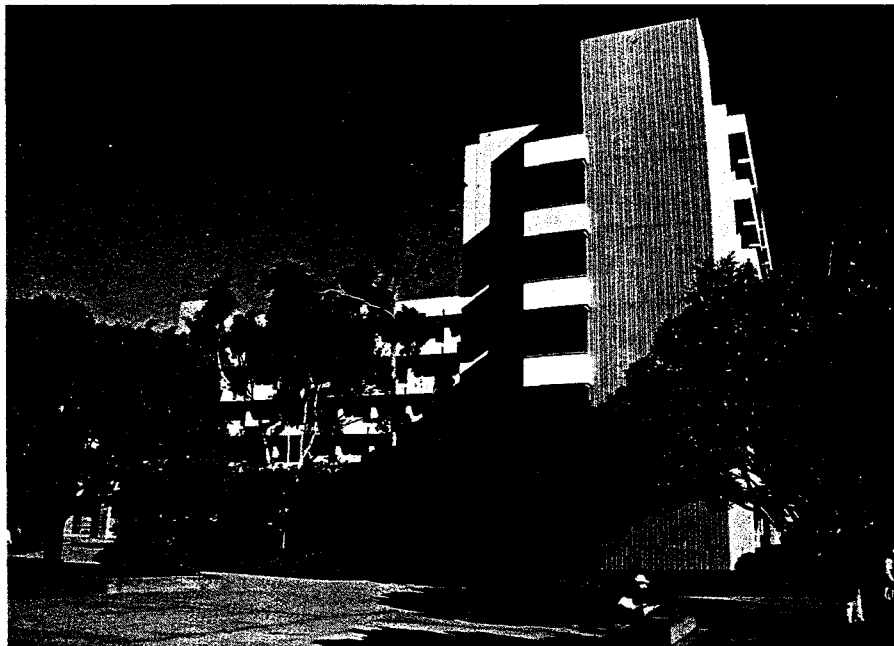


GIS Education and NCGIA

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and Analysis



This article discusses the National Center for Geographic Information and Analysis' *Core Curriculum*, geographic information system (GIS) education in general, and the introduction of GIS instruction at the high school level.

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The National Center for Geographic Information and Analysis (NCGIA) was established at the University of California, Santa Barbara; the State University of New York at Buffalo; and the University of Maine in August 1988. Its primary source of funding is the National Science Foundation (NSF), which solicited bids for the center in late 1987 and provides \$1.1 million per year under a cooperative agreement running until 1993. The center's primary mission is to conduct "basic research in geographical analysis utilizing GIS" (NSF, 1987).

One of the center's subsidiary missions is educational: specifically, to "advance the nation's supply of experts in GIS." In its original proposal, the three-university consortium argued that this mission could best be accomplished, at least initially, by developing teaching materials. The *Core Curriculum in GIS*, developed by NCGIA with international cooperation and published in 1990 (Goodchild and Kemp, 1990), provides lecture notes, handouts, slides, refer-

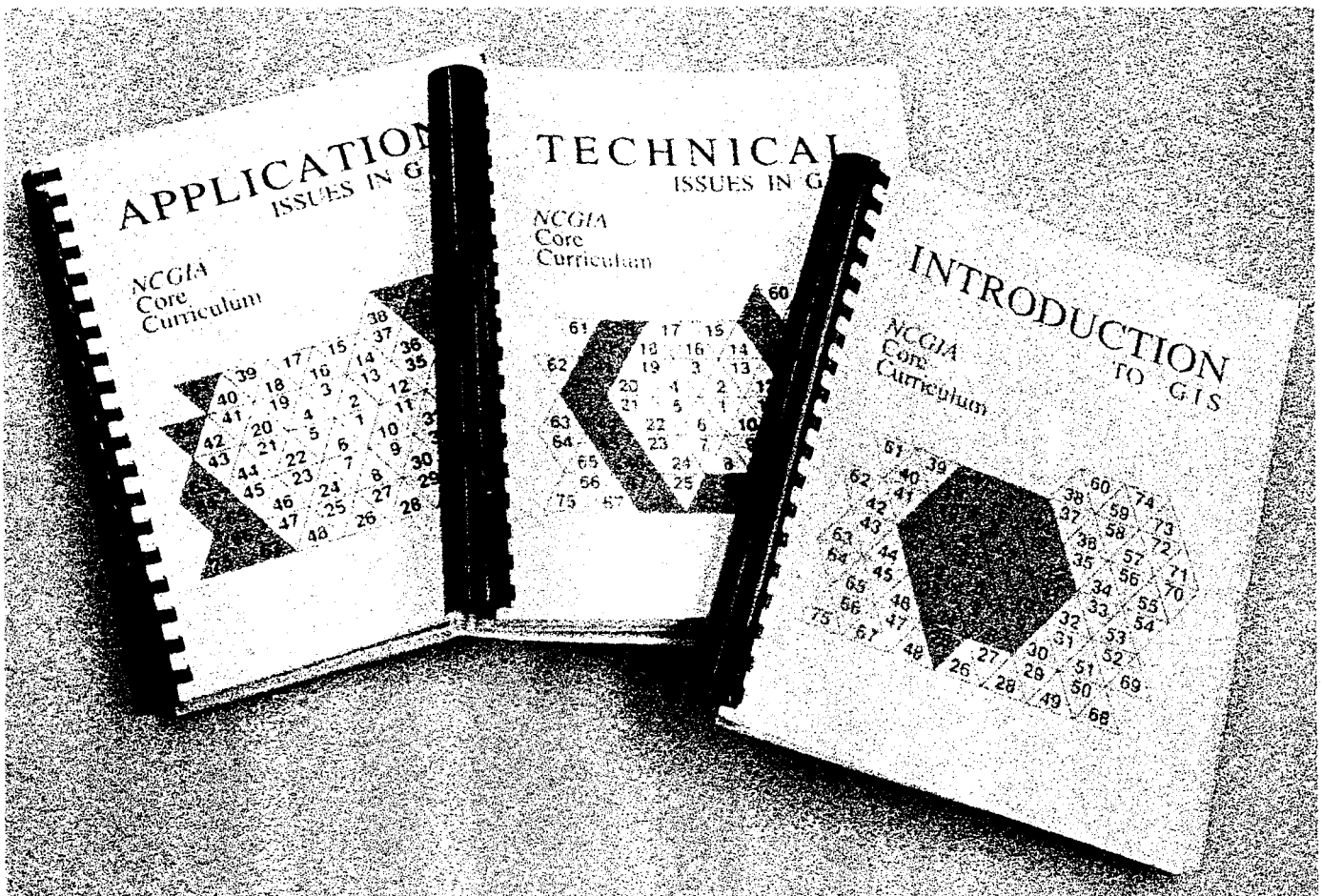
ences, and discussion questions for a series of 75 one-hour units. The units are grouped into modules in specific areas and into three 25-unit courses. The materials are intended to be adapted or used selectively as a basis for a course sequence at senior undergraduate or graduate levels.

Since July 1990, more than 750 copies of the curriculum have been distributed to more than 50 countries. Sixty percent of the copies have been sent to academic institutions; the remainder were sent to government agencies, software vendors, and consultants. Of the copies sent to academia, approximately 40 percent have gone to university departments of geography. The curriculum seems to fill a useful niche in a field that is still poorly supplied with textbooks and in which staff assigned to teach GIS courses often have difficulty finding adequate sources of material.

Outside North America, distribution of the *Core Curriculum* is affected by the difficulties experienced in many countries in acquiring hard currency, by language problems, and by the North American bias in the materials. Several efforts are under way to translate the curriculum, and agreements have been signed with several groups for editing, translation, and local distribution within specific countries. The curriculum will be distributed in Estonia, Hungary, Morocco, and Yugoslavia; it will be distributed in translation in China, Czechoslovakia, Japan, Korea, and Spain. Efforts are under way to obtain a Russian distributor and translation, and some discussions have taken place about an Arabic-language version. An electronic list server (mail facility) has been set up to allow users of the curriculum to send messages to other users, and workshops and discussions have been held at many conferences during the past two years.

RECENT ACTIVITIES AT NCGIA

Practical sessions are an almost essential part of GIS education, but setting up and operating a GIS lab is a costly and difficult challenge. Questions that arise when considering such a venture include where will funding come from, who will pay for continuing maintenance, how many workstations are needed for a given number of students, and what software is most suitable? To try to provide a source of useful advice on these issues, the center sponsored six case studies of recently estab-



lished or enlarged lab facilities: five in the United States and one in Canada (Palladino and Kemp, 1991). The results, published in the fall of 1991, provide interesting reading and a wealth of detail about successes and potential pitfalls. The report presents a broad spectrum of solutions — from small to large, modest to expensive, and simple to complex — and includes many different hardware configurations.

At Santa Barbara, the *Core Curriculum* is taught as a three-course sequence in the upper undergraduate division within the Department of Geography and is supported by lab facilities using both PCs and UNIX workstations. The lab materials developed to support the first two courses, "Introduction to GIS" and "Technical Issues in GIS," have been published as center reports (Dodson, 1991; Veregin, 1991) with the associated data sets. Additionally, the first edition of a directory of sources for lab materials was published in fall 1991; it includes entries from many other universities, as well as pointers to educational materials developed by software vendors (Dod-

son, Kemp, and Palladino, 1991). We hope to publish more extensive editions of the directory in the future and welcome information on potential entries.

may no longer be appropriate to limit exposure to GIS to the university or college level.

GIS IN HIGH SCHOOLS

The junior and senior undergraduate years may be the appropriate place to introduce students to the fundamental concepts of GIS and to current software because of the field's complexity and the need for stu-

dents to have adequate background information. But GIS is becoming increasingly widespread in the workplace and is touching our lives in more and more ways. That situation suggests that it may no longer be appropriate to limit exposure to GIS to the university or college level, but it also raises interesting questions: what aspects of GIS can be presented appropriately at the high school level and with what educational objectives? Is GIS ready to move down the educational hierarchy in this way, and how can such movement be achieved within the educational system? NCGIA is interested in pursuing those questions and in working with any other groups having similar interests.

Four substantive reasons support the idea of introducing GIS in high schools.

- GIS is an increasingly important technology in the workplace, particularly in local government, and high school students could benefit from familiarity with it and from seeing its value for managing and analyzing people's daily activities.
- GIS is an increasingly essential tool for



environmental analysis and decision making, and students should be exposed to it as part of an environmental program.

- GIS is a way of motivating students' interest in geography, thus contributing to the improvement of geographic education in the United States.

- GIS is an attractive application of high technology that is capable of motivating students toward careers in science and engineering.

Although many GIS researchers are also university educators who are familiar with the design of university courses, any effort to develop course materials or GIS curricula at the high school level will depend on joint efforts between the GIS community and high school teachers. What kinds of materials are most useful, what hardware is most often available, and how can course units on GIS be fitted into existing curricula?

To begin to address some of those issues, the center is proposing a series of workshops and continuing links with high school teachers beginning in summer

1992. Readers who are interested in this area are invited to contact Steve Palladino, NCGIA, 3510 Phelps Hall, University of California, Santa Barbara, CA 93106, phone (805) 893-8652, fax (805) 893-8617, email spalladi@ncgia.ucsb.edu.

Further information about center activities can be obtained by contacting the center at any of its three sites. The publications office is located at 3510 Phelps Hall, University of California, Santa Barbara, CA 93106, phone (805) 893-8224, fax (805) 893-8617, email ncgia@ncgia.ucsb.edu. For users of the Internet electronic network, center publications can be obtained using anonymous file transfer protocol (ftp) from ncgia.ucsb.edu.

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