

## **INTEGRATING DATA ANALYSIS (IDA): WORKING WITH SOCIOLOGY DEPARTMENTS TO ADDRESS THE QUANTITATIVE LITERACY GAP\***

*The NSF-funded Integrating Data Analysis (IDA) Project undertaken by the American Sociological Association (ASA) and the Social Science Data Analysis Network sought to close the quantitative literacy gap for sociology majors. Working with twelve departments, the project built on lessons learned from ASA's Minority Opportunities through School Transformation (MOST) Program, where curricular change was a departmental (not individual faculty) agenda. A critical mass of faculty in each IDA department developed and used quantitative modules in lower division courses. This article reports on the steps to develop departmental curricular change and the important results for student learning and future professional success.*

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SOCIOLOGY INSTRUCTORS ARE well aware that many sociology majors confront a quantitative literacy gap. These students often have little or no exposure to the empirical underpinnings of the field or to hands-on practice as novice researchers. They generally receive little exposure to research training or data analysis in introductory courses. Most sociology majors are initially trained to do research in their junior year or even when they are about to graduate. At that stage, having been excluded from the excitement, creativity, and skills of original research, students often see

research as unconnected to what they have learned thus far in earlier sociology courses. They can be resistant to learning about research and may see empirical work as irrelevant to sociology.

In order to address this "gap," beginning in 2002, the American Sociological Association (ASA) in collaboration with the Social Science Data Analysis Network (SSDAN) at the University of Michigan-Ann Arbor, with funding from the National Science Foundation (NSF), organized and led a national project aimed at Integrating Data Analysis (IDA) into the undergraduate curriculum. IDA was designed to address the quantitative literacy gap by introducing students to data analysis early, frequently, and sequentially throughout the curriculum. The IDA project has been instrumental in developing systemic department-wide initiatives aimed at increasing sociology students' exposure to research in general and to data analysis in particular. A more research-oriented academic program contributes to the professional development of students, enhances their research and critical thinking skills, and enhances graduate school and employment opportunities. A department with a curriculum more oriented to quantita-

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tive research may also *attract* more quantitatively-oriented students to sociology as minors or majors.

### QUANTITATIVE RESEARCH TRAINING IN THE UNDERGRADUATE SOCIOLOGY CURRICULUM

Fifteen years ago, former ASA President Hubert M. Blalock, Jr., a well-known methodologist and scholar-teacher, wrote a provocative article titled "The Real and Unrealized Contributions of Quantitative Sociology" (Blalock 1989). He noted that, owing to the computer revolution, large-scale data sets were now widely available and that the quality of quantitative work had improved. However, he argued that the training of students, both undergraduates and graduates, had failed to keep pace with these opportunities and technological innovations. The article suggests a number of potential disciplinary obstacles that need to be addressed in order to make use of the "unrealized" contributions of quantitative sociology. In short, Blalock argued that there is a quantitative literacy gap in the field of sociology, including in the preparation of undergraduate majors.

Soon thereafter, unrelated to Blalock's plea, the Association of American Colleges sponsored a review of undergraduate curricula in thirteen disciplines, including sociology.<sup>1</sup> The AAC charged individual disciplinary task forces to produce reports summarizing the then-current curricula and to make recommendations for improvements (AACU 1990; ASA 1990). At several points in the project, representatives from all thirteen fields came together to share their findings. It was clear from those gatherings that the sociology curricula had some unusual contours. In short, which courses are offered in sociology and how they are

sequenced throughout the curriculum differs widely from one department to another. Therefore, sociology graduates may be significantly different, from one institution to another, in terms of their acquired sociological knowledge, skills, training, and hands-on research experience.

In 1990, the Sociology Task Force issued its report—*Liberal Learning and the Sociology Major*—which included thirteen recommendations, only one of which directly addressed research training (ASA 1990). However, the Task Force's review of the sociology curricula revealed that research training was (and still is) the *dominant common feature* across undergraduate sociology programs. Almost every sociology program had a set of research courses, regardless of the other electives that were also offered. Despite this "common core," students did not seem to understand, much less embrace, the empirical foundation of the field and how research was linked to—indeed informed—the panoply of other required and elective courses.

Beginning with the publication of *Liberal Learning and the Sociology Major* (ASA 1990), ASA has recommended scientific literacy as a key curricular goal that needs to pervade the major, "early and often." Research training is central to quality education for sociology majors; thus the ASA encourages departments to offer a more extensive, *developmental sequence* of research training, both in courses and in projects or practicums. In order to convey the excitement of the inquiry process, from conceptualization to analysis, sociology departments and their faculty need to develop and implement pedagogical initiatives and strategies to expose students early and often to research, both quantitative and qualitative.

In the years that followed the 1990 report, interest in making research training more explicit and rigorous has increased markedly (see Bridges et al. 1998; Cappell, Haapoja, and Gong 2000; Jordan and Haines 2003).<sup>2</sup> When ASA formed a new Task Force in 2004 to update the 1990 *Lib-*

<sup>1</sup>The Association of American Colleges (AAC), now the Association of American Colleges and Universities (AACU), sponsored the project and published the collection of the reports for each major.

*eral Learning* recommendations, attention to undergraduate research training was more prominent, as shown in the following statement:

**Recommendation 4:** Departments should infuse the empirical base of sociology throughout the curriculum, giving students exposure to research opportunities across several methodological traditions, providing repeated experiences in posing sociological questions, developing theoretical explanations, and bringing data to bear on them. (McKinney et al. 2004:8)

Like its predecessor, the new Task Force report has become a springboard for conversation, experimentation, and the development of new initiatives to expand and enhance undergraduate research training.<sup>3</sup> A recent review (ASA 2003) of the sociology curricula across a broad range of institutional types in the United States reveals a common pattern: many sociology departments now require one or more courses in sociological theory and one or more in research methods and statistics for completion of the sociology major. Almost every undergraduate program in sociology across the United States has a research sequence of at least two courses (p. 18). These courses are generally recommended during students' sophomore or junior years. However, a transcript analysis shows that these courses

are often taken later, sometimes in the senior year, perhaps due to the fact that sociology students tend to declare their majors quite late in their undergraduate careers, or perhaps because of students' general unease with quantitative material.

Further, perhaps because sociology majors take a wide range of courses prior to the "research sequence," students feel that research is disembodied from the rest of the curriculum. Lower division courses tend to be large, with many non-majors, and may rely on textbooks and lecture methods. As a result, instructors generally offer summaries (empirical generalizations) of social science research rather than inviting critical thinking about the scientific process that *produced* the results. Few lower division courses ask students to engage in hands-on research themselves.

#### LESSONS FROM THE MOST PROGRAM

The IDA Project built on the success of ASA's Minority Opportunities through School Transformation (MOST) Program, funded by the Ford Foundation. The MOST program engaged 18 sociology departments in addressing five critical goals: 1) curriculum transformation, 2) research training for undergraduate students, 3) mentoring for all students, but particularly students of color, 4) enhancing department and institutional climate in order to ensure that students generally and students of color specifically are working in an environment that will allow them to integrate themselves into the culture and environment of the institution and the department, and 5) addressing pipeline issues aimed at increasing the voice and visibility of undergraduate and graduate students of color in institutions of higher education. (For a more detailed discussion of the MOST program, its goals, and its outcomes, refer to Levine et al. 2002.) In the following section, we present some of the overarching lessons emerging from MOST that served as the foundations for IDA, and we describe how they affected the IDA project.

<sup>2</sup>This increased emphasis on undergraduate research training reverberates across all disciplines. Quantitative literacy or quantitative reasoning is considered a key feature of a liberal arts education; several major national projects and new organizations have formed around this commitment (Katkin 2003; Schneider 2004; Wolfe 1993).

<sup>3</sup>ASA does not accredit departments and there is no other mechanism or sentiment to standardize curricula. The *Liberal Learning* guidelines have been reviewed and adopted extensively, but many departments have also modified them extensively. The ASA and the Task Force endorse this creative use, as long as the department has clear goals in line with its mission, and curricula that support those goals.

***Working at the Departmental Level***

MOST demonstrated the value, indeed necessity, of working at the departmental level to achieve long-term curricular change. Consequently, the IDA project also incorporated scientific reasoning into the curriculum of *departments* in ways that reach all students. Rather than work with individual faculty on course improvements, IDA centered on departments making a collective commitment to infuse data analysis into lower division courses. Departments selected to participate in the IDA project had to demonstrate that a critical mass of their faculty (at least 50%) would be actively engaged in the project and in the curriculum transformation initiatives. This pervasive shift in the curriculum should ensure that most sociology students in these departments experience the hands-on excitement of scientific discovery, ideally in developmentally sequenced ways. Working with departments, setting research goals, and anchoring those goals in specific courses (irrespective of who teaches the course) increases the likelihood that every student will have multiple exposures to research training or data analysis.

***Students' Professional Development***

MOST demonstrated the value of research training for undergraduate students' professional development—whether they pursue graduate work or employment after obtaining their undergraduate degrees. By providing research training across the curriculum, not only in a research methods sequence, sociology departments help students develop a deeper understanding of the challenges and limits in research, as well as new research skills.

***Retaining Students***

MOST demonstrated the role mentoring and research training play in retaining students generally, and students of color specifically, in sociology. A general lesson from the MOST schools is that mentoring is important but does not occur in a vacuum. One of the most fruitful contexts for mentoring is

while undertaking collaborative research; this finding is particularly important for minority students who may fall through the cracks in seeking or fully using mentors (Scisney-Matlock and Matlock 2001; Ibarra 1996). Although mentoring was not a central goal of the IDA project, by fostering data analysis and research training for undergraduates, IDA also promoted and encouraged mentoring relationships.

***Inquiry-Based Learning***

MOST demonstrated the importance of inquiry-based learning (Kinkead 2003) to help students retain and apply what they have learned. Research experiences, whether in the computer lab or the community, are active learning experiences. As a result of MOST, the IDA staff hypothesized that improving students' data analysis skills would result in significant benefits and opportunities for their immediate learning and long-term professional growth. For example, students would develop greater comfort with quantitative data analysis as a result of appropriate and incremental exposure to statistics and quantitative reasoning; data analysis experiences enhance students' understanding of and engagement with the course material; and such training allows students to develop an appreciation for the empirical base of the discipline from their first sociology courses (Lorenz and Bruton 1996; Markham 1991). Moreover, students who receive data-analysis training see the connections between what they do in class, what they are studying, and what underlies this work (e.g., active learning). Indeed, students learn sociology by doing sociology (Jenkins 1995).

**THE IDA PROJECT FOCUS**

Drawing on the lessons from MOST, the IDA project focused on addressing the scientific literacy gap for undergraduate students in sociology, placing special emphasis on the 2000 Census and thus building on the work of SSDAN. (Social Science Data Analysis Network [SSDAN] is a longstand-

ing project led by Dr. William H. Frey. Over the years, Frey and the staff at the University of Michigan have worked with individual high school teachers and college faculty to develop course modules using Census data sets. ASA's partnership with SSDAN brought together SSDAN staff experiences and resources with ASA's work with departments on curriculum change.) Specifically, IDA focused on: 1) working with *departments* to introduce data analysis early, frequently, and sequentially throughout the curriculum; and 2) promoting active learning through data analysis and research training.

### *The Department Focus*

To ensure that the IDA project developed into an institutional, systemic, and enduring initiative, IDA was located at the department level where education and training occur. Structurally, it is the department that is the locus of student learning and development. Departments have direct contact with students; they shape their curricula and co-curricula; they interact on a regular basis with institution-wide offices that directly or indirectly affect curricular development; and they have the capacity to initiate and prioritize their own recruitment and training efforts. While individual (faculty) leadership on a variety of training issues within the department is critical, systemic and institutional change can be sustained in the face of leadership and personnel transitions. IDA recognized in the academic department an opportunity to change "business as usual" practices in the academy in a meaningful way, to make reforms institutionally relevant to students and the life of the department, and to sustain change beyond the tenure of any given faculty member or chair.

As noted previously, the IDA Project required that a critical mass (at least 50%) of department faculty participate in the project in order to ensure systemic and enduring curricular transformations. The chair had to agree to the department's involvement and often chairs participated them-

selves. Active faculty participation in department-wide initiatives allowed a significant number of students to be exposed to research training and data analysis, multiple times and sequentially across the major.

If each sociology department is different from their other sociology counterparts, with its own set of specialty courses and its own sequencing (the horizontal curriculum), then each department must make its own collective decisions about which courses to offer, which to require, and in what sequence. Therefore, IDA moved the locus of control from the individual faculty to the department level. Sociological research on organizational change suggests that charismatic individuals are important to launch projects, but innovations are rarely implemented and "institutionalized" without investment by the group.

IDA and SSDAN staff worked directly with and provided support to faculty members and departments to facilitate the integration of data analysis into the curriculum. In essence, IDA was a three-year project designed to work with faculty at the (sociology) department level to introduce scientific reasoning and data analytic skills into the undergraduate curriculum.

### *Active Learning Focus*

The second emphasis of the IDA Project was inquiry-based active learning using secondary data. The SSDAN staff worked to ensure that data from the 2000 U.S. Census was more broadly available to an increasing number of users and departments, extending both the use of SSDAN curriculum materials and their impact on undergraduate student learning in the social and behavioral sciences. Students learned factual lessons from the data, as well as the potential of the Census as a data source for a wide range of questions.

The active learning process took place through engagement with data *modules* that faculty created to meet the learning goals for the course(s) they teach. Some faculty wanted students to explore counterintuitive findings; some asked students to compare

an array of data from one location to another (e.g., hometown to college town); some asked students to speculate on a finding (e.g., which state has the highest proportion of people over 85 years old?) and then to look at Census data to find the answer; while others explored issues related to inequality, stratification, discrimination, or emerging demographic patterns in the United States, among other topics. Generally, the modules consisted of: 1) learning objectives; 2) some reading or class work done in advance; 3) a set of questions to answer, usually in a worksheet format; and 4) a data set to explore those questions. In addition, students generally had to view and work with IDA modules on the SSDAN website (see Fuller 1998, Cover 1995, and Frey and First 2002, for other approaches).

### IDA PARTICIPANTS

The IDA team competitively selected 12 sociology departments in two cohorts from across the nation to participate in the IDA Project. The following departments formed the first IDA cohort in 2002: North Carolina State University, Sinclair Community College, South Dakota State University, State University of New York (SUNY) Brockport, University of Central Florida, and Western Washington University. In 2003, the institutions selected to participate in the IDA project were: Augsburg College, Berea College, Cleveland State University, City University of New York (CUNY) Lehman College, Ithaca College, and Wake Forest University.

The group of IDA participants represents a very diverse group of institutions with different mission statements, goals, enrollments, challenges, and resources. Institutions ranged from a community college (Sinclair), to relatively small undergraduate programs (Augsburg College) to PhD granting institutions (North Carolina State University), and included one serving a primarily Latino/a population (Lehman), as well as one serving a low-income population (Berea). Given the diversity of these institu-

tions, IDA evolved into 12 pilot projects or experiments aimed at enhancing and integrating data analysis into the undergraduate curriculum.

### IDA PROJECT STRATEGIES

The IDA-SSDAN team developed a number of initiatives to work with the participating departments, including:

#### *Summer Workshops and Meetings*

IDA faculty participated in summer workshops aimed at the development of specific course modules, particularly focusing on integrating data analysis into the curriculum. At least half of the department faculty were required to participate in these workshops, which were held at the University of Michigan and were led by ASA and SSDAN staff. The workshops were designed to acquaint sociology faculty with resources and approaches to reducing the quantitative literacy gap for their majors. Drawing on materials developed under the IDA grant, the staff demonstrated ways for departments to set and meet research goals for their students, emphasizing lower division courses and courses outside the research methods-statistics sequence. Departments had the necessary time (and access to consultants) to meet and plan curriculum reform. These workshops also resulted in a number of "departmental" meetings in which faculty met to think critically about and discuss new initiatives for curriculum transformation, enhancing data analysis in the curriculum, and expanding research opportunities for undergraduate students.

In addition to the summer workshops the ASA annual meeting brought together the coordinators and faculty to discuss the progress of the IDA project at the institutional level and the integration of data analysis into their courses.

#### *Course Modules*

While focusing on systemic changes at the department level and on curricular transformation, faculty at the summer workshops

developed modules aimed at integrating data analysis into their courses. Participants further developed these modules after they returned to their home institutions and implemented them in the corresponding courses. Participants also shared these modules with full-time faculty who did not attend the workshops, with graduate students teaching courses, and with adjunct faculty. The SSDAN website ([www.ssdan.net](http://www.ssdan.net)) includes a variety of modules, which are available and accessible to the general academic community and can be used by any faculty member.

The SSDAN staff generally provided technical assistance to participating faculty to allow them to develop and implement their classroom modules, including training on the use of programs such as Student Chip and Web Chip. SSDAN staff also worked with faculty to generate datasets, primarily based on the 2000 U.S. Census which would be used for these modules. IDA staff provided guidance and recommendations for the development of modules and curricular transformation, and in generating, implementing, and evaluating the outcomes of the classroom modules and the IDA project.

#### *Site Visits*

The IDA team visited participating institutions for several reasons: 1) to work with departments to help them achieve their IDA goals and to develop plans for implementing them more widely throughout the next year of the project, 2) to help them identify and address barriers to curricular change, 3) to promote the department's efforts and the IDA project within the university community, and 4) to work with departments to develop strategies for assessing student learning and other IDA outcomes. IDA staff recognized that success in achieving these goals would require department chairs, committees, and other university administrators all to engage in the process of reform. The site visits also allowed the IDA team to work with departments to identify opportunities within their institutions to

allow them to develop, implement, and institutionalize IDA. In some situations, involvement in the IDA Project was a bargaining tool to leverage support from the administration and faculty. At each institution the IDA site team met with students, faculty, the entire department, the Dean of the College, and, whenever possible, other administrators in the university structure. The site visits also provided each department national visibility and support and stressed to their faculty and administrators the importance of supporting and funding this effort. These visits allowed the IDA staff team to address key departmental issues and concerns with the Dean and others. After each visit the IDA site visit team wrote a report that included a number of observations, the strengths of the program, areas of concerns, and recommendations for strengthening the development and implementation of the IDA project. These reports were distributed to department faculty and administrators such as the Dean and the Provost, among others.

#### *Annual Reports and Evaluation Plans*

To keep track of department progress and the strategies and initiatives that were being developed, as well as the general development and implementation of the IDA project at the department or institutional level, IDA required departments to submit an annual report which also addressed issues relating to the assessment or evaluation of their current projects.

#### *General Resources on Teaching*

ASA offers a variety of resources on teaching, including: 1) curriculum materials—a catalogue of materials is available on the ASA homepage at [www.asanet.org](http://www.asanet.org); 2) teaching workshops—the ASA Annual Meeting, held in August, includes over forty workshops on teaching; 3) technical assistance and consulting—the Department Resources Group, a network of 70 consultants with expertise in program reviews and specific areas in teaching and learning, visits departments to lead workshops or review

programs; 4) the journal *Teaching Sociology*--some of the key articles that informed the IDA project were Kain 1999, Scheuble and Harper 1991, and Raymondo 1996, all published in *Teaching Sociology*; and many other resources to help departments address the agenda of infusing research throughout the curriculum.

### LIMITATIONS AND CHALLENGES: THE IDA PROJECT IN PERSPECTIVE

In subsequent sections, we present and discuss some of the important positive outcomes of the IDA project as well as some promising practices. However, we will first discuss some important limitations and challenges affecting the development and implementation of the IDA project that departments and faculty across all IDA institutions faced. In this section, we highlight three major issues or challenges that these institutions confronted in the implementation of the IDA project.

Both the MOST and the IDA initiatives showed that trying to develop or implement programs that require or demand a systemic and institutional approach is a very difficult process, even for sociology departments! The different methodologies (i.e., quantitative vis-à-vis qualitative), perspectives, levels of technological sophistication, time commitments and divergent responsibilities, and faculty interest (or lack thereof) reflected in a department can result in significant barriers that affect the development and implementation of department-wide initiatives. Requiring that a critical mass of faculty participate in the IDA initiative (albeit difficult) was instrumental for the long-term success and institutionalization of IDA. Nevertheless, through IDA we also learned that there must be mechanisms in place, at the department or institutional level, to facilitate and encourage participation in such initiatives.

Another important challenge reported by a group of faculty members was the difficulty of implementing data analysis modules in classes with large enrollments. The num-

ber of students enrolled in these courses exacerbated the time needed for implementing and grading the amount of coursework IDA generated. Different faculty approached this situation in different ways. For example, some faculty opted for using only one module in their courses; others randomly selected assignments to be graded; while in some institutions, some faculty were assigned undergraduate teaching assistants to help them with grading. However, some faculty designed and implemented a number of IDA modules in their courses notwithstanding the intensive time commitment. IDA faculty did note that, as is true with many course innovations, the first-time, up-front "costs" were high. Once they had developed a module, the time consuming work was done. Faculty also shared modules within the department and used existing modules on the SSDAN website. Thus, implementing data analysis in lower division courses does not have to be terribly onerous for busy faculty.

We are convinced that departments need to establish practices or strategies to facilitate and encourage faculty to engage in these types of initiatives. Providing additional departmental or institutional resources and incentives, such as taking these pedagogical and research training innovations into consideration in the promotion and tenure process, providing a reduced course load, or providing additional personnel (e.g., teaching assistants) to help in the grading process, are all important steps in that direction.

Another challenge that varied quite significantly from institution to institution was the availability of technological resources (e.g., computers, computer labs, smart classrooms, etc.) to implement the IDA project. Some institutions were at the cutting edge of these technological innovations (with extensive wireless networks, smart classrooms, and laptop distribution programs for students) while others faced serious difficulties particularly related to the unavailability of the necessary technological resources to implement IDA modules, or

even limited access to the limited resources available on campus. During our site visits, IDA staff discussed these issues, at the departmental and even at the college level; in some instances, IDA staff was encouraged by the commitment of the college to provide more adequate facilities for the sociology department or to put them higher in the queue to gain access to the limited computer labs on campus. In some institutions, IDA served as a key mechanism to address existing limitations; in others, IDA was instrumental in encouraging upper echelon administrators to provide the necessary resources for the implementation of the project; while in other institutions, existing challenges require long-term commitment and investments from administrators, the departments, and their faculty.

### POSITIVE OUTCOMES FROM THE IDA PROJECT

Despite the aforementioned limitations, a variety of concrete and very promising outcomes emerged from the IDA project at participating institutions.

#### *Appropriate Departmental Goals and Course Sequences*

Drawing on the work of departments who shared their process of curriculum reform (Kain 1999; Powers 2000; Hazzard 1991), the IDA project worked with departments to develop realistic learning goals and the curricular structure to meet them. Every institution has crosscutting pressures that temper “the ideal,” from obligations to offer service courses, to a high percentage of transfer students, to a lack of smart classrooms. The IDA staff encouraged departments to have mini-sequences, even if they were comprised of two courses, where one course was required before the other and built on its materials. Site visits, a review of syllabi, and department reports confirmed that every department developed a realistic set of research goals for the major.

#### *Lower Division Course Modules*

IDA participants developed and imple-

mented modules for one or more of their courses, using different sources of data, including Census data, the Current Population Survey, the General Social Survey, and crime data, among others. Departments set *research* goals (as a subset of department goals) and anchored those goals in required or highly popular courses. At a number of institutions, after extensive discussions on curriculum transformation and programmatic goals and objectives, departments decided to implement a particular module for all introductory sociology courses to allow all students to receive similar exposure and training in quantitative and/or qualitative data analysis. The basic IDA philosophy was to introduce data analysis and research training experiences *early* in the curriculum (introductory courses); *frequently*, to allow students regular and continued exposure to these methodologies and techniques; and *sequentially* throughout the curriculum to allow students to generate new skills and knowledge to prepare them for subsequent courses. As we have said, IDA was intended to be a department-wide initiative with a critical mass of faculty developing and implementing data analysis modules throughout the curriculum so that all or a majority of students would benefit from these experiences. Indeed, participating departments developed and used—and still use—a large number of modules that have affected a significant number of students. Preliminary analysis shows that 6500 students have been exposed to IDA modules among the participating institutions (see Table 1).

#### *Student Computer Literacy*

Learning research and computer skills go hand in hand. While today’s college students are usually very computer savvy, the digital divide still remains an issue in some institutions. In any case, using the computer for data retrieval and analysis purposes usually implies the development of new skills for college students. However, as we mentioned previously, institutions vary on the availability and quality of computer facili-

**Table 1. The Impact of the IDA Project Across Institutions (2003-2004)**

Institution	Number of Modules Developed	Number of Courses Using Modules	Total Number of Students Exposed to IDA Modules
Augsburg	12	7	169
Berea		12	181
CSU	19	9	440
Ithaca	8	7	395
Lehman	8	6	430
NCSU	7		950
SDSU		6	426
Sinclair	16	9	1,123
SUNY-Brockport	6		249
UCF	19	8	682
Wake Forest	5		180
WWU	10	3	1,275

*Note:* Blank cells represent missing data.

ties and the access that social science students have to these facilities. Technology always brings practical problems (Raymondo 1996; Persell 1992), but the potential for learning using digital technology is substantial (Benson et al. 2002). Students involved in the IDA project had many opportunities to increase their computer literacy.

#### ***Dissemination of IDA-Related Work***

Another important project objective was to disseminate IDA and its outcomes to other departments within the participants' institutions and to other institutions throughout the country. IDA was extremely successful in this aspect at the local, regional, and national level. A number of IDA participants developed workshops or seminars aimed at presenting the success of their programs to other departments at their respective institutions. Other IDA participants developed specialized sessions and/or workshops and presented them at regional conferences or meetings, particularly regional sociological

meetings. (Seventeen workshops were offered from 2003-2005.)

Also, during the ASA's annual meetings, ASA-IDA staff and IDA participants organized and led a significant number of sessions and workshops. Further, ASA's monthly publication, *Footnotes*, and the association's website as well as the SSDAN website have disseminated IDA project goals, course modules, and other types of information to the national and international community. Finally, the publication titled *Integrating Data Analysis: Instructional Materials for Integrating Data Analysis into Sociology Courses* (Hilal and Redlin 2004), co-edited by an IDA participant, aimed at disseminating IDA. This publication includes a number of course modules and other types of data analysis exercises developed by IDA and non-IDA participants.

#### ***Students' Learning Gains***

Of course, the most important outcome of the IDA Project is student learning about research, its process and its findings. The

site visits and meetings with students shed light on what students learned, the research skills they developed, as well as their attitudes and recommendations regarding the integration of data analysis into the curriculum. Further, several departments set research goals and then used pre- and post-tests to measure student improvement. For example, during the fall of 2003, the IDA faculty at South Dakota State University evaluated the courses that used IDA modules based on student outcomes using a pre-test/post-test design. The tests focused on assessing students' knowledge about methods, the role of statistics, and the nature of

variables and hypotheses before and after the IDA lessons began. Preliminary results show that the percentages of students being able to answer the questions correctly improved remarkably, from the pre- to the post-test, for every question asked, except for the question that asked students to identify the limitations of science, which showed no change (see Table 2).

Berea College and Ithaca College also saw improvements in students' overall scores in pre- and post-test studies (see Tables 3 and 4). The Sinclair Community College IDA project also implemented pre- and post-tests to test students' knowledge re-

**Table 2. South Dakota State University (SDSU) Pre-Test and Post-Test Evaluation of Modules, Fall 2003: Percent Answering Questions Correctly by Type of Lesson**

Stem of Question Asked		Percent Answering Question Correctly			
		Lecture	Lecture+	Webchip	Total
1. In social research the purpose of statistics is to...	pre-test	25.0	24.8	32.0	27.3
	post-test	62.2	29.0	23.4	40.1
2. In the language of science, the variable that is thought to be the assumed cause is called a(n) _____ variable.	pre-test	33.9	43.1	41.3	39.1
	post-test	85.4	71.7	72.6	77.2
3. A hypothesis differs from a theory in that it is...	pre-test	48.8	42.3	49.3	47.0
	post-test	84.1	45.7	70.2	67.6
4. Based on information in Table 1, what percent of social science majors had an above average GPA last semester?	pre-test	98.2	92.0	93.3	94.7
	post-test	99.4	97.1	97.6	98.1
5. What is the independent variable in Table 1?	pre-test	36.9	29.9	34.0	33.8
	post-test	65.2	49.3	47.6	54.9
6. A hypothesis states, in part, that "income increases as education increases." In this statement, education is the _____ variable.	pre-test	51.8	41.6	38.7	44.4
	post-test	79.9	63.8	62.9	69.7
7. In the research process, the role of statistics is limited because...	pre-test	79.8	83.9	71.3	78.2
	post-test	85.4	71.7	75.8	78.2
8. A professor of philosophy at Kerith University suspects that when compared to male athletes female athletes have a higher average GPA. Restate this suspicion as a hypothesis.	pre-test	59.5	65.7	65.3	63.3
	post-test	78.5	63.8	76.6	73.2

Notes: Lecture=no experiential activity; Lecture+=lecture and in-class analysis of tables, but no Web Chip modules; Webchip=Web Chip modules only.

Graduate teaching assistants decided when to administer the pre-tests and post-tests. The differences in percentages of pre-tests and post-tests might be due to the fact that some students did not complete either the pre-test or the post-test. Differences may also be due to the time the pre-tests and post-tests were given.

garding basic methodological concepts. Sinclair students showed strong improvement in these skills after taking courses with IDA modules (results not shown). Even if these results are explained, in part, by a greater comfort level among students with data analysis or research, this is, nevertheless, an important outcome of the IDA project and it is key for future research training initiatives.

#### PROMISING PRACTICES—ILLUSTRATIONS OF APPROACHES TO UNDERGRADUATE RESEARCH TRAINING

The diverse missions and characteristics of the twelve IDA departments led to a variety of innovative strategies for undergraduate research training. In the following section, we provide a summary of some promising practices that emerged out of the two-year IDA project.

#### *Generating and Implementing Department-Wide and Systemic IDA Initiatives*

In addition to the 50% or more faculty participation in the IDA workshops and implementation of IDA modules, many faculty provided training to colleagues (including adjunct faculty) and graduate students at their home institutions so that they were also able to develop and implement IDA modules in their respective courses. In some institutions, small groups of faculty and students teaching the same courses, such as introduction to sociology, continue to meet regularly and share experiences using IDA modules and other pedagogical resources. In other institutions, faculty shared modules with one another and with the adjunct faculty they hired in order to alleviate the burden of developing new modules. In order to ensure the institutionalization of IDA, one department agreed to recruit like-minded faculty; thus, when interviewing new fac-

**Table 3. Berea College: Pre- and Post-Test Results from Courses Using IDA Modules<sup>a</sup>**

	Pre-Test Average	Post-Test Average
Fall Courses 2003		
Introduction to Sociology (A)	2.3	4.8
Introduction to Sociology (B)	2.0	4.8
Methods	3.2	5.5
Spring Courses 2004		
Introduction to Sociology	2.3	4.3
Social Problems	3.3	4.9
Gender	4.6	5.1
Stratification <sup>b</sup>	3.1	4.1

<sup>a</sup>Pre- and post-tests consisting of six questions regarding research were administered in the spring of 2003 and the fall of 2004.  
<sup>b</sup>These tests consisted of only five questions.

**Table 4. Ithaca College: Pre-Test and Post-Test Results of Using Census Data in a Module on Race in the Community Context in Introductory Sociology**

Knowledge	Pre-Test (percent correct)	Post-Test (percent correct)
Extent of Poverty in Mississippi	45%	85%
Extent of Poverty on an Indian Reservation	62%	94%
Racial Composition in Mississippi	69%	95%
Percent of Households with Incomes Less than \$25,000	30%	55%

ulty, they asked the candidates about their willingness and experience in using data analysis modules in their courses, and how they would contribute to the department goals.

Initiatives such as IDA require institutional support, departmental commitment, and faculty buy-in to be successful. The majority of the IDA participants took seriously and adopted the IDA mantra, "research training early and frequently." Some departments completed a revision of their core curriculum, established a set of common goals, and implemented data analysis modules in introductory and other sociology courses. Some departments agreed on a few basic goals for their introductory courses and included them in every faculty member's syllabus thus ensuring that these goals were an important component of their courses. Other departments added a capstone course for the major, included independent research courses, and built in research experiences in the upper division electives to avoid a disconnect between the IDA work in early courses, the methods sequence, and more advanced courses.

#### *Using IDA to Enhance General Education*

Given that many students who take introductory sociology courses have no intentions to pursue a major in sociology, having them exposed to data analysis and other research methodologies in the introductory course provides general exposure to sociology, its empirical foundations, and the importance and contributions of research in the field. This practice not only enhances students' overall education, but in some institutions the IDA courses have been used to satisfy the institution's general education requirements.

#### *Data Analysis as a Means of Understanding Social Problems and Other Community Issues*

Although many students may be hesitant about quantitative work, IDA modules allow them to grasp the power of data in un-

derstanding and changing lives. For example, at Lehman College IDA faculty created data analysis modules to help students see beyond their own context; a module called "Exploring Your Neighborhood" asked students to describe their neighborhood and then test their observations using data from their particular Census tracts. At South Dakota State University, faculty developed some modules to focus on land use among the Native American community; the clearly tailored content was a real plus for the students and fit in with the land-grant university's mission. Faculty at Wake Forest University literally took IDA "on the road." In an innovative course on Sociology in the South, IDA faculty and a group of students boarded a bus and toured many cities and counties in the south. Along the way, they kept journals of their direct observations, and used their laptop computers to bring up Census information about those locales (Beaman 2004). Having the Census data at hand was a big help in verifying their observations, and realizing how observational data can enhance their understanding and interpretation of quantitative information. At Western Washington University, students (with faculty supervision) engaged in contract research, for the University itself and for the surrounding community.

Given the applied and hands-on experience that many students across different institutions were exposed to, it was no surprise to find that IDA staff interviews with students in participating institutions showed students to be positive about learning math or quantitative skills when they served a purpose or were relevant to the students' life experiences, and when students were able to connect what was taught in the classroom with actual hands-on types of data analysis and research experiences. Under such conditions, students not only appreciated and welcomed the IDA modules but indicated that these types of initiatives should be incorporated into other sociology courses and other courses throughout the campus.

### ***Cross-Collaborations across Campuses and Institutions***

Ithaca College sociologists collaborated with the ethnic studies center on campus to develop several modules focusing on race and ethnicity. Other faculty collaborated with other programs and institutions to discuss the advantages and opportunities that emerge out of programs such as IDA and the importance of integrating quantitative training into the curriculum. For example, IDA faculty at Lehman College received funding from the National Science Foundation to disseminate the successes and best practices that emerged from the IDA project to other institutions in the region. During this workshop (April 1, 2005), IDA faculty shared their IDA experiences, the data analysis modules they developed, and recommendations for introducing data analysis into the curriculum.

### ***Using Online Courses to Expand the IDA Project to a Wider Public***

Through the use of online courses, some faculty used IDA modules to reach an increasing number of undergraduate students. Using this online approach allows departments to expose significant numbers of students to data analysis techniques that would otherwise not be possible.

### ***Using Existing Programs to Enhance IDA and Related Activities***

Institutions can take advantage of available resources, their institutional mission, and college and department goals in order to develop and implement projects like IDA. For example, North Carolina State University has been an active member in a national Preparing Future Faculty Program. The IDA goals and objectives fit very well with the emphasis on more intentional preparation of future faculty.

### ***Allowing for Change and Growth***

Although initially the primary focus of IDA and its modules was on the use of U.S. Census data, the project then expanded to include data from the General Social Survey

(GSS) and other databases of interest to faculty and students in crime or the criminal justice area, among others. Also, although IDA originally focused on the development of quantitative data modules, it also expanded to include the development and use of qualitative data modules in the classroom. Thus, IDA's focus and orientation developed and expanded in response to the substantive, methodological, and theoretical interests of the IDA faculty, thus increasing faculty buy-in and enthusiasm for the IDA project.

### **CONCLUSIONS**

IDA was an important and innovative project, funded by NSF, in which the ASA, SSDAN, and a heterogeneous group of institutions of higher education worked collaboratively and interactively to address the scientific literacy gap. The IDA project promoted active learning among undergraduate students. These efforts took shape primarily through the development and implementation of quantitative data analysis modules used early, frequently, and sequentially throughout the curriculum. In order to achieve systemic and long-lasting change, IDA was designed to be a department-wide initiative in which a critical mass of the department's faculty was required to actively participate in IDA.

Multi-year, long-term projects (such as MOST and IDA) can make lasting changes in the culture of a department and in the mindset of its faculty. While in larger institutions long-term departmental commitment to IDA became a challenge, overall IDA achieved significant and widespread faculty participation and strong support from many administrators, particularly at the college level. Moreover, student reactions have been generally positive, and initial data on pre-post learning outcomes show gains in research knowledge. To the extent that IDA is successful, it will result in new cohorts of undergraduate students with a better understanding of sociology, of what sociologists do, and of the applicability and importance of the discipline. With the help of ASA and

SSDAN, IDA developed models of integrating data analysis throughout the curriculum, which are transportable to other departments and institutions throughout the country.

The IDA project has shown that introducing data analysis early, frequently, and sequentially throughout the curriculum can have a major impact on students' professional development and in developing hands-on experiences that will enhance their technical and methodological skills and will allow for a better understanding of the substantive and theoretical applications of the discipline. Indeed, students learn sociology by doing sociology. Almost every sociology department espouses "the sociological imagination" as its goal for its majors. Now some will increase the power of data to strengthen the connection between private troubles and public issues and to give students new tools to take action on those issues.

#### REFERENCES

- American Association of Colleges and Universities. 1990. *Liberal Learning and the Art and Sciences Major*. Vol. 2, *Reports from the Field*. Washington, DC: Association of American Colleges.
- American Sociological Association. 1990. *Liberal Learning and the Sociology Major*. Washington, DC: American Sociological Association.
- American Sociological Association. 2003. *How Does Your Department Compare?* Washington, DC: American Sociological Association.
- Beaman, Jean. 2004. "On the Road: Wake Forest University's Social Stratification in the American South Course." *Footnotes*, January, p.4. Washington, DC: American Sociological Association.
- Benson, Denzel, Wava Haney, Tracy Ore, Caroline Hodges Persell, Aileen Schulte, and James Steele. 2002. "Thinking Sociologically about Digital Technology, Teaching, and Learning: What We Know and What We Need to Know." *Teaching Sociology* 30:140-57.
- Blalock, Hubert M. Jr. 1989. "The Real and Unrealized Contributions of Quantitative Sociology." *American Sociological Review* 54: 447-60.
- Bridges, George S., Gerald M. Gillmore, Jana L. Persing, and Kristin A. Bates. 1998. "Teaching Quantitative Research Methods: A Quasi-Experimental Analysis." *Teaching Sociology* 26:14-28.
- Cappell, Charles L., Tom Haapoja and Fang Gong. 2000. "Computer Based Training in Quantitative Reasoning and Analysis." Presented at the annual meeting of the American Sociological Association, August 2000, Washington, DC.
- Cover, Dan. 1995. "Teaching Sociology as a Science: A Laboratory Reinforcement of the Sociological Heritage." *Teaching Sociology* 23: 226-33.
- Frey, William H. and Cheryl First. 2002. *Investigating Change in American Society*. 2d ed. Belmont, CA: Wadsworth.
- Fuller, Theodore D. 1998. "Using Computer Assignments to Promote Active Learning in the Undergraduate Social Problems Course." *Teaching Sociology* 26:215-21.
- Hazzard, John W. 1991. "Student Competencies and the Goals of the Undergraduate Curriculum." *Teaching Sociology* 19:532-3.
- Hilal, Susan M. and Meredith Redlin. 2004. *Integrating Data Analysis: Instructional Materials for Integrating Data Analysis into Sociology Courses. Resource Materials for Teaching*. Washington, DC: American Sociological Association.
- Ibarra, Robert A. 1996. *Enhancing the Minority Presence in Graduate Education*. Monograph VII, *Latino Experiences in Graduate Education: Implications for Change*. Washington, DC: Council of Graduate Schools.
- Jenkins, Richard. 1995. "Social Skills, Social Research Skills, Sociological Skills: Teaching Reflexivity?" *Teaching Sociology* 23:16-27.
- Jordan, Joy and Beth Haines. 2003. "Fostering Quantitative Literacy: Clarifying Goals, Assessing Student Progress." *Peer Review* 5:16-9.
- Kain, Edward L. 1999. "Building the Sociological Imagination through a Cumulative Curriculum: Professional Socialization in Sociology." *Teaching Sociology* 27:1-16.
- Katkin, Wendy. 2003. *Undergraduate Research and Scholarship and the Mission of the Research University*. Stony Brook, NY: The Reinvention Center.
- Kinthead, Joyce. 2003. "Learning Through Inquiry: An Overview of Undergraduate Research." *New Directions for Teaching and Learning* 93:5-17.
- Levine, Felice J., Havidan Rodriguez, Carla B. Howery, and Alfonso Latoni. 2002. *Promot-*

- ing Diversity and Excellence in Higher Education through Department Change. Washington, DC: American Sociological Association.
- Lorenz, Frederick O. and Brent T. Bruton. 1996. "Experiments in Surveys: Linking Mass Class Questionnaires to Introductory Research Methods." *Teaching Sociology* 24:264-71.
- Markham, William T. 1991. "Research Methods in the Intro Course: To Be Or Not To Be." *Teaching Sociology* 19:464-71.
- McKinney, Kathleen, Carla B. Howery, Kerry J. Strand, Edward L. Kain, and Catherine White Berheide. 2004. *Liberal Learning and the Sociology Major Updated: Meeting the Challenge of Teaching in the Twenty-First Century*. Washington, DC: American Sociological Association.
- Persell, Caroline H. 1992. "Bringing PCs into Introductory Sociology Courses: First Steps, Missteps, and Future Prospects." *Teaching Sociology* 20: 91-103.
- Powers, Charles H. 2000. "Evolving a Developmental Curriculum in Sociology: The Santa Clara Experience." *Teaching Sociology* 28:41-9.
- Raymondo, James C. 1996. "Developing a Computer Laboratory for Undergraduate Sociology Courses." *Teaching Sociology* 24:305-9.
- Scheuble, Laurie K. and Charles L. Harper. 1991. "Creating Professional Experiences for Students: Organizing an Undergraduate Symposium." *Teaching Sociology* 19:74-8.
- Schneider, Carol Geary. 2004. "Setting Greater Expectations for Quantitative Learning." *Peer Review* 1.6:26-7.
- Scisney-Matlock, Margaret and John Matlock. 2001. "Promoting Understanding of Diversity through Mentoring Undergraduate Students." *New Directions for Teaching and Learning* 85:75-84.
- Wolfe, Christopher R. 1993. "Quantitative Reasoning Across a College Curriculum." *College Teaching* 5:3-9.

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