Spatial Perspectives on Analysis for Curriculum Enhancement

NSF DUE 0231263

NSF 02-043 CCLI National Dissemination

Annual Report
October 2003 – September 2004

Compiled by

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Activities

SPACE seeks to achieve systemic change within undergraduate education in the social sciences. Current funding from NSF is for two years (October 2003 through September 2005), with a possibility of extension for a third year. Our approach is based on the value of spatial thinking, and associated technologies (geographic information systems, tools for spatial analysis), as the basis for greater integration among the social science disciplines, greater motivation for students, greater relevance to societal problems, greater integration of technology into undergraduate instruction, and greater employment prospects for graduates. In this program, knowledge in spatial analysis is linked with CCLI objectives for national dissemination of curricula and assessment resources.

The program is centered on a series of professional development workshops, with extensive follow-on activities; and features additional programs designed to leverage these workshops, to achieve high rates of participation among traditionally under-represented groups, and to bridge the gap between research and teaching in the social sciences. SPACE is organized by a consortium led by the University of California, Santa Barbara (Project PI, Donald Janelle; co-PIs, Michael Goodchild and Richard Appelbaum). Other participants in the consortium, under contract to UCSB, include The Ohio State University (PI, Mei-Po Kwan), and the University Consortium for Geographic Information Science (PI, Arthur Getis).

SPACE focuses primarily on National Education Workshops to provide undergraduate instructors with basic skills in GIS and spatial analysis, and introduce them to the latest techniques, software, and learning resources. SPACE is also committed to organizing sessions at major conferences to provide instructors with basic introductions to using spatial technologies in the classroom, to maintain engagement with participants in the national workshops, and to reach wider audiences than the workshops. The project includes a website (www.csiss.org/SPACE) that provides an on-line clearinghouse for lab exercises, data sets, test items, examples of syllabi, and assessment instruments.

Primary Activities in Year One

Commencing with access to NSF funding in October 2003, the project team carried out the following activities to achieve program implementation:

- Develop a website to service the administrative and pedagogic objectives of the program
- Initiate detailed planning for workshops at three sites and appoint workshop coordinators and instructors:
    - Ohio State University
    - University of California, Santa Barbara
    - San Diego State University (on behalf of the University Consortium for Geographic Information Science
- Convene a planning meeting of instructors from the three workshops, technical staff, and consultants (Santa Barbara, 8-10 December 2003)
- Design advertising and implement web-based application procedures, including design of the application survey
- Solicit applicants, with special attention to attract representatives of designated minority populations (Native Americans, African Americans, and Hispanic Americans)
- Select participants and communicate decisions and logistics
- Design and test web-administered Entry and Exit Surveys
- Offer workshops
- Evaluate outcomes of workshops
- Arrange follow-up activities – Awards for curriculum development and related innovations in instruction and student learning of spatial analysis concepts and technology.

SPACE Planning Meeting

December 12-13, 2003, Santa Barbara

The primary objectives of this meeting were:

- to communicate among all partners an understanding of the NSF meaning of such concepts as professional development and learning assessment;
- to build these concepts into the planning of *SPACE* workshops and into the assessment of their impact and value for workshop participants and their students;
- to identify suitable resources and tools for national dissemination to the broadly interdisciplinary set of social science participants in the *SPACE* workshops.

  Among the resources for **National Dissemination**, CSISS recommended some of its resources: the book on ***Spatially Integrated Social Science*** (Oxford University Press, 2003), the exploratory spatial data analysis software **GeoDa,** Tobler's **Flow Mapper** program for representing movement on maps, the extensive collection of ***CSISS Classics***, the CSISS ***course syllabi collection*** (by discipline), and the ***GIS Cookbook.*** Details on all of these resources are available at www.csiss.org. In addition, the meeting focused on the identity of special web links to resources on spatial social science and on educational professional development.

- to establish the basic objectives, content, and client audience of each workshop;
- to identify the instructional team and venue for each workshop;
- to expand instructional teams with representatives from a range of social science disciplines
- to determine which disciplinary association meetings might be suited for special didactic workshops on the *SPACE* project for years 2 and 3 (October 2004-September 2006);
- to consider means of attracting under-represented populations to apply for the workshop programs; and
- to review advertising approaches to spreading the word broadly across the social sciences.

Participants in the meeting included Don Janelle, Mike Goodchild, Richard Appelbaum, Fiona Goodchild, Waldo Tobler, Stuart Sweeney, Gamaiel Zavala, Eric White from UCSB; Mei-Po Kwan and Michael Tiefelsdorf from Ohio State Uniersity; Lynn Usery, Arthur Getis, and John Weeks from UCGIS; Stan Nicholson and Rick Johnson from Instructional Development at UCSB; Eric Fournier (Samford University) and Don Cartwright (University of Western Ontario) as instructional development consultants.

The meeting included live demonstrations of use of materials identified for national dissemination, examples of instructional development initiatives, discussions on program implementation, and a full review of timelines associated with essential tasks in mounting the program.

Of special interest was a position statement developed by Fiona Goodchild, the Educational Development Coordinator for SPACE:

SPACE: Professional Development Issues

Fiona Goodchild

To prompt discussion about *SPACE* professional development priorities for *program evaluation and student assessment,* I have raised questions and identified goals that appear either in the written reviews or in the text of the *SPACE* proposal. I have not defined all educational terms but recommend the Lexicon of Learning website as a source of reasonable explanations.
http://www.ascd.org/educationnews/lexicon/c.html

1. To what extent will *SPACE* programs influence the incorporation of spatial perspectives and analysis into undergraduate courses?

Program Evaluation

- How do participants benefit from participation in *SPACE* workshops and follow-up activities?
- We could consider this question in terms of the *professional development objectives* for three suggested dimensions as listed below? Do these cover the important ideas?

PERSONAL:

- Improve fundamental understanding of spatial methods and principles.
- Improve ability to understand and use related software.

PROFESSIONAL:

- Engage faculty in development of curriculum, including lab exercises, demonstrations and lectures.
- Engage faculty in collaboration with network of researchers who teach social science courses from a spatial perspective.
- Disseminate teaching resources on *SPACE* web site or at academic meetings (what criteria will be used to guide identification of best practices?)

INSTITUTIONAL:

- Enhance undergrad curriculum with new concepts, principles and techniques of spatial analysis.
- Implement new undergrad courses that build on spatial thinking and perspectives, such as GIS and spatial pattern analysis.
- Conduct student evaluation of new initiatives.

Once our initial objectives are clearly defined, it will be easier to agree on which ones we want to measure and how to document relevant results. Tools might include front-end planning (what does the target audience already know), pre-post tests, open-ended surveys, survey ranking and scales, interviews and focus groups.

- Any other important dimensions?
- Any alternative labels or groupings?

2. How can *SPACE* help faculty to develop methods for assessing and grading student learning and performance in enhanced or new courses?

Student Assessment

- What expectations do we have for demonstrating the impact of new activities or courses on student achievement?

- *SPACE* does not have the resources to conduct student assessment at remote sites. However, in order to make the claim that a spatial perspective is important to student achievement in social science disciplines, we need to raise the issue of how faculty can collect evidence of the impact of any new initiatives.

- One pertinent issue is the types of questions, rubric design and maybe even content validity of questions that are well matched to instructional and learning objectives. We will be able to document *SPACE* impact more effectively if the faculty participants can design student assessment that demonstrates learning and understanding of spatial approaches.

- At UCSB, Instructional Resources offers help on topics such as how to guide instruction, enhance learning or assign grades. Since many faculty have to work within the constraints of their local departments or institutions, they may find it easier to work with their own campus resources or peers. However, it could be useful for *SPACE* to investigate examples of assessment that are currently in use and to discuss these models at future workshops.

The planning meeting was of exceptional value in sorting out priorities for program development, establishing criteria for selecting participants, determining the differentiation of workshops, initiating the organization of workshop materials, and planning final workshop agenda.

Advertising the Program and Soliciting Participation

The design of the website by Gamaiel Zavala was a critical step in moving the program forward (details on the use of the site are provided in the Findings section of the report).

Another critical component was the design of the flier for distribution to departments, academic associations, and meetings. Approximately 1000 copies of the flier were distributed. In addition, the information on the flier was distributed through email and listserves of academic organizations and university departments. More than 100 fliers were sent to academic administrators of minority institutions (tribal colleges and universities, historically Black colleges and universities, and Hispanic serving institutions. Recipients of the flier and of electronic communications were advised to consult the website for full details on the workshops and the application procedures.

The homepage for www.csiss.org/SPACE features pull-down menus about each of the workshops, and for resources on learning and teaching. Data on the use of this site is presented in the section on "Findings."

A copy of the flier (next page) is followed by copies of the final agenda for each of the three workshops.

SPACE Spatial Perspectives on Analysis for Curriculum Enhancement

New from CSISS in 2004
For Instructors of Undergraduate Courses in the Social Sciences

SPACE workshops are intended for instructors of undergraduate students in the social sciences. They offer content knowledge in methods of spatial analysis, instructional resources, and professional development support for curriculum planning and learning assessment. Successful applicants must commit to implementing spatial perspectives in their undergraduate courses and to providing feedback and documentation to evaluate the SPACE workshop program.

Participants in the **SPACE** program are eligible for scholarship support for subsistence. *The deadline for applications is 18 April 2004*. Details are available at www.csiss.org/SPACE/workshops.

GIS and Spatial Modeling for Use in Undergraduate Education
28 June–2 July 2004, Columbus OH

Topics covered: This workshop provides basic background in applications of spatial analytic techniques suited for undergraduate social science courses. The techniques considered include cartographic visualization, space-time modeling of individual behavior, spatial interaction models, spatial pattern analysis, and spatial optimization methods. The workshop considers resources for developing undergraduate course outlines, instructional modules, exercises, and learning assessment instruments. Basic familiarity with GIS and quantitative methods is desirable.
Instructors: Mei-Po Kwan (coordinator), Alan Murray, Morton O'Kelly, Michael Tiefelsdorf, and Ningchuan Xiao (all of The Ohio State University)
Co-sponsor with CSISS and host institution: Department of Geography, The Ohio State University (www.geography.ohio-state.edu)

Spatial Analysis for the Undergraduate Social Science Curriculum
12–23 July 2004, Santa Barbara CA

Topics covered: This two-week workshop will integrate basic spatial methods (GIS, spatial statistics, and cartographic visualization) suited for application in the social sciences with curriculum development for undergraduate course work. Individual participants will focus on the design of course syllabi, instructional modules, and exercises that use spatial data and technologies, and on the assessment of student learning in these areas. Prior familiarity with spatial analysis and GIS is not required but interest in quantitative methods and basic computer literacy is assumed.
Instructors: Sara Fabrikant and Stuart Sweeney (coordinators), Fiona Goodchild, Michael Goodchild, Don Janelle, and Waldo Tobler (all of UC Santa Barbara)
Co-sponsor with CSISS and host institution: Department of Geography, University of California, Santa Barbara www.geog.ucsb.edu, Institute for Social, Behavioral, and Economic Research www.isber.ucsb.edu

Spatial Analysis and GIS for Undergraduate Course Enhancement in the Social Sciences
2–6 August 2004, San Diego CA

Topics covered: This workshop offers instructors of undergraduate courses in the social sciences an opportunity to gain expertise in the application of GIS and spatial pattern analysis. Primary concentration will be on problems and issues of interest to sociologists, criminologists, and demographers. Participants will work collaboratively with workshop leaders and other participants in the design of course materials for use in undergraduate teaching and in learning assessment. Familiarity with GIS and spatial analysis is desirable.
Instructors: Arthur Getis and John Weeks (coordinators), Jared Aldstadt, and Piotr Jankowski (all of San Diego State University); Fiona Goodchild and Michael Goodchild (both of UC Santa Barbara)
Co-sponsor with CSISS: The University Consortium for Geographic Information Science www.ucgis.org
Host institution: Department of Geography, San Diego State University http://typhoon.sdsu.edu

This new CSISS program is funded by the National Science Foundation's Division of Undergraduate Education, under its program for Course, Curriculum & Laboratory Improvement – National Dissemination.

CSISS Center for Spatially Integrated Social Science
Spatial Resources for the Social Sciences

For Resources on Spatial Analysis in the Social Sciences, see www.csiss.org

Monday, June 28		
8:00	Breakfast and Welcome	Don Janelle
9:00	Group Activity: Goal Setting	
10:15	Break	
10:30	*Introduction to Spatial Analysis*	
11:45	Lunch	
1:00	*Spatial Perspectives on Health and Social Issues*	Sara McLafferty
3:00	*Break*	
3:30	*Bringing in a Spatial Perspective to Underspatialized Topics in Sociology*	Linda Lobao
5:30	Drinks (Lobby)	
6:00	BBQ Dinner	
Tuesday, June 29		
8:30	Breakfast	
9:00	Lecture and Lab: *Spatial Interaction*	Morton O'Kelly
11:30	Lunch	
1:00	Lecture and Lab: *Spatial Pattern Analysis*	Michael Tiefelsdorf
3:30	Break	
4:00 - 5:00	Group Discussion	
Wednesday, June 30		
8:30	Breakfast	
9:00	Lecture and Lab: *Space-Time Analysis*	Mei-Po Kwan
11:30	Lunch	
12:30	Lecture and Lab: *Spatial Optimization*	Alan Murray
2:45 - 5:00	Lecture and Lab: *Location-Allocation*	Ningchuan Xiao
5:30	Drink reception, Buckeye Café	
6:30	Buffet Dinner, Buckeye Café	
Thursday, July 1		
8:30	Breakfast	
9:00	*Planning your Students' Learning*	Kathryn Plank
10:30	Break	
10:45	Group Discussion	
12:00	Lunch	
1:00	*Spatial Thinking/Modeling of Network-Based Problems*	Shih-Lung Shaw
2:30	Break	
2:45 - 5:00	Work on small group projects	
	All Instructors hold **office hours** during this time	
Friday, July 2		
8:30	Breakfast	
9:00	Work on group projects & Instructors hold **office hours** / Or begin presentations	
11:30	Lunch	
12:30 - 5:00	Group presentations	

Spatial Analysis for the Undergraduate Social Science Curriculum (UCSB)

WEEK I: CORE SPATIAL CONCEPTS AND METHODS

Monday, July 12: Introduction		
9:00	**Welcome** • Workshop vision, goals, and overview • Instructor greetings and introductions	Don Janelle, All SPACE Instructors
9:30	**Participant Introductions and Statements of Personal Workshop Goals**	Fiona Goodchild, Moderator
10:15	*Break*	
10:30	**Overview of Spatial Concepts in Social Science Disciplines** Examples from undergraduate course planning and lectures with reference to topics in anthropology, economics, political science, sociology, urban studies.	Stuart Sweeney
12:00	*Lunch*	
1:15	**Workshop lab logistics and access**	Alex Keuper, Rob Farrell
1:45	**Small-group Pedagogy Discussion** • Undergraduate teaching experiences and philosophies of participants • Role, or expected role, of spatial concepts or tools in their discipline	F Goodchild, Stacy Rebich, Moderators
2:45	*Break*	
3:00 - 5:00	**Introduction to GIS**	Keuper and Farrell
5:30	**Reception (UCSB Faculty Club)**	
Tuesday, July 13: Spatial Concepts in the Social Sciences		
9:00	**Core Concepts and Methods of Spatial Thinking** • Geographic Information Systems/Science: Basic concepts of GIS	Mike Goodchild
10:15	*Break*	
10:30	**The Challenge of Spatial Social Science** • GIS methods for spatial social science • Nature of spatial processes and their representation in GIS • GIS and its role in general social science education	M Goodchild
12:00	*Lunch*	
1:15	**An Introduction to the SPACE Website Resources**	Janelle and Gamaiel Zavala
1:45	**Lab - Introduction to Basic GIS Functionality/ Hands-on Demo (ARCGIS)**	Keuper and Farrell
2:45	*Break*	
3:00 - 5:00	**Continuation of lab**	
Wednesday, July 14:		
6:00 a.m.	**Hike to Inspiration Point**, pick up at Manzanita Village (for those interested)	
9:00	**Integrating Space into Social Science Theory and Analysis** • Social science theory and relationship to fundamental spatial concepts • Construct / measure issues in spatial analysis	Sweeney
10:15	*Break*	
10:30	**Spatial analytic methods (exploratory/descriptive/inferential)** • Point patterns - representation, pattern analysis tests and interpretations • Areal analysis - representation, pattern analysis tests and interpretations • Space-time analysis - conceptualization and representation	Sweeney
11:00	**Introduction to Spatial Analysis**	M Goodchild
12:00	*Lunch*	
1:15 - 5:00	**Lab exercises using GeoDA** • Multiple data source tailored to social science disciplines (segregation, income distribution, migration, language cultural diffusion, product flows, voting behavior, population and development)	Sweeney, Farrell
Thursday, July 15:		
9:00	**Visualization of Spatial Data I** • The cartographic communication process: map purpose, map functions, and map audience • The art in c a r t ography: graphic design issues	Sara Fabrikant
10:15	*Break*	
10:30	**Locational Reference Systems and Map Projection**	Waldo Tobler
12:00	*Lunch*	
1:15 - 5:00	**Lab** • Downloading and processing census data (WWW/Excel) • Depicting spatial data for exploration and analysis with GIS(Excel/ArcGIS)	Fabrikant, Keuper, Farrell
5:30	*BBQ at Goleta Beach*	
Friday, July 16:		
9:00	**Visualization of Spatial Data II** • Mapping social science data: data classification • Symbolizing point, line, and areal features • Statistical Mapping: Volumetric Data	Fabrikant
10:15	*Break*	
10:30	**Problems and Principles for Mapping Spatial Interactions** FlowMapper	Tobler
12:00	*Lunch*	
1:15	**Resources for Course Evaluation and Learning Assessment** • Reading: The Cognitive Process Dimension , from *A Taxonomy for Learning, Teaching, and Assessing*	F Goodchild, Rebich
2:15	**Taking Stock** • General Participant Overview of Workshop Experiences, Questions, and Needs • Overview of Objectives for Week Two	F Goodchild, Janelle, Rebich
3:30 – 5:00	**Open Lab**	Farrell, Keuper

Spatial Analysis for the Undergraduate Social Science Curriculum (UCSB)

WEEK II. CURRICULUM DESIGN ELEMENTS AND CONSULTATIONS

Monday, July 19:		
9:00	Review of FlowMapper weekend assignment	Tobler
9:30	**Panel on How I Teach and Why I do it that Way** • Ideas on course design, use of exercises, course evaluation, student learning assessment – F Goodchild and Rebich, moderators	M Goodchild, Fabrikant, Sweeney, Tobler
10:15	*Break*	
10:30	**Participant Responses and Discussion of Panel**	Participants
11:30	**Schedule Individual and/or Group Project Discussions** • Participants may schedule meetings with workshop instructors to discuss their course and curriculum development projects	
12:00	*Lunch*	
1:15	**Guest Presentation** Bridging Social Theory and Social Research: Cross-National Comparisons of Religion and Authority in the US and Europe	Jim Proctor, Geography / Religious Studies
2:45	*Break*	
3:00 - 5:00	**FlowMapper Exercise and/or Open Lab / Scheduled Individual and Group Project Discussions**	
Tuesday, July 20:		
6:00 a.m.	**Beach Hike**, pick up at Manzanita Village (for those interested)	
9:00	**An Overview and Discussion of GIS Software Packages for Teaching**	Jeff Howarth
10:15	*Break*	
10:30	**Participant Progress Reports**	Participants, Sweeney
11:00	**Open Lab / Scheduled Individual and/or Group Project Discussions**	
12:00	*Lunch*	
1:15	**Guest Presentation** "Research Design Issues in the Analysis of Spatial Data: An Example with Schools, Neighbors and Property Values"	Peter J. Kuhn, Economics
2:45	*Break*	
3:00 - 5:00	**Open Lab / Scheduled Individual and/or Group Project Discussions**	
Wednesday, July 21:		
9:00	**Spatial Preference / Attitude Data: A Practical Application of Data Collection and GIS Functionality**	Keuper
10:15	*Break*	
10:30	**Participant Progress Reports**	Participants, Sweeney
10:45	**Guest Presentation** "Spatial Aspects of Globalization" • UC Atlas of Gloabal Inequality	Richard Appelbaum, Sociology / Global & International Studies
12:00	*Lunch*	
1:15	**Guest Presentation** • "Resource-dependent Rural Communities and the Case of Spotted Owls in the Logging Regions of the Pacific NW"	Bill Freudenburg, Environmental Studies / Sociology
2:45	*Break*	
3:00 - 5:00	**Open Lab / Scheduled Individual and/or Group Project Discussions**	
Thursday, July 22:		
9:00	**GIS for Education**	M Goodchild
10:15	*Break*	
10:30	**Participant Progress Reports**	Participants, Sweeney
11:00	**Open Lab / Scheduled Individual and/or Group Project Discussions**	
12:00	*Lunch*	
1:15	**Guest Presentation** • "Spatial Perspectives on Risk Perception"	Barbara Herr-Harthorn, Anthropology
2:45	*Break*	
3:00 – 5:00	**Open Lab / Scheduled Individual and/or Group Project Discussions**	
6:15	**Dinner**, beach hike, swimming, and other diversions (909 West Campus Lane, Goleta)	
Friday, July 23:		
9:00	**Closing Workshop Procedures**	Janelle
9:15	**Project Presentations by Workshop Participants** (to be scheduled)	Sweeney, Moderator
10:15	*Break*	
10:30	**Project Presentations by Workshop Participants** (to be scheduled)	Fabrikant, Moderator
12:00	*Lunch*	
1:15	**Project Presentations by Workshop Participants** (to be scheduled)	Keuper, Moderator
3:15	*Break*	
3:30	**Workshop Exit and Follow-up Surveys / Certificates / SPACE Awards Program for Curriculum Development Initiatives**	Janelle
4:00	Close of Workshop	

Spatial Analysis and GIS for rgraduate Course Enhancement in the Social Sciences (SDSU)

Monday, August 2:		
8:30	Staff & Participant Introductions: What brings you to this workshop? The structure of this workshop	Arthur Getis, John Weeks
9:45	*Vision and objectives of SPACE*	Donald Janelle
10:15	Coffee Break	
10:30	*The meaning of spatial thinking*	Michael Goodchild
11:15	*A brief review of Spatial Analysis/Geographic Information Science Environment concepts*	M Goodchild, Getis
12:15	Lunch	
1:30	*Characteristics of an ideal project*	Fiona Goodchild
2:30	*Spatial analysis software packages*	Jared Aldstadt
3:00	Software demo: GEODA	M Goodchild
3:30	Exercise in exploratory spatial data analysis using GEODA	Aldstadt
5:30	Reception at Scripps Cottage on campus	
Tuesday, August 3:		
8:30	*Issues and answers*	M Goodchild
9:30	*Spatial analysis application in demography*	Weeks
10:15	Coffee break	
10:30	*Construction of curricula*	F Goodchild
12:00	Lunch	
1:15	Tour of Center for Earth Systems Analysis and Research	Getis
1:45	*Outlining a curriculum module; Resource issues in curriculum development*	F Goodchild
3:45	Exercise in spatial analysis using GEODA	Aldstadt
Wednesday, August 4:		
9:00	*Aspects of spatial analysis for curriculum development*	Getis
10:15	Coffee Break	
10:30	*Curriculum development and enhancement*	Stacy Rebich
12:00	Lunch	
1:15	Curriculum development issues: breakout groups	Staff
3:30	The development of evaluation instruments; student assessments	Rebich, Staff
5:00	Bus tour of San Diego (Balboa Park, Gaslamp District, and no host dinner at The Fish Market Restaurant)	
Thursday, August 5:		
8:30	*Participatory problem solving and decision making with GIS* - followed by tutorial	Piotr Jankowski
12:30	Lunch	
1:30	Curriculum development	
6:00	Picnic at Getis' house (bring bathing suits)	
Friday, August 6:		
8:30	Participants present their curriculum development plans; discussion; some participants conduct sample classes; summing up; exit survey	

Participants in Summer 2004 SPACE Workshops

Ohio State University

- **Veronica Arias**, Archaeology, University of New Mexico
- **Kathleen Bell**, Economics, University of Maine
- **Ulla Bunz**, Communications and Information Systems, Rutgers University
- **Maria Conroy**, Urban and Regional Planning, The Ohio State University
- **Owen Dwyer**, Human Geography, Indiana University, Indianapolis
- **Douglas Feldman**, Anthropology, SUNY Brockport
- **Robert Greenbaum**, School of Public Policy & Management, Ohio State University
- **Gregory Hooks**, Sociology, Washington State University
- **Nikitah Imani**, Sociology, James Madison University
- **Meadow Linder**, Sociology, University of Michigan
- **Sandy Marquart-Pyatt**, Sociology,
- **Leah Mathews**, Economics, UNC Asheville
- **Heather Richards**, Archaeology, University of New Mexico
- **Arun Srinivasan**, Economics, Indiana University Southeast
- **Sumeeta Srinivasan**, Environmental Studies & Policy, Harvard University
- **Sarah Surface-Evans**, Archaeology, Michigan State University
- **Michelle Thompson**, Geographic Information Science, Cornell University
- **Judith Van der Elst**, Archaeology, University of New Mexico
- **Marie-helene Vandersmissen**, Geographic Information Science, Laval University
- **Joan Walker**, Human Geography, Boston University
- **Lu Wang**, Geographic Information Science, Queen's University
- **Petra Zimmermann**, Geographic Information Science, Ball State University

University of California, Santa Barbara

- **Carlos Balsas,** Urban and Regional Planning, University of Massachusetts
- **Tapan Deka,** Socio-Economics, Gauhati University and UGC Govt. of India
- **Karen Donahue,** Criminology, University of La Verne
- **Julie Ford,** Sociology, SUNY-Brockport
- **Madelyn Glickfeld,** Environmental Studies & Policy, UCLA Institute of the Environment
- **Pavlina Latkova,** Tourism, Parks and Recreation, Michigan State University,
- **April Linton,** Sociology, Princeton University, University of California, San Diego
- **Stephen Lipscomb,** Economics, UC, Santa Barbara
- **Jo Beth Mertens,** Economics, Hobart and William Smith Colleges
- **David Padgett,** Urban Studies, Tennessee State University
- **William S. Payne,** Tourism Management, NC State University
- **Wenquan Zhang,** Sociology, University at Albany, State University of New York

San Diego State University (for UCGIS)

- **Katrin Anacker**, Urban and Regional Planning, The Ohio State University
- **Wendy Bigler**, Environmental Studies & Policy, Arizona State University
- **Mark Bjelland**, Human Geography, Gustavus Adolphus College
- **Timothy Bray**, Criminology, University of Texas at Dallas
- **Randy Gainey**, Sociology, Old Dominion University
- **Sukumar Ganapati,** Urban and Regional Planning, University of Southern California
- **David Guertin**, Watershed Management, University of Arizona
- **Karen Hayslett-McCall**, Criminology, University of Texas at Dallas
- **Amy Hessl**, Environmental Studies & Policy, West Virginia University
- **David Iaquinta**, Sociology, Nebraska Wesleyan University
- **Christine Jocoy**, Human Geography, California State University, Long Beach
- **Jani Little**, Human Geography, University of Colorado
- **Loretta Lynch**, Economics, University of Maryland
- **Wendy Miller**, Geographic Information Science, Washington College
- **Susan Pulsipher**, Geographic Information Science, Methodist College
- **David Rain**, Geographic Information Science, George Washington University
- **Jungyul Sohn**, Regional Science, University of Memphis
- **Christopher Weiss**, Sociology, Columbia University
- **Eric Yamashita**, Urban and Regional Planning, University of Hawaii

Follow-up Activities for the 2004 Workshop Participants

Incentive Awards for Course Syllabus, Exercises, and Undergraduate Student Papers will be announced in November 2004 to encourage workshop participants to use and adapt what they have learned in their own courses and programs. Awardees (three for year-one participants) will be invited to post their exercise and syllabi creations to the SPACE website, and to recognize their students' research on the *SPACE* web site. Awardees will be offered opportunities to participate in academic or applied conferences that feature spatial technologies. Consistent with standards of good science, the adjudication panel will seek a balanced distribution of awards across disciplines and across topical research domains. The adjudication panel of three individuals will be appointed from the project's PI, Co-PIs, and workshop instructors.

Academic Conference Courses to Enhance Spatial Science (ACCESS)
SPACE has encouraged workshop participants to suggest and help organize special short programs (e.g., half-day workshops) at academic conferences for their disciplines. Financial assistance will be provided to support instructors and organizers of these short courses. In addition, the Planning Meeting in December 2004 will make a concerted effort to identify conference events that SPACE might submit proposals for conference acceptance. These events are also opportunities to remain in contact with workshop participants.

SPACE was featured in a presentation by co-PI Richard Appelbaum in a session at the 2004 annual meeting of the American Sociological Association in San Francisco. The session was titled "Academic Workshop: Using the University of California Atlas of Global Inequality as a Teaching Tool." Appelbaum presented this web-based resource to the UCSB SPACE workshop.

In November 2004, Don Janelle will be part of a panel on the Teaching of GIS in History, at the annual meeting of the Social Science History Association, in Chicago. The session is being organized by one of the participants in a 2004 CSISS workshop on spatial pattern analysis.

A **follow-up survey** will be designed in draft form for review at the December 2004 SPACE Planning Meeting. This survey will be administered in late spring 2005 to the summer 2004 workshop participants. It will provide a principal means of judging the impact of the program on instructors and their students.

SPACE Results for Year-One

The Results of the first-year activities of the SPACE project reveal significant success in some areas and challenges that need attention as the project moves into its second year. These are summarized in this section under the following headings:

- Applicant Selection and Participation
- Application Form and Participant Entry / Exit Survey Results
- Commentary by Workshop and Educational Development Coordinators
- Evaluation of Workshop Pedagogy
- Use of SPACE Website

Both participants and instructors evaluated the three workshops in year one favorably. Nonetheless, the results point to challenges for improving the workshops in year two. The primary areas of control over workshop outcomes relate to the selection of participants, the structuring of workshop content (see agenda outlines under Activities), and the balance between content learning and education development initiatives.

Applicant Selection and Participation

Application advertising yielded at total of 100 applicants to fill a maximum of 60 workshop positions in year one. The evaluation criteria, worked out in the December 2003 planning meeting, stressed experience with computers and a favorable disposition to rigorous analysis, enthusiasm and commitment to teaching undergraduate students, representation from across the social science disciplines, and incentives for the selection of designated minority candidates. We were also interested in achieving a reasonable level of homogeneity in prior experience with spatial methods in each of the workshops. Offers to 64 of the applicants resulted in 55 final acceptances, 1 dropping out at the last moment, and 53 actually completing the workshops. Individuals who declined offers cited the difficulty of scheduling as the primary factor (especially for the two-week-long workshop at Santa Barbara), along with health issues, and previously unanticipated family and work obligations. The following table provides specific details.

SPACE Applicants and Participants by Discipline, Gender, Degree (2004)

	Participants by Workshop			Totals		Percent Applicants Accepted
	UCSB	OSU	SDSU	Participants	Applicants	
Anthropology		1		1	2	50
Archaeology		4		4	5	80
Communications		1		1	1	100
Criminology	1		2	3	4	75
Demography					1	0
Economics	2	3	1	6	8	75
Environmental Studies/Policy	2	1	3	6	7	86
GIS		3	3	6	16	38
History					1	0
Geography		3	3	6	15	40
Political Science					3	0
Public Health					1	0
Public Policy & Management		1		1	1	100
Regional Science			1	1	1	100
Sociology	3	4	3	10	13	77
Tourism/Recreat. Management	2			2	2	100
Urban & Region Planning	1	1	3	5	15	33
Urban Studies	1		1	2	4	50
Totals:	12	22	20	54	100	
Male	6	6	10	22	52	42
Female	6	16	10	32	48	67
Desig. Minority						
Offered	4	4		8	9	89
Attended	2	3		5	9	56
PhD	7	16	15	38	60	63
PhD Candidate	1	1	1	3	8	38
MSc	3		1	4	10	40
MA/ME/MBA	1	5	1	7	18	39
MURP			2	2	3	67
BSc					1	0
					100	
Offered / Could Not Attend	5	5		–	10	
Applicants - Workshop as First Choice	31	36	33			**Percent Completion**
Participants – Completing:						
--Workshop	12	22	19	53		98
--Entry Survey	12	23	20	55		100
--Exit Survey	11	22	16	49		91

The discipline breakdown reflects prevailing patterns of academic activity in the area of spatial analysis. Acceptance rates for applicants from geography and GIS were deliberately low in order to weight the participant numbers to social sciences with high potential for new dissemination. Again, owing to their potential for greater immediate dissemination, existing university faculty members, with PhDs, were favored (63% accepted) over applicants still in student status (approximately 40% accepted).

Women were admitted at a higher rate than men. This relates to the higher proportion of male applicants with student status and geography/GIS background.

Success in reaching designated minority individuals was reasonably good – 9 percent of the applicants were Hispanic American or African American. However, only 5 of the 8 positions offered were accepted, even though an extra financial stipend was available to assist their participation. In declining the offers, scheduling issues were cited most often.

Application Form and Participant Entry / Exit Survey Results

Significant care was addressed to the design of surveys to permit informed decisions for (a) selecting participants from the applicant pool, (b) refining the design of workshops based on the experience and aspirations of those selected, and (c) evaluating the overall success of the workshop program from the perspectives of participants.

Copies of the Application, Entry, and Exit surveys are attached on the following pages.. The application survey provided the primary information for selecting participants, including quantitative indicators of their self-assessed background in dealing with curricula issues and with spatial approaches to analysis. The design of the exit survey was intended to provide a close match to the workshop goals that participants cited in their entry surveys. The sections of the Entry and Exit surveys included questions about (a) the barriers that participants perceive to the adoption of spatial analysis in undergraduate teaching, (b) their aspirations for gaining technical content knowledge and insights for teaching and for assessing their own undergraduate students, (c) what they hope to learn from engagement with fellow workshop participants, and (d) what they hope to learn from workshop lecturers regarding spatial analysis concepts and insights on pedagogical strategies.

The results from the quantitative questions on the entry and exit surveys (scaled values from 1 to 4 or 1 to 5) are depicted on radial graphs as average values for each of the three workshops (UCSB, OSU, and SDSU). In addition, the application survey data show the self-assessed pre-workshop mastery of spatial analytic skills and curricula development background, stratified by gender for those who were accepted and not accepted into the workshops. The radial-graph format allows for easy comparisons across workshops. Low values may suggest aspects of workshop structure or implementation that need further consideration. Additional graphics for standard deviation and mode values are available, and these will be subject to review by workshop instructors and consultants at the SPACE planning meeting in December 2004.

Application form follows:

The Workshops

Please **rank** the following workshops in your order of preference to attend (1 being most preferred; 3 least preferred; 0 not interested):

Ohio State University:
UC Santa Barbara:
San Diego State University:

Not sure? See Which workshop should I apply for?

Personal Information

First Name:
Last Name:
Affiliation:
Address:
City:
State: AK
Postal Code:
Country:
Citizenship: ○ US citizen ○ US Permanent Resident ○ Other (describe below):
Email:
Phone:
Gender: ○ Female ○ Male
Ethnicity: * ○ African American ○ Hispanic American ○ Native American ○ Other (describe below):

* *SPACE* encourages applications to achieve a broad representation of all citizen groups, including underrepresented minorities and applicants from designated minority-serving institutions. This field is optional.

Academic Background

Note: *SPACE* workshops are limited to individuals with instructional appointments at colleges and universities and to Ph.D. students who are committed to careers that will involve instructing undergraduate students.

Discipline / Teaching interest: Anthropology
Highest Academic Degree Attained: ○ MA ○ MSc ○ PhD ○ Other (describe below):
Academic Rank: ○ Lecturer ○ Assistant Professor ○ Associate Professor ○ Professor ○ Other (describe below):
Academic Appointment: ○ Limited-term appointment ○ Untenured academic appointment ○ Tenured academic appointment ○ Other (describe below):

Teaching Experience

How many years have you been teaching at the college/university level?

Please list the titles and academic levels of courses you have taught in the past 2 years.

Have you participated in instructional development and professional development programs offered through your institution, discipline organizations, or other agencies? Please describe.

Do you have any experience with course evaluation and student assessment? If so, please explain.

Have you participated in previous CSISS, SPACE, or ICPSR spatial analytic workshops? Please describe.

Concept Familiarity

Rate your proficiency in the following areas where:

- 1 = No familiarity
- 2 = Familiar with concepts
- 3 = Experience with applications
- 4 = Know enough to teach
- 5 = Expert

	1	2	3	4	5
Spatial thinking:	○	○	○	○	○
Cartography/map making:	○	○	○	○	○
Data management:	○	○	○	○	○
Internet search and information retrieval:	○	○	○	○	○
Graphic visualization of data:	○	○	○	○	○
Qualitative methods in social science:	○	○	○	○	○
Quantitative methods in social science:	○	○	○	○	○
Undergraduate curriculum development:	○	○	○	○	○
GIS:	○	○	○	○	○
Spatial statistics:	○	○	○	○	○
Other (describe below):	○	○	○	○	○

Software Experience

Please list any software that you currently use for research:

Please list any software that you have students use in your classes:

Do you and your students have access to spatial analytic software at your institution? Please describe:

SPACE Workshop Referral

How did you learn about the SPACE Workshop Program?

○ The SPACE/CSISS Website
○ SPACE Workshop flyer
○ Colleague
○ Newsletter (please specify below)
○ List Serve (please specify below)
○ Other (please specify below)

Statement

How do you hope/plan to use the workshop experience to enhance your undergraduate courses, programs, and student learning experiences?:

Entry Survey for SPACE Workshop Participants 2004

Barriers to Spatial Approaches

To what degree are the following issues obstacles for you in teaching spatial approaches to undergraduates in the social sciences? If you see additional barriers to the use of spatial methods in undergraduate social science education, please add them in the available spaces.

Rate on a scale of 1-4 where:

- 1 = not an obstacle at all
- 4 = very significant obstacle

	1	2	3	4
Limited knowledge of appropriate pedagogical strategies:	○	○	○	○
Lack of experience with GIS and spatial analysis tools:	○	○	○	○
Inaccessibility of necessary data:	○	○	○	○
Inadequate access to necessary software/facilities:	○	○	○	○
Lack of technical support for spatial analysis tools at my institution:	○	○	○	○
Lack of student readiness to grasp the concepts behind spatial analysis:	○	○	○	○
Other (describe below):	○	○	○	○
Other (describe below):	○	○	○	○

Workshop Expectations

How important is it for you to acquire or gain experience with each of these things through the SPACE workshop?

Rate on a scale of 1-4 where:

- 1 = not important at all
- 4 = very important

	1	2	3	4
Practical Work				
Practical hands-on experience with spatial statistical software:	○	○	○	○
Practical hands-on experience with data visualization software:	○	○	○	○
Practical hands-on experience with a variety of GIS software packages:	○	○	○	○
Data sets that can be used for course/classroom activities:	○	○	○	○
Discussion with Other Participants				
Discussion of how to assess how learning through spatial analysis enhances student understanding of the target material and ideas:	○	○	○	○
Opportunities to discuss yours or others' experiences using spatial analytical methods for teaching; problems you may have encountered and pedagogical strategies to address them:	○	○	○	○
General ideas that I can use after the workshop is over to develop my own curricula or classroom/lab activities:	○	○	○	○
Ideas for student projects:	○	○	○	○
Learning from Lectures by Experts				
More knowledge about specific spatial analysis tools:	○	○	○	○
Theoretical framework for appropriate data visualization:	○	○	○	○
Answers to specific problems that I have encountered when using spatial analysis methods:	○	○	○	○
Pedagogical strategies for helping students learn successfully:	○	○	○	○
Other (describe below):	○	○	○	○
Other (describe below):	○	○	○	○

Current Teaching Practices

What are some concepts that you currently illustrate for your students through the use of data? What datasets do you use, and how do you analyze them?

Do you have a specific topic or dataset you would like to develop instructional activities around during this workshop? If so, provide information about scale, region, topic, type of data.

How are your courses currently evaluated?

Please write a brief paragraph describing your teaching philosophy and how you expect to enhance your undergraduate teaching through attending this workshop. These paragraphs will be distributed anonymously to all participants prior to the workshop to give you an idea of the goals and expectations of other workshop participants.

Exit Survey for SPACE Workshop Participants 2004

Personal Information

First Name (optional):

Last Name (optional):

Barriers to Spatial Approaches

To what degree did the workshops help in overcoming obstacles for you in teaching spatial approaches to undergraduates in the social sciences? If the workshop helped you in overcoming additional barriers, please add them in the available spaces.

Rate on a scale of 1-4 where:

- 1 = did not help at all
- 4 = helped significantly

	1	2	3	4
Provided knowledge of appropriate pedagogical strategies:	○	○	○	○
Provided experience with GIS and spatial analysis tools:	○	○	○	○
Enhanced awareness on how to access data for use in exercises:	○	○	○	○
Improved awareness of software resources appropriate for use in undergraduate education:	○	○	○	○
Removed technical barriers to the likelihood of using spatial analytical approaches in my undergraduate teaching:	○	○	○	○
Other (describe below):	○	○	○	○
Other (describe below):	○	○	○	○

Workshop Expectations

To what extent did the workshop experience meet your expectations in the areas listed?

Rate on a scale of 1-4 where:

- 1 = of no value
- 4 = exceeded my expectations

	1	2	3	4
Practical Work				
Hands-on experience with spatial statistical software:	○	○	○	○
Hands-on experience with data visualization software:	○	○	○	○
Hands-on experience with GIS software:	○	○	○	○
Suggested or provided data sets that can be used for course/classroom activities:	○	○	○	○
Discussion with Instructors and Other Participants				
Acquired a better understanding of how learning through spatial analysis enhances student understanding of the target material and ideas:	○	○	○	○
Gained ideas about assessment methods that allow observation of how spatial analysis has enhanced student understanding:	○	○	○	○
Learned from others' experiences with using spatial analytical methods for teaching:	○	○	○	○
Learned pedagogical strategies that will be helpful when teaching material or techniques that students find especially difficult:	○	○	○	○
Received ideas that I can use after the workshop to develop my own curricula or classroom/lab activities:	○	○	○	○
Gained ideas for student projects:	○	○	○	○
Workshop Lectures				
Expanded my knowledge about specific spatial analysis tools:	○	○	○	○
Provided a theoretical framework for appropriate data visualization:	○	○	○	○
Provided answers to specific problems that I have encountered when using spatial analysis methods:	○	○	○	○
Suggested worthwhile pedagogical strategies for helping students learn successfully:	○	○	○	○
Other (describe below):	○	○	○	○
Other (describe below):	○	○	○	○

Teaching Practices

Please describe how you plan to use what you have learned in this workshop to enhance the exposure of spatial methods to students in your undergraduate courses and programs (e.g., describe exercises that you will introduce, modifications to course syllabi, new course proposals, or changes in an academic program, etc).

As a result of this workshop, describe how you will alter your approach to the evaluation of courses and to the assessment of student learning.

Workshop Management and Facilities

Rate the following items on a scale of 1-4 where:

- 1 = totally unacceptable
- 4 = excellent

	1	2	3	4
Lecture Room and Laboratory Facilities:	○	○	○	○
Workshop Organization:	○	○	○	○
Level of Instruction:	○	○	○	○
Quality of Exercises:	○	○	○	○
Overall Quality of Guest Presenters:	○	○	○	○
Social Events:	○	○	○	○
Housing Arrangements:	○	○	○	○
On-line Application Procedures:	○	○	○	○
Information Provided for Planning for Workshop Participation:	○	○	○	○
Adequacy of Participant Funding:	○	○	○	○

Website Resources

Did you make use of the website resources and how helpful did you find them?

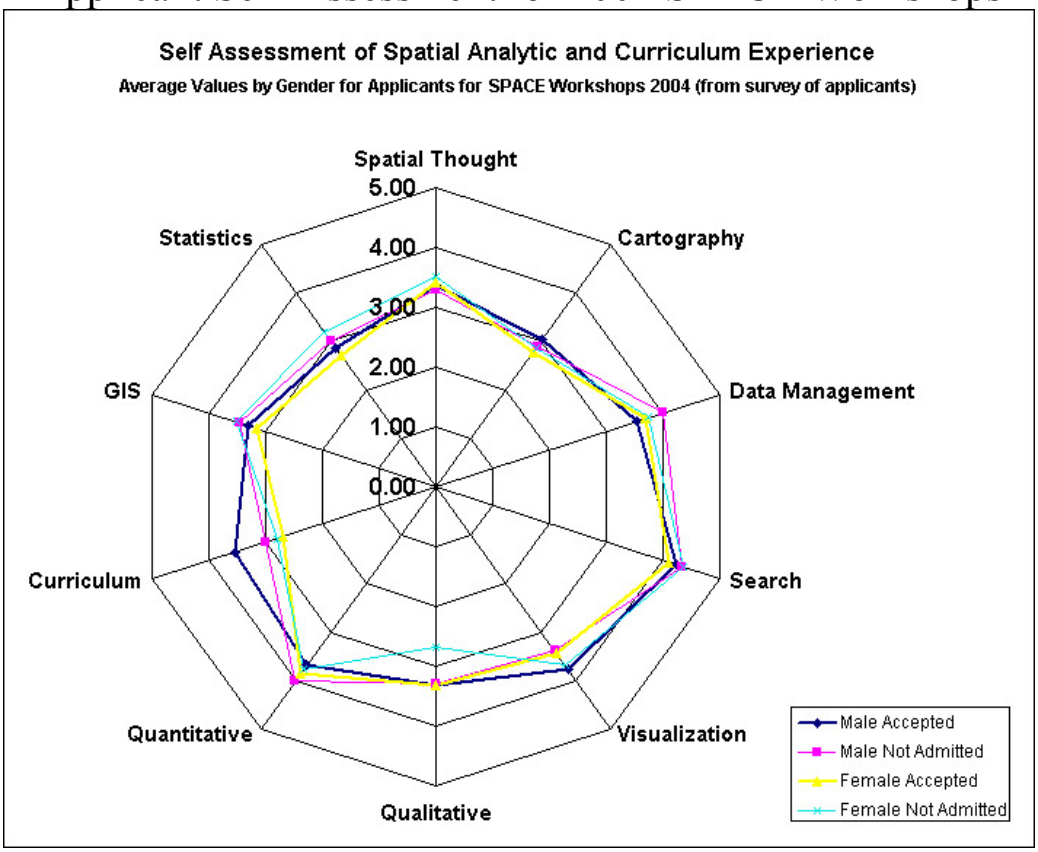
Web links to Course Syllabi of social science courses:	Did not use it
Web links to Instructional Assessment resources:	Did not use it
Web links to Instructional Discipline resources:	Did not use it
SPACE Workshop Forum:	Did not use it
MyPage:	Did not use it

Please suggest ways in which these resources could be improved.

Additional Comments

Enter any additional comments, suggestions, or concerns here.

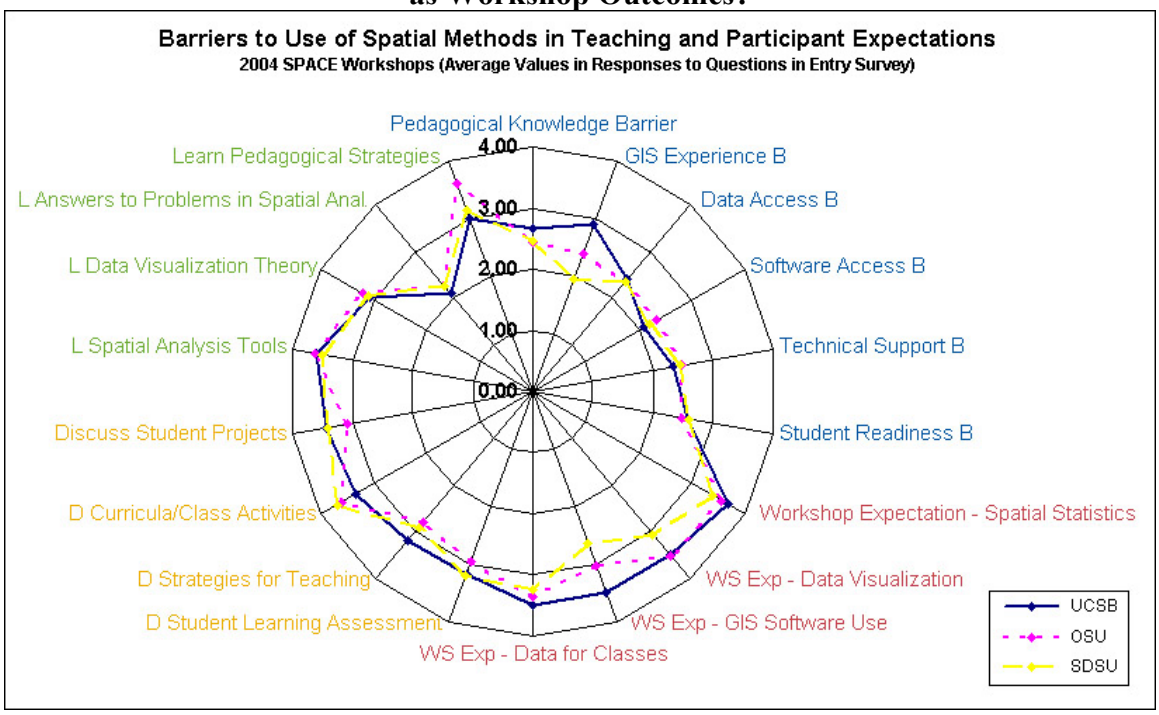
Applicant Self-Assessment for 2004 SPACE Workshops



Applicants' Self Assessment of Spatial Analytic Experience 2004 (Averages Values on 1 to 5 scaling – see Application Form)

Experience Indicators	First Choice of Workshop			Not Admitted		Accepted	
	UCSB	OSU	SDSU	Female	Male	Female	Male
Spatial Thought	2.92	3.32	3.75	3.50	3.30	3.41	3.36
Cartography	2.42	2.86	3.20	2.88	2.90	2.78	3.05
Data Management	3.42	3.36	4.05	3.75	4.00	3.69	3.55
Search	4.17	4.00	4.30	4.38	4.33	4.09	4.23
Visualization	3.50	3.41	3.80	3.69	3.40	3.44	3.77
Qualitative	3.25	3.41	3.25	2.69	3.30	3.31	3.32
Quantitative	3.50	3.82	3.90	3.75	4.03	3.84	3.68
Curriculum	2.92	3.00	3.15	2.81	3.00	2.69	3.55
GIS	2.67	3.27	3.50	3.50	3.47	3.16	3.32
Statistics	2.25	2.86	3.00	3.19	3.00	2.72	2.86

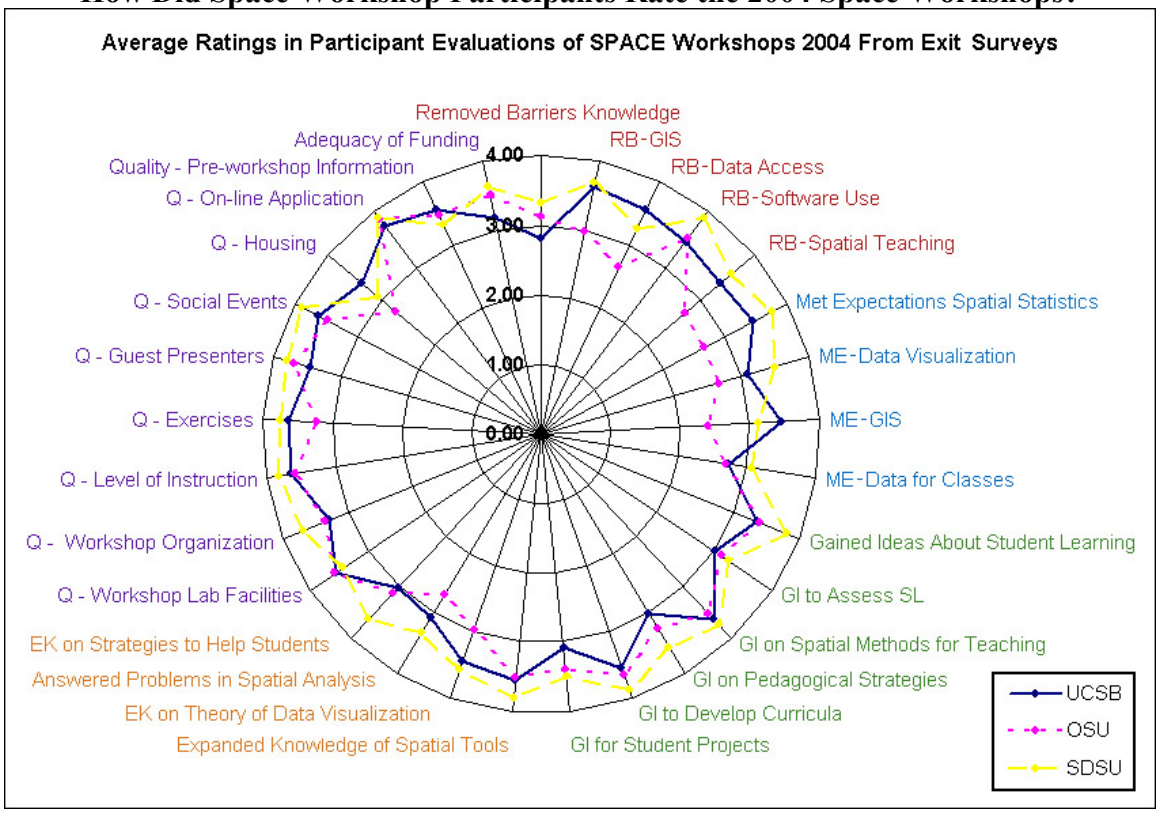
What Did Those Accepted into 2004 SPACE Workshops Perceive as Barriers and Expect as Workshop Outcomes?



Perceived Barriers to Spatial Analysis in Undergraduate Education and Expectations for SPACE Workshops by Participants (Averages on 1 to 4 Scaling – See Entry Survey)

Year 2004	Averages by Workshop		
	UCSB	OSU	SDSU
BARRIERS:			
Pedagogical Knowledge	2.67	2.43	2.45
GIS Experience	2.92	2.39	1.95
Data Access	2.42	2.35	2.35
Software Access	2.08	2.35	2.20
Technical Support	2.33	2.48	2.45
Student Readiness	2.58	2.48	2.60
WORKSHOP EXPECTATIONS:			
Spatial Statistics	3.67	3.57	3.40
Data Visualization	3.50	3.52	3.05
GIS Software Use	3.50	3.04	2.65
Data for Classes	3.50	3.35	3.25
EXPECTATIONS FROM DISCUSSIONS WITH WORKSHOP PARTICIPANTS:			
Student Learning Assessment	3.17	2.96	3.20
Strategies for Teaching	3.17	2.78	2.90
Curricula/Class Activities	3.33	3.61	3.70
Student Projects	3.42	3.09	3.40
LEARNING EXPECTATIONS FROM WORKSHOP INSTRUCTORS:			
Spatial Analysis Tools	3.58	3.61	3.50
Data Visualization Theory	3.08	3.22	3.10
Answers to Problems in Spatial Analysis	2.08	2.26	2.25
Pedagogical Strategies	3.00	3.61	3.15

How Did Space Workshop Participants Rate the 2004 Space Workshops?



How Did Space Workshop Participants Rate the 2004 SPACE Workshops? Based on 1 to 4 Scaling of Questions on the Exit Surveys

Workshop:	UCSB	OSU	SDSU
REMOVED BARRIERS IN:			
Knowledge	2.82	3.13	3.31
GIS	3.64	2.96	3.69
Data Access	3.55	2.65	3.25
Software Use	3.45	3.52	3.88
Spatial Teaching	3.36	2.70	3.56
MET EXPECTATIONS IN:			
Spatial Statistics	3.45	2.65	3.75
Data Visualization	3.09	2.65	3.50
GIS	3.45	2.39	3.13
Data for Classes	2.73	2.70	3.06
GAINED IDEAS FROM DISCUSSIONS ABOUT:			
Student Learning	3.36	3.39	3.81
Assessment of Student Learning	3.00	3.13	3.25
Spatial Methods for Teaching	3.64	3.52	3.75
Pedagogical Strategies	3.00	3.26	3.56
Developing Curricula	3.55	3.65	3.88
Student Projects	3.09	3.39	3.50
FROM INSTRUCTORS:			
Expanded Knowledge of Spatial Tools	3.55	3.52	3.81
Learned Theory of Data Visualization	3.45	2.96	3.56
Answered Problems in Spatial Analysis	3.09	2.70	3.31
Learned Strategies to Help Students	3.00	3.13	3.63
QUALITY ASSESSMENT:			
Workshop Lab Facilities	3.55	3.57	3.44
Workshop Organization	3.27	3.35	3.69
Level of Instruction	3.64	3.57	3.81
Exercises	3.64	3.22	3.75
Guest Presenters	3.45	3.70	3.81
Social Events	3.64	3.48	3.88
Housing	3.36	2.74	3.06
On-line Application	3.73	3.87	3.88
Pre-workshop Information	3.55	3.48	3.31
Adequacy of Funding	3.18	3.52	3.63

Commentary by Workshop and Educational Development Coordinators

Ohio State University SPACE Workshop

Mei-Po Kwan

Overview and Goals: Funded by a contract from the Center for Spatially Integrated Social Science (CSISS), the Department of Geography, the Ohio State University, conducted a SPACE workshop, June 28 to July 2, 2004. The PI was Mei-Po Kwan, professor of geography at OSU.

The 23 participants were primarily faculty members in the social sciences at a variety of large and small universities and colleges in the United States. The following disciplines were represented: archaeology, anthropology, economics, transportation, urban studies, environmental studies, geography, sociology, and regional science.

The goal of the OSU workshop is to change the attitudes of the participating social scientists towards spatial thinking and spatial concepts and to introduce important concepts and tools for use in their teaching. The workshop also targeted social scientists with methodological focus to their research and teaching. Selection criteria included whether the applicant has a strong potential to incorporate spatial analysis and techniques in their teaching at the undergraduate level. Clusters from universities who collaborate on developing curriculum from different disciplines were encouraged. For example, we had a cluster of anthropologists and archaeologists from the University of New Mexico who were charged to develop a GIS course for anthropologists and archaeologists. All of the participants at OSU had some prior knowledge in GIS and spatial analysis.

The workshop aimed to provide participants with a set of tools/exercises that can be readily incorporated into their teaching. The participants' workshop projects focused on education and professional development and the creation of instructional resources for their discipline.

The core instructional team: Kwan, Murray, O'Kelly, Tiefelsdorf, and Xiao introduced spatial concepts and focused on important ideas like spatial interaction, spatial pattern analysis, space-time analysis, optimization, and location analysis. The core instructors used lectures to introduce spatial concepts and techniques, utilized discussion to address how they are useful to the participants' courses, and used lab exercises that participants might use for their own classes.

Guest lecturers: Three guest lecturers (Lobao, McLafferty, and Shaw), who specialize in different application areas were invited to give presentations in the workshop on health-related issues, societal issues, economic development, and transportation issues. The lecturers provided practical examples of how spatial concepts and techniques can be used in teaching.

Pedagogies: The Associate Director of the Office of Faculty and TA Development at OSU, Kathryn Plank, provided a pedagogical session on "how students learn". She also helped with the group projects by participants.

A group of graduate students (Boschmann, Fang, Klaf, Ding, Hu, and Davis) also helped out in the lab sessions and with logistics for the workshop.

Agenda and Workshop Activities: The first four days were devoted to lectures, lab sessions, guest lectures, and pedagogy sessions. They last day was devoted to the presentation of participants' projects. Social activities included one BBQ dinner in the department and one dinner in a local restaurant. Receptions were held before the dinners. The agenda and list of participants are presented in the Activities section of this report.

Participants: Twenty-three participants were scheduled for the workshop but one canceled at the last moment due to a health problem. Each participant was asked to work on a group project related to what they learned from the workshop and how to apply it in their own teaching. The last day (Day 5) was devoted to the presentation of these projects by the participants.

Titles of Participant Group Project Presentations:

- Introduction to GIS and Spatial Analysis Module (Greenbaum, Linder, Mathews, Srinivasan)
- Geospatial Analysis in Archaeology (Arias, Richards, Surface-Evans, van der Elst)
- GIS and Environment (Zimmermann, Conroy)
- Introductory Course Outline on Spatial Analysis using GIS (Bell, Thompson, Walker, Srinivasan)
- GIS and Spatial Analysis for Social Science (Bunz, Vandersmissen, Dwyer, Imani)
- GIS for health issues (Wang, Hooks, Feldman)

Facilities: OSU Geography has a teaching laboratory equipped with state-of-the-art teaching equipment, and 50 powerful PCs running all the GIS and statistical software needed for the workshop. This software included ESRI software (ArcGIS, ArcView), GeoDa, TransCAD, SPSS, GeoMedia, IDRISI, and others. The department also has three classrooms (including one classroom with a capacity of 50, and two seminar rooms) reserved exclusively for the workshop. The departmental Xerox and fax machines were also available for the workshop participants.

Resources Disseminated in the Workshop: The following instructional resources were disseminated in the workshop:

- PowerPoint presentations of all the lectures
- Reading materials related to the lectures and the pedagogy sessions
- All lab exercises used in the lab sessions
- Free software, distributed to the participants, included GeoDa, GeoMedia by Intergraph, and IDRISI

OSU PIs' Evaluation of the Workshop: Overall, the quality of the participants and instructors are very high, as revealed in the results of the exit survey. However, more time or sessions on pedagogy from Plank and others would be desirable in year two, as this would facilitate the development of the participants' instructional and assessment skills. The planned workshop for 2005 thus can be improved by incorporating one more session on pedagogy. In view of the lack of time for some participants to learn the lab exercises, we plan to add a half-day session on GIS software (on the Sunday before the workshop) so that some participants can become familiar with the software before the workshop. It will be optional for advanced users of the software.

San Diego State University SPACE Workshop

On Behalf of the University Consortium for Geographic Information Science

Arthur Getis

Introduction and Summary: Funded by a contract from the Center for Spatially Integrated Social Science (CSISS), the University Consortium for Geographic Information Science (UCGIS) conducted a SPACE workshop at San Diego State University (SDSU) during the period August 2-8, 2004. The PIs were Arthur Getis and John Weeks, both professors of geography at SDSU. The PIs were selected by UCGIS, and they in turn selected SDSU as the venue for the workshop.

There were twenty participants who were primarily faculty members in the social sciences at a variety of large and small universities and colleges in the United States. The following disciplines were represented: economics, public health, urban studies, environmental studies, geography, criminology, sociology, and regional science. Instructors and staff were faculty members and graduate students from the University of California, Santa Barbara (UCSB) and SDSU. These were Michael Goodchild, Fiona Goodchild, Don Janelle, and Stacy Rebich from UCSB and Jared Aldstadt, Arthur Getis, Piotr Jankowski, Serge Rey, and John Weeks from SDSU. Infrastructural support was made available by the Department of Geography at SDSU and by Christian Brown and Gamaiel Zavala of UCSB. Facilities included a "smart" classroom, a seminar room, and a laboratory that enabled each participant to work independently at a properly loaded computer. Software packages were freely available for use by the participants.

The agenda included lectures by M. Goodchild, Getis, Janelle, Jankowski, and Weeks, exercises conducted by J. Aldstadt and P. Jankowski, curricular guidance by F. Goodchild and S. Rebich, and demonstrations of relevant software by M. Goodchild, Getis, Aldstadt, Jankowski, and Rey. The final day of the workshop was devoted to presentations and panel discussions by the participants to demonstrate their application of spatial concepts and analyses to specific course content. Social activities consisted of a reception, a short bus tour of San Diego, a no-host dinner at a local restaurant, and a picnic. Housing in on-campus dormitories was made available to the participants by the SDSU Conference Center.

A reading of the exit survey forms indicates that participants accomplished a great deal during the week, that the end-of-week workshop objectives were met, that the workshop provided an enjoyable and useful series of activities, and that the instructors and staff were warmly praised.

Overview of the SDSU Workshop Experience: The workshop offered instructors of undergraduate courses in the social sciences an opportunity to gain expertise in the application of Geographic Information Systems (GIS) and spatial pattern analysis. Primary concentration was on problems and issues of interest especially to sociologists, criminologists, and demographers. Participants worked collaboratively with workshop leaders and other participants in the design of course materials for use in undergraduate teaching and in learning assessment. All participants had at least some familiarity with GIS and spatial analysis.

The participants and the workshop agenda are listed in the "Activities" section of this report. On average, the participants had taught five years at the university level, were untenured, and were encouraged to apply to this workshop by a colleague. On average, they had taken a course of

instruction in GIS, had studied introductory spatial statistics, were committed to spatial approaches to their discipline, and had some experience with student assessment techniques. In addition, they had not participated in CSISS workshops previously and were familiar with a wide variety of non-spatial software.

The following are the responses of one of the applicants to the entry survey, after he had been selected to attend the workshop. This response represents a typical excerpt from that part of the entire survey that emphasizes participant expectations of the workshop.

> Teaching Interest: *Quantitative Methods in Social Science*
> Highest Degree: *PhD in Sociology and Demography*
> Years teaching at the college/university level? *Six years.*
>
> **Workshop Expectations**:
> - *Practical hands-on experience with spatial statistical software.*
> - *Practical hands-on experience with a variety of GIS software packages.*
> - *Data sets that can be used for course/classroom activities.*
> - *Discussion with other participants on how to assess that learning through spatial analysis enhances student understanding of the target material and ideas, and on general ideas that can be used after the workshop is over to develop my own curricula or classroom/lab activities.*
> - *More knowledge about specific spatial analysis tools and pedagogical strategies for helping students learn successfully.*
> - *I expect to learn more about how to apply spatial perspectives and techniques to answering interesting questions. I have had terrific success in developing undergrad courses that teach methods and perspectives through a question-based format (letting the questions, rather than methods, drive the content) - so I hope to learn how to extend this into the spatial realm.*
>
> Teaching philosophy:
> *My philosophy for the kind of course I will teach with this knowledge encourages students to be well-informed consumers and budding producers of research about the social world.*

Facilities: The Department of Geography at San Diego State University, the venue for the workshop, boasts outstanding GIS laboratories and considerable experience in conducting workshops and short-courses. The workshop took place on the third floor of Storm Hall. The main classroom is equipped with the latest presentation technology. The facility used for this workshop is the Richard Wright Laboratory for Spatial Analysis, a state of the art facility with two-dozen workstations. All machines were loaded with the new software, GEODA, a creation of Luc Anselin (University of Illinois), a member of the CSISS board of directors and developer of spatial statistics and corresponding software. In addition, participants were in a position to use STARS, a new time-space analytic package by Serge Rey (SDSU), and FlowMapper, a spatial interaction package created by Waldo Tobler of UCSB. Participants could use the laboratory at all times during the week. In addition, display material was available in the Center for Earth Systems Analysis and Research (CESAR), an advanced spatial analytic laboratory of the Department of Geography and in a large seminar room. Professor Douglas Stow (SDSU) took the participants on a tour of the specialized facilities in CESAR. Coffee and cookies were available each day in the seminar room and on the verandah of Storm Hall.

The software companies ESRI. Intergraph, and IDRISI provided the participants with software packages and, in the case of ESRI, a large supply of books and monographs for participants to read while at the workshop. In addition, UCGIS gave each participant a wall map. Several books and articles were also available for the participants to consult during the workshop.

Resources for the workshop included a wide variety of web-based materials (see CSISS/SPACE website). These were referred to from time to time during the week. In addition, we made available several sites where participants could place their own materials for group use or for personal use. In the former case, participants placed the lessons they had developed on a workshop website. In the latter case, they were able to place their materials on the web in such a way that they can be linked to their personal home pages.

The Agenda and Workshop Activities: The following lists the workshop schedule of activities. Notes have been added in italics so that it is clear what transpired for a given activity.

Monday, August 2:

8:30 Introductions: The structure of this workshop. *Weeks welcomed the participants and introduced the staff. Weeks and Getis briefly explained the purpose of the workshop and what was expected of the participants. Each of the participants introduced herself or himself and explained the motivation for applying to the workshop.*

9:45 Vision and objectives of SPACE. *In greater detail, Janelle explained the purpose of the workshop, its goals, and its antecedents. He outlined how the various organizations, from NSF to UCGIS, had a role in its creation.*

10:15 Coffee break

10:30 The meaning of spatial thinking. *M. Goodchild lectured on spatial thinking, giving many examples from the written and visual literature.*

12:00 Lunch break

1:30 Characteristics of an ideal project. *F. Goodchild interacted with the participants on their expectations and their interests as undergraduate instructors.*

2:30 A review of spatial analysis concepts. *Getis lectured on the traditional concepts that help to constitute the spatial view of the discipline of geography.*

3:00 Software demo: GEODA. *M. Goodchild took the participants through the basic elements of the GeoDa software.*

3:30 Exercise in exploratory spatial data analysis using GeoDa. *Aldstadt assisted the participants as they carried out an exercise using GeoDa, applying data derived from an NSF-funded research project (the Arab Fertility Transition project) for which Weeks is PI and Getis is Co-PI.*

5:30 Reception at Scripps Cottage on campus. *Scripps Cottage, near Storm Hall, is a lovely building in a pond and garden setting at which the participants and staff were able to interact informally.*

Tuesday, August 3:

8:30 Issues and answers. *M. Goodchild continued his discussion of spatial concepts for spatial thinking.*

9:30 Spatial analysis application in demography. *Weeks lectured on some of his research in demography where many spatial concepts are applied.*

10:30 Coffee break

10:45 Construction of curricula. *F. Goodchild had the participants divided into four groups where they discussed aspects of spatial thinking in their own classroom situations.*

12:00 Lunch break

1:15 Tour of Center for Earth Systems Analysis and Research. *Professor Douglas Stow of the Department of Geography (SDSU) conducted the tour.*

1:45 Spatial ideas and tools. *The participants divided themselves into two groups. Those seeking more understanding of GIS concepts heard M. Goodchild in Room 337. Getis lectured on spatial analysis tools in Room 338.*
3:45 Exercise in spatial analysis using GeoDa. *Aldstadt explained and assisted participants as they completed another exercise.*

Wednesday, August 4:
8:45 Aspects of spatial analysis for curriculum development. *Getis gave a lecture on characteristics of spatial analysis that can be used to advantage when creating curricular materials.*
10:15 Coffee break
10:30 About spatial Interaction and the software Tobler's FlowMapper. *Getis demonstrated the characteristics of Tobler's FlowMapper software.*
11:00 Curriculum development and enhancement. *Rebich organized the participants into groups based on disciplinary interests. These breakout groups discussed spatial concepts used for curricular development.*
12:00 Lunch break
1:15 Curriculum development issues. *Participants worked in the laboratory developing their projects, exercises, or curricular materials.*
5:00 Bus tour of San Diego. *Getis led a bus tour of various areas of San Diego including Old Town, Mission Hills, Hillcrest, Balboa Park, Downtown, and the Waterfront. The group then had dinner (no-host) at The Fishmarket Restaurant. After dinner, the tour continued to Coronado and the Gaslamp District.*

Thursday, August 5:
8:30 Participatory problem solving and decision making with GIS. *Jankowski lectured on this subject and then worked with participants for the remainder of the morning on a tutorial that demonstrated many of the spatial concepts he had mentioned earlier.*
12:30 Lunch break
1:30 Demo of STARS. *Rey gave a demonstration of his new space-time computer package, and distributed copies of the software to each participant.*
2:30 Special Presentation. *A participant, Wendy Bigler, who had made a great deal of progress toward developing an exercise on spatial aspects of a flooding problem demonstrated her project. After her talk, participants continued to work on their projects with the assistance of Rebich.*
6:00 Picnic at Getis' house. *The evening was used to eat, chat, and swim at the Getis' house.*

Friday, August 6:
8:30 Participants present their curriculum development plans; discussion; some participants conduct sample classes; summing up; exit survey. *Rebich divided the participants into four panels. Each panelist gave a presentation of about 15 minutes. This was followed by a question session where panelists were seated at a table facing their audience. There were two panels in the morning and two in the afternoon. After these sessions, the participants were given certificates. See the following chart for topics discussed.*

SDSU SPACE Workshop Curriculum Design Presentations
Friday, 8 August 2004

Time	Speaker	Title
8:45	Jani Little	On the Pattern of SIDS in North Carolina
	Wendy Miller	Geography for Every Occasion
	Susan Pulsipher	Demonstration of GIS Applications for Social Science Classes
	David Rain	**City Views:** Resources for Understanding Urban Dynamics in International Contexts
	Jungyul Sohn	Does Space Matter in Statistics?
	Christopher Weiss	Explaining Changes in Obesity: Examining Spatial Dimensions
	Panel Discussion	
10:30	Break	
10:45	Timothy Bray	Recognizing the Importance of Space
	Randy Gainey	Developing An Undergraduate Course in the Spatial Analysis of Crime: Focusing on the Final Exam
	Karen Hayslett-McCall	Patterns of Crime
	David Iaquinta	Spatial "Slight of Mind"
	Loretta Lynch	A Bid Rent Function: Does Distance from City Affect Rental Values?
	Panel Discussion	
12:15	Lunch	
1:30	Sukumar Ganapati	GIS for Public Administration: Spatial Thinking for Managers and Policy Analysts?
	Katrin Anacker	Practical Applications of Spatial Analysis for Undergraduate Students in City and Regional Planning
	Eric Yamashita	Planning 654: An Introduction to GIS for Planners
	Panel Discussion	
2:45	**Break**	
3:00	Mark Bjelland	Visualization of Urban Spatial Dynamics
	David Guertin	Development of Lab Assignments for Application of GIS and Spatial Analysis
	Amy Hessl	Let it Burn?
	Christine Jocoy	Space Matters in the Demographic Transition Model
	Panel Discussion	
4:15	**Closing Ceremony**	

Exit Survey: In order to give some idea of the success of the program, we have selected some comments from the exit survey of a typical participant at the SDSU workshop (a more complete assessment of the quantitative indicators from the Exit Survey were presented earlier in this report).

Please describe how you plan to use what you have learned in this workshop to enhance the exposure of spatial methods to students in your undergraduate courses and programs (e.g., describe exercises that you will introduce, modifications to course syllabi, new course proposals, or changes in an academic program, etc).

I plan to integrate the lessons I developed and the wisdom I received in my undergraduate and graduate courses starting in the fall semester. I also plan to share this information as soon as possible with the members of the urban studies methods course committee.

As a result of this workshop, describe how you will alter your approach to the evaluation of courses and to the assessment of student learning.

I think that the approach will vary less than the specific content of the courses - I think the assessment tools I've been using can be adapted very easily to the changes I plan.

Please suggest ways in which these resources could be improved.

I think that the syllabi and discipline-specific resources can be expanded to be more useful - but the site is new so I look forward to growth of the materials available on the site - including, hopefully, my own.

Enter any additional comments, suggestions, or concerns here.

This workshop was really terrific - each component was really just fantastic. You guys did a wonderful job putting this together. Thanks so much for an outstanding week of learning.

Plans for Follow-Up

Sufficient funds remain in the budget to allow UCGIS to invite three or four of the most outstanding participants to make presentations at the annual winter meeting of UCGIS in Washington, D.C. Getis and Weeks will make the selection after reviewing notes from participants' presentations and then negotiating with a rank-ordered list of candidates to generate a group of people who will have implemented a change in one or more of their courses during the fall term in response to the learning that took place during this workshop. Getis and Weeks will then moderate a session at the UCGIS winter meeting in which each of the invited participants will report on the success of incorporating new spatial methods and materials into their course(s), and they will receive feedback from UCGIS attendees, as well as from Getis and Weeks. We will implement revised versions of the entry and exit surveys to assess this mini-workshop**.**

The Santa Barbara SPACE Workshop

Fiona Goodchild

Pre-planning: Participants provided significant information about their own academic background and their interest in teaching spatial analysis. The workshop was planned to encourage participants to reflect on their teaching philosophies and experiences prior to integrating new ideas and techniques presented by workshop instructors and participants.

Workshop Format: The participants were grouped for **the first discussion of pedagog**y so that they would reflect as much diversity as possible. This session allowed participants to get to know each other and to become familiar with their teaching philosophies and experiences (or lack thereof) in teaching spatial thinking in undergraduate courses.

Questions used to focus this discussion included the following:

1. Discuss your experiences with teaching undergraduates in the context of your teaching philosophy.
2. What is the current role of spatial concepts or tools in your courses?
3. How is this consistent with the current role of spatial concepts in your discipline?
4. What types of activities are already included in a course that you hope to enhance by incorporation of spatial analysis?
5. What is the role you expect spatial concepts or tools to play in your teaching?
6. What are the pedagogical factors that you feel contribute most to student success in your discipline?
7. What are the guiding principles you keep in mind when designing undergraduate courses? Are any of these specific to your discipline or are they principles that are more general?
8. Beyond the acquisition of specific content knowledge, what learning goals do you have for students in your courses?
9. What do you consider the best ways to help students achieve both mastery of content knowledge and the skills you consider an important part of education in your discipline?
10. Do you ever feel that there is “so much content, so little time”? How do you accommodate this in your teaching?
11. Do you expect that incorporating spatial analysis into your course will require class/student study time that was previously dedicated to something else? If so, how do you plan to find the extra time necessary for these new activities?
12. What do you see as the barriers to teaching undergraduates to think spatially? Are any of these barriers specific to your discipline or your institution?
13. How do you currently assess student learning in this course?
14. Do you feel that your current student assessment methods will be adequate for evaluating the student learning that results from a spatial approach to the material? Why or why not?

The session allowed participants to recognize their colleagues as potential sources of advice and ideas, especially in the context of their specific disciplines.

The **second pedagogy session** addressed the issues of course evaluation and learning assessment. To provide a starting point for the discussion, participants were asked to read the chapter entitled "The Cognitive Process Dimension" from *A Taxonomy for Learning, Teaching and Assessing* (Anderson and Krathwohl). They were also asked to come with a brainstormed list of ideas for using a spatial approach in the classes they teach or within their disciplines. Participants worked from a prepared list of questions to guide these discussions. Participants were also asked to complete a set of questions designed to focus on a topic that they would present on the final day of the workshop.

Faculty Presentations: The second week of the workshop began with a question and answer session offered by the workshop instructors on the theme **"How I Teach and Why I do it that Way"**. Participants were asked to come with questions for the panelists, and a discussion of participant questions followed a brief statement on the theme by each of the instructors. During the second week of the workshop, participants spent a large portion of the time working on their personal projects under the guidance of the workshop instructors. Instructors were available for individual consultations by appointment, and at least one instructor with technical expertise and one instructor with pedagogical expertise was available in the lab throughout each work session.

Participant Presentations: On the final day of the workshop, each participant presented an overview of the course materials that he or she had prepared at the workshop. Other participants and instructors asked questions and gave comments following each presentation. Each instructor also evaluated the curriculum materials and activities each participant presented for effectiveness in helping students learn to use spatial thinking strategies and tools.

Evaluation of Workshop Pedagogy

Fiona Goodchild

One of the primary goals of SPACE is to support faculty to design innovative curriculum in undergraduate social science courses. The introductory materials that were sent to participants before the summer workshop encouraged them to identify elements of spatial analysis and technology they would like to introduce to their students. From the first day, the pedagogy of the workshop was designed to prompt them to design new curriculum that integrated spatial analysis. A worksheet with questions about these elements was circulated to reinforce this goal. At the end of each of the summer workshops, the participants gave short presentations about their intentions for innovation in their undergraduate courses. The following account summarizes the focus and range of presentations at the UCSB and at the SDSU sites.

University of California, Santa Barbara:
The participants in this workshop spent the first week learning how spatial statistics can be integrated into undergraduate social science courses as well as working in the STAR lab to improve their familiarity with technical tools for spatial analysis. In the second week, they prepared a short talk about how they would implement these ideas to achieve specific learning objectives.

1. ***Analyzing and explaining new relationships***

Participants explained how they would use GIS and GeoDa to illustrate and analyze new relationships (such as autocorrelation) in urban sociology, in econometrics, in urban geography and in tourism and recreation.

2. ***Visualizing patterns in data displays***

Participants created maps to display data on topics ranging from tourism to fisheries to criminology. Even though there was a marked discrepancy in knowledge and experience coming into the workshop, most of the participants were able to identify how they would introduce visualization projects into their courses.

3. ***Using spatial analysis in planning and community service research***

Several presentations talked about how spatial analysis and GIS tools would be built in to courses in urban geography and urban planning. A couple of the participants also intended to use both FlowMapper and GeoDa in projects that require students to collect local data and prepare an analysis and report.

San Diego State University:
The one-week workshop had been advertised for faculty with more previous experience in spatial statistics and technology, and many of the participants had already introduced spatial thinking into courses in regional planning, human geography, sociology, and public administration. Several of them had developed exercises that required students to work with databases and mapping packages. The workshop created the opportunity for them to compare their approach to teaching with a spatial perspective. At the end of the week, they presented a wide range of projects reflecting the following themes.

1. ***Using spatial data in analysis of social behavior and policy***

Several presentations indicated how students would use census data and databases from federal agencies, such as the CDC, to create maps and to consider spatial hypotheses.

2. ***Interpretation of spatial patterns through space and time***

Several presentations outlined how spatial patterns can illuminate concepts in demography, economics, environmental disaster planning, and land use change.

3. ***Introducing the spatial perspective into research methods courses***

Participants gave examples of how spatial aggregation could be taught and how spread sheets/summary tables and GIS mapping of point data enabled students to complete spatial analysis.

Defining Student Learning Objectives:

In this first year, the participants brought a wide range of applications that illustrated how student activities and projects can be designed around the use of GIS software and statistics packages. The faculty clearly sees these tools as enabling students to learn how to compile and represent digital data as well as how to learn visualization and analysis tools that develop problem solving and reasoning skills. Though the participants were encouraged to think in terms of setting student-learning objectives, only about a third of them was explicit about the knowledge and skills that they expected their students to develop.

We will contact the 2004 workshop participants throughout the next year to find out how they introduce the concepts and techniques taught at the summer institutes into their courses. One suggestion is that participants should bring their own data sets and work on how these can be adapted for student exercises. We will also reconsider how we can present ideas that make it clear how to match the content knowledge and student activities with students learning objectives. One possibility is that we can choose some examples from these project presentations and create some curriculum modules that are best practice examples.

SPACE Questions and Recommendations:

Participants at SDSU had the appropriate background to think about teaching applications, whereas the majority of the Santa Barbara participants did not. Should those who come to introductory course be asked to complete tutorials before they arrive?

Need to bridge the gap between what people currently do – both the instructors and the participants – and how this translates into a teaching context. Presentations at San Diego indicated that participants were ready to discuss this and wanted to look at more specific exercises and activities. There was more interest in defining learning objectives and some effort to identify questions for assessment. At Santa Barbara, only half of the participants appeared to focus on student learning in their presentations.

Need to be assertive about final presentations, both in terms of scheduling and collecting copies. Grouping in discipline groups was a good approach.

Prepare a package of materials on education (excerpts from educational texts), specially focused on learning spatial thinking and concepts. Prepare binders with basic info and room for handouts.

Rework the evaluation sheet after more discussion about what is consistent with SPACE objectives for final project presentations and participant learning. Someone needs to know ahead of time what the complete curriculum for the week will look like and how the sequence matches participant expectations and progress. For example, when visitors come in to talk, could they address how they teach specific concepts and analysis as opposed to talking about their area of research and incidentally about their methods of analysis.

Selected Comments from Workshop Participants' Exit Surveys

The workshop helped me to better think through the balance between teaching GIS purely as a tool and providing more theory/intuition. Also, the wide range of topics and scenarios that people presented was very useful because my own future instruction is likely to involve different topical areas, student abilities, and even course length (entire class versus a component of another class).

I have taken my existing syllabus and inserted multiple changes--places where I will use data visualization instead of mere graphs, places where I will have students engage in exercises using data visualization software, modifications to the course project, etc. All in all, I noted 8 discrete changes to my existing course syllabus!

I was especially excited about the use of student portfolios for assessment, and the varied approaches to group work (i.e., building in student-student evaluation) and weekly progress reports as well as the option to do the project alone. I also think that I will include daily surveys administered at the beginning of class that ask students to evaluate how well they understand key concepts from the reading and then a follow-up at the end of the class to assess how the lecture clarified things.

Before this workshop I was skeptical about using GIS in content classes, but now I am glad to report that I am much more optimistic. GeoDa is sophisticated yet intuitive enough to use that I believe my undergrads will be able to effectively explore their own data and create independent projects.

As my responses above indicate, I have been very impressed with the workshop. I learned a great deal both in terms of undergraduate education and spatial methods. In some ways, I wish there was more time, though I have been to workshops that seem to go on too long. This was a very compact week but, all in all, I couldn't be happier. Cheers to all of the facilitators, they made this a very special learning experience for me.

Use of SPACE Website

Gamaiel Zavala

Traffic logs were kept and analyzed by *WebTrends Log Analyzer* for 7-months (January –July 2004). In this period, the website's 267 pages were viewed by an average of 55 visitors per day, 27% of whom visited more than once.

Average hits per day – 842
Average visitors per day – 55
Number of Unique visitors to the site – 3,010
Total hits – 179,491
Total visitors – 11,730
Average visitor length – 12:22 minutes

The most requested areas of the site (by directory):

- Workshops (4,991 visits)
- Teaching Materials / Discipline Resources (2,806)
- About SPACE (1,740)
- Learning Resources (1,502)
- Forums (1,330)
- My Page (582)

The most requested pages on the site:

- Workshops Home (2,857 visits)
- Home Page (2,059)
- Discipline Resources Home (992)
- UCSB Workshop Home (889)
- OSU Workshop Home (772)
- Forums Home (769)
- SDSU Workshop Home (743)
- Teaching Materials Home (582)
- My Page (579)
- Learning Resources Home (538)
- Workshops Application (506)
- *Classics* Home (502)

The most downloaded files:

- Proposal (259)
- Project Summary (233)
- Workshops Flyer (85)

Use and Evaluation of Web Resources at www.csiss.org/SPACE by Workshop Participants

	Syllabi Collection	Assessment Links	Discipline Resources	On-line Forum	My Page
Did not use it	12	23	28	25	34
Not useful	0	1	1	1	1
Somewhat useful	22	12	11	13	3
Very useful	16	14	10	11	12

Eighty-four (84) percent of workshop participants rated the on-line application procedure as "4" and 16 percent as "3" on a scale of 1 (totally unacceptable) to 4 (excellent).

In year two of the project, attention will be devoted to expanding the scope and quality of resources at www.csiss.org/SPACE. This will include refining the content of learning resources, expanding the range of CSISS Classics, identifying syllabi of courses across the social science disciplines, and perfecting the use of the site for gathering and tracking data on participant progress.

From NSF Fastlane Report

The Following responses from D Janelle were copied from the NSF Fastlane Report:

Annual Report for Period: 10/2003 - 10/2004 **Submitted on:** 09/23/2004
Principal Investigator: Janelle, Donald. **Award ID:** 0231263
Organization: U of Cal Santa Barbara
Title: Spatial Perspectives on Analysis for Curriculum Enhancement (SPACE)

Primary contact for project information:
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Participant Individuals:
CoPrincipal Investigator(s) : Richard P Appelbaum; Michael F Goodchild
Senior personnel(s) : Mei-Po Kwan; Arthur Getis
Other -- specify(s) : John Weeks
Senior personnel(s) : Fiona Goodchild
Technician, programmer(s) : Gamaiel Zavala
Other -- specify(s) : Christian Brown
Graduate student(s) : Eric White; Jeff Howarth; Rob Farrell
Other -- specify(s) : Stuart Sweeney; Sara Fabrikant; Waldo Tobler
Graduate student(s) : Jared Aldstadt
Post-doc(s) : Alex Keuper
Other -- specify(s) : Piotr Jankowski; Allan Murray; Morton O'Kelly; Michael Tiefelsdorf; Ningchuan Xiao; Sara McLafferty; Shih-Lung Shaw; Serge Rey; Barbara Herr-Harthorn; William Freudenberg; Linda Lobao
Graduate student(s) : Fang Ren; Eric Boschmann; Suzanna Klaf
Other -- specify(s) : James Proctor; Peter Kuhn; Lynn Usery; Kathryn Plank; Richard A Johnson; Stanley Nicholson; Donald G Cartwright; Eric Fournier
Graduate student(s) : Guoxiang Ding; Wei Hui; Jason Davis; Stacy Rebich

Project Participants
Senior Personnel:

Name: Janelle, Donald
Worked for more than 160 Hours: Yes
Contribution to Project:
Serves as Principal Investigator and Program Director for SPACE. He plans and coordinates all project activities with the overall objectives for the NSF CCLI national dissemination program. He works with the workshop coordinators for UCSB, OSU, and UCGIS on the development of workshop programs, directs the advertising for applicants and the selection process, cooperates with the SPACE Educational Development Coordinator on the implementation of instructional development components in the workshops and in the design of instruments for evaluating workshop results. He supervises the work of the project administrator and webmaster, hires and supervises graduate student assistants at UCSB, organizes planning meetings for project leaders from the three partner institutions and workshop planning meetings for UCSB, arranges for SPACE participation in national academic conferences, and prepares documentation for annual reports to NSF and to UCSB's Institute for Social, Behavioral, and Economic Research.

Name: Appelbaum, Richard
Worked for more than 160 Hours: No
Contribution to Project:
As co-PI on the project, he participated in the December 2003 planning meeting of the project team and has assisted in advertising the workshop program. As an award-winning teacher at UCSB, he gave a featured presentation to the 2004 workshop at UCSB. He will also featured the SPACE program workshops in a presentation to the Annual Meeting of the American Sociological Association in mid August 2004. His primary role in SPACE will commence in year two of the project, helping to implement its program of short workshops at the annual meetings of academic societies. As Director of UCSB's Institute for Social, Economic, and Behavioral Research, he is well positioned to engage in this outreach effort.

Name: Goodchild, Michael
Worked for more than 160 Hours: Yes
Contribution to Project:
As a Co-PI on the project, he assisted in the overall design for the SPACE program and was one of the primary instructors in 2004 workshops at UCSB and at San Diego State University. He was especially active in the planning and implementation of the two-week workshop at UCSB; he participated in planning meetings throughout the year, provided advice to the graduate students involved in setting up exercises, and worked closely with the PI and workshop co-coordinators in setting the agenda.

Name: Kwan, Mei-Po
Worked for more than 160 Hours: Yes
Contribution to Project:
PI for the subcontract to Ohio State University. She was responsible for designing, implementing, coordinating the workshop program at Ohio State University. She took part in the SPACE planning meeting in Santa Barbara in December 2003. She supervised other personnel working on the project at OSU, developed lecture plans and lab exercises, and taught part of the 2004 workshop. She is coordinating the follow-up activities and plans for future workshops.

Name: Getis, Arthur
Worked for more than 160 Hours: No
Contribution to Project:
PI for the UCGIS subcontract on the SPACE project. He participated in the planning meeting for the SPACE project in December 2003, and served as Co-coordinator with John Weeks for the 2004 UCGIS SPACE workshop at San Diego State University. He was responsible for workshop development, was a principal workshop instructor, tutored participants, and supervised the work of Jared Aldstadt.

Name: Goodchild, Fiona
Worked for more than 160 Hours: Yes
Contribution to Project:

Fiona Goodchild serves as the Educational Development Coordinator for the SPACE Project. Her primary obligations are planning, documentation and evaluation of workshop outcomes. She prepared resources for and attended the SPACE planning meeting in December 2003. In Winter 2004, she participated in the design of survey instruments for selecting participants and for workshop entry and exit surveys for all three workshops (UCSB, OSU, and SDSU). In addition, she provided instruction about curriculum development and student assessment in 2004 for both the UCSB and SDSU summer workshops, and consultation to instructors in the OSU workshop. She worked with D. Janelle in supervising the assistance of Stacy Rebich and communicated with all workshop instructors on the pedagogical goals of the program. In fall 2004, she assisted Don Janelle with completion of the pedagogical aspects of the annual SPACE report to the National Science Foundation.

Post-doc:
Name: Keuper, Alex
Worked for more than 160 Hours: No
Contribution to Project:
He completed his PhD in June 2004. He was the primary lab instructor for the UCSB workshop; he prepared the workshop-related exercises on the use of GIS and tutored participants on their educational development projects.

Graduate Student:
Name: White, Eric
Worked for more than 160 Hours: Yes
Contribution to Project:
A PhD candidate in Anthropology and a expert on the development of Internet search engines, he held a 35 % appointment in the Fall 2003 and Winter 2004 quarters. His role was to locate web resources that feature educational curriculum development and learning assessment. These are presented on the SPACE website (www.csiss.org/SPACE). He also identified course syllabi on the Web that feature spatial perspectives in a range of social science disciplines. These syllabi were examined by workshop participants as examples for critique and emulation.

Name: Howarth, Jeff
Worked for more than 160 Hours: Yes
Contribution to Project:
He worked on a 35% graduate appointment in the Spring 2004 quarter and a 25% appointment in the summer to prepare resources for the 2004 workshop at UCSB. He prepared a document to assist undergraduate instructors in choosing a GIS software package suitable for their needs and he gave a presentation on his work to participants in the UCSB workshop.

Name: Farrell, Rob
Worked for more than 160 Hours: No
Contribution to Project:
He provided tutorial assistance on GIS and spatial statistics to participants in the 2004 UCSB workshop. He worked with the workshop coordinator in setting up exercises on the use of the GeoDa software (exploratory spatial data analysis).

Name: Aldstadt, Jared
Worked for more than 160 Hours: No
Contribution to Project:
He prepared lab exercises and instructed and tutored participants in the use of GIS and GeoDa software exercises at the 2004 workshop held at San Diego State University (host university for the UCGIS SPACE workshop).

Name: Ren, Fang
Worked for more than 160 Hours: Yes
Contribution to Project:
She helped to advertise and coordinate the 2004 workshop at Ohio State University, assisted in the development of lab exercises, and provided tutorial support in the lab sessions.

Name: Boschmann, Eric
Worked for more than 160 Hours: Yes.
Contribution to Project:

He assisted with overall project coordination for the 2004 workshop at Ohio State University, assisted in advertising the workshop, contributed to workshop logistics, helped in the development of lab exercises, and provided tutorial support during the lab sessions.

Name: Klaf, Suzanna
Worked for more than 160 Hours: No
Contribution to Project:
She helped with logistics during the 2004 workshop at Ohio State University.

Name: Ding, Guoxiang
Worked for more than 160 Hours: No
Contribution to Project:
Provided assistance with logistics for the 2004 workshop at Ohio State University. This work was funded by the Department of Geography at OSU.

Name: Hui, Wei
Worked for more than 160 Hours: No
Contribution to Project:
Provided assistance with logistics for the 2004 workshop at Ohio State University. This work was funded by the Department of Geography at OSU.

Name: Davis, Jason
Worked for more than 160 Hours: No
Contribution to Project:
Provided assistance with logistics for the 2004 workshop at Ohio State University. This work was funded by the Department of Geography at OSU.

Name: Rebich, Stacy
Worked for more than 160 Hours: Yes
Contribution to Project:
She provided educational development support for the SPACE project in 2004, assisting Fiona Goodchild in the refinement of survey instruments, grouping of workshop participants according to expertise and needs, providing tutorial support and instruction for workshops participants in the UCSB and SDSU workshops, and maintaining the workshop library for participant use. In addition, she has been involved in processing data and interpreting results on program evaluation.

Undergraduate Student
Technician, Programmer
Name: Zavala, Gamaiel
Worked for more than 160 Hours: Yes
Contribution to Project:
Webmaster and database development and management for the SPACE project. In 2003-2004, he developed the project's website (www.csiss.org/SPACE) as a basis for web advertising and project dissemination of instructional and course development resources. He designed all of the automated database management systems for participant applications and processing, and for workshop entry and exit surveys, providing a range of output to enable the PI and workshop organizers for all three workshops to assess applicants and to understand the backgrounds and needs of workshop participants. In addition, he created a customized web forum for participant-instructor dialog during and after workshops and developed a 'My Page' resource for workshop participants to store and retrieve customized teaching and learning resources that they find useful in their curriculum development efforts. He also serves as liaison with the systems director of the computer labs used in the workshop at UCSB.

Other Participants
Name: Weeks, John
Worked for more than 160 Hours:
Contribution to Project:
Co-Coordinated (with Art Getis) the development and implementation of the 2004 workshop at San Diego State University. He handled the workshop logistics, budgeting and related issues, and was a primary instructor in the

workshop, responsible for presentations and for tutoring participants. He also participated in the December 2003 SPACE planning meeting – representing SDSU and UCGIS.

Name: Brown, Christian
Worked for more than 160 Hours: Yes
Contribution to Project:
Project administrator for the SPACE program. Provides assistance to the PI on workshop advertising and application processing, processes all invoices on expenses for the UCSB workshop -- publications, printing, software, etc. He organizes accommodations, reserves classroom and lab space, and provides logistical assistance to the workshop organizers and participants at the UCSB workshop. He handles the preparation of participant stipends and certificates of completion for all three SPACE workshops and is responsible for all correspondence with workshop participants. He reviews all instructions to participants that appear on the SPACE website for accuracy and compliance with NSF regulations.

Name: Sweeney, Stuart
Worked for more than 160 Hours: Yes
Contribution to Project:
Worked with the PI and with Sara Fabrikant to organize the workshop agenda for the 2004 UCSB workshop. He supervised assistant Rob Farrell in the development of exercises using the GeoDa software (exploratory spatial data analysis) and presented instruction and offered tutorial support to participants throughout the workshop. He also played an important role in the December 2003 SPACE planning meeting.

Name: Fabrikant, Sara
Worked for more than 160 Hours: No
Contribution to Project:
Worked with the PI and with Stuart Sweeney to organize the workshop agenda for the 2004 UCSB workshop. She prepared lab exercises on the integration of GIS with other data visualization tools, lectured, and provided consultation for participants on their workshop projects.

Name: Tobler, Waldo
Worked for more than 160 Hours: No
Contribution to Project:
Emeritus Professor and one of the World's leading analytical and theoretical cartographers, he was one of the lead instructors in the 2004 UCSB workshop. He developed tutorials, exercises, and data sets to accompany the customized software that he developed (FlowMapper) for free download by workshop participants and their students. He also participated in the December 2003 planning meeting for the SPACE project and contributed to planning the agenda for the UCSB workshop.

Name: Jankowski, Piotr
Worked for more than 160 Hours: No
Contribution to Project:
He was an instructor at the 2004 workshop at San Diego State University, responsible for presentations and exercises on public participation GIS and for tutoring participants.

Name: Murray, Allan
Worked for more than 160 Hours: No
Contribution to Project:
He was an instructor in the 2004 workshop at Ohio State University. He developed related teaching materials and lab exercises.

Name: O'Kelly, Morton
Worked for more than 160 Hours: No
Contribution to Project:
He was an instructor in the 2004 workshop at Ohio State University. He developed related teaching materials and lab exercises.

Name: Tiefelsdorf, Michael
Worked for more than 160 Hours: No.

Contribution to Project:
He was an instructor in the 2004 workshop at Ohio State University. He developed related teaching materials and lab exercises. He also participated in the SPACE planning meeting in Santa Barbara in December 2003 and was involved in designing the workshop program for OSU.

Name: Xiao, Ningchuan
Worked for more than 160 Hours: No
Contribution to Project:
He was an instructor in the 2004 workshop at Ohio State University. He developed related teaching materials and lab exercises.

Name: McLafferty, Sara
Worked for more than 160 Hours: No
Contribution to Project:
Department of Geography, University of Illinois, Urbana-Champaign. She gave a guest lecture in the 2004 workshop at Ohio State University, illustrating the role of GIS and spatial analysis in health studies and in teaching.

Name: Shaw, Shih-Lung
Worked for more than 160 Hours: No
Contribution to Project:
Professor, Department of Geography, University of Tennessee. He gave a guest lecture in the 2004 workshop at Ohio State University.

Name: Rey, Serge
Worked for more than 160 Hours: No
Contribution to Project:
He was an instructor in the 2004 workshop at San Diego State University, demonstrating the STARS (Space-Time Analysis of Regional Systems) open source software and its potential uses in undergraduate social science education.

Name: Herr-Harthorn, Barbara
Worked for more than 160 Hours: No
Contribution to Project:
Research Professor in Anthropology. She gave a guest presentation on spatial perspectives on risk assessment in public health.

Name: Freudenberg, William
Worked for more than 160 Hours: No
Contribution to Project:
Professor of Environmental Studies and Sociology. He gave a presentation to the 2004 UCSB workshop participants.

Name: Lobao, Linda
Worked for more than 160 Hours: No
Contribution to Project:
Department of Sociology, OSU. She gave a guest lecture in the workshop and helped with several other sessions during the 2004 workshop at Ohio State University.

Name: Proctor, James
Worked for more than 160 Hours: No
Contribution to Project:
Professor of Religious Studies and Geography at UCSB -- gave presentation to the 2004 UCSB workshop participants on spatial perspectives in the regional of cultural values and attitudes.

Name: Kuhn, Peter
Worked for more than 160 Hours: No
Contribution to Project:

Professor of Economics, UCSB. He gave a guest presentation to the 2004 UCSB workshop on applications of spatial thinking in economics, with examples of how he treats this in undergraduate teaching.

Name: Usery, Lynn.
Worked for more than 160 Hours: No
Contribution to Project:
As 2003-2004 President of the University Consortium for Geographic Information Science (UCGIS), he was responsible for selecting San Diego State University to host the UCGIS SPACE workshop in 2004 and for overseeing management of the UCGIS subcontract on the SPACE project. He also participated in the December 2003 SPACE project-planning meeting in Santa Barbara.

Name: Plank, Kathryn
Worked for more than 160 Hours: No
Contribution to Project:
Associate Director, Office of Faculty & TA Development, Ohio State University. She helped in designing the educational development component of the workshop, facilitated the activities of participant focus groups, and taught part of the 2004 workshop at Ohio State University.

Name: Johnson, Richard
Worked for more than 160 Hours: No
Contribution to Project:
Senior Instructional Consultant with the UCSB Office for Instructional Consultation. He participated in the SPACE planning meeting in December 2003 and provided advisory support and resources for the project's Educational Development Coordinator.

Name: Nicholson, Stanley
Worked for more than 160 Hours: No
Contribution to Project:
Director of the Office of Instructional Consultation at UCSB. He participated in the SPACE planning meeting in December 2003 and provided advisory support and resources for the project's Educational Development Coordinator.

Name: Cartwright, Donald
Worked for more than 160 Hours: No
Contribution to Project:
Professor Cartwright is one of the most highly recognized teachers in Canada -- a recipient of the highest possible awards for the University of Western Ontario (UWO), for the Province of Ontario, and for Canada. He participated as a project advisor at the December 2003 SPACE planning meeting, sharing ideas about the faculty mentor program that he coordinates for the Teaching Support Center at the University of Western Ontario.

Name: Fournier, Eric
Worked for more than 160 Hours: No
Contribution to Project:
Professor Fournier (Samford University in Alabama) participated as a project advisor at the December 2003 SPACE planning meeting in Santa Barbara. He shared ideas based on his experience as Co-Principal Investigator in an NSF-supported program for GIS instruction for science and social science instructors at Samford (Academic Excellence through GIS project (AEGIS)). He also shared ideas from his involvement as an instructor in the NSF-supported Geography Faculty Development Alliance Workshops, led by Kenneth Foote at the University of Colorado.

Organizational Partners
Ohio State University
Under the direction of Professor Mei-Po Kwan, Ohio State University's Geography Department is a partner in the SPACE program under a subcontract from UCSB. OSU's primary role was in offering a one-week workshop on 'GIS and Spatial Modeling for Use in Undergraduate Education' (28-June - 2 July 2004).
The Department has provided additional funding for graduate students working during the workshop and for social events for workshop participants. In addition, it has provided lab and classroom space and has contributed staff support time for organizing workshop events. OSU Geography has a teaching laboratory equipped with state-of-the-

art teaching equipment, and 50 powerful PCs running all the GIS and statistical software needed for the workshop. This software includes ESRI software (ArcGIS, ArcView), GeoDa, TransCAD, SPSS, GeoMedia, IDRISI, and others. The department also has three classrooms (including one classroom with a capacity of 50, and two seminar rooms) reserved exclusively for the workshop. The departmental Xerox and fax machines were also available for the workshop participants. Professor Kwan has assisted in the design of workshop survey instruments (application, entry, and exit), and she and Professor Tiefelsdorf participated in a two-day planning meeting for the SPACE program in December 2003.

University Consortium for Geographic Information Science
The University Consortium for Geographic Information Science (UCGIS) is a partner in the SPACE program under subcontract to UCSB. The UCGIA President (Lynn Usery in 2004) is responsible for the selection of a member institution to offer a weeklong workshop on 'Spatial Analysis and GIS for Undergraduate Course Enhancement in the Social Sciences. For 2004, this workshop was offered by San Diego State University (2-6 August 2004), with Arthur Getis and John Weeks as workshop coordinators. UCGIS also assisted in advertising the SPACE program through its website (www.ucgis.org) and provided the assistance of Professors Lynn Usery, Arthur Getis, and John Weeks at the December 2003 planning meeting for the SPACE program.

San Diego State University
In 2004, San Diego State University's Department of Geography was selected to host a SPACE workshop on behalf of the UCGIS under a subcontract to UCSB. This occurred on 2-6 August. The Department's support included funding for social events for workshop participants and the use of in-kind and facility resources. Facilities included a 'smart' classroom, a seminar room, and a laboratory that enabled each participant to work independently at a properly loaded computer with software for all workshop activities. The SDSU Department of Geography boasts outstanding GIS laboratories and considerable experience in conducting workshops and short-courses. The workshop took place on the third floor of Storm Hall. The main classroom is equipped with the latest presentation technology. The facility used for this workshop is the Richard Wright Laboratory for Spatial Analysis, a state of the art facility with two-dozen workstations. All machines were loaded with the new software, GEODA, a creation of Luc Anselin (University of Illinois) as part of the NSF funding to the Center for Spatially Integrated Social Science (CSISS). In addition, participants were in a position to use STARS, a new time-space analytic package by Serge Rey (SDSU), and FlowMapper, a spatial interaction package created by Waldo Tobler of UCSB with support from CSISS. Participants could use the laboratory at all times during the week. In addition, display material was available in the Center for Earth Systems Analysis and Research (CESAR), an advanced spatial analytic laboratory of the Department of Geography and in a large seminar room. Professor Douglas Stow (SDSU) took the participants on a tour of the specialized facilities in CESAR. Coffee and cookies were available each day in the seminar room and on the verandah of Storm Hall.

Other Collaborators or Contacts
Luc Anselin (Spatial Analysis Laboratory, Department of Agricultural and Consumer Economics, University of Illinois, Urbana-Champaign) provided copies of the GeoDa software for exploratory spatial data analysis for all space workshop participants -- on disk for the UCSB workshop and as a free download from http://sal.agecon.uiuc.edu/geoda_main.php for participants in the other workshops. The GeoDa software was featured as a tool for direct application in undergraduate social science courses in the UCSB and SDSU workshops in 2004.

Intergraph Inc. provided one-year trial licenses of their GeoMedia Professional GIS software for all SPACE workshop participants in 2004, along with information on the Intergraph program for educational support.

The **ESRI Press** provided a complimentary library of fifteen publications on GIS applications in the social sciences for each of the three SPACE workshops in 2004 (approximate retail value $2,000).

Clark Labs (Clark University) provided evaluation copies of its Kilimanjaro Idrisi GIS software for workshop participants in each of the 2004 SPACE workshops.

The **Department of Geography, University of California, Santa Barbara**, provided a lecture room, a computer lab with 24 fully equipped computers, and technical assistance for the two-week-long workshop at UCSB in 2004.

Activities and Findings
Research and Education Activities:
Training and Development:

The SPACE project employs graduate students at each of the host institutions to assist with the organization and delivery of instructional materials. The graduate students have gained appreciation for how to design materials with clear instructions; how to assist in the instruction of labs and tutorials, and how to work with university professors from a variety of disciplines and different types of educational institutions. In working with workshop participants over the course of one or two weeks, they have acquired contacts within the academic teaching and research communities. Eleven graduate students and one Post Doc assisted in the development and administration of the SPACE project during its first year. Specific examples include:

- A PhD candidate in Anthropology (Eric White), with expertise in the design of customized search engines, helped in the search and organization of educational development resources. These include links to course syllabi that demonstrate instructional strategies for using spatial analysis in a range of social science disciplines. He also gained familiarity tools for the assessment of learning, discovering resources that e are currently featured on the website.
- An Environmental Science student (Stacy Rebich), with a strong interest in education, played a significant role in the project, helping to design survey instruments used in evaluating applicants for selection as workshop participants and in the development of entry and exit surveys to evaluate the program and to assess progress made by participants. She also assisted with instruction and in one-on-one discussions with participants about their pedagogical goals and projects during the workshops at SDSU and UCSB.
- A PhD student in geography (Jeff Howarth) helped to develop a tool for assessing various GIS software that workshop participants might consider for use in their undergraduate teaching. He gave a presentation on this to the UCSB workshop and, based on feedback from participants, the GIS selection guide will appear shortly as one of the resources on the website.
- At San Diego State University, a PhD candidate (Jared Aldstadt) designed the exercises and taught the lab component of the workshop for the use of GeoDA û an exploratory spatial data software package for spatial econometrics. This software, an outcome of the CSISS program, was provided to all workshop participants for use in both teaching and research.
- At Ohio State University, Eric Boschmann and Fang Ren played lead roles in workshop management and contributed to instruction about workshop lab exercises. In doing so, they and several other graduate students acquired an appreciation of the benefits and challenges of cross-discipline communication, awareness of different teaching issues, and exposure to different disciplinary perspectives on applications of spatial analytic methods.
- Workshop coordinators and primary instructors also benefited for the very same reasons noted for graduate students.

Outreach Activities:
Although project activities are oriented largely to serving university undergraduate social science instructors in the United States, the dissemination of project resources has invited unexpected outreach opportunities to share the science of spatial analysis. For example, the SPACE website has opened communications with a broad public of diverse interests. Inquiries arrive regularly from high school teachers, university instructors from outside the social sciences, and students from across the country and from abroad. A few workshop instructors have been invited by participants to meet with environmental agencies and community interest groups and to give guest presentations at academic institutions.

Advertising for SPACE targeted fliers and email announcements to designated minority institutions. The program also provided supplemental funding for minority participants -- two Hispanic American and three African American workshop participants received support under this initiative. In addition, the project supported one participant from the developing region of Assam in India -- an international outreach that also enriched the workshop experience for other participants. These initiatives are intended to have results beyond local campuses through the local outreach efforts of the workshop participants and their institutions.

Books or Other One-time Publications
Donald G. Janelle, "Spatial Social Science", (2004). Booklet, 16 pages, Published
Bibliography: Center for Spatially Integrated Social Science, University of California, Santa Barbara (developed under the NSF-supported CSISS program, and distributed to SPACE participants.

Web/Internet Site
URL(s):
www.csiss.org/SPACE
Description:
The SPACE website is a principal means of advertising the workshop program, it is the primary means for submitting applications to participate in workshops, and it is used to administer the program. Workshop instructors use a secure database on the site to evaluate applicants and to make decisions on admission. The site conveys information about workshop agenda and logistics and it is a repository of resources for workshop participants (example syllabi, learning materials, assessment instruments, etc.). It also provides the means for administering web-based entry and exit surveys. See "Findings" section for detailed information on the actual use of the SPACE website.

Contributions within Discipline:
The host discipline for this project is arguably Geography. However, the project's origin in the NSF-supported Center for Spatially Integrated Social Science enhances the importance of original instructional contributions from scholars in a range of disciplines. Accordingly, aside from Geography, SPACE workshop instructors have academic origins in other social science disciplines (e.g., John Weeks, coordinator for the workshop at SDSU, is a Demographer; Stuart Sweeney, coordinator for the workshop at UCSB, holds degrees in Urban and Regional Planning; and Fiona Goodchild, the Educational Development Coordinator for SPACE, has degrees in History, Education, and Psychology). Most of the featured guest lecturers came from outside of the discipline of geography -- anthropology, economics, environmental studies, health studies, and sociology. Workshop participants from this broad range of social science disciplines are expected to use the workshop experience to engage actively in exposing their students to the importance of spatial thinking in tackling a wide variety of social science problems. Spatially integrated social science (SISS) derives its principles and practices from the integration of spatial analytical methods with the theories and thematic problems of the social sciences (Goodchild and Janelle, editors, 2004. *Spatially Integrated Social Science*, Oxford University Press). SISS is based on the premise that a wide variety of social processes and problems are more clearly understood through the mapping of phenomena and the analysis of spatial patterns. The locational properties of information are often obscured in tabular formats that are traditional to most social sciences. Maps permit the visualization of this information to reveal patterns and trends not easily seen in a table. Spatial association, regional differentiation, diffusion, spatial interaction, and pattern detection are key concepts of spatial thinking. Through applications of analytical cartography, spatial statistics, spatial econometrics, and geographic information systems (GIS), these concepts facilitate the integration of theory with empirical analyses and aid both the interpretation of research findings and the presentation of research results. The integration perspective of SISS focuses on location as a natural basis for ordering and combining diverse information sources and for seeing the resolution of social science problems as fundamentally multi-discipline in character. For example, GIS and other spatial tools can facilitate an integration of perspectives from several disciplines (e.g., anthropology, economics, geography, political science, and sociology) to help understand social processes such as economic globalization or gentrification. Confining investigations of such issues to the realm of one discipline fails to capture the complexity of processes and interactions across geographic scales. Some examples follow:

- maps of environmental quality and human health can be overlaid to examine correlations that may suggest clues for further research.
- the territorial division of cities, based on ethnicity, demographic processes and social class, can be analyzed spatially as a key driver of social changes and as a basis for assessing social needs.
- public health researchers are concerned with contagion effects in the spread of diseases.
- changes in public opinion may reflect social diffusion processes that underlie spatial patterns of political movements, shifts in value systems, and changing norms of human behavior.
- cartographic visualization of these processes through animated maps represents one method to depict temporal patterns in the geographic spread of such phenomena.
- the analysis and modeling of spatial flows is an important focus for resolving problems in transportation studies, in explaining trade patterns in relationship to regional development issues, and in understanding demographic changes that alter the demand for social services.
- physical arrangement and clustering of phenomena are keys to pattern detection û for identifying the patterns of crime occurrences in cities and in being able to discern whether such patterns arise by chance or through some underlying associations of social and economic conditions that occur within regions and their surrounding areas.

Imparting these ideas and skills to undergraduates will yield significant benefits to their further education and to the knowledge that they will bring to their post-university careers.

Contributions to Other Disciplines:
Several workshop participants (approximately 25 percent) were from disciplines that apply social science perspectives in their study areas -- public policy and management, environmental policy studies, tourism and recreational resource management, and urban and regional planning. Our investigations indicate that these are areas that are making significant strides in recent applications of spatial methodologies in research. However, instructional uses of GIS and spatial statistics are only recently making their way into curricula. The SPACE program offers focused exposure to both the methods of analysis and the instructional issues that must be understood to introduce these powerful tools within the university curricula of these more applied areas of the social sciences.

Contributions to Human Resource Development:
The dissemination of spatial technologies among undergraduates has the potential to enhance the conceptualizing of problems by students in several social science disciplines, providing them with new tools to explore and process information for use in studying societal and environmental issues. Since many of the participants in the SPACE workshops are from applied disciplines (such as urban planning, criminology, and health studies), it is anticipated that the spatial conceptualization and analysis of problems will become more widely distributed skills in the workforce. Many of the participants indicated their intention to engage undergraduate students in group projects that would require the teamwork and experience with spatial analytic tools that is increasingly important for many jobs (in business, policing, investment assessment, etc.). The concepts and skills imparted by SPACE workshop participants to their undergraduate students will intensify the diffusion into an even greater variety of work and study environments in the years to come.

Contributions to Resources for Research and Education:
Since SPACE is focused on the national dissemination of existing spatial technologies within undergraduate social science education, it has also engaged in consolidating resources at www.csiss.org/SPACE to make it easier for busy educators to access information resources that they might find difficult to uncover on their own. For example, in establishing a collection of discipline-based syllabi from educators who teach spatial analysis, instructors who are contemplating the adopting of spatial components in their courses have a place to turn to for ideas. SPACE has also opened communication with commercial vendors to help facilitate access to GIS software by instructors and institutions that have not yet moved in this direction.

On the research front, the data collected via application forms and entry / exit / follow-up surveys will provide a rich set of resources for analyses on the pedagogic value of different approaches in structuring workshop programs and on their relative value in achieving national dissemination. At this point, the data are being used only for administering and evaluating the SPACE program. It will be necessary for the principal investigators to secure approval for research using human subjects in order to proceed with research investigations. This is currently under consideration.

Contributions Beyond Science and Engineering:
Citizen groups increasingly use spatial technologies, such as GIS, GPS, and remote sensing. The emergence of a movement referred to as Public Participation GIS (PPGIS) demonstrates the perceived power associated with being spatially informed in how one characterizes and resolves societal issues. By seeking the dissemination of spatial analytic methods among undergraduate students in a wide range of disciplines, the SPACE project helps indirectly to foster a more deeply informed use of these technologies. Spatial understanding is fraught with problems regarding scale, with alternative methods for the aggregation of data, and with difficulties in interpretation of spatial analytic results. Exposure to these concerns at the undergraduate level and from the perspective of the underlying theories of different disciplines will in the long run enhance significantly the spatial literacy of citizen groups and policy makers.

NSF Division of Undergraduate Education (supplement to report)

NOTE: The NSF Division of Undergraduate Education seeks a supplemental report on pedagogic goals. Responses were automatically transferred from the Activities and Findings section of the general NSF report. In some cases (below), I changed these responses to reflect more clearly the specific headings of the supplemental form (e.g., Updated Project Description and Innovations or Unique Successes to Date). dj

Project Goal(s):

- Facilitate undergraduate faculty development in spatial social science
- Expand curricula resources in spatial social science
- Provide follow-through professional development
- Achieve diversity in access to educational opportunities
- Establish and encourage support networks
- Foster technology integration in undergraduate education
- Promote discipline integration
- National dissemination

Updated Project Description:

No major changes were requested. The UCGIS workshop in 2005 will be held at a host institution to be selected by UCGIS at its Fall 2004 Executive Meeting. The SPACE PI will work directly with the host institution to help with the implementation of SPACE workshop goals. The workshop PI from the UCGIS institution will participate in the December 2004 planning meeting in Santa Barbara and this will be an occasion to review fully the experience of the past year in planning for summer 2005 offerings.

Innovations or Unique Successes to Date:

The SPACE program effectively recruited young faculty from a range of social science disciplines. The application pool was impressive and diverse, especially in terms of the range of institutions that were represented. Not only were these faculty interested in learning more about spatial analysis and technology, but they were active in exploring how to integrate this approach into their undergraduate courses. Several comments on the final surveys indicated that the SPACE program provides a unique opportunity for faculty to compare notes and resources that will improve their credibility and potential to make innovations at their home institutions.

Curricular Target(s) of Project:

SPACE has a specific goal to assist faculty in using new approaches to spatial analysis, including databases and software packages. Each of the summer workshops provided outstanding facilities and instruction that enabled the participants to the get hands-on experience that is critical in terms of preparing them to be innovative teachers.

At the end of the summer sessions, each participant made a presentation that reflected their current interest in engaging students in new exercises and projects. Some of these were better developed than others in terms of providing specific examples. Most of them indicated that they had gained confidence in being able to introduce GIS and GeoDa to their undergraduates.

Discipline(s) Affected by Project:

Participants from year one have come from:
-Anthropology
-Archaeology
-Business management
-Communication studies
-Criminology
-Demography

-Economics
-Geography (physical and human)
-Health studies
-History
-Public policy and management
-Regional science
-Sociology
-Tourism and recreation management
-Urban and regional planning
-Urban studies

Subject(s) Affected by Project:

Participants were interested in teaching spatial concepts in relationship to a broad base of subjects. Examples include:
- Poverty and inequality
- Immigration policy
- Environmental justice
- Globalization
- Urban gentrification
- Social and ethnic segregation
- etc.

Title(s) of Course(s) Affected by Project:

For the workshop entry surveys, participants were asked to list the courses that they taught over the past two years and to identify the courses that they are considering for inclusion of spatial analytic approaches. Given the diversity of the disciplines and subjects noted in the last two sections, the subjects are correspondingly varied. They include applied courses in crime pattern detection and in urban planning, quantitative methodology courses associated with a range of disciplines, and courses in social science theory.

Summary Description of Pedagogical Approaches:

This first year we presented several sessions during the summer workshops that encouraged the participants to focus on their objectives for student learning. We also varied the pedagogy of the summer workshops to illustrate the value of difference types of instruction, using small group discussion, individual laboratory assignments and lectures to achieve a variety of goals. It was clear that a few participants had experience in designing curricula that matched the content ideas with the assessment of student performance. However, many of the participants had not adopted this approach before, and several of them expressed interest in pursuing this aspect more extensively. This topic will be on the agenda for the upcoming SPACE Planning Meeting in December, since we plan to offer more concentrated emphasis on student learning objectives in the undergraduate curriculum in the 2005 summer workshops.

Additional Sources of Funding:

The SPACE project has made use of resources created from NSF funding of the Center for Spatially Integrated Social Science (BCS 9978058)-- including GeoDa and FlowMapper (software created for exploratory spatial data analysis and for mapping data from interaction matrices). These packages are provided to the participants of the SPACE workshops and are featured in the workshops. In addition, learning resources (*CSISS Classics* and *the GIS Cookbook*) are cross-listed on the SPACE website.

Report submitted to the National Science Foundation
Donald G. Janelle
14 October 2004