

## The Role of the Joint Program in Survey Methodology in Training U.S. Federal Statisticians

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The Joint Program in Survey Methodology (JPSM) was established in 1993 to support the U.S. federal statistical system by providing advanced training in survey statistics and methodology. Until then, traditional graduate degree programs did not provide the interdisciplinary training needed for large-scale surveys and censuses. Graduates of statistics departments were well-versed in advanced statistical estimation, but had little practical knowledge of how to design complex samples or how to develop survey instruments. A major part of JPSM's mission is to fill that gap by providing graduate-level training to current and future federal statisticians. In this article we review the history of the program and its initial efforts, discuss the different types of collaboration and how they have enhanced survey methodology, and review efforts that are being made to strengthen the program and provide a more integrated research environment for the future.

*Key words:* Academic and governmental collaboration; official statistics, teaching statistics; training survey methodologists.

### 1. Introduction

The Joint Program in Survey Methodology (JPSM) at the University of Maryland ([www.jpsm.umd.edu/jpsm](http://www.jpsm.umd.edu/jpsm)) was established in 1993 to support the United States federal statistical system by providing advanced training in survey statistics and methodology. The founding of JPSM resulted from an initiative of federal statistical agency heads, the head of the Office of Management and Budget's Statistical Policy Office, and the chair of the President's Council of Economic Advisors. The goal was to provide training both to current employees of the system, to employees at the private survey firms that serve the system by carrying out major federal surveys, and to other students who could be recruited to join one of the federal statistical agencies. It was clear from the outset that no one organization had the resources needed to accomplish this goal, so the founders of JPSM (including Robert Groves, Graham Kalton, and Stanley Presser) brought together a consortium of organizations, disciplines, and researchers to provide the necessary expertise. Because the theory and practice of survey methodology has drawn on a broad array of older disciplines with divergent traditions and approaches, survey methodology does not fit easily into any single academic department or program.

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Moreover, prior to the development of the instructional program at JPSM, no one had designed a comprehensive curriculum for training survey researchers. The blending of specific aspects of the traditional statistical and social science disciplines into a new discipline was the focus in the initial stages of development of the JPSM, and it remains the foundation of the program. The program now offers Master's and doctoral degrees along with certificate and citation programs; the latter are nondegree professional credentials. The degree and nondegree programs accommodate students who want to specialize in either statistical or social science. JPSM also sponsors an extensive list of short courses that touch many areas of survey methodology, sample design, and analysis of complex survey data.

A crucial step in the creation of JPSM was the development of partnerships among several organizations. Because JPSM was primarily an educational endeavor, the academic objectives and goals of the program were of paramount importance; still, the practice of survey methodology is not purely academic. It also requires knowledge and expertise in the efficient conduct of surveys and understanding of the federal statistical system and its needs. Since no one organization could provide all of these perspectives, the teaming of organizations was deemed critical to the program's success. The original members of the consortium – the University of Maryland, the University of Michigan, and Westat (a private survey organization) – brought some of the essential ingredients with them and found cooperative partners in the federal agencies to fill in the missing pieces.

This article discusses how collaborations at various levels have contributed to the success of the Joint Program. We begin by describing the relationship of JPSM to the U.S. federal government in Section 2. The third section reviews the history of the program and its initial efforts. In Section 4, we discuss the different types of collaboration that have formed and show how they have enhanced survey methodology over the first 18 years of the program. We conclude in Section 5 with some thoughts on efforts that are being made to strengthen the program and provide a more integrated research environment for the future.

## **2. The U.S. Federal Statistical System and Its Relationship to JPSM**

The JPSM is headquartered at the University of Maryland but is funded by a consortium of federal agencies that make up the Interagency Council on Statistical Policy (ICSP). The ICSP member agencies are the Bureau of Economic Analysis, the statistical office of the Environmental Protection Agency, the Statistics of Income Division of the Internal Revenue Service, the Bureau of Labor Statistics (BLS), the National Agricultural Statistics Service, the Bureau of Justice Statistics, the National Center for Education Statistics, the Bureau of Transportation Statistics, the National Center for Health Statistics, the U.S. Census Bureau, the Science Resources Statistics Division of the National Science Foundation, the Economic Research Service of the Department of Agriculture, the Energy Information Administration, and the Office of Research, Evaluation and Statistics of the Social Security Administration. The Chief Statistician of the U.S. at the Office of Management and Budget chairs the ICSP. The formal vehicle for the financial support of JPSM is a contract administered by the U.S. Census Bureau. The statistical agencies allocate money from their budgets each fiscal

year to cover the cost of the contract. The sizes of the contributions vary, with the Census Bureau being the largest contributor.

Unlike the Canadian and many European systems, the U.S. federal statistical system is decentralized, comprising 14 primary statistical agencies and many more statistical offices within other agencies, some of which serve primarily regulatory functions. Together these agencies and offices produce a wealth of data used by policy-makers, analysts, and the general public. Developers of the JPSM used their own extensive experience in the federal statistical system to conceive a program that would help federal agencies meet specific challenges in training, recruiting, and retaining the high-caliber workforce needed to maintain and enhance federal statistical programs.

### *2.1. Pros and Cons of Decentralization*

A decentralized statistical system can provide many benefits, perhaps the most important of which is an environment of close collaboration between mathematical statisticians, behavioral scientists, and subject matter experts. (Employees in the latter two categories may be officially designated as “statisticians” in the U.S. federal system). Such collaboration is crucial in many data collection efforts, such as the design of surveys of business establishments engaged in particular industries. Subject matter experts who have worked in the airline or auto industry, for example, contribute a deep knowledge of that industry’s culture, parlance, and common record-keeping practices. Combined with statistical and behavioral science expertise, this knowledge helps maximize a federal agency’s chances of collecting complete and accurate data from particular business sectors.

In practice, however, the work of designing and carrying out federal surveys sometimes falls to subject matter experts alone, whose lack of statistical and survey methodological skills can lead to the collection of poor-quality data with little analysis beyond basic tabulation. Through short courses and nondegree programs described in Section 3, the JPSM offers training in basic survey skills for federal employees educated in other fields who find themselves engaged in statistical survey work.

Among the disadvantages of the decentralized statistical system are the difficulties in coordinating efforts across agencies. Overlapping data may be collected by different agencies, and agencies may expend resources compiling their own frames for the same populations. This is particularly the case in the U.S. for business frames. Another problem is the possibility of professional isolation, especially for statisticians and survey methodologists working in regulatory agencies. Since JPSM is jointly supported by multiple federal agencies, it offers a forum for interagency cooperation, along with opportunities for ongoing professional contact between employees engaged in survey work in various agencies. Fostering collaboration among statisticians and social scientists has always been a focus of JPSM, as we discuss further in Section 4. Students in the social science and statistical tracks work together in small teams to complete projects in several courses, described later, including the Practicum and Survey Design Seminar. The Joint Program also requires that Master’s students complete a seminar course called Introduction to the Federal Statistical System, in which representatives from the federal statistical agencies explain their missions and employment opportunities.

## *2.2. Recruitment and Retention in the Federal System*

The U.S. government has long faced challenges in recruiting employees with advanced degrees in mathematical and scientific disciplines. Private employers may offer graduates in these disciplines higher salaries, often combined with other financial incentives, such as signing bonuses and payment of relocation expenses. Government entry-level salaries run somewhat below those of private industry. There are legal restrictions on recruiting incentives, and the time-consuming federal hiring process itself (currently under reform) deters many qualified candidates.

The JPSM Juniors Fellow Program, described more in Section 3, provides a high-quality work/educational experience for undergraduate students majoring in statistics and social sciences. Many JPSM interns find that they enjoy the quasi-academic work environment offered by statistical research offices in government agencies – an environment rarely found in private industry. Since highly qualified candidates sometimes return to work at federal agencies after graduating, the internship program has come to be viewed as an important recruiting tool.

Federal statistical agencies strive to retain qualified employees by offering generous benefits. In particular, many federal agencies offer generous training benefits, including tuition support for employees working toward advanced degrees, limited study time during the workday (arrangements can be formal or informal), and periods of voluntary leave without pay for educational purposes. JPSM is a major beneficiary of these training benefits in the Washington DC area.

Because of its ability to offer these training benefits, the federal government often hires employees with undergraduate degrees and then pays for them to attend graduate programs. With limited post-training service requirements, however, the government may not always receive an adequate return on its investment: employees may seek higher salaries with private employers after completing their advanced degrees. The JPSM is creating a pool of employees with both theoretical and hands-on training in federal survey methodology. Because this training is specialized and usually creates opportunities for rapid advancement within the federal government, these employees are less likely to leave for the private sector after completing their degrees. Many past JPSM graduates are federal employees in the agencies that sponsor the Joint Program.

## **3. Plans of Study Offered by JPSM**

JPSM is the oldest and largest program in the United States that offers graduate training in survey methodology. It offers both Master's and doctoral degrees in this subject. It began accepting students into the Master's program in 1993, following the award of a grant from the National Science Foundation to a consortium consisting of the University of Maryland, the University of Michigan, and Westat. The first students were accepted into the Ph.D. program in 1999.

From the outset, JPSM has aimed to strengthen the U.S. statistical system and the field of survey research more generally, by offering advanced training in survey methodology to staff of both the federal statistical agencies and the survey firms that serve the statistical agencies. Another goal is to attract new entrants to the field who might ultimately join the federal statistical system or its private contractors. Wallman et al. (1994) give the

background to the founding of JPSM. This article is also notable because the first author is from the federal government, the second is from JPSM, and the remaining three were students in the first cohort of the program. As one of the first descriptions of JPSM, it provides insight into the collaborative nature that has always been a hallmark of the program. Currently, the main educational packages of JPSM are:

- Master's degree program with concentrations on social science and statistical science;
- Ph.D. degree in survey methodology;
- Certificate programs in intermediate survey methodology and survey statistics;
- Citation programs in introductory survey methodology and economic measurement;
- An array of short courses; and
- A summer internship program, the JPSM Junior Fellows Program.

We describe each of these briefly below. More detailed descriptions, including curricula can be found at the department's website, <http://jpsm.umd.edu/jpsm/>, and <http://jpsm.umd.edu/jpsm/?programs/masters/coursesched.htm>.

Because of the history of JPSM and its overriding goal of strengthening the federal statistical system by training survey practitioners, the Master's program remains the core of the program. Of the 46 students currently seeking degrees at JPSM, 31 are Master's students. The course offerings are designed to support part-time enrollment to accommodate students who are currently employed (typically, at one of the federal statistical agencies). For example, almost all of the classes start at 3:30 pm or later. As of the spring of 2010, 17 of the 31 students enrolled in the Master's program were part-time students; this has been typical of the mix over the life of JPSM. Fifteen of the Master's students are in the social science concentration, and the remaining 16 are in the statistical science track. The split fluctuates over time and, historically, has been about 60% social science and 40% statistical science among the Master's students. As of spring 2010, a total of 182 students have graduated with a Master's degree since the inception of the program. 112 of them have been in the social science concentration and 70 in statistical science.

The Ph.D. program was initially aimed largely at full-time students; its purpose is to strengthen the overall infrastructure of the field by creating the next generation of researchers and teachers. Since the Ph.D. program began in 1999, we have had twelve graduates; their names and dissertation topics can be found on our website. As of the spring of 2010, eleven students were pursuing Ph.D.'s at JPSM; six of them were full-time. We expect four more to enter the Ph.D. program in the fall of 2010. The five current Ph.D. students who are part-time are employed full-time in federal agencies (the U.S. Census Bureau, BLS, Internal Revenue Service, and National Center for Health Statistics). These students are taking advantage of their agencies' willingness to allow them some paid release time from work to complete their studies.

Figure 1 is a graph of the number of Master's and Ph.D. graduates over time. There have been fluctuations over time in the number of Master's awarded. This is due, in part, to changes in hiring rates in the federal government, which also affects the number of enrollees in JPSM. Since the Ph.D. program is small, we have had only one or two graduates per year.

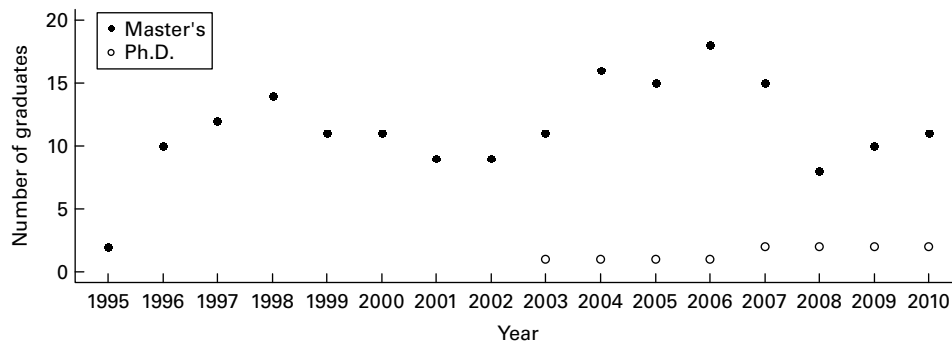


Fig. 1. Numbers of JPSM Master's and Ph.D. degrees awarded in each of the years 1995–2010

Tracking the number of dropouts provides another useful statistic when measuring the health of the program, although this is somewhat difficult to do. Students do not go through any formal procedure to drop out, and some who appear to have left may simply be taking a hiatus before returning to complete a degree. Since 1993, when JPSM began, we have had 50 apparent dropouts or an average of about three per year. 49 of these were Master's students, three of whom did obtain a JPSM certificate in lieu of a Master's. The average incoming cohort of new Master's students each year is about 15. Thus, the number of dropouts as a percentage of the average cohort size is about 20%. Although fewer dropouts would be better, this rate seems to compare favorably with the few reported statistics that are available. Using 2003 survey data from the U.S. National Center for Education Statistics, Redd (2007) found that only 61% of persons who received a bachelor's degree in the U.S. in 1992–1993 and enrolled in a Master's program had completed the degree in 2003 or before. That is, the “dropout” rate was about 39%. By comparison, JPSM's dropout rate looks very good.

The certificate programs are tailored to students who already have advanced degrees in some other field but are seeking to enhance their survey methods skills. For example, many of the staff at the Bureau of Economic Analysis or the BLS have advanced degrees in economics but limited exposure to survey research. Currently, 21 students are enrolled in one of the certificate programs and 18 have completed the requirements and received a certificate. The certificate is conferred by the University of Maryland and is a credential recognized by many federal statistical agencies. Completion of a certificate gives most government employees an advantage when applying for promotions. The curriculum consists of roughly half the course work involved in obtaining the Master's degree (and all but one of the courses in the certificate program also count toward the Master's degree). All of the courses making up the certificate programs are semester-length graduate courses.

The citation programs are less intense and more introductory than the degree or certificate programs. The main citation program is the citation in survey methodology. It consists of a bundle of short courses – four core short courses and four electives – plus a single, semester-length course. The short courses are one- or two-day courses on specific topics that are taught by experts on the topic. The instructors are a mixture of JPSM faculty and other experts in the field. Recently, we have developed a second citation program in

economic measurement that focuses on establishment surveys rather than household surveys. Currently, twelve students are enrolled in the two citation programs. Through spring 2010, 14 students have received citations. The citation programs and the short courses more generally are designed mainly to serve persons who are already part of the statistical system; their goal is to upgrade the skills of current survey staff at the statistical agencies and their contractors. Some of the agencies use them to help orient new staff. A total of 648 persons attended JPSM short courses in the 2009–2010 academic year.

The Junior Fellows Program is currently JPSM's only undergraduate program and is described at <http://www.jpsm.umd.edu/fellows/>. Students are eligible who have completed their sophomore or junior years and have achieved a grade point average of at least 3.5 on a 4-point system. One of its aims is to recruit promising undergraduates to the field of survey methodology. Highly qualified undergraduates are placed in internships at the various statistical agencies for the summer prior to their senior years in college. They work on methodological and statistical projects (e.g., see Lent 2010). In addition, the fellows attend a weekly seminar at JPSM. There were 33 junior fellows in the summer of 2010, bringing the total number to 384 since the program began. Eleven of the fellows have returned to the Joint Program as Master's students; two others earned Ph.D.'s in survey methodology at the University of Michigan. As these figures show, we have had limited success in enticing junior fellows to pursue graduate programs with us, although some fellows have pursued federal employment after receiving their undergraduate degrees. An alternative recruitment vehicle, which we hope to have in place for academic year 2011–2012, is an undergraduate minor in survey methodology. We describe this initiative in more detail in Section 5.

Although JPSM was created primarily to provide various types of educational programs, implicit in this mission was the conduct of research on the cutting edge of survey methodology. Research and teaching are often seen as intertwined, but for several reasons this relationship is especially close for JPSM. First, it is difficult to provide training in research methodology without giving the students extensive hands-on experience in conducting such research. Second, because almost all of JPSM's educational programs are aimed at the graduate level, its courses deal with the most advanced techniques for conducting surveys and survey methods research. Thus, it is essential that the faculty be intimately familiar with new developments in the field. Third, the field of survey research is undergoing profound and rapid changes brought on by larger societal, technological, and theoretical developments (Tourangeau 2004). The speed of these changes means that, more than in most fields, only active researchers can provide adequate instruction in the new methods being developed and adopted. JPSM faculty are listed in Table 1 and are engaged in a variety of research areas, including:

- Adaptive survey design for improving response rates and data quality
- Animated agents in self-administered surveys
- Use of technology in surveys: computer assisted telephone interviewing (CATI), computer assisted personal interviewing (CAPI), Web, audio-enhanced computer assisted self-interviewing (audio-CASI), interactive voice response (IVR)
- Mode effects in surveys
- Use of paradata

Table 1. JPSM faculty and partnership affiliation as of spring 2010

University of Maryland	University of Michigan	Westat
Katharine Abraham, Associate Director	Roger Tourangeau, Director	Michael Brick
Frauke Kreuter	Frederick Conrad <sup>a</sup>	David Cantor
Partha Lahiri	Mick Couper	Robert Fay
Stanley Presser	Michael Elliott	Carla Maffeo
	Steven Heeringa	Leyla Mohadjer
	James Lepkowski <sup>a</sup>	David Morganstein
	Trivellore Raghunathan	Jill Montaquila
	Richard Valliant	Keith Rust

<sup>a</sup> Lepkowski is Director of the Michigan Program in Survey Methodology; Conrad is the Associate Director. JPSM also has other affiliated faculty who teach on an occasional basis.

- Behavioral foundations of nonresponse error
- Confidentiality protection
- Regression diagnostics for survey data
- Latent variable modeling with survey data
- Small area estimation
- Multiple imputation
- Bayesian analysis of survey data
- Web survey methodology: interface design, statistical inference from nonprobability samples.

Many of these research projects involve the Ph.D. and full-time Master's students. Most are expected to work 20 hours per week in return for tuition support and a stipend. Their duties on research projects include data analysis, report writing, conduct of focus groups, and other tasks that are key parts of projects. The students are expected to present papers at professional conferences during their matriculation. We also encourage the Ph.D. students to submit their work to peer-reviewed journals prior to graduation.

The JPSM faculty are also actively involved in professional collaborative activities, including serving on the Committee on National Statistics of the National Academy of Sciences and working on joint projects with staff of the U.S. Census Bureau, the BLS, and the Internal Revenue Service, among other agencies. A number of faculty also serve on the editorial boards of journals and are involved in the organization of professional conferences.

#### 4. Types of Collaboration at JPSM

Two main types of collaboration take place at JPSM – collaborations between organizations and collaborations between disciplines. An earlier review of these efforts was given by Brick and Tourangeau (2004).

##### 4.1. Organizational Relationships

JPSM is funded by the consortium of federal agencies, listed in Section 2, that make up the Interagency Council on Statistical Policy. These agencies provide significant financial



resources to the program; in addition, they host the summer interns and provide briefings and lectures for both the regular classes and the interns.

One of these agencies – the U.S. Census Bureau – provides a key link between JPSM and the rest of the federal statistical system. Currently, 13 of the 31 Master's students at JPSM are U.S. Census Bureau employees. These employees and previous graduates have benefited from a special program developed by the U.S. Census Bureau as part of its Census Corporate University. The students work half-time, go to school half-time, and receive full-time pay and benefits. This enables most of the students to complete the Master's program in three years. Other agencies are gradually adopting similar policies but on a more limited scale. The U.S. Census Bureau also supports research assistants who are not employees of the U.S. Census Bureau but interns there while enrolled in the program. These research assistants are paid through the JPSM, like other research assistants there.

The partnership between JPSM and the U.S. Census Bureau goes well beyond these arrangements. Groves and Clark (2001) discuss in detail the relationship between JPSM and the U.S. Census Bureau, and Clark, Donnelley, and Tourangeau (2004) provide an update. They describe the procedures developed to meet the specific needs of the U.S. Census Bureau, the feedback that the U.S. Census Bureau provides regarding the training of the JPSM students, and the impact of JPSM on the U.S. Census Bureau workforce. In many respects, without this collaboration it would be impossible for JPSM to accomplish its goals.

One of the challenges that the U.S. Census Bureau initially faced in taking advantage of JPSM was that some of the employees interested in the Master's degree program did not have the academic qualifications for graduate work. The employees had gained on-the-job experience in survey operations and methodology, but it was not clear how that knowledge would transfer to the JPSM academic environment. At the request of the U.S. Census Bureau, JPSM developed a senior level undergraduate course – Fundamentals of Survey Methodology – designed to provide an introduction to the discipline for employees. This course was also envisioned as a screener course for admission to the JPSM Master's degree program. Individuals without the JPSM academic qualifications who performed well in this course were then given serious consideration for admission to the degree program. This has allowed more U.S. Census Bureau employees to participate in the graduate program. In addition, the absence of a textbook for the class led to a collaboration of six authors, each of them an expert in some aspect of survey research. The resulting text, *Survey Methodology* (Groves et al. 2009), was first published by Wiley in 2004, with a second edition released in 2009.

The U.S. Census Bureau also had individuals whose career needs and goals were not met by either of the Master's degree programs. Some of these needs are now being met through the Citation in Introductory Survey Methodology, the Certificate in Intermediate Survey Methodology, and the Certificate in Survey Sampling begun in 1999. Mid-career professionals often found the citation program was a good way to update their knowledge in a number of areas. The two certificate programs have been used by U.S. Census Bureau employees from varied backgrounds – with bachelor's or Master's degrees in a number of disciplines – to gain knowledge of the academic literature in survey data collection, questionnaire design, applied sampling, statistical computing, and an elective area. In total, 32 certificates and citations have been awarded, with ten going to U.S. Census

Bureau employees, comprising four Citations in Introductory Survey Methodology, four Certificates in Intermediate Survey Methodology, and two Certificates in Survey Sampling.

On a broader level, the collaboration with the federal government has been mutually beneficial. One example of this is that of the 182 students who have completed Master's degrees at JPSM, more than half are currently working in the federal government. The first Ph.D. in Survey Methodology was awarded in 2004 to Kennon Copeland, whose dissertation examined nonresponse in a BLS survey. During part of his tenure at the JPSM, Copeland had a fellowship at the BLS to study the problem. Two recent Ph.D. students, Stephanie Eckman and Cleo Redline, received Census Bureau Research Fellowships to study problems in field listing and data collection, respectively.

Other federal agencies also participate actively in the JPSM, some of them by employing research assistants from JPSM. The National Center for Health Statistics (NCHS), the U.S. Census Bureau, the Agency for Health Research and Quality, the National Agricultural Statistics Service, and the Office of Management and Budget have all employed research assistants. Other means of participation by the federal agencies are the survey design seminars and the JPSM Practicum. Survey researchers from several federal agencies, including NCHS, the Bureau of Justice Statistics, the BLS, and the National Science Foundation, have presented problems to the design seminar class, in which the students serve as consultants.

The students actually carry out a survey in the Practicum class. In recent years, the JPSM Practicum has conducted surveys on behalf of the National Science Foundation and the BLS. This year, the U.S. Census Bureau is sponsoring the Practicum.

In addition to the federal government, other survey organizations play an important role in JPSM. Research assistantships, summer internships, or both have been provided by Westat, Arbitron, Mathematica Policy Research, the Gallup Organization, Abt Associates, and the Pew Center, all leading private survey organizations. These stints in survey organizations provide both financial support and a base of experience for the students, greatly enriching their training. Obviously, these assistantships and internships also have benefits for the survey organizations that get the services of talented newcomers.

From the beginning, the founders of JPSM saw it as the hub of a national system of graduate training in survey methodology, increasing the impact of JPSM both on the field at large and on the federal statistical system in particular. To accomplish this goal, JPSM has developed relationships with other universities to further the field of survey methodology. The relationships have helped the other universities develop their own programs in survey methodology. These organizational collaborations began with consortium members from two academic institutions and one commercial survey research firm, but have expanded over time. JPSM has been able to expand its reach and improve its course offerings by sharing courses with other universities through the use of distance learning technology. Courses have been jointly offered with the University of Michigan at Ann Arbor, the University of Nebraska at Lincoln, and the University of North Carolina at Chapel Hill. Responsibilities for teaching in the shared courses are typically divided among the instructional staff at the universities sharing the classes. For both students and faculty members, this arrangement provides a richer and more diverse environment than is available in a single institution.



Fig. 2. A JPSM video classroom at the University of Maryland. The remote site is visible in the left-hand screen; the instructor's notes in the right

Our main academic collaborator is the Institute for Social Research at the University of Michigan, which established its own degree program in survey methodology in 2001. JPSM and the Michigan Program in Survey Methodology (MPSM) share many Masters' and Ph.D. level courses via video links. Students in the two locations can see each other, the lecture notes, and the instructor, and they can participate in class discussions. Figure 2 shows one of the video classrooms at Maryland. Instructors also travel regularly between the two universities to teach so that students in both locations can consult with each instructor personally. The U.S. Census Bureau and the BLS have also recently installed video-equipped classrooms. For some courses, instructors alternate between delivering lectures at JPSM, Michigan, and Census or BLS. JPSM also records many class lectures so that any students who miss class can view them later over the Internet.

#### 4.2. *Disciplinary Relationships*

As noted earlier, the curriculum at JPSM was built on ideas from the statistical and social science disciplines. However, both sets of disciplines are themselves large, and bringing them together raised some complicated issues. This feature of the problem has been discussed for a long time (e.g., Bishop 1964; Eldridge et al. 1982) and is still an important topic (e.g., Groves 1996; Kalton 2002).

To better understand the problem, consider the issue of deciding on the curriculum for training in the statistical sciences concentration. A standard statistics curriculum might

consist of courses in probability theory, the theory of estimation, large sample theory, analytic methods, and design methods. Survey methodologists with a concentration in the statistical sciences must be comfortable with these topics, but they must also be trained in relevant social science concepts and theories as well. The role of the behavioral and cognitive sciences in any training program for survey methodology is critical. These disciplines provide theories that can lead to a better understanding of the origins of survey error and the interactions in surveys between the interviewers, respondents, questionnaires, and other factors that contribute to errors in surveys. Thus, choosing what specific components of the statistical and social sciences should be included in the Master's degree program has been difficult. At JPSM, integrating pertinent aspects of the social sciences and the statistical sciences into a coherent academic program in survey methodology is an on-going activity. We discuss a few courses below to illustrate the choices that have been made.

A central course in the Master's degree program is the Practicum. This two-semester course involves the students in all aspects of a survey, beginning with conceptualization and planning, questionnaire development and testing, data collection and processing, and all the way through the analysis stages after the data have been collected. This course helps ground the students with a common experience and highlights the complementary nature of the social science and the statistical science disciplines in surveys. Both are essential in the design and implementation of the Practicum.

The Survey Design Seminar is another course that highlights the need for the students to have at least some familiarity with both the social sciences and statistical sciences. This course is designed for students nearing the completion of their training and exposes them to real survey problems ranging from classic sample design issues to improving response rates, estimating coverage biases, developing questionnaires, and devising unbiased estimation procedures. The class applies and links concepts drawn from the various disciplines to the problems of a particular survey. "Clients" in the Design Seminar are often from the federal government. They present problems they are currently working on; teams of students are given a few weeks to propose solutions. For example, one of the recent topics was the redesign of a survey of private adult health care facilities to account for the changing nature of this business in the U.S., and the potential for collecting some facility data via a web survey.

JPSM has also actively sought to serve the needs of economic surveys; the improvement of economic statistics in the United States was one of the main goals that led to the establishment of the Joint Program. Many large-scale federal government surveys deal with economic issues either directly or indirectly. Both household surveys and establishment surveys measure factors related to employment and unemployment, government services and products, and economic indicators that play a vital role in government policies. JPSM has developed full-semester and short courses to cover these issues, which have never been adequately taught in other academic settings. Thus, to address the special issues raised by economic surveys and to enhance the expertise of its faculty in economics, JPSM added a senior economist, Katharine Abraham, to the faculty. Dr. Abraham is the former Commissioner of the Bureau of Labor Statistics and has developed new semester-length courses and short courses on the collection and analysis of economic data.

One of JPSM's major contributions to the survey profession has been the establishment of its short course series. The short courses serve a wide audience, bringing experts from a variety of disciplines together with survey practitioners to share experiences and perspectives that otherwise might never be possible. The number and diversity of the topics covered in the short courses offered by JPSM is impressive and includes applied sampling, survey estimation, price index estimation, small area estimation, structural equation modeling, categorical data analysis, questionnaire design, confidentiality protection, national accounts, psychology of survey response, survey management, web survey design, focus groups, and other topics (for a complete list, see <https://projects.isr.umich.edu/jpsm/>). The instructors for these short courses are preeminent scholars and researchers. They come from many different academic as well as commercial and nonprofit organizations.

## 5. Plans

Over the years, JPSM has periodically reevaluated its programs. The last such evaluation was completed in 2006, when an external review committee of persons from the Universities of Chicago and Wisconsin, and NORC, a survey organization affiliated with the University of Chicago, was formed to evaluate how well JPSM was meeting its objectives. In addition, in preparation for a paper presented at the 2004 Joint Statistical Meetings, Clark, Donnelley, and Tourangeau (2004) conducted focus groups with JPSM graduates at the U.S. Census Bureau, getting additional feedback on the program's strengths and weaknesses. In the process of conducting these self-evaluations, we have identified several areas where we could improve the program's ability to meet its objectives. Several specific activities have been proposed as a result. All the activities are related to making sure that the research and educational environment at JPSM is at the highest possible level.

One initiative is to develop and offer more advanced seminars aimed primarily at the Ph.D. students. The Ph.D. program is evolving and the advanced seminars are one way to enhance the research environment and to stimulate high-quality dissertations from the students. Some examples of recently developed courses are:

**Envisioning the Survey Interview of the Future.** An exploration of how emerging communication technologies will shape the survey interview of the future. Among the topics covered are: the impact of video telephony on survey responses, how respondents react to animated interviewing agents, whether respondents are more willing to lie when they speak than when their communication leaves a textual trace as in Instant Messaging or email, and the kinds of paradata (information about the response process that can be informative about data quality) made available by new communication technologies.

**Practical Tools for Designing and Weighting Survey Samples.** A more in-depth review of topics that are covered only briefly or omitted from basic courses, including sample size determination via power calculations, multicriteria sample allocation problems that can be solved with mathematical programming algorithms, nonresponse adjustment using propensity scores or regression trees, calibration estimation, and variance component estimation for design of multistage samples. Programming in R (R Development Core Team 2009) is an important part of this course.

**Advanced Topics in Cognition and Survey Research.** This course covers topics relating findings from the cognitive sciences to problems in survey research. The main topics are improving comprehension of survey questions, conversational analytic approaches to the interactions between interviewers and respondents, visual effects in the design of self-administered and web questionnaires, and cognitive interviewing.

**Paradata.** Paradata are empirical measurements about the process of collecting survey data. They consist of visual observations of interviewers, administrative records about the data collection process, computer-generated measures about the process of the data collection, external supplementary data about sample cases, and observations of respondents themselves about the data collection. This course explores a variety of paradata to discover what properties of paradata are important and what analytic techniques are well-suited to exploiting them.

Other new courses that have been developed are ones on small area estimation, regression modeling with complex survey data, and Bayesian analysis.

A new initiative that we hope to have approved and implemented in the 2011–2012 academic year is an undergraduate minor in survey methodology. The minor will be a five- or six-course undergraduate program of instruction for students aspiring to careers in fields such as marketing, political consulting, economics or the social sciences that rest on the collection and use of survey data. The course will combine existing courses at the University of Maryland with a newly-developed undergraduate-level course in questionnaire design.

Other proposed activities intended to improve the research environment involve encouraging top-notch researchers to spend some time at JPSM in various ways. To this end, a Distinguished Lecture series was launched in 2004 to bring internationally recognized experts in survey statistics and survey methodology to JPSM, where they give lectures and discuss research topics with the faculty and students. The first Distinguished Lecturer was Christopher Skinner of the University of Southampton, who visited JPSM in September 2004. Subsequent lectures in the series have been given by Paul Biemer (University of North Carolina and RTI International), Jon Krosnick (Stanford University), Roderick Little (University of Michigan), Colm O’Muircheartaigh (University of Chicago), J.N.K. Rao (Carleton University), Donald Rubin (Harvard University), Nora Cate Schaeffer (University of Wisconsin), Alastair Scott (University of Auckland), and Eleanor Singer (University of Michigan).

A visiting faculty program is also being considered to bring in outstanding researchers to spend one or two semesters in residence at JPSM. During their stays, the researchers will give seminars and engage in discussions with other faculty and students about their research interests, thus enriching the research environment. A related idea is to establish affiliated faculty positions to take advantage of local area researchers, especially those employed in the federal government, who have expertise in survey methods or related topics. These affiliated faculty positions would provide a more formal mechanism for fostering the collaboration between the federal government and JPSM.

All of these enhancements to the program are designed to enrich JPSM as an environment for students, researchers, and faculty and to encourage further collaborations among the diverse actors who have contributed to the success of the program.

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