

Digital Geography: Geospatial Technologies in the Social Studies Classroom

Edited by Andrew J. Milson and Marsha Alibrandi

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Digital Geography, like the computer technology it assesses, boots up slowly before becoming a powerful resource. The opening chapter, Marsha Alibrandi and Thomas Baker's "social history" of GIS (geographic information systems) education, is all too social. The reader must wade through a bog of chatty self-congratulation inundated by no fewer than forty different acronyms to find valuable material; for example, the authors' application of GIS to National Council for the Social Studies standards. With subsequent chapters, however, Alibrandi and Andrew J. Milson organize a coherent volume around a clear mission. The editors and contributors, many of whom are leading members of the "international geospatial education community" described by Joseph J. Kerski in chapter 3, "share a sense of urgency that spatial literacy and skills need to be acquired by society as soon as possible, if the society is going to make it to the other side of the 21st century in a sustainable, healthy, and growing way" (66). Their collective urgency is in response to the underutilization of the digital hardware and software that comprise geospatial technology (GST) in K-12 education. Contributors offer explanations for GST's slow adoption in schools, suggest solutions to increase and improve education with GST, and present GST-based learning resources.

The authors concur on the intertwined obstacles that discourage educators from adopting GST. Sarah Witham Bednarz and Robert S. Bednarz make a convincing case in their chapter, "Spatial Thinking: The Key to Success in Using Geospatial Technologies in the Social Studies Classroom," that the most fundamental barrier to GST diffusion is teachers' unfamiliarity with core spatial concepts. While easily overlooked in our enthusiasm for introducing innovations, content knowledge precedes pedagogy and educational technology. Unfortunately, "spatial thinking," the intellectual skill set required to solve problems with spatial concepts, is not integrated into the K-12 curriculum. Other contributors share the Bednarzs' frustration with GST's omission from the educational standards demanded by assessment and accreditation. Milson and Jennifer A. Roberts cover this issue carefully in "The Status of Geospatial Technologies in U.S. High School Geography Standards." Their research demonstrates that GST's absence from most states' standards is a significant barrier to GST adoption.

Technical difficulties also postpone progress. In "Diffusion of Innovations Theory: Framing IT and GIS Adoption," Shannon White points out that much GIS software still requires computer hardware beyond the

purchasing power of many schools. Furthermore, GIS software comes with its own implementation issues. Daniel C. Edelson, David A. Smith, and Matthew Brown, in their chapter on the Geographic Data in Education Initiative at Northwestern University, remind us that teachers and students are put off by leading programs like ESRI's *ArcMap* that are designed for commercial users and have steep learning curves. A chorus of authors, including Aaron Doering, George Veletsianos, and Cassandra Scharber in "Coming of Age: Research and Pedagogy on Geospatial Technologies within K-12 Education," chime in that constraints on teachers' time, training opportunities, and institutional support increase GST's impracticality in the K-12 classroom.

In the face of these barriers, the editors dedicate half the volume to chapters which recommend how to hasten GST's acceptance and enhance GST instruction. To encourage educators to teach spatial thinking, the Bednarzs and Eui-Kyung Shin, author of "Examining the Teacher's Role when Teaching with GIS," emphasize that teachers need persistent and structured assistance. The Bednarzs offer a remarkable model for teacher training: their National Science Foundation project, "Advancing Geospatial Skills in Science and Social Science," which enrolls teachers in a two-year program that imparts spatial thinking and GST pedagogy.

Transmission of content depends on understanding spatial learning and on proper pedagogy. Two literature reviews articulate these relationships. Rick Bunch, Elisabeth Nelson, Robert Lloyd, Michael Kane, and Thomas Tricot review educational psychology research and stress the importance of integrating findings on spatial cognition into GST pedagogy in "Instructional Geographic Information Science: A Multi-Disciplinary Framework for Geospatial Technologies in Education." Doering, Veletsianos, and Scharber survey current research on GST teaching methods and find it wanting. They recommend four frameworks for GST pedagogy that incorporate their view that GST learning should be "self-created, self-relevant, self-structured, and authentic" (223).

Jumping scales from the classroom to the curriculum committee, standards must be amended to include GST. While Milson and Roberts discover that twenty-nine states' high school standards omit GIS, GPS (global positioning systems), spatial analysis, and geography itself, five states—Colorado, Indiana, Minnesota, New York, and Texas—require that all of these elements of GST are taught. These successes will inform the efforts

of the geospatial education community in noncompliant states.

Complementing these matters of general concern are presentations of three excellent learning resources customized for K–12 GST education that link content, pedagogy, and standards. Edelson, Smith, and Brown report on the development of *My World GIS*, a GIS tailored for the K–12 classroom that facilitates student-directed learning. *MapStats for Kids*, described in "Geospatial Online Learning Activities for Middle School Students" by Sven Fuhrmann, Alan M. MacEachren, Mark Gohegan, and Roger Downs, is an application created by Penn State's GeoVISTA Center that also engages students in constructivism and connects GST to curriculum standards. Josh Radinsky, in "GIS for History," demonstrates how his Web site of the same name realizes GIS's potential to lead students in authentic historical inquiry. These three articles, along with David R. Green and Joanna Mouatt's chapter discussing Google Earth's usefulness for leading virtual field trips, Joseph J. Kerski's "The World at the Student's Fingertips: Internet-Based GIS Education Opportunities," and James Merchant's (2007) recent special edition of the *Journal of Geography*, "Using Geospatial Data in Geographic

Education," map the online treasures available for GST educators.

For those in GST education, *Digital Geography* is a practical and principled guide. Not only does the volume include useful reviews of accessible GST resources, it also includes thoughtful and thorough discussion of the pedagogical challenges specific to GST. Indeed, it should be required reading in methods courses in geographic education. For geographic educators whose expertise is not in GST, the book is an excellent survey of core issues. Finally, for the discipline, this collection is an insistent assertion of GST's centrality to the future of geography in K–12 education.

REFERENCE

Merchant, J., ed. 2007. Using geospatial data in geographic education. Special issue. *Journal of Geography* 106(6).

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