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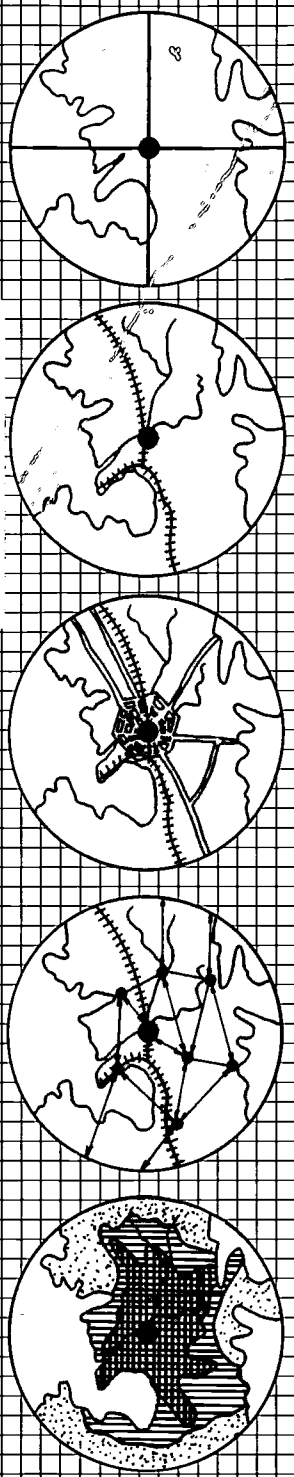
ABSTRACT

This manual is designed as a resource guide for preservice and classroom teachers with an interest in geographic education. The chapters cover a variety of topics including the most recent developments in geographic education. Each chapter offers suggestions and ideas that can be included in general geography/social studies methods courses or in-service seminars for practicing classroom teachers. Most chapters contain practical classroom examples to assist in the implementation of the concepts and are written for students of varying competencies, behaviors, and ethnic and cultural origins. The 13 chapters include: (1) "The Nature of Geography" (Salvatore J. Natoli); (2) "Geography for Life: World Class Standards for All Students" (James Marran); (3) "Setting Objectives for Lesson and Unit Planning" (Joseph Stoltman); (4) "Ideas and Teaching Strategies for the 1990's" (Cathy Riggs-Salter); (5) "Teaching Geography Skills" (R. S. Bednarz; S. W. Bednarz); (6) "So, You Want to Read a Landscape" (C. L. Salter); (7) "Using Maps in the Classroom" (Carol Gershmel); (8) "Teaching Geography with Technology" (Charlie Fitzpatrick); (9) "Authentic Assessment of Student Achievement" (Marianne Kenney); (10) "Teaching Geography in a Pluralistic Society" (Rickie Sanders); (11) "Resources for Geographic Education" (Joan P. Juliette); (12) "The Scope of Physical Geography" (Michal LeVasseur; R. S. Bednarz); and (13) "Putting Geography to Work: Leading Students Down Career Paths" (R. Denise Boehm; Richard G. Boehm). (EH)



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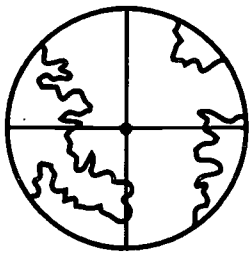

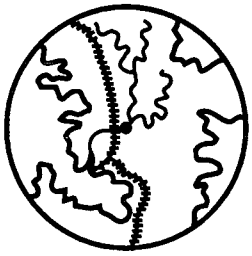

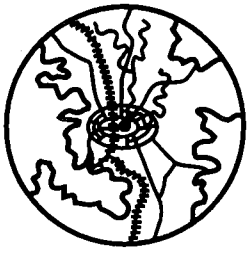

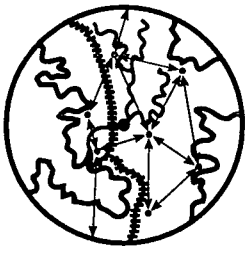

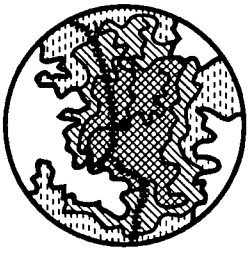

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Contents

Introduction

This manual is designed as a resource guide for pre-service and classroom teachers who have an interest in geographic education. The chapters cover a variety of topics ranging from the nature of geography to the methodologies of geographic education and career opportunities available to those who wish to continue in the field.

Included are the most recent developments in geographic education such as - the five themes, the national standards, technology, and authentic assessment strategies. Each chapter offers suggestions and ideas that can be included in general geography/social studies methods courses or in in-service seminars for practicing classroom teachers. The manual is designed for those in the classroom to better understand some of the methods and approaches that will assist in making geography teaching and learning more meaningful and exciting for students.

Most chapters contain practical classroom examples that will assist in the implementation of the concepts described in the text. These examples are designed to meet the needs of pupils of varying competencies, behaviors and ethnic and cultural origins.

Due to the restriction on the length of each chapter, only an introduction to the basic ideas could be provided. Readers are encouraged to delve further into the various topics by pursuing material listed in the references for each chapter.

Walter G. Kemball
Editor

1. The Nature of Geography

Salvatore J. Natoli

Abstract: This chapter examines the nature of geography from several viewpoints and many of the ordinary decisions we make about Earth that indicate our propensity for geography. It also explores the common characteristics of geographers' interests, the metaphors they use for reflection, the lenses through which they view Earth in perceiving and accommodating different perspectives that influence our conceptions of geographical reality. It outlines the fundamental interrelated themes, ideas, and scientific methodologies used to investigate geographic problems as well as the significance of cartography for understanding the nature of geographic reality. It provides a rationale for studying geography in the midst of constant change and the disorder that marks the character of Earth. Finally, it appeals to the responsibility implicit in studying geography for participatory citizenship and for becoming stewards of Earth.

Key Words: metaphors, perspectives, scientific methodologies, cartography, discipline, natural hazards, technologies, abstract science, concrete science, theoretical models, place, distance, environments - geographic, operational, perceptual, behavioral; weather, climate, interdependence, migration, spatial perspectives, skills, generalizations, scientific ideal, stewardship.

> *"If you are interested in the earth as the home of human beings and how we appraise, occupy, use and misuse it -*
>
> *If you are curious about where things are on the earth, why they are in those locations, and what are the consequences of their being where they are -*
>
> *If you like to investigate places and areas - what they are like, how they became that way, and how they function in relation to other places or areas -*
>
> *If you love to observe landscapes - their composition and character and how people perceive and change them -*
>
> *If you like to pore over maps, or devise new ones, as keys to all of the above - You are already thinking and acting like a geographer....."* Clarence W. Olmstead (1983)

Many people think and act like geographers but they are unaware that they are doing so. They need some guidelines on the systematic way professional geographers think and work. Effective teaching of geography requires such a systematic approach.

To understand how geographers think and act requires knowledge, skills, and perspectives about the reasons some people have chosen to become geographers. Ask a number of geographers this question and you may receive a variety of responses. Geographers, as humans, share some common characteristics about choosing their profession - satisfying a childhood curiosity about the unknown and the penchant for making sense of the world they see around them. All seem to have had an early fascination about maps - not so much because they wanted to impress others about the information they could obtain from them but because they had gnawing thoughts about why this or that was so, and how they could verify its truth or falsehood (Lowenthal and Bowden 1975, 5).

Consider David's musings about growing up, in Clark Blaise's engaging novel, *Lunar Attractions* (1983, 26-27).

> *"[We grow up] by learning that even implacable principles are in contention. One day the world is fixed forever, without cause, effect, or mitigation ... seasons arrive and depart*

by grace alone. ... Then suddenly spontaneity deserts us. ... We push back the borders of permissible ignorance. ...
As I grew into childhood the atlas became the prime book of my life. [In my mother's 1920 British atlas] 'unexplored regions' on every continent except Europe [were everywhere]."

My infatuation with the field was somewhat similar. I seemed to enjoy the scope of geography, the myriad phenomena encompassed along its permeable boundaries, and the readiness with which its ideas and concepts applied to my life. I could live and work in the past and the present, at home or abroad, in my imagination, in an educational institution, corporation, government agency, library, laboratory, and in splendid solitude. Most of us share one similar aspiration - to satisfy our own unquenchable curiosities and to explain that satisfaction to others about this significant, precious, fragile, and ever-changing world.

Origins of Geography

Geography, like most modern sciences, did not gain identity as a separate discipline until the latter part of the nineteenth century. Its origins as a science, however, reach back into the primitive and classical worlds of every continent. All civilizations and cultures have had geographers, driven by their curiosity about the changing surroundings that affected their lives. Early civilizations, however, perceived a much more circumscribed world than ours.

Our ancient ancestors saw their surroundings as places that would protect them against inhospitable climates, wild animals, and hostile tribes. Simultaneously they revered these places as suppliers of the necessities of life and as asylums from the dangers beyond the hills. From survivors at the mercy of natural hazards they progressed to living from meagre gatherings of plants and animals. Their curiosities and ingenuities eventually fashioned highly-developed civilizations. Through agriculture, animal domestication, clothing, presence or lack of shelters, art and architecture, transportation and irrigation systems, and belief systems, they began to modify their environments, planned for the future, and taught others about their discoveries. Culture and the built environment are the products of their incessant questions about things they did not understand.

As teachers, we must transmit some of these fundamental accomplishments when we introduce others to geography. As a field of study and as an element in the curriculum, geography helps to tell the ever-changing story of how the natural and built environments exert vital influences on every aspect of our lives, just as geography strongly influenced the lives of our ancestors.

At this point you are probably waiting for a definition of geography. Most academic subjects begin with teachers defining their subjects. Definitions, however, seem to be overly facile ways to describe the complexities of disciplines or fields of study, but I would rather ask the reader to discover, while skimming the following pages, to begin to put together some cogent ideas that have helped to describe the discipline we call geography.

Geographical Knowledge

Throughout the centuries, scholars culled the raw facts, speculated about and developed mythologies derived from the lore of ordinary people, and gathered and refined them into the information and knowledge that constitutes modern geography. Today, scholars continue to add and transform the discipline because the world is constantly chang-

ing, yet accessible information and technologies permit us to explore with increasing sophistication and precision the new worlds we encounter each day.

Metaphors for Geography

Geography is both an abstract and concrete science because it uses the facts of the natural and built environments to develop theories and explanations about the spaces on Earth's surface. Our chaotic surroundings demand a search for order. That perceived order becomes the basis for the theoretical models that help geographers to describe and make sense of our surroundings. Many of these models may take the form of metaphors such as the three Peter Haggett (1990, 3-5) uses to explain geography in, *The Geographer's Art*. He uses three mirrors as metaphors for proposing how, "to explore geographical space as Barbara Tuchman explores historical time, with place, rather than period." Then he defines distance as, "a proxy for certain aspects of place itself." *"Distance has two geographic meanings: distance in the lateral sense of the space separating the objects in the mirror in the plane in which they exist, and distance in the vertical sense of the observer's distance from that place. From lateral space come notions of cartography, morphology, and locational analysis; from vertical space come ideas of scale."*

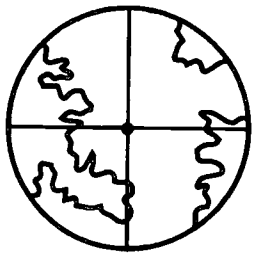
When combined, these reflections become the views for the theoretical concepts that define the field.

Haggett also stresses the metaphorical mirror, "as indicating the remote view geographers take of the world," because of the size of the objects they study. "The image seen in their mirror is not the global reality itself but the symbolic reflection of that reality in which - the image remains an image only" - generally depicted on maps (5).

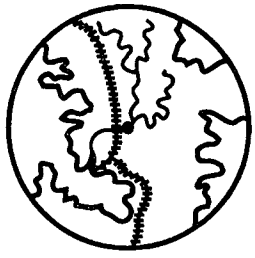
Defining Reflections

Place, distance, and the use of maps are the three defining reflections of geography - all spatially–derived elements. From them we can also concoct the recurring fundamental themes in the environment by which geographers describe and explain the world. Every place in the world has a *location* that influences all manner of physical and cultural phenomena. *Place*, itself, contains the numerous intricate characteristics of a location's environment that help differentiate or distinguish it from other places. These physical and cultural characteristics also interact with each other and with themselves (*relationships within places or human-environmental relationships*). For example, people from different economic classes transact business to produce and distribute goods and services. Weather and climate affect the types of architecture as well as agricultural and transportation systems that develop within and between particular places. The daily weather and long-term climate combine to set in motion forces that wear away or build up the basic landforms on which the architecture, farmer's fields, or roads might rest which must withstand the capricious forces of the atmosphere.

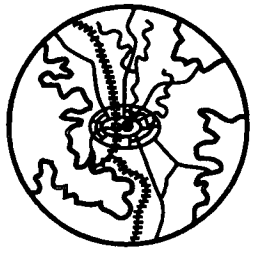
Places do not exist in a spatial vacuum but are related through various movements to other places on Earth. John Donne's aphorism that, "no man is an island entire of itself," indicates the interdependence of people both within and between places. These interdependencies or *relationships between places* create *movements* that occur as a result of cultural developments such as trade and transportation, communications, the spread (diffusion) of ideas, and people (migration) - (*spatial interaction*). The physical environment is also in motion. Ceaseless weather systems, ocean currents and winds, glaciers, and avalanches are examples. Finally the distant mirror reflects the *regions* or convenient areas of study devised by geographers and reduces them to places of manageable proportions. These areas are unified by the physical and cultural elements that make them distinctive from other regions (Joint Committee on Geographic Education 1984, 5-8).



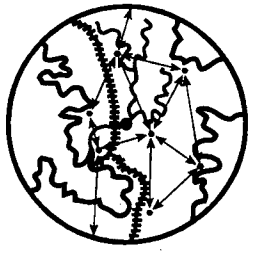
LOCATION:
Position on the Earth's Surface



PLACE:
Physical and Human Characteristics



RELATIONSHIPS WITHIN PLACES:
Humans and Environment



MOVEMENT:
Humans Interacting on Earth

REGIONS:
How They Form and Change

Figure 1. The Fundamental Themes of Geography
from Joint Committee on Geographic Education, Association of American Geographers and National Council for Geographic Education (1984, 3-8)

Multiple Perceptions

Lenses constitute another metaphor through which geographers view the world. Some of these are behavioral as they relate to the environments within which people live. According to Sonnenfeld (1968) people live and work within a nested set of environments.

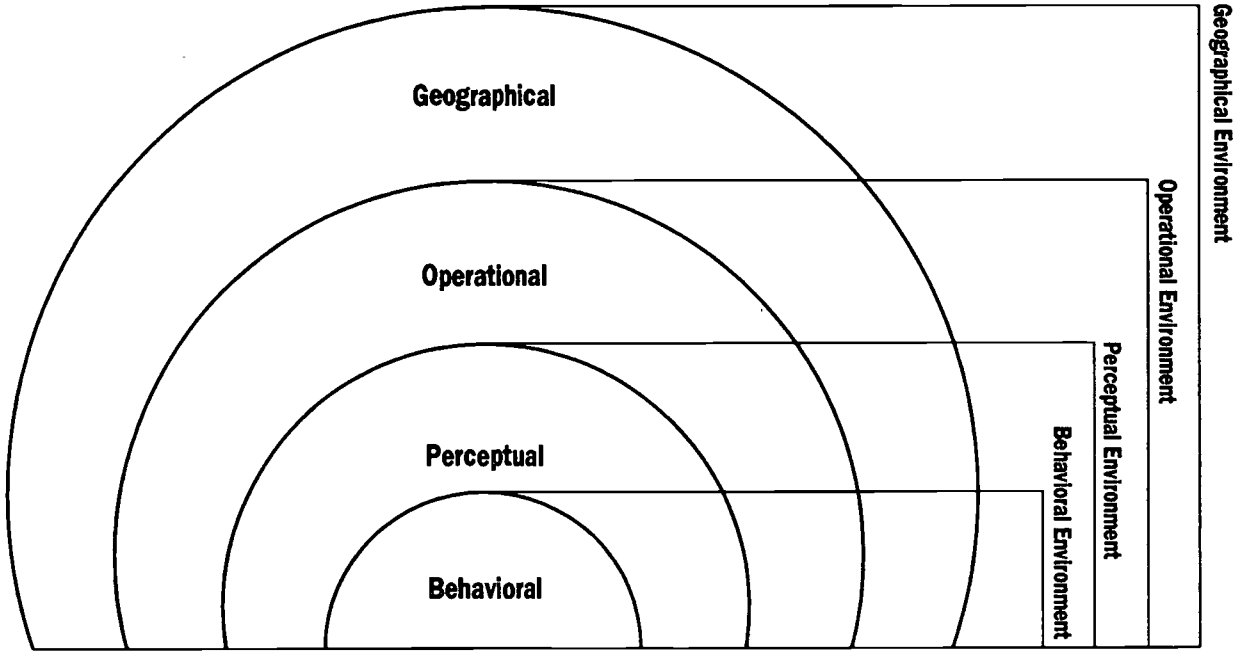


Figure 2. Nested Set of Environments
from J. Sonnenfeld (1968)

The most inclusive of these is the geographical environment - the whole environment that is external to the organism. We can measure and quantify it by some objective standards or scale. The geographical environment is the source of all that is *objective* in the operational, perceptual, and behavioral environments, but also includes elements that may not exist or have no meaning to the individual.

The *operational environment* is the *functional* portion of the geographical environment. It impinges on people as individuals or groups and influences behavior. Different ethnic and cultural backgrounds are just two of the many variables that will cause people to view this environment distinctively. For example Muslims and Christians view religious structures as operationally different. Even the numerous Protestant sects view religious structures differently from Catholics.

The *perceptual environment*, is that portion of the environment of which people are conscious because of organic-sensory sensitivity or because of a sensitivity that derives from one's learning and experience. Seashores are popu-

lar resort areas where getting a sun tan becomes a mark of summer's beneficence to good health. Yet, today we know that most people cannot tolerate strong sunlight for prolonged periods of time. We also know that skin pigmentation has different sensitivities to various wave lengths of light and that most people are now aware (whether by heredity or environment) of the pathological damage to the skin by strong sunlight.

The *behavioral* environment is that part of the environment of which the individual is aware and that also elicits a behavioral response or toward which one may direct a behavior such as conscious use or transformation of the environment. Some individuals may perceive the leaf litter on their lawns as debris to be raked, bagged, and carted away. Others may see it as a potential soil additive and react accordingly by turning it into compost.

Multiple Perspectives

Perspectives operate as another lens through which we view our world. Robert W. Morrill (April 1993) has elaborated on the necessary perspectives that influence our views of reality. He writes (June 1993)[1]:

> *"A **geographically informed** person looks at the world from a variety of perspectives. Thus, such a person:*
> *• knows that each individual has personal points of view in unique life experiences;*
> *• accepts the existence of diverse ways of looking at the world;*
> *• understands how different perspectives develop;*
> *• is aware that perspectives incorporate values, attitudes, and beliefs;*
> *• considers a range of perspectives when analyzing, evaluating or trying to solve a problem; and*
> *• knows that perspectives are subject to change."*

Further, he notes that, "a perspective is looking at one's world through a lens shaped by personal experience, selective information, and subjective evaluation." He divides geographic perspectives into two broad categories, each of which has many sub-categories. One includes *systemic* perspectives that may be based upon systematic study using different intellectual frameworks to interpret the world, e.g., spatial, ecological, environmental, historical, economic. The other includes *life-status* perspectives that are based on the life-status conditions of personality traits, occupational role, age, or gender socialization, e.g., civic, cultural, age, gender.

Our pictures of the world may be considerably distorted from the way others view it. Even those aspects of the environment that we might be able to measure or quantify can have different interpretations to different observers in different times and places. In addition, different people in the same place may view the same environment differently. The Blue Ridge Mountains of eastern United States may appear as small hills to the Sherpas accustomed to the lofty heights of the Himalayas. Washington, D. C. is about 236 miles (388 km.) from New York City. A Texan who has never traveled in the eastern United States may think that one could drive that distance in little more than 4 hours. It is rare if one can cover the distance in less than 6 hours because of the densely populated areas with heavy traffic through which one must pass. A Japanese rice farmer finds it difficult to understand how a rice farmer in Louisiana or Arkansas can farm such large acreage of land. A farmer in Zaire might travel several hours to reach a regional market ten miles distant because he must carry the produce on his back.

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[1] For a complete description of these perspectives, their origins, categories, and operations see Robert W. Morrill, "One Perspective on Geography," Part One. Perspective 21 (April 1993): 1-3 and Part Two. Perspective 21 (June 1993): 3-5.

In describing his stays in Bhutan, Pico Iyer (1993, 105), the travel writer, commented that, "things went wrong every day in Bhutan. Keys fell off chains, doors locked one in, taps refused to turn. Twice in twenty minutes one night, the lights went off, and then again I was busy flooding my bathroom." After contemplating his comments, he then added that, "what was most surprising about Bhutan was how little really went wrong, how efficiently everything worked. ... All the time I was in Bhutan, nobody ever asked me for a favor or troubled me with an outstretched hand" (106). The lenses we use to examine other cultures, should encourage us to contemplate those aspects of the culture that impress us.

Teachers must consider these perceptual environments and perspectives when attempting to make geography a living science. They must overcome students' attitudes conditioned to coming up with the right answer and to help them realize that their perceptions will cause them to come up with somewhat different answers about the same thing. Every situation may have different perspectives that will require different answers.

The Methodology of Geography

Geographers study four fundamental but interrelated elements - place, people, pattern, and process (Stoltman 1990, Salter 1991, 207-224). Geographic methods are derived from the traditional scientific methods - observation, speculation, analysis, and evaluation (Salter 1989). The *Guidelines for Geographic Education* (Joint Committee on Geographic Education 1984, 22-23; modified in *Geography For Life: National Geography Standards, 1994*), define these as five skills: asking geographic questions, acquiring geographic information, organizing geographic information, analyzing geographic information, and answering geographic questions. For example, when we assign students to draw a map of the different functional areas of the school, e.g., teaching-learning, recreation, entertainment, research, and dining, we would expect them to make a survey of the school building and grounds by walking around and noting briefly that different activities usually occur in different places. They might notice that some play areas are outdoors and others, indoors. They might ask some questions about why this is so. They then might estimate the areas of each. They might wish to calculate the percentages of the school area for indoor and outdoor recreation. As a result, they will have followed the steps in the scientific method and from their analysis make some generalizations about why these two areas differ in size and function.

To summarize the process, following the observation, one asks the geographic questions that speculate about the important where and why aspects of a problem. This is followed by organizing the information in ways that can assist in analyzing the questions. Answering geographic questions may eventually result in concepts. Finally, the evaluation portion of the process is reached.

Geographic Data

To return to the class assignment on mapping the functional areas of the school, we might be able to portray the information gained in geographic form, i.e., to construct a bar graph showing the percentages of the school areas assigned to each function. This form of description does not convey as well as a map the spatial qualities of the information required to complete the assignment.

As a result, we can test the *spatial* quality of the information we acquire to solve geographic problems by transferring it to a map. The major sources of data from which, and to which, geographers translate their data are perceptual devices in the form of maps. Maps transform the spherical surface of Earth to a plane and in doing so add some distortion to the way we see things. Even a map as detailed as a 1:24,000–scale topographic map cannot convey the

detail one can see from a plane flying at 5,280 feet (1,609.35 meters) above Earth. Viewing the school grounds from an airplane will not give us the detail we would be able to see from a scale that is closer to the size of the school grounds. We must then decide which scale is appropriate to give us the detail we require for the problem. Yet maps are so important in geographic work that Richard Hartshorne (1939, 249) noted that:

> *"without wishing to propose any new law, it seems fair to suggest to the geographer a ready rule of thumb to test the geographic quality of any study [he or she] is making: if [the] problem cannot be studied fundamentally by maps - usually by a comparison of several maps - then it is questionable whether or not it is in the field of geography."*

On the other hand, Monmonier (1991, 25) offers this admonition:

> *"A good map tells a multitude of little white lies: it suppresses truth to help the user see what needs to be seen. Reality is three–dimensional, rich in detail, and far too factual to allow a complete yet uncluttered two–dimensional graphic scale model. Indeed, a map that did not generalize would be useless. But the value of the map depends on how well its generalized geometry and generalized content reflect a chosen aspect of reality."*

"A Chosen Aspect of Reality"

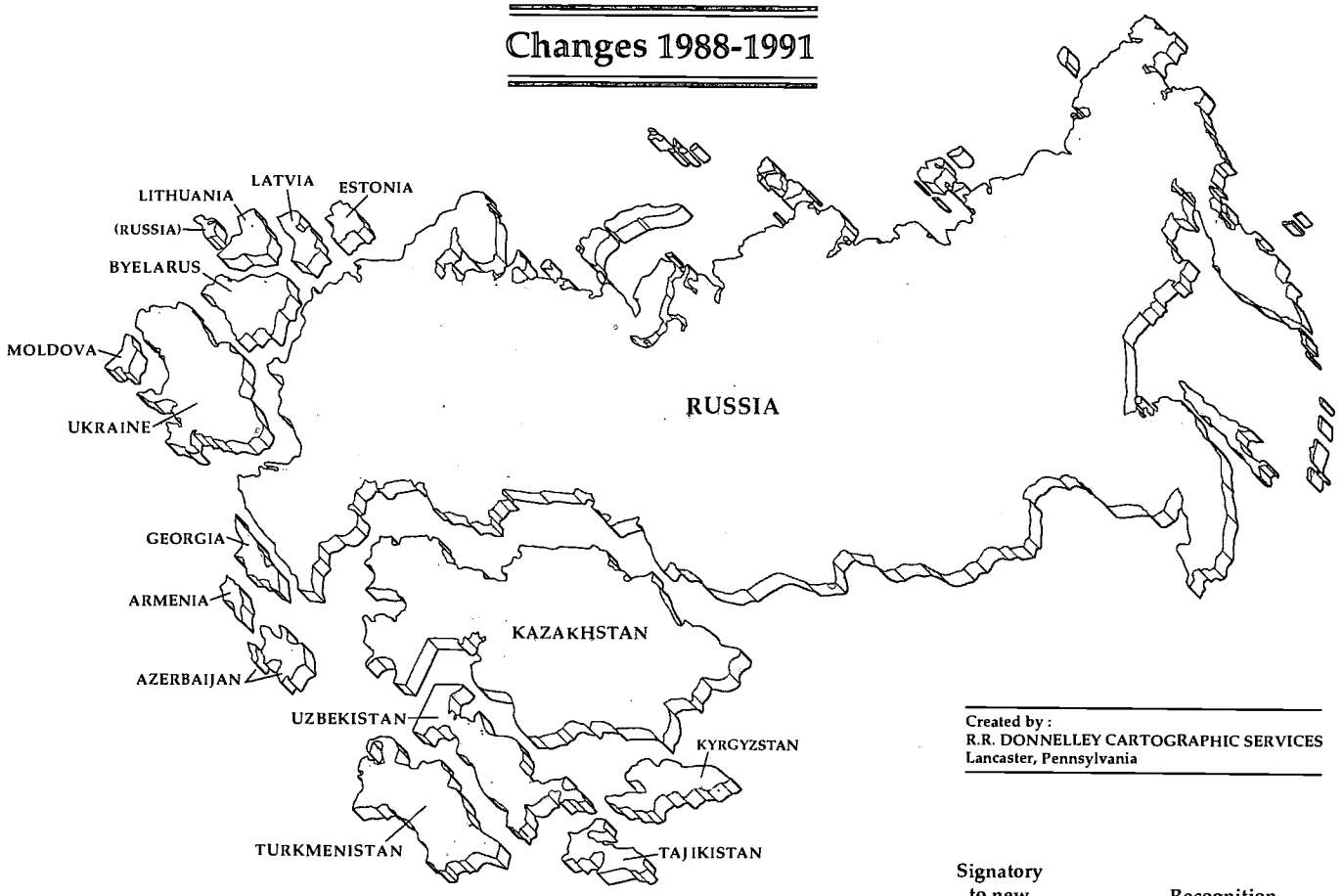
Geographers, like all other scientists and humanists, select or choose an aspect of reality from those places and areas they are studying. For example, will we ask the students to map each individual desk on the map of the school or give the locations and species of each plant or tree on the school grounds? Historians cannot transport themselves through time to examine and report every event or occurrence during the time period they are studying, nor can the biologists reduce themselves in scale to the microscopic size of an amoeba. Physicists cannot travel to the edges of the universe nor the chemist to the nucleus of an atom. All scientists seek generalizations about what they observe to transmit that information to other people.

Generalizations are not fuzzy generalities, but results derived from systematic investigations of physical and cultural phenomena and ideas. Implicit, however, in the term, *science*, is that each scientist pursues certain scientific ideals. Some sciences seem to achieve these ideals with greater precision than others (Hartshorne 1939, 314). The achievement of these ideals is not the measuring stick of success in science, but, "science may be distinguished from ordinary, common-sense knowledge by the rigor with which it subordinates all other considerations to the ideal of certainty, accuracy, universality, and system" (Cohen 1978, 83). To complicate matters, in pursuing the scientific ideal we must factor constant change into the equations. The school's population will change each year and the uses of school areas may change considerably over time as the school population grows or declines, or as new activities are added to the curriculum.

Change as a Constant

Most changes are not dramatic, but some occur on a grand scale. Think about what has happened to the world map in the last several years. The former Soviet Union is now a collection of independent states, some loosely organized in a commonwealth and others fiercely independent. The former Yugoslav nation is now torn by ethnic civil wars between and among several independent nations. Czechoslovakia has been divided into two independent republics - the Czech and the Slovak Republics (Figs. 3, 4, 5). Eritrea, northwest of the Horn of Africa, became independent from Ethiopia in 1993. The British crown colony of Hong Kong, southeast of the Guangzhou (Canton) on the mainland of China, will return to Chinese sovereignty on June 30, 1997. The strong forces of nationalism with their territorial imperatives have produced an uneasy jig-saw puzzle of not only nation-states but also provinces and territories with ever-changing and disputed boundaries.

Changes 1988-1991



Incorporated into Soviet Union[1]	Republic	Declaration of Sovereignty[2]	Declaration of Independence[2,3]	Signatory to new "Commonwealth" agreement[3]	Recognition of Independent Status[3]
1940	ESTONIA	16 Nov. 1988	A 21 Aug. 1991		F 6 Sept. 1991
1940	LITHUANIA	18 May 1989	11 March 1990		F 6 Sept. 1991
1940	LATVIA	28 July 1989	B 21 Aug. 1991		F 6 Sept. 1991
1922	AZERBAIJAN	23 Sept. 1989	30 Aug. 1991	21 Dec. 1991	G 25 Dec. 1991
1922	GEORGIA	9 March 1990	9 April 1991		G 25 Dec. 1991
1922	RUSSIA	12 June 1990	C	D 8 Dec. 1991	G 25 Dec. 1991
1924	UZBEKISTAN	20 June 1990	29 Aug. 1991	21 Dec. 1991	G 25 Dec. 1991
1940	MOLDOVA	23 June 1990	27 Aug. 1991	21 Dec. 1991	G 25 Dec. 1991
1922	UKRAINE	16 July 1990	24 Aug. 1991	E 8 Dec. 1991	G 25 Dec. 1991
1922	BYELARUS	27 July 1990	25 Aug. 1991	E 8 Dec. 1991	G 25 Dec. 1991
1924	TURKMENISTAN	22 Aug. 1990	27 Oct. 1991	21 Dec. 1991	G 25 Dec. 1991
1922	ARMENIA	23 Aug. 1990	23 Sept. 1991	21 Dec. 1991	G 25 Dec. 1991
1929	TAJIKISTAN	24 Aug. 1990	9 Sept. 1991	21 Dec. 1991	G 25 Dec. 1991
1936	KAZAKHSTAN	26 Oct. 1990	16 Dec. 1991	21 Dec. 1991	G 25 Dec. 1991
1936	KYRGYZSTAN	12 Dec. 1990	31 Aug. 1991	21 Dec. 1991	G 25 Dec. 1991

Sources:
1. The Statesman's Yearbook (1991-92)
2. U.S. Department of State
3. News Media

Notes:
A. Transition to independence declared March 30, 1990.
B. Transition to independence declared May 4, 1990.
C. No formal declaration. In effect declared independence by signing commonwealth agreement, and asking for international recognition as an independent state.
D. Ratified by parliament on December 12, 1991.
E. Ratified by parliament on December 10, 1991.
F. Independence formally recognized by Soviet Union.
G. Widespread international recognition began on December 25, following the resignation of Mikhail S. Gorbachev as President of the Soviet Union formally marking the point at which the U.S.S.R. ceased to exist.

Figure 3. Process of Disintegration (Former Soviet Union)
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Figure 4.

The Former Yugoslavia

Former Republic	Total Population
BOSNIA AND HERZEGOVINA	4,364,000
CROATIA	4,760,000
MACEDONIA	2,041,000
MONTENEGRO	610,000
SERBIA	9,722,000
Serbia proper *	*5,754,000*
Kosovo Province	*1,955,000*
Vojvodina Province	*2,013,000*
SLOVENIA	1,974,000

* Serbia without Kosovo and Vojvodina Provinces

Note: Bosnia & Herzegovina, Croatia, and Slovenia have been recognized as independent states.

Macedonia's declaration of independence has not yet been widely recognized.

Serbia and Montenegro have proclaimed themselves to be a joint successor state of Yugoslavia. This has not been accepted by the international community.

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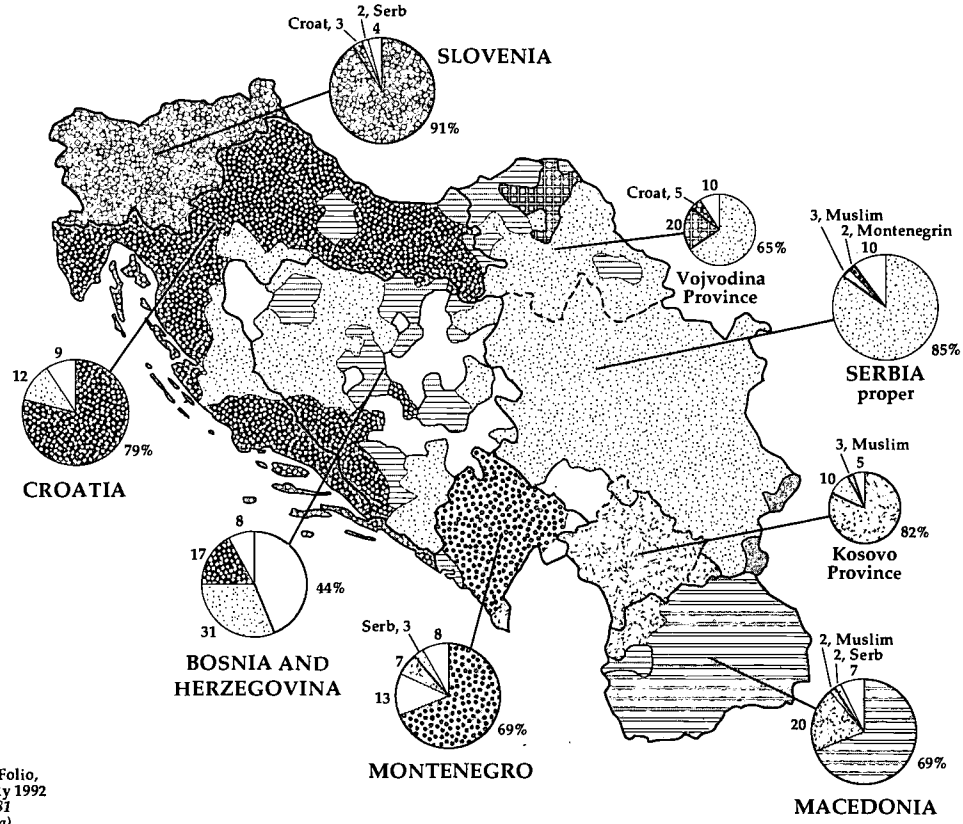
Ethnic Groups

Ethnic Majority	% of Total Population in the former Yugoslavia
Albanians	7.7
Bulgarians	0.2
Croats	19.7
Hungarians	1.9
Macedonians	5.9
Montenegrins	2.5
Muslims	8.9
Serbs	36.3
Slovenes	7.8
No group composes majority of population	

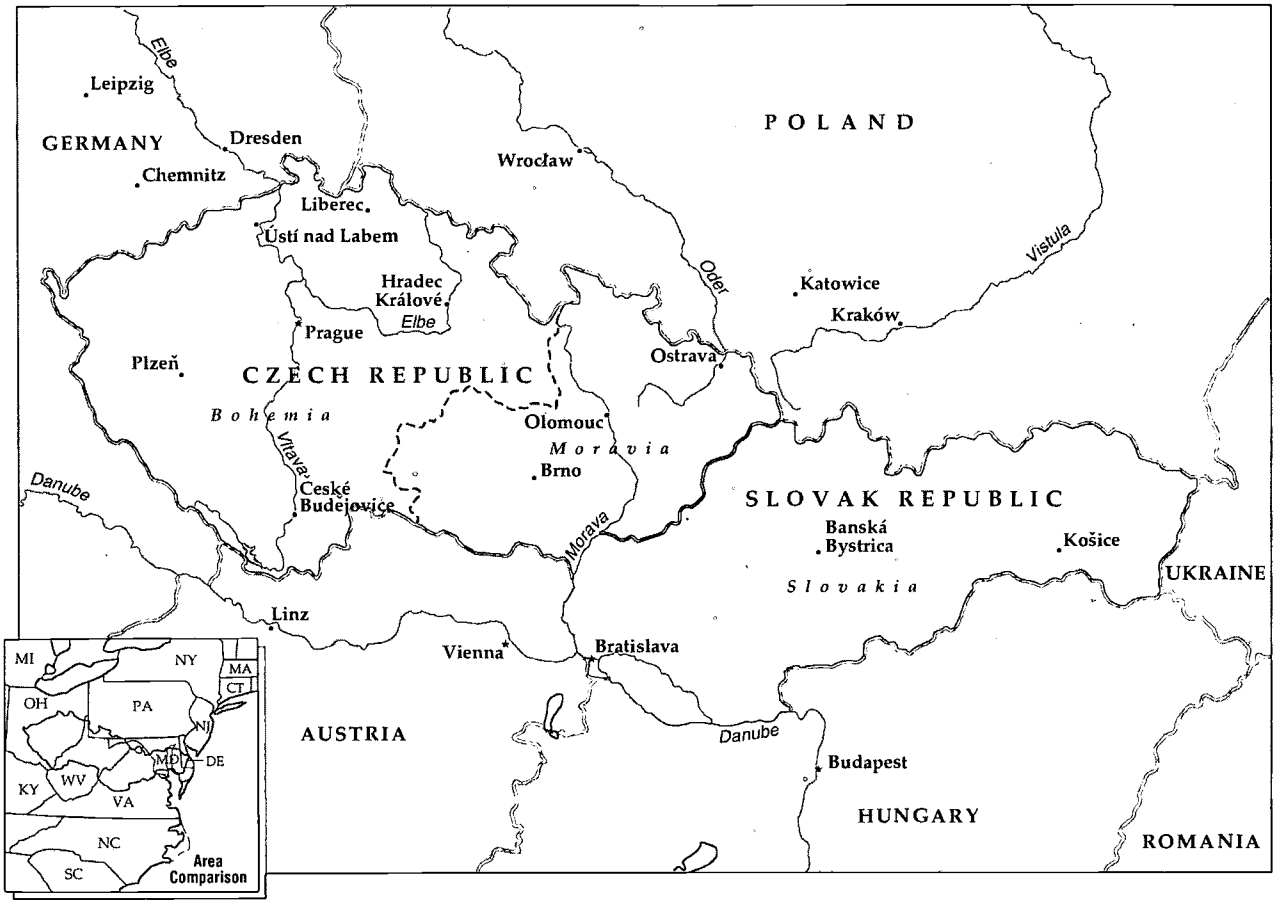


Sources :
1. The Former Yugoslavia: A Map Folio, Central Intelligence Agency; July 1992 *(population figures, based on 1981 census and preliminary 1991 data)*
2. Geographic Notes (No. 9), U.S. Department of State *(ethnic distribution)*
3. The Statesman's Yearbook (1991-92) *(population figures, based on 1981 census)*

Note : Pie charts indicate proportions of ethnic groups within a nation, republic (or province).

Figure 5. The Czech and Slovak Republics

courtesy R. R. Donnelley and Sons Company © 1992



The Czech and Slovak Republics

On the Threshold of Independence

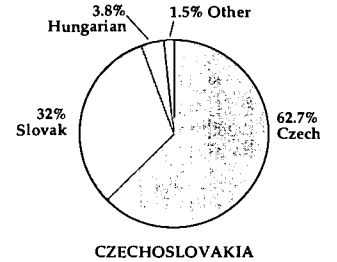
AREA	sq km	sq mi
Czechoslovakia	127,899	49,382
Czech Republic	78,864	30,450
Slovak Republic	49,035	18,932

POPULATION	
Czechoslovakia	15,675,000
Czech Republic	10,365,000
Slovak Republic	5,310,000

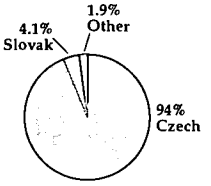
MAJOR CITIES

Prague	1,211,000
Bratislava	435,000
Brno	390,000
Ostrava	331,000
Košice	232,000
Plzeň	175,000
Olomouc	107,000
Ústí nad Labem	106,000
Liberec	104,000
Hradec Králové	100,000

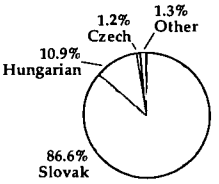
Ethnic Composition



CZECHOSLOVAKIA



CZECH REPUBLIC



SLOVAK REPUBLIC

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Sources :
1. Atlas of Eastern Europe
Central Intelligence Agency; August 1990
2. The Europa World Yearbook 1992
(Republic statistics)

The African nations created after World War II bear little relationship to the territorial claims of ethnicity and tribalism. Political boundaries, ideas that arbitrarily unite and separate peoples, have little stability except when strengthened by some formidable natural (Pyrenees Mountains between France and Spain) or built obstacle (the Berlin Wall that had separated East and West Germany). Passes and valleys breach even high mountains. Beachheads jump across wide river boundaries and the incessant shifting of river channels requires constant tinkering with political maps. Desert areas once uninhabitable become weak barriers when transformed by irrigation and settlements. The claims of seven nations, that most other nations do not recognize, slice Antarctica, the most desolate of the continents, into overlapping pie-shaped wedges.

Earth's natural environment is in perpetual motion. Mountains rise, sink, or erode; the sea reclaims the coasts; rivers breach their banks; and earthquakes fracture the surface. Each season brings a collection of natural hazards - winter blizzards and ice storms, spring floods from snow melt, tornadoes, or heavy rains; summer has thunderstorms, tornadoes, floods, dust storms, and hurricanes. Early frosts, snow storms, or even late hurricanes mark the advent of autumn. Meanwhile, we have been busy constructing dams across raging rivers, flood gates to guard against storm surges from the ocean, polders to fill in shallow seas, narrowing, widening, and deepening river channels, extending groins along coasts to preserve beaches, and diverting water flow from rivers to farmland. Farmers must flood irrigated farmland to leach the build-up of mineral salts that rise to the surface by capillarity as a result of constant under-irrigation, and timber companies clear cut thousands upon thousands of square miles of forests. The construction of highways, bridges, interchanges, and tunnels proceeds apace. This small sample hints only at the transformative power of human and natural influences on the land.

Constant change is a given in geography. Populations increase and decrease, move, or are displaced. Every year we strip- or deep-mine the land, drill for petroleum on land and under the sea, dig deep and shallow wells for irrigation or for drinking water, and lay hundreds of miles of pipelines to transport natural gas, oil and oil products, or water for irrigation and drinking.

The business of geographers is to observe, examine, gather data on, ask questions about, speculate upon, and analyze these changes. Applied geographers might recommend how we can make these changes with the least damage to the environment, recommend no change, or suggest measures to mitigate the effects of poor land use or management.

Need for Geography in the Curriculum

Despite its ubiquitous nature and ready source of material for serious study, geography has never established or enjoyed a premier position among the subjects in the school curriculum. Some nations attach a greater importance to geography in the curriculum than the United States, but its overall status as a permanent school subject is at the mercy of curriculum developers or the gatekeepers of school reform.

The widespread fragility of Earth's environments, the areas under environmental stress, and the need for intelligent land use planning and management require the knowledge and skills that only geography can uniquely supply. Earth's transformations have placed at risk many millions of the more than 5 billion inhabitants of the planet. The land available to support each of these people decreases every year despite multiple and multilevel use of the same land. Fishers and hunters have seriously depleted the populations of marine life by taking more fish and sea mammals than the species can replace. Toxic wastes and pollutants increasingly foul the ground and surface water and the beaches.

Geographic knowledge can temper our ability to misuse Earth's resources. We are at a period in our history when we can no longer depend upon the seemingly endless resources that blessed many parts of Earth. Ignoring geography means ignoring history, and the future as well, and the foundation for the events that have transpired on Earth.

Geographic Responsibility - Contributions to Stewardship of Earth

In every part of Earth, planners and governments are making decisions that have the potential to jeopardize the environment to the point where it may not be able to recover. People the world over require the competencies geography can bring them to make informed decisions as citizens of their nations and of the world. People need to see more clearly than ever, their reflections and they must use their lenses to observe, study, and understand these, "chosen aspects of reality," the changing constants, and the myriad interconnections of the components to maintain Earth's health for its people and all living things.

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Biography

Salvatore J. Natoli recently retired as Director of Publications and Editor of Social Education for the National Council for the Social Studies. He is currently editor of special publications for the National Council for Geographic Education (NCGE) and an independent scholar and consultant in geography. His baccalaureate, master's and doctoral degrees are in geography, culminating in a Ph. D. from Clark University, Worcester, Massachusetts. Dr. Natoli is the author or editor of more than 100 publications on geography, geographic education, and the social studies. He has taught at the junior, senior high school, college and university levels, was a federal government administrator of geography and social science programs, and served as Educational Affairs Director and Deputy Executive Director of the Association of American Geographers. He received the George J. Miller Award for Distinguished Service to geographic education from the NCGE in 1987. He lives in Washington, D. C.

2. Geography for Life: World Class Standards for All Students

James F. Marran

Abstract: The need to improve competence in geography must become a national priority if the United States is going to continue to play a leading role in the increasingly competitive global economy. Issues affecting the fragile relationship between the environment and society must also be examined through more critical analysis than has heretofore been the case if Earth's physical systems are to continue to be responsive to the needs of human populations. These and similar geographic issues of such importance require informed thinking and reasoned judgement. The nation's governors devised the National Education Goals at an education summit in Charlottesville, Virginia, in September, 1989. These goals identify geography as one of the core subjects in the curriculum of the schools. In support of this goal, the geography community has developed *Geography for Life: National Geography Standards* (1994). These eighteen standards, which are clustered around six essential elements in geography, lay out the content, skills and perspectives students should know and understand about geography at grades 4, 8, and 12, and serve as benchmarks by which state education departments and local school districts can measure the quality of their instructional programs in geography.

Key Words: national standards, essential elements, knowledge, understanding, content, skills, perspectives, spatial, environmental, physical geography, human geography, interaction, systems.

The National Geography Standards in Context

When President Clinton signed the "Goals 2000: Educate America Act" into law on April 1, 1994, it was the culmination of a decade-long school reform effort that began with the publication of "*A Nation at Risk*" in 1983. That report, which was released early in the Reagan Administration, concluded that the schools in the United States were not doing their job and that the educational establishment was so ineffective that it was in dramatic need of a massive overhaul. Many students were graduating from high school as functional illiterates. Their ability to make simple computations was woefully inadequate; and their knowledge of even the most rudimentary science concepts was virtually nonexistent. Further, the dropout rate in many schools topped fifty percent or more. Thousands of students were leaving school unprepared to assume responsible jobs in the workplace. They lacked both the knowledge and the skills to be even trainable, let alone function with any degree of competence.

The alarming consequence of this deficiency in education was that the United States was close to losing its competitive edge in the global economy. Many other societies in the industrialized world had school systems that were more demanding, better organized and more responsive to preparing graduates able to participate in a work force that demanded not only basic literacy in the language arts but also the skills to develop and operate the technology that was defining the market realities of the late twentieth century. As a result, "*A Nation at Risk*" provoked a ground swell of reaction from all over the country demanding educational reform.

One significant initiative was undertaken by the nation's governors meeting in Charlottesville, Virginia in 1989. At what was later to be recalled as the Education Summit, the governors drafted a declaration of principles that they identified as the National Education Goals. There were six in all and among them was a call for students in the United States to attain academic parity in selected core subjects with students in the other industrialized nations of the world by the year 2000. The goal interestingly juxtaposes expectation with aspiration. It states:

> *"American students will leave grades 4, 8 and 12 having demonstrated a competency in challenging subject matter including English, mathematics, science, foreign languages, arts, history and geography; and every school in America will ensure that all students learn*

to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy."

The initiative of the governors had a catalytic effect. Through the statements they made in the National Education Goals, they were reflecting an economic reality increasingly expressed by the business communities in their states. Leaders in commerce and industry reminded the governors and other politicians at the state and national levels that an unprepared work force would mean not only a decline in the quality of manufactures and services but also sooner or later, the failure to find new markets abroad or to trade effectively in a world market system that depended on a skilled and well-educated cadre of workers. The Bush Administration responded immediately by establishing that educational reform was a national priority and that the federal government would assume a more active role in promoting change in the schools. What followed was a flurry of initiatives within the various government departments and public and private agencies to develop updated curricula and new strategies to encourage fresh approaches to learning in the nation's classrooms.

The Department of Education, with support from the National Endowment for the Humanities and other groups, provided funding to major professional and scholarly organizations for the development of appropriate voluntary national content standards for each of the core subjects. These standards were to establish what students should know and be able to do. Mathematics educators provided the model because several years before the Education Summit, they had prepared a set of performance standards that while demanding, were proving to be workable. In fact, by the mid-1990's, the mathematics standards were having a significant impact on transforming the teaching of mathematics across all the grade levels through the restructuring of curriculum, the retraining of teachers, and the development of new assessment tools. With the passage of the Goals 2000 legislation, the Congress and the Clinton Administration affirmed the importance of national standards and, in effect, established that they represent the country's educational policy for what ought to be taught in the schools.

The Purpose of National Education Standards

Standards are a definition of what students should know and be able to do. They describe the knowledge, skills and understanding that students should have in order to attain high levels of competence in challenging subject matter. The establishment of clear standards both raises expectations and clearly defines for everyone the aims of a school system.

There is no federal mandate imposing the new standards. Therefore, they stand or fall depending on whether they are accepted by teachers, administrators, parents and the public at large. As a result, states are encouraged to use them as models in developing their own content standards. Using the standards as benchmarks, school districts can measure their own curriculum against a set of rigorous expectations developed by teachers and subject matter experts in specific content areas.

Meaningful voluntary national standards will help state education agencies, local school boards, superintendents, principals, teachers and parents establish challenging content ensuring that the schools systems across the country will focus on providing the opportunity for all students to learn at high achievement levels. The implications of the impact of high content standards are significant on a number of different levels. They can lead to:

- textbooks that will emphasize student understanding rather than the acquisition of bits and pieces of often disconnected information;
- student assessments that will test whether students understand and can use the knowledge, skills and perspectives of the core subjects at a challenging achievement level;
- instructional methods that not only will present the basics but encourage problem-solving strategies and higher order thinking skills as well;
- teacher education and staff development that will prepare classroom practitioners to teach to challenging standards;

• new technologies that will increase learning to meet high standards geared to internationally competitive levels of performance.

Geography's Place in the Standards Movement

When geography became one of the core subjects identified in the National Education Goals statement, the geographic community in the United States reacted quickly. The country's major geography organizations (American Geographical Society, Association of American Geographers, National Council for Geographic Education and the National Geographic Society) collaborated to create the Geography Education Standards Project. Its purpose was to develop a set of voluntary national standards identifying what students should know and be able to do in geography at the end of grades 4, 8, and 12. The Project received financial support in July, 1992 from the Department of Education, the National Geographic Society and the National Endowment for the Humanities with the National Council for Geographic Education acting as its fiscal agent. With funding in place and with the endorsements it needed to meet its charge from supporting professional associations, the Project was fully operative by early fall, 1992 with plans to have a set of standards ready for publication within two years.

As is the case with the standards in the other core subjects, those in geography identify what it is that students should know and be able to do in the discipline throughout their school experience so that when they leave high school, they will be able to use geography in life situations. To underscore geography's utilitarian value and to affirm its practical applicability, the national geography standards have been published under the title *Geography for Life* (1994). With geography as an integral part of their academic experience, today's students as adults will be able to exercise informed judgment in order to make decisions and solve problems about issues that are rooted in the reality of geography. The end product of an effective geographic education is to see the world in *spatial* terms.

Space is a central and essential concept for geographers. In fact, without it there would be no reason to teach geography at all. Geography would be meaningless and standards in geography would be irrelevant. *Spatial* is special to geography. It refers to the patterns and distributions of all the physical and human phenomena on Earth. Every discipline in the galaxy of knowledge is held together by a single, binding concept. Historians , for example, see time as their essential component; economists wants and needs as theirs; sociologists group behavior as theirs; and political scientists the processes of government as theirs. For geographers, space is what distinguishes their study from all others - its use, its appearance, and how people are influenced by it. Space and spatial relationships define what geography is about.

The Evolution of the National Geography Standards

Earlier in this century, geography was an important school subject in every region of the country. Very often the emphasis was on physical geography in the early grades, where map and globe skills were stressed. At the secondary level, economic geography was the most commonly taught course. Almost always it was organized around the regional theme. Students learned about the location of resources, the patterns of trade and manufacturing, and agricultural practices in both industrial and pre-industrial societies. Such an approach provided students with a global awareness and helped them understand how commerce connected the United States to the rest of the world. After the end of World War II, however, all that changed. In an effort to incorporate as many of the social sciences into the curriculum as possible, geography became one of the disciplines fused into school programs under the general rubric of the social studies. As a result, in many classrooms, it lost its identity altogether, or else was restricted solely to place location on maps and to the memorization of generally irrelevant and discrete pieces of data (e.g., population statistics about major world countries, the names of capital cities, or the most abundant resources in a given region).

By the 1980's, it had become abundantly clear that young people in the United States had minimal competence in geography. Many could not even locate their own country on a world map, or describe the location of where they lived, or relate major news stories to the places where they occurred. To address this crisis, the Association of

American Geographers and the National Council for Geographic Education organized the Joint Committee on Geographic Education. It was given the charge to develop a strategy that would begin to remediate the languor that had overtaken the study of geography in the schools. What resulted was a set of precise content organizers presented as five logically developed and interrelated themes. They have been published as the *Guidelines for Geographic Education: Elementary and Secondary Schools* (1984), and serve as the framework for structuring the concepts of geography across the grade levels. Combined with a set of basic geographic skills (also published in the *Guidelines*), they became the essence for understanding geography and applying its basic principles in ways that were meaningful to students and related to their own life experiences.

Since the publication of the *Guidelines*, instruction in geography across the grade levels has been arranged and driven by the five fundamental themes. Their popularity among teachers and curriculum directors has been far-reaching and largely responsible for energizing the reform movement in geographic education that set the stage for the development of the national geography standards. The *Guidelines* and the standards are complementary and each provides a framework to help the student view the world in spatial terms. The standards enhance the five themes by outlining the depth of content necessary to have students in the United States achieve world class competence in geography. Such knowledge not only responds to the expectations expressed in the National Education Goals but also better equips students to compete more effectively as adults in the emerging world order that will define the economic and political realities of the next century.

Developing the National Geography Standards

The standards-setting process in geography was built on a broadly based consensus involving hundreds of teachers, scholars, administrators, parents, political leaders and other members of the public. A panel of international geographers was assembled to serve as advisers and reviewers, and to ensure their, "world class," status. The standards document was crafted by seven primary writers. This group included four professional geographers, a classroom teacher, a teacher educator, and an expert in measurement and evaluation. Their work was subject to constant review and revision and closely followed the content criteria developed by the Department of Education and similar agencies within federal and state structures. It was built upon the available research on how students learn geography as well as curriculum materials assembled from school districts in the United States and a number of foreign countries. In addition, the writers conferred with educational and content experts as well as with professionals involved in preparing teachers in colleges of education. All work was periodically reviewed by an oversight committee comprised of a broadly representative group of twenty-one people from both the private and public sectors.

A number of factors informed the writing process. The overriding one, of course, was that the standards present the basic concepts of physical and human geography and that they demonstrate how geography is the systematic study of Earth and its people. A content advisory committee regularly reviewed their development to ensure that the geography standards represented not only sound scholarship but also reflected recent research. Predictably, the *Guidelines* and the five themes served as foundations for the standards. In fact, the whole standards process derives from the themes and is built upon them. Recognizing that the primary audience for the standards are teachers familiar with the themes, standards developers consistently worked to include examples suggesting how the content of the national standards might be presented to students at grades 4, 8, and 12. These learning opportunities both reinforce the five themes and expand upon them to illustrate how geography is an arch joining the physical and social sciences and the humanities. The standards, then, by their very nature are integrative and present geography as a discipline that helps connect other areas of inquiry (e.g., history and the social sciences, mathematics, the natural sciences, etc.) by encouraging students to develop an informed world view firmly based on an awareness of spatial relationships and the interaction constantly taking place between people and their physical and human environments.

A final element that informed the standards' development process was connecting a knowledge of geography to citizenship. If students as adults are to function as responsible parents, productive workers, and effective and active participants in the community, then they must possess a full sense of place. They must not only understand the meaning of place as a focal concept in geography but also how places are connected and interdependent on a scale that is

local to global. Knowing and understanding the principles of geography facilitate civic efficacy so that in the world of tomorrow, students will be able to use the spatial perspective to make reasoned judgments about the human habitat.

The Structure of the National Geography Standards

Geography for Life presents the critical components of geography, those integral elements of content, skills and perspectives which make possible an informed geographic point of view. These are framed within the context of the Vision Statement which answers the question: Why should the people of the United States understand geography? It captures the ideal of the geographically informed person, the consequence of systematic exposure to effective instruction in geography throughout the school experience. That exposure leads to the realization that geography involves judgment, speculation and analysis providing people with an image of the world as a spatial context within which to fix places, people, objects, and events.

The Vision Statement

"Geography is the study of people, places and environments from a spatial perspective. Geographically informed persons understand and appreciate the interdependent worlds in which they live from a local to a global scale. Further, the study of geography has practical value through the application of a spatial view to life situations."

A successful geography education equips students with both spatial and environmental perspectives so that they can make sense of the patterns of daily life. Understanding spatial patterns and processes is essential to appreciating how people live on Earth. Knowing where things are, why they are there, and the significance of their location helps people recognize the context of the spatial relationships in which the drama of their lives is played out. Also important is understanding Earth as a complex set of interacting physical and human elements. A person who regularly inquires about the connections and relationships among ecosystems and human societies possesses an environmental perspective. Making reasoned decisions about where to live, work, shop or attend school, or understanding and evaluating the trade-offs between economic development and environmental change, require spatial and environmental perspectives if students are to address the reality of their lives after formal education concludes. While these two perspectives are evident throughout the standards, they are explained and amplified fully in the introductory materials in *Geography for Life*.

In addition to reflecting the spatial and environmental perspectives, the national geography standards identify five skills to ensure that students are able to relate the content of geography to specific modes of inquiry. These geographic skills, set forth in separate chapters, mirror the scientific method and are modeled after the skill development framework that appeared in the *Guidelines for Geographic Education* (1984). They represent a taxonomy that prepares students to know what kinds of geographic questions to ask and how to ask them as well as the complexity of researching and answering those questions by identifying and using appropriate data sources. The skills for each grade level are cumulative and require building on those learned in previous years. The skills are:

1. asking geographic questions;
2. acquiring geographic information;
3. organizing geographic information;
4. analyzing geographic information;
5. answering geographic questions.

The skills identified in *Geography for Life* clearly illustrate the kinds of strategies students should be able to use comfortably at the end of grades 4, 8, and 12 in order to solve geographic problems and make intelligent geographic decisions. For each grade level, there are numerous examples illustrating how the skills can be presented to students in meaningful and practical ways. These descriptions suggest the type and performance level of each skill. However, the list is not comprehensive, nor was it meant to be.

There are eighteen national geography standards identifying what students should know and be able to do at the conclusion of grades 4, 8, and 12. Each presents an aspect of geography. The standards are clustered under six essential geographic elements which simplify them by providing a set of core concepts around which they are organized. The standards and the essential elements provide the knowledge component of geography and complement the skills and perspectives. Taken together knowledge, skills and perspectives constitute the three components of geography and are the essence of *Geography for Life*.

The six essential elements and the eighteen geography standards identify what a geographically informed person should know and be able to do in order to be prepared to use geography in meaningful ways as an adult. Each of the standard statements is introduced with a prefix clause which states: *The geographically informed person knows and understands . . . .*

Listed here are the standards clustered under the six essential elements which serve as their organizers.

I. THE WORLD IN SPATIAL TERMS

1. how to use maps, globes and other geographic representations, tools and technologies to acquire, process, and report information from a spatial perspective
2. the use of mental maps of Earth to put people, places, and environments in their spatial context
3. how to analyze the spatial organization of Earth's surface

II. PLACES AND REGIONS

4. physical and human characteristics of places
5. people create regions to interpret Earth's complexity
6. how culture and experience influence people's perception of places and regions

III. PHYSICAL SYSTEMS

7. physical processes that shape patterns on Earth's surface
8. characteristics and spatial distribution of ecosystems on Earth's surface

IV. HUMAN SYSTEMS

9. characteristics, distribution, and migration of human populations on Earth's surface
10. character and complexity of Earth's cultural mosaics
11. patterns and networks of economic interdependence on Earth's surface
12. processes, patterns, and functions of human settlement
13. how forces of cooperation and conflict shape the division of Earth's surface

V. ENVIRONMENT AND SOCIETY

14. how human actions modify the physical environment
15. how physical systems affect human systems
16. changes in the meaning, distribution, and importance of resources

VI. THE USES OF GEOGRAPHY

17. how to apply geography to interpret the past
18. how to apply geography to interpret the present and plan for the future

The essential elements and the national standards provide a conceptual framework that has been carefully worked out for grades 4, 8, and 12 within the structure of *Geography for Life* so that students will understand the power of geography as a way to deal with the physical and cultural complexity of the world. They are designed to avoid the kind of trivialization that for too long has characterized the teaching of geography in the schools of the United States. Much classroom geography was so fact-oriented that students learned only disconnected and disjointed

pieces of information. The, "new," geography as presented in the national standards emphasizes the essential nature of the discipline as an integrative and systematic approach to the places, people, and environments of the world.

The Anatomy of a Geography Standard

The standards are organized under one of the six essential elements and are fully developed at each of the prescribed grade levels (i.e., 4, 8, and 12) in separate chapters of *Geography for Life*. That means there is one chapter detailing the standards at each of the grade levels. The outline presented below illustrates the structure of a standard as organized for the three grade levels.

THE FORM OF A GEOGRAPHY STANDARD

Essential Element

Statement of the Standard

Rationale Essay for the Standard

Content Standards for Grades 4, 8, and 12

- knowledge statements
- activity statements
- learning opportunities

The following uses Standard Four at grade 4 as an example to illustrate the development of each of the national standards.

Essential Element: Places and Regions

Statement of the Standard: The geographically informed person knows and understands the physical and human characteristics of places.

Rationale Essay for the Standard: Chapter four describes the subject matter of geography. It presents essays of about two pages in length on each of the standards which provides an explanation of geographic content and its importance in the curriculum. The essay for standard four explains the nature of place as a concept in geography and illustrates the physical and human features which define places and concludes with this assessment about the importance on knowing about place: "*Personal identity, community identity, and national identity are rooted in place and attachment to place. Therefore, the physical and human characteristics of places influence personal and societal decisions. Understanding why places are the way they are enriches a geographically informed person's sense of place in the world allowing the appreciation, enjoyment, and sense of connection with physical environments and human communities at all scales, local to global.*"

Knowledge Statements: These are a series of content-based statements which specifically identify what the student must know and understand to demonstrate competence in the standard. Depending upon the complexity of the concept, there may be as few as two knowledge statements or as many as five. The following express those aspects of the concept of place that fourth graders must know to demonstrate their proficiency in the standard.

The student knows and understands

- the physical characteristics of places, (e.g., land forms, bodies of water, weather and climate, soil, resources, vegetation)
- the human characteristics of places, (e.g., beliefs, ideas and religions, economic activities, population distribution and settlement patterns, land uses, languages, ethnicity)
- how physical and human processes together shape places.

Activity Statements: The activity statements provide explanations about what students might do to demonstrate what they know and understand about the content of the standard. These statements complement the knowledge statements. Thus there are typically as many of them as there are knowledge statements. The one for grade 4 that follows relates to the first knowledge statement identified above.

Therefore, the student is able to:

- describe and compare the physical characteristics of places at a variety of scales, local to global.

Learning Opportunities: These are suggestions to the teacher on how to implement the activity statements. There are three for each one. Their purpose is to indicate through the use of examples how the various aspects of the standard as expressed through the knowledge and activity statements can be made meaningful to students. There are, of course, any number of ways by which this information can be taught. As a result, teachers should recognize that the learning opportunities included in *Geography for Life* are points of departure for lesson or unit construction and not prescriptive identifiers on how to present the content of the national standards. These learning opportunities complement the grade 4 activity statement noted above.

- observe and describe the physical characteristics of the local community in words and with sketches using a data retrieval chart with headings of physical features (e.g., land forms, bodies of water, soil, vegetation).
- use a variety of visual materials and data sources (e.g., aerial photographs, satellite images, pictures, tables and charts) to describe the physical characteristics of a region noting items that have similar distributions (e.g., trees in river valleys).
- use cardboard, wood, clay and/or other material(s) to make a model of a region which shows its physical characteristics (e.g., land forms, water drainage systems, and vegetation).

Use of the the National Standards

Meeting the national standards will require more time on geography in the classroom throughout a student's school experience, more preparation in geography for teachers, and better resources and materials in classrooms, libraries and media centers. The standards also address the role of technology in geography education, suggesting, for example, that high school students should be able to generate computer maps to explain such phenomena as population distribution, patterns of trade, and the diffusion of a culture trend across Earth's surface.

Geography for Life includes a number of supporting materials. There is an extensive chapter describing student behaviors in geography at three levels of performance: aspiring to standard, at standard, and beyond standard. The narratives in the chapter are designed to help teachers recognize the sort of classroom performance the standards might engender among students at different stages of development at grades 4, 8, and 12. The chapter concludes with a challenge to parents in the form of a set of questions they might use to assess their child's ability to use geography in a practical way. Parents of a fourth grader, for example, should reasonably expect their child to walk with them in a familiar environment and identify and describe some of the physical and human features on the landscape. The appendix contains a glossary as well as references that will be helpful to classroom teachers anxious to access specific information about the content of geography.

The standards espouse a broad view of geography. They communicate what is important and relevant at three stages in a student's development (grades 4, 8, and 12). As a result, they can be used as guidelines to help teachers and curriculum designers decide what to teach and what to expect in terms of student performance. In addition, they can serve as frames of reference to evaluate curricular models already in place and provide benchmarks so that school personnel and parents can compare their students with other students throughout the country and the world. Teachers will no longer have to work in isolation to know what is content and grade appropriate in geography. Although the standards identify what students should know and be able to do in geography, they leave how this is to be achieved to the schools.

As a part of their consensus statement articulated at the Charlottesville summit, the nation's governors concluded, "*The time for rhetoric is past; the time for performance is now.*" The national geography standards are a confirmation of that flourish of resolve.

Learning More About the National Standards

For information about the national standards and about how to acquire copies of *Geography for Life*, contact:

Geography Education Standards Project
1145 17th Street, NW
Suite 2500
Washington, DC 20036-4688

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Biography

James F. Marran is Social Studies Chair Emeritus at New Trier Township High School in Winnetka, Illinois where he taught world regional geography. He served as one of the primary writers for the Geography Education Standards Project in the preparation of *Geography for Life*. Presently he is coordinating the development of a mentor-oriented Master of Arts in Teaching program for second career professionals through the School of Education at Loyola University, Chicago. In addition, James Marran is the coordinator of the Geographic Education National Implementation Project and a member of the Executive Planning Committee of the National Council for Geographic Education. He is also president of the Geographic Society of Chicago. He and his wife Barbara live in suburban Chicago.

3. Setting Objectives for Lesson and Unit Planning in Geography

Joseph P. Stoltman

Abstract: Teacher room discussion and shop talk among teachers focuses on numerous topics. However, two topics are very predictable. One is discipline, or how the teacher can remain in charge in the classroom. The second includes lesson and unit preparation, the focus of this chapter. In reality, lessons require considerable planning. This chapter presents ideas about the role of objectives in lesson and unit planning and provides suggestions regarding implementing lesson and unit planning in geography.

Key Words: geography lessons, geography units, unit planning, objectives in geography teaching.

Myths and Realities of Planning Lessons and Units

Numerous questions surround lesson and unit planning. How do lesson and unit plans differ? Should they be planned rationally and calmly prior to the day they are presented in the classroom? The first question may be answered directly. A lesson plan is typically one or two class periods in length and focuses on a specific topic, such as a water issue along the Mississippi River, or the occurrence of earthquakes in the Los Angeles urban area. The unit, on the other hand, is usually 10 to 20 class periods and focuses on more general topics, such as the Mississippi River Basin or North America as a region. Units may also be designed for the systematic study of geographic topics such as urbanization, population, the use of natural resources, and natural hazards. Whether it is a regional or systematic approach, lessons are the building blocks for units.

The second question about planning lessons and units requires more discussion. On the front line of teaching, it is possible to encounter three beliefs about lesson and unit planning (Bartlett and Cox 1982). Those beliefs question whether lesson and unit plans are spontaneous classroom performances, or carefully planned productions.

Belief One: Some individuals believe that, "no plan," is the best plan. Just go into the class and, "wing it!" The, "no plan," teachers are high risk takers. Most teachers who walk into the classroom, "winging it," have problems ranging from discipline to keeping their jobs. While sometimes preached by a few, the, "no plan," approach must be avoided. To be avoided equally is the rationalization that, "I know exactly in my head what I will do, but I just can't write it down in a lesson." Don't believe it! A clearly thought through plan does not have a security lock, and can and must be described in plain terms on paper for the teacher and others, including colleagues, supervisors and parents to review.

Belief Two: These individuals believe that a plan based on textbook teaching is best and one need only stay several pages ahead of the students. Such an approach abdicates most of the teaching role to the textbook author, and assumes that the author is expert in all areas, including content, approaches to teaching, and knowledge of the particular dynamics of the students and community. The textbook is a valuable aid because it is usually correct, has interesting and attractive maps, photos, and statistical graphics. However, it should not

become a crutch in teaching. Wait! Don't discard textbooks, but make them a part of your lesson and unit plans along with other types of materials.

Belief Three: These individuals believe that a teacher can successfully organize the learning opportunities students will experience during a class period, a particular week, and an academic year through lesson and unit planning. Planning entails using objectives to establish benchmarks along the way. The objectives facilitate a smooth transition from idea to idea and topic to topic within the learning process. The lesson and unit plans form the structures for progress from basic to complex ideas relative to the discipline, to the information presented, to problem solving, and to examining issues. They are thought through by the teacher, organized in a coherent plan considering the context of the class and the students, and addressed in a fashion that promotes learning. Objectives are critical for the teaching and learning process (Bartlett and Cox 1982; Rockler 1988).

When comparing the prior three approaches to teaching, there is little argument that the third approach, based upon conventional wisdom, is the one to employ (and the one the author of this chapter promotes). Belief three requires using objectives in planning lessons and units. The next question is, How does the teacher decide upon objectives?

Setting and Using Objectives in Teaching

There is one major question that acts as an umbrella across all considerations of objectives. It is the use of the term, "behavioral." In a practical sense, every time an objective is set in teaching and learning, it is intended to alter mental, skill, or attitudinal behaviors. For example, an objective as broad as, "teaching a student how to read a map," operates under the assumption that the map reading skills are not there to begin with, but will be present at the conclusion of the teaching. The development of the ability to read a map is a behavioral change in the student (Clegg 1990).

It is important to note that the changes sought are in the student's behavior, and the objective (general as it was) had as its ultimate goal the student. However, the objective begins with the term, "teaching," and the teacher is responsible for that behavior. There is, and should be a clear distinction between what student behavior is expected, and what the teacher will do. Therefore, objectives must be written based on student behavior, or what the student will or should be able to do. These objectives are also called outcomes and performance objectives. In that regard, student orientated objectives (as distinct from objectives related to what the teacher does) are always concerned with what the student will be able to do, based on behavior. Thus they are called behavioral objectives.

There are numerous variants in the way behavioral objectives are written, the degree of specificity they demonstrate, and the ways that behaviors are described. Despite these variations, there is broad agreement that objectives are essential to the lesson and unit planning processes and that objectives should reflect what it is that the students will gain from a lesson and a unit. There are also numerous other questions that surround objectives. They include: What is the source for the objectives? How are the objectives to be written? How are student behaviors described and identified? How do they fit into the lesson and the unit plan? Each of these questions is important to consider during the lesson and unit planning process.

The Development of Objectives

A teacher need not begin with a blank sheet when writing objectives. There are numerous sources for ideas and models regarding objectives. Unit objectives, for example, may begin with the broad goals set out in the geography or social studies curricula for a school district, state, or province. The standards for geography (presented

and discussed in Chapter 2) are also a rich source of material for both lesson and unit objectives. The standards represent what every student should know and be able to do by the conclusion of grades 4, 8, and 12. A close alignment should exist between the geography standards, curriculum goals and unit and lesson objectives. With regard to units and lessons, the standards statements are especially good models for writing objectives that demonstrate what students should know, understand, and be able to do with geography.

Using Standards to Guide Objectives

The objectives that teachers design and use in teaching geography serve two purposes, planning and measurement. Within the objectives useful for planning (Fig. 1) there are three categories. The first is the broad statement called a geography standard. It represents a consensus among scholars, lay persons, and professional educators regarding what geography content should be learned by students. The geography standard, because of the consensus process that brought it about, and its broad attention to learning, represents a guide for selection and adaptation of content for curriculum development. It is a planning objective of the first order - a big idea. The standards are important guides in formulating curriculum. They are also useful as yardsticks to review the adequacy of existing curriculum.

At the classroom level the standards must undergo a translation into unit and lesson objectives (Fig. 1). Standards are the umbrella for the students' educational experience. At the classroom level they become the reference for more specific objectives regarding what students will be doing, or what their behaviors should be as a result of their learning experiences.

The unit and lesson objectives provide explicit statements of learning outcomes that the teacher determines are consistent with standards and appropriate for a particular group of students. The lesson and units also identify and define the methods and materials most suitable for attaining the outcomes. In this way, the means (methods and materials for instruction) are carefully tied to the ends (the student outcomes). Since teachers are on the front line of instruction, they should select the most promising methods and materials after they have determined the objectives leading to more general learning outcomes.

Objectives for the lesson and unit flow from the standard. They are written so that the achievements of the students are demonstrated as learning outcomes relative to the standard. Such an approach to lesson and unit planning places emphasis on the creativity and ingenuity of the teacher to implement the standard. It also relies on the best judgment of the teacher to design teaching and learning approaches that enable students to attain the objectives articulated in the standard.

Geography standards, lesson and unit objectives must also serve as the basis for measuring objectives (Fig. 1). The standards set the parameters for assessment. They serve as performance criteria and guide the design of both traditional test questions and other forms of assessment. Measurement objectives differ from planning objectives. Planning objectives for units and lessons state the general and specific measurable learning outcomes. The measurement objectives specify the method of measurement as well as the desired outcome. For example, the planning objective may state that pointing to the landforms on a map is the desired behavior to demonstrate the outcome. Measurement objectives state more precisely the behavior expected by adding prerequisites and proficiency levels. For example, a performance based objective may state that the student when given a list of physical features and a map, is expected to attain at least 80% accuracy in identifying physical relief features on the map (Fig.1).

The measurement objectives provide examples of how the geography standard and planning objectives related to it may be assessed. Objectives that specify measurement and performance have been applied widely in edu-

cation. However, they have a degree of specificity that is unnecessary at the lesson and unit level. Such specificity, however, is very helpful at the testing and measurement level (NAEP 1992).

Figure 1: Objectives Based on a Geography Content Standard

Planning Level	Sample Objective
Geography Standard:	The geographically informed person understands the physical and human characteristics of place. (Standard 3)
Unit:	The student can describe and compare the human and physical characteristics of places. (Standard 3, Grade 4)
Lesson:	The student can identify the major landforms of a place using a physical relief map. (Standard 3, Grade 4)
Measurement Levels	**Sample Objectives**
Behavioral Based:	Given a list of ten major landforms, the student will identify those that appear on the physical relief map by pointing to them. (Standard 3, Grade 4)
Performance Based:	Given a list of ten major landforms, the student will identify with 80% accuracy those that appear on the map by pointing to them. (Standard 3, Grade 4)

Writing Objectives that Work

At their best, objectives tell the teacher and student what it is that the student should learn or be able to do upon completion of a lesson and unit. The objective implies a definite behavior by the student. The behavior is the way the teacher or student validates the learning or doing, such as writing a narrative, pointing to a physical feature on a map, or measuring the distance on a map. Writing, pointing, and measuring are all observable behaviors by the student. Objectives that include such specific behaviors help teacher, student, and parent get a clear idea about what is to be achieved. The teacher may observe and the student can perform the behavior.

A rule of thumb in writing objectives is that they should clearly communicate what it is that the student should do or learn and how those results can be demonstrated. The objectives should be useful and comprehensible to the student as well as the teacher. If the teacher writes an objective stating, "The student should identify five environmental regions of North America on a map," then they must provide the requisite materials and experiences to enable student to do just that. In addition, the student should be informed that it is necessary to identify five environmental regions on the map. The student should not be surprised if asked to answer either a study question or test question involving identification of environmental regions.

Can objectives be stultifying to creative teaching? There are many points of view regarding the specificity of objectives. Some criticize planning objectives for being too specific in identifying behaviors. There are many ways that, "The student could identify the environmental regions of North America." For example, they could be described in a narrative, or states and provinces corresponding with a region could be listed. These, as well as other spontaneous means, are ways that a student might decide to identify environmental regions. The behavior described by the objective may be too rigid, may restrict creativity, may not use multiple intelligence (Gardner 1983), or may reduce the student to rather mundane outcomes (Brandt 1993). There is validity in these criticisms. Objectives are written to focus on student behavior, not teacher behavior, and a student may demonstrate a better way to attain an objective. Teachers need to be attuned to those alternatives as they enhance the objective in presenting clear ideas to the students. Objectives are not absolute. They may and should be reviewed and amended as time passes, knowledge develops, and classes change.

Lesson and Unit Objectives: What Action is the Focus?

Every lesson and unit has objectives imbedded within it. Objectives that use a behavior to describe what the student will do as a result of the lesson or unit are an essential component of the plan. In some cases the behavior is a very obvious physical action, but in others it is a mental activity that is not readily apparent to the teacher. In the latter case, the teacher must select some means to tease out the intent of the objective. These differences require the teacher to consider both overt observable behaviors as well as predispositions to behaviors that may not be readily observable. The first objective describes action since it is based on observable behavior. The second outcome is a process that goes on within the student's mind and predisposes the student to a particular behavior. A word (often a verb) in objectives makes the outcome either an action or a process in terms of what the student will do. For example, here are two lists of verbs that are often used in stating objectives.

Sample Process and Action Verbs Useful in Objective Writing

List 1	List 2
to think	to identify
to understand	to list
to appreciate	to sort
to attend to	to solve
to reflect upon	to analyze
to enjoy	to explain
to believe	to draw
to value	to discuss

The verbs in list 1 are not observable behaviors, but we assume they are going on within the cognitive functioning of the student. If we want to find out, then we usually design a series of exercises, or a test, that we believe will bring out the process so it can be analyzed. For example, we may ask the student to select four pictures that show an enjoyable landscape. Based on the selection of landscapes that are attractive, clean, and friendly, we might conclude that the student is predisposed to environments that are most enjoyable as a result of the planned learning experience. However, in another context, a student might enjoy an environment that is crowded, busy with cars and people, and laden with smog and litter. This student may associate enjoyment with the comforts of home and family, and the family and home may be located in such an environment. Some process objectives are relative and sub-

ject to the values that a student holds. Learning may broaden that field of values, but environmental context is an important element.

List 2 consists of observable behaviors. We can give a student a map, a paper and pencil, a time and place to deliver a talk or participate in a debate, and as teachers, we can observe the outcome. These verbs are specific and there is little leeway regarding the behavior. The quality of the behavior and its message, such as the dialogue in a debate, is critical to the objective. For example, the use of four key points regarding environmental consequences of a particular land use may be specified in the objective, and then used as the criteria for assessing the content attributes of a talk.

Objectives for Knowledge, Skills and Values

There are three main categories of objectives that are used for lesson and unit planning. They are: knowledge objectives; skills objectives; and values/attitude (affective) objectives.

Knowledge Objectives.

Knowledge objectives deal directly with the content and methodology (syntax) of geography. The taxonomy of educational objectives for the cognitive domain (Bloom 1956) is widely recognized as a way to classify knowledge objectives. The cognitive domain is made up of knowledge, comprehension, application, analysis, synthesis, and evaluation. Each represents an increasingly complex level of dealing with and using knowledge. The taxonomy is useful for the planning and writing of lessons and units because it serves both as a guide and as a check for the intellectual abilities and skills that are used by learners. For example, objectives may be classified according to their placement in the taxonomy. There are several advantages in classifying objectives within a taxonomy. It will tell if all the objectives are at one level, such as knowledge, or if objectives are distributed across several cognitive levels. It will also tell if there is a balance between basic (knowledge, comprehension, application) and more complex expectations (analysis, synthesis, and evaluation) in the lesson and unit objectives. An example of objectives classified according to the taxonomy is shown in Figure 2.

Figure 2: Classifying Objectives: Bloom Taxonomy

Objective	Classification					
	K	C	Ap	An	S	E
The student will identify and locate the countries of Central America on an outline map of the region.	X					
The student will use map scale to determine the shortest highway route between three cities in Central America.			X			
The student will use climatic and transport information to select and justify the best location for a fresh vegetable exporting company.						X

Skills Objectives

There are two types of skills that are dominant within geography teaching. The first is the visual/psychomotor skill associated with map making, map reading, landscape sketching, sketch mapping and visual observation. The second type includes the cognitive skills that involve the processing of information. These skills often entail mathematics such as in using map scale, verbal skills such as in describing landscapes, and inquiry skills for investigating geographic issues. Within geography, the two types of skills complement each other because they are very often concurrent in application. They are the practical skills that help distinguish the discipline of geography from other fields of knowledge.

Skills should be integrated into the content of geography, not presented separately. The discipline is the context for the skills and the skills provide a means for the students to practice and learn geography. The skills for geography are generally acquired by students over a period of time and have three stages (Bartlett & Cox 1982).

> **Development Stage.** The students experience what the skill involves. It may entail such activities as reading, observing, listening, watching, and using scale and symbols on a map.
>
> **Application Stage.** The students use the skill through practical work, involving the actual performance of the skill. The students experience how the skill works for them, and how well they are able to use it.
>
> **Perfection Stage.** The skill is used automatically when required to complete a task. The understanding of its wider applications is developed. Several basic skills may be combined to make composite skills, and the transfer of skills from one situation to another occurs, such as applying measurement on a map to measurement on an aerial photo.

The teacher must incorporate objectives reflecting several skills categories that are essential to geography. The geographic skills presented in Chapter 5 are very useful for that purpose. They include developing skills in: 1) asking geographic questions; 2) acquiring geographic information; 3) organizing geographic information; 4) analyzing geographic information; and 5) answering geographic questions. These are composite skills that have embedded in them numerous skills components. Lesson and unit plans should include the skills components, leading to the use of one or more composite skills in some lessons and in the unit plan.

As an example, the following skill objective may be categorized under skill 3: organizing geographic information.

> **Skill Objective:** The student will be able to construct a map that is useful in organizing a verbal presentation about a global environmental issue such as drought, deforestation, or climate change. The map must have a legend, key, and scale suitable for showing relative locations (land masses, cities, and countries).

Embedded in the composite skill for organizing geographic information are the skills components of mapping, scale, legend making, key design, location of places, and interpreting the spatial attributes of the environmental issue shown on the map. The integration of those skills into the content of geography is an important component of lesson and unit planning.

Affective Objectives

Attitudes and values are always present in teaching, and geography provides an opportunity to deal with values and attitudes that have particular attributes. There are two major kinds of affective learning in geography.

1. Learning that examines or has students reflect upon the moral and values-based aspects of an issue that has geographical significance, such as environmental degradation, pollution, political and economic refugees, etc.
2. Learning that develops a sense of valuing or an appreciative attitude towards an aspect of geographic study, such as the landscape, environmental quality, cultural characteristics, ethnic diversity, etc.

Affective objectives are often stated in quite general terms. For example, the following affective objectives address important learning outcomes in geography.

1. Students will appreciate the natural and cultural beauty of a place.
   This objective focuses on the aesthetic elements of a place, and provides the opportunity to build a value for both the natural environment and the cultural conditions that are observed in the place.
2. Students will develop empathy for other cultures.
   This objective has a distinct geographical component. When students understand the environmental conditions in which people live, then their styles of living and behaviors can be better understood. The understanding of others and elimination of stereotyping is an important element of this objective.
3. Students will become involved as citizens of the community in which they live by studying and acting on an issue with geographical implications. Geography helps students develop attitudes and values that both reflect and contribute in a positive way to the community in which they live. As community members they make decisions that affect the environment, the way different groups of people interact, the use of resources, and the value the community places on quality of life. These issues are akin to geographic study and help students as citizens to make decisions, value judgments, and solve problems relative to the community (Stoltman 1990).

The geography standards discussed in Chapter 2 were written so they have little direct reference to attitudes and values. It is the intent that attitudes and values will be developed within the context of the local curriculum and community. However, we can look at how that might play out in a hypothetical way. For example, geography standard 16 states: "The geographically informed person knows and understands the changing meaning and importance of resources."

What opportunities are there for a teacher or curriculum committee to develop several affective aspects from standard 16, and how might they be stated at the unit and lesson level? At the unit level, the affective aspects of the standard may result in a statement such as: *The student will develop an appreciation of the ways that resources are viewed by different groups, how conflicting views of resources may result, and how those conflicts might be resolved.* The underlying value is to recognize the position of others regarding a resource issue, and to realize the values held by each concerned group. That recognition is important in facing the big issue about conflict resolution among groups regarding resource use.

At the lesson level, the affective objective may be stated: *The student will recognize the importance of a balanced use of water resources for recreational and industrial uses in the Great Lakes basin, and make recommendations regarding the resolution of conflicts among groups with different resource use interests.* The underlying value is for a balanced approach to resource use, including sustainable development and other alternative practices that protect the environment. The resolution of differences among individuals as well as groups will require judgments involving decisions about values. In some instances the local community may be a laboratory for such issues, but in other instances the value and attitude dimensions must be sought through the use of role playing and other methodologies conducive to affective learning.

Planning the Unit

Sound educational practice should always be based on planning large units of instruction and then selecting and designing lessons that complement the objectives of the unit. Units are components of a school, state, or provincial curriculum. While the broader curriculum statements may be general, the unit plan addresses the same curriculum issues, but in greater detail. The issues that emerge in unit planning result from the curriculum plan. They focus for the most part on four aspects; curriculum, content, activities, and assessment. These four planning issues may be expressed as a series of leading questions, first at the curriculum level and then at the unit level (Figure 3).

Curriculum	Content	Activities	Assessment
What are the objectives for the curriculum?	What content topics and issues are to be included?	What methods should be used to enhance learning?	What are the recommended ways to assess student learning?
What are the objectives for this unit?	What are the key concepts, information, and skills?	What teaching and learning activities/ methods will be included?	What specific kinds of testing will be included to assess student achievement of objectives?

Figure 3: Unit Planning: Issues and Questions

The unit plan should have the following components clearly specified.

1. Unit title, when during the year it is presented, how much time it is intended to take, and a statement about how it complements the curriculum for that grade.

2. List of educational resources necessary, such as AV, resource books, field study sites, computer, etc.

3. List of objectives for the unit, including those for knowledge, skills, and values/attitudes.

4. Design and plan for the presentation of daily lessons that will make up the unit.

The overall structure for the unit should be in place prior to the design or writing of lessons. It is important to consider the sequence of the lessons, the linkages of the concepts and skills that are presented, and the reinforcement and practice activities that are essential to the development of content understanding, skills competencies, and values considerations.

Planning the Lessons

The lesson plan is what the teacher uses as a guide in teaching one or several class periods. There are four fundamental ideas that should underpin the development of each lesson.

1. Lessons should be completed within the allocated time for the class. The best lessons are those built in stages, and each stage should be completed during the class period. A lesson should not be interrupted because time has run out. Usually this happens when there is a digression from the topic, and students are often experts at leading the teacher away from the lesson topic. In order to keep to the allocated time, there should be three specific stages to lessons.

Lesson Stages

Opening the Lesson

This may include an overview of the lesson, an interest generating idea, or both, that may be used to bring the topic of the lesson to the forefront. A review of a prior lesson or idea may at times serve as an opening for a new lesson.

Developing the Lesson

The main objectives of the lesson are developed here. It includes the necessary resources to complete the lesson and carefully selected ideas and suggestions for involving students in learning.

Closing the Lesson

The school bell should never close a lesson. Within each lesson plan there should be a clear suggestion for bringing a lesson to a close. The lesson close can be a short summary discussion, a memorable example from the lesson, or a practice session revisiting the big ideas developed. Concluding the lesson may also involve an assessment. It can be verbal, written, or entail demonstrations of learning gained from the lesson.

2. Lessons are enhanced if they have a variety of activities that engage the students in attaining the objectives. For example, the developing stage may take 35 minutes of the class period. During the development of the lesson, there should be two or three changes of pace. For example, one could be a fifteen minute video, followed by a five minute discussion, followed by fifteen minutes spent in cooperative learning on an assignment related to the topic of the video and discussion. The teacher should identify 15 to 20 different styles of activities that work well for the class and recycle them through lessons and units. Repetition of activities is appropriate, since the students will develop expertise in completing them in an efficient and effective way. The students will adopt the activities as models for working through issues, solving problems, and making decision about the topics studied in the lessons and units.

3. Lessons must be prepared in units rather than as single entities. There are literally hundreds of lessons available in printed resource materials. They are of limited use unless they can be placed in a unit context. In the classroom, lessons need a home within a larger unit structure. This enables the linear development through the unit, the school year, and the curriculum of objectives, skills, and value/attitude dimensions. Each lesson is a building block for the big ideas included in the unit.

4. The planning of lessons can have a major influence on the classroom climate. Some students may become behavior problems when they are not directed to a specific task. Lesson plans enable the thoughtful inclusion of meaningful tasks. The noise level of a room can be graphed during a lesson to relate the classroom environment, at various times during the class period, to the types of activities. Graphing lesson plans provides a good means to evaluate the lesson functions. It provides the teacher an opportunity to identify and promote those teaching methods that engage students and promote an academic, orderly group dynamic.

Using Technology for Unit and Lesson Planning

Lesson and unit plans require planning, and planning is time consuming. There are ways to make the planning process more efficient, to retain unit and lesson access so that revisions are easy and new materials can be added. The plan that is encouraged by the author of this chapter is called the screen and box method. The screen is the computer screen. The box is a basic storage box, such as a banker's box or a bottle carton.

The computer has revolutionized the ease of unit and lesson plan management. For example, teachers once learned to outline their unit plans on a huge sheet of roll paper by indicating days and lessons, and developing the lesson-unit sequence. It was difficult to use the rolled up scroll in class, but it did provide a means to design a plan with continuity, since a lesson could be viewed relative to any other lesson. A similar process entailed using individual sheets of writing paper and arranging them as a huge calendar on the living room floor. As each page was filled with essential information to the lesson and unit plan, new sheets could be easily added. Upon completion of the unit plan, the sheets could all be numbered and arranged in a notebook so that day-by-day progression could be followed.

Computers offer the best of both worlds. The software for regular word processing, such as Word Perfect and Microsoft Word have layout options whereby individual lessons may be viewed on the screen in an organized manner similar to being organized on a table or the floor. Desktop publishing software programs permit such a sophisticated arrangement of materials from a range of sources into printed lessons and unit plans. The real power of the computer for lesson and unit planning, however, comes in the ability to reorganize, to cut and paste, and to import materials from other files and sources. For example, a clip file of physical geography features may be copied and pasted on the lesson plan with the information highlighted that the teacher needs. The same clip art can be used to make overhead transparency masters to be used for group instruction, or to design a worksheet that the students might use as a resource in a cooperative learning activity. If it becomes apparent after the lesson that some additional information would have been helpful, then the lesson and unit are on disk and modifications can be made easily and quickly in preparation for the next time it is used in class.

The second part of the planning strategy is the box. Using storage boxes for unit resource materials is an excellent way to organize the items that the teacher and students will use. Students need to use maps, data, reference books specific to the unit topic, and numerous random topics including newspaper clippings, pictures, and the exemplary work of prior students. The design of a unit is the first step. The second, but equally important step in the planning is to develop a means to keep the unit organized. The screen and box method works well for many teachers.

Conclusions

Teachers, both experienced and novice, have the responsibility to professionally plan the lessons and units they use in their teaching. It is a challenge that lasts throughout a career in teaching, since information, methods, educational

philosophies, and the mission of schooling evolve with time and with the changing needs of society in general. These changes must be captured by objectives that guide planning for a sound geographic education. Objectives are the basis for designing and teaching lessons and units in geography.

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Biography

Joseph P. Stoltman is Professor of Geography at Western Michigan University, Kalamazoo. He is the author of numerous articles and books that address the teaching of geography. His many activities in geographic education include service as coordinator of the Michigan Geographic Alliance, co-director of the Michigan Geographic Frameworks Project, and member of the Commission on Geographical Education of the International Geographic Union. He was recipient of the George J. Miller Award for Distinguished Service from the NCGE in 1988.

4. Ideas and Teaching Strategies for the 1990's

Cathy Riggs-Salter

Abstract: Teaching geography in the 1990's offers teachers an enormous challenge. What students know and what they are able to do must prepare them for the workplace and have relevance to real world issues they will be concerned with as adults. In the discussion of new ideas and teaching strategies, this chapter revisits the High School Geography Project, pointing out the relevance of this powerful inquiry/problem-solving approach to teaching geography which was developed in the 1960's. Two newly developed geography projects are also explored in this look at creative teaching strategies available to teachers today. Strategies for taking geography from the classroom into the field are provided, along with an annotated sample of K-12 teaching strategies that include inquiry methods, cooperative learning, field-based learning simulations, role playing, teaching geography across the curriculum (using literature, art, math, science, music, poetry), and computer technology. Finally, new ideas and teaching strategies are discussed in connection with standards-based education.

Key Words: discovery and inquiry, problem-solving process, High School Geography Project (HSGP), Activities and Readings for the Geography of the United States (ARGUS Project), the Geographic Inquiry into Global Issues Project (GIGI), cooperative learning, teaching across the curriculum, geographic skills, geographic perspective.

Introduction

A geography teacher in the 1990's has a world of things to think about and some tough questions that need to be answered. What is geography? How does it fit into the state or provincial curriculum? What are the National Geography Standards and what will be done with them? How can World History and Geography be taught at the same time with justice done to both? Can geography be taught without a textbook? Are there any good geography textbooks available? How can a computer be used in a classroom with 35-40 students? Are field trips a thing of the past? Where does geography fit into the elementary school curriculum? How can geography content be taught effectively with a mix of ability levels and large class sizes? Are there some strategies that are particularly effective in the teaching of geography? Help!

Teaching Geography Through Direct Instruction

From the teacher's point of view, teaching from the textbook is probably the easiest strategy and the surest way to get through the volume of content that teachers are expected to cover in the course of the school year. It is also the safest strategy if the teacher has little or no background in geography, which is often the case, and suddenly finds she/he is expected to teach the subject. It is precisely that individual who asks, "What is geography?," and turns to a textbook for answers and teaching ideas. At the other extreme, are the teachers who find textbooks too limiting and advocate teaching geography without them.

Textbooks are valuable teaching tools in a geography classroom. Current geography textbooks are a source of pertinent geographic information - facts about physical and human geography as well as regions of the world; charts, graphs and diagrams that illustrate geographic information; readings and exercises that build geography skills; connections between geography and history; case studies on current issues; readings that reinforce students' understandings of major themes in geography; and practice in map reading and map interpretation. A good geography textbook also includes a table of country facts, an atlas, a gazetteer, and a glossary of geographic terms.
Atlases, are an important part of every geography classroom - one at every desk in the same way an English teacher

places a dictionary at each desk. If they are not handy, they gather dust in distant cupboards. Beyond simple location, students need to be introduced to the wealth of information that can be found in atlases. They can explore world comparison tables; find explanations for geographic features on maps; learn how to measure distances, and determine how to interpret map symbols; study political and physical features of the world and the regions of the world; explore historical changes to the physical and cultural landscape; and analyze special purpose maps (e.g., climate, settlement, economic activities, population density, rainfall, literacy) for various regions of the world. How a teacher uses a geography textbook and a classroom atlas, and the way in which one helps students learn by using these tools can become a very real part of teaching success.

Strategies for Developing Geographic Skills and Perspectives

Let me suggest a few teaching strategies that begin with a textbook, but then encourage students to seek additional sources of information beyond the text. If the textbook only emphasizes, "what," rather than, "how," and, "why," it is up to the teacher to design lessons that provide students with opportunities to think critically, solve problems, use geography skills, and inquire about real world issues. The following are strategies for extending students' research bases beyond the textbook and developing geographic skills and perspectives in the process:

1. Assign readings from the textbook as homework. This lays the foundation for discussion and research that will build upon the readings.

2. In small groups, have students identify key themes and major ideas from the readings and present their findings to the class. For example, in a chapter on China, students might identify the theme of transportation and the powerful role rivers play in China's economic and cultural life. Another key theme might be the continual pattern of environmental modification in China, creating changes in both rural and urban settings - terraces for agriculture, the bridging and damming of rivers, or the very densely settled city spaces in the eastern third of the nation.

3. Focused, small group research assignments as extensions to textbook readings are an excellent way to familiarize students with additional geography reference materials - classroom atlases, geography dictionaries, encyclopedias, gazetteers, handbooks on geography related issues (e.g., population, water, and background information on the social, economic, and political conditions of the world's countries), on-line databases, periodicals, printed indexes, maps, globes, yearbooks (e.g., almanacs), filmstrips, videocassettes, films, supplementary printed materials (print, case studies, essays), and simulations.

4. Work stations, or work centers, can be established around the classroom to house different reference materials. It will be the teacher's task as classroom manager to assemble the reference materials for the centers and arrange the classroom so that students will have easy access to the various work stations. (See suggestions in number 3 above.) By working cooperatively with the school librarian, students can have an even wider range of reference materials available for use.

5. Working in cooperative learning groups, students of differing abilities and skills can assess issues as they are presented in the textbook and compare those opinions with information gleaned from their research beyond the textbook. Analysis by students of potential prejudices and biases in textbooks and other research materials can be an effective way of discovering and criticizing racist, sexist, and ethnocentric attitudes in societies.

Geography Resources Handbooks

For additional ideas on creative geography resource materials and teaching strategies, see *Directions in Geography: A Guide for Teachers*, available in the National Geographic Society's Educational Services Catalogue (Ludwig, et

al, 1991). Another excellent geography resource handbook is *Geography: A Resource Book for Secondary Schools* (Hill 1989). This resource book includes an annotated listing of materials available for teaching and learning geography at the secondary school level. The annotated bibliographic information can assist teachers in the selection of course content and can be used for class assignments or special projects. A chapter on geographic data provides examples of many kinds of geographic data displays that can illustrate human and physical processes and characteristics (e.g., maps, graphs, tables, diagrams, satellite imagery, computer-generated imagery). The general reference works described range from atlases, gazetteers, handbooks, on-line databases, and teacher resource materials, to computer software, games and simulations, textbooks, and films.

Teaching Geography Through the Discovery and Inquiry Approach

When I began teaching, my geography lessons were designed almost exclusively around a textbook. I had almost no geography background and, therefore, found a textbook both essential for my own education and wonderfully comforting as a way to organize lessons. However, as I gained confidence in my own sense of geography, I began to explore materials beyond the classroom text and classroom atlases that were kept at each student's desk. It was in that exploration that I discovered a program entitled, *Geography in an Urban Age*, developed by the High School Geography Project (HSGP) - sponsored in 1961 by a committee of the Association of American Geographers as an effort to improve high school geography. This program opened the door for me to a whole new approach to the teaching of geography.

Geography in an Urban Age, used textbooks, games, and transparencies to teach about urban geography, manufacturing and agriculture, cultural geography, political geography, the environment and resources, and Japan. Direct instruction was replaced by analysis and inquiry-based learning. (Inquiry-based learning being an organized, directed search which is a step in the problem-solving process).

Reflecting on the HSGP twenty years hence, an activity on the city of New Orleans encapsulates the spirit and purpose of this extraordinary geography teaching resource. Students began the unit with an activity on location and growth of cities of the Midwest during the first half of the nineteenth century.

In the second activity, they focused on New Orleans which served as a case study. The student resource booklet provided students with a brief history of the city but suggested that there were many ways to find out more about the city - take a trip, write the Chamber of Commerce, go to the library and search the printed word, or ask one who knows the city well to answer questions about it. And, it went on to provide another alternative.

> *"You will be given some photographs taken from airplanes, and some maps. Using these sources, you may be able to learn some things about New Orleans with greater efficiency. These materials cannot answer all your questions and they may even raise some that will send you to the library or to another information source to find some sort of an answer"* (HSGP 1965: Unit 1, p.8).

After a brief introduction to aerial photographs, students were launched on a three-dimensional journey of discovery, exploring the development of New Orleans from its original waterfront site to its modern day metropolitan area. In that decision of the HSGP authors to move from having students simply read about the development of New Orleans to involving them in inquiry and discovery through, "reading," photographs, geography leapt from a passive teaching approach to an inquiry and discovery problem-solving approach.

Innovative Approaches to Teaching Geography in the 1990's

What is happening now in the way of new and innovative programs for teaching geography? Selected activities from The High School Geography Project are being revised and will be available in the future. In addition, a num-

ber of college geographers and classroom teachers are involved in the development of two innovative programs for teaching geography.

Geographic Inquiry into Global Issues (the GIGI Project) is a Natural Science Foundation funded project, directed by A. David Hill at the University of Colorado. The project is developing materials designed to help meet the goals of teaching responsible citizenship, modern geographic knowledge, and critical and reflective thinking. It is seeking to create challenging, useful, and relevant, issues-oriented materials in order to motivate students to learn geographic content, skills, and perspectives (Hill 1993: 4). The instructional design of the *Geographic Inquiry into Global Issues* project is issue-based modules developed for each of ten world regions.

Modules typically begin with a broad instruction to the issue. Then, a primary case study, lasting 3-4 lessons, examines the issue in a real place within the selected world region. Next, usually in a single lesson, students explore a comparative case study in a different region, which gives a variant of the issue and a sense of its global implications. Modules typically close by bringing the issue 'back home' through focusing on the issue as it may appear in the U.S., Canada or even locally. Program components include student DataBooks, teacher's guides with overhead transparencies, laminated mini-atlases, CD-rom with user's manual, videodiscs and thematic posters (Hill 1993:4).

Activities and Readings for the Geography of the United States (the ARGUS Project), is another innovative teaching approach currently being developed and classroom tested. The ARGUS Project is an NSF-funded materials development project to develop secondary-level materials for the geography of the United States.

ARGUS is a set of high-school geography course materials: a text, a book of readings, student activity manuals, and a teacher's guide. The four components are complementary rather than interchangeable. The core is a short text about some big geographic forces that shape the United States:
1) population geography;
2) economic geography;
3) political geography;
4) environmental geography (Hill 1993:8).

Students work with photographs, maps, diagrams, statistics, and short descriptions of specific places in the United States. Case studies illustrate how broad geographic principles interact to shape the landscape in particular places, and readings provide a variety of geographic perspectives on the landscape and people of the regions covered in the case studies. Activities give students opportunities to develop skills in analyzing real-world data, to use a variety of map types, and to apply major theories of geography.

Teaching Geography Today

What must accompany creative teaching materials in the, "new," geography is a way of thinking creatively about the classroom. The *Journal of Geography* includes many such teacher-oriented lessons throughout the year. As well, a rich source of teaching strategies and ideas that have been designed for K-12 geography classrooms today, appear in the annual July/August Teachers' Issue of the *Journal of Geography* from 1989-1993 guest edited by Kit Salter and myself. What follows is an annotated sampling of some of the K-12 classroom activities that have appeared in these issues. Many of them complement the inquiry approach developed in the HSGP materials.

July-August, 1989 (Volume 88, Number 4)

- Dwight Zirschky's, "*Traffic Light Geography*," chronicles how his 5th grade class utilized the five fundamental themes of geography in a community effort to get a traffic light installed at an intersection near the school.

• Kurt Martin's, "*Creating an Interactive Globe*," is a study of how his 5th grade class constructed a giant globe from a weather balloon and papier-mache, then designed geographic exercises around knowledge of global geography.

• Richelle Bragg and Micki McWilliams in, "*Cultural Exchange: A Video Pen Pal Program,*" use a five-themes approach and video technology to link their high school classrooms in Alabama and North Carolina, to compare life in two states.

July-August, 1990 (Volume 89, Number 4)

• Judy Bock's, "*Ride for Wildlife: The Fundamental Themes of Geography in Action*," chronicles how she introduced the five themes of geography (as they apply to Africa for her 8th grade gifted and talented students) and then planned a school fund raiser for endangered wildlife.

• John Daly's, "*Focus on Geography: Team Themes and Field Experiences*," is a middle school,"how to," study of a year of field activities built around Rachel Carson's concern for the environment.

• Trudi Kepner's, "*Quilt-making as a Window on the World*," chronicles and outlines a third grade quilt-making project that focuses on learning about variations among cultures - their communities, belief systems, and basic needs.

• Sally James', "*From Key to Shining Key*," is a lesson in how to create a,"living," vinyl floor map as a way to introduce geographic concepts and features of South Florida's environment to third grade students.

July-August 1991 (Volume 90, Number 4)

• Ray Jobin's, "*Trains, Tracks, and Nodal Regions*," is a hands-on community field study in which third graders determine - through map making, map interpretation and map analysis - how their own community became an important nodal region.

• Judy Morgan's, "*From Artifacts to Archives*," is a hands-on historical research exploration by sixth graders of their community using local artifacts, photographs, maps, clipping files, and oral histories.

• Billie Kapp's, "*A Magic Carpet Trip to Learning Geography*," uses poetry, music, games, science, math, cooking and student writing to bring geography alive in the elementary classroom.

July-August, 1992 (Volume 91, No. 4)

• Kathie Patterson and Linda Vetters', "*Geography of the Desert*," is an interdisciplinary elementary unit that utilizes cooperative learning and hands-on activities in the teaching of reading, writing, spelling, math, social studies, science, and art, centered around the desert as the central geographic setting and theme.

• Frederick L. Bein and Patrick Rea, a university geographer and a junior high school teacher, chronicle a U.S. Navy-National Geographic co-sponsored travel study to Japan using journal excerpts that focus on the link between the natural and social sciences.

• Henry De Vona in, "*Whales:Incredible Ocean Mammals*," creates a month-long integrated thematic unit for K-3 students on whales, incorporating reading, writing, speaking, listening, science, math, social studies, art, music, and geography - especially focusing on the theme of human-environment interaction.

• Marianne Kenney's, "*Harvest of Hope*," is an interdisciplinary science/geography project that provides students from two diverse high schools - one in Denver's inner-city, one in its suburbs - the opportunity to work in a cooperative community service effort, and at the same time learn about real world geography issues (i.e., thinking globally, acting locally).

July-August, 1993 (Volume 93, No. 4)

• Esta Gutierrez and Yvette Sanchez in, "*Hilltop Geography for Young Children*," created a year-long, integrated geography program for first and second graders in a hands-on laboratory approach to exploring their immediate school environment in rural New Mexico. "*Hilltop Geography for Young Children*," revisits Lucy Sprague Mitchell's discovery approach to geography for young children, described in her 1934 classic, *Young Geographers* (Mitchell 1934).

• David Lanegran and Patrice St. Peter, along with Jo Ann Trygestad and Jasmine Nelson wrote two articles on a U.S. Navy-National Geographic, Marco Polo study trip to Egypt and Greece through journal excerpts - the geographic perspectives of a college professor, a middle school teacher, a high school teacher, and a high school student.

The *Journal of Geography* articles are examples of teaching approaches that include inquiry, field-based learning, use of computers and videotapes, role-playing, community action, neighborhood as well as long distance field trips, journal writing, and simulations. These articles and others in issues of the *Journal of Geography* illustrate ways to teach geography through integration with math, science, literature, art, music, poetry and history. Additional articles discuss ways to make computers a valuable part of the geography classroom; illustrate how to develop a Macintosh hypercard geography lesson in the elementary classroom, and discuss field and community-based projects, and much more. Lessons in these issues can be easily adapted to your own school and classroom situation.

Designing a Lesson

For those new to lesson plan design, let me suggest a format that is a useful one for planning and sharing teaching strategies. What follows are two lesson plans that illustrate step by step how to incorporate a variety of teaching strategies that can be used to teach students about geography issues, one at the secondary level, the other at the elementary level. The lesson design followed is:

1. **An Overview**, or summary. What is the lesson about?
2. **Connection to Curriculum**. Where does this lesson fit into the curriculum?
3. **Suggested Grade Level**. For what grade levels is the lesson appropriate?
4. **Time**. Approximately how long will it take to teach the lesson?
5. **Materials and Equipment**. What resource materials and/or equipment are needed to teach the lesson?
6. **Objectives:** What should students know and be able to do at the conclusion of the lesson?
7. **Suggested Evaluation**. What are some ways to determine what students know and are able to do at the end of the lesson?

8. **Extending the Lesson**. What are some of the ways students of differing ability levels can extend this lesson on their own?

I. Secondary Lesson: An Example

Understanding the Dilemma of Landlocked Nations

Overview

Forty of the world's independent nations are without access to the sea - they are landlocked. With some exceptions, landlocked nations are generally small, developing countries with numerous social and economic problems. The following lesson plan, designed for geography and world history classes explores the background essential to understanding the problems that landlocked nations face.

Connection to Curriculum

This lesson is appropriate for the following teaching areas - history, social studies, economics, geography, international relations.

Suggested Level: Grades 7-12
Time: 2-3 class periods plus 3-4 hours of additional outside research time.

Materials and Equipment

The Rand McNally, *Goode's World Atlas;* world political maps/globes; The World Bank's, *Development Data Book;* current almanac; current *World Book Encyclopedia;* and a geography textbook.

Objectives

1. To define the term,"landlocked," and to identify the world's landlocked nations.
2. To point out some possible advantages and disadvantages of being landlocked.
3. To research social and economic data about landlocked countries and draw conclusions about the level of economic development of such countries.
4. To identify and understand the origin of problems that landlocked nations face.
5. To investigate how certain countries came to be landlocked.
6. To speculate on places that could become landlocked in the future.

Suggested Procedure

1. **Define**, "landlocked," nations: (countries without seacoasts).

2. **Pre-test** students on geographic knowledge about landlocked nations, such as:
   a. What percentage of the world is water? (70%)
   b. How many of the world's 194 independent countries are landlocked? (40)
   c. Are there more or fewer landlocked nations than before WWII? (more than twice as many now)
   d. What are typical characteristics of landlocked countries? (small and poor).
   e. List 4 continents with landlocked nations in order by most to fewest. (Africa-14; Europe-13; Asia-11; South. America-2)

3. **Prewriting Activity**. Have students **discuss/write** possible advantages/disadvantages of being a landlocked nation. (small group or individual activity)
   a. Advantages: Historically, being landlocked was not always a handicap because an isolated nation was protected from foreign wars, invaders, pirates, hurricanes, and the influence of outside, "inferior," cultures (barbarians).
   b. Disadvantages: After World War II, as more newly independent states struck out on their own and sought to join in a world of expanding

international trade, being landlocked became a serious problem. A lack of coastline diminishes trade; often forces a geographic dependence on neighbors; and the country is often victim to someone else's wars, dock strikes, or trade embargoes. They often have little with which to bargain.

4. **Discuss/research/speculate on** why some countries end up landlocked:
   a. An accident of geography, placing them in the interiors of continents or of vast empires which were later divided (as when Austria, Hungary, and Czechoslovakia ended up landlocked remnants of the Austro-Hungarian Empire after its collapse following WWI.);
   b. As a result of independence and the end to colonialism (especially in Africa);
   c. As a result of losing seacoast in war [Bolivia lost its seacoast to Chile in the War of the Pacific (1879-84)];
   d. As a buffer state (Mongolia, the world's largest landlocked nation, emerged as an independent buffer state lying between Russia and China).

5. **Use an atlas to locate and list** Africa's 14, Asia's 11, South America's 2, and Europe's 13 nations without seacoast.

Africa (14)	Asia (11)	So. Am. (2)	Europe (13)
Central African Rep.	Afghanistan	Bolivia	Switzerland
Burkina Faso	Nepal	Paraguay	Austria
Niger	Bhutan		Hungary
Mali	Mongolia		Czech Rep.
Chad	Laos		Slovak Rep.
Uganda	Kazakhstan		Liechtenstein
Rwanda	Turkmenistan		Luxembourg
Burundi	Tajikistan		Vatican City
Malawi	Kyrgyzstan		San Marino
Zambia	Uzbekistan		Andorra
Zimbabwe	Armenia		Moldova
Botswana			Belarus
Lesotho			Macedonia
Swaziland			

Suggested Evaluation

Group work, research, debate issues, oral reports, grade chart findings.

Extending the Lesson

1. In cooperative learning groups, have students use the World Bank's, *Development Data Book*, to **review various indicators** such as: life expectancy; literacy; population growth rates; GNP; merchandise exports; calorie supply; energy consumption; etc. Discuss the social and economic conditions which such statistics measure. (Note: Many of these social and political indicators are also illustrated in the special maps section of atlases, for example, Rand McNally's, *Goode's World Atlas*).

2. Assign students a landlocked nation. Have them **study and analyze** the social and economic indicators for their assigned nation. Have students locate their landlocked nation and identify its distinguishing physical and cultural features. Use a computer or a chart to have students record, by continent, the data they collect on the landlocked nation. What generalizations can be made about them? Compare the findings by continent.

3. **Research** problems of landlocked nations by having each student read about his/her landlocked nation in an almanac, textbook, newspaper, encyclopedia, handbook, etc., and explore evidence which might be a contributing

cause of their nation's problems. For example, Botswana opposed apartheid but maintained relations with South Africa which borders it on three sides.

4. Have students **write** an essay on landlocked nations in which they define terms, discuss causes and problems, and support their statements with data they have collected.

5. In small groups, ask students to **speculate** on places whose future might be landlocked. Some possibilities are - if Palestinian Arabs win an independent state on the West Bank; if Zaire's mineral-rich Shaba (Katanga) Province seceded; if disputed/divided Kashmir became independent from India and Pakistan; or if Iraq lost its slim access to the Persian Gulf to Iran - they would all be landlocked. Ask each group to **report their findings** to the class and identify the locations of these places on a wall map or in their classroom atlases.

II. Elementary Lesson: An Example

Africa: A World of Things to Do

Overview

Karen Blixen (Isak Dinesen) began her now famous book, *Out of Africa*, with the line, "*I had a farm in Africa, at the foot of the Ngong Hills.*" She proceeded to describe the location of her farm in relation to the Equator, and its altitude at over six thousand feet. "*The geographical position and the height of the land combined to create a landscape that had not its like in all the world,*" she went on to write.

Africa is a tapestry of colors and textures, of different faces on the land and on its peoples. This lesson is an attempt to suggest activities that introduce children to aspects of African cultures, as well as some of the themes of human, economic, and physical geography. It will also ask students to think about various ways that Africa touches upon their own lives.

Connection to Curriculum

Geography, history, economics, language arts

Suggested Grade Level: Elementary grades (can be adapted to upper grades)
Time: Each activity will take 1-2 class periods, and can be extended.

Materials and Equipment

Individual world outline maps (class set), pencils, colored pencils, outline maps of Africa, classroom atlases, VCR and TV monitor.

Objectives

1. To explore themes of human, political, physical, and economic geography relating to Africa.
2. To develop an awareness of how the students' everyday lives are touched by other nations.
3. To translate information they have learned about Africa into creative projects in the language arts.

Suggested Procedure

1. **Global Connections.** Most students are not aware of how their lives are touched by other nations. Include in your study of Africa a simple activity that helps students to understand the global connections between their local community and the world - and to Africa, in particular.

a. Have students contact local businesses, universities/colleges, and the Chamber of Commerce to obtain information concerning the community's

global connections (e.g., in the business sector, educational linkages, church connections, markets, foreign exchange programs, etc.).

b. On a world outline map, have students draw lines illustrating any connections between their community and places in Africa (e.g., a line with an African country's name and a product).

c. Discuss with students the positive and negative aspects of living in an increasingly interdependent world.

2. **Story Weaving.** There is a wonderful book called, *Why the Crab Has No Head* (Knutson 1987). This African tale retold and illustrated by Barbara Knutson is the basis for an activity which I like to call story weaving.

a. Have students select an African animal and create a story (weave a tale) about the origin of some characteristic of the animal -
   - How did hippos come to be vegetarians and water creatures?
   - How did the zebra get its stripes?
   - How did the elephant get such a long nose?
   - How did the giraffe get such a long neck?
   - How did the ostrich (a bird) become a land creature that sticks its head in the sand and buries its eggs?

b. Illustrate your animal tale with the animal's natural environment in the background.

c. Make a class book of African animal tales (animals in alphabetical order) by combining all of the illustrated stories.

d. Make a fabric cover for the book (use the African tie-dye method to simulate African fabric for your cover).

e. Include a page with chapter titles and authors (students' names).

3. **Geographic Themes in Southern and Eastern Africa.** Regions of Africa vary physically and culturally. The following is a look at some of the key themes of human, economic, and physical geography for the regions of Southern and Eastern Africa. The list is intended to give the teacher ideas for issues that gifted, or high achieving students might research, debate, and discuss. These issues can be used at the secondary level as well.

a. Pressures on the land:
   - runaway population growth, especially in Kenya and Zimbabwe;
   - shortage of agricultural land; nomadic pastoralism vs. settled agriculture;
   - humans/livestock vs. wildlife;
   - deforestation and impoverishment of ecosystems;
   - United States parallels/differences;
   - a day in the life of a capital-intensive grain farmer in the Midwest compared with that of a subsistence small-scale landholder in rural Zimbabwe.

b. Wildlife - Asset and Problem:
   - the value of wildlife - spiritual-mystical/actual;
   - Kenyan economy underpinned by tourism/wildlife; Tanzania, Zimbabwe, Botswana, Zambia seeking to expand tourist trade;
   - wildlife ranching, an alternative to livestock husbandry;

- the animals and their migrations (human obstacles, such as miles of fences bordering Botswana's seasonal watering place - the Okavango Swamp);
- poaching (ethics of Zimbabwe's shoot-to-kill anti poaching war; United States parallels and endangered species);
- Africa's wildlife - a global resource (the role of Western conservation agencies in animal preservation; the concept of sustainable development);
- game ranching as conservation paying its own way.

c. Urbanization:
- forces for urban expansion: national government and industry (perceived opportunities);
- forces against: continuing dependence on subsistence agriculture.

d. Physical Geography:
- origin and character of the Great Rift Valley; effects on human settlement, migrations, and wildlife;
- mineral deposits of the African shield - gold, copper, chromium, cobalt, uranium, - and their human consequences;
- patterns of vegetation and climate - west coast arid zone desert (similar to South America); moderating effect of altitude in the tropics (snow on Mt. Kilimanjaro at the Equator);
- African soils - not always rich.

Suggested Evaluation
Story-writing, group work, written and oral presentation of data and issues.

Extending the Lesson
1. Familiarize students with a variety of thematic maps relating to Africa - political, economic, vegetation, historical. Have students use maps to record information, locate places, compare regions, explain conclusions, etc.

2. Assemble books for students on the various cultural aspects of African life - clothing, food, music, art, dance, stories, daily life - to be used in class research and projects.

3. Read with students or guide them to books about Africa.

4. View landscape scenes (with music only) from films such as, *Out of Africa, Mountains of the Moon, Greystoke: The Legend of Tarzan, Lawrence of Arabia, The Gods Must Be Crazy, The Power of One*, NGS Specials, etc. Then ask students to describe geographic images from the films in some form of written style (travel journal, poetry, etc.).

Field and Community-based Learning

Places tell us so much about ourselves, our past, and our propensity for change. Field walks and research are opportunities for students to explore a city or their local community using four geographic tools - observation, speculation, analysis, and evaluation (Salter 1990). Mapping, sketching, and photography help develop students' observation skills. Surveying, journal writing, interviewing, collecting artifacts, making rubbings are ways students can collect information. Once students have observed the field study area and collected information, they can speculate on, and analyze information they have acquired, and evaluate their findings. Such explorations help students develop a geographic perspective concerning the essence of urban, suburban and rural places.

Field-based learning can happen at a number of different scales. In the years that I spent as a teacher in Los Angeles, explorations with my students ranged from the local neighborhood to the Midwest. These explorations can be divided into three categories:

1. **Local neighborhood field walks.** Students interviewed people who lived near the school, observed the condition of the neighborhood, talked about the economic health of the community with local residents and business people, learned something of the history of the locale from a local real estate office and longtime residents, and studied the area's physical geography. Students utilized geographic skills such as interviewing, observation, mapping and sketching, recording, analysis, speculation, and evaluation in this field-based exercise.

2. **Downtown field walks.** Field explorations to L.A.'s culturally rich neighborhoods and Central Business District involved trips to Chinatown, Little Tokyo, a Greek Orthodox church and market, a Thai Buddhist temple, Koreatown, and the Grand Central Market - the largest Hispanic open air market outside of Mexico City - as well as an urban park reclamation project being developed in an oil field in the Baldwin Hills. Students kept field journals in which they drew maps, recorded interviews, sketched buildings, wrote impressions and added photographs taken during the field trip.

3. **Urban-Rural field study.** Seventh grade geography pen pals in Los Angeles, CA, and Fort Dodge, IA, exchanged geographic information about their neighborhoods and regions of the country during the school year. What began as an information exchange grew into a student exchange. As a culminating activity, teacher and student exchanges were arranged with the help of the two communities. Exchange students - three from each school - made presentations about the physical, cultural, and historical aspects of their own city and region to classes, as well as to the local city councils. [Note: If the idea of a field trip outside of your state interests you, there are state geographic alliances in all 50 states, as well as Puerto Rico and Canada, with teachers who might be interested in a student exchange or joint geography project, (e.g., exchanging information using electronic mail, videos, computer data, etc.)] Small grants are available in some school districts that would help offset the cost of such an exchange. For information on state alliances, contact the Geography Education Program, the National Geographic Society, 1145 17th Street, N.W., Washington, D.C. 20036.

4. **Post field study activity.** In all instances, information learned on class field explorations led to students preparing teaching units which they presented to their peers, either in their own class or to other social studies and science classes. Students prepared pretests and post tests, visuals, overheads, maps, and information for discussion about the nature of their field experiences. Geographic information learned in the field was reinforced as students reported their findings to other students in their own classroom and classrooms they visited. Both as a class and as a school community, we discovered the richness of broadening our field of vision both literally and figuratively - and adding a geographic perspective to our lives.

National Geography Standards

Geography is an enormously exciting subject. As a teacher, you must deal daily with how to teach geography. You must also have a sense of what is relevant and important in geography to teach, at what grades to teach it, and what to expect of students as a result. The National Geography Standards (See Chapter 2) will help you teach geography by identifying what students should know and be able to do in order to be productive and internationally competitive citizens. In the sample lesson plans on landlocked nations and Africa, students are involved in an array of activities that go far beyond place location and listing skills. The geography standards, in the same way, encourage students to delve into the subject matter in depth. In that in-depth exploration, students have a real opportunity to absorb and apply geographic knowledge and skills in their lives.

The National Geography Standards are intended to be, "geography for life." It is therefore imperative that teachers provide students with skills for civic decision-making and for the workplace. In designing teaching strategies, you as teachers, must help students understand the connections and relationships that link them with people, cultures, economies, and events around the world. Finally, help your students become geographically literate citizens through their capacity to link knowledge of a whole world of subject matter with geographic skills and perspectives. The Geography Standards are a valuable educational resource that will help teachers do exactly that.

Conclusions

This chapter began with a consideration of a teacher's dilemma when faced with the call to teach geography with only minimal background in the subject. The chapter then proceeded to a discussion of textbooks as a traditional instructional approach to the teaching of geography. There is a definite place for textbooks in the classroom but teachers need to move beyond textbook instruction and introduce students to the wide variety of print and electronic materials discussed in this chapter, as well as in other chapters of this manual, if they are to meet the demands of geography's national standards. Elementary teachers, in particular, need to develop integrated, cross-curricular lessons and materials such as those illustrated in the sample elementary lesson on Africa, as well as in the Journal of Geography articles listed earlier in the chapter. And most critically, teachers at all levels need to build activities into their lesson plans which demand critical thinking, problem solving, skills building, and inquiry about real world issues.

Albert Einstein once said, "*It is the supreme art of the teacher to awaken joy in creative expression and knowledge.*" As a teacher in the 1990's, you have the opportunity to awaken in your students the joy and excitement of geography. What a grand calling and challenge that is!

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Biography

Cathy Riggs-Salter has been a secondary history and geography teacher for 17 years, four years in Nebraska and thirteen years in the Los Angeles Unified School District. From 1985-87, she directed a Geography Pilot Program, one of two in the nation sponsored by the National Geographic Society. At Audubon JHS in south Central L.A., she served as Social Studies Chairperson for eight years and began an Indian Education Program. From June 1987 - October 1988, she was employed in the National Geographic Society's Geography Education Division, working on the development of new educational materials, as well as new educational technologies for teaching geography. From 1986-93, she has been on the faculty of the National Geographic summer Geography Institutes, held in July at Society headquarters in Washington D.C. She currently serves as the Missouri State Geography Bee Coordinator, is an editor for the *Journal of Geography Special Teachers Issue*, and is involved in the National Geography Education Standards Project.

She is married to Kit Salter - her partner in writing, teaching, travel, and reading the landscape - and has two children - Hayden, an architect-to-be, and Heidi, author/illustrator of, *Taddy McFinley and the Great Grey Grimley*. She manages Breakfast Creek's geese, ducks, cats, dogs, birds, and assorted wildlife; gardens; cooks; cans; and creates bottled herbal vinegar. She is an active reader, an editor, and a journal writer. Among her proudest accomplishments are her years as a classroom teacher.

5. Teaching Geography Skills

R. S. Bednarz and S. W. Bednarz

Abstract: The best way to learn geography is to do geography. Geography is not just a body of content to learn, it is a way of approaching problems, of seeing the world, and of applying a range of skills to answer questions and develop new understandings. This chapter will introduce you to geography skills and show how they can be used to teach students geography. A brief inventory of the skills used by geographers and a teaching framework for the skills begin this chapter. A discussion of the importance of skills and the methods students use to learn skills follows. Next, the framework for teaching geography skills, including strategies for teaching and developing student skills is presented. Finally, an example illustrating how to use the framework to teach geography is outlined.

Key Words: skills, performance-based assessment, generalizations, map interpretation.

The Skills of Geographers

Geographers use a wide variety of skills. Some of these are generic; that is, they are not used exclusively by geographers. Other skills are unique to geography. Not surprisingly, many of the skills geographers use help them describe, analyze, and display spatial information. Sometimes geographers refer to the skills they use as, "tools."

Among the skills that are important to geographers as well as other academics are: library research techniques; field observation; graphic presentation, including making graphs, charts, and tables; quantitative analysis, including using statistics and modeling; computer techniques; and historical and qualitative analysis. These methods, tools, and techniques are used by geographers to understand the spatial aspects of a wide variety of problems, processes, and phenomena. Although they are not unique to geography, they become geographic skills when they are applied by geographers to answer geographic questions.

Another group of tools are used more exclusively by geographers. These include: cartographic techniques; geographic information systems; remote sensing; and modeling spatial and human-environment systems. These tools and techniques have a strong spatial orientation. Cartographic techniques involve all of the methods used to design and construct maps. Because communication through the use of maps is so important to geography, virtually every geographer is required to study cartography. Geographic information systems, and other computer mapping and analysis techniques, have become an electronic version of the pen-and-ink cartography of the past. These computer-based tools allow geographers to collect, store, analyze, update, and display large sets of geographic data. Remote sensing, the collection of information from aerial photographs and satellite images, gives geographers the power to collect information about large parts of Earth's surface from afar (Mather 1991, 140). Aerial photographs and satellite imagery provide geographers with information about Earth's surface and atmosphere that would be very difficult and time-consuming to collect otherwise. Modeling geographic processes or human-environment systems is a technique geographers use to try to understand the complex relationships that exist between and within the human and physical systems that operate on Earth. By mathematically or symbolically modeling what happens in the real world, geographers are able to carry out what-if experiments and to predict changes in either or both the systems.

Which of these geographic skills are important for K-12 students to learn? To answer that question, we must look first at the broad context of education. Today, public attention is focused on learning that is relevant beyond school walls. For many, the purpose of geography education is, "...to foster the development of citizens who will actively seek and systematically apply the knowledge *and skills* of geography in life situations," (emphasis added) (National Assessment of Educational Progress 1992, 3). Society recognizes the value of geography in preparing literate and able citizens who can use geography to make reasoned decisions, solve problems, and work effectively in a global

economy. Americans are calling for geography that fills the needs of society and the workplace. To respond to this call, teachers can engage students in a *process of inquiry* that challenges them to do geography and to develop their geographic skills. This process can be based on five core skills. Additional, ancillary skills that support the core are also important and are discussed later. The five core skills are:

1. asking geographic questions;
2. acquiring geographic information;
3. organizing geographic information;
4. analyzing geographic information;
5. answering geographic questions.

These broadly defined geographic skills, which mirror the scientific method, have proven to be an effective model for skill development.

The Five Core Skills and the Process of Inquiry

Although the core skills are broken down into five, separate activities, they are not isolated or discrete. They form an interlocking process and should be practiced and mastered in a way so students understand that geographic inquiry is a way of thinking that requires certain unique methods of analysis and observation. As you read this brief definition of the core skills and how they fit into a process of geographic inquiry, start making a list of the specific, ancillary skills which allow students to perform each core skill and complete inquiries. This framework of core and ancillary skills will be explained in more depth later.

Asking Geographic Questions
Successful geographic inquiry involves the ability and willingness to ask, to speculate on, and to answer questions about where things are, how they got there, and why they are important Asking and answering these kinds of questions give geography its unique spatial perspective. Speculation and hypothesis-development are key aspects of geographic inquiry. Speculating about possible answers to questions leads to the development of hypotheses that link the asking and answering stages of the process. Hypotheses guide the search for information that will answer the questions.

Acquiring Geographic Information
Geographic information is data about locations, about the human and physical characteristics of locations, and about the geographic activities and conditions of humans who live there. Primary sources of information, especially those derived from field work, are important in geographic inquiry. Equally important are secondary sources, such as texts, maps, statistics, and photographs; multimedia; computer-based databases; newspapers; telephone directories; and government publications. Tertiary sources, such as encyclopedias, which report information gained from secondary sources, are important in some research situations. Data acquisition skills include: locating data sources; observing in the field; systematically collecting and recording information; reading and interpreting maps; extracting information from graphs, charts, and tables; and interviewing.

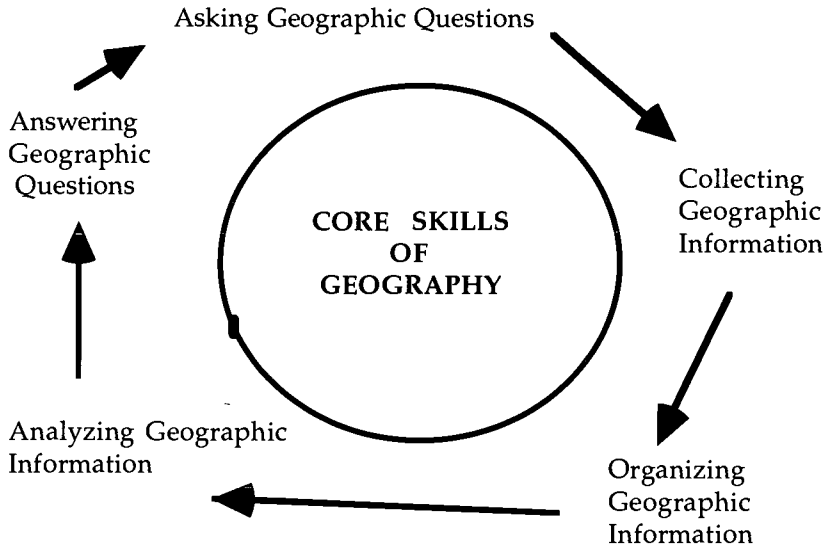
Organizing Geographic Information
Once collected, the geographic information is organized and displayed in ways which help with the analysis. Students must learn to organize observations and data systematically. Different types of data are separated, classified, and organized in visual, graphic forms: photographs, aerial photos, geographic information systems, graphs, cross-sections, climagraphs, diagrams, tables, cartograms, and maps. Written information from documents or interviews is selected and summarized into pertinent quotes or organized into tabular or graphic form.

Analyzing Geographic Information
As information is analyzed and interpreted, meaning emerges from the patterns or processes that are revealed. Observations of, or about, places are synthesized into a coherent explanation. Associations and similarities between and among areas are noted, patterns recognized, and inferences drawn from maps, graphs, diagrams, tables, and

other sources of information. Data are analyzed using simple statistics to identify trends, relationships, differences, and sequences.

Answering Geographic Questions

Skills associated with answering geographic questions include the ability to make inferences based on information organized in graphic form and in oral and written narratives. These skills involve the ability to distinguish those generalizations that apply at the local level from those that apply at a larger, more global, level. Generalizations are the key ideas that students should learn at the culmination of a process of inquiry. They help to codify understanding (Slater 1982, 47). Successful geographic inquiry ends with the development of generalizations and conclusions based on the data, observations, and evidence that has been collected, presented and analyzed. This is the last step in a process of inquiry. But it is not the end because the process usually begins again with new questions suggested by the conclusions and generalizations that have been developed. These questions, posed as hypotheses to be tested, provide a way to review generalizations. Each decision reached or problem, "solved," leads to new problems and new issues. Geographic learning is a continuous process that is both empowering and fascinating.



Why Skills Are Important to Students

Geographic skills provide the tools and techniques needed to do geography. They are central to the geographic perspective and are part of geography's distinctive approach to understanding patterns and processes on earth. These skills allow people to use geography to make informed personal, community, governmental, and business decisions. They enable individuals to analyze the wide range of spatial and environmental issues that are important to today's citizens.

Geographic skills are an important subset of the life skills that students must develop and use when they make decisions important to personal and community well-being. Personal decisions, such as where to live, where to work, how to get to work or a friend's house, where to shop, vacation, or go to school, all involve skills in acquiring and using geographic information. Daily decisions and community activities are linked to thinking geographically about all sorts of environmental and societal issues. Community decisions relating to problems of air, water, and land pollution or locational issues such as where to locate industries, schools, and residential areas require skillful geographic decision making based on the effective use of geographic skills. Business and government decisions, from the best location for a supermarket or a regional airport to issues of international trade and resource use, also involve the

analysis of geographic information.

Geographic skills help students make reasoned political decisions. Whether the issues involve the evaluation of foreign affairs and international economic policy or local zoning and land use, geographic skills enable interested citizens to collect information, analyze it, come to an informed conclusion, and make intelligent decisions about a possible course of action. Geographic skills also aid in the development and presentation of effective, persuasive arguments, an important aspect of participating in group decision-making and of influencing public policy. This application of skills begins at an early age and continues throughout life. It is the responsibility of teachers to model the use of geographic skills in real-world contexts. For example, under the direction of their teacher, a fifth grade class in Oregon collected information on the volume of traffic at a busy intersection next to their school. The students analyzed the information they collected and prepared maps and graphs that persuaded the Oregon Department of Transportation to have a traffic light installed (Zirschky 1989).

The nature of geography makes it important for students to develop skills that help them clearly observe patterns, associations, and spatial order. These skills guide students to see patterns and associations of objects in the landscape such as the complex of visual clues that indicate varying qualities of the environment in different neighborhoods. Many of the skills which students should master involve learning to use the tools that are part of the process of geographic inquiry. Maps are, perhaps, the most essential tools of geography because maps enable us to visualize patterns and relationships in space.

Other tools, such as remotely sensed images, graphs, sketches, diagrams, and photographs are also integral parts of geographic analysis. The rate of growth of an urban area can be observed by comparing old and new photographs. Large-scale, environmental, land-use changes become clear by comparing aerial photographs taken over a period of years. A new and important tool in geographic analysis is the spatial database, or geographic information system (GIS). Spatial databases are computer-based programs that link data or statistical information with locations. These systems make displaying the information on maps quick and easy. A GIS makes the process of presenting and analyzing geographic information less difficult and, thus, accelerates geographic inquiry. Spatial databases do not have to reside in computers; they can be developed in the classroom using paper-and-pencil methods.

Critical thinking skills are also used by students in the study of geography and to conduct geographic inquiry. They are not unique to geography; they involve a number of generic thinking processes, such as knowing, inferring, analyzing, judging, hypothesizing, generalizing, predicting, and decision-making. The goal is for all students to be able to move easily and readily from low to high levels of thinking.

How Do Students Learn Skills?

As you read through the discussion on skills, you will note that there are many different kinds of geographic skills. Some can be classified as cognitive or thinking skills including decision-making and problem-solving skills; still others involve motor skills. Most geographic skills are combinations of cognitive and motor skills. For example, reading a map can be a low-level, mechanical skill requiring the translation of symbols into language. Map interpretation, on the other hand, involves a complex process of synthesis, inference, and deduction as well as linking symbols to definitions (Cox 1989, 171).

Students learn skills by doing them. Here are some points to remember when developing learning opportunities which involve skills.

1. Skills help students to do something. Each skill should help students learn about geography. For example, learning to draw a cross-section and calculate slope gradient is not an end in itself. These skills are useful only in as much as they help students to understand how the relief of a region influences human activity in that area.
2. Skills must be taught in context and modeled by teachers if students are to implement them successfully. Skills

should be practiced and taught within the context of meaningful instruction in geography, not as separate, discrete items. Nevertheless, students must practice in order to become proficient. The more practice students have in drawing freehand maps to present spatial information, the more automatic and accurate this efficient means of presenting geographic information will become. But practice must be meaningful, not just repetitious.

3. How well students learn skills should be assessed through actual student performance. Authentic assessments require students to demonstrate their ability to integrate content and skills in a performance. These assessments may take the form of a series of meaningful tasks collected in a portfolio that documents the individual student's progress toward mastery of content and skills. Projects are a second form of assessment. They require students to develop and practice complex understandings and to employ the process of geographic inquiry. Teachers can develop performance assessments that help them to determine student ability to construct and use knowledge. Skills-based geography requires performance-based assessments and evaluations. (See Chapter 9)

4. Students learn skills in four stages: awareness, understanding, guided practice, and implementation.

Awareness. Students first must be made aware of the skill or series of skills you wish them to learn. They must understand why it is important to know about and be able to use the skill. Watching someone else use the skill, reading a detailed description of the skill, or viewing a video that explains the skill can be effective methods of making students aware. They should also be informed about the real-world application of the skill so that they understand why it is important to master it.

Understanding. Students must understand exactly what the skill entails. Demonstrations and modeling are helpful. Talk aloud as you model a skill. Try to break complex skills into component parts that can be explained separately. For example, in order to learn how to make an effective map, students must know the essential components of a map, and they must understand the steps involved in designing one (Anderson 1989). In learning how to solve geographic problems, students who have a step-by-step sequence that can guide their thinking processes accomplish this task much more effectively (Wilson 1989, 49). Before students convert climate data into a climate graph, it is useful for them to understand the purpose of a climate graph and to see how one is constructed. All of these understandings can be demonstrated or modeled by the teacher.

Guided Practice. Learners must practice the skill(s) in a comfortable, supportive situation. The idea behind guided practice is for the teacher to provide constructive feedback and to help students if they need assistance. It is sometimes a good idea to have students work cooperatively at this stage of skill development. When developing learning activities, the teacher should try to achieve optimal difficulty, not too easy but not too hard. Do not introduce new material and a new skill in the same lesson, especially if you expect students to complete the lesson independently (Brophy and Alleman 1990).

Implementation. Mastering a skill requires continuing opportunities to use the skill. Students must have many opportunities to implement their newly acquired abilities. Practice makes perfect, but avoid the repetition of meaningless practice. The goal is to prepare students to be independent, life-long learners who are able to use skills learned in your classroom.

Strategies to Teach Geography Skills

This section describes strategies which can help students learn the ancillary and core skills. Following the discussion of skill-teaching strategies is a table which lays out ancillary skills related to each core skill. These are arranged by grade level. They are the skills students should be able to use at the end of elementary school (grade 4), at the end of middle school (grade 8), and upon completion of high school (grade 12). For example, by the end of grade 4, under the core skill, "Organizing Geographic Information," students should be able to, "make oral and written reports, accompanied by maps, graphics, and other geographic data, to organize geographic information." To the right of each ancillary skill are examples of the kinds of learning opportunities teachers can structure to give stu-

dents practice in the skill. An example of a learning opportunity involving organizing geographic information in elementary school is to "organize a wall display which integrates maps, graphs, tables, and written captions on a geographic theme."

The skills students develop are cumulative and build on skills learned in previous years. Teachers must structure and sequence learning opportunities to teach these skills over a period of years until students are comfortable, able, and proficient. The information contained in the table suggests types of skills and performances students should be able to master. It is not comprehensive nor is it an attempt to exclude any skill not specifically mentioned. A detailed example of how to use the five core skills in a geography class follows the table.

Strategies

Asking Geographic Questions

It is important that students develop and practice skills in asking geographic questions such as *where* and *why there* for themselves. The task can be approached by giving students practice in distinguishing geographic from non-geographic questions and by presenting students with issues and asking them to develop geographic questions (Joint Committee on Geographic Education 1984, 22). A student should learn to pose questions about elements of the landscape he or she observes. Where is it located? Why is it there? With what other features is it associated? What are the consequences of its location and associations with other features? What is the place or thing I am observing? What are my perceptions of it? What are the perceptions other people have? What is the language used to describe this place? This skill area can also involve identifying relevant geographic problems and issues, or ways in which an application of geography can help solve problems or resolve issues.

Acquiring Geographic Information

To answer geographic questions, a student gathers information from a variety of sources in a variety of ways. Maps of all kinds are read and interpreted. Primary and secondary sources of information are compiled and used to prepare quantitative (numerical) and qualitative (verbal) descriptions. Data are collected from interviews, visual observations, field work, reference material, and library research. Together this information serves as a basis from which students begin to answer the geographic questions they have posed.

Geography teachers can help students master skills by arranging for learning experiences outside of the classroom in the community. These experiences include field work and community-based learning. Research in the community will give students the opportunity to use skills such as distributing questionnaires, taking photographs, recording observations, interviewing citizens, and collecting samples. Field work helps arouse student curiosity and makes the study of geography more enjoyable and relevant. Field work fosters mastery of the core skills by enabling students to observe, to ask questions and identify problems, and to hone their perception of physical features and human activities. In short, field work connects students' school activities with the real world in which they live.

Organizing Geographic Information

There are many ways to organize and present geographic information. Geography has been called "...the art of the mappable" (Haggett 1990). Making maps should be a common activity for all students. Students read (decode) maps to collect information and to analyze geographic patterns; they need to make (encode) maps to organize information as well. Making maps can mean using sketch maps to illustrate a point in an essay or to record field observations. It can mean mapping the location of resources on a world map using symbols, or it can mean producing a county-level map of income in a state. Students might even map the distribution of playground equipment or trash cans on a school playground. For students, making maps should become as common, natural, and easy as counting or writing. Students should be skilled in interpreting and creating map symbols, finding locations on maps using a variety of reference systems, orienting maps, finding directions, using scales to determine distance, and thinking critically about information on maps (Winston 1984, 4-6).

Although maps play a central role in geographic inquiry, there are other important and useful ways to portray data and other geographic information, visually. Graphs of all kinds, tables, spreadsheets, and timelines are valuable

ways to organize geographic information, especially when accompanied by clear oral and written reports. Creativity and skill are needed to arrange geographic information effectively. Issues of design, color, scale, and clarity are important in developing maps, graphs, and charts. Geographic information can be displayed using multimedia: pictures, maps, graphs, and narratives arranged to present a story, or to illuminate a generalization. Geographic information can also be organized and presented through poems, collages, plays, journal writings, and essays. Most state and national assessments and curricula emphasize conventional skills, especially map making, but the value of other means of expression should be considered. Every medium chosen to organize geographic information should stimulate inquiry and communicate clearly.

Analyzing Geographic Information

Analyzing geographic information involves seeking patterns, relationships, and connections. Geographic analysis involves a variety of activities. It is sometimes very difficult to separate the presentation of geographic information from its analysis. The two processes go on simultaneously in many cases. But in others, analysis follows the manipulation of raw data into an easily understood and usable form. Maps are carefully scrutinized to discover and compare spatial patterns and relationships. Tables and graphs are studied to observe trends and relationships between and among items. Data are probed through statistical methods to identify trends, sequences, correlations, and relationships. Texts and documents are examined to interpret, explain, and synthesize characteristics. Together these processes begin to lead to answers to the questions that first prompted the inquiry and to the development of geographic models and generalizations.

Many geography teachers are comfortable using simple mathematics and statistics with their students. Modern social, behavioral, and physical sciences all require an integration of quantitative (numerical) and qualitative (narrative) methods of inquiry. Today many teachers work in interdisciplinary teams. Geography and its process of inquiry offers an excellent opportunity to work with mathematics teachers (and teachers with other disciplinary expertise) to help students become numerate and literate.

Answering Geographic Questions

Answering geographic questions requires that students use the information they have collected, processed, organized and analyzed to make general statements about the real world. Students should use the results of their analysis to make decisions, solve problems, or make judgments on a question, problem, or issue. Skills associated with answering geographic questions include the ability to make inferences based on information presented in graphic form (maps, tables, graphs, etc.) and in oral and written narratives. In addition, students must be able to differentiate between those generalizations that apply at the local level and those that apply at a larger, more global, level. Issues of scale are important in developing answers to geographic questions.

Geographic generalizations can be made by using inductive reasoning or deductive reasoning. Inductive reasoning requires students to synthesize geographic information to reach generalizations. Deductive reasoning approaches the problem in another way. It requires students to identify relevant questions and then to collect and analyze information in order to test their hypotheses against their observations of the real world. Students should have experiences in both approaches to learning.

Students should also understand that there are alternative ways to reach generalizations and conclusions. There are many ways of knowing, many constructions of reality and meaning. Teachers should encourage students to develop multiple perspectives and to seek multiple outcomes to problems. This includes collecting many kinds of data from a variety of sources, including personal, subjective information.

Asking Geographic Questions

Ancillary Skills	Students should be given opportunities to:
Ask geographic questions, e.g., Where is it located? Why is it there? What is it like there? What is significant about it? How is it related to other people, places, and environments?	• ask geographic questions concerning places read about in books; • identify geographic aspects of current news stories; • pose geographic questions derived from their community, e.g., Where do my classmates live? How is land used in the area around my school and my home? Is it different? The same? Why? How far do my classmates travel to school? How long does it take? What mode of transportation do they use? What routes do they follow?
Distinguish among geographic and non-geographic questions.	• classify a list of questions as geographic or non-geographic; • analyze an issue and pose questions regarding the issue from the viewpoint of a variety of members of the community who are affected differently by the issue. Which questions are geographic and which are not geographic?

Acquiring Geographic Information

Ancillary Skills	Students should be given opportunities to:
Locate, gather, and process information from a variety of primary and secondary sources including maps.	• apply quantitative skills, e.g., count landforms, cities, lakes, population characteristics; measure distances; • obtain information from interpreting maps on characteristics of places such as climate, elevation, population density; • determine distance, direction, and size of places, e.g., mark and measure a region of interest on a map;
Observe human and physical characteristics of places.	• keep records of observations in a systematic manner ; • use aerial/satellite photos and topographic maps to identify elements of physical environment/human environment; • use field work to collect data and observations .

Organizing Geographic Information

Ancillary Skills	Students should be given opportunities to:
Prepare maps to organize geographic information.	• map the location of places, resources, etc., on outline maps at a variety of scales, using appropriate symbols, e.g., use point symbols of different sizes to locate largest and next-to-largest cities in a state; • draw sketch maps to illustrate geographic information, e.g., to provide directions to points in and around the community; to map the geographic information of narrative passages or stories; to locate the distribution of grocery stores in the community ; • organize information obtained from graphs spatially by preparing maps , e.g., interpret a bar graph of commodity exports by country to prepare a map displaying the same information using arrow-shaped lines of varying width; • create maps and other documents with information needed to communicate clearly, e.g., use a self-checking system such as TODALSIGs [Title, Orientation, Date, Author, Legend, Scale, Index, Grid, source] to prepare maps (Anderson 1986);

Construct graphs, tables, and diagrams to organize geographic information.	• organize quantitative (numerical) geographic information into bar graphs, pie graphs, and line graphs, as appropriate; • keep a daily record of temperature, precipitation, cloud cover, and other weather data in graphic and pictorial form; • prepare a diagram to illustrate a written description of a geographic process, e.g., the water cycle, the rain shadow effect, growth of a settlement.

Analyzing Geographic Information

Ancillary Skills	Students should be given opportunities to:
Use tables, charts, and graphs to observe geographic trends and relationships.	• prepare explanations of information obtained from graphs, tables, and charts, e.g., summarize climagraphs to produce a brief oral or written description of a location's climate and how that climate might influence agriculture, clothing, and other ways of life; • identify relationships among countries or regions evident from comparing graphs, e.g., compare social and economic indicators from different world regions obtained from data used in graphs ; • predict future trends based on data in graphic form, e.g., predict probable future outcomes from a graph showing past trends in world consumption of non-renewable resources;
Use maps to observe and interpret geographic relationships.	• use maps to make inferences, e.g., use a map showing the migration routes of humans at various periods of history to offer reasons for the migration and why they followed particular routes; • interpret maps to make decisions, e.g., use maps showing land contours, roads, and current land use to choose good locations for a proposed activity such as a new park, fire station, ski resort, or solid waste landfill; • compare and contrast maps of different types and topics to describe spatial patterns and relationships, e.g., use maps to describe the physical and human characteristics of a region and to compare and contrast it with other regions;
Use simple mathematics to analyze geographic data.	• use numerical information to describe and analyze geographic information, e.g., count the number of days of rain and sunshine over a period of time to determine the average for each; • compare and contrast places using numerical data to discover variation in patterns, e.g., plot weather conditions to observe monthly, seasonal, and yearly variations; • analyze graphs to make predictions and estimations, e.g., analyze a graph showing the ethnic distribution of population in a state to observe patterns and to predict future trends;
Use texts, photos, documents, and other sources of information to observe geographic trends and relationships.	• interpret and summarize information obtained from primary and secondary sources, e.g., analyze student-prepared questionnaires; • compare a variety of media such as photographs, maps, aerial photos, and field sketches to draw conclusions, e.g., • compare field sketches, aerial photos and maps to draw conclusions about the transformation of the landscape over time; • observe and analyze visual information, e.g., photographs, slides, cartoons, video, CD-ROM images, to make geographic inferences about the nature of a place.

Answering Geographic Questions

Ancillary Skills	Students should be given opportunities to:
Make both oral and written reports, accompanied by maps, graphics, and other geographic data, to present geographic information.	• organize a wall display which integrates maps, graphs, tables, and written captions on a geographic theme or to to answer a geographic question; • research and make an oral report to class and/or the appropriate public agency on a locational question, e.g., the best place to roller blade, to skateboard, to picnic, to create a biking and hiking trail, etc.;
Draw conclusions and make generalizations from geographic information and inquiry.	• make statements summarizing key geography ideas at the conclusion of learning opportunities, e.g., after watching slides of cities around the world, write a paragraph summarizing some functions of cities; • detect common elements and relationships in information to draw a conclusion; • recognize whether a series of statements forms a logical progression that explains an occurrence;
Apply generalizations to solve geographic problems and make reasoned decisions.	• use maps and an understanding of the friction of distance to help organize car pools, homework buddies, baby sitting networks, etc.; • test generalizations on threshold and range (how far individuals are willing to travel for certain goods and services) by conducting a survey on how far people drive or walk to shop for groceries in order to suggest the best location for a new grocery store; • arrange a series of activities in an efficient geographic order, e.g., the "best" (least time, most direct) route from school to a friend's house and back home.

Asking Geographic Questions:

Ancillary Skills	Students should be given opportunities to:
Identify geographic issues,define geographic problems, and pose geographic questions.	• analyze newspaper and magazine articles and identify geographic issues and problems related in the material; • apply the geographic perspective in developing questions about material in other subjects, e.g., language arts, history, science, physical education; • observe local issues relating to traffic, the environment, land use, housing, etc., identify geographic problems, and summarize aspects of these problems with maps, graphs, and written or oral statements.
Plan and execute a geographic inquiry to answer geographic questions.	• ask a series of questions to develop a description of a location; • identify and order a range of factors that should be considered in relation to an issue and identify a problem, e.g., • brainstorm factors pertaining to free trade agreements and order them in terms of their importance to the economic health and well-being of the United States and its allies.

Acquiring Geographic Information:

Ancillary Skills	Students should be given opportunities to:
Use a variety of research skills to locate and collect descriptive and statistical data.	• enter and retrieve information on a computer using databases, spreadsheets etc.; • know how to find as well as choose appropriate periodicals, census materials, databases, reference works, telecommunication networks, interviews, multimedia, etc., as sources of information; • conduct interviews and surveys to collect information.
Use maps to collect and compile information.	• use cartograms, such as one dealing with oil production, to prepare a list of major producers; • read aerial photos to recognize patterns apparent from the air and identify the patterns using a topographic map of the same area; • describe phenomena reported on a map, e.g., use dot maps to make statements about population per square mile in an area in 1930, 1950, and 1980.
Observe systematically, human and physical characteristics of places from field and other experiences.	• map information about land use from field surveys; • take photographs and/or shoot video or prepare sketches of human features (architecture and the built environment) and physical features (landforms and natural vegetation); • use the landscape as a source of information, e.g., cemetery headstones to collect data on death rates, to identify seasonal patterns in death rates, causes of death, country of origin, etc.; • view a variety of pictures and video images on a geographic topic to collect information, e.g., use slides, video clips and other visual sources to observe relationships between climate and vegetation.

Organizing Geographic Information

Ancillary Skills	Students should be given opportunities to:
Prepare various forms of maps to organize geographic information.	• use area data to create choropleth (area) maps, e.g., prepare a map showing areas of food surplus and deficit based on World Bank data on calories consumed per year per human; use voting data to map states that supported A. Lincoln in the election of 1860; • use graphs to plot information on maps, e.g., given a set of graphs showing per capita energy consumption in selected countries for 1980 and 1990, prepare graduated circle maps to show the data; • use isolines to map information, e.g., *physical* data such as elevation and rainfall; *demographic* data such as homicides in urban areas, to prepare a map showing regions of greatest and least personal safety; *historical* data such as isolines used to mark the extent of European settlement at different periods of time.
Prepare various forms of graphs to organize and display geographic information.	• use weather data to produce climagraphs; • use population data to produce gender/age graphs (population pyramids) for a variety of countries; • use computer programs to graph data from geographic databases, e.g., use an integrated word processing/database/spreadsheet/graphic program (ClarisWorks or Microsoft Works) to create a geographic database and graph the information in a variety of forms to determine which best displays the information.
Prepare various forms of diagrams, tables, and charts , to organize and display geographic information.	• create a table to compare and contrast data between and among different geographic regions; • use flow charts and diagrams to illustrate inputs, outputs, elements, feedbacks and other aspects of human and physical systems; • organize data into tables or diagrams to help make decisions or draw conclusions, e.g., use a preference-sorting diagram to organize data regarding places where individuals prefer to live, e.g., create a table to summarize data obtained from maps; graphically organize information obtained from questionnaires and surveys.
Integrate various types of materials to organize geographic information.	• prepare overlays of different types of geographic information (descriptive, statistical) to create a geographic information system, e.g., base map, vegetation map, contour map, land use map, etc., of a region; • organize materials for a multi-media report on a geographic topic which features, as appropriate, maps, graphs, diagrams, and pictures.

Analyzing Geographic Information

Ancillary Skills	Students should be given opportunities to:
Interpret information obtained from maps, aerial photographs, remotely sensed images and geographic information systems.	• draw inferences from information presented in maps, e.g., interpret environmental conditions from a variety of maps and other sources to explain the effect a logging operation has on physical systems ; • use a variety of maps to recognize areal associations and relationships between and among locations, e.g., similarities and differences between and among regions of the world at the same latitude; similarities and differences between and among urban areas in North America, Europe, and Japan;. • interpret information from overlays of maps and data to prepare a description of the geography of a region or place.

Analyze information obtained from a variety of sources (e.g., graphs, charts, tables, diagrams, texts, photographs, documents, interviews) using spatial and environmental perspectives.	• analyze, classify, and arrange information according to spatial variables, e.g., identify landforms by the process(es) creating them; characteristics of cities in economically developed, moderately developed, and less developed regions of the world; • sequence information into flow charts and maps to observe spatial patterns and relationships, e.g., the location, production and marketing of fossil fuels; • evaluate geographic information to identify possible bias or impartial perspective such as map projections drawn to distort distance or to present a particular geographic perspective, documents representing one viewpoint, etc.
Use statistics and other quantitative skills to evaluate geographic information.	• use data obtained from quantitative (numerical) methods of analysis to identify trends in data, patterns in data, and the variable nature of some data, e.g., prepare scatter diagrams to observe relationships among sets of geographic information such as, number of Asian food restaurants and percentage of immigrants from Asia; • process data to obtain information, e.g., use descriptive statistics (average, median, mode, range) to determine the nature of the distribution of a particular characteristic; • cross-tabulate the occurrences of two or more items to discover if the characteristics frequently occur in the same location, e.g., use data on cotton production and length of growing season to demonstrate a relationship.
Interpret and synthesize information obtained from a variety of sources, e.g., graphs, charts, tables, diagrams, texts, photographs, documents, interviews.	• analyze and explain geographic themes or characteristics in texts and documents, e.g., analyze newspaper stories to compare and contrast information and to develop explanations of events; • prepare written and oral explanations of geographic relationships based on a synthesis and analysis of information, e.g., •write a summary of the geographic diffusion of Islam by using maps, photographs of art and architecture from different regions of the world, etc.; • compare maps of voting patterns, ethnicity, and congressional districts to make inferences about the distribution of political power in a state at different periods of time (Reconstruction South, Post-W.W.II South, Present-Day South).

Answering Geographic Questions:

Ancillary Skills	Students should be given opportunities to:
Develop and present combinations of geographic information to answer geographic questions.	• prepare overlays of different types of geographic information (descriptive, statistical) to create a geographic information system, e.g., base map, vegetation map, contour map, land use map, etc., of a region; • develop and present a multi-media report on a geographic topic which features, as appropriate, maps,graphs, diagrams, video, and pictures; • draw sketch maps and graphs to illustrate written and oral summaries of geographic information.
Make and assess the validity of generalizations from geographic information and inquiry.	• reason about the best locations for specific crops by comparing a crop's requirements for moisture with a rainfall map; • select reasonable locations for service industries using population, transportation, and other kinds of maps, e.g., optimal location for a video rental store; • identify populations at risk for specific natural hazards, e.g., flood-vulnerable houses from a topographic map.
Solve problems by applying generalizations which represent a variety of different perspectives and suggest multiple solutions to problems .	• explain the type of agricultural practice likely to exist in a country depending on its level of economic development; • predict the types of food eaten in a country by considering cultural, economic, and religious characteristics; after forming generalizations about land use in the local region, determine what programs can be implemented to lower pollutants in a nearby watershed.

Asking Geographic Questions:

Ancillary Skills	Students should be given opportunities to:
Plan and organize a geographic research project, i.e., specify a problem, pose a research question or hypothesis, identify areas in need of investigation, and identify procedures for testing the hypothesis/answering the question.	• observe a series of maps of a region and list geographic questions suggested by the maps, e.g., What is the influence of land-division systems on road patterns, distribution of houses, efficiency of city services, etc.? • develop hypotheses which are based in geographic theories to develop questions and solve problems about local issues, e.g., traffic congestion, vandalism, pollution; • study several sources of graphic and written information, e.g., databases, graphs, photographs, first-hand accounts, to prepare lists of questions suggested by the information and organize an inquiry to answer them.

Acquiring Geographic Information:

Ancillary Skills	Students should be given opportunities to:
Systematically locate, gather, and evaluate geographic information from a variety of primary and secondary sources.	• gather data in the classroom and library through observation of maps; photographs; videos and media, such as CD-ROMs, telecommunication services, charts, aerial photographs, in addition to other non-book sources to identify, name, describe, order, sketch, measure and evaluate items of interest; • gather data by spatial sampling from secondary sources and in the field, e.g., place a transparent grid of squares on maps to count whether or not two characteristics (such as corn production and hogs or the distribution of cholera) that are hypothesized to be related coexist within grid cells ; • gather data in the field through observing, identifying, naming, describing, ordering, sketching, interviewing, recording, and measuring ; • apply simple quantitative methods to count and describe data (e.g., determine means, medians, and modes), e.g., collect data on social and economic indicators for different nations of the world, conduct simple statistical analysis, group nations as above or below the average, create categories to slot nations and defend categories orally and in writing.
Systematically assess the use and value of geographic information.	• distinguish between necessary and extraneous information while acquiring it (listing, grouping, categorizing, and labeling); • use paper and computer-based databases and spreadsheets to enter, sort, and retrieve data as needed to answer specific geographic questions, e.g., identify the appropriate geographic information needed to answer a question about the location of a dam from a list of data in a geographic information system.

Organizing Geographic Information

Ancillary Skills	Students should be given opportunities to:
Select and design appropriate forms of maps to organize geographic information.	• use various map symbols and ways of arranging them for particular purposes, e.g., use proportional dot and point symbols to show quantitative data; • produce dot (point) maps, choropleth (area) maps, isoline (surface) maps of data as appropriate to level of measurement (nominal, ordinal, interval) and type of spatial phenomenon (point, line, area, surface); • produce accurate maps of small areas using a compass, protractor, plane table, and measuring tape; map field data onto sketch maps, e.g., map geographic information from a transect (an urban walk, from a bus window) noting phenomena of geographic interest such as land use, housing styles, neighborhood ethnicity, etc.
Select and design appropriate forms of graphs, diagrams, tables, and charts to organize geographic information.	• use plots of the value of one item against another item (called scatter graphs) to display the association between the two items, e.g., relationships between land values and distance from the Central Business District (downtown); correlation between temperature and rainfall; • prepare diagrams illustrating geographic information, e.g., physical features from topographic maps; landscape sketches from field work; cross-sections from topographic maps; posters using graphic codes, e.g., ears of corn to represent number of calories consumed; • use line graphs to show changing patterns through time, e.g., rural population in the United States from 1890 to 1990; energy consumption in different regions of the world at ten-year intervals from 1950 to the present; telephone connections in the U.S., 1890 to 1990.
Develop and organize integrated summaries of geographic information using a variety of media.	• prepare integrated summaries on geographic issues featuring texts and documents; audio-visual materials; maps; and statistics organized into tables, graphs, diagrams; • summarize information obtained from questionnaires or surveys to identify and classify responses.

Analyzing Geographic Information:

Ancillary Skills	Students should be given opportunities to:
Use quantitative skills of analysis to interpret geographic information.	• produce descriptive and analytic statistics to support the development of geographic generalizations, e.g., develop a Physical Quality of Life index to support a classification system of world nations into standard-of-living categories ; • calculate ratios between local measures and national averages; • use a spreadsheet and weighting system to combine variables into a single index for ranking and decision-making.
Make inferences and draw conclusions from maps and other visual representations.	• compare maps of geographic information at different historical periods to determine relationships, e.g., largest urban areas at different historical periods to compare location and propose relationships between site, transportation technology, and urban growth; • interpret information from several maps simultaneously, e.g., maps showing family income, transportation networks, resources, and other data, to develop ideas on why some regions prosper and others do not; • reason about cause and effect from correlation, e.g., soil nutrient deficiencies and crop yields.

Interpret (involving analysis, synthesis, evaluation, and explanation) geographic information from a variety of sources.	• use a balance sheet model to evaluate costs and benefits of various decisions, e.g., alternative uses for land near a freeway exit; • detect relationships (areal, cause and effect, chronological, etc.) from the analysis and interpretation of data; • apply thinking skills to interpreting geographic information, e.g., identify lines of argument and points of view, possible bias, logical flaws in content and perspective, unwarranted assertions, inferences and conclusions, inappropriate selection of map symbols for particular data, etc.

Answering Geographic Questions

Ancillary Skills	Students should be given opportunities to:
Formulate valid generalizations from a variety of geographic information and inquiry.	• use the results of several case study analyses to speculate about a general relationship among characteristics (variables); • identify correlations between the location of different phenomena by examining maps and atlases; • use information on natural hazards and attitudes toward natural hazards in a specific region to develop generalizations regarding perception and hazards.
Apply generalizations to evaluate and solve problems based on reasoned decision-making.	• synthesize information to support a point of view expressed in written and oral forms, e.g., make choices comparing various viewpoints on land use, such as, whether to expand an existing airport or re-locate; • evaluate the feasibility of solutions to problems, e.g., alternative locations for a visitors' center in a wildlife refuge ; • apply generalizations regarding boundaries and other geo-political considerations in a simulation of long-standing cultural/ethnic tension.
Apply geographic models, generalizations, and theories to analyze interpret, and present geographic information.	• use a geographic model to predict consequences from multiple forms of data e.g., predict rates of soil erosion from generalizations about the interrelationships of soil, climate, slope, and land use; • choose the appropriate model to explain locations of various kinds of industry, recreation, and agricultural patterns in the United States; • analyze regional political case studies to make generalizations about the forces affecting stability in the region; • explain the results of geographic inquiry both orally and in writing, e.g., make a presentation to the city council on a town recycling program researched as part of a class project; • identify geographic questions in need of further investigation and develop new hypotheses as the conclusion of a process of inquiry.

Using the Skills to Teach Geography

The five skills can be used to structure a number of kinds of learning activities for students at all ages. As a process of inquiry, the skills provide a framework to organize long-term projects or investigations into local environmental and social problems. Many one- and two-period inquiry-type lessons mirror the five skills in their structure. For example, in the lesson, "Climographs and Deductive Reasoning" (Ludwig *et.al.* 1990), students are challenged to ask questions about the distribution and characteristics of world climate. Then they are given raw climate data that they organize and present by drawing climagraphs. In the final step, the students deduce the location of the climagraphs they have prepared, drawing conclusions and making generalizations about climate regions of the world.

The following lesson, designed for use in grades 6-8, features the five skills. It can be adapted to suit a variety of classes, subjects, and age groups.

The Five Skills and Geography: Everybody Counts!

Objectives:

As a result of this lesson, students should be able to:

- develop the ability to ask geographic questions and apply other geographic skills to answer questions;
- describe population characteristics of the United States in a variety of ways.

Procedure:

I. Asking Geographic Questions; II. Acquiring Geographic Information

1. Distribute a map of the United States with census regions and divisions drawn in and a set of data to students (Appendix 1 and Appendix 2). This lesson uses United States data by census region on these topics: population in 1980, population in 1990, population density, median income, percent rural population, percent urban population, marriage rate, divorce rate, birth rate, and energy use. Customize the size of the map and the data to suit your topic and ages of student. Older students can manipulate more complex state-level data; younger students prefer large-scale maps. In classrooms with computers, the data can be entered into and retrieved from a spreadsheet or data base.

2. Ask students to peruse and explore the data. Ask: What geographic questions can you ask about the United States from these data? Students may suggest questions such as:

- Where in the United States has the population changed most in the last decade?
- Where is the population of the United States most dense?
- In what regions of the United States are people wealthiest?
- What part of the United States is mostly urban? Mostly rural?
- Where is the marriage rate highest? Divorce rate? Birth rate? Is there a relationship among these?

Students may need some guidance in asking geographic questions, that is, questions that reflect spatial and environmental perspectives.

III. Organizing Geographic Information; IV. Analyzing Geographic Information

3. Divide the class into groups of four. Assign each a question to investigate. They must:

- develop a hypothesis addressing the question;
- map the data.

Students can create choropleth maps using different colors. An exciting alternative for middle school students is to use stacks of washers (1-1/2" lightweight washers work well) to make three-dimensional maps. Remind students

that they are developing an answer to their question. One group member should prepare to explain the results of their inquiry to the class. They must:

- title the map;
- develop a, "scale," for the washers or divide the data into categories;
- analyze the map and be able to explain the patterns they observe to other groups.

4. After students complete the maps, give them about ten minutes to observe other groups' maps, looking for interesting regional patterns and relationships among data mapped by the student groups. One student should stay and explain the map produced by his or her group to other students. Students should observe whether there are marked regional differences in distribution and whether distributions appear related.

V. Answering Geographic Questions

5. What do the maps and supporting information say about the question each group posed and the hypothesis they developed? Ask each group to briefly state its question, its hypothesis, and what it found out. Can students draw any geographic generalizations?

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Biographies

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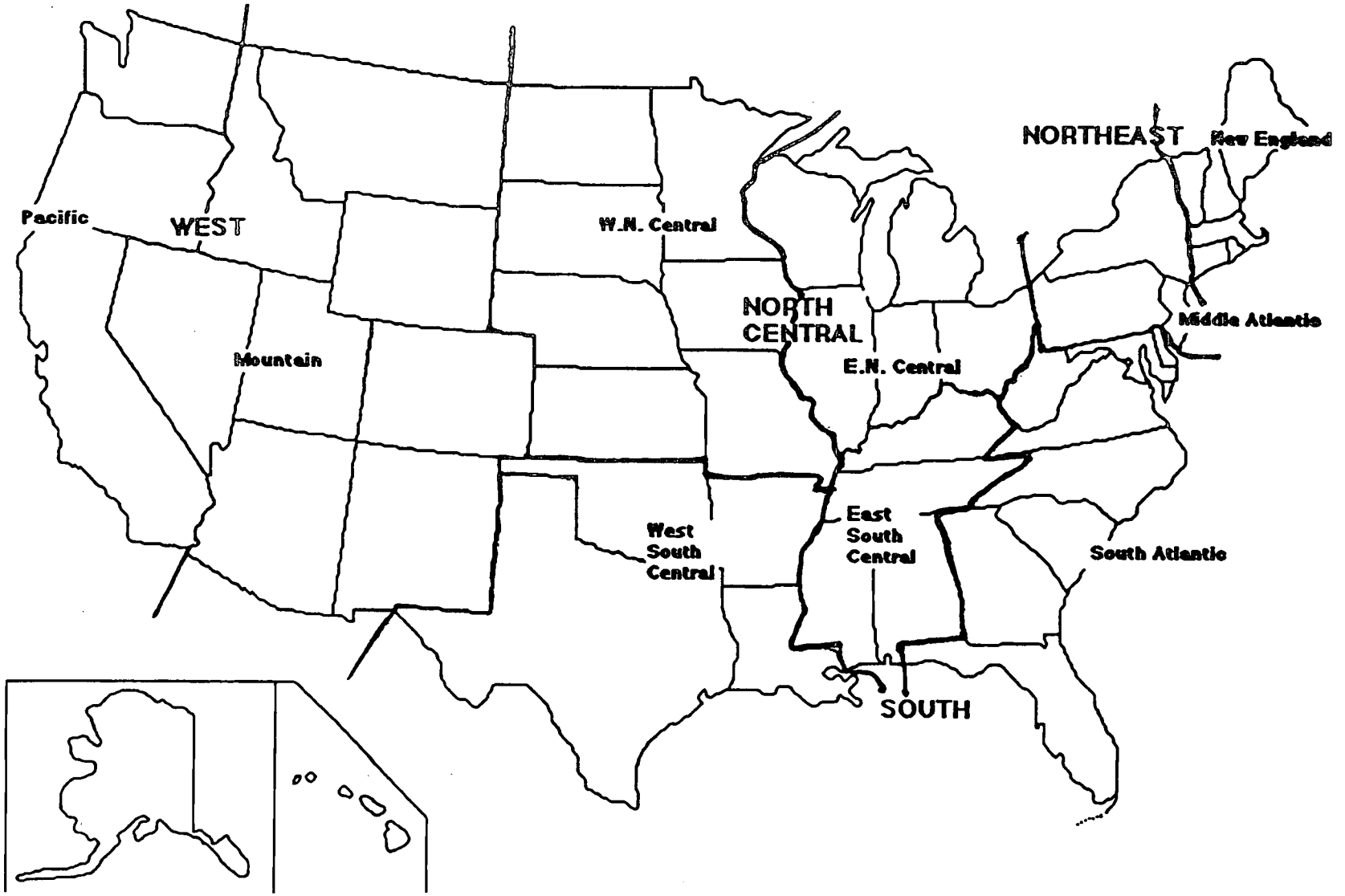
Census Regions Data

Census Region & Division	Pop. 1980 Millions	Pop. 1990 Millions	Pop.Per Sq. Mi. of Land Area	Personal Income Per Capita, 1989, in Constant (1982) $	% Urban	Marriage Rate Per 1000 Pop.	Divorce Rate Per 1000 Pop.	Birth Rate Per 1000 Pop.	Energy Use Per Capita (Millions BTU)
NORTHEAST	49.1	50.8	313.1	15,931	78.9	(NA)	(NA)	(NA)	247.2
New England	12.3	13.2	210.3	16,554	74.4	8.5	3.4	15.5	235.2
Middle Atlantic	36.8	37.6	378.1	15,715	80.5	8.3	3.2	15.7	251.4
MIDWEST	58.9	59.7	79.4	13,030	71.7	(NA)	(NA)	(NA)	331.2
East North Central	41.7	42.0	172.5	13,252	74.0	8.7	4.3	15.8	332.4
West North Central	17.2	17.7	34.8	12,505	66.3	8.7	4.3	15.3	328.4
SOUTH	75.4	85.4	98.1	12,413	68.6	(NA)	(NA)	(NA)	393.3
South Atlantic	37.0	43.6	163.6	13,182	69.4	10.4	5.2	16.1	288.4
East South Central	14.7	15.2	85.0	10,526	56.2	12.0	6.1	15.8	381.0
West South Central	23.7	26.7	62.6	11,406	74.5	10.8	6.0	17.8	567.7
WEST	43.2	52.8	30.1	14,125	86.3	(NA)	(NA)	(NA)	293.5
Mountain	11.4	13.7	16.0	11,983	79.7	10.2	6.3	17.7	326.6
Pacific	31.8	39.1	43.7	14,881	88.6	8.5	5.6	19.7	281.8
UNITED STATES	226.5	248.7	70.3	13,546	75.2	9.8	4.7	16.7	327.6

U.S. Census Regions & Their Divisions



6. "So, You Want To Read A Landscape...."

C. L. Salter

Abstract: Maps are evocative in their capacity to conjure up images of unknown places. However, it is not the map, but rather the landscapes of those places that are most powerful. In this paper a means of reading such landscapes in suggested so that the nature of place can be understood by people of any age. The **"O, SAE Can You See?"** methodology is a simple means of having students read the landscape as a primary document. Examples of urban, suburban, and rural scenes are explored as the four step methodology is carried from beginning to end. References include works that help anyone interested in seeing the world more completely, better understand how to plumb the meaning of a landscape.

Key Words: observation, field study, speculation, landscape analysis, evaluation, primary document.

Introduction

Geographers, when asked how it is that they have chosen this field for their vocation, often speak of their early fascination with maps. However, behind the love of maps lies a much larger reality. It is the landscape imagined when someone looks at the names, "San Francisco," "Paris," or "Beijing," on the map that engenders the real romance of maps - and of geography. It is the power of the mind's eye to conjure up images of places that makes a map so evocative. While the map serves as the most available access to places all across the globe, it is the image of the landscape captured by the name on the map that is the real attraction to that place. This article suggests an approach to making sense of the landscape images that lie hidden in those maps.

"Reading a landscape," is the way in which a geographer - or any student of landscape - attempts to make order of the nature of place (Hiss 1990; Lewis 1979; Meinig 1979). The cultural landscape - the environment that has been modified by human activity in an effort to remake segments of Earth's surface into more productive and satisfying settings - is the scene most often considered in such a reading. This modification of the landscape is one of the most fundamental of all human acts for it is a way of establishing a sense of place and gaining a sense of understanding exactly where you are. For the geographer, the primary act of landscape observation leads to the perception of patterns, of dominant and subordinate elements in the landscape, and a sense of well-being, or failure, in a locale. It is imperative that any student of the landscape, no matter the age, gain the skill to make landscape interpretation and evaluation.

Such a reading is also supportable in an educational framework because the act of such observation and analysis is akin to reading primary documents. Just as current curricular reforms are calling for more student interaction with primary materials, so too should geographers be requiring more field analysis. The cultural landscape is a primary document. It is in the patterns of shelter, transportation networks, recreation and market areas, and personal lawns and cemeteries that we have laid down our landscape preferences (Salter 1989). A philosophic tract can be written with some nonchalance. A housing tract is written with enormous fiscal and leisure time dedication. The vernacular landscape - the mundane collection of regular changes we make in landscapes as we establish our farmsteads, home, cities, and other human space - is a repository of considerable human investment of money and time.

If field work is meant to be more than just an escape from the classroom and the school grounds, the teacher ought to help students read the cultural landscapes that lie within easy reach of the students. As John Conron notes in the Introduction to, *The American Landscape* -

> *"Landscape" means, quite simply, the land's shape as it is seen from a particular and defined perspective. Land has no definable shape without that perspective. What is the shape of America? It has one*

shape when we see it from the moon, another, much more detailed but less extensive shape, when we see it flowing by a car window on Route 66 or enveloping us as we stand on an elevation in the Green Mountains or in a Michigan beanfield.

When, furthermore, we consider that "perspective" has a double meaning, that it applies not only to a physical outlook but also to a psychic outlook, we come to see that landscape includes both a physical and an ideal shape. It is both a cluster of physical facts seen from physically locatable points of view and the projection, the visible image, of a personal or cultural point of view - an ideal design of hopes, needs, values, and ideas which both shapes and takes shape in the landscape" (Conron 1973:xviii).

Seeing, and reading, the cultural landscape as a primary document lets the landscape bring its message to you as you learn to read it to see what earlier landscape authors have intended in their work (Samuels 1979; Tuan 1979; Clay 1987).

Teaching Approaches and Strategies

One of the most positive aspects of teaching and learning landscape analysis is that every classroom has access to the world in which this skill can be learned. There is, in that sense, no bad landscape. Outside the windows of every classroom, on the way from home to school, at the local park, farmers market, shopping mall, and on the screen of every television set exists a landscape waiting to be read. The cultural landscape is a truly universal resource.

Nor is this resource only available to a certain age group. From the child learning the way to navigate through a child care center's playground to a senior citizen's careful selection of a route from bank, to pharmacy, to home, there is landscape analysis going on. It is a skill that has application for everyone, and provides utility for their intersection with the real world.

To best utilize this domain for geography education, the teacher must make a decision about how to craft such learning so that it seems applicable to specific grade and school educational goals, and appropriate for student ages and levels of independence. I offer a simple approach to the reading of the landscape below.

"**O, SAE Can You See?**" the messages in the landscape? There are three absolutely fundamental essentials in reading the landscape, and I add a fourth element that I feel is increasingly vital to productive education. O,SAE embraces the full quartet.

"O" is for Observation.
"S" is for Speculation.
"A" is for Analysis.
"E" is for Evaluation.

Observation is where all geographic equations must begin. What is the nature of the scene being considered? What is the land use, the pattern, the distribution that the viewer is trying to understand? In the very earliest importance of geography, it was the news of things observed in a world unseen by the listeners around a fire or at a water source that gave value to a traveler's (perhaps the earliest geographer?) message. Making yourself clearly observe the scene in question is absolutely vital to any useful analysis. And, in making these first efforts at reading the scene being observed, recall the importance of perception as stated by John Conron above. Even so-called objective observation has the capacity to be shaped by the viewer's preferences, (e.g., the building has a shabby look vs. the building has a lived-in look vs. the building has an old-fashioned look may all describe the same facade in an urban landscape, but observed through three distinct sets of eyes and backgrounds).

Speculation is the assembling of evident information and probable or possible information into a whole. It is making a hypothesis about what has occurred, or is still occurring, to create the scene that is being studied. Speculation is an intellectual exercise that should be promoted for the sake of deduction and critical thinking. It is an essential stop on the way to developing a landscape hypothesis about a given scene, or a larger pattern of land use.

Analysis is the next step that must take place to bring the observations and the speculations into a more reliable total assessment. What information must be gained to support or reject the speculation? To whom might one turn to verify speculations about this scene? What information would one go after in the library to become more certain in the analysis of this scene? What answers does one need to complete the exercise of reading this specific landscape?

Evaluation is the element in this O,SAE quartet that may cause some teachers to become uneasy. How productively is this landscape being used? Is this an equitable, or an environmentally sensible cultural landscape? This is always a difficult question to pose for the range of answers is potentially very broad. However, all teachers impart values in their hours with students and, as geographers, one of the most useful skills we can teach is the willingness to judge a cultural landscape to be good, bad, or something else relative to some individual or societal standards. Part of this process is the determination of appropriate criteria for such judgement, and developing the capacity to read the success or failure of a cultural landscape helps one begin to understand what such criteria might be. In addition, one of the most frequently touted aspects of social studies education, wherein geography is most often nested, is the preparation of good citizens. Such citizenship will mean making intelligent land use decisions as adults. Learning to evaluate as part of the O,SAE process is a step in that very essential direction.

When we think of the language used in the promotion of expanded geography education, we hear again and again about land fills, recreation areas, wilderness areas, and timber vs. wildlife questions. The E in O,SAE brings the reading of a landscape to such a focus. Teaching evaluation of landscape scenes is good geography. Teaching students to think about the nature of the world around them and instruction in the consideration of its most effective and well-balanced transformation is good education.

Two Teaching Strategies for O,SAE

One of the beauties of this approach to reading the landscape - reading the primary document that we and earlier generations have labored over to manifest our wishes for a setting of accommodation and productivity - is that all landscapes can be interpreted, that is, can be read. There is nowhere on Earth where a landscape does not have explicit and implied messages to a reader about the nature of environment and human use of Earth. The essential quality in making this exercise successful is teacher motivation, ingenuity, and personal interest in landscape analysis.

However, for the sake of clarity, let me use the exercise to explore two different scenes using O,SAE. These examples can be expanded to any other scene.

One: Reading an Urban Scene

Urban parks are often a goal for class field trips. They provide space for activity, entertainment, and reasonable ease of seeing all of your students at once in a field situation (Jackson 1984). As you approach the park, ask the students what they see, what they notice as they are across the street and looking at the open land. You will, of course, find very distinct responses to this question depending upon the age of the class and individual student perspectives.

Give this exercise a map component so that in this **Observation** the student can develop the ability to chart land use, systematic inventories of landscape elements. By learning to weave together, observation, mapping, perhaps field sketching, the student is learning geographic skills that can be improved and utilized continually, no matter his or her age.

Consider this approximation of what might be noted in this **Observation**: trees, lack of houses, public toilets, play equipment, a ceremonial stage, bandstand, benches, pathways, people sitting around, children playing ball, a fountain, homeless people, bicycles, dogs, a police officer, men and women with baby buggies, a hot dog and ice cream vendor, a baseball diamond, a parking lot, and much more. A sketch map with notes and graphic detail can serve as solid, "reading notes," for such an exercise.

What can be learned from this observation, from this inventory? **Speculation** will include the ideas that this has always been a park, that old houses were torn down and this area was made into a park, that rich people wanted a place to walk in the early days of the city, that such space is for the children from all of the houses near the park, that the place serves for Fourth of July and other festival days, that children who do not have yards can come and play, that the city used to have more trees and now only the park has them, that gangs hang out in the park, that some high schoolers used to go there but now only, "geeks," go to the park and the, "cool kids," go to the Mall, or that a city has a park to show off its best face for other towns and people to see when they drive through the city. The elements noted here represent an approximation of what a Middle School field group might see in this exercise. The phenomena observed and the assessment made of such elements will, of course, change from age group to age group just as it might from place to place.

Analysis as a step in reading the landscape is an excellent entrance into purposeful library work. Where can the students find out how old the park is, who designed it (if anyone?), what kinds of trees are there, what used to be on that land. They can also have a productive time doing some simple interviews in an effort to find out where people come from to enjoy the park, what they like most about it, what they find frustrating about it, and what they would change if there were money in the city for more investment there, and would they be willing to pay an entrance fee for the park? All questions that come from the speculative process are starting points for more formal research. Searching out the answers to such questions is an important component of O,SAE for it forces a connection between field work and supportive and vital library and survey work.

In **Evaluation**, there needs to be a forum for thoughtful discussion about what a park means, and what specifically, this park means. How might the land be used if there were no park there? Would these be better uses? Is the park used by all sorts of people or do there seem to be some groups not evident? Is the park accessible for people who are physically challenged? Is the park safe? Is there an appropriate set of playground equipment there, and if not, what should be added, and how would it be paid for?

Such an exercise, except for library analysis, might be accomplished in one morning, or it might be parceled out over a few days with some class discussion, some library work, and some possible phone calls and interviews arranged. The teacher has the capacity to determine the nature of the investigation by simply deciding how important this particular landscape scene is to the teaching agenda. This approach, once experienced in a city park, can easily be translated to virtually any other urban setting or landscape.

Two: Reading a Country Scene

Sit on a bluff with a class overlooking a flood plain, farms, perhaps a small farm community, and a distant river. In **Observation** students will inventory such physical and human features as the river, a bridge, barns, farm animals, fence lines, roads, farmsteads, different crops, silos, clumps of trees, abandoned houses, farm machinery, old cars, a levee, round bales of hay, a church, a small town, and consciously created patterns on the earth between their location and the distant horizon.

In **Speculating** about the reasons for these particular landscape elements, students will talk about the river as a line of communication and transportation, irrigation, the bottomland soils, the clearing of the land for farming, the small town and its dependence upon farming and the river, the town being located where it is because of farming but also being threatened by possible floods, the transportation links between the floodplain population and the upland cities and other farmlands, and the richness (or the poverty?) in the appearance of farmland and community.

When was this plain settled? Where did the farming populations come from? How many of the people living in the small town make their living directly from the land? An effort at more complete **Analysis** will bring up questions about initial land cover, stages of land clearance and flood patterns, the population history of the town and the farmlands surrounding it as well as what crops are being grown now, and what crops were grown earlier? Again, the library will have many of the answers to these questions, but people in the scene itself will also have answers - and will generally provide them to students. To provide structure, the teacher may prepare a questionnaire. or develop a list of relevant questions for student use. In working with the A of O,SAE the teacher should encourage the students to see what else they want to know about this scene. Fashioning the correct questions for analysis leads to good discussion and is one of the most creative aspects of this exercise.

In **Evaluation**, the students will have to think about the river and its periodic flooding as it tries to reclaim the floodplain it has cut from the high lands on each side of its banks. Does it make sense to farm here? Does it make sense to have a community built on the flood plain and not upslope? Are these farms viable, or are they mostly maintained by governmental subsidy programs? Are the people who live in the town, and on the farmsteads, likely to stay with farming? Is this what the people would really like to do with their locale? Or, independent of the people in the scene, does this particular land use make sense to the students? Is this the best use of such land? Why? By what standards do the students answer this question?

Conclusions

There is a grand and refreshing simplicity to O,SAE Can You See? It provides a vehicle for exploration and discovery of any landscape anywhere. The teacher does not need a landscape of monumental scale or grandeur. Absolutely any scene can accommodate visual analysis as students "parse" the landscape and attempt to see what elements make up the content and the intent of the people who earlier modified the environment for some particular set of reasons. Learning to determine those reasons will help the student grow more comfortable with the fact that he or she will invariably be involved in some aspect of landscape transformation in their own lives, as a gardener, a home owner, an engineer, a farmer, or as a person making a decision about where to travel, where to recreate, or where to move.

Some of the power of this approach comes in having students learn to see more and more of what exists before them. Some of the excitement comes in speculating about what has been done and finding out that they are right. Even if they find that some of their speculations are incorrect, they learn something about the motivations and goals people have in reshaping the environment, just as they gain some experience in the design of an hypothesis.

Such learning is akin to reading a primary document and has a satisfaction that can be sensed by virtually all ages and in all settings. It is fitting that geography education be associated with such learning, such exploration, and ultimately such discovery, for it connects the landscape to the students engaged in the experience. There is grand general education in learning to read a landscape.

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Biography

Christopher L. "Kit" Salter who has his B.A. from Oberlin College, spent three years teaching English in Taiwan (Tunghai University) immediately after his 1960 graduation. He has his M.A. and Ph.D from the University of California, Berkeley. He taught 20 years at UCLA, spent about two years working full time at the National Geographic Society in Washington (he has been an active consultant in their geography education effort from 1985 to the present), and went to the University of Missouri, Columbia as professor and chair of the Department of Geography in December of 1988. His M.A. is on San Francisco's Chinatown, and his dissertation dealt with the geography of marginality and agricultural development in western Taiwan. He has published over 100 articles and defines himself as a cultural geographer with major interest in the American landscape as a source of identity, landscape and literature, China, and during the past decade especially, geographic education. He shares life with Cathy Salter, an author and educational consultant. They live in Breakfast Creek, a small farm in southern Boone County, Missouri.

7. Using Maps in Classrooms

Carol Gersmehl

Abstract: This chapter encourages students to explore geographic patterns displayed in thematic maps and to recognize locational frameworks provided by the maps. Furthermore, it asks students to compare several different thematic maps. The nine maps focus on Africa and illustrate cartographic generalization in isoline, proportional symbol, and choropleth maps.

Key words: thematic maps, spatial frameworks, map comparison, cartographic generalization, Africa.

Overview

Graphic images, a series of nine maps, are the core of this chapter. Each map concentrates on one main theme, but the separate topics are related to each other. To facilitate comparison among topics, short paragraphs outline activities that highlight relationships. All of the maps focus on Africa and include frameworks that aid overlay of different themes.

Representation

This chapter uses a "language of maps." Maps are representations; their images stand for physical characteristics and spatial relationships in the real world (Ottosson, 1987). Map images usually are flat, maintain systematic euclidian relationships among objects, and choose to show only a selective generalization of the actual world (Robinson et al., 1978). Each cartographic image presents a miniaturized version of something that is actually much larger. Maps provide grand overviews; they take scores of miles and reduce them to something that we can comprehend in a single glance (Raisz, 1938). For example, Figure 1 shows half the world as if seen from a great distance.

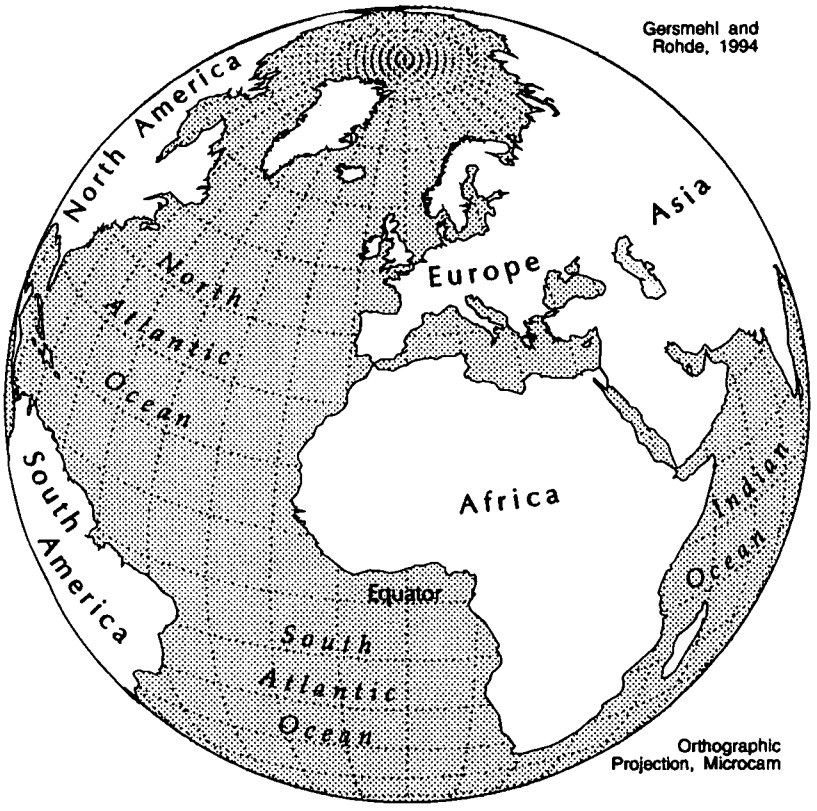


Figure 1. Continents and oceans near Africa.

From this vantage point above Earth, the major distinction is between continent and ocean. In a sense, Figure 1 lifts us out of our chairs and gives us the perspective of astronauts. Map readers are not actually orbiting Earth, but they see an image that represents basic positions and proportions of land and water near Africa.

Figure 2 enlarges Africa; its larger scale brings the map reader closer to a patchwork of nearly 50 nations.

Although a space shuttle astronaut could not literally see national boundaries, these borders are meaningful to people living within them. War and famine may rage within one nation while peaceful elections rule inside another. One country benefits from oil reserves beneath its territory; a neighboring land may provide refuge for endangered species. Figure 2 serves as a miniature stage upon which students can arrange other themes. When we turn to the next thematic map, we shall see why three of the countries in Figure 2 are shaded.

Patterns

Geographers who make maps (Cartographers) often encourage students to look for geographic patterns; for example, *"the main thing to be read from each map is the geographic pattern of the phenomenon shown"* (Borchert and Yaeger, 1969). Thematic maps focus primarily on one topic because cartographers want map readers to notice where the topic is intense, frequent, and high in number or rate. For example, Figure 3 shows the network of major rivers and lakes in Africa.

They appear plentiful in some regions and absent in others. Ideally, students first would recognize and remember geographic patterns and then later try to explain them.

ACTIVITY:

Students could describe where major rivers are present and where they are absent. There are several ways to describe location. A sophisticated response might specify that major rivers are absent between 20°N and 30°N latitude in Northwest Africa while a more general answer might be that the upper left bulge of the continent lacks major rivers. On the other hand, major rivers are plentiful near the equator and in Eastern Africa or in the center and along the right hand side of the continent.

Frameworks

The previous activity asked students to specify where the phenomenon occurred. Maps provide information about spatial relationships. *"The meaning of a cartographic message is not contained in the symbols themselves, but in how they are arranged"* (Guelke, 1979). Often when map readers specify where something is, they indicate where it is in relation to something else. If cartographers want map readers to remember a geographic pattern, then cartographers should provide a rich context for the map theme. Petchenik (1977) stressed that map readers construct meaning from maps, especially when the maps provide locational, "hooks," as a framework for the thematic pattern. Respecting these suggestions, this chapter provides a latitude-longitude grid behind the familiar landmass of the African continent so that the series of maps will share a common framework.

Comparisons

Ideally, if a student remembers the geographic pattern of one topic, that theme might serve as an explanatory framework for other topics. For example, Figure 3 shows networks of major rivers in Africa. Students might use the map of rivers, not as an isolated set of information, but as background for exploring other topics. Subsequent paragraphs ask map readers to compare a series of themes: major rivers, elevations, precipitation, population, cropland and forested land in Africa.

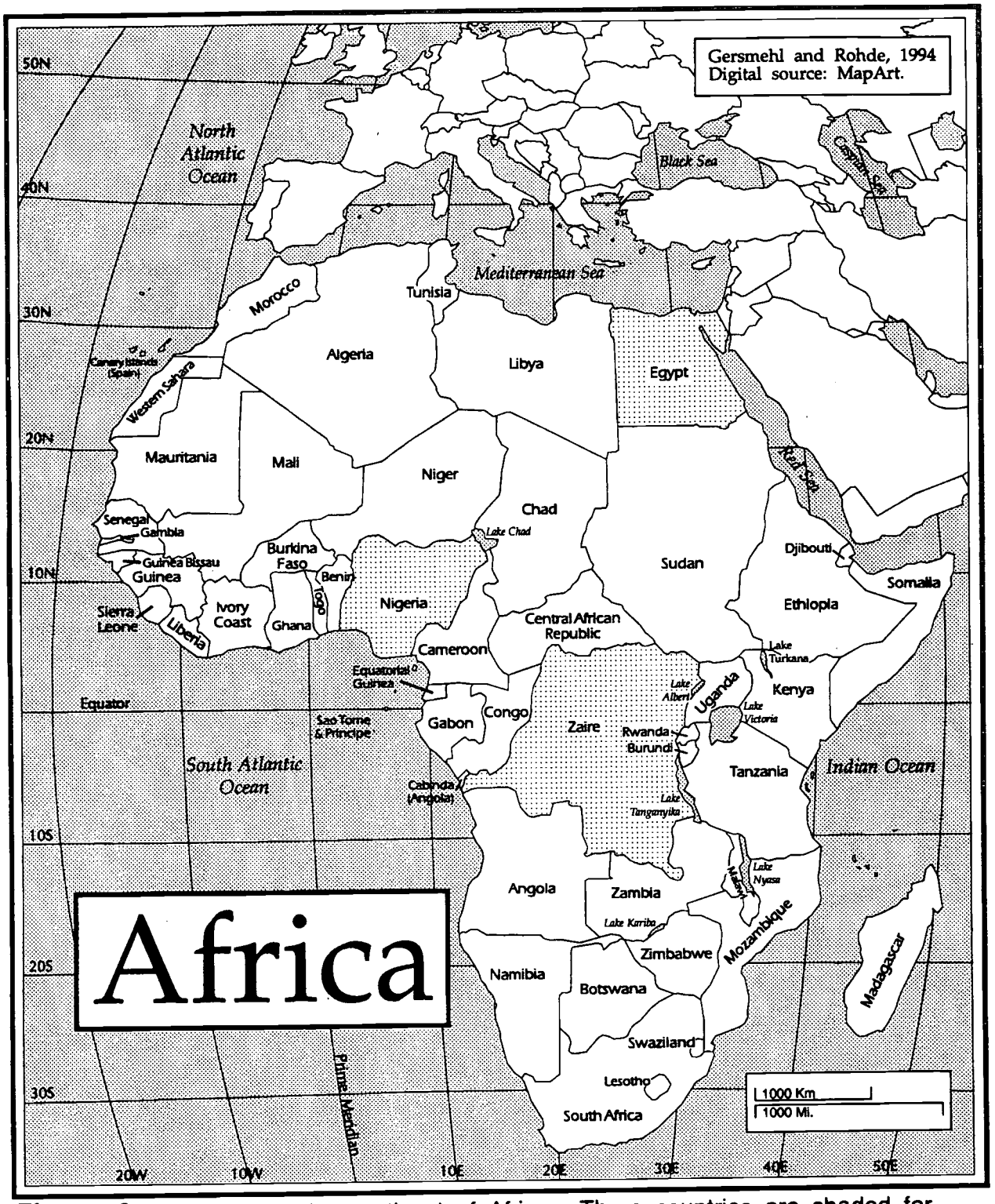


Figure 2. Countries in the continent of Africa. Three countries are shaded for comparison with Figure 3.

ACTIVITY:

In Figure 3, major river systems (Nile, Niger, and Congo-Zaire) flow into oceans or seas. Compare country boundaries in Figure 2 with Figure 3, and identify countries where major rivers meet the ocean. Thus, Egypt, Nigeria, and Zaire are shaded on Figure 2. In an initial look at Africa, students do not need to memorize the location of every nation. Instead, they can concentrate on a few with significant waterways. This is one way to tackle, "big things first."

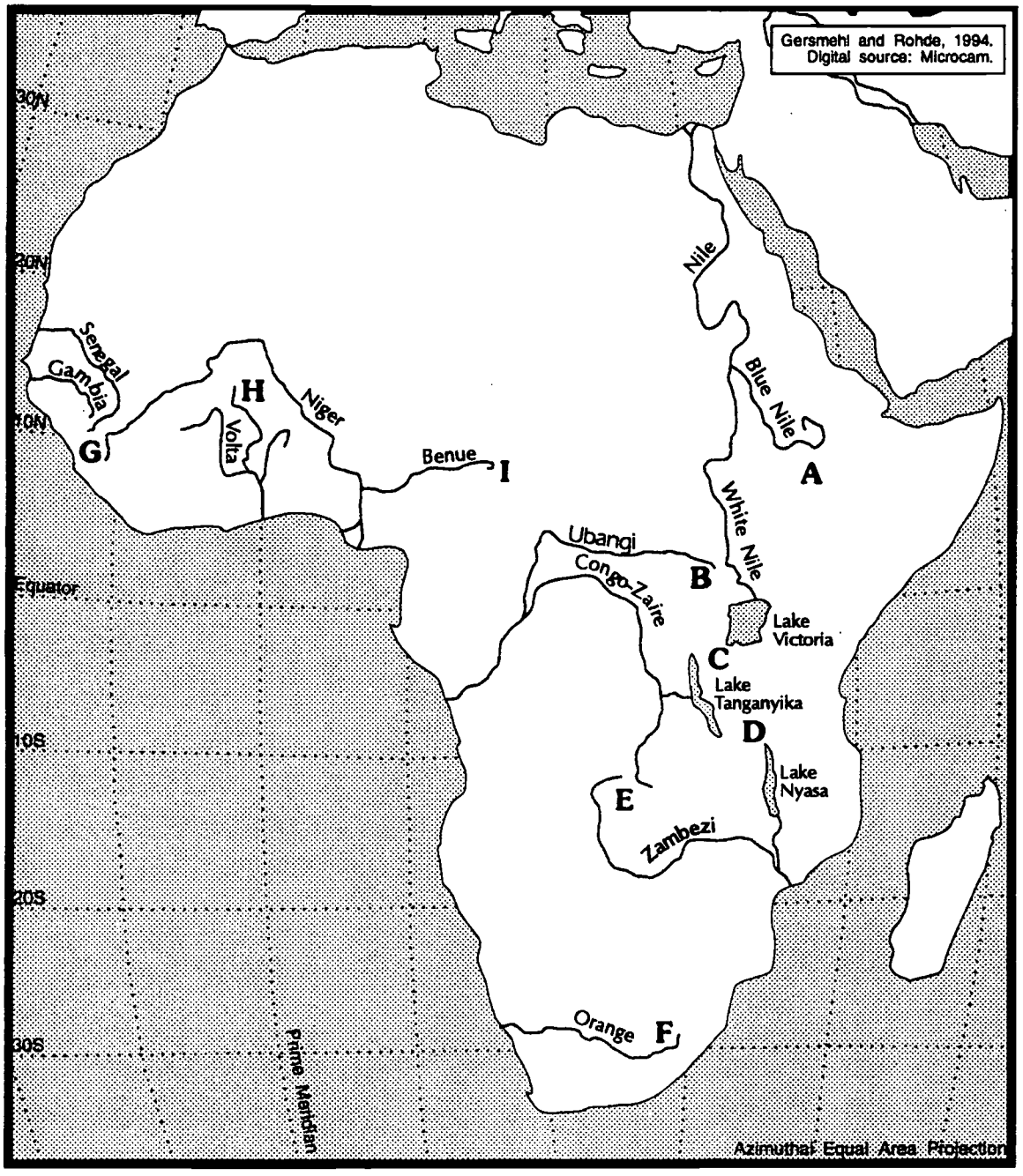


Figure 3. The Fundamental Themes of Geography

The arrangement of major rivers in Africa raises several questions. Why do rivers begin in certain parts of the continent? What would the landscape look like at the origin of the rivers? Other maps provide clues to answer these questions. Figure 4 shows the major rivers against a background of elevation.

This elevation map is a typical isoline map; it uses lines to separate Africa's landscape into a few elevation categories. Figure 4 gives up complexity in order to gain a general picture, so students can more easily notice elevation patterns. Where are the intermediate and high categories located?

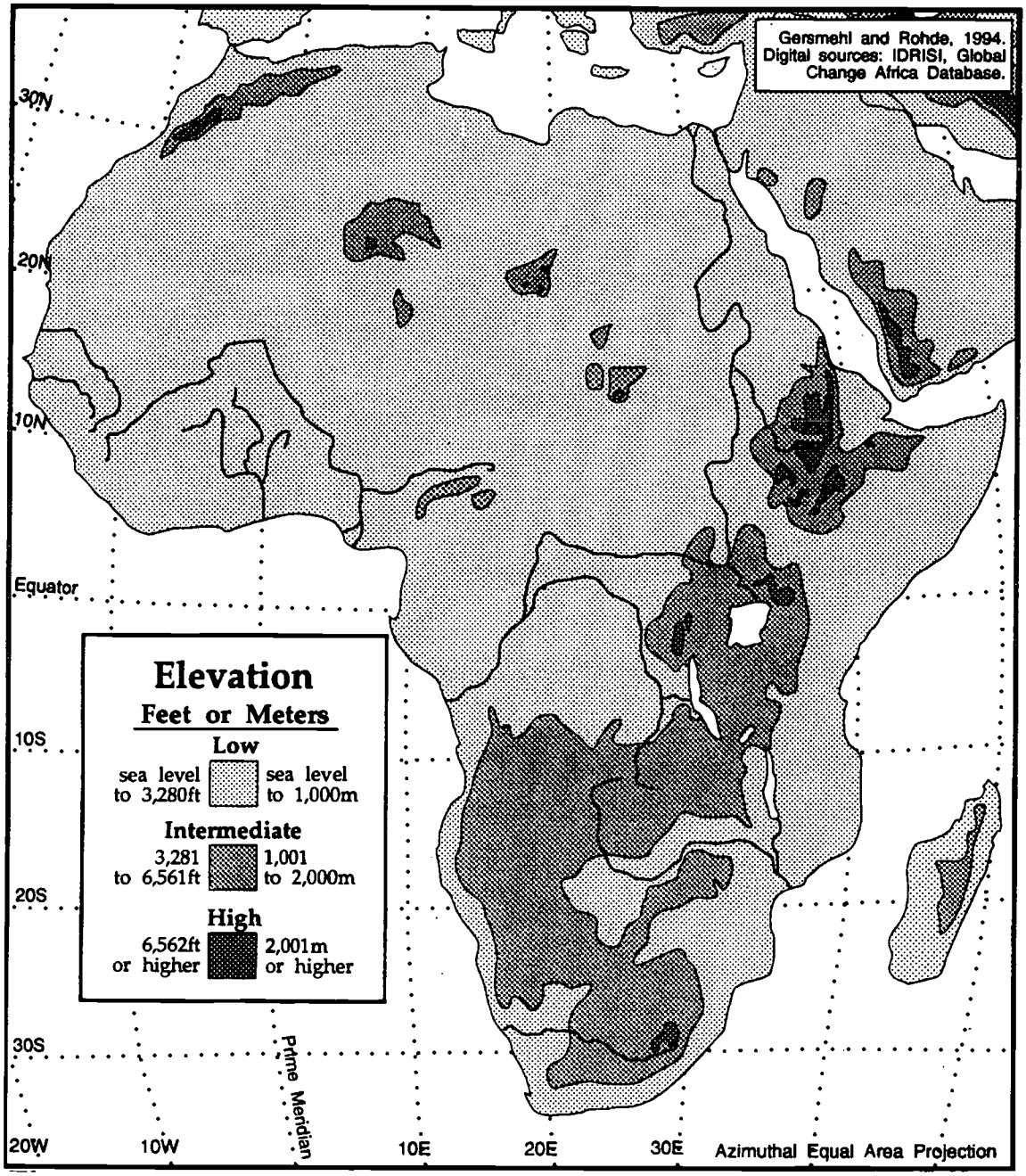


Figure 4. A generalized picture of land elevation.

ACTIVITY:

Look at river origins in eastern Africa, near letters A through F on Figure 3. Find these same rivers on the elevation map (Figure 4), and write their names (Nile, Ubangi, Congo-Zaire, Zambezi, and Orange). What seems to be the relationship between river origins and elevation? Transferring river names from one map to another focuses attention on the relationship between those rivers and the elevation theme. (Rivers that start near letters A through F originate in high and intermediate elevation categories. These rivers flow from high to low elevation, ultimately reaching sea level.)

On the other hand, rivers in western Africa (originating near letters G and H in Figure 3) begin in the low elevation category. They start above sea level, but not above 1000 meters. To find more information about their origin areas, students must look at another topic. Figure 5 shows how annual precipitation varies across the continent.

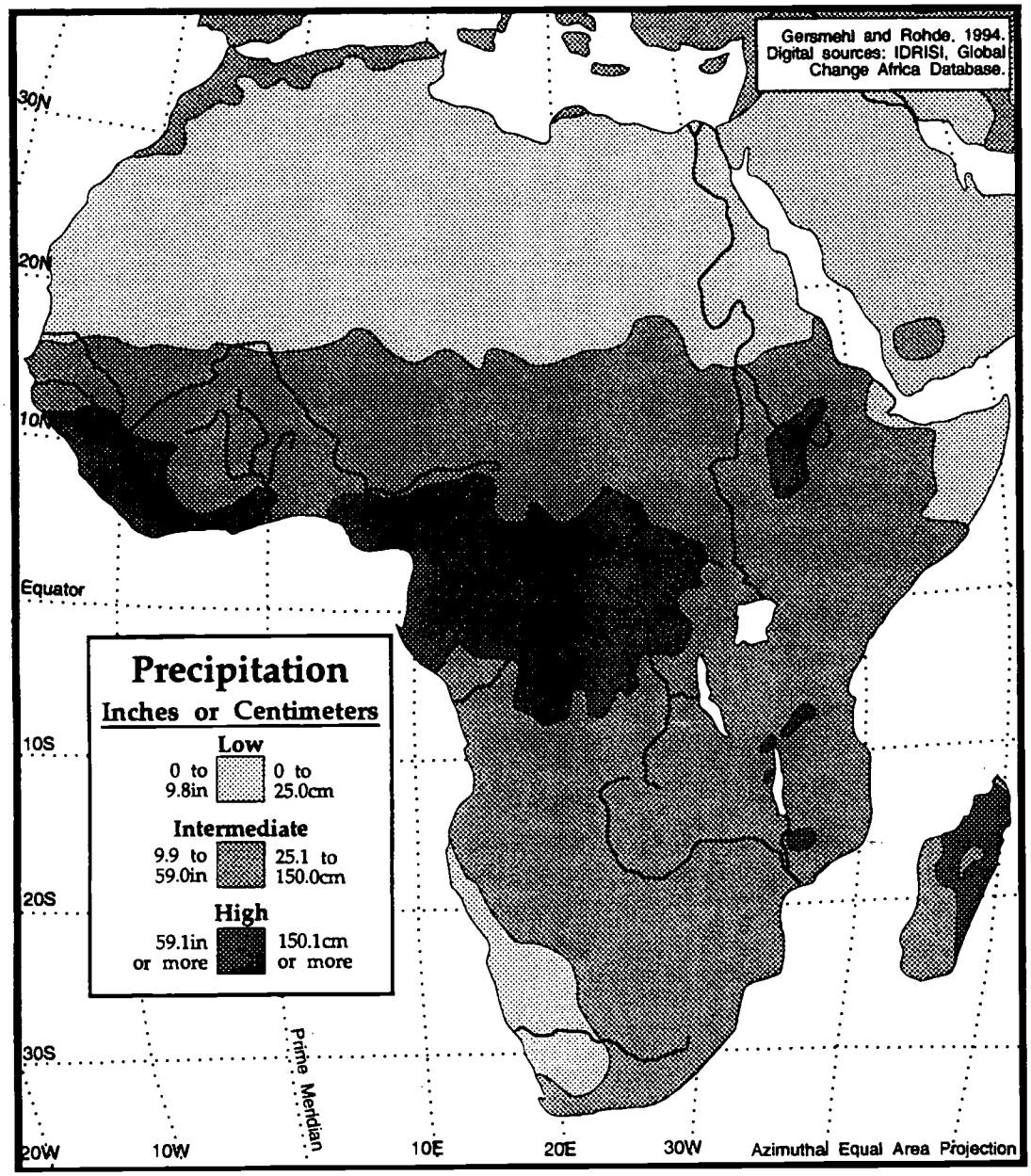


Figure 5. A generalized picture of annual precipitation in Africa.

Letter G, where the Gambia and Niger Rivers begin, is definitely in the darkest high precipitation category. Letter H is in the intermediate category as are several other river origins. Again, students could transfer river names from Figure 3 to Figure 5 to actively reinforce a layering of topics.

In areas shown with the lightest shading, less than 9.9 inches (25 cm) of precipitation fall during a typical year. Figure 5 shows that a vast part of northern Africa receives less than 9.9 inches (25 cm) of annual precipitation. This low precipitation region is not a birthplace for large rivers.

ACTIVITY:

Look at maps available in atlases or textbooks to find names for the low precipitation areas. (The Sahara in the north is a world famous desert; the Kalahari in the southwest is less well known.) Suggesting that students compare maps from different sources is a way to stimulate inquiry. It also reinforces some fundamental ideas about map scale. Maps from different sources seldom use exactly the same scale or symbols. Awareness of these differences is an essential step in trying to become better map sleuths.

In sharp contrast to the northern and southwestern deserts, parts of Central and Western Africa have an annual precipitation of more than 59 inches (150 cm). Imagine a total of more than five feet of rainfall in a single year. As our eyes glance from low to intermediate to high categories, cartographers would like us to imagine gradual change between the lightest and darkest areas. Each category has an edge, but the edges are neither abrupt drop-offs nor fence-like barriers; they certainly are not lines on the ground. Instead, these isoline maps imply gradual change between low and high categories. If a cartographer used clay to make a 3-dimensional model of the precipitation map, the darker areas of high precipitation would slope downward toward the lighter categories, steeply in some places and gently in others.

Figure 5 is based on measurements taken at many weather stations, and Figure 6 shows a small sample of such stations.

Here we trust the cartographer to reduce complexity in a reasonable manner. For Figure 6, the cartographer chose weather stations at both high and low elevations in several African nations. The black squares locate each station according to its latitude and longitude coordinates. Numbers beside the squares report annual precipitation in inches. The dark bold numbers generally occur in the highest precipitation category of Figure 5. The numbers shown with small, light type correspond fairly well to the lowest precipitation category. Students should understand that maps are often based on information that someone recorded at specific points. When they compare the shading on Figure 5 with the weather station data of Figure 6, they will see a general correlation. The shading on Figure 5 is based on the assumption that precipitation in areas between weather stations is similar to what was observed at the stations themselves.

ACTIVITY:

On Figure 6, circle all weather stations with at least 59 inches of annual precipitation. Then, underline every station having 10 inches or less. Yes, there is a weather station in North Africa with less than 1 inch (.3 inches) of annual precipitation. Does this give you some idea how a cartographer might use rainfall measurements to make a map such as Figure 5?

Initial figures in this chapter have focussed on a few topics and have illustrated strategies for using maps to ask and then answer questions. The figures are grand views that provide a general picture. One way to avoid being overwhelmed by confusion about any topic is to look for, "big," things first. Maps often simplify; they may emphasize only one or two topics. They also generalize; they use a single kind of shading to show a broad category of precipitation or a wide range in elevation. Even when a map shows precipitation at particular weather stations, we see only a selection of stations. Geographers often put their trust in maps to emphasize what is basic and to make it familiar.

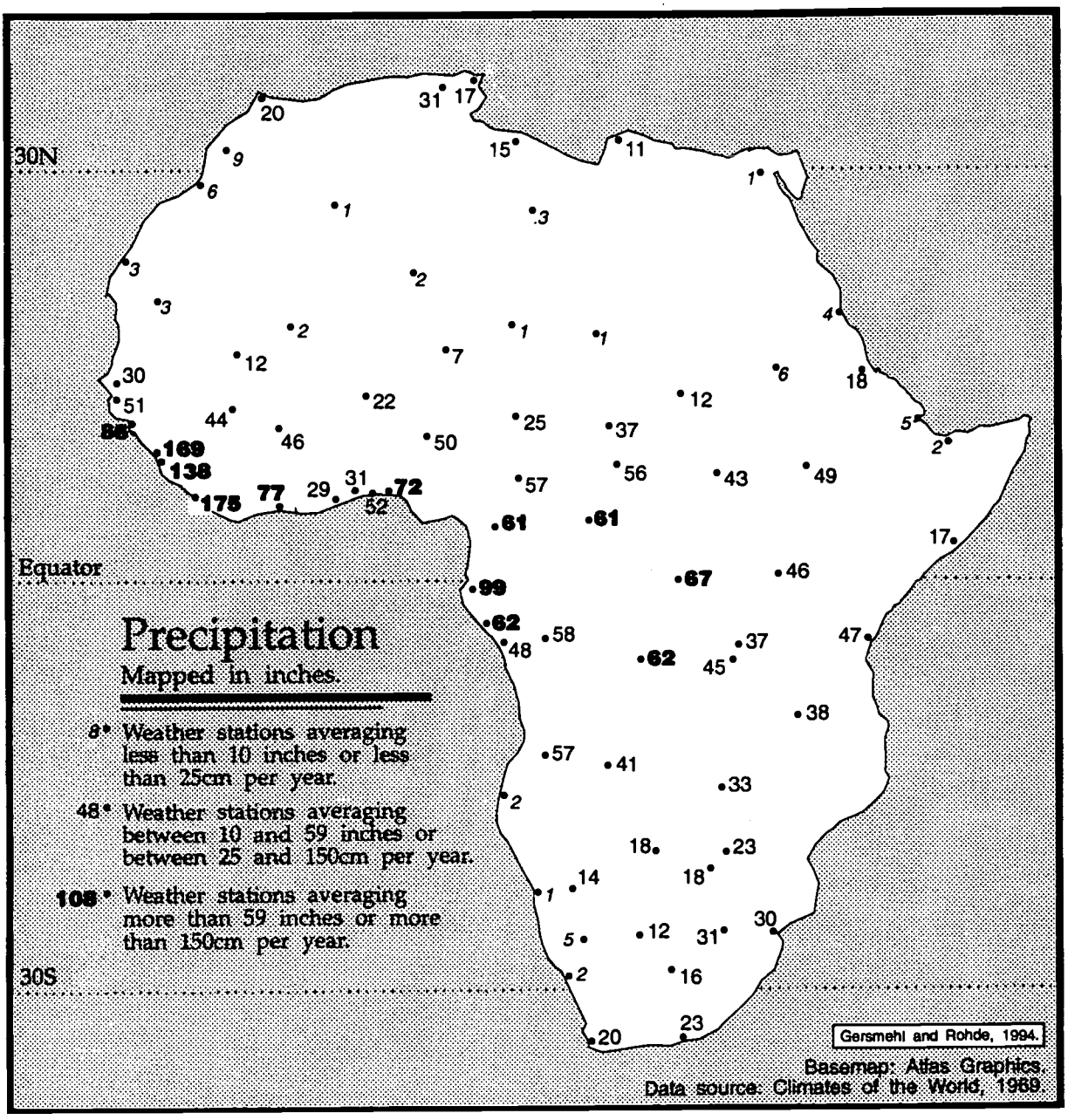


Figure 6. Average annual precipitation of selected weather stations in Africa.

So far, the figures have set forth only a few topics. Starting an inquiry often calls for setting priorities. Geographers choose framework topics to provide skeletons upon which students can progressively hang more detail. The maps in this chapter are designed to facilitate comparison. They acknowledge that students remember spatial relationships in different ways. For example, younger students might employ fundamental topological terminology (Piaget and Inhelder, 1967), saying that high precipitation regions are in, "the middle," or, "the center," of the continent. Older students might use the latitude-longitude grid to specify high precipitation regions (i.e., near the equator). Some may understand that 30°N indicates a latitude 30 degrees north of the equator and that the Prime Meridian separates western longitudes on the left from eastern longitudes on the right. This level of sophistication makes it possible to say that part of west Africa near 10°N and 10°W receives very high rainfall totals. A third framework involves the use of place names. For example, Central Africa near the Congo-Zaire

River receives high rainfall, but coastal West Africa near the origin of the Niger receives even more (Figures 2, 3, 5, and 6).

Thus far, the latitude-longitude grid, country boundaries, river networks, and patterns of elevation and precipitation have served as fundamental frameworks. Figure 7 adds a new topic, population distribution, and a new type of symbol, known as a proportional symbol.

The squares indicate the general arrangement of population; they are drawn at different sizes to indicate different numbers of people. The largest square represents 20 million people, and its area is logically four times larger than the area of the medium square. To create the map, Joseph Schwartzberg first found information about populations within African and European nations. To lead students toward a better understanding of some of the mapmaker's decisions, have them do the following activities.

ACTIVITY:

Use Figure 7, to find the two African countries that have the largest squares. Use Figure 2 as a source of information about country names, and write the names of those two countries on the map (Egypt and Nigeria). Students might wonder how the cartographer decided where to place the largest squares within these two countries. By consulting other atlas sources, they could find the names of large cities along the Nile River in Egypt and also along the coast of Nigeria.

ACTIVITY:

An earlier activity noted these same two countries when students looked at major rivers. Refer to Figure 3 and review the names of rivers that flow through Egypt and Nigeria.

It is important that map readers appreciate cartographers' generalizations in Figure 7, too. The symbols emphasize where large numbers of people live near each other (i.e., where squares are large or close together). To learn about factors that influence the distribution of population, map readers could focus first on regions with large and medium size squares.

ACTIVITY:

Circle groups of large and medium size squares. Refer to previous figures, to note names of countries that have large and medium size squares and also:

Major rivers (Figures 2 and 3 - Egypt, Nigeria)
Coasts (Figure 2 - Morocco, Algeria, Tunisia, Ghana)
High elevations (Figures 2 and 4 - Ethiopia, Kenya, Uganda, Rwanda, South Africa, etc.)

Again, we do not ask students to memorize locations of all African countries. In this case, our priority is countries having large numbers of people settled closely together. Furthermore, students explicitly use maps of other fundamental topics to organize and specify their memory for population patterns Students could repeat comparison activities as they focus on areas with small squares that are widely spaced. Cartographers try to give a general impression of sparsely settled regions. Each small square represents 1.25 million people, but that does not mean 1.25 million people live directly under the square. Notice, for example, the areas with a few, widely spaced squares in Figure 7. In desert regions of Africa, one small square may represent people who actually are spread out over an extremely large area halfway to the next small square.

This section of the chapter (Figures 8 and 9) employs a special type of map, known as a choropleth map. To make these maps, a cartographer starts with data for individual countries. Several sources provide such data: almanacs,

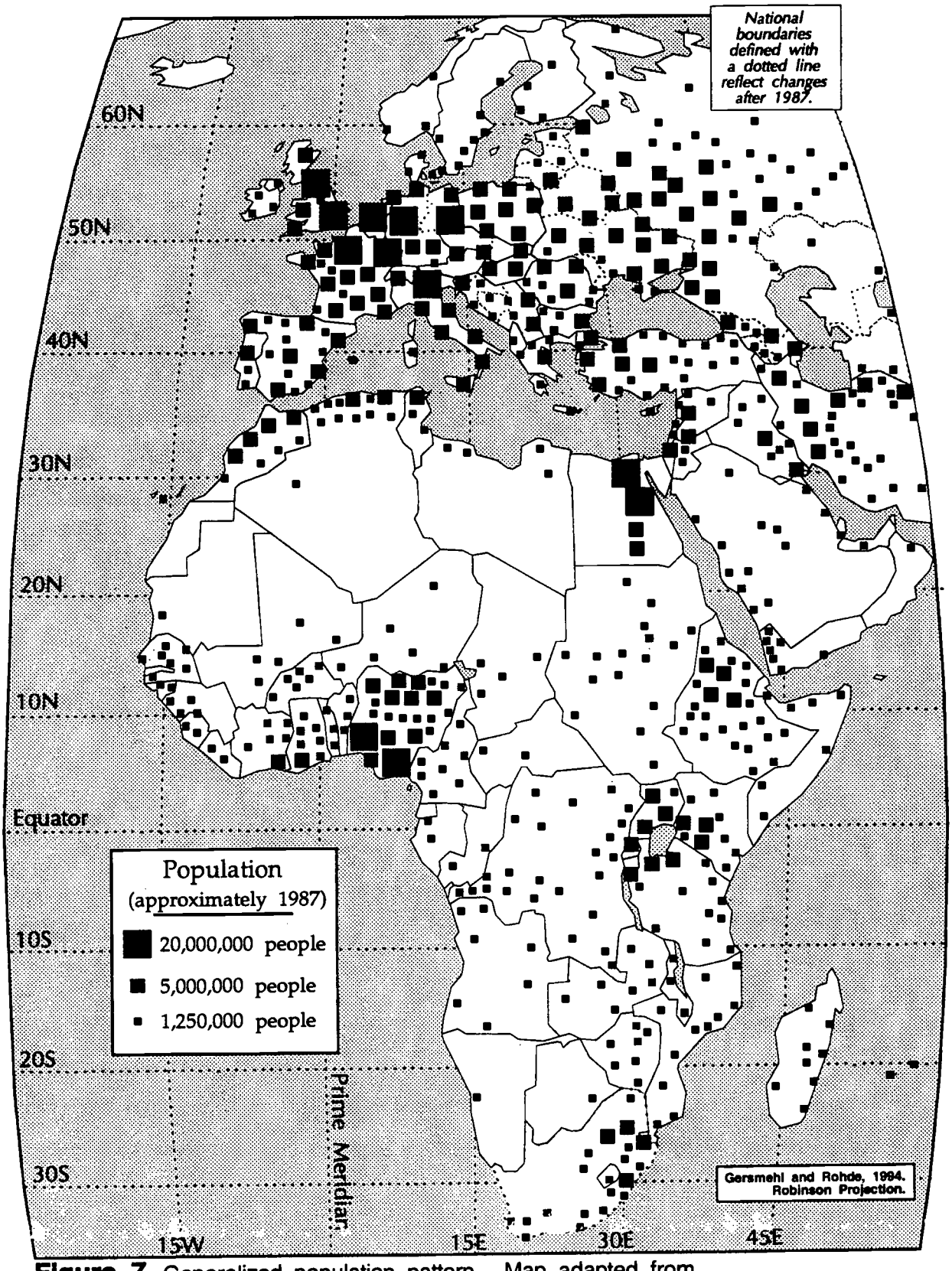


Figure 7. Generalized population pattern. Map adapted from J.E. Schwartzberg's 1987 world map.

textbook appendices, and publications from the United Nations, Population Reference Bureau, and World Resources Institute. Ideally, data for choropleth maps has, "per," in its title: per capita, per square mile, or percentage. Choropleth maps usually start with, "per," data for census areas, put data values into categories, and then shade countries light if they have low percentages and dark if they have high percentages. Figures 8 and 9 list percentages for individual countries and also illustrate categories.

Figure 8 shows both European and African countries and visualizes arable cropland as a percentage of the total land area of each nation. With this information, we can start to investigate how nations feed their populations. The contrast between Europe and Africa is striking. Most African countries are lightly shaded because they are in the lowest categories. Few African nations have cropland percentages higher than 24 percent.

ACTIVITY:

Use Figure 2 as a source of information about country names, and write the names of African nations on Figure 8 if they are shaded with the two highest categories (between 24 and 62 percent of the land used for cultivated crops). (Tunisia, Senegal, Sierra Leone, Togo, Nigeria, Uganda, Rwanda, Burundi, and Malawi).

ACTIVITY:

Refer to Figure 7 (population), and find countries that have high populations (large and medium squares) and also devote at least 24 percent of their land to cultivated crops. (Tunisia, Nigeria, Uganda, Rwanda, Burundi).

ACTIVITY:

Refer to Figure 5, and find one precipitation category that all these 24 to 62 percent cropland countries share. (They share the intermediate precipitation category. One might conclude that too little and also too much precipitation somehow hold cropland percentages down.)

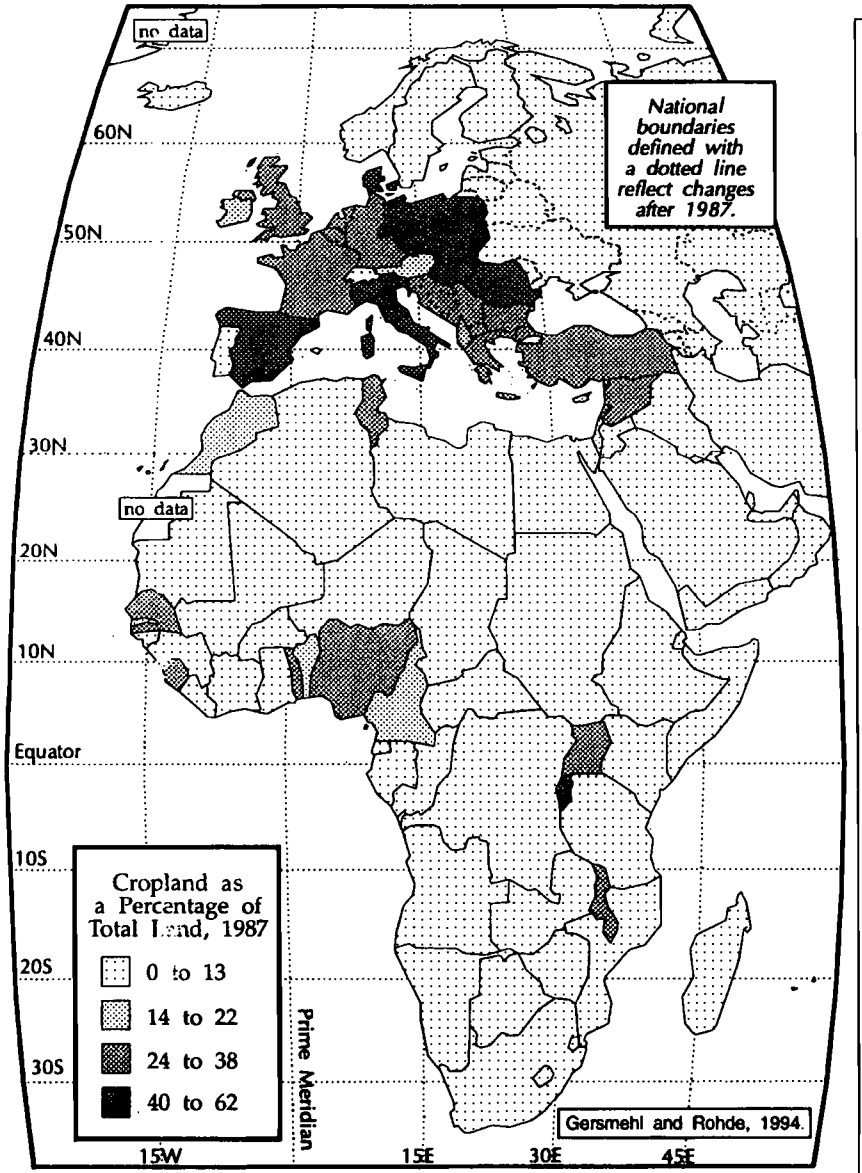
These three activities represent three different levels of inquiry. The first involves simple map reading and consulting another map to obtain place name information. The second requires a middle level of map comparison in order to identify areas that scored high on both maps. The third is the most sophisticated; it obligates the reader to determine which category on one map corresponds to a specified pattern on another map. When the goal is to have students operate at this level, it helps to have them do simpler tasks first.

Figure 9 introduces a still more abstract concept; it uses choropleth shading to show areas of forest and woodland.

These areas include a variety of environments that support trees of different kinds. What makes this potentially misleading is that the appearance, density, and species composition of forests can change quite dramatically from one place to another. Those differences are hidden when a mapmaker shades an entire country with an, "average," based on the percentage calculated for the whole country.

ACTIVITY:

Examine Figure 9. What two countries have the highest percentages of their area covered by woodland? (Gabon and Zaire) Do you think trees are scattered evenly throughout these countries? Most likely, several areas within Zaire have land covered entirely by trees, but some portions of the country have patches of land without tree cover. Atlases or other map sources might show patchwork patterns of vegetation within the country.



Sources: Robinson Projection. Data collected from World Resources, 1992-93; and The Economist Book of Vital World Statistics, 1990.

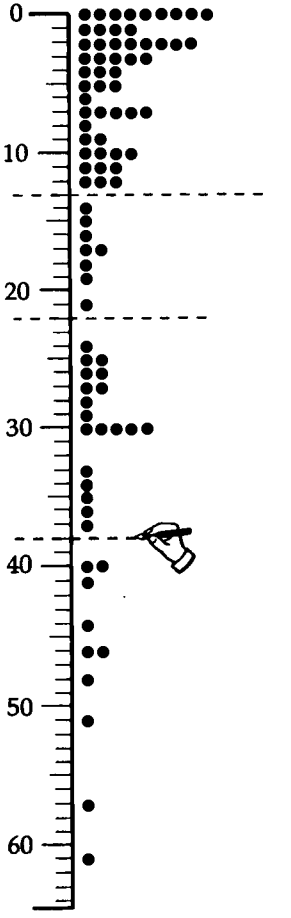
Countries ranked from lowest to highest percentages

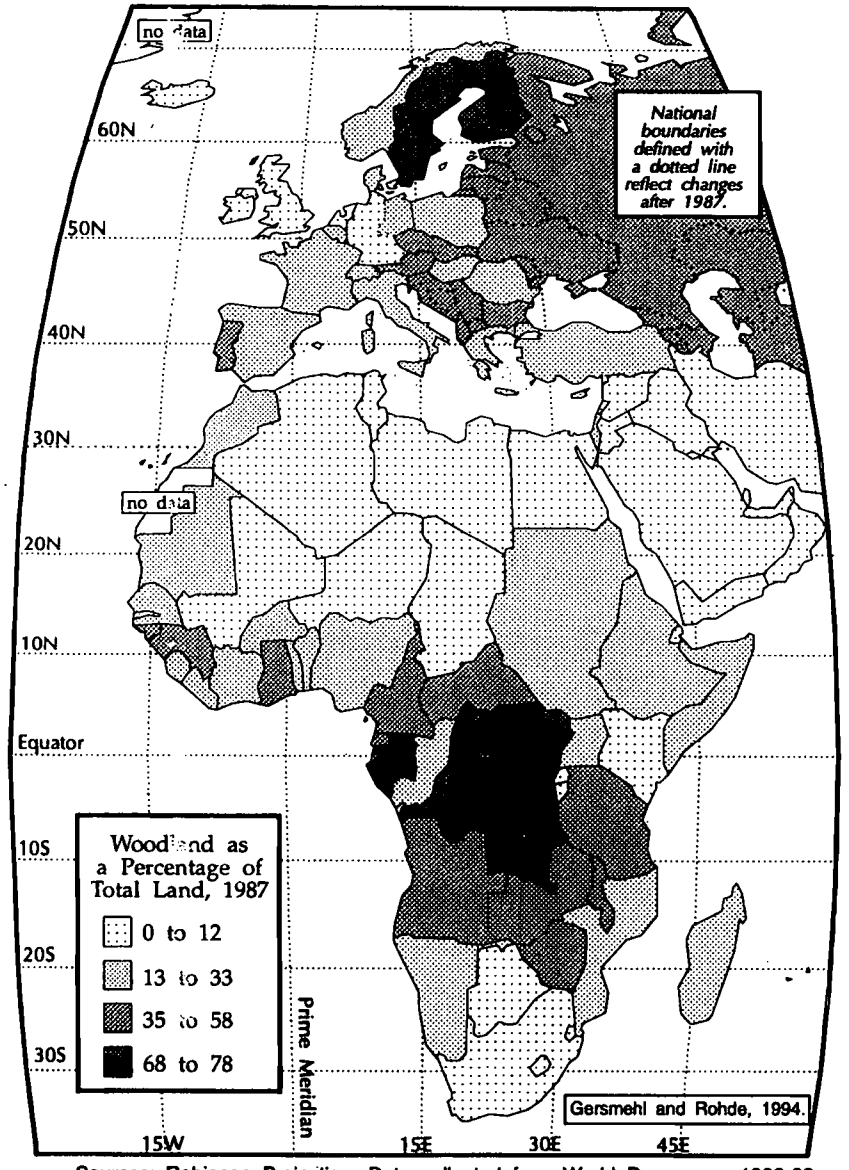
Djibouti	0.0	South Africa	10.8
Iceland	0.0	Cote d'Ivoire	11.4
Kuwait	0.2	Burkina Faso	11.5
Mauritania	0.2	Guinea Bissau	11.9
U.A.E.	0.2	Iraq	12.5
Oman	0.2	Ghana	12.5
Qatar	0.4	Ethiopia	12.7
Saudi Arabia	0.5	Ireland	14.3
Namibia	0.8	Cameroon	15.0
Libya	1.2	Benin	16.6
Somalia	1.5	Cyprus	17.0
Mali	1.7	Gambia	17.4
Gabon	1.8	Austria	18.3
Congo	2.0	Morocco	19.0
Botswana	2.4	Israel	21.5
Chad	2.5	Belgium	24.9
Egypt	2.6	Sierra Leone	25.1
Norway	2.8	Malawi	25.3
Angola	2.8	Albania	26.1
Niger	2.8	Togo	26.3
Bahrain	2.9	Senegal	27.1
Zaire	3.0	Netherlands	27.2
Portugal	3.0	United Kingdm.	28.9
Algeria	3.2	Lebanon	29.4
Cen. Afr. Rep.	3.2	Greece	30.1
Mozambique	3.9	Tunisia	30.1
Liberia	4.0	Yugoslavia	30.4
Kenya	4.3	W. Germany	30.6
Jordan	4.6	Syria	30.6
Sudan	5.2	Uganda	33.6
Madagascar	5.3	Nigeria	34.4
Tanzania	5.9	France	35.4
Guinea	6.4	Turkey	36.3
Zambia	7.0	Bulgaria	37.4
N/S Yemen	7.0	Czechoslovakia	40.9
Sweden	7.2	Spain	40.9
Zimbabwe	7.2	Italy	41.1
Finland	7.9	Rwanda	44.9
Eq. Guinea	8.2	Romania	46.4
Iran	9.1	E. Germany	46.9
Swaziland	9.5	Poland	48.4
Switzerland	10.4	Burundi	51.9
USSR	10.4	Hungary	57.3
Lesotho	10.5	Denmark	61.4

Figure 8.

CROPLAND

$$\left(\frac{\text{cropland}}{\text{total land}}\right) \times 100$$





Sources: Robinson Projection. Data collected from World Resources, 1992-93; and The Economist Book of Vital World Statistics, 1990.

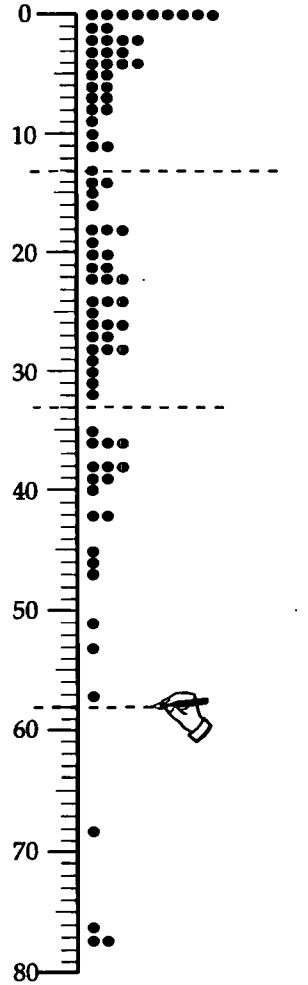
Countries ranked from lowest to highest percentages

UAE	0.0	Cote d' Ivoire	20.1
Lesotho	0.0	Belgium	21.3
Qatar	0.0	Liberia	21.8
Egypt	0.0	Denmark	22.1
Kuwait	0.1	Namibia	22.4
Djibouti	0.3	Italy	22.9
Libya	0.4	Togo	24.8
Saudi Arabia	0.6	Burkina Faso	24.8
Jordan	0.8	Ethiopia	24.9
Iceland	1.2	Madagascar	25.3
Botswana	1.7	Turkey	26.2
Niger	2.0	Switzerland	26.5
Algeria	2.0	France	26.7
Rwanda	2.0	Norway	27.1
Syria	2.9	Romania	27.5
E. Germany	3.0	E. Germany	28.3
Tunisia	3.6	Uganda	28.6
South Africa	3.7	Poland	28.7
Iraq	4.3	Sierra Leone	29.0
Oman	4.7	Senegal	30.8
Ireland	4.9	Spain	31.5
Berundi	4.9	Benin	32.7
Israel	5.4	Bulgaria	35.0
Bahrain	5.9	Ghana	36.0
Swaziland	6.2	Yugoslavia	36.6
Kenya	6.4	Czechoslovakia	36.7
Mali	7.0	Guinea-Bissau	38.1
Lebanon	7.8	Albania	38.2
N/S Yemen	8.2	Austria	38.7
Netherlands	8.8	Zambia	39.4
United Kingdm.	9.6	Portugal	39.6
Chad	10.3	Guinea	40.5
Iran	11.0	USSR	42.4
Morocco	11.7	Angola	42.6
Cyprus	13.3	Malawi	45.7
Somalia	14.0	Equa. Guinea	46.2
Mauritania	14.6	Tanzania	47.9
Nigeria	15.7	Zimbabwe	51.5
Gambia	16.8	Cameroon	53.4
Hungary	18.1	Cen. Afr. Rep.	57.5
Congo	18.7	Sweden	68.1
Mozambique	18.9	Finland	76.2
Sudan	19.7	Zaire	77.3
Greece	20.0	Gabon	77.6

Figure 9.

WOODLAND

$$\left(\frac{\text{woodland}}{\text{total land}}\right) \times 100$$



ACTIVITY:

Examine Nigeria in Figure 9. What percentage of this country is covered by trees? (Note the 13 to 33 percent category or Nigeria's specific data value of 15.7 percent.) According to Figure 8, Nigeria also used about 34 percent of its total area for crops. Forestland and cropland may intermingle in some areas but also separately dominate other areas. Significantly, Nigerian environments support both types of land use.

Additional comparisons present other relationships.

ACTIVITY:

Refer to Figures 2, 5, and 9. Use Figure 2 as a source of information about country names, and make a list of countries that have more than 35 percent of their area covered by trees. Finally, look at Figure 5, and make a list of countries that have at least part of their area in the zone of highest precipitation. What countries are on both lists, having high percentage of their area covered by woodland and also having high precipitation? What does this suggest about the relationship between precipitation and forestland in Africa?

Summary

This chapter encourages teachers and students to work with map images as a way to organize and integrate information. The activities follow a common sequence; first, students concentrate on the geographic pattern of one topic and note location frameworks (place names, topological relations, latitude-longitude grid.) Then, they proceed to compare patterns on two or more maps as a way to solve puzzles and explore relationships.

The chapter treats map perception as an active and purposeful process. It follows admonitions voiced earlier by cartographers. For example, Keates (1982) recognized the active nature of map perception when he insisted that map information is sought; it doesn't simply flow. Similarly, Castner (1990) encouraged students to learn with maps rather than about maps, to extract location information, and to investigate relationships. Consequently, this chapter asks students to probe thematic maps separately and also to make comparisons among them.

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Biography

Carol Gersmehl teaches cartography and GIS fundamentals in the geography department at Macalester College in St. Paul, Minnesota. Nearly twenty years ago, she taught seventh and eighth graders. Each summer for the past seven years, Carol has traveled to Tennessee to teach in geography workshops for in-service teachers. In addition, Minnesota Geographic Alliance teachers encourage her to work on mapping projects that involve their students.

8. Teaching Geography With Technology

Charlie Fitzpatrick

Abstract: The capabilities available to today's teachers of geography have exploded in the last three years. These capabilities can affect all facets of a teacher's job. Staggering increases in power per dollar for hardware and software place stunning new possibilities within the reach of those teachers open to them.

Key Words: computer, technology, software, hardware, word processing, database, spreadsheet, telecommunication, graphics, drill and practice, games, reference, simulation, multimedia, authoring, remote sensing, global positioning system, geographic information systems.

Introduction

In rapid and profound ways, the world is changing. These dramatic shifts present both challenge and opportunity to geography teachers everywhere. Recent developments have brought a dizzying array of options for teaching geography using technology. Since geography's domain is, "the world and all that is in it," the challenge of keeping up with what can be done has grown more demanding and complex.

A decade ago, the Apple IIe was introduced and began moving into schools, but good software was hard to obtain. By contrast, today's choices for a teacher and a school can seem overwhelming. Even ignoring inflation, for less than the cost of the original Apple IIe, teachers, students and schools now have the choice of multiple platforms (Apple, Macintosh, IBM, and others), with computers unimaginably more powerful and able to run a bewildering array of software.

Take a stroll through any computer superstore, itself a newcomer on the urban landscape. While, only a few years ago, there was a finite number of titles which bore relevance to geography, now the range seems infinite. Any attempt at simply listing titles of software useful for geography teachers would be hopelessly inadequate. It would be more useful to discuss broad genres, to highlight trends, and describe the expanding possibilities of creative instruction in geography though the computer.

There is still no discipline better suited than geography to the powers of a computer. The geography teacher has to deal with vast libraries of textual information, numerical data, and graphic displays, all of which need to be constantly updated and experienced from a range of perspectives. The teacher who wants to help students understand the complex world of today and prepare for the unpredictable world of tomorrow must take advantage of powerful tools.

Word Processing, Data Base, Spread Sheet

The stalwart companion of any teacher should be good word processing, database, and spreadsheet programs. Much of a teacher's work remains as text-oriented as ever. However, the wise geography teacher responds to increased demands not by working more hours, but by working more efficiently.

Word processors remain central to teachers for the creation and editing of lesson and unit plans, tests, reports, and a host of supplemental materials. They can also be used by students to plan out public surveys, to prepare the text files that will later be placed into multimedia creations, or to prepare explanatory documentation for any number of individual or group projects.

Databases are important for filing information, adding and removing records, sorting lists to organize a report, and for tracking individual student progress. They can store shared information from other schools, provide a place for student hands-on involvement in large group projects, or serve as an easily accessed electronic encyclopedia.

Spreadsheets are valuable for calculating numbers, setting up elaborate formulas, and for grades or planning. They can run complicated projections, graph populations, or track public accounting matters, especially with help from mathematics, biology, earth science, and economics teachers.

Telecommunication

Geographers see the world as an intricately interconnected place. Teachers of geography now have the opportunity to take advantage of outside experts offering timely information. This means using telecommunication services to download news updates; finding good shareware programs or public domain creations; importing current news, weather maps, and graphics; or exploring online databases. Telecommunication services provide channels for linking with teachers and students in other parts of the globe. Teachers can take courses at home in the evening, send mail to, and receive it from, like-minded colleagues with special expertise, or collaborate in, "realtime," (that is, at the same time from various locations) interstate discussions.

At school, the biggest challenge may be in physically making the connection between the outside world and the classroom. Telephones may be distant from the classroom and funding may be scarce, but institutional fear of, "what might happen," could be the greatest hurdle for many teachers. The results of telecommunication links with other places, however, indicate that students love the immediacy of connections, the identification with strangers, and the greater resources available in the galaxy of telecommunications. These links with the world beyond the classroom can assume a productive and instructive role in any class.

Graphics

Older graphics programs dealt with kludgy blocks of a single color. Today's graphics include tremendous libraries of clip art for illustrating documents, detailed map templates for manipulation, and a quarter million colors from which to choose. Even simple programs are immensely powerful; they can be learned by elementary students in just a few minutes and used at any grade level to illustrate all manner of geographic concepts, in both electronic and printed projects. By adding explanatory markings to weather maps, sketching a mental map of the trip home, or doing simple fill-paint choropleth maps, the students' sense of space and place will be enriched while they are involved in a vast range of hands-on work.

The recent explosion of scanning technology allows you to put an image into the computer by rolling a scanner across photographs, drawings, illustrations, logos, maps, handwriting, clothing, wallpaper, tiles and other flat surfaces. The rolling scanner translates the images into a series of dots. This process is called digitizing. When combined with the blossoming photo Compact Disc industry, both have burst the limits of graphics programs. Anything tangible that can be created or conceived can be presented in graphic form. Modern tools can capture images in digital form; others turn existing images (like slides) into digital counterparts. Once digitized, they can be cut and pasted, tweaked and twisted into countless different uses for the creative geography teacher.

Drill and Practice

In the early days of computing, drill and practice programs were the dominant, "computer teaching tools." The programs are functional, patient, and can be effective when used judiciously. But they can be stultifying when poorly written or over-used. Fortunately, many creators have learned from earlier failed efforts, camouflaging these programs in effective games which titillate as well as educate.

The best written, "drill and practice," programs are almost indistinguishable from games. The differences are subtle, and matter mainly to those focused on the means of achieving particular ends. To students, races to assemble geographic puzzles or quizzes which positively reinforce correct responses with harmonious dings and negatively reinforce incorrect responses with bronx cheers are just plain fun, "even if they are learning."

Games

The number of geographic games available has increased significantly in the last few years. With printed reference materials at the ready, students can chase around the globe, across various continents, even back through time, in search of villains, puzzle pieces or treasure. Some programs that are composed of geographic references challenge students by demanding that they know or explore other fields of knowledge in order to advance in the game. Today's games call for the ability to create ecosystems, build cities, manage businesses, and attempt to cope with the interaction between business, city, and hinterland. Each builds on the grasp of interconnections among geography and other fields, at scales from local to global.

Students can explore in the rain forest, the polar zones, the oceans, and space. They can fly over and through remarkably accurate 3-D renditions of current cities. Even in the made-up worlds of some computerized games, students can develop a spatial sense which the creative teacher can tap. Asking students to go through a game and then map the terrain encountered can provide an interesting twist to the study of landforms, direction, and perception. Even pre-schoolers playing intently on hand-held video games can describe the spatial arrangement of a game after only a few tries.

Electronic References

Despite all the games housing variably camouflaged information and concepts, the public thirst for information has led to the creation of a sizable spread of pure electronic references. There are a number of atlas programs which marry the computer's graphic capacity with its facility for handling large data sets. The explosion of numbers has emphasized the value of seeing them in a spatial context. There are programs for people who, "want it all," and programs with more defined data sets and viewing capacities. There are floppy-disk versions, multi-disk editions for use from a hard drive, and CD-ROM based sets. There are electronic encyclopedias which, like their printed forebears, supplement text with map, picture, and music, and versions which emphasize these to different degrees.

Simulations

In days gone by, simulations were the only fun instructional programs on the block. Students could engage individually in military battles, strategize in groups to develop cities, or role-play among classes (and even between schools) contemporary or historic geo-and socio-political problem-solving scenarios. These are still applications with immense educational potential, but they are no longer the only fun computer-based activities. Consequently, they may receive somewhat less press than they deserve; good simulations are powerful tools for developing geographic understanding and positive group skills at the same time.

Multimedia

Perhaps the biggest explosion which has made its way into schools in recent years is that of multimedia materials. Geography is an especially appropriate arena for the richness of multimedia which covers a broad range of information, both qualitative and quantitative. A city, farm or forest cannot be fully understood by any one map, essay, picture, or set of numbers; it should be experienced in all its richness, or at least in sight and sound. So too, can domestic tensions, a hurricane, a medical crisis, American history, and the global environment be more clearly understood through a mixing of data types - maps and text combined with picture and sound. The steady increase of videodiscs and the dramatic rise of video on CD provide teachers with vast storehouses of images which can be mixed and melded into new expressions of the state of the world. With interactive hypermedia software facilitating exploration of these digital libraries, students can spend hours watching, reading, and listening. They can spend days combing the images for just the right picture to put in just the right place. The result - their own short picture of the world as they see it. Final products may be brief but, because it is engaging for the student, the learning that takes place in the creation of these products can be significant.

Authoring

With all the resources available for geography teachers and students to manipulate, the individual student project can take on dramatic new meaning. Students who are comfortable accessing various resources can produce single, or multi-media creations dealing with any geographic topic. Teachers can in short order produce basic, easy to use, but powerful instructional programs with a friendly, mouse-driven interface. Adding to and refining these programs, teachers can amass a whole slate of tutorials, games, reference works, and other materials, which students can use with or without a teacher present.

Even more powerful is the capacity for teachers to share these creations with others through telecommunication. No teacher has the time to create masterpieces on every topic, but every teacher has the time to author at least one. Working in concert with legions of others from around the state and across the country, teachers can use what experts have produced and share their own creations with others. Because the various authoring programs are available and common nationwide, creators need send and receive only the meat of the product, not the entire authoring program itself. Thus, in just a few minutes, teachers can upload to a national bulletin board, their own geography programs and download any number of creations from other people. (That is, they can deposit duplicate copies of their creations into a vast and publicly accessible electronic file cabinet, and draw out and save personal copies of others' works.)

Remote Sensing, Global Positioning Systems, Geographic Information Systems

Perhaps nowhere in geography is the tremendous potential of computers more apparent than in the domains of geographic information systems, global positioning systems, and remote sensing. Once the strict province of the researcher, government agency, and specialized industry, these three fields are moving into the pre-college realm with potentially stunning results.

Teachers have long known that aerial photos provide a rich and powerful resource for a study of spatial phenomena. Remote sensing expands the storehouse to include not just photographs but satellite imagery. With the capacity to see great swatches of landscape in a single image, changing the computer's "display rules" changes how the land appears. The technology has grown famous for its capacity to show large scale deforestation, urban sprawl, crop health, flood impact, and so on. In the classroom, these visual images can be manipulated to show different factors and different scales. And the range of data will continue to expand in the years ahead.

Global Positioning Systems (GPS) are small (and shrinking) devices which receive satellite signals and calculate latitude, longitude, and elevation to a quite precise figure. The devices have been very important in several arenas, particularly utilities industries and recreational boating. They have already been incorporated into automobiles, in combination with a set of street maps, to provide the driver with a, "you are here," interface. The locational information can be stored and later placed into computers and turned into a map. With GPS prices dropping as capacities rise, they can be made into digitizing instruments, so students can walk the grounds of their school, neighborhood, or local forest to create the data for a digital map.

Geographic Information Systems (GIS) provide the means to integrate all forms of spatial data. GIS combines powerful hardware and software to enable users to tinker with spatial data, much as a composer orchestrates a musical score. Imagine layers of data, each independent, but with the computer able to analyze questions across layers. The user defines the scale, controls how each bit of data is to be displayed, and creates the map, querying and selecting and correlating data as desired, modifying on the fly. It may be the ultimate test for a computer system, but recent developments have brought it to a level where elementary students, using commonplace but powerful hardware, can easily conduct sophisticated analysis after only brief instruction. With proper data, they can have the computer map the traffic accidents that happen in a city at certain times of the day, the ethnic patterns of their county, the number of pig farms in counties that make up a watershed, ad infinitum.

Hardware Developments: Where Are We Going?

Geography teachers who deal with populations know about J-curves, where the growth rate may stay relatively consistent, but the absolute number skyrockets. The power of computers has followed the same pattern, roughly doubling every eighteen months; this pattern is likely to continue into the foreseeable future.

A staggering amount of digital spatial data has been collected and formatted for use in examining geographic problems. There will be immensely more data available, even more readily, long before the end of the decade.

Personal computers now have the potential to link and directly access each other's storage areas. Through networking and telecommunication, users can expand the capacity of their personal computer by orders of magnitude.

Yesterday's computer operator had to function by typing in commands. Today's user can operate more intuitively, graphically, pointing and clicking. One visionary talks about tomorrow's users - today's students - navigating by means of a geo-graphical interface, reaching out to access information from here, there, and everywhere - grabbing this program from here, that data set from there, crisscrossing political boundaries at the speed of light.

Methodologies

How can teachers of geography handle a given subject under widely disparate hardware conditions? In just the same way all topics are handled currently - preferably with training for teachers; certainly with creativity, exploration, and sharing by teachers; and with involvement on the part of students. No one strategy will work for all teachers in all circumstances. Clearly, those with phalanxes of the latest and most powerful hardware may have a few more options, but effective teaching has never depended solely upon the technology available to a teacher.

Many teachers rely on single computers for production of masters suitable for photocopying, or for creating different sets of hardcopy materials. Some make effective use of a single computer through a research station approach. Others use it as a demonstration kiosk, perhaps with large monitor or an overhead projector hooked to a liquid crystal display panel for full-screen activities. While some teachers vouch for students being able to work in groups as large as six per computer, depending on the activity, most would prefer seeing four or fewer per station. Rotating tasks over short periods or day-by-day helps students integrate skills. Working in pairs often provides greatest total benefit, greater even than working solo for many activities, as students can process information and ideas synergistically, moving farther and faster together than either could separately.

Stations of varied capability can coexist when different activities are set up for the different stations. For instance, even the plain old Apple IIe can still play a profound role among other higher powered computers, as a station for telecommunicating, doing basic word processing, learning keyboarding, or generating databases for inclusion in reports created on other machines. While it is clearly more efficient for planning purposes to have enough stations, all of high enough capability, and while there is generally more that can be accomplished with higher powered stations, much exciting learning can still occur under less than ideal circumstances. The capacity of computers to translate text and graphic files means that teachers can rely on a large number of existing computers.

This should not be taken to mean that upgrading is a frivolous expense. Upgrading tools used in teaching geography is most certainly not frivolous. Students of today should have access to the tools and information of today, not only those of a previous decade. But, again, good teaching can occur even in situations of less than ideal technology.

Sample Lesson

Not all activities can be accomplished with a single program; some tasks may require (or at least benefit from) several tools. Here, as an example, is a set of steps using census data.

1. One telecommunication service showed census data available on another service. A switch was made to that site and a file was downloaded containing new data on all U.S. counties. Total time: 5 minutes.
2. The data were not formatted as desired, so a word processor was engaged to reformat them. Total time: 20 minutes.
3. Absolute populations were listed for two different times, and the percentage change between them was wanted. The spreadsheet was engaged to create a new column of computed percentage change. Total time: 5 minutes.
4. A database was used to select entries which met certain criteria. Three different analysis were conducted. Total time: 5 minutes.
5. A geographic information system was used to join the data to an existing map, and new display options were chosen. Total time: 10 minutes.
6. In order to see the map in a different application, it was saved as a graphic image, then modified further using a paint program. Total time: 5 minutes.
7. To incorporate the modified image into a multimedia presentation, the authoring software was engaged, the image was placed on screen, and a textfile summary about what the map showed was written. Total time: 10 minutes.

The entire operation took about one hour, included seven different software packages, and ended up providing new materials in several different formats which could be incorporated into any number of classroom applications. And because each creation was electronic, it could be shared very easily, with colleagues, and with students.

Now What?

What can geography teachers do? What should they do? Clearly, there is no going back to the way things were. Teachers who wish to help their students understand the complex issues of today and tomorrow face a tremendous challenge - or opportunity. Here are a set of statements designed to help teachers assess their computer-savvy quotient.

1. I recognize that the computer is here to stay.
2. I see the computer as a tool which, like any other tool, can be used effectively or ineffectively for the purpose of educating.
3. I use a computer for most of my paperwork tasks.
4. I know the computer capabilities of my current students.
5. I know the technology that is available to me at school - what it is, where it is, and how I can gain access to it and use it for class.
6. I know the technology that is available to the general public in computer stores, and have either spent an hour exploring such a store or carefully read a computer magazine in the last two months.
7. I can name two projects involving technology that I would like to do with my classes but do not currently do.
8. I share ideas, information, programs, or inspiration with colleagues via telecommunication.
9. I know the next piece of hardware and the next piece of software that the school should get, roughly how much they cost, and how my colleagues and I would use them to improve geography education.
10. I am comfortable with my students working with technology, recognize that learning is not always quiet and ordered, and know that most students learn best by doing.

If all ten of these statements reflect your situation, you are comfortable with the technology. If any one of these items does not sound like you, it may help to post the list near your desk and talk with a colleague - or student - about them.

References

Any attempt at listing computer resources will be hopelessly incomplete. New titles of both commercial software and printed materials emerge hourly, and "freeware" or "shareware" even faster.

For information on any aspect of computers, explore the computer section in your local bookstore, or the book section in your local computer store. Check books with titles indicating they are designed for novices, such as the "**(fill in the blank) for Dummies**" series. Contrary to the impression conveyed, these are in fact quite complete, but written in ordinary language, with technical sections carefully demarcated.

For general software and hardware information, examine the magazine sections of book and computer stores. New titles appear and hardware evolves frequently. Magazines are an excellent source of reviews and previews of computer materials. The strong interest shown by the general public for geography related software has pushed developers to release a steady flow of such materials with reviews for new programs. Year-end summaries and software award issues are especially good. Pay close attention to the software review sections in the National Council for Geographic Education's, *Journal of Geography* and the Association of American Geographers', Microcomputer Specialty Group newsletter.

Catalogs for software and peripherals, both specialized (classroom) and mainstream (general use, including schools). Educational Resources, 1500 Executive Drive, Elgin, Illinois 60123; telephone 1-800-624-2926 or 1-708-888-8300; fax 1-708-888-8499.

Catalogs for software and other materials designed primarily for use in the classroom. Social Studies School Service, 10200 Jefferson Blvd., Culver City, California, 90232-0802; telephone 1-800-421-4246 or 1-310-839-2436; fax 1-310-839-2249.

IBM compatible software and peripherals from a high volume mail order house. MicroWarehouse, 1720 Oak Street, P.O. Box 3014, Lakewood, New Jersey 08701-3014; telephone 1-800-367-7080; fax 1-908-905-5245.

Macintosh software and peripherals from a high volume mail order house. MacWarehouse, 1720 Oak Street, P.O. Box 3013 Lakewood, New Jersey 08701-3013; telephone 1-800-255-6227; fax 1-908-905-9279.

Biography

Charlie Fitzpatrick taught geography to junior and senior high students at St. Paul Academy & Summit School in St. Paul, Minnesota, from 1977 through 1991. He started using personal computers in 1983. After a few years of electronic heartaches and happiness, and a few summers of geography teacher institutes, he spent more and more time helping other teachers learn how to use computers to teach geography. Anxious to bring the wonders of geographic information systems to schools and libraries across the land, he joined Environmental Systems Research Institute (ESRI), of Redlands, California, in 1992. He now works out of ESRI's regional office in St. Paul, Minnesota, just a few minutes from the home he shares with his wife Cindy and a clutch of computers.

9. Authentic Assessment of Student Achievement in Geography

Marianne Kenney

Abstract: This chapter is about authentic assessment: its newly found importance and strategies in organizing instruction in order to put this important concept into practice. It includes classroom examples of authentic assessment in action with the use of a) performance assessments, b) rubrics, c) portfolios, and d) open-ended questions.

Key Words: accountability, authentic assessment, performance assessment, portfolio, open-ended question, rubric.

"*What we test is what we get; if we don't regularly assess it, we won't get it - our students know this far better than we care to admit.*" - Grant Wiggins

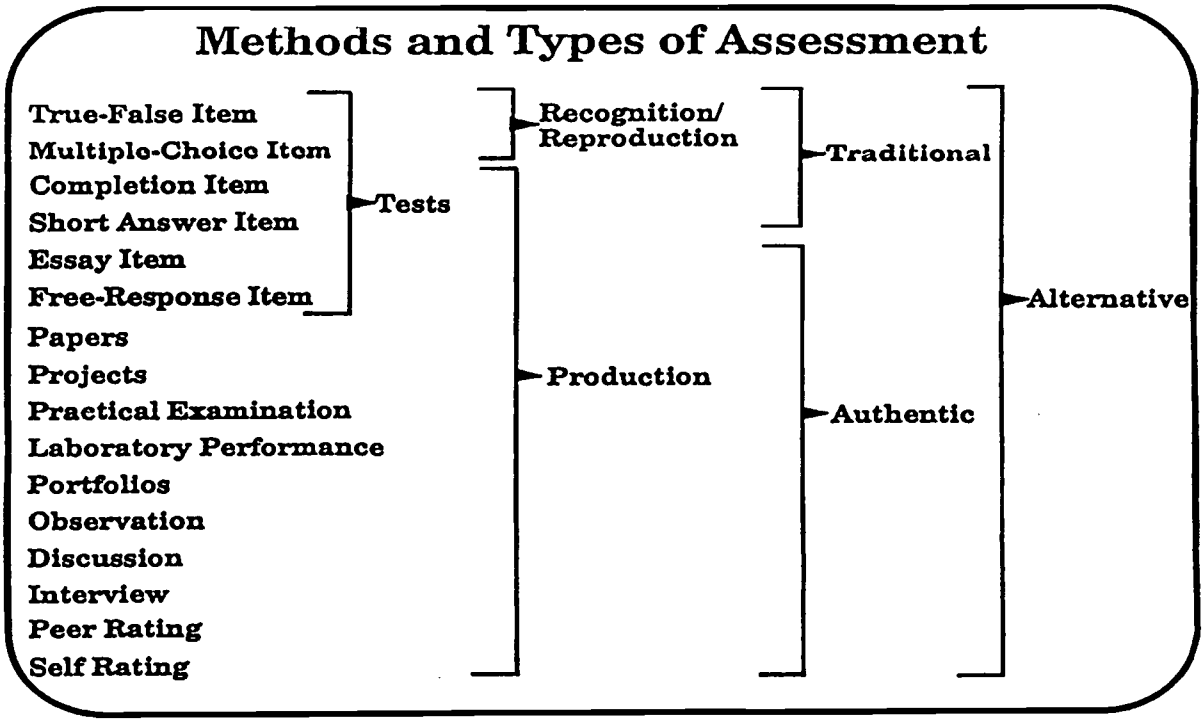
Growing Need for Authentic Assessment

The increasing demand to make state and federal education funding contingent on student performance and make educators accountable for performance has precipitated the need to establish a means by which performance can be assessed accurately. Clearly, if accountability is to be meaningful, it is critical that assessment be accurate.

Traditionally, accountability has relied on standardized multiple choice test results and, "minimum competencies." By far the most insidious of the misconceptions, both inside and outside the educational community which have created this test-based system, is that standardized test results accurately reflect student - and by extension - teacher performance.

Certainly standardized tests have a place in the assessment picture, but in order to gauge the success of educational direction in this country, assessment must be broadened and redefined. A concept of assessment beyond traditional tests has inspired an educational revolution.

Figure 4. Methods and Types of Assessment.



Source: New York State Department of Education

Educators who have felt frustrated and confined by the inflexibility of standardized test scores now have the opportunity to utilize their professional skills of evaluation by making assessment an authentic reflection of student performance levels.

Authentic assessments feature an emphasis on *understanding* - understanding the essential concepts of a discipline, higher order thinking skills, cultivation of students' abilities to apply skills and knowledge to real world problems, and development of transferable and flexible skill learning and problem-solving skills. New assessments should address performance of authentic tasks.

Educators must provide the impetus for changes in assessment. Instead of viewing assessment as a means to discriminate among students, teachers, and schools, it must be considered as a means to improve student learning and school effectiveness. The purpose for all assessment must be the improvement of education.

How is Evaluation in Geography Unique?

Geography, by its very nature, is spatial, so assessment and instruction should employ graphic means whenever possible and encourage the use of data to draw spatial conclusions. If students do not possess a spatial perspective, they revert to describing data chronologically or thematically. Wherever possible, students should be asked to show where things are and to look for explanations as to why they are there. Additionally, students should be encouraged to develop skills through the use of geographic tools such as maps, charts, graphs, surveys, interviews, and the analysis of data.

If instruction is organized around the, "Five Themes" (location, place, human-environment interaction, movement, and region), then the, "Five Skills" (asking geographic questions, acquiring geographic information, organizing geographic information, analyzing geographic information, and answering geographic questions) will enable the student to use geography - and understand how to, "do geography."

Where We Are in Geography

What do students know about geography after the completion of most of their course work? The overall achievement is dismal. During 1990, the National Assessment of Educational Progress (NAEP) reported on a 76-item test that measured knowledge in four topics: knowing locations, using geography skills and tools, understanding cultural geography, and understanding physical geography. Overall, the national sample of twelfth-grade students answered only 57 percent of these items correctly.

The NAEP study suggests relationships between classroom lessons involving utilization of knowledge and higher level performances on tests in geography. For example, students who said their teachers required them to interpret and apply knowledge to the completion of tasks tended to score higher on these assessments than did respondents who reported that their lessons were limited to mostly reading and recalling the contents of textbook chapters.

In general, systematic and stimulating exposure to fundamental knowledge in geography is associated with higher scores. Students who reported more challenging contacts with key topics and ideas made higher scores on the test of knowledge. One might hypothesize that there appears to be a connection between students' general lack of knowledge, as exhibited by the recent national assessments, and a diminished ability to develop skills in deliberation, discourse, critical thinking and decision making - all of which are basic attributes of exemplary citizenship. It is reasonable also to conclude that with its higher order thinking and interactive nature, developing the relationship between skills and knowledge is the needed vehicle for the improvement in geography.

Questions to Consider Before Writing Assessments

Schools and teachers must make it clear and be focused on what is essential for students to know and be able to do. For the past ten years geographic content has been organized around the, "Five Themes," published in the

Guidelines for Geographic Education (1984). Content is now being reorganized to include the National Standards as well as the Five Themes. These give educators a clear framework of how to organize content. Before teachers write any geography assessment questions, they need to ask some crucial questions when planning lessons and units:

- what geographic knowledge and skills should students possess?
- how should the objectives of geographic knowledge be assessed?
- does the assessment meet curriculum goals?
- is the assessment meaningful to students?
- does the assessment promote good teaching?
- does assessment lead to higher order thinking?

It is important to teach and assess geography not in isolation, but in an interdisciplinary manner with other core subjects such as science and language arts, and to use the Five Themes as a means to elaborate upon the issue that is being presented.

Performance Assessments

A performance assessment is an experience designed by teachers or students which allows students to demonstrate ability as measured by identified criteria. It involves giving a student or a group of students a task to perform. The assessment has two objectives. To evaluate: 1) how students are working; and 2) the completed tasks or products. Efficiency is achieved by directly integrating assessment with instruction before developing the lesson.

Performance assessment has a focus on students moving around the classroom exhibiting understanding and application of a task as opposed to sitting quietly absorbing information without demonstrating evidence of understanding and application.

A common flaw in designing the newer assessments is changing a favorite hands-on activity into a performance assessment. Criteria to be assessed must be developed first. Here are some questions teachers should ask themselves as they write a performance assessment.

What is the purpose of the assessment?
- What is an important issue?
- Is the geography standard or concept addressed?
- What is the complex reasoning process?

What is the nature of the task?
- Is the task clear?
- What content does it address?
- What type(s) of performance is expected?
- How realistic and engaging is it to the student?

How will the performance be evaluated?
- What features of the task will be focused on?
- What variety of methods will be used to gather data? (final products, presentations, peer evaluations, observations)

This following performance activity exemplifies the concepts - performance objectives, rubrics, portfolios, and student self-evaluation. Because the study of geography demands spatial evaluation, a section on map evaluation is also included. It concludes a 5th grade unit in which students are asked to demonstrate important knowledge and skills on understanding the endangered species in North America. The teacher's objectives for the unit are these:

- to show the impact of economic development on natural habitats of a region;
- to illustrate how region and human-environment interaction can be employed for hands-on lessons for elementary students;

- to begin to explore values and quality-of-life issues;
- to continue to develop the language and terms used in geography;
- to become acquainted with issues related to endangered species.

"How are Endangered Species Affected by the Way We Live in North America?"

Activity

The class is divided into six groups. Each group chooses an endangered species such as the spotted owl or bald eagle. They, "become this animal," for the duration of this assessment. As the endangered species, the students make a plea to the humans in the audience to understand their position. Students will persuasively argue about:

- habitat of their endangered species;
- where the species can and cannot exist;
- their opinions about what humans are doing to them and how human economic development affects them.

In their autobiographical presentation they are expected to:

- conduct research in the media center;
- develop an oral presentation;
- complete a mapping exercise;
- prepare a, "point-of-view," poem.

At the culmination of the unit, students participate in a one-day presentation. The criteria for judging the quality of student performance include their ability to do the following: work as a team; acquire and use accurate geographic content; gather data and use cartographic skills; develop a clear and focused presentation; develop well-written poems; and exhibit creativity.

If the issues are human impact on the environment and the problem of endangered species, then the assessment must clearly focus on these issues. One way to ensure this is to begin with a challenging question. In the case of this unit the question might be, "How are Endangered Species Affected by the Way We Live in North America?" The students then analyze the assessment task at the beginning of the unit and the criteria for judging their performance. Together the teacher and students can work on building the skills and acquiring knowledge that will, "make meaning," on endangered species in their roles as facilitator and worker.

This could become an interdisciplinary activity by teachers working with the art department to have each student group make a mask or headpiece of the endangered species for the presentation. Presentations by resource people from the state's Division of Wildlife could provide additional information. On the day of the presentation, the assessment task is recorded with a video camera and observed by parents or adult guests. Students should evaluate their own work on the following day and through an, "instant replay," where both student and teacher discuss the quality of the work. Students need to be given opportunities to assess their own work. For example, as a homework assignment, the teacher might ask them to design a way to score the task they are doing or to create a contract for the activity.

Rubrics

A key element of authentic assessment is the way in which the performances are graded and student progress reported. A rubric is a set of criteria for scoring student work. Although the term has been used for years, it has taken on new meaning within the context of authentic assessment. Unless teachers know how to evaluate work, they may find it difficult to make reliable, consistent judgements about a student's ability. A good rubric provides: 1) a description of the varying levels of achievement, 2) an established scale, 3) emphasis on scoring based on shared

standards as opposed to counting errors. "Upfront," expectations about what will be assessed provide students with road signs of where they are in relation to where they need to be. Use of rubrics help teachers and students realize that there is consistency in the rating of performances. There are many types of rubrics that elaborate the levels of proficiency in reaching the standard (e.g., novice, proficient, distinguished).

Here is an example of an open-ended test item, its scoring rubric, and examples of student responses. The directions are addressed to a student.

Examine the graphs and follow the directions.

Figure 2 (a)

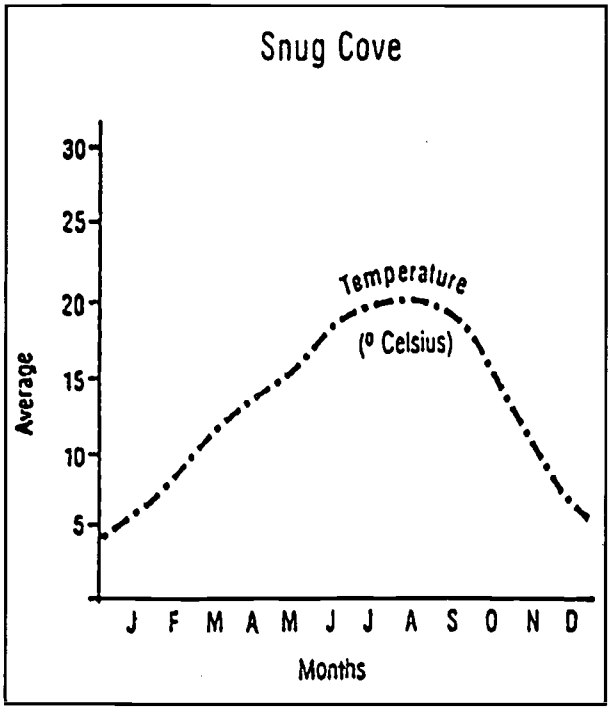
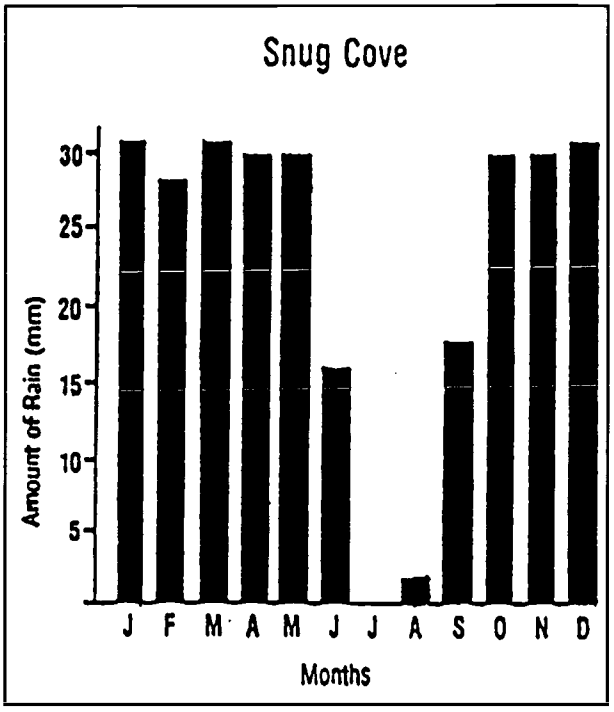


Figure 2 (b)



Describe the climate in Snug Cove. In your answer tell something about each season of the year.

Rubric (Score Scale)

0	Does not address the task or response is unrelated or inappropriate.
1	Response is related to the task but is inaccurate or illogical.
2	Addresses both aspects of the task: describes the climate and explains what the major seasons are like. There are some inaccuracies or an absence of specific examples.
3	Addresses both aspects of the task: describes the climate and makes references to each season. The description is logical and supported by specific and appropriate examples. (See Appendix 1)

A rubric as simple as the one below can be developed for the endangered species activity. More sophisticated models provide more detail. This may be used for either individual or group evaluation.

Rubric for Presentation - 40 points total

Geographic content:

___ identifying appropriate geographic location of habitat; (5 pts.)
___ taking into consideration where species can and cannot exist; (5 pts.)
___ effective use and design of maps and visuals. (5 pts.)

Oral presentation:

___ there is a persuasive argument about their opinions on how humans have affected their species; (5 pts.)
___ there is a clear, articulate statement of the species' problems; (5 pts.)
___ the presentation is smooth and flowing; (5 pts.)
___ the knowledge of facts gained during the lesson and research are well incorporated; (5 pts.)
___ student refers to notes, but does not read. (5 pts.)

Mapping skills and rubric

Each group creates a map of their endangered species. Using an atlas for reference, they will look at thematic maps that show that species' habitat. Included on the map must be:

- climate;
- natural resources;
- population;
- vegetation.

Use the map information to answer the question: In which of these are humans interested?

The maps can be done in one of two ways:

- a series of maps about the location (habitat of the species);
- one map with different types of data represented.

Rubric for grading map - 20 points

Map has:

___ a legend with symbols; (5 pts.)
___ at least four types of regions represented; (5 pts.)
___ (TOADLS - title, orientation, author, date, legend, and scale); (5 pts.)
___ labels on all the regions. (5 pts.)

Students can also evaluate their own progress. The teacher can use this information to draw conclusions about students' understandings as well as to plan further activities.

Sample of student self evaluation of progress

Circle 3 if you did very well. Circle 2 if you did quite well. Circle 1 if you did not do this well.

1. I made a legend for my map.	3	2	1
2. I labeled the regions.	3	2	1
3. I placed the directions on the map.	3	2	1
4. I gave my map a title.	3	2	1
5. I labeled the regions neatly and added color to my map.	3	2	1

My total = _____

Comments:

Self evaluation adapted from, *Grades 4-6 Social Studies Teacher Resource Manual*, Alberta Education, 1989.

Connection of Portfolio to Rubric and Objectives

An example of (best work) type of assignment for the Endangered Species task follows:

> *Poem*
> Write a poem from the endangered animals point of view that begins with the line, What are they doing to my home?.....

Use *five* of the vocabulary words students learned in the unit.

Rubric for grading poem - 30 points

___ The word choice paints a picture and makes a point without having to state it. (5 points)
___ There are no misspelled words or mechanical errors. (5 points)
___ The poet shows a mature understanding of the problem. (10 points)
___ The poet shows creativity, passion, and insight. (5 points)
___ There is evidence of geographic content. (5 points)

More samples of *best work* type of assignment:

(a) Design a tour to one of the world's most holy sites.

- Accurate maps included;
- Guidebook with description of local norms, customs, etiquette;
- Analysis of most cost-effective route, means of transportation;
- Short history of the site that is interesting to students;
- Annotated bibliography: recommended readings for other students;
- Glossary and important phrases in native language;
- Accounts of customs and 2-3 visits by students to local churches.

(b) Conduct an oral history of recent American immigrants on how their views of this country compare with that of their homeland. Analyze for patterns in views of recent immigrants, biased views of first country, etc.

(c) Draft a speech for the head of another country on a world ecological issue, and a response by the President's spokesperson. Video-tape the speeches.

—from Grant Wiggins, *CLASS*, 1992

Another type of portfolio assessment that is particularly appropriate in a world geography class is centered around geographic issues and an inquiry approach. It will help teachers assess students' ability to apply geographic content, skills, and issues presented in the units, to real world understanding.

An example of a portfolio centered around a specific purpose.

> *International Student Magazine* is a year-long project that the class works on periodically as each student applies learning to a country of choice. Each part of the portfolio serves as a culminating activity for units of study from the classroom. Throughout the year, each student works on and compiles an international magazine that is structured around the topics of physical geography, interdependence, development, population, conflict, the environment, and human rights, to a country of choice. Besides helping pupils to better understand these topics, a multitude of learning skills are used. These include research, mapping, atlas use (including the use of thematic maps), table and chart interpretation, graphing, note taking, writing, and word processing.
>
> from Martha Riley, Portfolio Project,
> Eaglecrest High School,
> Cherry Creek School District,
> Aurora, Colorado

Open-Ended Questions

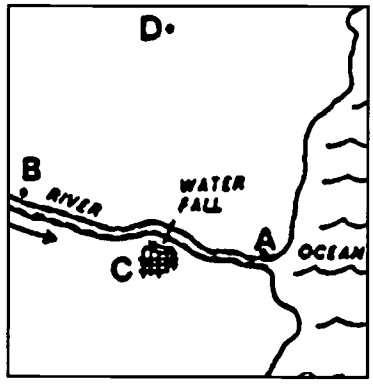
If short answer questions are constructed correctly they can become a valuable evaluation instrument. The following are examples of open-ended questions concentrating on higher order (analysis, synthesis, and evaluation) thinking skills. An inquiry approach to learning lends itself to techniques of assessment that provide students with data in the form of maps, tables, photographs, tables, etc., and asks them to respond to a question or series of questions.

Analysis

Analysis-level questions test the thought processes a student uses to determine how something is organized. In order to answer such questions, the student must have specific information, comprehend the form in which it is presented, and apply the concepts and skills which enable him or her to complete the task. Because the task is complex, it is important to encourage the student to explain the reasoning used in the analysis. The student should be able to interpret geographic data and write/analyze a news article about the geographic causes and consequences of current and past events. The following is a typical analysis question.

Examine the map and suggest two reasons why the largest community in this area developed at location C. Explain your reasons briefly.
Use an atlas to find three examples of North American cities with sites similar to that of C.

Figure 3



Synthesis

Synthesis questions involve students pooling information to form a new whole. Through synthesis one can integrate information, ideas, concepts or skills; or one can solve a problem that requires creative original thought. The student should be able to develop and test geographic generalizations and use a geographic perspective to describe contemporary global issues. The following is an example of a typical synthesis question.

Let's suppose you have been given a number of photographs taken in the northern part of Nigeria. The photographs show:

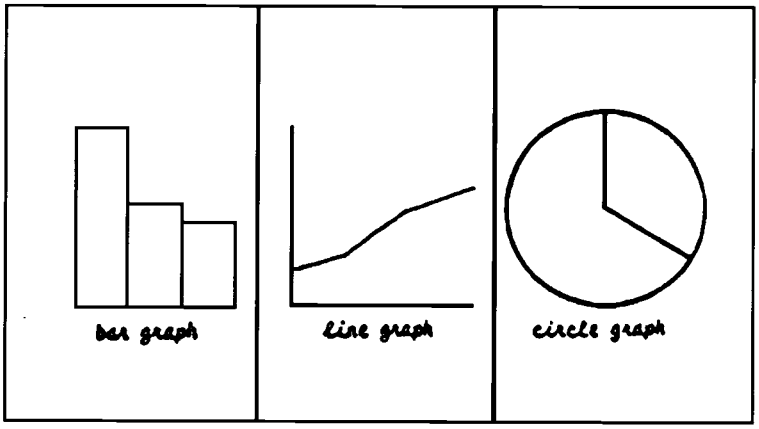
- the countryside surrounding a small village;
- typical animals - wild and domestic - found nearby;
- several houses found within the village.

What features found in the photographs show you that this community is located in a hot, dry environment?

Evaluation

Evaluation is the highest level of thinking. In order to evaluate an idea, event, or material object, the student must have in mind standards against which judgements can be made. If the student uses valid standards, he or she will be in a better position to develop valid judgements. The student should be able to evaluate local, regional, and global issues, environmental problems, and location decisions from different perspectives. The following is an example of a typical evaluation question.

Figure 4



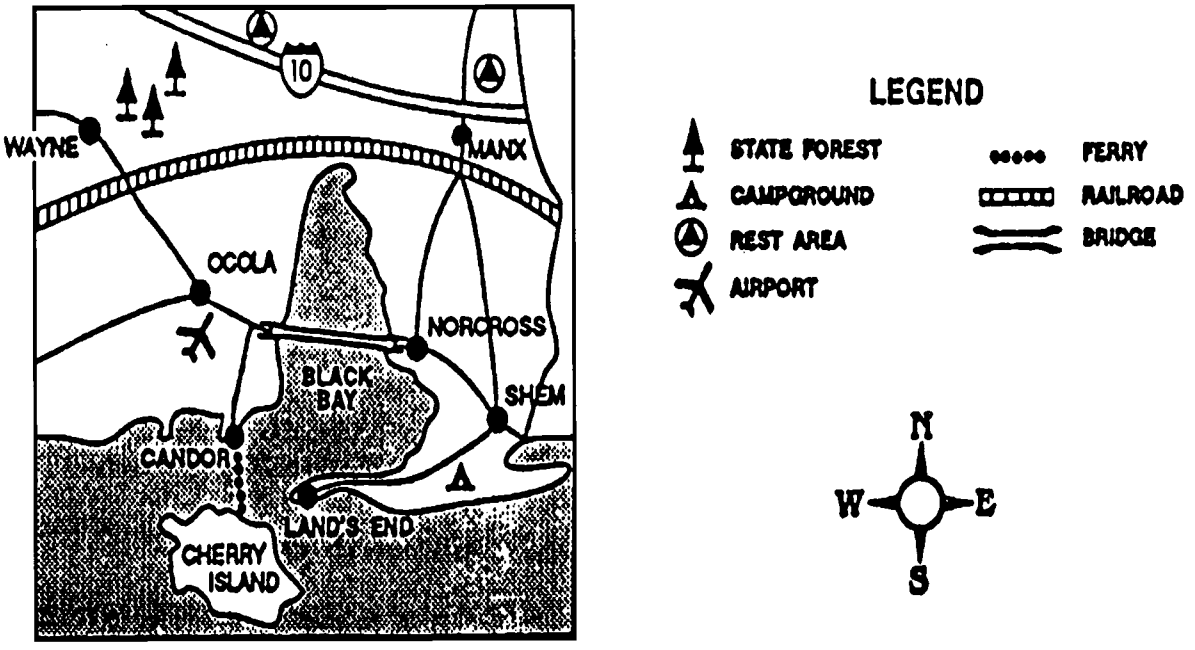
Which one of the graphs would best show each of the following types of information? In a sentence for each, explain why you think the graph type you have chosen is best:

a) comparison of income levels found in several countries;
b) growth of a city population over a hundred-year period;
c) percent of fish caught by type;
d) land use in a city;
e) chief exports of a country;
f) number of trucks manufactured by a company during each of the past ten years.

Here are two examples of open-ended map skills questions - one written for a fourth grade exit outcome and the other for a 10-12th grade exit outcome.

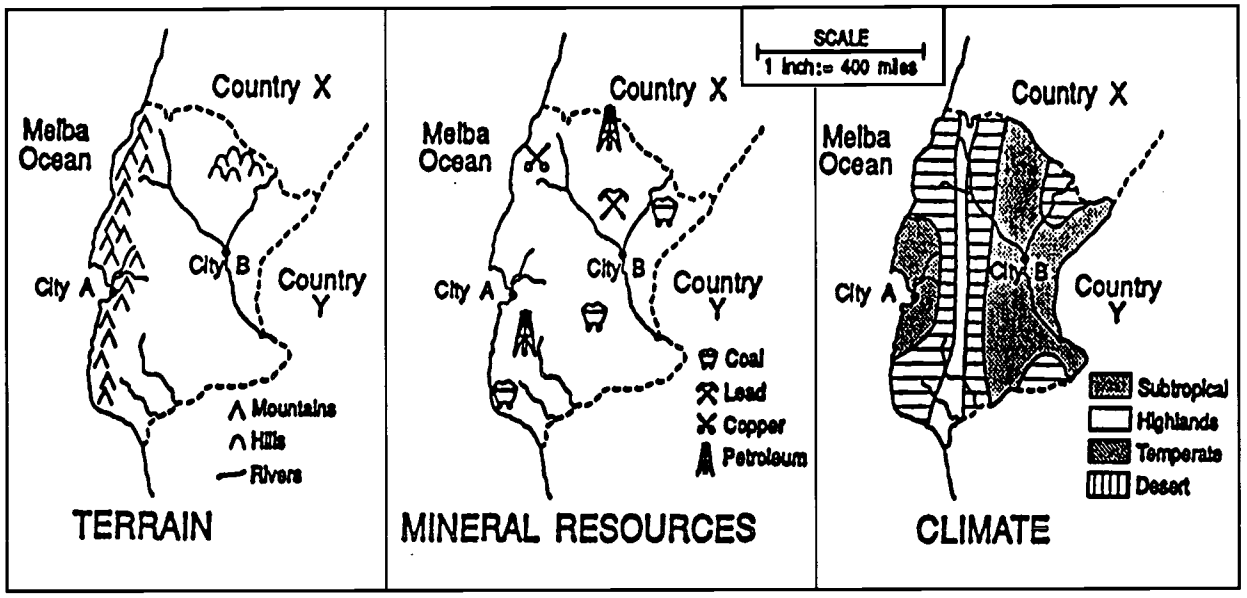
Grade 4

Figure 5. Cherry Island



You and your family live on Cherry Island. Some friends are coming for a visit. They will be travelling east on route 10. Write a set of directions explaining to your friends how to get to Cherry Island.

Figure 6. Trinity



The three maps provide information about the terrain, mineral resources, and climate of a hypothetical country named Trinity. City A and City B are two major centers of population.

Use the information shown in the maps to describe how people in each city live and work. Explain the reasons for your answers.

Where We Are Going: Conclusions

Students must leave the school environment with the skills needed to continue to learn and with inquiring minds prepared for life in a rapidly changing world. Media reports from surveys and tests illustrate the pervasive geographic ignorance of American students. To address this problem, geography teachers need not continue drilling students with more place name locations, but instead develop in-depth analysis and critical thinking skills involving relevant geographic issues and questions that go to the very heart of essential learning. Meaningful geographic

assessment should be engaging and present students with complex, open-ended problems that integrate knowledge and skills. This will help assure that students can achieve even higher levels of knowing. Techniques mentioned in this chapter (rubrics, portfolios, and open-ended questions) provide vehicles for higher student success that focuses on the end result - learning for understanding and the improvement of education for everyone.

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Biography

Marianne Kenney, a veteran of seventeen years teaching social studies, coordinated the International Studies program at Eaglecrest High School in the Cherry Creek School District in Colorado. She attended the first National Geographic Society Summer Institute in 1986, and served on the Society's Summer Geography Institute staff in 1987. A recipient of the National Council for Geographic Education, Distinguished Teaching Award in 1989, she was subsequently recognized with the 1991 Governor's Award for Excellence in Education because of her commitment to geographic education. Currently, Ms. Kenney is the Social Studies Specialist for the Colorado Department of Education and teaches secondary social studies methods for the University of Denver. She serves as a member of the writing committee of the National Geography Standards Project and is Project Director for a statewide Geography Standards Frameworks grant awarded by the U.S. Department of Education Innovation in Education Fund.

Examples of student responses

The average of Snug Cove in Jan is about 5°C celsius that is cold. in Feb it is still 5° celsius and cold. March is about 10° celsius and pretty cold and warm. April is close to 15° celsius that is prety hot. May is hot. June is hot July is hot Aug is warm. Sep is hot. Oct is hot. Nov is pretty hot. Dec is cold.

1 Attempts the task but is literal and repetitive.

In winter the temperatures in Snug Cove are cold and it has a lot of precipitation. In spring the temperatures begin to rise and the precipitation stays the same. In the summer the temperature reach 20°C and there is little precipitation. In fall the temperatures drop and precipitation rises.

2 Addresses the task but needs to be more developed for a higher score.

In winter the climate is cold and wet. In spring it is cool and rainy. In the summer it is hot and not very rainy. In the fall it is warm and rainy.

2 Addresses the task but lacks supporting detail.

10. TEACHING GEOGRAPHY IN A PLURALISTIC SOCIETY

Rickie Sanders

Abstract: One of the most challenging tasks in teaching today is responding to the diversity and pluralism found in classrooms. A growing school of thought argues that the challenge can best be met through revisions in the curriculum and learning activities. This paper responds to that challenge. It seeks to provide teachers with a feel for the issues - what they should be aware of. In doing so, it puts forth ideas, tools, and approaches that can be used effectively in geography classrooms with diverse student constituencies.

The definition of pluralism advanced here moves beyond racial, ethnic, and religious diversity and acknowledges that diversity also includes differences in class/economic status as well as differences in learning.

The chapter provides general guidelines and assessment criteria that high school teachers have found to be of use in developing teaching strategies for diverse student populations. It concludes with two sample learning activities that can be adapted to various classroom situations.

Key Words: diversity, urban education, underrepresented groups - women, racial and ethnic minorities.

For most of us, born before the 1960's, our recollection of the United States was that it was a melting pot. As myth would have it, gender, religious, and ethnic differences simply did not exist. Schools were homogeneous, the physically challenged were not mainstreamed and the poor were invisible. The popular television sitcom, "Leave It To Beaver," was cinema verite.

Today, the reality of United States society is vastly different. Even with its perjorativeness, "political correctness," has made it impossible to ignore the experiences of underrepresented groups - whether they be racial/ethnic minorities, women, gays/lesbians, or the physically/mentally challenged. To stretch the fabric even further, alongside the average student for whom the traditional pedagogy was devised, are others who don't quite fit under the umbrella, "average." They are likely to have repeated a grade at least once; many are very poor; some have children of their own and combine parenting with schooling; more and more are diagnosed as learning disabled or emotionally disturbed; and some carry weapons and sell drugs. The melting pot has been replaced by the "salad bowl." Everybody is a minority of one.

Critics argue that despite high global ranking on dimensions such as literacy, teacher salaries, etc., the United States' educational system is marred by failure. They point out that the proportion of students expecting to finish high school each year is getting smaller and smaller. Many of those who do finish are unable to compete in a job market that is becoming increasingly more global. Among economically disadvantaged Hispanic, Native American, and African American students, school is just another part of the system which they feel is grooming them to maintain the status quo. Because it demands so much and provides so little in terms of opportunity, it simply fails to capture them.

There is considerable debate over what the appropriate response to this crisis should be. Some argue that nothing short of dismantling the system (to make it less culturally hegemonic and more engendered and racially inclusive) will do. Others, however, view this as the mindless bantering of a few narrow-minded zealots. One suggestion that has recently gained favor is that teachers need to use a more rigorous and challenging curriculum which employs different tools and approaches.

Lacking answers to some basic philosophical and practical questions, however; What is meant by, 'plural'?; Why are students in school? and What do they need? - the challenge is deceptively simple. With regard to geography in

particular, the challenge is to come up with answers to questions such as - What are the central geographic concepts a student should grasp? Why (and how) were these concepts selected? Are they relevant to students from diverse racial/ethnic, religious, economic backgrounds? Should they be relevant? How important is relevance? (Many teachers are given mandates on what must be taught. It may not be "relevant" to students' lives and may not affirm their experiences. There are lots of things that teachers must teach that have no connection whatsoever to students' daily lives. What then?) What can be taught in geography classrooms that grounds students in the discipline of geography and at the same time, is important to their everyday lives? What can teachers provide to help students become informed, committed, and powerful thinkers/citizens?

The Learning Environment and Effective Teaching Practices in the Context of Diversity

Teachers, either actively or passively, construct, "environments," for learning. These environments either encourage or discourage students. Being willing to consider non-standard questions and situations or being alert to (and bringing in) new developments in the field for which there are no, "correct," answers indicate to students that learning is a life-long process. Students will try to answer questions and make contributions to discussion if they can link the topic with something they know. Underrepresented students in particular commonly feel they have been silenced in the educational process and their experiences are not worthy of inclusion. Given an opportunity, they may have much to say. Teachers who create a classroom that allows students to express their ideas ultimately encourage the *critical catharsis,* that is a threshold for all learning.

Students are more likely to think critically when knowledge acquisition and critical thinking are intertwined rather than sequential. For example, when introducing concepts like race, class, and gender, teachers might want to emphasize the social constructedness of these phenomena - the idea that they originate out of society and their meanings emerge only through cultural appraisals. Other concepts, like wind speeds or Richter scale measures that form the basis of housing design specifications, can also be used. These provide students with some "food for thought," and also force them to think more critically about the subject.

Finally, it increases student confidence in the learning process to know that the teacher has teaching goals and a sense of what the product should be - what is to be accomplished. It is also helpful for students to develop personal learning goals.

There is now plenty of evidence supporting the idea that teaching/learning is much more effective when it takes place in an environment guided by a set of good classroom practices. Here are illustrations of good classroom practices:

1. respect diverse talents and intellectual diversity. Acknowledge differences in learning styles;

2. communicate high expectations and encourage students to have high expectations of themselves;

3. give prompt feedback on performance and help students figure out what to do in response;

4. encourage interaction and contact among students within and outside normal classroom hours;

5. develop reciprocity and cooperation among students so that they learn to work productively with others;

6. encourage active learning and foster the idea that students should think, do, and think about what they are doing;

7. emphasize time on tasks by providing useful, productive, guided practice.

Sample Learning Activities

Two examples of classroom exercises that are helpful in terms of illustrating what has been mentioned above are, "Shaking Things Up: The Human Side of an Earthquake" (Appendix 1), and "The Real World" (Appendix 2).

"Shaking Things Up: The Human Side of an Earthquake," was developed by the Committee on Underrepresented Groups (National Council for Geographic Education) in an effort to expose students to a real life situation that, (a) creates an opportunity for an authentic performance and, (b) imparts geographic content. The exercise requires that students divide themselves (or be divided) into groups based on their assessment of how many groups are needed. After reading a description of what has happened during an earthquake (or some other natural disaster that they might be more familiar with), students are asked to respond as a particular interest group would. In taking sides, students are sensitized to how others act and the ways they protect their interests.

"The Real World" was developed by this writer for use in introductory college classes but has been field tested, with positive results, in several high school classrooms throughout Philadelphia. "The Real World" requires students to fully appreciate the cartographers' task as well as to understand the politics behind it. Knowing that what is being taught is not "cast in stone," encourages students to consider that they might have something to bring to the process.

In "The Real World," students are divided into groups. After comparing three map projections, the Mercator, Peters and Robinson, they are asked to debate the strengths and weakness of each. In the course of the exercise, students become aware of how values and attitudes enter into the process of map making and can skew the presentation of information. The book *How To Lie with Maps* by Mark Monmonier might be used by teachers to supplement this exercise.

These exercises share a number of characteristics.

1. Both activities **incorporate** many of the new **pedagogies that have been found effective** for use in plural classrooms - cooperative learning, group discussion/team planning, role playing, etc.

2. **They provoke other questions.** "Who decides?" is a question that inevitably arises.

3. **There are no right or wrong answers.** Students can express their position without fear of its being wrong.

4. **Both exercises are flexible.** Regarding, "Shaking Things Up: The Human Side of an Earthquake," in particular, the entire text can be changed to connect more closely with students' life experiences.

5. The activities also **emphasize attitudes, values, feelings or ethical considerations.** Students can debate what is, "right," and why it is right.

6. Both **intertwine factual information** about physical geography **with critical thinking skills.**

7. **They both appreciate learning differences.** Some students process information visually, others aurally and still others graphically. By using a wide range of methods and asking students to respond by tapping

into a wide range of skills - writing, speaking, application, and analysis - they make learning easy. (See Newell 1984; Griffith 1982 for a discussion of the importance of writing).

8. Both are **easy to "control."** The teacher can guide the discussions, ask critical questions, and provide directions when necessary.

It is tempting to use these characteristics as assessment criteria. Indeed, in some ways they are. In this case, however, the circularity of the logic makes that impossible. What makes a good activity? What criteria should be used to assess the effectiveness of geography lessons in plural classrooms? Anecdotal wisdom gleaned from classrooms suggests that when the following questions are answered in the affirmative, the activity is a good one.

1. Does the activity provide students with an effective tool for making sense of the world?

2. Does it build an appreciation of territorial relationships in the wider world?

3. Does the activity extend understanding of places by examining human-environment interactions?

4. Does the exercise deepen and extend understanding of the nature of places?

5. Does it encourage individuals to examine their attitudes to and about places?

6. Does the activity foster imagination?

Conclusion

Traditional thinking is that effective teaching imparts knowledge of facts and provides students with answers to questions. Yet, recent experiences in plural classrooms consistently point to a more fluid hands-on, group based, and active learning approach that relies less on imparting facts and shuns almost completely any attempt to provide students with answers to questions. Emphasis is on process. Small group activities, cooperative learning, problem solving, class discussions, and writing are important elements (Johnson and Johnson 1985; Bouton and Garth 1983) as are frequent, short writing assignments. Writing fosters learning and thinking. When writing, students often realize what it is they don't understand. Sharing writing (peer grading) is also effective in plural classrooms as it acquaints students with each other's work and ideas.

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Biography

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Shaking Things Up: The Human Side of an Earthquake

Natural events, such as earthquakes, serve as dramatic reminders that the earth is not a passive agent in the human occupation of the planet. This learning activity examines the impact of an earthquake on different groups of people and assesses their responses through a role-playing experience.

Grade Level: 10-12

Time Required: 5-6 class periods

Themes/Key Ideas: Place:

- places have physical characteristics;
- physical processes result mainly from natural processes;
- natural processes are parts of global systems.

Human-Environment Interaction:

- relationships within places include how people adapt to or modify the environment.

Vocabulary/Concepts:

- natural hazards;
- distribution pattern;
- plate tectonics;
- seismography;
- Richter scale.

Objectives: The learner will:

- observe physical characteristics of places;
- understand natural hazards;
- understand the importance of knowing the location and the effects of natural hazards as well as their causes and magnitudes.

Materials: Student Resource 1: "An Earthquake is Only the Beginning," Student Resources 2-5; World maps showing the distribution of earthquakes and other natural hazards (See Hardwick and Holtgrieve, p. 134 and p. 304).

Learning Activity

Role playing and problem solving are very useful teaching strategies that enable students to assume a different perspective, critically analyze a problem, and develop possible solutions for the dilemma in question.

This learning activity examines a natural disaster - an earthquake - and its effects on humans. For most people, knowing the location and effects of a natural hazard are perhaps most important. Geographers, however, also study the cause and magnitude. This information can be useful in predicting future events.

Introduction

Ask students what comes to mind when they think of a "natural disaster" or "natural hazard."

Allow students to brainstorm; write their responses on the board.

Define "natural hazard" and point out that almost daily, the news media bring information about drought, floods, earthquakes, hurricanes, or volcanic eruptions somewhere in the world. Distribute (or have students locate in their textbook or atlas) a world map showing the distribution of natural hazards.

Present background information on earthquakes, their causes and distribution; lead students in a discussion of the map showing the distribution of earthquakes.

Execution

1. Have students read (either aloud or individually) Student Resource 1.

2. Ask students what different interest groups are represented in this reading. Encourage discussion until the following groups have been named:

Garment Factory Owners;	Soldiers;
Women Garment Workers;	Mexican Government.

3. Divide students into eight groups, two groups representing each of the four roles. When assigning groups, be sure to consider their composition with respect to gender, race/ethnicity, and ability levels. Explain to students that they will be representing the interests of the four groups identified. Distribute Student Resources 2-5 among the respective groups. Direct students to read the scenario presented and respond as instructed.

4. Allow time for students to discuss the assignment. The written assignment may be completed in class or as an out-of-class assignment, depending on the time available.

5. Allow time for students to share their positions with the rest of the class.

Closure

Bring closure to the lesson by revealing to students that although the 1985 earthquake was a horrible tragedy in every way, it also marked a political and personal turning point for the garment workers. Despite numerous previous attempts to create a union, they created one that autumn: the "September 19th Garment Workers Union." By 1987 it had gained workers' support and official recognition in twelve factories.

Although the women's empowerment had been challenged, the mobilization of the women and the establishment of the "September 19th Garment Workers Union" was an important first step in employment rights for women in skilled labor in Mexico (Enloe 170-173).

Student Resource 1

AN EARTHQUAKE IS ONLY THE BEGINNING[1]

At 7:19 on the morning of September 19, 1985, Mexico City experienced one of North America's worst earthquakes. Thousands of people were killed, countless numbers were left homeless, and many more were left jobless since many office buildings were damaged or destroyed. An estimated 800 small garment factories in Mexico City were destroyed that morning, killing over 1,000 garment workers and leaving another 40,000 without jobs.

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[1] Adapted from: Enloe, Cynthia. *Bananas, Beaches & Bases: Making Feminist Sense of International Politics* Berkeley: University of California Press, 1989. 169-171

September 19th was a Thursday - payday - and many of the garment workers were single mothers whose families depended on their wages. Many of the women were already at work at 7:00 a.m. and therefore became trapped inside the flattened buildings. Managers usually kept windows closed and doors locked to prevent the women from taking work breaks or stealing materials, so few of the them had any chance of escaping.

Some of the buildings held up to fifty different garment companies, several per floor. The floors and cement pillars on which they rested could hardly have been expected to hold the weight of heavy industrial sewing machines and tons of fabric, although no government inspector had ever complained.

Women outside the collapsed building who had arrived later, tried to climb over the debris to rescue their coworkers trapped inside. Hastily mobilized soldiers told them to get back and roped off the building. Equipped with cranes, soldiers began to pull away piles of fallen cement so that the owners' could retrieve their machinery. Employees still standing in the sun on the other side of the ropes watched with mounting horror and indignation as their bosses and the soldiers chose to rescue sewing machines before women.

Student Resource 2

GARMENT FACTORY OWNERS

You are stunned by the negative press your group has received. Most of you are small subcontractors, backed by foreign money. The government used you as a major part of their policy to pay off its spiraling debt. And now, it seems that even the government is turning its back on you.

The women workers are clamoring for their money, but you were not insured and it will take much money to reconstruct the factory. You desperately brainstorm to see who can be called upon to help you out of this crisis.
You are being called, "beasts," and, "unfeeling monsters," in the press. Can you be blamed for wanting to salvage the equipment that you worked so hard to acquire? And besides, without this equipment, these women will have no jobs to return to.

As a group, you decide that you must inform the public of your plight and let people around the world know that you are not "unfeeling monsters."

You have 30 minutes to draft a press release to the news media as a group. Be sure to explain the situation from your point of view and appeal for assistance from the community at large.

COMPOSE YOUR PRESS RELEASE NOW.

Student Resource 3

SOLDIERS

You are the government soldiers who were hastily mobilized to keep order at the garment factory site. You felt badly roping off the area and telling the surviving women workers to get back. However, you were just following orders.

The real problem started when your regiment started removing piles of fallen cement in order for the owners to retrieve their machinery. Since then, there have been newspaper reporters, camera people and protesters there around the clock. Last night the women set up a human roadblock and refused to move to let the cranes in. You feel torn as to what should be done.

While the government figures out what to do, the commander of the regiment has given you a 30 minute break. During this time you will write a letter to your parents who live in a rural town several hundred miles away. You

feel this might do some good and help you understand your position on the issue. You also want your parents to understand your actions.

COMPOSE YOUR LETTER NOW.

Student Resource 4

WOMEN GARMENT WORKERS

You are the surviving women garment workers of the neighborhood known as San Antonio Abad in Mexico City. You are disgusted by the way the factory owners have acted in prioritizing machinery over people. You are sickened by the government's apparent conspiracy with the owners and are enraged that you have not been compensated for last week's labor and future lost work.

For the last week, you have built a human road block against the soldiers, owners, and the cranes. You have kept a constant watch outside the factory since the earthquake.

Just one hour ago, you received a telegram from the World Court. It has heard of your plight (you've been very successful at embarrassing the president by publicizing the army's role in removing the sewing machines before rescuing trapped women workers) and has sent a telegram to let you know that it is willing to pay for two of you to travel to their chambers to hear your grievance.

You decide that although all of you can't go, you should all have a say. You compromise and decide to write an impassioned speech that one of you will read before the Court. Unfortunately, you have only thirty minutes to write the speech before the selected two must leave for the airport.

COMPOSE YOUR SPEECH NOW.

Student Resource 5

MEXICAN GOVERNMENT

You are advisors to the President of Mexico. You are greatly saddened by the loss of life and property that the earthquake has caused in the capital city. This will no doubt worsen the economic situation in the country. You must analyze the situation quickly and advise the President how he should respond.

The President has been seriously embarrassed by the mobilization of the women workers. They have drawn international attention to the army's role in removing the sewing machines from the damaged factory. But most people do not understand that the garment factories have become an integral part of the government's policy to pay off Mexico's spiraling debt.

However, the women have gotten international publicity and the government has been made to look like a "monster" by most of the newspaper accounts. The reputation and image of the Mexican government must be salvaged. After all, the country is in dire need of foreign investments.

The President is expecting a memo from you in 30 minutes, advising him as to the course of action he should take.

COMPOSE YOUR MEMO TO THE PRESIDENT NOW.

The Real World

Maps are commonly thought of as objective representations of the world. This learning activity examines the notion that maps are also a state of mind. It asks students to sharpen their skills of observation (compare and contrast) and relate what they see through writing and discussion.

Grade Level: 10-12

Time Required: 3-4 class periods

Themes/Key Ideas: Space:
- space is socially constructed;
- distortions are a natural by-product of mapmaking;
- mental map/cultural perceptions;
- geographic information systems;
- lesser developed countries/Third World.

Vocabulary/Concepts:
- projection(s);
- scale;
- latitude/longitude;
- skewness/distortion.

Objectives: The learner will:
- observe various map projections and evaluate their relative merits;
- understand what the art of cartography entails;
- understand the importance of mental maps.

Materials: Student Resource 1: World maps showing three different projections.
Student Resource 2: Article, "The Politics of Cartography."

Learning Activity

The learning activity allows students to examine several map projections (Mercator, Peters, and Robinson) and critically analyze and discuss the implications of the differences among them. After being introduced to the cartographers' task, students might be asked to approach the issue as though it were a problem and devise solutions, by brainstorming, as to how distortion could be avoided or minimized.

Introduction

Ask students to think about a definition of "map." What comes to mind when they hear the word "map"? How often do they use maps? What for? How do they think maps are made? By whom?

Allow students to brainstorm. Write their definitions of "map" on the board.

Define "map" and alert them to the fact that their lives are full of maps. Note that maps are found in newspapers

(they might have been asked beforehand to examine the newspaper for maps), on the nightly news, in malls, practically everywhere.

Present background on maps; rudimentary information that describes to the student the process of mapmaking. Lead students in a discussion of problems and how they are solved.

Execution

1. Divide students into groups of 4 or 5 each. Provide each student with a copy of Student Resource 1 - map projections, and Student Resource 2 - mental maps.

2. Ask them to look closely at the maps and afterward, discuss the differences they see in each of the projections. Each group should come up with a list.

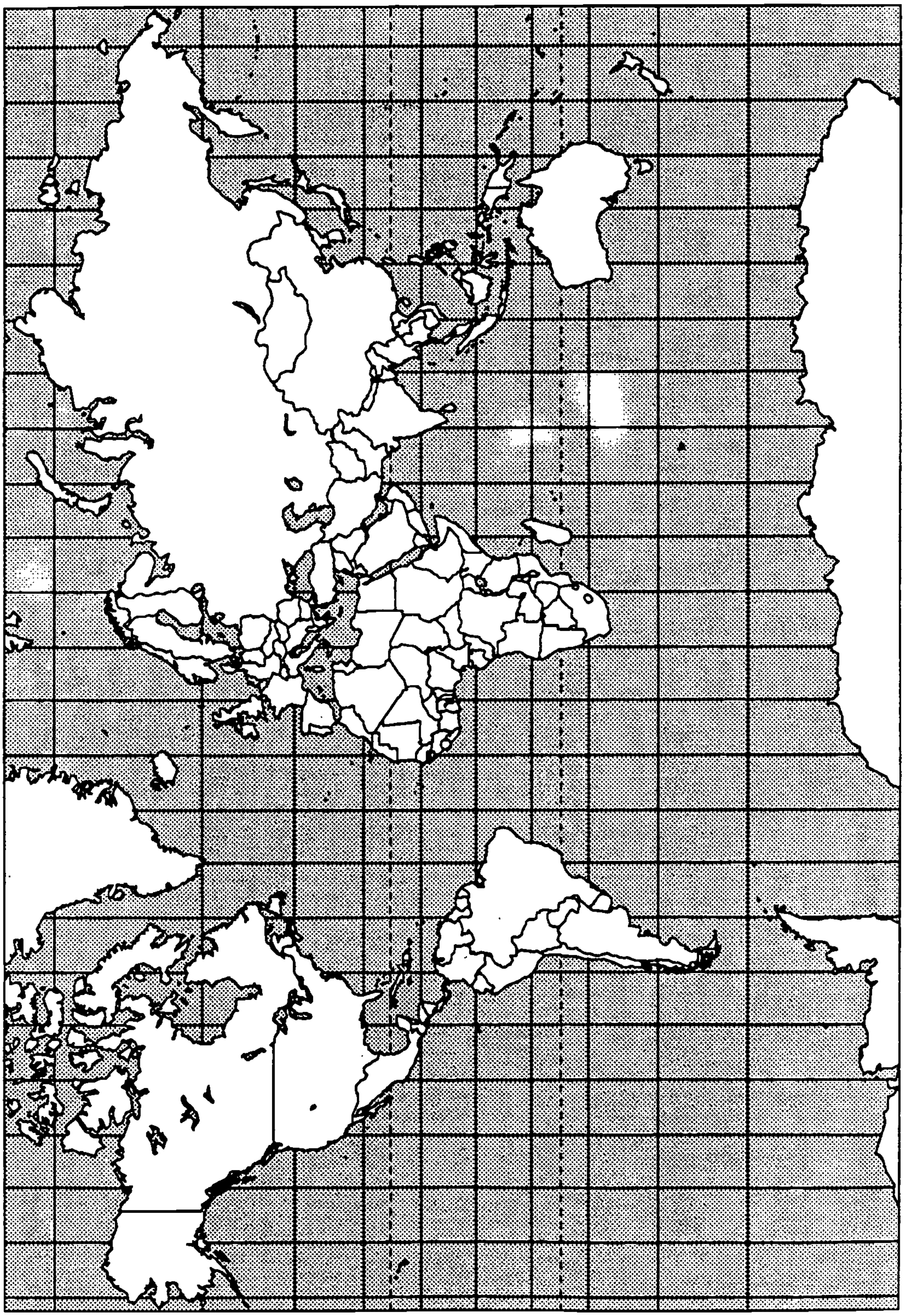
3. Each group should then present its list to the entire class. Direct students to be as precise as possible in their observations.

Closure

Bring closure to the lesson by revealing to students the social construction of the world as presented by Mercator. Note for instance, the placement of the equator, the amount of space devoted to depicting the "north" vs. the amount of space devoted to depicting the "south" and the size of Europe vs. the size of South America. At the same time, enjoin them to appreciate the task of the cartographer, especially during the time of Mercator and share with them the appropriate uses of the Mercator projection.

If time permits, have students discuss how they would construct their map of the world given what they know about the difficulty of "flattening a round ball."

Student Resource 1 (a)



Mercator Projection

Student Resource 1 (b)

Peters Projection

149

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148

Student Resource 1 (c)

Robinson Projection

151

150

Student Resource 2

"Mental Maps": The Politics of Cartography
Scott Minerbrook

All maps distort reality. Flattening a spherical world without misrepresenting some part of it is simply not possible. Map makers have long appreciated this fundamental paradox of cartography, but in recent years the distortions in maps have become increasingly political. Indeed, map making appears to be the most recent target of the political correctness movement that is currently sweeping through American education and publishing.

The political debate centers mostly on a 400-year-old map, the Mercator projection, the image of the world most familiar to American schoolchildren. Originally designed as a navigational tool, it still works fine for that purpose, but it gets the relative size of land masses dead wrong. The Soviet Union doesn't dwarf Africa, as the Mercator makes it appear. Nor is Europe larger than South America.

Maps of the mind. *Such distortions are of more than passing significance, critics of the Mercator insist, because, "mental maps," are crucial to cultural perceptions. "In our society," argues Salvatore Natoli of the National Council for the Social Studies, "we unconsciously equate size with importance and even with power, and if Third World countries are misrepresented, they are likely to be valued less."*

The most provocative challenger to the Mercator is the Peters projection, named after its creator, German historian and cartographer Arno Peters. Although the map is nearly 20 years old, it is being heavily promoted today by the World Council of Churches and various United Nations organizations, which distribute the projection as, "a map for our day," and as a politically sensitive replacement for the outdated Mercator. The Peters map is an, "equal area," projection that claims to represent relative sizes of land more accurately. In publicizing his map, which noticeably elongates the Third World continents of Africa and South America, Peters has bitterly denounced the, "European arrogance,"of the Mercator map, saying that the cartographic profession has intentionally used it to foster European imperialist attitudes.

The Peters map has been roundly attacked by the cartographic establishment on technical and philosophical grounds, but publishers and educators appear to find the map's politics appealing. Despite an intense lobbying effort by leading cartographers that dissuaded Prentice-Hall from publishing the map, in October, Harper Collins Publishers in New York released the first American edition of a world atlas based on the Peters map.

The schools, too, are yielding to the tide of cartographic political correctness. More and more are using the Peters map not only to raise consciousness about the inevitability of map distortions but also to counter the strong European emphasis of the Mercator and other maps. The Texas Education Agency has required textbook publishers who sell books to Texan children to explain that the world does not really resemble the traditional Mercator image. Publishers of new texts must also include comparisons of different map projections. In Paramus, N.J., educators are using the Peters projection with other maps to get students to look at the world differently.

It is human nature for map makers to put their own interests at the center of the world and keep what is foreign peripheral. The enthusiastic reception that the Peters map is currently receiving suggests that the Third World's point of view is, if nothing else, politically fashionable.

11. Resources For Geographic Education

Joan P. Juliette

Abstract: Many national organizations are devoted to the enhancement of geographic education. The scope and purpose of each organization is followed by a brief description of publications and services of interest to geography teachers. A brief annotated list of college level texts and resources is included as a guide for teachers.

Key Words: geography education, geography curriculum, geographical organizations, geography teaching methods, geography college texts, atlases, almanacs.

Introduction

Physicians have the American Medical Association, lawyers the American Bar Association, librarians the American Library Association, but geographers have an abundance of national organizations which promote, enhance and support the field of geography. Does this mean geographers are gregarious by nature, like to attend meetings, or do not get along in one big group? No matter what the answer, all of these organizations have done an excellent job of supporting the revitalization of geography. Educators and students are the benefactors of these efforts. This chapter will outline what types of materials and support are available to geography educators.

The importance of state and national organizations should not be overlooked. Even as geography makes a comeback in the curriculum, some educators may find themselves the only geography teacher in a secondary school. Elementary teachers are not quite so isolated. These teachers especially, need to become familiar with state, local, and national conferences, as well as the most recent geography materials and research. Many innovative attempts are being made by educators all across the United States to revive geography education and to make geography more than the memorization of place names. Geographers can network and share ideas and innovations through contact with these organizations. The contributions of each of the organizations follows.

American Geographical Society
156 Fifth Avenue
Suite 600
New York, NY 10010-7002
(212) 242-0214

Founded in 1851, the American Geographical Society is the oldest of the geography organizations. The 31 founders intended to establish a library of maps, charts, and instruments, and to publish their proceedings. They were originally housed at New York University. Today the society serves business, government, and education. A variety of publications is available.

The Geographical Review (4/yr.) - This is a scholarly journal of refereed papers on primary research and field work.

Ubique (Latin for, "everywhere") (2/yr.) - This AGS newsletter deals with trends and developments in geography.

Focus (4/yr.) - Published since 1950, this journal is written and edited by geographers for the general population. Highly readable and informative articles provide a resource of supplemental information for secondary teachers. Since 1988, the column, "Geography and Teaching," has offered tips for teachers of grades K-12. An introductory half price subscription at $10 is available to teachers.

Around The World Program - This series of 64 page books describes the land, people, economy and contemporary characteristics of the world's countries. Full-color photos, maps and computer graphics enhance the writing of professional geographers. Designed for young adult readers, it may be used for grades 4-12. Three types of subscriptions are available:

Family activity edition (12/yr. - $48);
Softcover trade edition (12/yr. - $60);
Library-bound edition (12/yr. - $140);
Activity guides (a separate subscription - $18).

Available from:

The McDonald & Woodward Publishing Co.
P.O. Box 10308
Blacksburg, VA 24062-0308
(703) 951-9465

The American Geographical Society also supports geography education by recruiting volunteers for the Junior Achievement Program. These recruits lend a geographic focus to the economic and business ventures of the secondary students who are members of Junior Achievement.

National Geographic Society
1145 17th Street N.W.
Washington, D.C. 20036-4688
1-800-638-4077

The National Geographic Society was founded in 1888 by a small group of Washington, D.C., scientists and explorers for the *"increase and diffusion of geographic knowledge."* The Society became well known for sponsoring the Arctic explorations of Peary and Byrd. Through the illustrations and articles of the *National Geographic Magazine*, which is intended for the general population, the Society piqued the interest of many a student and adult in geography. Pull-out maps and numerous illustrations and photographs have always been a feature of the publication. Membership in the Society numbered over 10,000,000 by the mid-1980's due to the popularity of the magazine. Today the National Geographic Specials on television have opened the wonders of the world to children and adults.

The Society is well known to educators for producing a great variety of the highest quality educational materials. Maps, globes, atlases, videos, filmstrips, learning kits, books, magazines, games, prints and posters, software and multimedia are available for all age levels. Of special note is the *Kids Network.* By means of computers and telecommunications, students in grades 4-6 can share data and research with classrooms around the world. The *National Geographic Educational Services Catalog Pre-K-12/Adult* is the detailed listing of all the items available. No geography teacher will want to be without it.

The Society has gone a step further in promoting geography. The Geography Education Program is specifically designed to, *"restore and revitalize geography instruction in the nation's schools."* It includes the following:

Update - This is a periodic newsletter for educators including reproducible geography lesson plans.

Geographic Alliances - These are a network of groups in every state, the District of Columbia, and Puerto Rico. Educators from K-college, as well as policy makers and citizens, promote geography through activities for teachers, curriculum reform, and public awareness. The Society and its Foundation provide technical and financial support to the Alliance movement. A variety of workshops and summer institutes has been hosted

by these Alliances and some have published curriculum materials. A list of the Alliance Coordinators and their addresses is available from the Society by contacting the Geography Education Program.

Directions In Geography: A Guide For Teachers - This is a resource for K - 12 teachers with suggestions about how to integrate the 5 themes of geography into the classroom, lesson plans with black-line maps, and an annotated bibliography of teaching resources. ($29.95)

Geography: A Voyage of Discovery - This is a multi-image slide show on VHS format to motivate students to study and explore geography. ($22.50)

Geography Awareness Week - It is observed during the third week in November. Activities are designed to enhance public concern for the need for geographic education.

National Geography Bee - This is an annual contest for students in grades 4-8. Only principals may register their schools. Media coverage of this event draws lots of attention to geography education.

For more information of any of these programs, write:

National Geographic Society
Geography Education Program
P.O. Box 37138
Washington, D.C.20013-7138

Association Of American Geographers
1710 16th Street, N.W.
Washington, D.C. 20009-3198
(202) 234-1450
FAX (202) 234-2744

The Association of American Geographers, a scholarly nonprofit organization founded in 1904, is dedicated to professional studies in geography. It promotes geographic research in education, government, and business. The worldwide membership is 6500. Geographers with all varieties of subfields can join specialty groups. One such group is geography education. At annual and regional meetings, members may present papers, and attend symposia, workshops, and field trips. Publications include the following:

The *Annals of The Association of American Geographers* - This is a quarterly journal of major scholarly articles, book reviews, and commentaries.

The Professional Geographer - This quarterly publication features concise research articles, technical reports, and book reviews.

The *AAG Newsletter* - This monthly publication contains information on current activities and the availability of research grants.

Activities And Readings In The Geography Of The United States (ARGUS). A grant from the National Science Foundation enabled the AAG to develop classroom materials integrating textbook learning, hands-on activities, and

directed readings from diaries, newspapers, literature, and research reports. Materials, oriented to the physical and cultural geography of the United States, consist of a concise text, a set of related readings, student activities, and a teacher's guide. The curriculum may be used in geography, history, environmental studies, and global studies. The materials, which are available from the AAG, are oriented to future geography assessment by NAEP (National Assessment of Educational Progress).

ARGUS has also developed curriculum exchanges with Russia and Japan. Russian and U.S. materials will be exchanged and translated for teachers and students and will be coordinated so that comparisons may be drawn.

For more information on ARGUS or other educational programs contact:

Dr. Osa Brand
Director of Educational Affairs and ARGUS Project Coordinator
Association of American Geographers
1710 16th Street, N.W.
Washington, D.C.20009-3198

National Council For Geographic Education
16-A Leonard Hall
Indiana University of Pennsylvania
Indiana, Pennsylvania 15705
(412) 357-6290

Every geography teacher will want to be a member of the National Council for Geographic Education, an organization founded in 1915 under the leadership of George J. Miller, professor and head of the geography department at the State Teachers College of Mankato, Minnesota. Members gather at annual meetings to present their ideas and to share teaching strategies and concerns. The NCGE offers a variety of publications to educators.

Journal Of Geography (6/yr) - This is a journal for geography educators from K through the University level. The journals contain teaching ideas and methods, articles on geographic research, and reviews of software and books.

Perspective (5/yr) - The newsletter of the NCGE keeps members up-to-date on happenings of the organization. Teaching tips and, "Geography in the News," are regular features.

Pathways In Geography Series - created to support the teaching and learning of themes, concepts and skills at all levels of instruction. Current titles include:

The Language Of Maps. Phil Gersmehl;
Learning Through Geography. Frances Slater;
Beyond Seeing And Hearing: Teaching Geography To Sensory Impaired Children - An Integrated Based Curriculum Approach. Sona K. Andrews, Amy Otis-Wilborn, and Trinka Messenheimer-Young;
Revisiting The Americas. Teaching And Learning The Geography Of The Western Hemisphere. Thomas L. Martinson and Susan Brooker-Gross, (Eds.);

Water In The Global Environment. Marvin Waterstone.
NCGE Resource Lists - These are listings of textbooks, map products, software, games & activities, and environmental information at a cost of $1.00 each.

Geographical Association Resource Publications - The NCGE serves as the U.S. outlet for these British publications which are also available from the Association office at, 343 Fulwood Road, Sheffield S10 3BP, United Kingdom. Tel: (0742) 670666.

Geography Through Topics In Primary And Middle Schools. The Geographical Association and National Council for Educational Technology, 1989.

Geographical Work In Primary And Middle Schools. David Mills, 1988.

Selling Geography (ideas, reproducible logos & cartoons). Ashley Kent, 1990.

Handbook For Geography Teachers. David Boardman, 1986.

Local Studies 5-13: Suggestions For The Non-Specialist Teacher, 1982.

Methods Of Presenting Fieldwork Data. P.R. St. John and D.A. Richardson, 1985.

Teaching Slow Learners Through Geography. Graham Corney and Eleanor Rawling, 1985.

Other helpful materials from the NCGE include textbook evaluation forms, intermediate and secondary level geography tests, outline map blackline masters, NASA imagery posters, and map and globe skills manuals. Publications are reasonably priced and are described in a brochure available from the NCGE.

National Council For The Social Studies
3501 Newark Street
Washington, D.C. 20016-3167
(202) 966-7840

The National Council for the Social Studies, founded in 1921, is dedicated to social studies education from the elementary through the university level. The Council promotes quality curriculum and instruction at all levels and the highest level of professional standards, rights, and status for social studies educators. It communicates to the public, the rationale, substance and value of social studies education and the conditions for its effective teaching and learning. Numerous publications available from the Council include:

Social Education (7/yr) - Designated for all levels, this is the voice of the NCSS, with information on practical classroom ideas as well as the latest research in social studies.

Social Studies And The Young Learner (quarterly) - Exclusively for elementary teachers, it contains ideas, activities, reviews of literature and media, "Teacher's Roundtable," "Teacher's Bookshelf," and "Point/Counterpoint."

Social Studies Professional (5/yr) - This publication includes news and current information on resources and teaching materials, travel and study programs, conferences, and recent developments in the field.

NCSS Bulletins - They provide in-depth coverage of various aspects of social studies. Geographers will be interested in *Strengthening Geography In The Social Studies*, Bulletin No. 81, Salvatore J. Natoli, Ed., 1988. This publication is an excellent overview of the status of geography, and provides practical suggestions on how to make it a part of the social studies curriculum. NCSS and the George Cram Company are co-sponsors of a $2500 grant for the promotion of geography programs at the classroom, district, and state levels which enhance geographic literacy. A grant proposal should incorporate geography into the social studies curriculum and affect a significant number of students. Applications are due by September 1 and should be sent to Geography Grant, NCSS, 3501 Newark St., N.W., Washington, D.C. 20016.

Ontario Association For Geographic And Environmental Education
36 Bessemer Court, Unit 3
Concord, Ontario
L4K 3C9

The OAGEE is dedicated to improving the teaching of geography and environmental education in Ontario. It promotes the planning and development of resources for all levels and facilitates communication among members and with other organizations. The OAGEE holds spring and fall conferences and publishes newsletters, resource materials, and book reviews. The organization sponsors contests, presents awards for excellence in education, and produces promotional items.

The Monograph, the quarterly journal of the OAGEE, is published for geography teachers at all levels but with a secondary and senior elementary emphasis. The journal features teaching strategies, book and media reviews, lab exercises, units of study, convention addresses and workshops, field trip ideas, evaluation techniques, simulation games, bibliographies, and geographical humor.

Canadian Council For Geographic Education
Program Coordinator
c/o Faculty of Education
Queen's University
Kingston, Ontario
K7L 3N6
Tel: (613) 545-6221 FAX (613) 545-6584

Formation of the Canadian Council for Geographic Education was formally announced in August, 1993 at the Nova Scotia meeting of the National Council for Geographic Education by Dr. Dennis St. Onge (President of the Royal Canadian Geographical Society) and Gilbert Grosvenor (President of the National Geographic Society) as a joint initiative of the two organizations. Its goals are to increase the emphasis on geography in Canada's elementary, secondary and college systems by supporting teachers in their classrooms, by facilitating action at the national level to strengthen the position of geography in the curricula, by promoting the flow of geographic knowledge, and by increasing public awareness of the importance of geographic literacy.

Members receive a free newsletter which will alert them to the latest professional development opportunities throughout Canada as well as tips on teaching strategies and the latest resources. An electronic network (**GeoNet**) has been established. For further information and registration, contact:

GeoNet
% Dick Mansfield
Faculty of Education
Queen's University
Kingston, Ontario
K7L 3N6

The first summer institute for Canadian teachers, held in Kingston in 1992, provided opportunities for 26 elementary and secondary teachers to share and develop teaching methods and materials.

Geographic Education National Implementation Project
1710 SIXTEENTH ST., N.W.
WASHINGTON, D.C. 20009
(202) 234-1450

The Geographic Education National Implementation Project was created in 1985 by four geography organizations - the Association of American Geographers, the American Geographical Society, the National Council for Geographic Education, and the National Geographic Society. It was the result of a proposal by Salvatore J. Natoli for implementing the 1984, *Guidelines For Geographic Education.*

The groups quickly responded to the challenge and began a cooperative effort to raise geography to its rightful status and importance in the curriculum. They first met on June 27, 1985. A steering committee was formed with representatives from each organization. The committee meets twice a year to share information about what is happening within each member organization, to review current projects, and to evaluate proposals from individuals, organizations, and private groups. The steering committee is also responsible for making presentations and conducting workshops at meetings of educators of geography, social studies, earth science, and related fields.

The impact of GENIP, as well as the tremendous efforts of the various geographic organizations in the past decade, has aided in the re-emergence of geography as an integral and important part of education.

GENIP publications are distributed through the National Council for Geographic Education, 16-A Leonard Hall, Indiana University of Pennsylvania, Indiana, PA 15705. Recent titles include:

K-6 Geography: Themes, Key Ideas and Learning Opportunities, 1987;

7-12 Geography: Themes, Key Ideas And Learning Opportunities, 1989;

Text Assessments In Geography: Interpretive Analysis Of The Twenty Most Commonly Used Geography Textbooks, 7-12. Patrice St. Peter, 1990.

Earth At Risk. Melissa Posley-Pacak, 1991.

Spaces And Places: A Geography Manual For Teachers, 1995. An essential manual for geography and social studies methods courses and in-service professional growth.

College Textbooks Of Interest To Geography Teachers

Geography teachers may find it helpful to have some introductory college texts available as resource material.

Included here is a small sample of the college texts available.

Birdsall, Stephen S. and John W. Florin. *Regional Landscapes of the United States and Canada*, 4th Ed. New York: John Wiley and Sons, 1992. 519p. (0-471-61646-X).

Birdsall and Florin, of the University of North Carolina at Chapel Hill, have created a clearly written text for first or second year college students. They focus on the character of each region and the specific geographic attributes that define the area. Although done in black and white, the maps and illustrations are clear and concise. Some sample chapter titles include the Megalopolis, the Deep South, the North American Manufacturing Core, the National Regional Core of Canada, the Great Plains and Prairies, and the Southwest Border Area. Additional readings are listed for each chapter and there is a glossary and map appendix.

DeBlij, H.J. and Peter O. Muller. *Geographic Regions And Concepts*, 6th Ed. New York: John Wiley and Sons, Inc., 1991. 638p. (0-471-57275-6).

DeBlij and Muller link basic geographic concepts with an overview of the realms and major regions of the world. Over 150 ideas and concepts of physical, economic and political geography are put into a regional perspective. Each chapter has a unique focus depending on the characteristics of the region. A listing of the 10 major geographic qualities for each region and systematic essays on topical subfields are additional features. The numerous excellent maps and illustrations are done in color. Pronunciation guides and bibliographies of references and further readings are included.

Fisher, James S., Ed. *Geography And Development: A World Regional Approach*, 4th Ed. New York: Macmillan, 1992. 729p. (0-02-337935-9).

Nine geographers have contributed to this text intended for better understanding of this complex and challenging world. Each chapter has one short essay on a topic of regional significance. The excellent color illustrations and maps are well integrated to the text. Selected terms are highlighted and further readings are listed for each chapter. The initial chapters focus on geography as a discipline, as well as on population and resources, physical and cultural elements, and world conditions as they relate to human development. The remaining chapters have a regional context. Chapter summaries, key terms and endnotes are helpful features.

Getis, Arthur, Judith Getis, and Jerome Fellmann. *Introduction To Geography*, 3rd Ed. Dubuque, Iowa: William C. Brown, 1991. 469p. (0-697-07919-8).

This basic text is intended to introduce college students to the breadth and excitement of geography. The perspectives of earth-science, culture-environment, location, and area analysis are used in the four parts of the text. Color illustrations, maps, diagrams, tables and charts are profusely used throughout the concise text. Introductions and boxed inserts of real events attempt to arouse student interest in the chapter topic while summaries, key words, and review questions serve as study aids at the end of each chapter. Selected references, world population data, and a glossary provide additional information.

Jordan, Terry G. and Lester Rowntree. *The Human Mosaic, A Thematic Introduction To Cultural Geography*, 5th Ed. New York: Harper and Row, 1990. 480p. (0-06-043481-3).

The Human Mosaic is intended as a basic text for general cultural or human geography. The five themes of cultural region, diffusion, integration, ecology and landscape are applied to the topics of demography, agriculture, the city, religion, language, ethnicity, politics, industry, folklife and popular culture. The cartographic design is done by Mei-Ling Hsu and the text is extensively illustrated with photos. Concept boxes, suggested readings, and a glossary are included.

McKnight, Tom L. *Physical Geography: A Landscape Appreciation*, 4th Ed. Englewood Cliffs: Prentice Hall, 1993. 626p. (0-13-667130-6).

McKnight's text is presented in an informal writing style with an attractive color format. It presents the physical and environmental aspects of geography at the introductory level. With landscape defined as everything one sees, hears and smells when looking at the world, McKnight promotes an understanding and appreciation of this world. The processes of physical geography are explained with emphasis on the interrelationships of various phenomena.

Focus boxes expand topics and chapters, include key terms, review questions, useful references and summaries. Appendices of additional information such as meteorological tables, soil taxonomy, biological taxonomy and topographic symbols make this a useful resource.

Strahler, Arthur N. and Alan H. Strahler. *Elements Of Physical Geography*, 4th Ed. New York: John Wiley and Sons, 1989. 288p. (0-471-61647-8).

Arthur and Alan Strahler have designed this as a text for general education students. It gives an overview of global physical environments with an emphasis on the way environment influences human activity. Abundantly illustrated, topics include our spherical habitat, Earth's atmosphere and oceans, heat and cold, moisture and precipitation, climate, plate tectonics, landform and rock structure, the flow of energy and material in the biosphere, and environmental regions. Each chapter begins with term definitions and the text includes an excellent glossary.

Atlases

Many fine atlases are available for use in the geography classroom. Included here is a small sample.

Espenshade, Edward B., Ed. *Rand McNally Goode's World Atlas*, 19th Ed. Chicago: Rand McNally, 1995. 371p.

Goode's World Atlas was first published in 1922 and since that time has been a classic teaching atlas of general reference and thematic maps of specialized information. The atlas is divided into 4 sections: (1) World Thematic Maps of climate regions, raw materials, landforms, and world features; (2) Major Cities maps; (3) Regional maps of physical and political data for all inhabited land regions, and (4) Plate Tectonics/Ocean Floor Maps. A section of Geographical Tables and Indexes includes comparative data, a glossary of foreign terms, and a universal pronunciation index for place names. *Goode's World Atlas* is useful for secondary and college courses and has proven its worth for over 70 years.

Hammond Atlas Of The World. Hammond. Maplewood: New Jersey, 1993. 303p.

This atlas was produced using a computerized geographic database. The atlas has six major divisions: (1) Interpreting Maps - a history of cartography and an explanation of scales and projections; (2) Quick Reference Guide - page and reference keys for continents, countries, states, and territories; (3) Global Relationships - discussion of the connection between people and the environment; (4) Physical World - TerraScape maps with 3-D relief; (5) Maps of the World - highlighting political and topographic detail; and (6) Statistical Tables and an Index. The excellent maps and additional information make this a valuable reference tool.

The National Geographic Atlas Of North America, Space Age Portrait Of A Continent. Washington, D.C.: The National Geographic Society, 1985. 264p.

Produced through a combination of cartography and remote sensing, this atlas gives a thorough and exciting view of the North American continent. The variety of physical, political, thematic, topographic, and remote sensing maps illustrate the political and physical features of the continent. The atlas is arranged by areas such as the Great Lakes, Pacific Southwest, Middle Atlantic, Four Corners, Alaska, Canada, Metro Areas and Park insets. Introductory pages for each section highlight the flora and fauna of the area. This is an excellent purchase for any age level.

The New International Atlas. Chicago: Rand McNally, 1991. 520p.

This atlas was created with an international approach. Local forms of place names are used with only country names being identified in English. Native language glossaries are found along the edges of the pages. The metric system is used throughout. The color maps are done in a series including continents, major world regions, inhabited areas of the earth, key regions of each continent, and major urban areas. Additional information is found in the form of tables, summaries, a glossary, a world information table, and an index of 160,000 place names with latitude and longitude coordinates. This is a well organized and visually appealing source of geographic information.

Almanacs

Listed below are a sample of Almanacs useful for geographic research.

The 1995 Information Please Almanac, Atlas and Yearbook, 48th Edition. Boston: Houghton Mifflin, 1993. 1024p.
This well-known and information-loaded almanac is labeled the, "Ultimate Browser's Reference." Organized by subject, the data must be located through the index. Topics include, Business and Industry, Taxes, Health, Headline History, World Statistics, Astronomy, Space and Aviation, Travel, Military Affairs, Geography and Atlas Section, U.S. History and Government, Current Events of the Year, and a section of Year-in-Pictures Review. This is a wealth of information at an extremely reasonable price.

The Universal Almanac. Kansas City: Andrews and McMeel, 1994. 714p.
This almanac provides a global approach to statistical information on geography, people, economics, health and government. Historical essays on every nation are also included. The almanac is arranged according to: (1) Almanac of the Year; (2) The United States; (3) The World; (4) Science and Technology; (5) Awards and Prizes; (6) Sports; and (7) an Atlas. This is an easy-to-use and appealing information source.

The World Almanac and Book of Facts, 1995. New York: Newspaper Enterprise Association, 1994. 976p.
"The Authority since 1868," is a popular handy reference source for statistical information and facts. Though arranged in topical order, the information is easily located through the index. Special features include a chronology of the previous year's events, an atlas and photo section, feature articles on current topics, and the top 10 news stories. Topics covered include, U.S. Presidential elections, the economy, health and medicine, sports, countries, the stock market, election results, Olympic results, scientific achievements, and awards.

Biography

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12. THE SCOPE OF PHYSICAL GEOGRAPHY

M. LeVasseur and R. S. Bednarz

Abstract: Modern educators recognize that geography is **neither** physical **nor** human geography but **both**. The citizens of today's interdependent global society must understand the characteristics and distribution of environmental phenomena and systems that influence human activity; and, they must understand the impact of increasing human activity upon environmental systems. As educational goals focus on national assessments and the development of content and performance standards, teachers and students are being asked to develop and bring the perspectives, skills, and knowledge of geography to the study of Earth's natural features: its weather, climate, water, plant and animal life, rocks, soil, resources, and landforms. Physical geography focuses on the distribution and characteristics of Earth's natural landscapes and the environmental systems and processes that create them. Teaching physical geography is discussed relative to its perspectives, skills, content, national standards and the five themes with suggested learning activities and student performance standards.

Key Words: absolute location, atmosphere, biosphere, ecosystem, environmental system, equilibrium, hydrosphere, interaction, lithosphere, movement, pattern, place, process, region, relative location.

Unique among disciplines, geography serves as a bridge between the social studies and the physical sciences. Generally, most science teachers do not focus on human systems and most social studies teachers do not focus on physical science. But geographers and geography teachers must be knowledgeable about both human systems and physical science, or what is termed human/cultural geography and physical geography. This knowledge is necessary to understand, from a geographic perspective, the systems of the natural environment and the relationships between human activity and these natural systems. As the 21st Century approaches, it is even more important in an interdependent global society to understand environmental phenomena and systems which influence human activity; and, it is necessary to understand the impact of increasing human activity upon environmental systems.

Growth in world population demands ever increasing amounts of resources, and as levels of technology increase, the ability of humans to change natural systems for better or worse also grows. Thus, it becomes more important than ever to know the location of fertile land that can be used for food production or to understand the El Nino phenomenon, which can affect rainfall patterns. On the other hand, people must also evaluate the impact on global climates of burning large quantities of fossil fuels and releasing CFC's into the atmosphere. Never in human history have people asked so much of the planet's natural systems, and never have humans had as much power to interfere with them. Today's population must be much more careful than the smaller, less powerful populations that lived in the past. More understanding of physical and human systems and the interaction between them is required or future generations will pay for mistakes that are made today.

What is Physical Geography?

Physical geography focuses on the distribution and characteristics of Earth's natural physical landscapes and the systems and processes that create them. The ability to discern, analyze and explain the distribution of natural features and to understand the physical systems that produce them is at the core of geographic study. The skills of scientific investigation are required to define and explain the characteristics of specific physical features and environmental systems of Earth's natural environment. These characteristics can be classified or grouped to form categories of similar features. These categories can then serve as the basis for defining or establishing physical regions. A good example is the region referred to as the Basin and Range - an area in the southwestern United States composed of parallel mountain ranges separated by broad valleys. The processes that create and maintain natural landscapes and environmental systems must be understood in order to describe and explain Earth's natural systems and predict their future development.

In the school curriculum, the richness and depth of physical geography is best explored by a focus which includes a consideration of content, perspectives and skills.

Content of Physical Geography

The content of physical geography draws from systems of the atmosphere, biosphere, hydrosphere, and lithosphere. Although features may be studied individually, it is their interrelationship with and among systems that brings a full understanding of the environment and its relationship with human activity.

A study of the **atmosphere** focuses on weather and climate, their elements, processes, regions and relationships with human activity. Upon exiting high school, students should have a knowledge of:

- earth/sun relationships as they affect the measurement of time and the elements of weather, climate and seasons;
- composition of Earth's atmosphere;
- heating of the atmosphere and Earth's surface; how heat energy is stored and transferred; what variables affect the differential heating of Earth's surface;
- greenhouse effect in the atmosphere;
- temperature regions of Earth's surface;
- atmospheric pressure conditions and their relationship to global and local patterns of wind and precipitation;
- condensation and precipitation processes and distribution patterns;
- genesis of storm systems and their impact on human activity;
- use of weather maps and weather forecasting;
- classification of climate regions;
- major controls of climatic differences;
- reciprocal relationships among climate, soils, and vegetation;
- climatic changes which result from both natural and human activities;
- differences between macro and micro climate systems.

The **biosphere** includes a consideration of the plant and animal life on Earth as ecosystems, their regional distributions, characteristics, interrelationships with each other and with humans. At the conclusion of grade 12 students should have a knowledge of:

- classification of major ecosystems;
- connections among climate, landforms, soil, vegetation, and animal life;
- interaction of component parts of major ecosystems which produce spatial patterns of vegetation and animals;
- relationships that exist within major ecosystems;
- definition, characteristics, and distribution of ecosystems;
- impact of human activity upon natural ecosystems.

Water, in all its states, forms the basis of the hydrosphere which provides water for human activity, ecosystems, and the development of landforms. At the end of the high school experience students should have a knowledge of:

- location of Earth's oceans and major water bodies;
- role of oceans and ocean currents in weather and climate;
- oceans as natural resources and their conservation;
- movement of water through the hydrologic cycle;
- groundwater systems, their use and conservation;
- surface fresh water systems (rivers, lakes, ponds, etc.);
- importance of water quantity and quality as a major natural resource for human activity;
- sources of pollution and the impact of human activity upon water.

The **lithosphere** forms the crust of Earth and is subject to internal tectonic forces which *build* its surface as well as to forces of weathering and erosion which *rearrange* the surface landscape. Located within the lithosphere are most of the natural resources important to human life and economic activities. By the end of the 12th grade the student should have a knowledge of:

- tectonic processes that produce landforms in different regions, including plate tectonics, volcanic activity, folding, faulting and warping;
- erosion agents, such as rivers, subsurface waters, ocean currents, waves, glaciers, wind, and processes such as weathering and erosion that produce landforms in different regions;
- types of landforms that are created and shaped by natural processes;
- location of major landform regions of the world;
- characteristics of landform regions of the world and the processes that shape them;
- characteristics of major soil groups: how they are formed, their composition, and how they are classified;
- importance of soil and its uses;
- how resources are defined by different cultures over time;
- differences between a renewable and non-renewable resource and the implications of the differences on human activity;
- world distribution of selected natural resources;
- use and conservation of natural resources.

Perspective

The physical perspective within geography is concerned with the spatial arrangement of Earth's natural physical systems, why they are located where they are, what they are like, the interactions within and among systems, and how these systems relate to human activities. This scientific perspective is not unique to physical geography. Many geographers strive for objectivity and logic. One way they do this is by using the research process spelled out in the next section. Physical geography also involves a scientific perspective that seeks observable and reproducible evidence for its explanations, theories and predictions.

Since geography is the subject interested in answering the questions, Where? and Why is it there?, it is hard to imagine how physical features and systems can be ignored. Even if one's primary interest is in explaining human geographic patterns, it is impossible to disregard physical geography. How can American westward migration be understood without understanding the nature and importance of the Cumberland Gap? How can students understand why the grain-producing Great Plains were once called the Great American Desert? An understanding of the physical side of the subject is necessary to exploit geography's unique advantage - the ability to handle both human and natural processes.

Skills

Geographic skills are methods and tools by which students bring the perspective of geography to a study of Earth's physical features. These skills involve the development of geographic and scientific modes of inquiry, knowledge of the use of databases, laboratory techniques, and a working knowledge of the technological tools of analysis, including computers and satellite imagery.

Why Should Physical Geography be Included in the Curriculum?

An understanding of the distribution, characteristics and processes that define Earth's natural features and environmental systems is essential to an understanding of world environmental, historic, economic, political and social con-

ditions. Today, many of the world's most important issues and problems are global in nature and involve both physical and human systems. To analyze the impact of agricultural practices on soil erosion, or the effect of resettling urban poor in the rainforest on deforestation, or the geographically uneven effect of the ozone hole on skin cancer rates, students must understand both physical and human processes. Many of society's greatest mistakes were made by well-meaning professionals who neglected to take humans into account when tackling what they thought was a physical problem or vice versa. For example, few expected that building levees to protect land from flooding might actually result in greater flood damage losses because the, "protected," areas become more densely settled.

History of Physical Geography in American Schools

Geography's uniqueness has caused confusion through the years in terms of its definition and role in the school curriculum of the United States. For most of the 20th Century, elementary and secondary school geography has been equated with world regional geography and the social studies, but this has not always been the case. In the past, geography in the schools was often defined as physical, not cultural, geography.

Physical geography was an important and practical component of the informal education of the early European settlers in North America. These settlers needed knowledge of transportation routes, available resources, soils for farming and weather patterns for planting and harvesting. As a formal subject for school study, physical geography of the second half of the 19th century began with what Dryer called, *The Wonder Book Stage* (Dryer 1924). The textbooks of the 1850's and 1860's contained descriptions of the more unusual, interesting and spectacular phenomena of Earth with no attempt at scientific explanations.

The appearance of M. F. Maury's series of factually correct and interesting geography textbooks strengthened physical geography in the schools. His most successful text, *Manual of Geography*, was published in 1899 and was the first text to have an isothermal chart of the world (Stowers 1962). In 1873, Arnold Henri Guyot published, *Physical Geography*, hailed as a milestone in the teaching of high school geography. Guyot infused the deterministic thesis of the relationship between people and the environment into physical geography.

The popularity of physical geography in the high schools caused the Committee of Ten of the National Education Association to consider the status of secondary school geography in 1892. The committee recommended physical geography and physiography as courses for high school (United States Bureau of Education, 1893). During this era, physical geography became dominated by the work of Harvard professor William Morris Davis and focused on the evolution of physical phenomena.

By the turn of the 20th century, educators were voicing dissatisfaction with the emphasis on physical geography. In 1909, the National Education Association authorized the Committee on Secondary School Geography to address the criticisms (Whitbeck 1921). Although not officially stated, the committee favored a regional approach, and physical geography began to decline in popularity. At the same time, a movement was underway to establish a course in general science that could meet citizenship goals. An easy solution was to add some chemistry and physics to the established physical geography course and convert it to general science. With this change, geography came to be seen as a part of the social studies. After World War II, world regional was the most common geography course taught in schools, while after 1950 physical geography was usually found in general science or earth science.

National Assessments and Standards

With the national surveys and assessments of the 1980's drawing attention to the geographic illiteracy of American students, there has been a renewed interest in geography in general and physical geography in particular. The 1988 National Assessment of Educational Progress (NAEP) revealed that high school seniors did not demonstrate an understanding of the basic concepts of physical and human geography, location, or the skills and tools of geography. According to the 1990 NAEP report, the average student had only a basic understanding (58-percent of the items correct) of the physical geography topics of climate, weather, tectonics and erosion (NAEP 1990:2). An assessment

of geography knowledge by Bein (1990:261) indicated that over 3,000 college students demonstrated no greater knowledge of physical geography, answering 58-percent of the questions correctly.

The national educational goals of the 1990's continue to demand excellence, focusing on national assessments and the establishment of national content and performance standards for the core disciplines, which include geography. Physical geography is an important component of the 1994 NAEP assessment and the national standards. A recent article in the *Journal of Geography* explains to teachers what the National Standards are and how they can use them effectively. Concerning the importance of physical geography, the article says:

> *"The Standards recognize that geography is both a physical and human science. Physical geography is an important and vital part of the academic discipline of geography. It is also a large component of the study of geography in elementary and secondary schools in other parts of the world. Because the Standards emphasize human-environment interaction and because they encourage a systems approach, ignoring physical geography is impossible. At first, teaching physical geography may be challenging to many social studies/history teachers, but the benefits for student understanding will be worth the additional effort." (Bednarz and Bednarz 1994)*

Of the 18 National Standards, several are relevant to, or inclusive of, physical geography:

Standard 4 - physical and human characteristics of places;

Standard 7 - physical processes shape patterns on Earth's surface;

Standard 8 - characteristics and spatial distribution of Earth's ecosystems;

Standard 14 - human actions modify the physical environment;

Standard 15 - physical systems affect human systems;

Standard 16 - meaning, distribution, and importance of resources.

Five Themes and Physical Geography

Since the publication in 1984 of the, *Guidelines for Geographic Education*, five themes have been used to provide an instructional framework for geography. The concepts of physical geography may be easily understood in context of the five themes: (1) location, (2) place, (3) human-environment interaction, (4) movement, and (5) regions.

While each theme may be considered separately, a full understanding of the physical aspects of geography requires the integration of the five themes into a single system.

(1) **Location** refers to an absolute or relative position on Earth's surface. Every physical feature, resource, cultural landmark, settlement, and historical event occurs in a particular location and reasons can be identified for the location of places and events. It is important that the use of location not be just a passing reference to a point on a map, as is too often the case. The use of location should provide students with information about why a particular location is significant. During the Persian Gulf War, the location of an important physical feature, the Strait of Hormuz, was frequently marked on maps displayed during the evening news. The location was significant because of its strategic location relative to the Persian Gulf and the movement of oil.

Absolute location is defined by precise points on the geographic grid using the coordinates of latitude and longitude. For example, the summit of Mt. Everest is located at 28° 00* North latitude and 86° 57* East longitude. Absolute location is critical to an understanding of the world's global political and economic systems. Critical resources are located in particular or absolute locations making them the property of one particular country or

region and not another. These locations affect patterns of world power, political alignments, cooperation and/or aggression, trade and economic development. For example, a map of the world's reserves of coal indicates that the southern hemisphere is lacking in this critical resource; as a result, students should be challenged to examine the consequences of this unequal distribution of a vital resource.

Relative location indicates a position in reference to other places and may change over time. For example, the Great Plains of North America are located east of the Rocky Mountains. A consideration of this relative location of the Great Plains helps to explain the development of a semi-arid climate on the plains. The north-south trending Rocky Mountain system, in a prevailing westerly wind belt, blocks incoming moisture from the Pacific Ocean. Events such as the passage of time, discovery of new lands or resources, and changes in political and economic power change the relationships between locations and the balance of locational reference and importance. For example, the current world dependence upon petroleum changed the relative location of the Persian Gulf region from a peripheral to core resource location.

(2) Place refers to the distinctive characteristics that define locations and distinguish them from other places. Places are generally described by their physical and human characteristics. The physical characteristics of a place include observable forms and patterns resulting from processes within the atmosphere, hydrosphere, biosphere, and lithosphere. Each sphere is unique but each interacts with the others to form the physical geography system.

The physical characteristics of a place provide the stage, complete with scenery and props, upon which the drama of life is played. As such, there are very few places on Earth that have not been touched by human contact and modified in some manner. A population density map reveals the distribution pattern of the world's people. How can such a pattern be explained? Often people are attracted to a particular place because of the physical features of the place: a mild climate, rich agricultural soils, natural resources for industry, access to water, the scenery. An even more important question may be to ask why people are missing from certain regions of Earth? In the uninhabited places, it is almost always the physical environment which has limited population - a severe climate, the lack of productive soils, inaccessible natural resources, limited water supplies, rugged terrain.

(3) Human-environment interaction occurs between the physical and human components of the place, also referred to as the relationships within places. Geographers want to understand how these relationships have developed over time and what the consequences of these relationships and interactions have been.

Relationships within places include how people depend upon the environment. In the history of human activity, people have been directly dependent upon the physical environment to provide the necessities of life: agricultural soil for growing food; fresh water for drinking, agriculture and industry; forests for lumber, fuel, and medicines; iron ore and coal for steel production; petroleum for oil and chemicals. With technological advances, humans are increasingly able to manipulate the environment. Such use of technology can improve the quality of life. However, physical geographers are also interested in the long-term impact such manipulation might have on the environment. During the 20th century, large-scale dam and irrigation projects in essentially arid and semi-arid world regions brought thousands of acres under cultivation and increased food production. In places where these projects have been built, such as the American Great Plains, the Aral Sea and the river basins of the Colorado, the Nile and the Indus, geographers study and assess the impact of such manipulations on the quality of soils, erosion rates, surface and groundwater supplies, and the implications for future crop production.

Relationships within places include how people adapt to and change the environment. Humans inhabit almost every type of climatic zone, vegetation ecosystem and landform region because of specific adaptations to the environment they have been able to make. These adaptations include house types, clothing, methods to obtain food, sources of water and fuel, scheduling of seasonal activities, and types of recreation and jobs. Human activity has reclaimed land from the sea, plowed prairies, cut and replanted forests, paved ribbons of highways and built cities. It is important for students to recognize that when one aspect of the environment is changed other changes, intended or unintended, are triggered. A geographic perspective enables students to anticipate resulting changes in a system and to suggest means whereby adverse change can be minimized or even eliminated.

(4) Movement has been primarily defined in terms of human interaction - the transfer of resources, products, people, information, inventions and ideas. These transfers reveal interdependence and linkages between places and result in patterns which geography helps to explain.

The components of physical geography also involve movement at various scales within environmental systems and between systems. It is the transfer of energy that initiates atmospheric and oceanic circulation and supports the processes that create the physical landscapes of Earth. Movement occurs for a variety of reasons and results in explainable patterns. For example, physical geography considers the movement of global and local wind systems, oceanic currents, lithospheric plates, lava flows, soil creep, landslides, rivers, glaciers and wind. Further study is made of the resulting patterns of precipitation, storms, beaches, mountain ranges, volcanic cones, landslide deposits, alluvial fans, glacial moraines, and sand dunes.

(5) Regions are areas that are defined by a degree of unity in selected criteria. Regions are tools of classification which enable geographers to describe, explain and analyze the human and physical landscape. As a mental construct, a region and its boundary are established by the careful selection of criteria. The criteria selected to define a region may differ from time to time and place to place resulting in regions with different sizes, shapes and boundaries. For example, one set of climatic regions may be defined by temperature and precipitation criteria and another by air mass characteristics. While regions are marked on maps with clear boundaries, in reality these boundaries are zones of transition subject to fluctuation.

Physical geographers attempt to classify climates, soils, vegetation types, and landforms into regions in order to describe patterns, explain distributions and examine relationships between and among regions.

Systems

Besides the five themes, the systems concept is very useful in geography. Taking a systems approach encourages students to think holistically and to look for relationships between processes and phenomena. The National Standards encourage teachers to use the systems approach in their classes. Thinking in systems terms is especially useful for understanding the interaction between humans and the environment. Although many teachers may not have used the systems approach explicitly, most are familiar with the concepts and principles that it incorporates. A system is nothing more than a collection of things and the relationships that connect them. A good physical geography example of a system is the hydrologic (water) cycle. Solar energy, in the form of sunlight, passes through the atmosphere and strikes the ocean. The water is warmed and the resisting force holding the water molecules together as a liquid is overcome and the water evaporates. The water vapor rises and cools. The cooling water gives up energy and condenses into liquid water, which falls as precipitation. When the water reaches the surface, it flows back to the ocean both over the land and through the soil. Then the process repeats itself.

Why Bother?

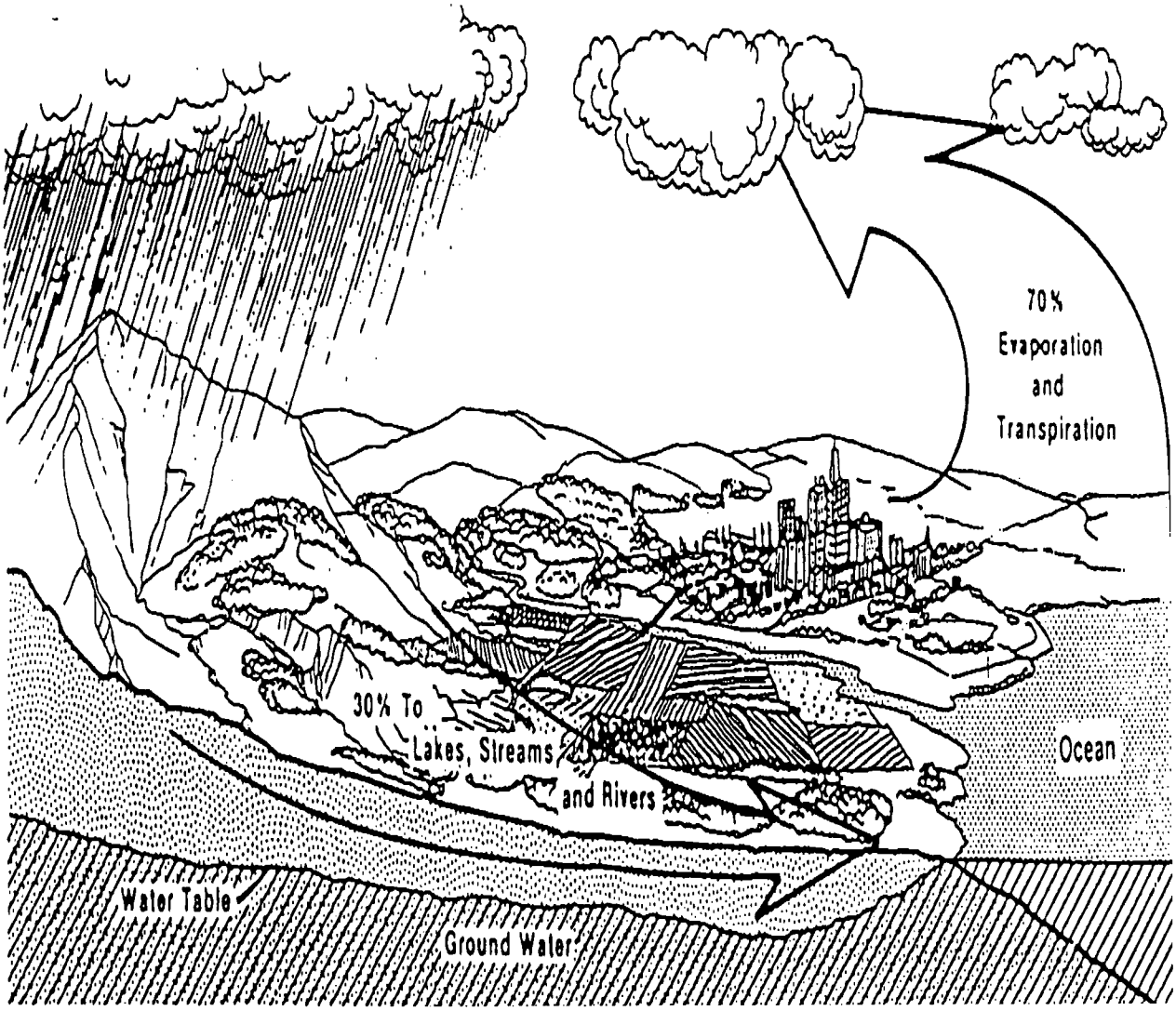
Some teachers who have not incorporated physical geography or the systems approach into their classes might reasonably ask, "Why bother?" This question was addressed in a recent article published in the *Journal of Geography* (Bednarz, Tchakerian, and Giardino 1993). The authors argue that for students to understand and analyze the spatial patterns of the past, present, and future, they need to understand the interaction that occurs between humans and the environment. This requires a comprehension of both physical and human systems. For example, many settlements have been and still are, located along or at the mouths of rivers. These towns are affected by the moving matter and energy represented by the river's flow. The flowing water has a direct impact on the town; it can serve as a water supply and as a method of disposing of the town's liquid waste products. The energy in the stream can erode the banks of the river and it can transport sediment, which might require that the town dredge its harbor periodically. The energy of the flowing water can be harnessed to generate electricity. Finally, the river is both a potential transportation corridor and a transportation barrier. It functions as the former when it is used for water transportation and as the latter if cars, trucks, and trains are unable to cross it. To interpret the geography of this and so many other situations correctly, students must understand both the physical and human systems at work - they cannot be separated.

How Can Physical Geography be Incorporated into the Curriculum?

Examples of activities and student performance standard which incorporate and integrate the perspectives, skills, content and systems of physical geography are found in the National Standards documents, in *K-6 Geography: Themes, Key Ideas, and Learning Opportunities* (GENIP 1984), and in *7-12 Geography: Themes, Key Ideas, and Learning Opportunities* (GENIP 1984). Additional information may be obtained from professional organizations, such as the National Council for Geographic Education and the Association of American Geographers, and from the state coordinator of a Geographic Alliance (the names of state coordinators are available from the National Geographic Society).

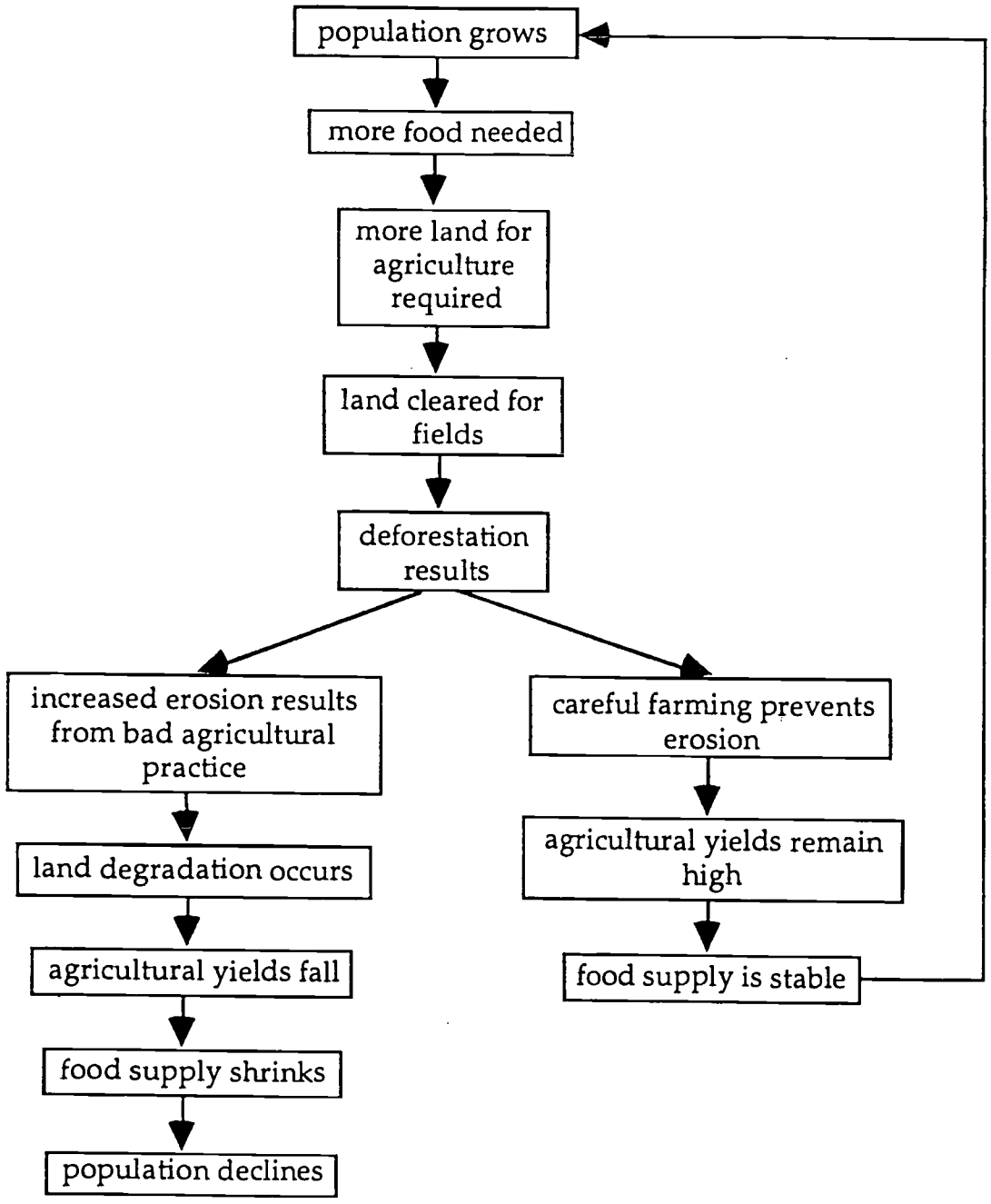
One way to incorporate physical geography and a systems approach in classes is to encourage students to use diagrams to explain systems or the interactions among them. A common and simple example of a systems diagram is that of the water, or hydrologic cycle. Diagrams such as this, which trace the movement of energy and matter through the system, can be complicated and symbolic or simple and pictorial like the one below (USGS 1993:3-4). Naturally, their sophistication should be adjusted to the student's level of knowledge and ability.

Diagram: Hydrologic Cycle



More complicated diagrams can be used to explore relationships between systems. The diagram of land degradation is an example.

Diagram: Land Degradation



This diagram is not meant to offer an authoritative explanation of the process of land degradation. It is provided as an example of the logical reasoning process that is encouraged by using a systems approach. These diagrams are often referred to as flow diagrams in systems terminology. Teachers sometimes call them conceptual maps or webs. Whatever they are called, they encourage students to engage in higher level thinking, to make connections between processes and phenomena, to look for cause and effect, to make logical rigorous arguments, and to take a comprehensive perspective.

Teaching Suggestions

How can you make physical geography an important and valuable part of your class? Here are some suggestions:

- encourage students to do geography. Use of the five skills will help your students ask and answer geographic questions by gathering their own information and then analyzing it. Invite students to incorporate field work in their studies whenever it is appropriate.

- help your students try to understand the processes that produce geographic phenomena. Use of the systems approach will help.

- urge students to look for interactions among systems, especially interactions between human and physical systems. A diagram of systems might make these connections more obvious.

- look for opportunities to teach physical geography across the curriculum. Cooperate with teachers of other subjects to take advantage of this opportunity.

- make sure physical geography is an integral part of your course, (not a short separate section with little or no relation to the rest of the course). The holistic approach suggested in this article is a strategy that will help make physical geography a real part of a comprehensive geographic perspective.

Conclusion

Contemporary geography recognizes that geography is **neither** physical geography nor human geography but **both**. With this balance, geography is strengthened and broadened and is made more significant in the school curriculum. Geography's contribution to the social and natural sciences is enhanced and its role as a bridge between the two made secure. The current holistic view of the world with its complex patterns and intricate relationships places a balanced geography in a powerful position to enhance students' understanding of the world and their ability to logically address contemporary and future local-to-global problems and issues.

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Biographies

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13. Putting Geography to Work: Guiding Students Down Career Paths

R. Denise Boehm and Richard G. Boehm

Abstract: Over the past decade, the number of geography-related jobs and careers has increased dramatically. The purpose of this article is to convey information and increase the awareness of teachers and school counselors about the vast array of jobs and careers available to students who show a keen interest in geography. Types of careers, background coursework, and places of possible employment are summarized in tables throughout the article for various fields of geography. Some of the fields in which geography-related jobs are increasingly in demand include environmental geography, urban and regional planning, cartography and geographical information systems. This article will serve as a useful tool for teachers and school counselors in guiding students down career paths in geography.

Key Words: careers-geography; jobs-geography; guidance counseling-geography; careers; human-environmental interaction.

Taking a Few Extra Steps

"Doing" geography is only a few short steps away from learning geography, yet we often neglect to tell students that in addition to being lawyers, doctors, and super heroes, they can also be a geographer when they grow up. Teachers have risen admirably to the call for providing students with meaningful geographic fundamentals and spatial concepts; by doing so, they are only a short distance away from introducing students to a variety of careers in geography or geography-related fields. As teachers address and discuss geographical issues such as global warming, wetland endangerment, or water scarcity, students might also learn in tandem about the climatologist, the coastal zone planner, or the hydrologist. Today there is an array of jobs for those with geography background and training - some for high school graduates and many for those who follow their interest in geography into college and beyond.

Recently, national standards in geography were prepared for grades 4, 8, and 12. These are, "internationally competitive," standards designed to measure our students' accomplishments in content and performance. The standards are appropriately titled, *Geography for Life*. The document calls for the mastery of geography content and requires that students be able to use and apply their geographic knowledge and skills. This suggests a widespread utility for geography in the real world. Today, there are enormous societal issues with geographic dimensions - issues such as environmental quality, land use and transportation, location of business and industry, waste-management, water availability, resource management - to name just a few. The challenge of *Geography for Life* is for students to master the content and methods of geography and then translate those skills into real life applications. The challenge for teachers is to make clear to students that many career opportunities exist in geography and geography-related fields.

Guiding Students Who Are Pursuing a College Degree

For beginning students, many colleges now require, or strongly suggest, an introductory geography course to meet general studies requirements. It is often part of a core curriculum and fulfills requirements toward obtaining a bachelor's degree in fields such as social science, natural science, international studies, and cultural studies. Some colleges test incoming students to assess the degree of adequacy of freshmen's geographic knowledge. Recent evidence suggests that many incoming college students have grossly inadequate geography skills. If a student is found to have an insufficient background, then remedial courses may be required before the student proceeds to college-level courses in geography, and other basic subjects as well.

For the student who desires to major in the discipline, many colleges and universities offer a broad range of upper division courses and programs in geography. Fields of study often include the following:

- Regional Geography
- Urban and Regional Planning
- Economic Geography
- Environmental Studies
- Cultural and Human Geography
- Cartography and Geographic Information Systems
- Remote Sensing and Air Photo Interpretation
- Physical Geography and Earth Science
- Political Geography
- Geographic Education

Career paths that students may pursue from these fields of study in geography are discussed below. Students with geography degrees may find that few jobs are designated for geographers per se, but many jobs with various other titles and names, ask for geography content and skills.

Jobs and Career Ideas for Geography Majors

Regional Geography

Students in this field study major regions of the world such as North America, Europe, Russia, Latin America, South America, Asia, and Africa. They become area-experts in all facets of the particular region - its economic, political, cultural, environmental and physical geography. They often complement their major with courses from other disciplines such as foreign languages, anthropology, history, economics, or political science. Students with this background bring real expertise and understanding to issues of foreign policy and international business. Table 1 suggests careers that students might pursue in regional geography.

Table 1. CAREERS IN REGIONAL GEOGRAPHY

Job Title	College Coursework	Job Opportunities
AREA SPECIALIST	All geography courses helpful, but especially cultural, economic, and political geography. Also, air photo and remote sensing. One or more foreign languages.	U.S. State Department; Central Intelligence Agency; Department of Defense; Economic Development; Tourism Promotion; Marketing Firms.
INTERNATIONAL BUSINESS REPRESENTATIVE	Courses in cultural, economic and political geography. Also, finance and international studies. One or more foreign languages.	Large U. S. Corporations; Import-Export Businesses; Commodities Stock Trader; Agricultural Machinery; Banking and Finance Co.; International Law Firm; Chamber of Commerce.

TRAVEL AGENT	Courses in cultural geography, map interpretation, international studies, environmental, and recreational geography. Also, one or more foreign languages.	Private Travel Firms; Tourism Agencies; Cruise Ship Lines; Organized Tour Groups; Airlines.

Urban and Regional Planning

Geographers often work as planners to ensure that communities, and the services necessary to support them, develop in an orderly way. Planners are found at all geographical scales - community, city, county, metropolitan area, regional, state, national, and global. Planners must possess the skills for creating, organizing, analyzing, and implementing master projects. These professionals must also have good communication abilities in order to work with decision makers and citizens of the community. Planning is a rapidly expanding field, and geographers are filling many planning positions. Some of these careers are listed in Table 2.

Table 2

Job Title	College Coursework	Job Opportunities
COMMUNITY PLANNER	Courses in economic and population geography, community development, land use planning, environmental hazards, solid waste management, transportation, statistics, parks and recreation, and geographic information systems.	All levels of local government; city, county, and citizens groups.
STATE ECONOMIC DEVELOPMENT PLANNER	Courses in economic and population geography, community and regional planning, land use planning, transportation, statistics, and geographical information systems.	All State Agencies: Commerce Department; Transportation; Tourism Planning; Economic Development; Public Service Commission; Agriculture Department; Governor's Office.
METROPOLITAN PLANNER	Courses in urban, economic and population geography; all planning courses, environmental, and transportation. Also, geographic information systems, statistics and research methods.	Regional Councils of Government; Metropolitan Transportation Groups; Free Trade Zones; Regional Environmental Impact Zones.

Economic Geography

Economic Geography is concerned with the location and distribution of economic activities. It focuses on the location of industries, retail and wholesale businesses, transportation and trade, and on the changing values of real estate.

Courses that complement economic geography are varied and may include topics such as transportation, agriculture, industrial location, world trade, and the spatial organization and function of business activity. Students who have a strong interest in economic geography will be likely to see global interdependence as a focus of their academic program. Table 3 provides some suggested career opportunities.

Table 3. CAREERS IN ECONOMIC GEOGRAPHY

Job Title	College Coursework	Job Opportunities
LOCATION/SITE SELECTION EXPERT	Courses in economic, population, and urban geography; community and regional planning, location analysis, land use planning, environmental hazards, research and field methods, statistics, geographic information systems. Also. business, economics, marketing and finance.	Real Estate Developers; Shopping Center Developers; Office and Research Park Developers; Site Planner for Industrial Plants; Convenience Stores; Banks and Savings and Loan; Appraisal Companies; Environmental Impact Assessment Firms.
MARKET RESEARCHER	Courses in economic population and urban geography, location and land use planning, survey design, research analysis, geographic information systems, statistics.	Marketing Firms; Retail Shopping Centers; Survey Research Firms; Real Estate Developers; Public Relations Firms.
REAL ESTATE BROKER/ AGENT	Courses in economic and population geography, location and site analysis, community planning, marketing, economics, and finance.	Residential Real Estate; Commercial Real Estate; Real Estate Development; Investment Trusts; Real Estate Law; Appraiser.

Environmental Geography

Environmental problems have become a strong concern of private business, government, and citizens. Threats to our quality of life include toxic waste dumping, increased air and water pollution, and incipient changes in our global climate. Catastrophes involving natural disasters cause major losses of life and huge dollar amounts of property loss in many countries around the world. As a result, hundreds of new jobs are now emerging in areas related to environmental fields.

Environmental studies programs can be comprised solely of geography majors or students from complementary disciplines can combine their expertise with geography. Other appropriate areas of study include biology, chemistry, geology, natural hazards, disaster emergency and evacuation planning, energy resource management, and solid-waste management.

Students who develop a specialization in environmental studies may choose from a wide variety of careers. Jobs might include anything from the preparation of environmental impact statements to the geographic aspects of environmental law to forest and wildlife management. Some careers that you might suggest to your students are found in Table 4.

Table 4. CAREERS IN ENVIRONMENTAL GEOGRAPHY

Job Title	College Coursework	Job Opportunities
ENVIRONMENTAL SPECIALIST	Courses in environmental planning and management, community development, land use planning, environmental hazards, solid waste management, air and water quality, parks and recreation, wetlands and coastal planning management, statistics, geographic information systems, science and math.	All levels of government-city, county, federal and citizens groups; State Parks/Wildlife; Quasi-Governmental Regulatory Agencies; U.S. Environmental Protection Agency; Consulting Firms.
HAZARDS PLANNER AND MANAGER	Courses in environmental population geography, land use planning, community planning, transportation, natural hazards, medical geography, geographic information systems, and research methods.	Federal Emergency Management Agency; State Offices of Emergency Planning and Management; Health Departments; The Red Cross; Insurance Companies; Weather Bureaus; Hurricane Centers; National Oceanic and Atmospheric Administration; Oak Ridge Labs.
PARK TECHNICIAN/ RANGER	Courses in environmental geography, land use planning, biogeography, location analysis, environmental hazards, environmental conservation, environmental law. Also, biology, zoology, geology, conservation, wildlife management, agriculture and forestry.	U.S. Forest Service; U.S. Agriculture Department; U.S. Department of Commerce; National Park Service; State Parks and Wildlife; Recreation Agencies.

Cultural and Human Geography

This field of study focuses on the aspects of geography that relate to different cultures. It places an emphasis on cultural origins and movement as well as the cultural characteristics of regions: language, religion, ethnicity, politics, historical development, agricultural methods, settlement patterns, and quality of life. Cultural ecology, the ways in which humans have interacted with their cultural and natural environment at various times, is also included.

Geographers who reconstruct past environments require skills in library research, field observation, and the interpretation of cultural artifacts. Therefore, a strong relationship exists among cultural geography, cultural ecology, historical geography, anthropology, archaeology, physical geography and library science. You might direct your students to some career opportunities in cultural geography in Table 5.

Table 5. CAREERS IN CULTURAL AND HUMAN GEOGRAPHY

Job Title	College Coursework	Job Opportunities
PEACE CORPS VOLUNTEER	Courses in cultural and historical geography, community development, political and economic geography, environmental hazards, medical geography; also one or more foreign languages.	Peace Corps Program; Global Relief Agencies; United Nations' Programs.
HISTORICAL PRESERVATION SPECIALIST	Courses in historical and cultural geography, community development, location and site analysis; also, library research, architecture, and environmental design.	City Planning Agencies; County Planning Agencies; State Preservation Offices; Chambers of Commerce; Philanthropic Organizations; Citizens' Historical Groups; State Archives.
ARCHIVIST, DOCUMENTS SPECIALIST OR MAP LIBRARIAN	Courses in historical and cultural geography, cultural ecology, archaeology, history, anthropology. Also, library science and research methods courses.	Library of Congress; Public Libraries; State Archives; National Archives; Philanthropic Organizations.

Cartography, Computer Mapping, and Geographical Information Systems

Cartography is the science and art of making maps. Though hand-drawn cartography is still prevalent, traditional drafting is being replaced rapidly by computers and graphics software whereby maps and blueprints can be created quickly and accurately. Complex maps are made with computer workstations although a wide variety of maps can be drawn on a personal computer.

A geographic information system (GIS) is a computer hardware and software system that is used to store, display, analyze, and map information. The use of GIS has increased significantly in all aspects of modern planning. GIS

allows visual display of spatial phenomena such as population distribution, traffic movement, land availability, real estate values, environmental hazards, soil types, vegetation types, and flood zones. Table 6 gives some ideas for careers in these technical areas of geography.

Table 6. CAREERS IN CARTOGRAPHY, COMPUTER MAPPING, AND GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Job Title	College Coursework	Job Opportunities
DRAFTING SPECIALIST	Courses in spatial analysis, computer mapping software, land use planning, community management and other courses with content specific to the particular job.	All levels of local government- city, county, and metropolitan. Architectural Firms; Environmental Consulting Firm.
GEOGRAPHIC INFORMATION SYSTEMS (GIS) ANALYST	Courses in spatial analysis, computer mapping, land use planning, location and site analysis, GIS software and labs, and other courses with content specific to the job.	All levels of government- city, county, metropolitan, regional, federal-especially those with planning. Private Consulting Firms- Environmental, Architectural, Transportation, Utilities; Census Bureau; Defense Mapping Agency.
CARTOGRAPHER	Courses in map reading and interpretation; map compilation; land use planning; location and site analysis, and other courses with content specific to the job.	Road Atlas Companies; Travel Clubs; Tourism Agencies; Many State Agencies; Defense Mapping Agency; National Geographic Society; Planning Agencies; Surveyors.

Remote Sensing and Aerial Photo Interpretation

Remote sensing is a relatively new term, introduced in the 1960's to replace the more limited, "aerial photography," or, "aerial photo interpretation," which referred only to the acquisition and analysis of data acquired by conventional photographic processes. Today, remote sensing includes the use of satellites for monitoring changes over Earth's surface. Popular uses include pollution detection, vegetation mapping, land use planning, land resource policy formulation, landscape conservation; monitoring natural hazards, crop growth, pastureland, and wildlife inventories. Table 7 shows exciting careers that you might share with your students.

Table 7. CAREERS IN REMOTE SENSING AND AERIAL PHOTOGRAPHY

Job Title	College Coursework	Job Opportunities
REMOTE SENSING ANALYST	Courses in spatial analysis, remote sensing, air photo, weather and climate, earth sciences, astronomy; and other courses specific to the job.	Large research organizations- National Aeronautics and Space Administration; U.S. Geological Survey; EOSAT; Private Satellite Companies; Oak Ridge Laboratories; Department of Defense; Natural Disaster Agencies; Central Intelligence Agency; State Department.
GLOBAL POSITIONING SYSTEMS (GPS)	same as above except special training is required on GPS equipment and network.	State Transportation Department; Natural Disaster Agencies; U.S. Geological Survey; National Guard.
AIR PHOTO INTERPRETER	Courses in air photo interpretation, earth sciences, environmental geography, spatial analysis, land use planning, community development, location analysis, economic geography.	Real Estate Developers; Environmental Impact Assessment Firms; Parks and Wildlife; Forestry Department; National Park Service; Environmental Consulting Firms; Planning Agencies.

Physical Geography and the Earth Sciences

Geography has a strong link to the natural sciences through physical geography and earth science. Students can combine a physical geography major with any of the following disciplines: biology, chemistry, computer science, mathematics, physics, meteorology, or astronomy. Courses in physical geography are important because they deal with Earth processes that concern the human use of Earth. For instance, agriculture depends upon such physical processes as climate, weather, and the formation and erosion of soils.

Individuals with a good background in physical geography can combine their expertise to deal with the scientific side of environmental problems such as air pollution, water pollution, and the effects of hazardous waste. Physical geographers also study the physical effects of weather and natural hazards such as the formation of thunderstorms, floods, hurricanes, volcanic eruptions, and earthquakes. Table 8 provides suggestions for careers in physical geography for students.

Table 8. CAREERS IN PHYSICAL GEOGRAPHY and the EARTH SCIENCES

Job Title	College Coursework	Job Opportunities
CLIMATOLOGIST	Courses in climatology, meteorology, dendrology, oceanography, soils, Arctic regions, biology, chemistry, earth sciences, air and water quality, astronomy, statistics, wetlands and coastal landforms, and geomorphology.	Large Research Institutions- National Center for Atmospheric Research; National Oceanic and Atmospheric Administration; Cooperative Institute for Research in the Environmental Sciences; National Aeronautic and Space Administration; Weather Forecasting.
HYDROLOGIST	Courses in environmental and population geography, land use planning, water resources, environmental law, conservation, hazards, climatology, geology, geomorphology. Also, biology, chemistry, mapping, statistics, and research methods courses.	Natural Resource Agencies; Parks and Wildlife; City Environmental Conservation Dept.; State Health Dept.; Quasi-Governmental Water Quality Agencies; Large Research Institutions; Private Consulting Firms; Water Conservation Districts; Army Corps of Engineers; U.S. Bureau of Reclamation.
SOIL SPECIALIST	Courses in environmental geography, land use planning, biogeography, mapping skills, landforms and soils, environmental conservation, geology, geomorphology, chemistry, and research methods courses.	U.S. Forest Service; Department of Agriculture; Department of Commerce; National Park Service; State Parks and Wildlife; State Health Departments; Private Consulting Firms; Natural Resource and Conservation Departments; U.S. Bureau of Reclamation.

Geographic Education

Now that more and more geography courses are being offered in high schools and colleges, the need for teachers of geography at all levels of education has risen dramatically. Most college geography departments offer comprehensive teacher certification programs either in geography or earth science or through multi-disciplinary programs (often referred to as the social studies composite). Courses are geared to state curriculum requirements in geography and earth science. For those who wish to teach geography in a junior college, college, or university, graduate-level study is a necessity. Suggestions for careers can be found in Table 9.

Table 9. CAREERS IN GEOGRAPHIC EDUCATION

Job Title	College Coursework	Job Opportunities
K-12 TEACHER	Courses in geographic education, regional geography, selected courses in physical geography, selected courses in human geography, education courses.	Public Schools; Private Schools; Overseas Schools; Informal Education Groups; Remedial Education Agencies; Public Education on the Environment; Education Specialist for Zoos, Aquariums, and Museums.
COLLEGE PROFESSOR	Same as above; must follow degree plan outlined by your advisor to specialize in geographic education.	Public State Colleges and Universities; Private Colleges and Universities; Community Colleges.
TECHNOLOGY SPECIALIST	Same as K-12 above; in addition, computer hardware and software courses, computer mapping, GIS and remote sensing.	Public and Private Schools; Community Colleges; Overseas Schools; Training/Consulting Firms; Hardware/Software Firms; National Geographic Society.

Geography Internships

Teachers should also be aware that many geography programs offer an internship course for students, especially those in their last year of college. Typically, a student registers for an internship as if taking a regular course, except that course credit is earned by working in a governmental agency or private firm that does geography-related work. This arrangement gives the student an opportunity to sample a wide variety of work in different areas without making a long-term employment commitment. In addition, the student gains practical work experience while creating a resume for future employment searches.

Jobs For The High School Graduate

As in most fields, better jobs in geography await those who earn a college degree. However, background for geography-related jobs may be obtained formally in high school and by informal means such as through traveling, reading, and absorption of information from the media.

The list in Table 10 suggests jobs for high school graduates who have some background and a strong interest in geography. School counselors should be able to provide more detail or to assist the student in obtaining additional information.

Table 10. JOBS FOR THE HIGH SCHOOL GRADUATE

- Travel Agent;
- Trip Counselor for Travel Clubs;
- Route-maker for Travel Clubs;
- Map-makers for Hiking Organizations;
- City and County Parks and Recreation Workers;
- Outdoor Guides;
- Military Intelligence;
- Surveyor;
- Real Estate Agent/Appraiser;
- Draftsperson/Cartographer;
- Environmental Organization Worker.

Summary

Today we live in a global society. Rapid advances in communications and information technology over the latter half of our century literally have brought the world into our homes, schools, and workplaces. While we celebrate greater knowledge and increased awareness of our world, we also bemoan the morass and complexity. Geography as a discipline has risen in prominence because it provides us with a perspective through which to learn about and understand our world at all scales.

It is our obligation as teachers to help our students answer the question, "What can I do with geography?" Beyond that *Geography for Life* the national standards, require that students not only know geography but be able to do geography. To emphasize the opening statement of this message, we say again, "doing" geography is only a few short steps from, "learning," geography. Let's help our students take those few short steps!

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Biographies

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Geographic Education National Implementation Project

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The Project

In 1984 a joint committee of the National Council for Geographic Education and the Association of American Geographers published the *Guidelines for Geographic Education: Elementary and Secondary Schools*. This 28 page booklet was designed to inform educational decision makers about the need to institute, update, and enrich geography programs in America's schools. The guidelines address the growing problem of geographical illiteracy in our society and provide a blueprint for developing a sequence of programs that will improve the teaching and learning of geography in the elementary and secondary schools.

Acting upon the favorable public response to the *Guidelines*, the National Council for Geographic Education (NCGE) and the Association of American Geographers (AAG) agreed to combine their efforts to implement the recommendations of the *Guidelines* nationwide. The American Geographical Society (AGS) and the National Geographic Society (NGS) joined with the NCGE and the AAG to form the Geographic Education National Implementation Project (GENIP) on July 1, 1985. The GENIP is a national project to improve the status and quality of geographic education in grades K-12 in the United States. This publication is one of the GENIP activities designed to implement the Guidelines by promoting geographic education.

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