Spatial Perspectives on Analysis for Curriculum Enhancement

Program

***SPACE*, a consortium** of the University of California, Santa Barbara, The Ohio State University, and the University Consortium for Geographic Information Science, was funded by the National Science Foundation (CCLI-ND, NSF-DUE 0231263; Oct 2003 – Sept 2007).

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- Education Development Coordinator: Fiona Goodchild

SPACE focused on Professional Development Workshops for undergraduate social science instructors to provide basic training in GIS and spatial analysis; access to the latest techniques, software, and learning resources; and guidance on teaching approaches and learning assessment.

To leverage these workshops, *SPACE* provided participants with awards for curriculum development and support for developing special sessions and short workshops at the annual conferences of academic associations.

SPACE Program Goals:

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

Technical Themes for Workshops:

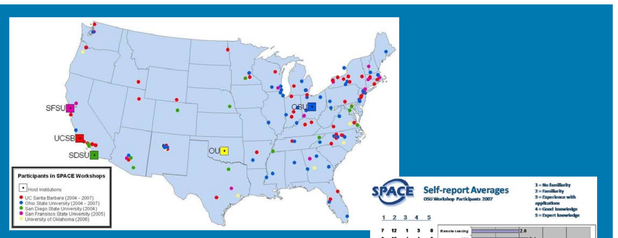
- Geographic Information Systems (GIS)
- Spatial Pattern Analysis
- Spatial Econometrics
- Map Making and Cartographic Visualization
- Spatial Interaction Modeling
- Place-Based Search Methodologies
- Applications in the Social Sciences

http://www.csiss.org/*SPACE* provides access to lab exercises, vignettes on spatial analysis in the social sciences, examples of syllabi from social science disciplines, and guides to assessment instruments. It features descriptions of eleven week-long workshops, more than a dozen conference sessions, and summaries of projects by workshop participants.

Participants

Workshop Participants:

The 218 workshop participants came from 143 different institutions of higher learning in the United States and a dozen universities elsewhere in North America, South America, Asia, and Europe. Nearly 20 percent of all participants were instructors at designated minority-serving institutions.



Disciplines:	Applicants	Participants
Anthropology	19	12
Archaeology	14	11
Art & Design	1	1
Communications	1	1
Computer Science	2	0
Criminology	9	7
Demography	8	6
Economics	24	17
Education	2	2
Enviornmental Studies	30	14
GIS	75	27
Geography	48	33
History	7	4
Political Science	24	17
Psychology	2	0
Public Health	11	9
Public Policy/Manage	3	1
Regional Science	6	4
Religious Studies	1	1
Sociology	46	33
Statistics	3	2
Tourism Planning	2	2
Urban/RegionPlan	25	10
Urban Studies	13	4
Other	2	0
Total:	**378**	**218**
Gender/Minorities:		
Female	166	113
Male	212	105
Designated Minorities	59	43

Completion:	Number	Percentage of Participants
-workshop	216	99
-entrysurvey	217	99.5
-exitsurvey	202	93

Workshops

Graphic Syllabus for 2007 UCSB Workshop includes five columns (time arrows) on the sequence of activities over six days; from left to right:

(1) general logistics
(2) linking spatial theory and analysis with social science perspectives
(3) alignment of theory and analysis skills with pedagogic needs and assessment of student learning
(4) structured labs for the development of technical skills
(5) preparation of individual projects for presentation on the final day

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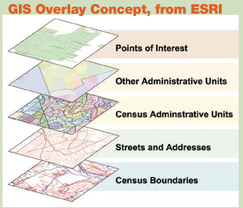
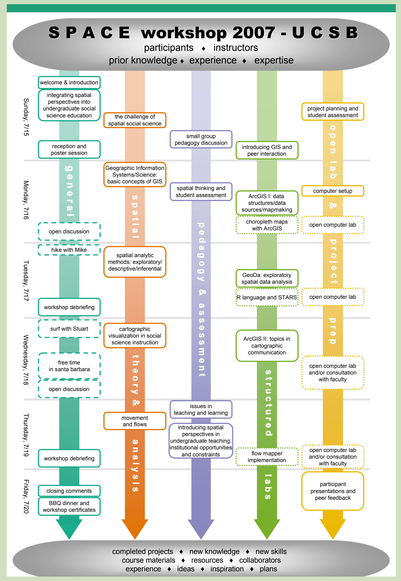
GIS Overlay Concept, from ESRI





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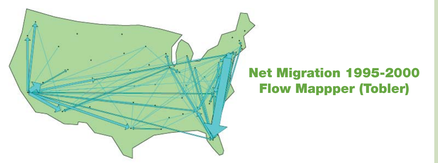

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Selected Titles from Final Project Presentations

- A Curriculum Sequence for Landscape Analysis & Planning
- Demonstration of Spatial Auto-Correlation
- Developing an Undergraduate Course in the Spatial Analysis of Crime
- Incorporating Spatial Analysis Options in Economic Geography
- Infusing Basic Spatial Thinking through Exercises and a Final Student Project
- Integrating Geospatial Technologies into the Arts & Sciences
- Integrating Sociological Research Using Spatial Concepts in Sociology
- Introducing the Spatial Perspective into Research Methods Courses
- Introductory Course Outline on Spatial Analysis Using GIS
- Minds on GIS: Encouraging Spatial Thinking in an Introductory GIS Lab
- Photo Interpretation and Remote Sensing for Archaeology Students

Results

Average Values from Entry and Exit Surveys for Participants in 2006 Workshops

What Did Participants Perceive as Barriers and Expect as Outcomes for Teaching Spatial Analysis?		How Did Participants Rate the Workshops?	
ENTRY[1]		**EXIT**[2]	
Barriers:			**Removed Barriers:**
Pedagogical Knowledge	2.62	3.32	Knowledge
GIS Experience	2.38	3.67	GIS
Data Access	2.18	3.46	Data Access
Software Access	2.05	3.68	Software Use
Technical Support	2.45	3.42	Spatial Teaching
Workshop Expectations:			**Met Expectations:**
Spatial Statistics	3.45	3.39	Spatial Statistics
Data Visualization	3.48	3.46	Data Visualization
GIS Software Use	3.15	3.52	GIS
Data for Classes	3.48	3.50	Data for Classes
Discuss:			**Gained Ideas:**
Learning Assessment	3.30	3.56	about Student Learning
—		3.24	Assess Student Learning
Strategies for Teaching	3.15	3.63	Spatial Methods for Teaching
—		3.29	Pedagogical Strategies
Curricula/Class Activities	3.63	3.76	Develop Curricula
Student Projects	3.25	3.61	Student Projects
Learn:			**Expanded Knowledge:**
Spatial Analysis Tools	3.40	3.71	Spatial Tools
Data Visualization Theory	3.08	3.33	Theory of Data Visualization
Answers to Problems in Spatial Analysis	2.67	3.38	Problems in Spatial Analysis
Pedagogical Strategies	3.48	3.49	Strategies to Help Students

[1] 1 = not an obstacle at all / not important; 4 = very significant obstacle / very important
[2] 1 = did not help at all / of no value; 4 = helped significantly / exceeded expectations

Impact of Workshops on Participants

Average value on scale of 1 to 5 for 134 respondents to the follow-up surveys, conducted one year after each of the 2004, 2005, 2006, and 2007 workshops

1 = No Impact, 2 = Very Little Impact, 3 = Some Impact, 4 = Moderate Impact, 5 = Strong Impact

	2004	2005	2006	2007	% indicating 'moderate' to 'strong' impact of *SPACE*
Gained and implemented **new ideas for content in undergraduate courses**	4.1	4.1	4.2	4.1	80
Developed **new labs and exercises** for undergraduate courses	3.8	3.9	4.0	4.0	72
Introduced **new course(s)** that include student learning about spatial analysis	3.2	3.1	3.4	3.6	53
Developed plans for **new course modules** that will engage undergrads in spatial analysis theory and/or techniques	3.9	3.8	4.1	4.1	72
Initiated **assessment of student ability/learning** in use spatial analysis	3.1	3.3	3.3	3.3	43
Held **discussion(s) with teaching colleagues** about new resources for teaching spatial analysis	4.1	3.8	4.1	4.0	78
Made **formal presentation(s) to teaching colleagues** about new resources for teaching spatial analysis	3.4	2.4	3.4	3.0	41
Have **plans to make presentations about *SPACE*** at professional meetings	2.8	2.3	3.1	2.5	33
Have **already made presentations about *SPACE*** at professional meetings	2.1	1.5	2.3	2.1	18
Overall Workshop Experience 1= unsuccessful, 2= a little successful, 3= moderately successful, 4 = successful, 5 = very successful	4.3	4.2	4.5	4.5	**% indicating workshop 'successful' to very successful'** 90

Summary

The *SPACE* program achieved its mission for promoting the dissemination of spatial technologies to enhance undergraduate education in the social sciences.

- A focus on **diversity** resulted in representation of participants across gender, ethnicity, and race from all regions of the United States.
- More than 70 participants from more than a dozen disciplines reported on the role of *SPACE* in their introduction of **new courses** on spatial analysis and spatial thinking.
- Nearly a hundred participants cited *SPACE* workshops as instrumental in their introduction of **new course exercises and teaching modules**.
- The workshops, in general, **exceeded participant expectations** in removing barriers to applications of spatial technologies in teaching, in expanding participant knowledge about uses of tools for spatial analysis, and in introducing strategies for successful teaching.
- More than 100 participants reported on actively **sharing their workshop experience with colleagues** at their own institutions and with colleagues at conferences.

Poster prepared by Donald G. Janelle, PI for *SPACE*, for presentation at the **2008 Course Curriculum and Laboratory Improvement (CCLI) PI Conference** in Washington, D.C., August 13-15, 2008. Conference sponsored by the National Science Foundation (NSF) Division of Undergraduate Education (DUE) and the American Association for the Advancement of Science (AAAS). Appreciation and credit to Stacy Rebich-Hespanha (graphic syllabus), Jake Sopher (participant map), Natalie Wong (poster design).