricultural Statistics Board simulation. They are also given a briefing on current research activities and computer operations. They become acquainted with the Headquarters environment and meet the Headquarters staff, as well as meeting with top management in a question-and-answer session.

*On The Job Training.* Learning while working is the most important element of NASS's training program. Opportunities are provided to travel with the state office managers and senior statisticians to agricultural meetings, field days, and commodity meetings. These meetings help increase their knowledge of agriculture and acquaint them with the agricultural industry. They are given assignments requiring them to conduct survey interviews and do crop observations. Their workloads and responsibilities are gradually increased in accordance with their performance and promotions. They generally work in their first state office for at least four years, and during this time they are expected to have different assignments in at least two of the three major functional areas of responsibility which are surveys, estimates, and systems services.

*Basic Concepts Training.* All new statisticians attend formal training sessions on NASS survey procedures, estimates and analysis, and yield measurement. These are usually four-day training sessions conducted by the Headquarters Survey Training Group. Basic concepts are taught and everyone is expected to know and understand these basics regardless of their current assignments.

*Advanced Survey and Estimation Training.* Statisticians who have completed the basic concepts and are assigned major responsibilities for either surveys or estimates are provided formal training on specific topics. These are usually four-day sessions conducted by the Survey Training Group. This training is directed toward specific actions and programs that are designed to give the participants the knowledge and skills to perform these activities at the full performance level.

*Special Survey Training.* Statisticians assigned to work on specific surveys are sometimes provided with additional training specific to that survey. This training covers all topics involved in conducting the survey including list building, sampling, questionnaire design, training of enumerators, data collection, editing, data analysis, summarization, and publication. This training is directed to complex surveys such as objective yield, environmental, or economic surveys.

*Senior Statistician Workshops.* When a statistician reaches the journeyman level, they are often designated as the technical leader for state office operational groups: survey data collection, survey estimation, or computer survey support. Periodically, training workshops will be held for each of the operational group with individuals from all or a group of state offices. These workshops emphasize project planning, coordination of office activities, and overall project management. This training involves sharing of ideas and interaction among participants and Headquarters technical leaders.

*Professional Training.* Statisticians are encouraged to engage in professional training opportunities such as college courses, seminars, toastmasters, and self-development training provided by local institutions or the NASS Headquarters resource library (videotape training). NASS pays the fees for this training, provided the training is related to the overall mission of the agency. Training may be done on work time or on the individual's own time. The IDP is used to identify specific employee training needs and indicate appropriate professional training.

*Pre-supervisory Training.* A specially designed course has been developed by the USDA Academy at Texas A&M University to meet the unique needs of NASS statisticians and computer specialists at the grade 11 or 12 level. Training topics include values clarification, workplace diversity, stress management, effective meetings, presentation techniques, team building, communication, change, and ethics. In addition, NASS requires all of its statisticians and computer specialists to attend at least 80 hours of supervisory/management training prior to becoming a supervisor.

*Mathematical Agricultural Career Enhancement (MACE).* The MACE program is a combination of "on-the-job" and formal educational program designed to permit agricultural statisticians to become cross-qualified as mathematical statisticians and mathematical statisticians to become cross-qualified as agricultural statisticians. Applicants accepted into MACE will complete the portion of the IDPs for both the agricultural statistician and mathematical statistician required for classification in the respective series. This program formalizes agency sponsorship of academic courses for an individual selected to develop skills in both job series.

*Computer/Agricultural Career Enhancement (CACE).* The CACE program is designed similarly to the MACE program but permits computer specialists to become agricultural statisticians and agricultural statisticians to become computer specialists. Applicants accepted into the CACE program complete the portion of the IDP's for both the agricultural statistician and computer specialist required for classification in the respective series.

**Competitive Training Programs.** When NASS professionals have completed their first year and are making satisfactory progress on their IDP, they have the opportunity to apply competitively for any of three tracks in the *Full-Time Graduate Education Program* or the *Career Development Intern Program*. These programs are described below.

*Full-Time Graduate Education Program.* To be eligible, employees must attain the GS-9 level with at least one year of experience and be performing in a superior manner with satisfactory progress on their IDP. The full-time training programs provide at least one year of graduate level academic training. Agricultural statisticians, mathematical statisticians, and computer specialists are competitively selected for these training programs and, upon successful completion of the training and fulfillment of the OPM-required years in each grade, are placed non-competitively in GS-13 Headquarters positions. Selected candidates are given a new IDP which include any "warm-up" courses required. They are generally relocated to an SSO near a university with a NASS-approved graduate program. They must meet the qualifications for admission to graduate school at the selected educational institution in question.

The full-time graduate level training programs are:

**N** *Mathematical Statistician:* This program is designed to provide education for agricultural and mathematical statisticians in advanced statistics and statistical theory to become highly-trained mathematical statisticians.

N *Information Technology*: This program is primarily designed for computer specialists to provide training in software engineering, telecommunications, or management information systems. However, the program is open to agricultural and mathematical statisticians who have a strong interest and background in computer systems and information technology.

N *Survey Methodology*: This program is designed for agricultural statisticians and mathematical statisticians to receive advanced training in survey methodology. Participants attend the Joint Program for Survey Methodology at the University of Maryland.

*Career Development Intern Program (CDIP)*. The CDIP program is designed to provide accelerated training and career enhancing experiences for agricultural statisticians in state offices. The training program is designed to prepare statisticians for specific assignments in Headquarters at the GS-13 level. Agricultural statisticians can apply as GS-11's when they are expecting a relocation to their second state office assignment. They will be expected to maintain a full workload assignment in the SSO and complete all the IDP requirements for the GS-13 position targeted.

**Impact of Career Development Programs.** NASS does not formally evaluate and measure the results of its career development programs. An informal assessment would indicate that the current programs have been successful. Most NASS employees are hired as college graduates without previous work experience in statistics, without graduate level statistical or survey methodology skills and knowledge, and, increasingly, without an agribusiness background. After they complete their career development programs, NASS employees are able to successfully carry out the organization's mission which requires them to do sophisticated statistical tasks.

As of 1995, 122 NASS employees had completed full time training, and 62 were still employed. Of those who had left, many had retired. (*Clark and Schuchardt*) In 1997, there were 23 participants in formal training program activities.

NASS has experienced many positive results from its career development approach, both on an individual level and an organizational level. Such benefits include:

N Increased communication across the agency as statisticians network and exchange information taken from training and other developmental events.

N Rotational assignments provide statisticians with broad range of experience and knowledge about commodities, estimates, etc. nationwide, exposing them also to various management styles of State Statisticians and Deputy Statisticians in SSOs in which they work.

N Increased pool of highly qualified staff to fill vacancies nationwide (SSOs and HQ).

Even an excellent program produces some concerns and misgivings in the course of its generally beneficial career development approach. Unexpected outcomes experienced by NASS include:



- N New statisticians are less willing to participate in rotational assignments when they upset dual career families and exacerbate other personal difficulties. This creates new hiring and retention issues.
- N Identifying development/promotional opportunities in SSOs is challenging when talented statisticians decide not to accept rotational assignments. This also creates morale, retention, and career development issues for other individuals in those offices.
- N Some uncertainty exists about specific future agency staffing requirements being effectively met by using today's career development approaches.
- N Ever-decreasing resources and increasing work demands prompt NASS leadership to ask: Do current career development approaches enable individuals and work units to do more with less? This situation raises productivity issues.
- N With many rapid changes occurring in the field of agriculture, the statistician's work, and technical support systems, NASS must ask: Is our generic IDP current? Who ensures the IDP's developmental tasks are always current and appropriate? Similar challenges exist for in-house survey and statistical training; these and related questions indicate currency and relevancy issues.

NASS's training program to the journeyman level is designed to provide each professional employee with broad-base training in agriculture, statistics, surveys, and computer science. This gives all employees the opportunity to choose the career path most suited to their skills and abilities, but also offers them the opportunity to switch career paths. Everyone receives similar training and career development opportunities, allowing them to compete for competitive technical positions at the GS-13 level in Headquarters and for supervisory and management positions after a Headquarters assignment.

This program has been very successful in providing NASS with a highly trained staff of agricultural statisticians while at the same time providing a source of specialized mathematical statisticians and computer specialists who have state office experience. Despite the concerns, NASS management strongly believes that the current developmental plan has benefitted and will continue to serve the agency well by providing a broadly experienced and knowledgeable group of statisticians who will be able to meet the present and future organizational challenges.

## **2. Bureau of the Census**

The Census Bureau has designed two staff developmental programs directed toward the goal of training and retaining highly skilled staff. In the Census Bureau, statistical employees engage in a variety of training opportunities that provide both technical and nontechnical skills development. Two such programs are the Joint Program in Survey Methodology (JPSM) at the University of Maryland and the Census Bureau's Mathematical Statistician Intern Program.

In addition, for technical skills training, the Bureau employees may participate in any combination of the following options:

- N college and university courses,
- N outside seminars through private vendors, and
- N participation in American Statistical Association and Washington Statistical Society events.

For nontechnical (or soft skills training), employees may attend any in-house course on such subjects as: Public Speaking, Effective Presentations, Writing for Results, Managing Time and Stress, Teamwork, Problem Solving and Decision Making, Customer Services, and other such courses.

Except for the trainees who attend courses at the JPSM, Census employees normally do not complete an Individual Development Plan. Training at non-Government sources has to be job-related but the documentation indicating so is typically a short sentence on the individual's training application. Any training activity which requires employees to compete in order to be selected does, however, require a formal training plan.

**Competitive Career Development Programs.** The Census Bureau has developed two competitive programs for statisticians and mathematical statisticians. These programs are Census Bureau sponsorship of staff enrolled in the Joint Program in Survey Methodology and a Mathematical Statistician Intern Program.

*Census Bureau Participation in JPSM.* The Census Bureau saw the JPSM as an opportunity to have staff trained specifically in statistical and social science methodology used for large-scale economic and demographic surveys. Since the program began in September 1993, the Census Bureau has competitively selected six employees each year to start the program. In addition, several staff are supported in taking one course a semester. Also, the Census Bureau has actively participated in the numerous short courses offered by JPSM. Attrition from the program has been occasioned by personal circumstances: one person took maternity leave, one went to another federal agency, and one decided that the program was not a good fit for her circumstances.

There is a commitment and burden on the organization to have a valued employee engaged in only half-time work for about three years — and to pay their full salary during this time along with tuition, books, and local travel. There was much discussion as to whether and to what extent the Census Bureau could afford such an investment.

In the case of the JPSM, it is probably too early to say if the Census Bureau has made a good investment. Some may say that the proof is that staff members selected for the program are now graduating and staying with the Census Bureau. All students sign a commitment to federal employment equal to three times the amount of time released to take courses. At this time no student has repaid that commitment. Others may say that the graduates will have to contribute significantly for many years before there is proof of success. How one might recognize and evaluate "significant contributions"

constitutes a separate problem. The students are pleased with the quality of their education and enthusiastically support the program. The students report that they come back to their jobs with new insights and techniques to apply to their work. It is also very clear that they are effectively networking amongst themselves and with students from other agencies. These staff members are eagerly sought by Census Bureau managers to fill vacancies and to accept positions of further responsibility

*Mathematical Statistician Intern Program.* The Census Bureau started this program in 1993 at the same time the JPSM began. The two programs were seen as complimentary, even though they appeal to two different staff universes fulfilling two different missions. The participants in the Intern Program already have a Masters Degree (or have completed several graduate-level courses). The general profile of the participants has been: staff who have had five years or more experience at the Census Bureau, who had worked in only one division, who were about 30 years old, and who were generally recognized as the best in their peer group. Competition for one of the four intern positions selected each year has been intense.

The Intern Program was established with five objectives:

- N Identify staff for the fast-track to the GS-13 level and perhaps later management assignments.
- N Provide exposure to each of the Census Bureau program areas — economic, demographic, decennial census, and statistical research.
- N Provide opportunity for statistical assignments that require different areas of knowledge.
- N Provide opportunity for professional growth through formal paper preparation and presentation in a professional forum.
- N Provide enhanced training opportunities to meet career goals.

The program has the following features:

- N Competitive selection — which has involved intensive group interviewing by the Associate Director for Methodology and Standards, the methodology division chiefs from each of the four program areas, and a division chief selected each year from one of the program areas.
- N One-year assignments in each program area where the intern has not had experience. With four program areas, the Intern Program normally lasts three years.
- N Presentation/participation at the annual ASA meetings. This is an important benefit since competition to attend ASA meetings is very intense among other staff. It is assumed and expected that interns will prepare a paper and go to the meetings.

- N Each intern is assigned one of the division chiefs from each of the four program areas as a mentor. Regular meetings are held between the intern and the relevant division chief, and individual development plans are prepared.
- N Increased exposure to senior staff. Quarterly meetings are held for all interns with the Associate Director for Methodology and Standards and the methodology division chiefs from each of the four program areas. Usually a member of the Executive Staff is invited to attend also and talk about a particular program area.
- N Increased training opportunities. With the crunch on training funds during the past few years, this has proven to be a valuable benefit of the program, as interns have been given priority for training money. Numerous JPSM short courses have been taken with these training funds, along with courses related to personal development.
- N When rotated to another area, the interns have been given priority for assignments that can be completed within a single year and that lead to preparation of an ASA paper.
- N Experience in working as a group on a broader management or organizational problem. For example, the interns recently worked together to prepare a proposal for reorganizing the utilization of Census Bureau mathematical statisticians.

Those employees selected for the program have, in general, been satisfied with the opportunities and experience that the program provides. The interns have benefitted personally from their assignments, the training opportunities, and the mentoring that they have received. In addition, there are the benefits of increased communication across the Census Bureau as the interns band together for numerous networking opportunities, taking back to their respective branches news from across the Bureau. For example, they have regular luncheons without senior management involvement.

Through rotational assignments, this program has the capacity to give interns their first opportunities to obtain supervisory experience. For several reasons, this has not materialized. The interns are, however, seeing and taking notice of the various management styles they are being exposed to, and these differing styles are discussed and compared during their informal meetings. Another positive contribution of the program is the increased pool of highly qualified staff to fill technical and management vacancies. Not all interns have stayed in the program long enough to experience three assignments. However, those leaving the program have left for permanent assignments within the Census Bureau or opportunities in the private sector.

Even though senior management has been generally pleased with the progress of the Intern Program, there have been valid issues and concerns raised by Census Bureau managers:

- N When a division has a person selected for the Intern Program and that person leaves the division to start the rotational assignments, the programs of the division are affected because the divisions have not always been able to back-fill the vacated position.

- N Although most managers support the objectives of the Intern Program, several question whether the Census Bureau can support the statistical program disruptions caused by the one-year staff assignments.
- N Some managers believe that a negative message is being sent to other staff members in units that the interns are assigned to by giving the interns priority in assignments. These managers argue that there are other deserving employees in the units who should be given these assignments.
- N Some managers express a concern that the Bureau has created a caste system. They raise the following question: Will there be any promotion opportunities for the GS-12s who choose to dedicate themselves to becoming expert in one of the more complicated surveys of the Bureau, or who choose a rotation and development program of their own?
- N In the view of some managers, this focus on Census Bureau staff detracts from a proper focus on its programs, the fulfillment of which is the primary purpose of the Census Bureau.
- N Finally, from the Human Resources Division comes the concern that when the interns complete the program, there will not be permanent GS-13 positions available for them to fill.

None of these concerns are trivial; in some cases emotions run deep. When the first interns completed their three years, there was no problem in finding permanent positions for them to fill. In fact, there were more positions than interns. It can also be argued that the Bureau has taken every step possible to rotate the interns to positions of the greatest need, but that is of little solace to the manager who ends up with one less staff resource. Of course, it is true that there is always a learning curve when a new person enters any position. With the one-year assignments, there is the constant overhead of the learning curve, but senior management does not believe that this price is too high.

The issue of opportunity for those who are not a part of the Intern Program is a more difficult one. In the past year, there have been GS-13 job announcements, not filled by an intern, to which all could apply. Inevitably, there will be positions, filled by an intern, with respect to which the manager will feel that he/she was not given the opportunity to fill as desired. There will be some deserving employee, not a part of the Intern Program, who might have done quite well in that position. But all employees know about the Intern Program; all have an opportunity to apply and be selected into the competitive process. It is the belief of senior management that the Intern Program will provide a superior pool of candidates who, through broadening work experiences, will be better equipped to fill future vacancies.

**Impact of Career Development Programs.** The Census Bureau recognizes that a highly trained and specialized staff is a necessary resource to perform its functions. Creating staff development programs to train and retain these staff is in the best interest of the Census Bureau. Both of the Census Bureau career development programs are designed as three-year programs. They differ in the focus of activities during the three years. The JPSM program is primarily for those employees who do not have Masters level preparation in statistics or a social science discipline. The intern program is focused primarily on

those employees who have a Masters Degree in statistics and provides three different career development opportunities.

To better understand how training programs such as the JPSM and internship programs are perceived, the Census Bureau conducted a series of focus groups in the spring of 1998 among both supervisory and non-supervisory mathematical statisticians. The analysis of the focus group interviews demonstrated high awareness of the formal JPSM and intern programs, high value for short technical courses (such as JPSM short courses), mixed support for rotational opportunities, and significant interest in the development of a formal mentoring program.

Both programs could be viewed as a burden on the organization. Issues and concerns have arisen about these investments in the future. Yet, both staff-development programs have vital components for preparing and retaining a highly technical pool of staff — a staff resource with the technical and managerial leadership skills needed by the Census Bureau in the next millennium.

### 3. Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) has developed the Quantitative Methods Enhancement Program (QMEP) in response to the recent emphasis on reinventing government and a need to provide alternative career development training for statisticians (Williamson and Betts). In addition, the program is designed to sustain and enhance statistical capacity within CDC. The QMEP is a career enhancement alternative for CDC statisticians and other scientists who have a strong career interest in statistical and other quantitative methods.

In a January, 1989 memorandum, the Associate Director for Science, Centers for Disease Control and Prevention, established CDC's Statistical Advisory Group (SAG) in recognition of the increasingly important role statistics and statisticians play in fulfilling the agency's mission. The SAG was asked to act in an advisory role to CDC's Office of the Director on statistical issues, to oversee and coordinate CDC-wide statistical activities, and encourage communication among statisticians and other scientists at CDC. In 1991 the SAG cosponsored CDC's Planning Retreat for Epidemiologic and Statistical Methods in Public Health to produce a plan for maintaining and developing expertise in statistical and epidemiologic methods essential to preserving CDC's national leadership role in assessment of health status and in public health practice. One of the high priority recommendations from the retreat was enhanced recruitment and retention of statisticians and data analysts with expertise in methods to analyze public health data. This recommendation, coupled with the reinvention/reengineering environment in government fostered by the 1993 National Performance Review, became the impetus to consider ways to provide positive reinforcement for CDC employees who have a strong career interest in analytic methods.

In December 1993, the SAG convened a focus group comprised of CDC statisticians, management analysts, and personnel experts to discuss and lay the foundations for an internal rotation program that might identify outstanding employees who demonstrate interest and promise in analyzing public health data. It was contemplated that they would be temporarily reassigned to another group within CDC to acquire and develop new statistical skills. During the next year, the focus group and others in CDC's Epidemiology Program Office (EPO), the group which provides personnel to coordinate and support much of the SAG activities, discussed and revised the original proposal for the methods rotation program. The resulting proposal was one which provides alternative career development training for statisticians and, at the same time, sustains and enhances the statistical capacity within CDC. In 1996, with approval and support from SAG, the Statistics and Epidemiology Branch of EPO, along with CDC's Human Resources Management Office, the QMEP was introduced.

**Quantitative Methods Enhancement Program (QMEP).** The purpose of QMEP is to provide an innovative career enhancement opportunity for CDC and Agency for Toxic Substances and Disease Registry (ATSDR)<sup>4</sup> scientists. The program facilitates professional growth and development for

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<sup>4</sup> Future reference to CDC includes ATSDR because the QMEP applies to both agencies and allows participation between those agencies.

statisticians and other data analysts, assists in maintaining and strengthening CDC's capacity in analytic methods expertise, and promotes retention of CDC scientists.

The QMEP provides CDC employees with a unique opportunity to temporarily be assigned to another group at CDC to acquire new skills in specific analytic methods from CDC experts on current statistical methods. The areas of skill development include generalized estimation, longitudinal data analysis, sample survey analysis, small area estimation, meta-analysis, neural networks, Geographic Information Systems (GIS), and risk assessment. The program consists of 1) a competitive application process that is used to match an applicant with a mentor, 2) an internship training period, and 3) an evaluation of the program experience by the intern, mentor, and sponsoring Center, Institute, or Office (CIO) of CDC. The intern will be released from all job duties during the time of participation in the program.

The QMEP is open to health and mathematical statisticians and to other scientists who have a strong career interest in statistical and epidemiologic analytic methods. Applicants must be permanent employees of CDC with a minimum of two years service in the agency, and must have secured approval from supervisors to participate in the program. Applicants should be at the GS-11/12/13 (or CO-04/05 level for Commissioned Corps employees), and have received a rating of "Excellent" (or "D" for Commission Corps employees) or higher on their most recent end-of-year personnel evaluation.

Each applicant must submit to the human resources organization a current position description, including job series and grade, CIO, and location; curriculum vitae; name, address, and phone number of immediate supervisor; a one-page memorandum that addresses the following topics:

- N Reason for applying to the program
- N Specific methods area(s) in which new skills or knowledge are sought
- N Primary learning objective(s)
- N Description of how assignment will benefit career goals
- N Description of how new or enhanced skills will benefit the sponsoring CIO.

After a SAG subcommittee screens applicants, prospective applicants will receive a listing of available projects/methods areas and associated mentors for the program. Mentors will be located throughout CDC, including locations other than Atlanta (CDC's headquarters). Subsequently, mentors and applicants will interview each other and rank their choices. A matching process will be used to team selected program participants with mentors. CDC plans to select a maximum of three applicants will be selected for the initial year of the program, depending on qualifications and availability of interns and mentors.

The duration of this training is variable, depending on the length of projects. Generally, intern assignments will be four months to one year. The QMEP, modeled after CDC's long-term training program, calls for the applicant's sponsoring office to provide the FTE and salary support throughout the training period, but there is flexibility in this arrangement and exceptions to this model should be mutually agreed upon by the sponsoring and receiving offices. The intern will return to their own office upon completion of training.



**Impact of the QMEP.** The QMEP was first introduced for FY 97; one can not yet evaluate results. It goes without saying that, whenever a new program is established, there are issues to be discussed and difficulties to be overcome before the program can be effective and successful. To ensure the success of the QMEP, these are a few of the concerns that CDC must address:

- N Foster “buy in” by management to support a career development program in which a sponsoring group will lose the use of the intern and the intern’s staff position for the duration of the internship,
- N Accrue a number of scientifically diverse and statistically valid projects and mentors for the interns,
- N Evaluate usefulness of limited eligibility (QMEP is available to GS-11/12/13 civil service and CO-04/05 Commissioned Corps staff who have been employed for at least two years with CDC),
- N Ensure widespread announcement and afford opportunities to ask questions about the QMEP,
- N Implement the program in different CDC cities and across CDC agencies.

All these difficulties can be overcome with carefully prepared messages to employees regarding the usefulness of training programs. Support for the program acknowledges that:

- N supervisors and agencies have a major responsibility for the career growth of employees,
- N career enhancement programs such as the QMEP benefit the organization in technical expertise and overall work environment,
- N employees not supported in their professional development will either be unhappy (and not maximally effective in their jobs) or will seek other opportunities offering career support.

It is arguably more cost effective to support career training opportunities, gaining employees with increased skills and better working attitudes, rather than lose them. In the latter case, vacancies arise — requiring long recruitment times to fill — and, worse, a negative working environment is created — which impedes recruitment efforts and inevitably proves detrimental to those employees who remain with the organization. In addition, the QMEP is a highly competitive program which can be used as a reward for deserving individuals (both interns and mentors) in times of downsizing at a time when cash and other awards may be difficult to justify or facilitate.

The QMEP is a new career enhancement program that presents a model that might have application at other federal statistical agencies. Although there are drawbacks to the program from a resource standpoint, the potential gain is great in development of individual capabilities and agency capacity building in statistical and other analytic methods for application to important public health problems. The program provides flexibility to meet the career growth needs of those who wish to remain in disciplines of quantitative analysis, as well as those who wish to expand their skills into areas of quantitative methods and possibly switch career paths.

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## CHAPTER FIVE: INTERVIEWER TRAINING

The interviewing staff of a statistical agency is the backbone of its data collection effort. The quality of interviewer training is a concern for host and sponsoring agencies. The Census Bureau, the National Agricultural Statistics Service, and the Bureau of Labor Statistics use the largest interviewing staff among federal statistical agencies. These agencies collect data for their own agency surveys and on a reimbursable basis for other agencies and organizations. Their programs are very different in approach and nature. Reasons for this include the agencies' unique training audiences and the disparate nature of their interviewers' work. Interviewers include both agency employees and employees of other organizations. The BoC and BLS hire permanent employees who are dedicated to specific data collection programs while NASS uses temporary interviewers who work on a variety of surveys. The BoC, NASS, and BLS looked closely at their interviewer training programs prior to the introduction of computer-assisted interviewing, given the fact that the technology imposed new skill requirements upon interviewers.

This chapter offers a more detailed perspective of the training components of the interviewer operations at these agencies. The first three sections outline agency interviewer selection criteria; training program design, development, and delivery; survey content training; training evaluation; and the role of quality assurance in identifying training needs. The last two identify interviewer training issues and future direction. Figure 1 defines commonly used terms relating to various aspects of training interviewers.

### Figure 1. Acronyms and Definitions

<b>CAI</b>	Computer-assisted interviewing.
<b>CAPI</b>	Computer-assisted personal interviewing: a personal visit, using an automated data collection tool such as a laptop computer to display the questionnaire and enter data directly. Follow-on interviews may be conducted by phone from the interviewer's home.
<b>CATI</b>	Computer-assisted telephone interviewing: interviewing from a telephone center, using a computer from which questions are read and in which responses are recorded.
<b>CPS</b>	Current Population Survey.
<b>Enumerator</b>	Performs the same duties as interviewer, as well as recording field measurements of crop counts, collecting crop samples, and observing for non-response. This term is used in NASS instead of interviewer.
<b>FR</b>	Field Representative: an interviewer who works out of his/her home and reports to a field office.
<b>GIST</b>	General interviewing skills and techniques.
<b>Instrument</b>	The survey questionnaire, either paper or electronic.
<b>Interviewer</b>	An individual who seeks information from selected respondents using a standardized questionnaire on which the interviewer records and transmits the data for later tabulation. Most inquiries are initiated by the interviewer.
<b>NASDA</b>	National Association of State Departments of Agriculture. NASS and NASDA have a cooperative agreement in which NASDA employs enumerators for NASS surveys and pays salaries, travel expenses, and other costs associated with data collection.
<b>Training</b>	This chapter discusses training in the context of interviewer training in a structured learning environment in which stated objectives are designed to produce acceptable interviewer performance.

## 1. Interviewer Recruitment and Selection

Census Bureau interviewers are recruited by regional offices and telephone centers to fulfill specific program interviewing needs and, after passing qualifying procedures, are hired as agency employees. NASS interviewers, on the other hand, are contract workers employed by NASDA. Interviewer selection is the responsibility of the NASDA supervisor. For both agencies, training is agency-provided. In the Census Bureau, interviewer performance is assessed by the agency, and in NASS, the NASDA supervisor evaluates the enumerator performance.

For NASS, an interviewer is either a NASDA field enumerator or a NASDA state office enumerator. Because of the specific terms of the NASS/NASDA agreement, NASDA has the hiring responsibility for all interviewers who collect data for NASS surveys. Although field and state office enumerators perform many of the same tasks, there are differences in how and where they perform their work. Field enumerators work out of their home and in the field. In addition to respondent interviewing, they make crop counts in designated fields and must also read aerial photographs and grid acreage. State office enumerators conduct telephone interviewing, prepare survey materials, and may process lab samples collected by field enumerators.

BLS utilizes three basic categories of interviewers in the collection of its programs - federal employees, state employees, and private sector employees. The federal employees are hired by the regional offices and include economists, a few statisticians, and a large number of part-time economics assistants. Federal employees are used for the collection of wage and price data from businesses, with most of the Consumer Price Index collection conducted by the economic assistants who work primarily from home. The voluntary data collections are conducted by personal visit, telephone, or mail.

The state employees are hired by the states and funded through BLS grants. The Data collection centers under contract to BLS also hire interviewers. State employees and data collection center employees are normally involved in telephone and written contact with respondents in support of the employment related surveys of the Bureau. This includes nonresponse prompting, solicitation of new respondents, and establishment of routine reporting of data by mail, touchtone data entry (TDE), CATI, Voice Recognition, and electronic data interchange (EDI) technologies. In all of these programs, there is a significant element of statistical work at the first contact with a respondent. This may include definition of the eligible universe of units, products, jobs, and so forth, followed by a probability selection to determine the particular items for which data will be collected.

## 2. Current Interviewer Training Design, Development, and Delivery

**Design and Development.** In the Census Bureau, design and development of interviewer training has been a one-step operation performed by Census Bureau headquarters employees. The training outline is based on planning meetings and discussions between subject matter experts, instrument authors, field division statisticians, and mathematical statisticians from Census Bureau's quality assurance and

evaluation units. Representatives from the agencies sponsoring surveys conducted by the Census Bureau play a major role in determining what interviewers should know about the survey subject matter (referred to as “concepts training”); how interview questions should be worded; and the order in which they are to appear in the questionnaire or survey instrument.

The actual writing or development of the interviewer training packages is performed, in most cases, by headquarters statisticians and by training specialists located in Census Bureau field operations. Some writing focused on training is developed by statisticians and subject matter experts in other Census Bureau divisions. Training is generally developed in two formats: self- study and classroom.

In NASS, interviewer training is conducted in conjunction with most surveys. For both general and survey-specific training, NASS uses state or regional workshops, individual supervisory groups, one-on-one sessions, and home study (similar to Census Bureau self study). Training workshops are designed to provide the interviewer with background information about the survey and its purpose and to familiarize the enumerator with survey materials and procedures. To work a particular survey the enumerator must participate in the training provided for that survey. Limited exceptions based on unusual circumstances may be allowed.

BLS also conducts a multi-faceted training program. Each program liaison function within the national Office of Field Operations contains a training group with responsibility for the development and maintenance of an effective training program for its surveys. Regional BLS staff, supported nationally, also have particular responsibilities for training state staff as states do not maintain training functions for BLS programs. BLS has established curricula and, in a number of cases, specific "certification" training requirements for interviewers both as they begin their duties and as a continuing education process. These generally include classroom training, study of materials, on-the-job training, observations, specific evaluation of live work, with follow-up and advanced work. BLS also utilizes a significant amount of private vendor training in the regions to support general systems applications such as word processing and spreadsheets. These are directed primarily by regional management based on need.

**Training Review.** Review of training materials cuts across the organization at all three agencies. The review involves those designing the training, the sponsor of the survey whether an internal or external organization, and those who will conduct the training. For all three organizations, this review involves both headquarters and field staffs. The review addresses both content and presentation of training.

**Testing the Training Package.** Many training programs, particularly those that involve the execution of a new survey or major changes in the design of an existing survey, are tested with a “dry run.” A dry run is one in which classroom training is executed as originally designed. Depending on the comments made by the dry run participants (interviewers, survey sponsor, trainer, etc.) the final training package may require major revision; however, in most cases, only minor revisions are needed. The dry run may also discover changes needed in the final production instrument.

**Training Delivery.** The delivery of interviewer training is performed by regional and telephone center supervisors for the Census Bureau. Verbatim training guides are provided to the survey supervisor who

serves as trainer and are read from during classroom training. Self studies are also generally paper-based although there are some computer-based training (CBT) applications as well as both audio and video training tapes. Only one office within the regional office/ telephone center network has a dedicated trainer.

Interviewer training within NASS is performed by Headquarters and field office personnel and NASDA Supervisors. Enumerator practice exercises are used extensively. Home study prior to structured training is also routinely used. Home study quizzes are used as a means to ensure that pre-workshop study on important items was accomplished.

Interviewer training in BLS also utilizes a variety of techniques, including formal classroom training, CBT, and individual exercise and self-study work. Formal training of direct BLS staff is generally delivered by headquarters personnel while both national and regional personnel have a large role in training of state staff working under BLS grants. In addition, BLS maintains a formal mentoring program by regional personnel in the compensation collection activity. Regional supervisors are responsible for ensuring that pre-course materials are completed prior to sending their staff to training courses and for identifying particular training needs of employees beyond the standard curriculum. In particular, regional supervisors and administrative officers are responsible for primary delivery of information related to confidentiality and administrative procedures when interviewers are hired.

### **3. Interviewer Training Content**

The specific content of interviewer training often depends on the level of project funding. However, initial training for Census Bureau interviewers who conduct demographic surveys generally follows the CPS model, shown in Figures 2 and 3 below. The exact amount of time allotted for each exercise may differ for each survey. Figure 2 describes the four CAPI components for CPS: pre-classroom generic self-study, pre-classroom survey-specific self-study, classroom training, and post-classroom practice interviews. Figure 3 describes the three CATI components also for CPS: generic CATI introduction, pre-classroom survey-specific self-study, and classroom training.

The Census Bureau assigns a laptop to a new field representative at the time of initial hire, before training and interviewing commence. Since training packages include video tapes as well as audio tapes, the interviewer must have access to the equipment on which these run. If the interviewer does not own the necessary equipment, the Census Bureau reimburses the interviewer for rentals.

Training videos and written materials comprise the interviewer's self study. The General Interviewing Skills and Techniques (GIST) video is used to introduce new interviewers to the basic practices of quality interviewing. The video covers six major themes. These include: sampling, knowledge of the survey, confidentiality, interviewer bias, adherence to question order and wording, non-directive probing, and techniques for interviewing reluctant respondents. Interviewers are taught how cases are selected by sampling and why assignments cannot be substituted for neighboring units. The video also teaches about the Census Bureau authorizing legislation, Title 13, and sworn oaths to emphasize confidentiality. A large part of the video is devoted to interviewer behaviors that may introduce bias.

Interviewers are trained to avoid these biases by using neutral, non-directive probes that do not lead respondents. To emphasize the consequence of rephrasing questions, the video includes a methodological experiment showing how slightly different question wordings can result in large answer differences. Techniques on how to avoid refusals are covered both in the video and again in the classroom. A new refusal avoidance workshop, using role-plays and interactive skill modeling, is being implemented for telephone center interviewing training.

Figure 2. CAPI Training for Current Population Survey  
New field representatives and experienced field representatives with no CPS experience.

Location	Training Content	Allotted Time
Home	<p><i>Pre-classroom Generic Self-study</i></p> <p>Introduction to Census Bureau (video)      Segment procedures  Confidentiality (video)                              Data transmission (video)  Laptop computers (video)                          Preventing refusals  Typing tutorial    Trouble shooting  Case management functions                          Safety  Interviewing techniques (w/GIST video)      Payroll  Walk-through an instrument (CBT)</p>	10 hours for new employees, 6 hours for experienced employees
	<p><i>Pre-classroom Self-study for CPS</i></p> <p>Background of CPS                                      Final review exercise  Labor force concepts                                      Two practice interviews (one a phone interview with SFR or case management supervisor)  More computer operations</p>	8 - 10 hours
Regional Office	<p><i>Classroom Training for CPS</i></p> <p>Review of self-study                                      Practice interviews (paired practice and/or audio tapes)  Case management (video, exercises)              Day in the life of a CPS-CAPI field representative  "Walk-through" interview                              Troubleshooting  Labor force concepts SS(video)                      Function key usage  Non-interview (video)  Telephone interviewing skills (video)</p>	3 days
Home	<p><i>Post-classroom Practice Interview</i></p> <p>Audio-taped practice interviews and      Reinforcement of concepts  telephone interviews with supervisors</p>	10 hours

Figure 3. CATI Training for Current Population Survey: New CATI interviewers.

Location	Training Content	Allotted Time
CATI Facility	<p><i>Generic Introduction CATI Training</i></p> <p>Introduction to CATI                                      CBT: intro to terminal, keyboard  Introduction to Census Bureau and                      Walk-through interview  telephone facility    CATI interview techniques, skills  Comparison of personal and phone interviews      Probing and biasing the respondent</p>	10 hours
	<p><i>Pre-classroom Self-study for CPS</i></p> <p>Introduction to CPS    Using your manual  Non-interviews    Practice interviews  CPS concepts</p>	6 - 8 hours
	<p><i>Classroom Training</i></p> <p>Self-study review    Concepts and procedures  Using the manual    Function keys  Walk-through interview</p>	2½ days





For CAPI or CATI surveys, classroom training takes place in decentralized locations. This enables interviewers to go through the survey on an instrument designed for training purposes only. When the resulting production instrument contrasts sharply with the training instrument, headquarters survey liaisons prepare and distribute a memorandum identifying the changes that need to be brought to the attention of the interviewer.

NASS uses the same training components, mentioned above, that the Census Bureau does. When an interviewer is first hired, training is provided in interviewing skills and survey and administrative procedures. Interviewing skills address the task of gaining respondent cooperation, converting refusals, interview and call-back procedures, and explanation of the mandatory respondent burden statement. Survey procedures include requirements for maintaining respondent confidentiality, supervision and quality control procedures; administrative topics dealt with include procedures for completing time-mileage-expense sheets, ethical behavior, compensation, promotion and award procedures, survey evaluations, safety, and grievance procedures. Interviewer training for specific surveys covers survey purpose, data collection procedures (including reading aerial photographs), locating survey respondents, deciding who to interview, laying out objective yield plots (and plant and fruit counts), need for explanatory notes, and multiple-survey coordination. Telephone interviewers are instructed in general computer skills and in the use of computer-assisted survey interviewing software.

BLS training contains elements of both the Census Bureau and the NASS approaches. Direct employee training is centralized while state employee training is geographically dispersed. Most training is delivered on a program-specific basis. Personnel working on the Consumer Price Index (CPI), for example, receive training primarily related to CPI concepts, procedures, technologies, and outputs while those working on other programs receive the training related to those programs. The usual situation would be a set of training activities directed to newer employees followed by a series of advanced courses — directed to more experienced employees — addressing cases of greater complexity or nuance. Various statistical techniques, such as probability selections on site with respondents, are generally taught in their program-specific configuration, although they are clearly generic techniques. For example, the Producer Price Index personnel would be trained on product probability selection called "disaggregation" while the National Compensation survey personnel would be trained on a similar activity called "probability selection of occupations."

There is a set of common issues (e.g., interviewing techniques) which are covered in all BLS programs rather than in a separate course. Regional full-time personnel are often rotated for brief periods through the regional economic analysis and information units to ensure applied familiarity with the full range of BLS programs and data outputs. This activity specifically supports the effort to obtain voluntary cooperation of respondents through cross-product marketing of BLS and to teach respondents how to readily obtain BLS data.

All employees utilize computers in their work. For employees in some programs, laptops or penpads are the primary tool for data acquisition. The program-specific applications of these technologies are generally taught in program-specific courses. Training of regional and state staff on general computer

applications such as spreadsheets and word processing is normally accomplished by a combination of on-the-job training, mentoring, and vendor-specific training obtained commercially.

#### **4. Interviewer Training Evaluation**

At the Census Bureau, interviewers evaluate their training at the conclusion of formal training sessions. Late in 1996, the Census Bureau conducted a comprehensive evaluation of interviewer training. Over 500 interviewers and senior interviewers participated in an attitudinal survey which focused on interviewer training for a computer-assisted data collection environment. Results from this survey note that most interviewers rate automated training as “excellent” or “good” on such topics as: gaining respondent cooperation, learning survey concepts and definitions, communicating the survey’s purpose, and answering respondents' questions. Interviewers felt somewhat less favorable about training on the topics of converting refusals, interviewing by telephone, and following skip patterns. Overall, approximately 90 percent of the interviewers who responded to the survey said they felt “thoroughly” or “adequately” prepared by the training they had received. This evaluation tool has been standardized for routine implementation.

Written training evaluations are also used within NASS. NASDA enumerators complete an evaluation after each workshop. Survey statisticians complete evaluations after each major survey that encompass the entire survey process, including training issues.

In BLS, training evaluations are completed by trainees after formal courses. These address issues of both content and presentation. Periodically, taskforces composed of both regional and headquarters employees are formed to review and refine training and "certification" requirements for the various BLS programs. BLS field representatives in most programs complete end-of-survey reports which, in part, evaluate the success of training efforts in addressing individual survey issues. These often include specific recommendations for future training content.

#### **5. Quality Assurance as a Tool to Identify Interviewer Training Needs**

**Observation of Field and Telephone Interviewing.** In the Census Bureau, field observation is one of the methods used by the supervisor to check and improve performance of the field representative staff. It provides a uniform method for assessing the FRs' attitudes toward the job, use of the computer, and evaluating the FRs' ability to apply concepts and procedures during actual work situations. There are three categories of observations -- initial, general performance review, and special needs. Information from these observations is used to provide feedback to the FRs.

In NASS, NASDA supervisory enumerators are responsible for carrying out a quality assurance check on major surveys and periodic checks on other surveys. This two-phased evaluation may point out deficiencies in questionnaires, instructions, training, supervision, equipment, or other problems in which corrective action should be taken before the next survey. The NASDA supervisor is responsible for providing guidance to enumerators on how to improve. This guidance will come in many forms, but should include information on new developments in NASS, instruction on survey techniques, coaching,

and suggestions for improvement. Additionally, supervisory enumerators complete a “NASDA Enumerator Evaluation” form for each enumerator following all major surveys. This provides input for addressing interviewer performance issues that have broad implications in formal training.

BLS uses observational interviews to deal with the substantive content of the collection and with interview techniques, including presentation and ability to obtain voluntary cooperation by effective explanation of the program and its applications. The observers are generally regional supervisors and senior field staff. Upon entering duty, field personnel normally observe an experienced field representative collecting data, followed by a reversal of roles in later interviews when the experienced person observes the less experienced individual — leading to collection "certification." After the initial training phases, observational interviews are normally conducted periodically for all collection staff. Feedback and retraining are the primary purposes for the observational program.

Telephone monitoring is used to identify quality problems for CATI work. In all three agencies, interviewers can be monitored at any time. However, they are usually monitored during about 2.5 percent of their log-in time. Interviewers are monitored by survey and telephone center supervisors who, in remote offices, hear the actual interview and see what data are being recorded. Feedback is given to the employee immediately.

**Role of Reinterviews.** A reinterview is the process of conducting for a second time a previous interview using a different interviewer (usually a senior field representative or survey supervisor). The reinterview process identifies potential falsification in reporting, problems in the instrument design that need to be corrected to assure quality data, and problem areas requiring additional interviewer training and development, such as lack of understanding of specific survey concepts.

Sometimes the reinterview is not a repeat of the original questions but rather a cognitive reinterview using different questions and probing techniques. Generally this is a face-to-face reinterview of a previously conducted face-to-face or telephone interview. The original respondent is recontacted and asked a portion of the questions on the original interview, questions concerning how survey responses were formulated, and questions about the survey process in general. The cognitive reinterview process points out problems similar to those identified in a repeat of the original interview. These problems may identify needs for additional interviewer training and development.

BLS conducts reinterviews as part of its quality assurance and training regime. These take various forms in the different BLS programs, but an example of the strategy used would be the reinterview program of the National Compensation Survey. As collected schedules for this program are uploaded from the laptops by field staff onto the central national database, a probability sample of them is selected and routed to the reinterview staff at headquarters. Then, within each sampled schedule, a probability sample of detailed data items is selected and respondents are reinterviewed, normally by telephone. Results are reviewed on a schedule and item basis by the headquarters reinterviewer and the collecting field economist as an informal training mechanism. Results are also categorized and tabulated into Pareto charts for broader error pattern analysis (by management and staff) and as a guide to targeting training efforts in the program.

**Use of Quality Control Procedures.** Many BLS programs contain a structured statistical quality analysis component related to incoming data. These vary considerably in sophistication and content, from small sample reviews of SIC coding done by states to relatively sophisticated Pareto analysis of error patterns of probability-sampled incoming data in the Price and Compensation programs of the Bureau. The objectives of these efforts are to identify "conformance to specification" error patterns and to discern whether error sources may be for individual reports or more general in nature. If they are individual, then targeted training programs directed toward individual interviewers are conducted. When errors are not highly correlated with individuals but are rather systemic or random, clarification or alteration in program-wide training, procedures, or approaches is implied. Normally in these structured quality analysis programs, there are different sampling ratios for incoming work of individuals with lower error rates than for those with higher error rates.

The BLS compensation program contains a "calibration" component which is simultaneously a training and quality improvement device. Calibration exercises essentially involve small groups of field staff who work on case studies in data collection. The case studies may be either constructed or live data cases. The objective of the exercise is to generate discussion of the precise handling of a given fact-set under the concepts and procedures of the program involved, to elucidate any differences in the group in how the given facts should be handled, and to lead to action items for training and program decision-making on differences that may remain unresolved or unclear. Calibration exercises are conducted by both headquarters and regional staff and may be either relatively general or targeted to particular collection issues.

## **6. Interviewer Training Issues**

The introduction of computer-assisted interviewing requires that the interviewer be trained in the use of the technology. This is a new training cost, but not a necessary component of all survey training since this knowledge generally carries over from one application to the next. However, within each application the interviewer needs to learn how to proceed through the instrument. This new component is included as part of the survey-specific training.

Survey managers are concerned about the increase in the cost of interviewer training. Interviewer training for the regional office staff involves travel by both the interviewer and instructor. Other components of training costs include the cost of reproducing and distributing thousands of documents and the often hidden management review costs (i.e., the time spent by headquarters and regional managers reviewing and commenting upon preliminary training materials). Training costs are also driven by interviewer turnover.

One solution to the spiraling costs of training development and delivery might be the use of advanced training technologies such as CBT, CD-ROM, and distance learning. However, these training techniques present additional technical and cost requirements. For example, multi-media training involves the purchase of additional peripheral equipment such as compact disc players.

## **7. The Future of Interviewer Training**

Generally, any major change in interviewer training will provide for three items: basic interviewing skills mastery, quick adjustments to technological and operational changes, and simultaneously training many interviewers in a cost-effective manner. An administrative information system that has information on interviewer performance could provide direction for training design and modification. This would allow linkage between performance and training.

NASS has entered into a cooperative agreement with the University of Michigan to assist in the development of improved interviewing methodology. The focus of this agreement will be to identify methodology that reduces interviewing and data collection errors, thus improving data quality. The agreement involves the study of alternative interviewer training regimens across survey organizations, with emphasis on techniques to improve the rate of participation among sample units and improve the quality of survey responses. The University of Michigan will construct a set of alternative procedures for training interviewers in methods to reduce survey nonresponse and measurement error.

Similarly, the Census Bureau engages the services of Syracuse University's School of Education — Instructional Design, Development, and Evaluation Program. The contract provides a comprehensive evaluation of interviewer training, using the Current Population Survey's CATI and CAPI training programs as the evaluation focus. Current plans require that training design and content, training delivery, and an assessment of interviewer knowledge, skills, and abilities obtained through formal and on-the-job training be addressed.

## CHAPTER SIX: FINDINGS AND RECOMMENDATIONS

This chapter presents four recommendations to the federal statistical agencies on ways in which the training environment for survey and statistical training offered to "statisticians" might be improved at these agencies. The recommendations are:

1. Elevate priority for training at federal statistical agencies.
2. Assess training needs and opportunity within federal statistical agencies.
3. Create a formal approach to employee career development.
4. Enhance statistical literacy outreach to agency clientele.

Additionally, the subcommittee sought the insights of senior agency executives at the largest of these agencies regarding their future statistical training needs. Their insights conclude the chapter. Each recommendation is discussed in relation to findings that support the recommendation and implementation suggestions that arose from the subcommittee analysis. Each implementation suggestion was categorized as an activity that could best be undertaken by an *individual agency*, by *collaboration* between agencies, or by *standardization* among agencies.

### **Recommendation 1. Elevate Priority for Training at the Federal Statistical Agencies**

*Finding.* There is variation among agencies in amount of resources and priorities assigned to training. However, all agencies have the need for a workforce trained in statistical and survey methodology. Academic programs do not adequately prepare the workforce to conduct the functions required to produce official statistics.

*Action 1. Top Management Emphasis on Training (Individual Agency Action).* Training must take a high priority in the strategic plans of agencies. It must be made more visible. Top management must emphasize the importance of training to the agency and ensure that consistent and adequate resources are devoted to training. Training should be seen as a part of everyday work, not just a luxury or something to be done when the employee has extra time.

### **Recommendation 2. Assess Training Needs and Opportunity within Agencies.**

*Findings.* The statistical agencies exhibit great variation in the size and format of their training programs; the numbers, series, and grades of their statisticians; and the skill levels of current employees and new hires.

The majority of the statistical agency workforce consists of computer specialists (32%), survey statisticians (26%), and economists (22%). The proportion of computer specialists varied from one percent at NCES to 85 percent at the Smithsonian. There was similar variation for survey statisticians and economists. The proportion of survey statisticians varied from 2 percent at BEA to 77 percent at NCES and the proportions for economists varied from one-half of one percent at BoC to 80 percent at ERS. Mathematical statisticians, the initial focus of the study, compose only 8.6 percent of the

workforce, varying from less than one percent at the Smithsonian to 16.9 percent at EIA. But the large variation in numbers of employees at the several agencies affects the size and scope of training and development needs in these organizations.

The amount of money spent on statistical training does not appear to be a good overall measure of the adequacy of an agency training program. There is a large amount of variability in the assessment of cost of individual training courses. Not all the costs are captured as part of the accounting for agency training. The subcommittee hypothesis that average per-employee cost of training would provide a measure of training performance was not valid.

The Federal Statistical Agency training databases were not standard across agencies. The information in the existing databases was incomplete, had varied formats, and often lacked desired information.

*Action 1. Focus Groups (Individual Agency).* Agencies should consider conducting focus groups with different subpopulations of employees in order to explore employee awareness of training (where and how they get their information), what kinds of training they want more or less of, and why they may fail to take advantage of the opportunities available. This technique will expose weaknesses in the communication chain between those who plan and provide for training and those for whom it is intended. This technique was recently employed at the Census Bureau to provide employee and supervisor feedback on career development opportunities for mathematical statisticians. The feedback will be instrumental in establishing new directions for career development for this group of employees.

*Action 2. Performance Measures and Databases (Individual Agency, Collaboration, Standardization).* Training needs at each agency should be assessed on a routine basis; performance measures should be established to ensure that agencies are meeting training goals.

**N** Training databases can be very effective in facilitating evaluation of training needs. Two agencies, NASS and NCHS, have a complete and accurate training database. Elements of the NASS database are provided in Section 3 of Chapter One. These agencies could be encouraged to share information on the format and development of their databases. This could be in the form of a written article or a workshop presentation. The audience may well be broader than the federal statistical agencies.

**N** EIA has developed performance measures for its processes and resources. Those specific to training could be shared with other agencies.

*Action 3. Training Hours per Employee as Training Measure (Individual Agency, Collaboration).* Hours of survey and statistical training per "statistical" agency employee may be a more reliable comparative measure of availability of this type of training to this group of agency employees. After the agency data had been collected, a search of private sector training information uncovered a measure used in the Human Resource Development literature. *Training Magazine* reports that in 1996 the total dollars budgeted for formal training by U.S. organizations was \$59.8 billion. The total number of individuals who received formal training was 58.6 million, with professionals receiving



the greatest amount (37 hours per individual) and administrative employees the least (21 hours per individual). Data on hours of training is available on most agency training forms and agency databases. Analysis of this information would permit comparisons, among federal statistical agencies, of the quantity of training taken, but no measure of its comparative quality or effectiveness.

*Action 4. Information on Recently Hired Employees (Individual Agency).* The survey did not request "number of junior employees" and their participation in training. This information would be useful in assessing the training needs of entry level staff in comparison with those of employees who have a longer tenure with the organization.

### **Recommendation 3. Create a Formal Approach to Employee Career Development.**

*Findings.* Many survey and statistical courses are common between the federal statistical agencies who are, in many cases, using the same providers. Many federal statistical agencies support academic training for their employees in statistics, survey methodology, and computer science. Three agencies (NASS, BoC, CDC) have some formal career development programs for statisticians. Other agencies leave career development up to individual employee initiative, providing opportunities to take both in-house and external (academic or professionally sponsored) courses.

*Action 1. Training for Broad Professional Workforce (Individual Agency).* Statistical and survey training should meet the needs of this broad professional workforce which includes mathematical statisticians, survey statisticians, statistical assistants, operations researchers, computer specialists, economists, sociologists, psychologists, and anthropologists. These training needs cover a broad scope and should not be limited to the needs of the mathematical statisticians (the original focus for this study). Each agency confronts some specific requirements — caused by agency specialization — that all need to be addressed.

*Action 2. Interaction with Educational Institutions (Individual Agency and Collaboration).* More interaction with educational institutions should be encouraged to provide input on specialized courses needed by federal statisticians. The roles served by the Washington Statistical Society of the ASA and of ASA itself could be expanded. Specialized training for statisticians in areas other than statistics (such as technical writing and technical presentations) should also be addressed *by educational institutions.*

*Action 3. Sharing of Training Information (Collaboration).* Because of the variation in the nature of work done at each of the agencies and the variation in the types, grades, and skill levels of statisticians, the subcommittee does not recommend a "one size fits all" training program. It is recommended, rather, that federal statistical agencies increasingly share training resources and information. Courses offered at one agency could accept attenders from other federal statistical agencies. JPSM is presently facilitating cooperation in this area. There exists an opportunity for still more collaboration through JPSM. Examples of collaborative opportunities include:

- N Coordination of in-house courses common to several agencies may enhance agency training opportunities. For example, NASS offers a Basic Survey course that should be of interest to survey statisticians in any agency. They also developed, on videotape, a nonsampling error measurement course for agricultural statisticians. Statisticians at other agencies could benefit from this course.
- N An annual workshop for agencies to exchange information on survey and statistical training may facilitate collaboration. This might be an activity that FCSM would want to sponsor.

*Action 4. Training Collaboration Group (Collaboration).* If the agencies desire to pursue additional collaboration opportunities, a group with this focus should be established. A program of on-going measurement of training may be useful.

- N An interagency Federal Statistical Training Group could be organized to facilitate the interagency sharing of information and resources. This group could be an interest group reporting to the Federal Committee on Statistical Methodology, such as the Interagency Committee on Data Access and Confidentiality. Representatives from academic institutions (including JPSM) and a liaison with the Washington Statistical Society could participate in the group.
- N A web site would facilitate sharing of information on training opportunities and new programs and enable cross agency participation in those programs.

*Action 5. Agency Orientation Program (Collaboration).* Although agency orientation was not the focus of the study, this is another related area for potential collaboration. Agency orientation might well include an introduction to the federal statistical agency programs. This might be developed in conjunction with JPSM and their already existing seminar on the Federal Statistical System.

*Action 6. Career Development Showcase Session (Collaboration).* Because only three agencies (NASS, BoC, CDC) have designed formal career development for statisticians (or mathematical statisticians), finding out more about their plans should be of interest to all the other statistical agencies. Perhaps the three agencies could co-host a half-day showcase session for representatives from the other agencies.

*Action 7. Mentoring (Individual Agency, Collaboration).* Another approach to career development is to support professional employee mentoring programs. The only formal mentoring directed specifically toward mathematical statisticians was part of the Census Bureau Intern Program. CDC has a mentoring program, but it is not particularly focused on professional occupations. The Census Bureau is piloting a mentoring program for all professional series. Collaboration in the development of such programs has the potential to benefit all of the agencies.

#### **Recommendation 4. Enhance Statistical Literacy Outreach to Agency Clientele.**

*Findings.* Several agencies conduct statistical training for data users, customers, or other non-employees. Some federal statistical agencies provide statistical and survey methodology training to international audiences, yet make these courses generally available to agency employees. BoC, NASS, and BLS conduct extensive interviewer training programs that are very different in approach, but all have common components that would benefit from broader sharing of approaches.

*Action 1. Interviewer Training (Collaboration).* BoC, NASS, and BLS conduct interviewer training and evaluate interviewer performance. Possible collaboration might result in the development of a competency model of interviewer skills, knowledge, and abilities. Collaboration might also produce an evaluation model to measure interviewer performance.

**N** Noting interviewer competencies that are common to both agencies, generic training modules could be designed to meet the needs of both. In order to meet the shared challenge of simultaneously training a large number of interviewers in a cost-effective manner, perhaps Census Bureau and NASS could offer joint interviewer training, thus benefiting from economies of scale.

*Action 2. Non-Employee and Customer Training (Collaboration).* There also seems to be opportunity for sharing in the areas of non-employee and customer courses. Six agencies — BoC, BLS, ERS, NASS, NCES, and NCHS — provide statistical training to non-employees, including customers. Although course content might be too agency specific, the overall methodology, design, course objectives, and delivery strategies would be of value in meeting the goals of educating and informing stakeholders, the general public, and interested international parties about statistics. The administrative processes of communicating these unique courses to specialized audiences and encouraging them to participate might be of interest, as would the process of establishing cost and payment options.

## R R R R R The Future R R R R R

The information that the subcommittee gleaned from senior agency executives identified several new quantitative areas of application in federal statistical agencies. These are newly emerging fields. Rich Allen (NASS) mentioned the need for "statistical" employees to gain skills in accessing and using data from multiple sources — surveys, censuses, and administrative records. This includes computer data warehousing knowledge, record linkage, messy data analysis, and operation or household profiling. Jay Hakes (EIA) articulated a need for statisticians to lead their agencies in the development of performance measures respecting attainment of strategic goals.

Another area of increasing need is that of providing quantitative information to a broader audience (Jay Hakes; Cathryn Diplo, BLS; Pascal Forgione, NCES). This need has been greatly accelerated through the Internet and its capabilities for near-instantaneous dissemination of graphical and other information. Making data more readily available will increase the need for skills in disclosure avoidance procedures. That is, one must develop products that provide statistical data without releasing individual identities. Statisticians will need to assist in developing the quantitative literacy skills of the public. Both statisticians and the public must deal with data, metadata, and graphics. Agencies must assist in training "statisticians"

to communicate these statistical concepts. Additionally, "statisticians" will need to enhance their basic competencies in other disciplines (e.g. social sciences, computer science, business, health) as they bear on survey design and operations (Paula Schneider, BoC; Edward Sondek, NCHS).

The future shape of federal career development programs might emulate that of today's private sector, in which organizations support all employees ". . .to continually add to their skills, abilities, and knowledge." (*Robbins, p. 285*) In this model, employees take personal responsibility for their individual futures with support from their agencies (in contrast to relying on the agency to take responsibility for managing the careers of statistical employees). The federal statistical agencies are moving from a prescriptive model (wherein all participate in the same activity) to a more open descriptive model (wherein individual employees understand both the organization's goals and their own expectations). It becomes their own responsibility to develop an open descriptive plan for their training. By way of illustration, the Census Bureau has recently instituted an electronic system by which employees can view their own training history, access curriculum information and a schedule of in-house courses, then apply to participate in both in-house and academic courses.

Progressive employers facilitate and support employee development initiative by: (1) clearly communicating the organization's goals and future strategies; (2) creating growth opportunities; (3) offering financial assistance; and (4) providing the time for employees to learn." (*Robbins, p. 285*) Appropriate survey and statistical training supporting the missions of individual agencies should be made available to the agency workforce along with the opportunity to participate in the training and apply it to real work situations.

Enhancing collaboration in training across the federal statistical agencies will enhance the skills of the employees of the system. This will facilitate better mechanisms for training staff and increasing the skill level of the agencies. If this is done effectively, employee skills will be enhanced across the system. Thus, the future federal career planning process will be one in which the individual employees keep their skills, abilities, and knowledge current in order to prepare for tomorrow's new tasks with the support of their federal employer.

## **References**

Robbins, S. P. (1997).  
*Managing Today!* Prentice-Hall, Inc. Upper Saddle River, N.J.

## 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.



## **APPENDIX A: CASE STUDIES OF FEDERAL STATISTICAL AGENCY TRAINING PROGRAMS**

### **Survey and Statistical Training at Federal Statistical Agencies Training Program Case Study #1**

#### **BUREAU OF THE CENSUS U.S. Department of Commerce**

#### **I. The Agency**

The training available to Bureau of the Census statisticians and mathematical statisticians is described below. This training supports both individual career interests and the mission of the agency. The mission of the Bureau of the Census is to collect and report statistical information on people, places, and things. It is further described by the following statement:

In its best interests, a civilized nation counts and profiles its people and institutions. Doing so ably and objectively is the abiding mission of the United States Census Bureau. We honor privacy, shun partisanship, invite scrutiny, and share our expertise globally. Striving to excel, we chronicle the Nation's past, describe its present, and illuminate its future.

The Bureau's mission of data collection and dissemination is carried out by a workforce of about 5,000 employees. The majority of them work at BoC headquarters in Suitland, Maryland. The remaining employees work in the twelve regional offices, the two telephone centers in Hagerstown, Maryland and Tucson, Arizona, and the Data Processing Division in Jeffersonville, Indiana.

#### **II. Description of Statistical Employees**

There are three statistical occupational series in the Census Bureau: mathematical statistician (1529), statistician (1530), and statistical assistant (1531). In 1976, during the period covered by this report, the Census Bureau employed 278 mathematical statisticians, 998 statisticians, and 269 statistical assistants. All of these mathematical statisticians and statistical assistants were assigned to BoC headquarters, except for seven statistical assistants who worked in the Census Bureau's telephone centers; statisticians were employed both at BoC headquarters and in regional offices.

The Bureau of the Census carries out demographic and economic programs that require the technical abilities of statisticians and mathematical statisticians. The demographic programs — such as surveys

— deal with people; the economic programs deal with institutions. *Statisticians* who work in both program areas have the same tasks:

- C design and carry out sample surveys,
- C design and test survey instruments,
- C define statistical input/output requirements,
- C prepare estimates and forecasts,
- C plan and conduct research in estimation techniques, and
- C provide technical assistance to state and local data centers.

In addition to survey and census work, *mathematical statisticians* (especially those in the Methodology and Standards Division) perform statistical and methodological research. In concert with statisticians and mathematical statisticians, *statistical assistants* perform support tasks such as tabulation of raw data, elementary survey research, program specifications for data processing, and routine narratives for statistical reports.

### III. Training in Statistics and Surveys for Statistical Employees

**Training for Statisticians at BoC Headquarters.** The Census Bureau provides a range of training opportunities for statistical employees, in both technical and non-technical subjects. The purpose of training for statisticians and mathematical statisticians, as for all BoC employees, is to ensure that they have the necessary knowledge, skills, and abilities to perform their assignments successfully. The Census Bureau places high priority on training for statisticians, mathematical statisticians, and computer programmers because the proficiency level of these individuals affects the quality of BoC products. The Census Bureau provides both technical and non-technical training. The non-technical classes such as public speaking and writing are designed for employees in all occupational series.

Five types of training are available to statisticians and mathematical statisticians: college and university courses, on-site seminars, statistical association conferences, outside vendors, and staff rotation. Each type is described below.

*College and university courses:* Each division in the Census Bureau determines what college courses its statisticians and mathematical statisticians should take to meet the needs of the particular division. Shown below are the courses that statisticians and mathematical statisticians across the Bureau most often take.

Statisticians	Mathematical Statisticians	Both
Applied Sampling Econometrics Theory and Practice Theory of Sample Surveys Probability Questionnaire Design	Differential and Integral Calculus Linear Algebra Multivariate Analysis Probability and Statistical Analysis Regression Analysis	Demographic Analysis Research Methods Statistical Inference

While these courses are taken in sequence and the skills, knowledge, and abilities that employees acquire are job-related, there is no other structure or direction in terms of the purpose of the training. This issue was addressed to a large extent by the Joint Program for Survey Methodology (JPSM), established in 1993. This program, a result of a partnership among the University of Maryland, the University of Michigan, and Westat, Inc., serves current and future professionals of the federal statistical system.

The Joint Program offers four forms of instruction: introductory short courses designed for all professional staff, advanced topic short courses designed for senior technical staff, a Master of Science in Survey Methodology, and the Washington, D.C.-area offerings of the University of Michigan Survey Research Center's Summer Institute in Survey Research Techniques.

The Census Bureau annually places up to six employees in the MS program; nineteen had received degrees as of May 1998. This program offers concentration in two areas, statistical science and social science. Both programs have the same core courses; each area of concentration also requires its own specialized courses.

Core Courses	Social Science Program	Statistical Science Program
Survey Practicum I, II Data Collection Advanced Sampling Randomized/non-randomized Design Total Survey Error Federal Statistics System I, II Survey Design Seminar I, II	Social Statistics I, II Questionnaire Design Social and Cognitive Foundations of Survey Measurement Analysis of Complex Sample Data Survey Management	Introduction to Probability Theory Introduction to Statistics Statistical Methods I, II Sampling Theory Inference from Complex Surveys Topics in Sampling

To the extent that the Joint Program continues to provide quality educational experiences, the time and money expended on trainees are taken to be well spent. It is believed that a cost/benefit analysis should be conducted in the near future in terms of the impact of the training and job performance; this might be done in 1998, at the end of the Program's fifth year.

*On-site seminars:* Weekly, the Census Bureau conducts open seminars in its auditorium for all interested employees (and non-employees) on subjects related to survey and statistical aspects of the Bureau's work, such as research methodology, sample survey design, and measurement techniques. These seminars provide "state-of-the-art" overview and enhance working relationships between researchers and survey designers.

Non-technical courses also are conducted frequently in the Census Bureau for all employees: project management, managing time and stress, effective writing, professional presentations, customer services, problem solving, teamwork, and effective meetings. Non-technical training enables employees to carry out assignments more effectively by providing them with "people" or "human interaction" skills essential to good performance.

*Statistical Associations:* Statisticians and mathematical statisticians, in particular, are encouraged to participate in American Statistical Association conferences and Washington Statistical Association seminars. Such participation enables employees to develop public relations skills as well as to learn how other organizations in the federal statistical system operate. It is a good networking and professional development experience.

*Vendors:* The Census Bureau sponsors about 2,000 instances of "human interaction" type training (non-ADP, non-academic) by outside, private vendors. About half of these are attended by statisticians and mathematical statisticians.

*Career Development Program:* The Census Bureau has been experimenting on a small scale with a mathematical statistician career development program. Employees enter the program at their current grade level (9 to 13) through a competitive process. Sixteen individuals have participated in the program. This program is described in Chapter 4, "Education and Career Development Programs."

**Regional Office Training for Statisticians at BoC.** Training for statistical employees located in the Census Bureau's twelve regional offices is different from that at BoC headquarters because the jobs of regional-office employees are entirely different. In the field, statistical employees in grades 9 or above actually serve as supervisors almost as soon as they are hired. They supervise field representatives and senior field representatives; these "representatives" are actually the ones who go door-to-door collecting information for a particular survey, such as the Current Population Survey. Each senior representative supervises a crew of field representatives, and the statistical employee supervises the whole group.

Given the demands of the job of a statistical employee in the field, therefore, it is critical that these individuals understand and master teamwork and basic supervisory skills as soon as possible. To help accomplish this goal, each regional office conducts an intensive orientation for new employees where all expectations are discussed extensively. The orientation, which may extend up to a week, is the basic training given to all field employees. Other sources of training, such as the Office of Personnel Management's training centers and local private vendors, are utilized to round out new employee's scope of knowledge. Outside training typically covers basic management principles such as coordination, budgeting, reporting, motivating employees, and project review and analysis.

**Training for Interviewers.** This is described in Chapter 5, "Interviewer Training."

#### **IV. Training in Statistics and Surveys for Non-employees**

Training for non-employees provided by the Census Bureau is primarily for representatives of governmental and statistical agencies outside the United States. This is described in Chapter 2 (at page 25).

#### **V. Training Costs**

The Census Bureau supports trainees in the Joint Program by paying tuition and related fees, reimbursing employees for mileage beyond their normal commuting distance, and providing up to 20 hours of work

release time to commute and attend classes. Other training costs are paid by the relevant employee's division.



Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #2

**BUREAU OF LABOR STATISTICS**  
U.S. Department of Labor

**I. The Agency**

The Bureau of Labor Statistics (BLS) is the principal fact-finding agency for the federal government in the broad field of labor economics and statistics. The BLS is an independent national statistical agency that collects, processes, analyzes, and disseminates essential statistical data to the American public, the U.S. Congress, other federal agencies, state and local governments, business, and labor. The data relates to employment, unemployment, and other characteristics of the labor force; consumer and producer prices, consumer expenditures, import and export prices; wages and other worker compensation; productivity and technological change; employment projections; occupational illness and injuries, and international comparisons of labor statistics. The BLS also serves as a statistical resource to the Department of Labor.

BLS data must satisfy a number of criteria, including relevance to current social and economic issues, timeliness in reflecting today's rapidly changing economic conditions, accuracy and consistently high statistical quality, and impartiality in both subject matter and presentation.

**II. Description of Statistical Employees**

In FY 96 the BLS had a total of 2,449 Headquarters and field office personnel:

Mathematical Statisticians (1529 series) . . . . .	91
Statisticians (1530 series) . . . . .	33
Economists (0110 series) . . . . .	1,166
Computer Specialists (0334 series) . . . . .	282
Computer Assistants (0335 series) . . . . .	20
Statistical Assistants (1531 series) . . . . .	19
Psychologists (0180 series) . . . . .	9
All Others . . . . .	829
Total . . . . .	2,449

Mathematical statisticians at BLS are responsible for assuring the statistical integrity of the sample survey estimates. As a result, many positions offer opportunities in the design of large-scale sample surveys and some positions involve research into new techniques for sample design and estimation. In planning and designing sample surveys, statisticians work closely with economists and computer specialists regarding program objectives, survey design, and systems development. Mathematical statisticians perform work involving the development and adaptation of mathematical statistical theory and methodology for a wide variety of statistical investigations. They investigate and evaluate the applicability, efficiency, and accuracy of the theory and methods used by subject-matter specialists or other statisticians in various statistical programs and studies. Typical duties include:

- C developing and refining sampling frames,
- C defining and implementing sample survey designs,
- C measuring quality of data collected and improving data collection and processing procedures,
- C deriving or selecting appropriate estimation procedures and preparing written systems requirements,
- C evaluating the results of surveys for sample design and accuracy,
- C researching and developing statistical procedures to improve surveys,
- C serving as statistical consultant for economic analysts of the Bureau.

### **III. Training in Statistics and Surveys for Statistical Employees**

The BLS has a fully equipped on-site training and conference center that provides a wide variety of classes and seminars. An on-going information technology training program is designed to meet the needs of staff. In addition to on-the-job training and technical training attended during regular work hours, there are opportunities to attend courses at local universities and to participate in conferences and seminars around the country.

Additionally, BLS provides various training seminars for its national office and field staff in the areas of data collection and program methodology. This training focuses on the areas of federal/ state data collection, the Consumer Price Program, and Wage and Compensation programs. The seminars are designed for economists, statisticians, researchers, analysts, and managers, to strengthen the participants' ability to collect and analyze economic and labor statistics and data.

### **IV. Training in Statistics and Surveys for Non-employees**

The BLS provides international training seminars of three to eight weeks at its training facilities in Washington, D.C. The seminars are designed for economists, statisticians, researchers, analysts, and managers for labor ministries, planning ministries, central statistical offices, central banks, development agencies, social affairs ministries, universities, trade unions, and the private sector. These seminars are specialized training based upon the needs and interests of the participants. They are designed to strengthen participants' ability to collect and analyze economic, labor, and social statistics as well as their ability to apply the results to policy formulation, especially for human resources development.

### **V. Training Costs**

In FY 1996, the BLS training budget was \$1,206,000. Approximately 7.7 percent of that was spent on statistical training courses and seminars alone.

Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #3

**CENTERS FOR DISEASE CONTROL AND PREVENTION**

**I. The Agency**

The Centers for Disease Control and Prevention is composed of eleven Centers, Institutes, and Offices which employ 6900 people in 170 occupations. CDC Headquarters in Atlanta, Georgia at the Clifton Road facility employs over 1600 people. The mission of CDC is: "To promote health and quality of life by preventing and controlling disease, injury, and disability." This outlines the statistical component of CDC's workforce and the statistical training available to them.

**II. Description of Statistical Employees**

The description of statistical employees given below does not include employees of the National Center for Health Statistics.

Mathematical Statistician, GS-1529, number employed: 67

Serves as technical and research consultant in mathematical and theoretical statistics and statistical analysis, provides assistance in the design of epidemiological studies and the resultant analyses, and develops mathematical models for estimating disease risk.

Statistician, GS-1530, Health or Survey, number employed: 53

**R Health Statistician:** Provides technical support in all phases of analytical process including design of studies, design of data collection instruments and systems, planning and selecting appropriate statistical techniques for analysis of data, assessing the quality of data, and presenting the results of studies and research.

**R Survey Statistician:** Participates in the planning, development, and conduct of national surveys; plans and conducts methodological and evaluative studies relating to quality of data, data collection methods, and medical coding techniques and practices.

Statistical Assistant, GS-1531, number employed: 20

Involves one or more of the following assignments: processing questionnaires or reporting forms to obtain and compile data for specific studies; preparing tables, charts or graphs for presentation or publication; editing questionnaires or reporting forms for completeness and consistency; performing scientific support work for statisticians and other professional personnel.

### III. Training in Statistics and Surveys for Statistical Employees

**Training for Statisticians.** No formal policy exists for statistician training. Courses sponsored by CDC are shown below, followed by courses from vendors and three additional training programs.

CDC-sponsored Training for Employees	
Course Title	Course Description
Basic Sampling Methods	Terminology and basic approaches to survey sampling, indicating how these all tie in to the process of designing a good sample.
Categorical Data Methods and Counterparts in Regression	Classical categorical data analysis and modern regression methods that have been developed to perform many of the same analyses.
Design and Analysis of Case Control Studies	Rationale and structure of case-control studies, selecting cases and controls, and performing statistical analyses on case-control study data.
Introduction to Neural Networks: Concepts and Applications	Provides an overview of neural networks.
Neural Networks: Hands-on Training	Using neural networks: computer lab
Modern Regression and Classification	A short course on the state of the art in modeling and prediction.
Regression Modeling	Regression analysis, including logistic regression models.
Research Methods in Epidemiology	Design, analysis, and interpretation of epidemiological studies.
SAS Courses	All levels of SAS training; many courses offered.
SUDAAN, Beginning and Advanced	Introduces researchers to SUDAAN, a statistical software package for analyzing complex sample survey data.
Statistics I	Introduction to descriptive statistics and elementary probability.
Statistics II	Rules of probability and probability distributions.
Statistics III	Estimation, hypothesis testing, and analysis of paired data.
Survey Design and Analysis	Continuation of Basic Sampling Methods

Non-CDC Training for Employees		
Course Title	Sponsor of Training	Cost
Advanced General Linear Models, with Emphasis on Mixed Models	SAS Institute	\$ 675
Advanced SAS Programming Techniques and Efficiencies	SAS Institute	550
Applied Introduction to Categorical Data Analysis	American Statistical Association	250
Basic Statistics	Penn State	600
Bayesian Data Analysis	American Statistical Association	350
Building SCL Applications	SAS Institute	675
Exact Statistical Methods in ANOVA and Mixed Models	American Statistical Association	150
Generalized Linear Models	Emory University	1750
Interfacing StatXact-3 and SAS 6.11 for Exact Tests	American Statistical Association	40
Jumpstart S-Plus	Hamilton Labs	85

Non-CDC Training for Employees		
Course Title	Sponsor of Training	Cost
Multivariate Statistics	University of Florida	850
Probability	Emory University	3500
Regression Models for Complex Survey Data	Joint Program in Survey Methodology	375
Sampling Based Methods for Bayesian and Likelihood Inference	American Statistical Association	350
Statistical Disclosure and Disclosure Limitations	Joint Program in Survey Methodology	350
Survival Analysis in Epidemiology	New England Epidemiology Institute	400
Theory of Linear Models	Emory University	1750

*Quantitative Methods Enhancement Program.* This program is described in detail in Chapter 4, "Education and Career Development Programs."

*Long-term Training.* Opportunities are available to selected employees. Long-term training is full-time training through non-government facilities that lasts more than 120 consecutive days.

*Analytic Methods Forum.* Each month this lecture series explores a new topic involving analytical methods. Topics presented in 1996 included estimating risk ratios in logistic regression, analysis of repeated measures of continuous outcomes using mixed models, and interval estimation of the odds ratio in logistic regression. This series is frequently attended by area university students.

**Training for Interviewers.** Each year a new class of Epidemic Intelligence Service officers is oriented on how to conduct an epidemiological study. Part of their training consists of instruction in how to collect data. Included in this training are guidelines for developing and administering questionnaires.

**IV. Training in Statistics and Surveys for Non-employees**

**Analytic Methods Internship Program.** This program is designed for graduate students who wish to gain training and personal experience in the development of statistical and other analytical methods for public health applications.

**V. Training Costs**

- CDC-sponsored training for employees, approx. . . . . \$246,000
- Non-CDC-sponsored training for employees, approx. . . . . \$40,000
  
- CDC-sponsored training for non-employees . . . . . not reported

Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #4

**ENERGY INFORMATION ADMINISTRATION**

**I. The Agency**

The Energy Information Administration (EIA) was created by law in 1977 as an independent statistical agency. It consolidated energy data collection and analysis. EIA was designed to be the focal point for Federal energy information. It was designed to serve all decision makers. Between them, EIA's four program offices collect data, monitor energy markets, analyze data, forecast future needs, and prepare reports.

The special characteristics of EIA include:

1. Within the Department of Energy, EIA is nonetheless an independent agency.
2. EIA gathers information for both regulatory and statistical uses.

EIA's vision is:

“On-line and off the shelf, EIA is the first place to go for the last word in energy information.”

EIA's mission is:

“The Energy Information Administration is a leader in providing high quality, policy independent energy information to Government, industry, and the public, in a manner that promotes sound policy making, efficient markets, and public understanding.”

EIA prides itself on its customer-oriented attitude. It seeks to provide timely, relevant and accurate products and services and strives for quality and cost effectiveness. EIA pursues its customers' trust through open processes, clear communication, and responsiveness to their needs.

At the top of the EIA organization is the Administrator, who reports directly to the Secretary of Energy. The second in command is the Deputy Administrator. EIA currently has four program offices. These are the Office of Oil and Gas, the Office of Energy Markets and End Use, the Office of Coal, Nuclear, Electric and Alternate Fuels, and the Office of Integrated Analysis and Forecasting. Other groups within the agency include the National Energy Information Center, which answers energy questions and distributes energy publications; the Office of Resource Management, which handles budget and personnel issues; the Information Technology Group, which is responsible for computer operations and internal computer training; and the Statistics and Methods Group, which is responsible for providing statistical and analytical support to the Agency (including the task of organizing statistical and industry seminars and workshops).

At the end of FY 1995, there were 464 employees in EIA; by the end of 1996, the number had declined to 420. The distribution of employees by job series was similar in the two years.

At the end of FY 1995, the number of EIA mathematical statisticians was 36 and the number of survey statisticians was 41. At the end of FY 1996, the number of EIA mathematical statisticians had declined to 33, and the number of survey statisticians to 37.

## **II. Description of Statistical Employees**

Statisticians at EIA perform a wide range of activities. Some manage all aspects of the operation of a survey, from mail-out to obtaining data that are ready for publication. Others concentrate on the development of statistical methodology such as sampling, estimation, editing and imputation procedures. Some statisticians focus on ensuring the quality of the data through performance measures, evaluations and other special studies. Others are involved in forecasts and analyses pertaining to energy issues.

## **III. Training in Statistics and Surveys for Statistical Employees**

**Training for Statisticians.** EIA provides several types of training for statisticians. The first type is formal classroom training at universities or from outside vendors. Formal training included courses in statistics, computer skills, energy industry, technical writing, and quality control.

The Office of Statistical Standards (now the Statistics and Methods Group) offered statistical and industry seminars and workshops. In 1995, Office of Statistical Standards training included:

- FEDWORLD Internet System
- Determinants of Long-Run Energy Demand
- Intermediate Econometrics
- Restructuring the Electric Power Industry
- Commodity Pricing of Natural Gas
- Writing Well and Writing for Results
- Structural Econometric Modeling, Forecasting, and Uncertainty

In 1996, Office of Statistical Standards training included:

- On Writing Well
- Writing For Results
- Structural Econometric Modeling, Forecasting and Uncertainty
- Electric Utility Restructuring
- Basic Statistics
- A Basic Understanding of the Electricity Futures Market
- Electricity Transmission (Network Theory)
- Qualitative Choice Analysis

Because EIA maintains its own computer center, it also provides computer training such as Microsoft Access. EIA has several computer self-paced tutorials, such as Statistical Analysis System (SAS). EIA also offers informal training such as one-on-one coaching and mentoring.

*Training Policy for Statisticians.* EIA has as a strategic goal: to work together to achieve the full potential of a diverse work force through teamwork and employee development. In the past EIA's practice has been to hire highly-trained personnel. Thus, career development programs have not been formalized as they have been for the statistical agencies featured in Chapter 4.

One issue that affects training policy is the budget. The allocation of training funds must be adequate and allocated according to well-developed plans.

**Training for Enumerators.** EIA conducts two surveys that involve enumerators. The Residential Energy Consumption Survey (RECS) collects information from households across the United States through an in-person on-site interview. The Commercial Buildings Energy Consumption Survey (CBECS) collects similar information from commercial buildings. For the 1997 RECS and the 1999 CBECS, interviewing will utilize the Computer-Assisted Personal Interviewing (CAPI) technique. The training procedures for RECS have been developed and are described below. Detailed procedures for CBECS have not yet been developed, but will be similar to RECS.

For RECS, each interviewer has a laptop computer loaded with the Household Questionnaire, as well as case management information to help both the interviewer and Headquarters (HQ) staff track survey response status. The CAPI Questionnaire leads the interviewer through the survey instrument and the interviewer keys in the respondent's answers. The completed interviews are then sent to the contractor's HQ via a modem. For the 1997 RECS, there were two three-day in-person training sessions, held during the first two weekends in April.

The training included a small amount of home study prior to the session and a practice interview with a respondent of the interviewer's choice after the session. After the practice interview had been completed and reviewed by HQ, the interviewers began their assigned data collection cases. Approximately 200 interviewers were trained in the two sessions. Because of the hands-on nature of CAPI training, all of the training was conducted in small groups of 16-17 interviewers each.

There was a pretest of the 1997 RECS CAPI Household Questionnaire at the end of 1996. During that time, a "mini" training session was held for the group of interviewers involved in the pretest. The current training content reflects input from that pretest training, previous experience and "lessons learned" from 1995 Commercial Buildings Energy Consumption Survey CAPI training, and the survey contractor's experience with both CAPI and previous RECS and/or CBECS. The basic content of the three-day training includes: CAPI Training, a review of the Case Management System, RECS sampling exercises, practice sessions of easy, medium, and difficult versions of the Household Questionnaire, and discussions of Questionnaire topic areas.



#### **IV. Training in Statistics and Surveys for Non-employees**

EIA does not currently offer any formal statistical or survey training courses for non-employees. Contractors working on EIA tasks have the opportunity to enroll in courses that are offered to EIA employees.

#### **V. Training Costs**

For FY 1996, the total operating expenditures were \$72.150 million and the total training expenditures were \$226,000, or 0.3 percent. The costs for FY 1997 are projected to be \$70.927 million for total operating expenditures and \$218,000 for training, or 0.3 percent.

Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #5

**NATIONAL AGRICULTURAL STATISTICS SERVICE**  
U. S. Department of Agriculture

**I. The Agency**

This is an overview of the National Agricultural Statistics Service (NASS), USDA’s statistics agency, and of its training programs referred to throughout this report. NASS produces estimates for “production, stocks, inventories, disposition, utilization, and prices of agricultural inputs and commodities,” and other items, such as labor, farm numbers, and agricultural chemical usage. NASS provides its services through a main Headquarters unit located in Washington, DC, and in 45 State Statistical Offices (SSOs) serving all 50 states. The mission of NASS is: “To serve the United States, its agriculture, and its rural communities by providing meaningful, accurate, and objective statistical information and services.”

**II. Description of Statistical Employees**

The following sections describe the five types of statistical employees in NASS: mathematical statisticians, ADP statisticians, agricultural statisticians, survey statisticians, and statistical assistants. Listed are the title, occupational series, grade level, location, and duties and responsibilities of each type.

Mathematical Statistician - 1529	
Headquarters, GS-12 and above	State Statistical Office, GS-09 and above
<ul style="list-style-type: none"> <li>C design and conduct research on new procedures for agricultural data collection, estimation, forecasts</li> <li>C research to improve crop and livestock production estimates/models and forecasts using LANDSAT and remotely sensed data</li> <li>C plan, co-ordinate, and conduct major remote sensing research projects</li> <li>C crop yield estimation using weather data modeling and satellite sensor input</li> <li>C develop new methodologies to use satellite digital data to improve area estimates of U.S. crops</li> <li>C international projects to improve foreign agriculture estimation, including design of area sampling frame, sample selection procedures, questionnaire design, data collection, editing, and processing</li> <li>C publish research</li> </ul>	<ul style="list-style-type: none"> <li>C crop and livestock tasks, similar to the duties of a 1530</li> <li>C recommend math techniques/methods to plan/conduct surveys</li> <li>C recommend sample frames and data sources</li> <li>C design, allocate, and supervise drawing of samples</li> <li>C recommend questionnaire design/construction</li> <li>C train enumerators/data collectors (office and/or field)</li> <li>C perform mathematical analyses for isolating and measuring sampling and non-sampling errors to increase statistical sampling efficiency</li> <li>C work with commodity statisticians to build list frames</li> <li>C use multiple frame sampling techniques to design/draw list frame samples</li> <li>C evaluate data collection forms for efficiency in data conversion and processing</li> <li>C determine validity and representativeness of data</li> <li>C prepare estimates/forecasts</li> <li>C serve on Agricultural Statistics Board</li> </ul>

ADP Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
<ul style="list-style-type: none"> <li>C implement end-user training for LAN hardware and software</li> <li>C provide network and LAN administration support</li> <li>C install and provide training on software products for personal computers</li> <li>C collaborate with those outside NASS to support the development of end-user computing applications</li> <li>C provide advice to NASS staff in matters pertaining to hardware and software</li> </ul>	<ul style="list-style-type: none"> <li>C basic statistical survey methods and techniques</li> <li>C analyze and maintain list frame</li> <li>C conduct surveys</li> <li>C assist with enumerator training</li> <li>C make objective yield counts for yield determinations</li> <li>C participate in automated data processing projects</li> <li>C prepare flow charts</li> <li>C write simple automated applications</li> <li>C create job control statements</li> <li>C participate in analysis of survey data</li> <li>C examine survey forms to determine validity</li> </ul>

Agricultural Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
<ul style="list-style-type: none"> <li>C plan, direct, implement nationwide programs</li> <li>C formulate overall policies, programs</li> <li>C define statistical input/output requirements</li> <li>C determine estimates and forecasts for programs</li> <li>C plan and conduct research in estimation techniques</li> <li>C serve on Agricultural Statistics Board and World Agricultural Outlook Board</li> <li>C analyze/interpret survey data</li> <li>C set national estimates</li> <li>C provide technical assistance to SSOs</li> <li>C represent the agency at industry meetings</li> <li>C crops work assignments: crops programs such as oil seeds and Crop Weather</li> <li>C livestock work assignments: animal programs such as cattle and poultry</li> <li>C economics work assignments: ecology programs such as pesticide usage</li> </ul>	<ul style="list-style-type: none"> <li>C plan, direct, implement statewide programs</li> <li>C prepare reports critical to agricultural production and state economy</li> <li>C determine statewide procedures for conducting surveys, analyzing and preparing estimates and forecasts, and editing data</li> <li>C disseminate data to the public in the state</li> <li>C serve on Agricultural Statistics Board</li> <li>C crops work assignments: specialist on a group of crops</li> <li>C livestock work assignments: animal specialist</li> </ul>

Survey Statistician - 1530	
Headquarters, GS-12 and above	State Statistical Office, GS-05 and above
<ul style="list-style-type: none"> <li>C data collection methodology/questionnaire design</li> <li>C evaluate survey for data collection effectiveness</li> <li>C conduct cognitive studies for questionnaires</li> <li>C evaluate data collection procedures to improve data quality, decrease respondent burden, and produce more timely collecting and editing of data</li> <li>C ensure content consistency: between paper and computer assisted questionnaires; across NASS nationwide survey programs; sound data collection methods across surveys</li> <li>C serve on Agricultural Statistics Board</li> <li>C assist SSOs with data collection procedures, questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>C plan, direct, and implement various surveys</li> <li>C determine statewide procedures for conducting surveys, analyzing/preparing estimates and forecasts, and editing data</li> <li>C disseminate data to the public in the state</li> </ul>

Statistical Assistant - 1531	
Headquarters, GS-05 to GS-09	State Statistical Office, GS-05 to GS-08
<ul style="list-style-type: none"> <li>C responsible for complex technical work</li> <li>C collect, validate, tabulate, and analyze data to prepare reports</li> <li>C maintain master/historical files</li> <li>C collect data via telephone from non-respondents</li> <li>C reconcile data inconsistencies with respondents</li> <li>C use micro computers and software to validate/tabulate data</li> <li>C assist crop/livestock statisticians</li> <li>C prepare statistical tables, time series charts, and narratives for publication</li> <li>C prepare spreadsheets and documentation for Agricultural Statistics Board</li> </ul>	<ul style="list-style-type: none"> <li>C assemble data for state release and reports</li> <li>C establish/conduct routine reoccurring surveys</li> <li>C prepare survey materials</li> <li>C check completed surveys for accuracy, consistency</li> <li>C review and summarize data</li> <li>C co-ordinate data entry</li> <li>C recommend estimates</li> <li>C lead technical support assistant</li> <li>C update list sampling/area frame records after each survey</li> <li>C statistical/clerical work during all survey phases: pre-survey, survey, post-survey</li> </ul>

### III. Training in Statistics and Surveys for Statistical Employees

This section describes the training opportunities available to NASS statistical employees. The learning activities can be divided into two categories: non-competitive and competitive. NASS Policy and Standards Memorandum 20-96 states the NASS policy on employee training activities.

**Training for Statisticians.** Each employee in NASS is required to have an approved Individual Development Plan (IDP) on record, updated annually to reflect the mutual needs of the employee and the agency. All GS-05 through GS-11 agricultural statisticians and mathematical statisticians are automatically enrolled in the Core Technical Development Program, which provides cross-series qualifications and activities. The IDP lists the training activities that provide the knowledge, skills, and abilities to perform successfully in the 1529 and 1530 job series at the GS-12 level. Agricultural statisticians and mathematical statisticians have similar core IDPs.

The unique training, educational, and developmental needs and objectives of each employee are coordinated with the career opportunities in the agency. Consideration is given to both the short- and long-term agency goals and the employee's career goals. Individual plans vary, ranging from college courses and other formal programs to "none" for employees who are fully competent at their current tasks and have completed the Core Technical Development Program at the GS-12 level. Activities needed to accomplish goals are planned and scheduled within the unit's workload and budget constraints.

*Non-competitive, Job-related Training.* Non-competitive training courses are provided for all statistical employees, based on job requirements and need for training. Non-competitive training courses provided for statistical employees are listed below.

Office orientation  
 Headquarters orientation  
 On-the-job training / Core Technical  
 Development program  
 Basic concepts training:  
 Survey basics  
 Yield concepts  
 Estimation basics  
 Advanced survey training  
 Advanced estimation training  
 Special survey training  
 Senior statistician workshops

Systems services training:  
 List frame  
 CASIC Coordinator  
 LAN Administrator  
 ADP  
 Survey Software:  
 Blaise, SAS, PEDBUGS, TSO, FSE, C-  
 list, SPF, etc.  
 Computer / Agricultural Career  
 Enhancement (CACE)  
 Mathematical / Agricultural Career  
 Enhancement (MACE)

*Competitive Programs.* Competitive technical programs fall into one of two types, educational or developmental. They are exemplified by the full-time Graduate Education Program and the Career Development Intern Program.

" Graduate Education Program: An agricultural or mathematical statistician can apply for any of the three competitive, full-time Graduate Education Programs listed below when he/she meets the following requirements: (1) employed by NASS for one year, (2) at GS-09 level or above, (3) performing in a superior manner, (4) making satisfactory progress on IDP, (5) completed course pre-requisites, and (6) satisfies graduate entrance requirements.

**N** **Mathematical Statistics** — Agricultural statisticians and mathematical statisticians take advanced statistics and statistical theory courses to become highly educated mathematical statisticians. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division, the Estimates Division, or the Survey Management Division.

**N** **Survey Methodology** — Agricultural statisticians and mathematical statisticians take courses in survey methodology. Participants attend the Joint Program for Survey Methodology at the University of Maryland to become highly educated survey methodologists. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division or the Survey Management Division.

**N** **Information Technology** — Primarily designed for computer specialists to acquire advanced training in software engineering, telecommunications, and management information systems. This program is also open to agricultural statisticians and mathematical statisticians with strong interest and background in computer systems and information technology. Upon completion, graduates are usually assigned to BoC headquarters, either to the Research Division or the Systems and Information Division.

Candidates are competitively selected for the programs but are placed non-competitively in BoC headquarters positions at grade GS-13 after successfully completing the program. Each program usually provides at least one year of full-time, graduate-level education. During the program, candidates develop a new IDP encompassing any pre-requisite courses, as well as all required

courses for the program. Field statisticians are generally reassigned to the SSO nearest the approved university.

- " Career Development Intern Program: Field agricultural statisticians can apply for the Career Development Intern Program (CDIP) if they meet the following requirements: (1) at NASS for five years, (2) at GS-11 level for two years, or expecting a relocation to their second SSO assignment, or at GS-12, and (3) making satisfactory progress on their IDPs. The CDIP is expressly designed to provide additional training and career-enhancing experiences so that agricultural statisticians receive the same training opportunities as do statisticians in other series when competing for training programs that culminate in GS-13 positions in Headquarters. Candidates are competitively selected for CDIP. During the program, candidates develop a new IDP reflecting experiences to be gained and courses taken in preparation for the GS-13 level. When the second SSO assignment begins, a program of work is jointly developed by the Field Operations Division, Estimates Division, and the supervising State Statistician. The program typically includes:

- N a full workload in the SSO
- N assignments rotated between commodities and surveys
- N attending commodity meetings with State Statisticians
- N attending national commodity meetings with Estimates Division staff
- N attending supervisory and management workshops
- N taking Dale Carnegie courses
- N joining Toastmasters
- N attending writing workshops

After successful program completion, CDIP participants may be transferred non-competitively to an agricultural statistician BoC headquarters position at grade GS-13 in the Estimates Division or the Survey Management Division.

**Training for Interviewers.** Although the staffs at NASS headquarters and field offices coordinate training activities for enumerators and supervisory enumerators, the majority of training sessions are managed by the SSO statisticians.

*Enumerator Training by SSO Staff.* This is described in Chapter 5, "Interviewer Training."

*Enumerator Training by Headquarters Staff.* The Data Collection Branch, part of the Survey Management Division in Headquarters, coordinated Telephone Interview Monitoring training during FY 96. Telephone monitoring, a quality control procedure for data collection, is new to NASS. In these training sessions, the office supervisory enumerators learned to electronically monitor both interviewers and respondents during operational telephone data collection conducted in state offices. Monitoring sessions have several uses for supervisory enumerators: (1) train new interviewers by providing feedback on performance, (2) assess each interviewer's strengths and weaknesses, (3) pinpoint areas where interviewers might need additional training, and (4) identify problem areas in the questionnaire.

Forty SSO Telephone Supervisory Enumerators were trained in five two-day sessions, held around the country.

#### **IV. Training in Statistics and Surveys for Non-employees**

On a recurring basis, NASS conducts unique survey and statistical training sessions for international groups. For example, a “Basic Agricultural Survey Statistics and Methods” course was conducted in Washington, D.C. from September 16 to October 10, 1996 for eleven statistical employees of organizations in three countries. The course was designed to give a complete overview of an agricultural statistical program. The learning goals were to: (1) understand types of sampling and sampling frames, (2) construct sampling frames and select a sample, (3) design questionnaires for data collection, (4) understand the importance of quality control, (5) implement a control program, (6) edit, summarize, and analyze data, and (7) formulate a report of the results of a survey. Training was accomplished using lectures, audio visual instruction, demonstrations, and field trips. The instructors were NASS subject matter experts, most of whom had extensive international experience.

#### **V. Training Costs**

NASS allocates annually about 3.0 percent of its appropriated budget to human resource development activities, including statistical and survey training. Training costs were 2.41 percent of the \$90 million FY 96 budget; 3.18 percent of the FY 95 budget; and 2.75 percent of the FY 94 budget.

Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #6

**THE NATIONAL CENTER FOR EDUCATION STATISTICS**  
U.S. Department of Education

**I. The Agency**

The National Center for Education Statistics (NCES) is the primary apolitical federal agency for collecting, analyzing, and reporting data related to education in the United States and other nations. It is headed by a Commissioner appointed by the President, and is currently a part of the Office of Educational Research and Improvement, U.S. Department of Education.

NCES' mission is to fulfill a congressional mandate to collect, collate, analyze, and report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in foreign countries (see Section 406(b) of the General Education Provisions Act, as amended (20 U.S.C. 1221e-1)).

NCES activities are designed to address high priority education data needs; provide consistent, reliable, complete, and accurate indicators of education status and trends; and report timely, useful, and high quality data to the U.S. Department of Education, the Congress, the states, other education policymakers, practitioners, data users, and the general public.

**II. Description of Statistical Employees**

As of March 1997, NCES had 108 employees, the majority of them statisticians. The staff was made up of:

- 14 mathematical statisticians (GS-1529),
- 64 statisticians in education (GS-1530), and
- 3 statistical assistants (GS-1531).
- 9 program analysts (GS-0343),
- 5 office automation assistants (GS-0326),
- 1 computer specialist,
- 1 economist, and
- 11 others.

In general, statisticians are involved in the development and implementation of data collection, analysis, report writing, and information dissemination. Most of them, particularly those at higher grade levels



(GS 13 and up), also have responsibility for monitoring contracts with private firms that carry out projects for NCES, including survey design, data collection, data analysis, and report writing.

Several mathematical statisticians bear responsibility for reviewing the sample design, variance estimation, and imputation procedures for various studies across the Center. They also provide statistical review of NCES products to ensure that the products meet NCES statistical standards.

### **III. Training in Statistics and Surveys for Statistical Employees**

The NCES has training programs for staff to learn or upgrade their knowledge and skills in statistical design, analysis, and project management. These programs are in three categories:

- N Training courses provided by the Department of Education;
- N In-house training through the NCES University (NCESU); and
- N Training courses provided by external sources such as the USDA Graduate School and Joint Program for Survey Methodology.

Through these three types of training opportunity, staff members could upgrade their skills or acquire new knowledge in statistical methods to perform their tasks. In the 1996 Department Employee Survey, over 70 percent of NCES staff expressed satisfaction with the training opportunities available to them.

The Training and Development Center of the Department of Education offers a wide range of courses for employees, including computer software applications, leadership skills, contract and grant management, and technical skills such as writing and basic concepts of statistics. Most of these courses are free to Department of Education staff. In addition, the Department supports a few selected staff members to participate training programs offered by the Office of Personnel Management. Participating members will be selected through a competitive review process.

**Training for Statisticians.** Training for statisticians is provided through NCESU or external sources. NCES considers training an important professional development activity, and has been generally proactive in providing training opportunities to its staff.

The NCES University (NCESU) offers seminars and courses for its own staff (and staff from other offices within the Department). A number of topics have been covered, including (1) statistical methods such as logistic regression, hierarchical linear modeling, variance estimates for complex sample data, and missing data imputation; (2) computer applications such as SUDAAN and Wesvar PC — special computer programs for handling survey data from complex sample designs; (3) contract management, such as developing the statement of work and project cost estimates; and (4) emerging educational priorities, issues and policies. NCESU also sponsors seminars on products or findings of projects supported by NCES. Courses are either taught by in-house staff who have the needed expertise or outside experts in pertinent fields. These seminars and courses are offered on an as-needed basis. There is no regular schedule for these activities.

NCES also supports programs provided by outside vendors. In FY 96, for example, fourteen staff members participated in courses offered by the JPSM and other universities. Courses include: regression models for complex survey design, variance estimates for sample survey, cognitive and communicative aspects of survey, and total survey error.

**Training for Interviewers.** NCES does not offer enumerator training. NCES contracts out all data collection to private companies or the Bureau of the Census. These contractors generally train their enumerators before they collect and process data.

#### **IV. Training in Statistics and Surveys for Non-employees**

The NCES has a unique training program for external data users to promote the effective and correct use of NCES data. These data users include faculty members and graduate students in higher education institutions as well as researchers and data analysts at the state and local education agencies, professional associations, and other Federal agencies.

Some of these users are also NCES data providers. Thus, the training would help these people gain a better understanding about the importance of the data they provided; in turn, they might possibly help NCES improve its future data collection procedures and data quality.

The training program offers seminars on the use of NCES databases usually in the summer each year. Each seminar is about four to five days long. During these seminars, participants learn how to access and analyze the NCES data properly and correctly. They also review certain statistical topics such as sample design, variance estimation, imputation, sampling weights and their use in analyses. Instructors for these seminars are usually NCES staff, mostly the project officers, who have had extensive knowledge and experience in the subject matter. Sometimes nationally known experts in a field such as hierarchical linear modeling and item scaling are invited to give lectures.

The conduct of seminars is considered NCES ional databases and to improve data quality. For this reason, NCES provide financial support to participants, covering their travel and per diem. Over 800 individuals have participated in these seminars over the past 6 years.

In addition to these programs, NCES frequently conducts training seminars at the annual meetings of professional associations such as the American Educational Research Association and the Association for Institutional Researchers. These seminars help participants gain a proper perspective about NCES data sources and some hands-on experience in accessing and analyzing NCES data.

To facilitate the analysis of NCES data by outside users, NCES also placed a great emphasis on developing user-friendly data files and procedures for assessing NCES databases, including the use of CD ROMs to store data, the use of electronic codebooks to help users identify data elements and create analysis subfiles, and the data license system to allow researchers to access restricted data. These efforts have significantly helped educational researchers and policy analysts outside of NCES.

## **V. Training Costs**

NCES has only limited funds to support staff attendance at training programs outside the agency. In FY 96, the total amount thus spent was \$ 8,076, representing about five percent of the training budget of \$165,000. For FY 97, the budget for staff training was estimated to be \$13,750.

In addition, NCES provides some funds for NCES University and the training of outside researchers. For example, in FY 96 the budget for the NCES University was \$25,000 and for the training of outside researchers, \$350,000. (The same level of budget was requested for FY 97). These funds were used to pay for instructional materials and reimburse lecturers' costs. The budget for training outside researchers and data providers also covered participants' travel costs, per diem, and costs for labor and for facilities such as computer rentals, meeting room, and software packages.

Survey and Statistical Training at Federal Statistical Agencies  
Training Program Case Study #7

**THE NATIONAL CENTER FOR HEALTH STATISTICS**  
Centers for Disease Control and Prevention

**I. The Agency**

NCHS is one of 10 general purpose statistical agencies that make up the core of the Federal statistical system. Along with the other agencies, NCHS produces statistics for the Nation, sets statistical policy, develops statistical standards and methodology, and leads and advises on statistical data collection. NCHS has special legislative authority for its programs under Sections 304, 306, and 308 of the Public Health Service Act. The Act authorizes data collection, analysis, and dissemination of a broad range of health and health-related areas and provides specific legislative authority to enable the Center to protect the confidentiality of information received in its surveys. In addition the Act provides for NCHS to undertake and support research, demonstrations, and evaluations regarding survey methods and to provide technical assistance to State and local jurisdictions. The Disadvantaged Minority Health Improvement Act authorizes the Center to obtain more detailed data on racial and ethnic populations and subpopulations through vital statistics and national surveys and to establish a grants program for special studies, analyses, and methodological research regarding obtaining data on minority populations.

The mission of the National Center for Health Statistics (NCHS) is to provide statistical information that will guide actions and policies to improve the health of the American people. As the Nation's principal health statistics agency, NCHS design, develops and maintains more than a dozen data systems that cover the full spectrum of health concerns. These data systems provide essential information to policy makers, to medical researchers, and to others in the health community.

**II. Description of Statistical Employees**

Currently NCHS has 482 employees:

- 185 Statisticians/assistants
  - 15 Math Stats (1529 series)
  - 146 Survey Stats (1530 series)
  - 10 Stat Assistants (1531 series)
- 115 Computer Specialists/coding clerks
- 27 Medical/Public Health Group (600 series)
- 30 Publication/information specialists
- 125 All Others

Statisticians are involved in the development and implementation of data collection, analysis, report writing and information dissemination. Their work includes monitoring contracts with private companies that carry out projects for NCHS. The agency advises on the availability and appropriateness of health statistics. The NCHS staff makes numerous presentations and publications on research findings of our data systems as well as on survey methods and techniques.

### **III. Training in Statistics and Surveys for Statistical Employees**

NCHS has an extensive training program available to all employees. The training is provided from sources such as the SAS Institute, university-based, and on-site vendors. The university-based training included eight employees on survey research course work as well as two employees at the Summer Epidemiology Program at the Johns Hopkins University. NCHS also supports one employee each year in the Long Term Training Program, which allows one to complete doctoral studies full-time at a local university. All employees continuously upgrade their software application skills through training with vendors on-site (SUDAAN, FoxPro, SAS, S-plus, etc.).

**Training for Statisticians.** There is no written training policy for statisticians, but NCHS has a strong commitment to their professional development and supports training as a large part of that development. In particular, NCHS supported 89 employees at various JPSM courses in FY 96: Statistical Disclosure and Disclosure Limitations, Variance Estimation for Sample Surveys and Regression Models for Complex Survey Data, etc.

**Training Enumerator.** NCHS does not offer enumerator training. NCHS has contracted out all data collection to private companies or the Bureau of Census. These contractors generally train their enumerators before they go out to collect and process data.

### **IV. Training in Statistics and Surveys for Non-employees**

NCHS provides training to various federal agencies, academic researchers, and local and state public health professionals:

- N** The Applied Statistics Training Institute (ASTI), a collaboration between the Schools of Public Health, the State and local offices of public health, and NCHS. ASTI provides basic and advanced training on current statistical topics that are meant to inform and direct public health practice, primarily for use in State and local settings.
- N** NCHS provides training to public health professionals through a five-day course on Vital Statistics Records and their Administration and a course on Vital Statistics Measurement and Production, which covers basic vital statistics measures for fertility and mortality, concepts of classification, and practices of classification with emphasis on International Classification of Disease (ICD).
- N** NCHS collaborates with the Department of Biostatistics, University of North Carolina at Chapel Hill, on The Minority Health Statistics Grants Program to sponsor a Summer Public

Health Research Institute on Minority Health. Modules addressing theoretical and practical issues related to the collection, analysis and interpretation of racial and ethnic data are offered.

- N NCHS teaches a two-day course on Analysis of Data from the National Health Interview Survey, which includes estimation and variance estimation to government and academic researchers.
- N NCHS hosts a biennial Data Users Conference where each of our data systems is described in detail, as are methodological issues related to content, estimation, and analysis.
- N Each of NCHS's four Data Divisions produce periodic Data Systems Seminars, which are devoted to in-depth explanations for using each of the systems.
- N For the benefit of federal statistical agencies and academic researchers, the Office of Research and Methodology sponsors one-day seminars on the geographic analysis of health data.
- N The University Visitation Program is a series of lectures and presentations by NCHS staff covering the programs, surveys, activities and data of the Center.

## **V. Training Costs**

NCHS has a training budget of \$388,000, which encompasses all areas of training. Approximately 30 percent of that budget was spent on statistical training in FY 96.

**APPENDIX B: TRAINING OF STATISTICIANS:  
FEDERAL STATISTICAL AGENCY QUESTIONNAIRE**

**FCSM Subcommittee on Training of Statisticians:  
Agency Questionnaire**

**Agency Name:** \_\_\_\_\_

- **For FY 1996 please indicate the number of employees your agency had in the following job series, by grade.**

Series Number and Description	Total Employees	Grades 5-7	Grades 9-11	Grades 12-13	Grades 14-15
Total					
Mathematical Statisticians (1529 Series)					
Survey Statisticians (1530 Series)					
Statistical Assistants (1531 Series)					
Student Assistant (1599 Series)					
Operations Research (1515 Series)					
Computer Specialists (334 Series)					
Economists (110 Series)					
Sociologists (101 Series)					
Psychologists (180 Series)					
Anthropologists (190 Series)					



- The FCSM Subcommittee on Statistical Training is interested in learning about survey and statistical courses taken by agency employees and paid for through training funds of the agency. These could be courses offered within you agency, short courses offered by a professional group or university, or credit-bearing college courses. For the purposes of this survey, we are defining “statistical courses” broadly, including courses in statistics, mathematics, statistical computing, survey methodology, and questionnaire design.**

**Please complete the following table for FY96. If you can’t decide whether a course should be included or not, please err on the side of including the course.**

**Listed on the next page are a series of codes for you to use in providing the course information.**



## Codes to use in answering Question 2

### Column 3: Type of Course

#### 1: Statistical Analysis

Examples: Analysis of Complex Sample Data, Categorical Data Analysis, applied Time Series Analysis

#### 2: Sampling

Examples: Applied Sampling, Introduction to Survey Sampling, Complex Sampling Designs

#### 3: Other Statistical Courses

Examples: Elements of Statistics, Introduction to Biostatistics, Small Area Estimation, Applied Probability and Statistics

#### 4: Statistical Computing

Examples: Introduction to SAS, Fundamentals of SUDAAN, Getting the Most out of SAS

#### 5: Survey Methods - Not Otherwise Classified

Examples: Conducting and Evaluating Focus Groups, Cognitive and Communicative Aspects of Surveys, Nonsampling Error in Surveys

#### 6: Other

### Column 4: Course Length

#### 1: 1 Day or less

#### 2: 2 Days

#### 3: 3 or more days

#### 4: College credit-bearing course (Code "4" for all college credit-bearing courses)

### Column 5: Course Vendor

#### 1: In-house trainer

#### 2: Vendor, Consultant

#### 3: USDA Graduate School

#### 4: Joint Program in Survey Methodology (JPSM)

#### 5: Other University-Based

#### 6: SAS Institute

#### 7: Other

### Column 6: Cost per Participant

Provide this cost only for those courses in which a per person fee was charged.



. Was FY 96 different in any way with respect to the amount of training taken by agency employees?

91. YES----Go to 4A

92. No-----Skip to 5

4A. Please describe how FY96 differed from either previous years or the current fiscal year.

*Example: Training funds were completely eliminated due to a 10% reduction in the agency's budget. In fiscal year 1995 we had over 300 staff members participate in approximately 25 different courses.*

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- . **Please provide total operating expenditures, total training expenditures, and expenditures for statistical training for Fiscal Year 1996.**

**Total Operating Budget (for the agency):**

\_\_\_\_\_

**Total Training Expenditures: (Includes all training paid for with agency funds):**

\_\_\_\_\_

**Statistical Training Expenditures: (Expenditures for “statistical courses” listed in Question 2):**

\_\_\_\_\_

- . **Name, title, and phone number of person or persons completing this form:**

**Name:**\_\_\_\_\_

**Name:**\_\_\_\_\_

**Title:**\_\_\_\_\_

**Title:**\_\_\_\_\_

**Telephone:**\_\_\_\_\_

**Telephone:**\_\_\_\_\_

**Thank you for your assistance in completing this questionnaire.**

**APPENDIX C: EMPLOYEE TRAINING QUESTIONS,  
1996-97 JPSM PRACTICUM,  
ORGANIZATIONAL CLIMATE SURVEY AT FEDERAL STATISTICAL AGENCIES**

# **Organizational Climate at Federal Statistical Agencies**

- This survey is about your perceptions of the organizational climate in your agency. Please answer based on your experiences of the overall climate in your agency.
- Your responses to this questionnaire are strictly confidential. Any information that could identify you will never be linked to your answers.

A Survey Conducted for Federal Statistical Agencies  
by  
Joint Program in Survey Methodology and the Survey Research Center



On the following scale, circle the number to indicate how much you agree or disagree with each statement.

STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
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**A. Your Experience of Communication and Information Sharing in the Agency**

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. Top level management encourages open and candid communication.     | 1 | 2 | 3 | 4 | 5 |
| 2. Top level managers disregard employee ideas for improvements.      | 1 | 2 | 3 | 4 | 5 |
| 3. Agency policies are clearly communicated.                          | 1 | 2 | 3 | 4 | 5 |
| 4. There is poor communication between different parts of the agency. | 1 | 2 | 3 | 4 | 5 |
| 5. Employees are kept informed about issues affecting their jobs.     | 1 | 2 | 3 | 4 | 5 |
| 6. Employees regularly share job-related information with each other. | 1 | 2 | 3 | 4 | 5 |
| 7. Poor communication seriously hurts agency performance.             | 1 | 2 | 3 | 4 | 5 |
| 8. Employees receive useful feedback on their work.                   | 1 | 2 | 3 | 4 | 5 |

**B. Your Experience of Top Level Agency Management in the Agency**

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. The ratio of managers to employees is appropriate.   | 1 | 2 | 3 | 4 | 5 |
| 2. Management lets employees know how their work contributes to the agency's mission and goals. | 1 | 2 | 3 | 4 | 5 |
| 3. Management sets a good example.  | 1 | 2 | 3 | 4 | 5 |
| 4. Management looks after employees' interests.   | 1 | 2 | 3 | 4 | 5 |
| 5. Managers have poor managerial skills.  | 1 | 2 | 3 | 4 | 5 |

STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
----------------------	----------	---------	-------	-------------------

C. Your Experience of Employee Involvement and Teamwork in the Agency

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. A spirit of cooperation and teamwork exists in the agency.                | 1 | 2 | 3 | 4 | 5 |
| 2. Employees have little say about what assignments they receive.            | 1 | 2 | 3 | 4 | 5 |
| 3. Opinions are considered on their merit regardless of the employee's rank. | 1 | 2 | 3 | 4 | 5 |
| 4. Employees have a sense of ownership in their work.                        | 1 | 2 | 3 | 4 | 5 |
| 5. Work is distributed fairly among employees.                               | 1 | 2 | 3 | 4 | 5 |

D. Your Experience of Innovation and Change in the Agency

- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1. Creativity and innovation are valued.  | 1 | 2 | 3 | 4 | 5 | 9 |
| 2. Supervisors/team leaders are open to new ways of doing things.                                     | 1 | 2 | 3 | 4 | 5 | 9 |
| 3. Employees are encouraged to try new ways of doing things, even when there is some risk of failure. | 1 | 2 | 3 | 4 | 5 | 9 |
| 4. It is difficult to get things changed in the agency.   | 1 | 2 | 3 | 4 | 5 | 9 |

	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
<b>E. <u>Your Experience of General Agency Mission and Goals</u></b>					
1. Employees have a sense of loyalty to the agency.	1	2	3	4	5
2. The agency's mission is clearly understood by employees.	1	2	3	4	5
3. Employees can participate in developing agency goals.	1	2	3	4	5
4. Management effectively communicates the agency's mission to employees.	1	2	3	4	5
5. The agency's work is valued by the public.	1	2	3	4	5
<b>F. <u>Your Experience of Internal and External Customer Service in the Agency</u></b>					
1. Employees are unsure who their customers are.	1	2	3	4	5
2. Employees are recognized for providing high quality products and services to customers.	1	2	3	4	5
3. Employees feel that customer requests interfere with their real work.	1	2	3	4	5
4. Customers are satisfied with the agency's products and services.	1	2	3	4	5
5. Internal customers often do not receive good service from other agency staff.	1	2	3	4	5

	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	
<b>G. <u>Your Experience of Rewards and Recognition in the Agency</u></b>						
1. Performance is evaluated fairly.	1	2	3	4	5	9
2. Agency awards go to the most deserving people.	1	2	3	4	5	9
3. Opportunities for advancement in the agency are inadequate.	1	2	3	4	5	9
4. Employee promotions are based on performance and qualifications.	1	2	3	4	5	9
<b>H. <u>Your Experience of Training and Career Development in the Agency</u></b>						
1. Employees receive the training necessary to do their jobs.	1	2	3	4	5	9
2. Employees receive necessary training about new technologies.	1	2	3	4	5	9
3. Training opportunities are unfairly allocated across employees or work units.	1	2	3	4	5	9
4. Supervisors/team leaders support employee efforts to learn outside the job (e.g. conferences, continuing education, membership in trade or professional organizations).	1	2	3	4	5	9
5. High priority is given to providing appropriate training.	1	2	3	4	5	9
<b>J. <u>Your Experience of Job Security in the Agency</u></b>						
1. The agency takes actions to avoid layoffs or reductions in force.	1	2	3	4	5	9
2. The agency keeps employees well informed of job changes that affect them.	1	2	3	4	5	9
3. The agency does not seem concerned about its employees' futures.	1	2	3	4	5	9

STRONGLY  
DISAGREE

DISAGREE

NEUTRAL

AGREE

STRONGLY  
AGREE

K. Your Experience of Work Environment and Resources in the Agency

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. Employees have adequate resources (e.g. computers, fax machines, software) to do their job well. | 1 | 2 | 3 | 4 | 5 |
| 2. The physical environment in my office makes it difficult to do my job well.                      | 1 | 2 | 3 | 4 | 5 |
| 3. The agency has programs or facilities to promote a healthy lifestyle.                            | 1 | 2 | 3 | 4 | 5 |
| 4. The agency has too few employees to accomplish its goals effectively.                            | 1 | 2 | 3 | 4 | 5 |
| 5. Red tape and unnecessary rules interfere with completing work on time.                           | 1 | 2 | 3 | 4 | 5 |

L. Your Experience with Accommodation of Employee's Personal Needs

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. Employees who take time off for family, medical or personal reasons hurt their career opportunities.        | 1 | 2 | 3 | 4 | 5 |
| 2. Supervisors/team leaders try to accommodate employees' needs to deal with family/personal responsibilities. | 1 | 2 | 3 | 4 | 5 |
| 3. The agency has effective programs to help with personal and family responsibilities or problems.            | 1 | 2 | 3 | 4 | 5 |
| 4. The agency's work schedule policies try to accommodate employees' personal needs.                           | 1 | 2 | 3 | 4 | 5 |

STRONGLY  
DISAGREE

DISAGREE

NEUTRAL

AGREE

STRONGLY  
AGREE

DO NOT KNOW

**M. Your Experience of Diversity in the Agency**

1. The agency does not do enough to promote diversity in the workplace.	1	2	3	4	5	9
2. Differences among individuals are respected by employees.	1	2	3	4	5	9
3. The agency works hard to accommodate people with disabilities.	1	2	3	4	5	9
4. The agency does a good job of preventing sexual harassment in the workplace.	1	2	3	4	5	9
5. Managers deal effectively with complaints about sexual harassment.	1	2	3	4	5	9
6. Managers deal effectively with complaints about prejudice or discrimination.	1	2	3	4	5	9
7. Supervisors/team leaders work well with employees of different backgrounds.	1	2	3	4	5	9

STRONGLY  
DISAGREE

DISAGREE

NEUTRAL

AGREE

STRONGLY  
AGREE

**N. Your Experience with Supervision in the Agency**

- |  |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
| 1. Supervisors/team leaders seek employee input before making work decisions.  | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. Supervisors/team leaders rarely provide employees with constructive suggestions to improve their job performance. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. Supervisors/team leaders trust employees to do the job correctly.   | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. Supervisors/team leaders communicate the level of job performance expected of employees.                          | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. Supervisors/team leaders are effective in resolving work-related conflicts.                                       | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. Supervisors/team leaders and their employees respect one another.   | 1 | 2 | 3 | 4 | 5 | 6 |

**P. Job Satisfaction and General Perceptions of the Agency**

- |  |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
| 1. My pay is fair for the work I do.                             | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. I am satisfied with the benefits package the agency provides. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. I am satisfied with the agency's leave policies.              | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. I have the opportunity to excel in my work.                   | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. The work I do is boring.                                      | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. I like the people I work with.                                | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. My job allows me to do the kind of work I enjoy.              | 1 | 2 | 3 | 4 | 5 | 6 |

8. Overall, how satisfied are you with your job?

- 1 VERY DISSATISFIED
- 2 DISSATISFIED
- 3 NEITHER SATISFIED NOR DISSATISFIED
- 4 SATISFIED
- 5 VERY SATISFIED

9. How satisfied are you with the overall conditions in the agency?

- 1 VERY DISSATISFIED
- 2 DISSATISFIED
- 3 NEITHER SATISFIED NOR DISSATISFIED
- 4 SATISFIED
- 5 VERY SATISFIED

10. Overall, how satisfied are you with the training you have received at the agency?

- 1 VERY DISSATISFIED
- 2 DISSATISFIED
- 3 NEITHER SATISFIED NOR DISSATISFIED
- 4 SATISFIED
- 5 VERY SATISFIED

11. Currently, would you say your morale is:

- 1 VERY LOW
- 2 LOW
- 3 NEITHER LOW NOR HIGH
- 4 HIGH
- 5 VERY HIGH

12. Would you say the morale of agency employees is:

- 1 VERY LOW
- 2 LOW
- 3 NEITHER LOW NOR HIGH
- 4 HIGH
- 5 VERY HIGH



13. Would you say the quality of products and services provided by the agency is:

- 1 VERY BAD
- 2 BAD
- 3 NEITHER BAD NOR GOOD
- 4 GOOD
- 5 VERY GOOD
- 9 DON'T KNOW

14. As an organization to work for, would you say the agency is:

- 1 VERY BAD
- 2 BAD
- 3 NEITHER BAD NOR GOOD
- 4 GOOD
- 5 VERY GOOD
- 9 DON'T KNOW

15. How likely do you think it is that this survey will result in changes in the agency?

- 1 VERY UNLIKELY
- 2 UNLIKELY
- 3 NEITHER UNLIKELY NOR LIKELY
- 3 LIKELY
- 4 VERY LIKELY
- 9 DON'T KNOW

R. Background Questions

These items will be used for subgroup analysis only, and will not be used to identify individual respondents. Background information that could be used to identify individuals will be suppressed.

1. In what location do you work?

\_\_\_\_\_ Building

\_\_\_\_\_ City

2. In total, how many years of service do you have in the agency?

- 1 LESS THAN 1 YEAR
- 2 1-2 YEARS
- 3 3-10 YEARS
- 4 11-14 YEARS
- 5 15-24 YEARS
- 6 25 OR MORE YEARS

3. In total, how many years of service do you have in the federal government?

- 1 LESS THAN 1 YEAR
- 2 1-2 YEARS
- 3 3-10 YEARS
- 4 11-14 YEARS
- 5 15-24 YEARS
- 6 25 OR MORE YEARS

4. What is your current grade?

- 1 GRADES 1-4
- 2 GRADES 5-11
- 3 GRADES 12-13
- 4 GRADES 14-15
- 5 SES

5. What is your Job Series and Job Title? (e.g. 0318 Secretary; 1529 Mathematical Statistician)

\_\_\_\_\_

Series

\_\_\_\_\_

Title

6. Are you a manager?

- 1 YES
- 2 NO

7. Do you supervise other employees?

- 1 YES
- 2 NO

8. Are you:

- 1 MALE
- 2 FEMALE

9. Are you of Hispanic origin or descent?

- 1 YES
- 2 NO

10. Are you:

- 1 WHITE
- 2 BLACK OR AFRICAN AMERICAN
- 3 ASIAN OR PACIFIC ISLANDER
- 4 AMERICAN INDIAN OR ALASKA NATIVE
- 5 OTHER

11. Do you have any additional comments on the issues covered in this questionnaire?

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Date questionnaire was completed: \_\_\_\_ / \_\_\_\_ /97

\*\*\* Thank you for your participation \*\*\*

**APPENDIX D: QUESTIONNAIRE ON FUTURE TRAINING  
AT FEDERAL STATISTICAL AGENCIES**

## Future Training at Federal Statistical Agencies

Agency Name: \_\_\_\_\_

Respondent Name/Title: \_\_\_\_\_

Respondent Telephone Number: \_\_\_\_\_

Date of Completion: \_\_\_\_\_

### Questions:

- . What Competencies will a statistical agency staff need 5 to 6 years in the future?
  - ! What are the statistical and survey methodology requirements and training needs for statistical employees in the 21<sup>st</sup> Century?
  - ! describe the nature of work in you agency in 5 to 6 years.
  - ! What competencies that are important today will a statistical agency staff NOT need 5 to 6 years in the future?
  - ! What competencies that are NOT important today will a statistical agency staff STILL need 5 to 6 years in the future?
- . Describe your agency's teams, groups, councils which assess training needs.
  - ! How do you plan to obtain funds to adequately resource your training budget?
- . Is your training budget adequate?
  - ! How do you plan to obtain funds to adequately resource your training budget?
- . Describe your agency's commitment to your career development programs?

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