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A Road Map to 21st Century Geography Education

by

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Never before in human history has it been more important for a person to be geographically literate. Our world is astoundingly complex and increasingly interdependent – economically, environmentally, politically, socially, and culturally. But the unsettling reality is that many teachers and most students are not yet geographically literate. Currently, American students are not even provided opportunities to learn enough geography to understand the very basic aspects of the world in which they live. Without explicit intervention and a dedicated focus on geographic literacy by educators, curriculum developers, and policy makers, U.S. children will be unable to thrive in the global marketplace, unlikely to connect with and care for their natural environment, and unsure about how to relate to people from other parts of the world. One thing is abundantly clear - if

American children hope to participate in our democracy and play a strong leadership role in our world, they must possess geographic knowledge, skills, and perspectives. Simply put, if our children are not taught to think geographically, their success and the success of our nation and the world in the 21st century are in jeopardy (Schell, Roth & Mohan, 2013).

What is Geographic Literacy?

Geographic literacy or geo-literacy is the ability to use geographic understanding (of human and natural systems) and reasoning to make far-reaching decisions in the 21st century. It consists of three components: interactions, interconnections, and implications (National Geographic).

Who thinks geography education is important in today's K-12 classrooms?

Geography is identified as one of the nine core academic subjects in existing federal education legislation, No Child Left Behind (2001). National standards for geography were recently revised and released as *Geography for Life, Second Edition* (2012). The College, Career and Civic Life (C3) Framework for Social Studies State Standards introduced last Fall includes geography as one of the four core disciplinary concepts and tools (2013). The Partnership for 21st Century Skills Framework describes Global Awareness and Environmental Literacy as two of the five 21st Century Themes – both describing geography (2011). National Assessment of Educational Progress, or NAEP, continues to assess students in geography – though limited to testing in 8th grade in 2014. In California, Geographic Literacy remains one of six strands under the Goal of Knowledge and Cultural Understanding in the History-Social Science Framework (2005) and can be found in the content standards under K-5, 6-8, and 9-12 Historical and Social Sciences Analysis Skills under the standards listed for Chronological and Spatial Thinking.

Many policy makers and educators agree that geography remains important for K-12 students to study, and the discipline is acknowledged in these national and state reform efforts. However, leaders at the National Geographic Society, Association of American Geographers (AAG), National Council for Geographic Education (NCGE), and American Geographical Society (AGS) argue that contemporary geography is largely misunderstood in the U.S., instructional materials are outdated or inaccessible in today's classrooms, teachers frequently lack adequate preparation and professional development to teach geography effectively, assessments require retooling, and education research in geography education requires attention. These leading organizations formed a plan, worked together, and recently released *A Road Map for 21st Century Geography Education* (2013).

The Road Map Project

In response to the issues raised by the four leading professional organizations supporting geography education in the U.S., three blue ribbon panels were assembled to explore these concerns and make recommendations to chart a course for geography education over the next decade. Led by National Geographic, this National Science Foundation-funded project resulted in three reports to address assessment, research, and instructional materials and professional development. All three reports are intended for three audiences that are best positioned to affect improvement in our public education system – front line professionals (teachers, teacher educators, administrators, developers, and researchers), policy makers at the local, state, and national levels, and funders (public and private). Executive summaries and full reports are available as free pdf downloads at the National Geographic website (www.natgeoed.org/roadmap).

Each committee was comprised of academic experts in geographic education, academic geographers, academic experts in science and social studies education, K-12 practitioners, and experts in the specific foci of each committee (assessment, education research, professional development, instruction materials development). They worked together to discuss geographic thinking and the practices of geography with experts in such fields as real estate, government, and defense. Separately, each committee conducted literature reviews, research, meetings, and conferences with specialists to frame the issues and recommend improvements in their assigned areas. Those findings and recommendations are summarized in the following sections.

What is Contemporary Geography?

What is Geography?

Geography is interdisciplinary and incorporates bits and pieces from the fields of science, arts, health, humanities, law, business, engineering, and technology. The “geographic perspective” is a way to understand a topic or area using spatial relationships and focuses these bits and pieces into a dynamic kaleidoscope of ideas and data. Geography is something you do, not just something you know. Those who study geography identify relationships between these varied subjects, graft those relationships onto a geographic space, and explain why certain systems are where they are. A common shorthand for geography is “*the why of where*” (National Geographic).

Each committee discussed the historic and current state of geography in schools, and wrestled with the concepts of geographic sciences, geo-literacy, and geography. After careful review and consideration, all three committees agreed that the second edition of *Geography for Life* should serve as the “destination” for this Road Map Project, because it describes a shared vision for geography education. Like the Road Map Project committee members, *Geography for Life* authors envision students using geographic information to inquire about and understand real issues (e.g., climate change, migration, urbanization, water transport) while using modern tools (e.g., GPS, GIS, remote sensing, online communications) to access, analyze, organize, and display data while developing and proposing solutions. This integration of *knowing* and *doing* promotes a practical approach to geography education that engages and challenges students who are learning about their world.

The national standards reflect the essence of contemporary geography as defined by geographers, depict the perspectives and skills of the geographic advantage, and focus on portions of geography that have the greatest value for students and society. Like the Road Map Project reports, *Geography for Life* promotes the multi-faceted nature of geography as perspectives, skills, and content. However, the Road Map Project enhances this vision with attention to balance, integration, and “doing geography” with geographic practices.

One major goal of the Road Map Project is to replace the stereotypical view of geography as fact-based and descriptive with a balanced and integrated view of geography that recognizes the importance of learning place names, location, and terminology that have historically characterized geography education, along with understanding powerful geographic concepts, and being able to reason geographically. In other words, naming and identifying locations might accompany studies about migration while students figure out how and why people moved from one place to another and whether or not their living conditions improved. This example integrates the acquisition of knowledge with conceptual understanding and the development of skills. Furthermore, inquiry-based learning experiences can better integrate “thinking geographically” and “doing geography” in order to help students develop the practices of geography.

Geographic practices, used by practicing geographers as well as other professionals and ordinary people, are derived from the skills presented in *Geography for Life* and represent an aspect of geographic inquiry or problem-solving that further promotes the goals of “doing geography” by:

1. Posing geographic questions

- a. Identify problems or questions that can be addressed using geographic principles, models, and data; express problems and questions in geographic terms

For example: What causes drought in California?

2. Acquiring geographic information

- a. Identify geographic data that can help to answer a question or solve a problem.
- b. Collect data (including observations and measurements) about geographic phenomena, and/or gather existing data to help answer a question or solve a problem.

For example: Finding reports, charts, and maps providing information about snowfall, water levels, water transfer, and water use

3. Organizing geographic information

- a. Organize data and create representations of data to help solve a problem or answer a question.

For example: Making a map (or series of maps) to show the relationship between snowpack and water availability (or increased water use in agricultural and urban regions) throughout California

4. Analyzing geographic information

- a. Identify data analysis strategies that can be used to help solve a problem or answer a question.
- b. Find and describe spatial and temporal patterns in data, or find data that matches a pattern, to help solve a problem or answer a question.
- c. Construct an explanation or prediction for phenomena by comparing data to a model or theory.

For example: Presenting a solution for California's drought with supporting evidence that might be drawn from another region in the world with similar climate and/or issues

5. Answering questions and designing solutions

- a. Construct an answer to a question or a solution to a problem using geographic principles, models, and data
- b. Evaluate one or more answers to a question or solutions to a problem using geographic principles, models, and data.

For example: Brainstorm solutions for the drought, evaluate proposed ideas to determine the best solution, and explain why this solution is the best

6. Communicating geographic information

- a. Inform or persuade an audience using geographic principles, models, and data.

For example: Present plans to address California's drought using a charts, maps, and/or graphs to represent data that supports the plan

A Vision of Teaching and Learning in Geography

The Instructional Materials and Professional Development committee focused their work on these two questions: *How do students learn the big ideas of geography?* and *How does professional development impact teacher practice and student achievement?* They began by describing a vision for effective teaching and learning in geography that includes:

- engaging, student-centered, hands-on learning activities that focus on student thinking and experiences with real-world issues
- fieldwork that requires students to investigate problems and solutions using geospatial technologies, such as GIS and remotely sensed images
- students making decisions and actively participating in their local communities after collecting, organizing, and analyzing geographic data
- teachers who are skilled, knowledgeable, and well-prepared to teach geography
- accessible and useful resources, such as maps, photographs, graphs, and charts, for students to analyze and better understand patterns and distributions of geographic phenomena

With this vision, the committee developed ten recommendations that support student learning, teacher learning, and large-scale collaboration and change in geography education. To support student learning, instructional materials should help students learn geography's big ideas and practices. Examples of big ideas include:

- Maps and other representations communicate spatial information about people, places, and environments at various scales.
- There are advantages and disadvantages of location.
- Push and pull factors influence movement of people.
- Physical systems affect people.
- Humans modify the environment, and this has consequences.

Instructional materials should also be organized to value student geographic knowledge and experience by guiding teachers to identify prior knowledge and experiences, capitalize on student interests, and challenge student thinking. Thoughtful questions and instructional activities that elicit students' ways of thinking about geographic concepts will help students validate conceptions and effectively correct misconceptions.

Additionally, instructional materials should guide teachers to use effective and appropriate teaching practices. These include:

- Engagement with contemporary geographic questions
 - Exploration of one's local geography
 - Vivid experiences using the tools of geography
 - Variety of learning experiences
 - Application of knowledge across contexts
 - Developing the language of geography
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To support teacher learning, instructional materials should be educative (intentionally supporting teacher learning) and professional development should focus on teacher’s content knowledge and pedagogical content knowledge. Professional development should be sustained, coherent, and designed and implemented with clear and measurable goals. Preservice education programs should be enhanced to provide effective models and mentors through field experiences and coursework.

To support large-scale collaboration and change, strategic research on instructional materials and professional development in geography is needed as well as collaboration among various stakeholders who have a direct or indirect role in teacher and student learning of geography. In addition, a need exists for the development of tools, such as video cases and learning progressions, to support the design, evaluation, and implementation of materials and professional development.

This committee asserts that instructional materials and professional development must be integrated to achieve the best results. Materials should not be used without proper professional development and professional development should not occur in the absence of the materials used by teachers. The committee also asserts that geography should be taught wherever it is found in the curriculum – Social Studies, Science, English Language Arts, Technology, etc.

Improving Teaching and Learning through Assessment

The Assessment Committee’s work is grounded in the belief that although assessments can be vital tools for improving K-12 geography education, this potential is not being realized. While many perceive assessments to be an endpoint, or something done after instruction, the committee’s report articulates a much more important role for assessments.

The Assessment Committee analyzed a national sample of geography assessment items. The study revealed that only 30% of geography assessment items required students to use any geographic practices, such as *posing geographic questions, collecting and organizing geographic data, analyzing geographic information, answering questions and designing solutions, or communicating geographic information*. Of those assessment items that did include geographic practices, *analyzing geographic information* was identified in 21% of the items, but the other practices rarely appeared. The most common type of analysis in multiple-choice or short-answer items required students to observe a graphic, such as a photograph or map, and characterize the pattern that they see (e.g., early agricultural sites in a region, locations of trade centers). This study also found the cognitive demand, or degree to which students are asked to process information, for geography assessment items unequally distributed. See Figure 2.

Cognitive Demands	Tasks	Percentage of Items Found in Assessments
Declarative (i.e., <i>knowing that</i>)	<ul style="list-style-type: none"> • Identify, describe, classify • Recognize a true statement • Find relevant information in a text • Make a comparison between two variables 	54%
Procedural (i.e., <i>knowing how</i>)	<ul style="list-style-type: none"> • Read a map • Collect information from a table, graph, map, 	27%

	or representation <ul style="list-style-type: none"> Plot data on a table, graph, map, or representations 	
Schematic (i.e., <i>knowing why</i>)	<ul style="list-style-type: none"> Make a comparison across multiple variables Explain or predict a phenomenon using a general principle or model Perform evidence-based reasoning Recognize and compare patterns 	17%
Strategic (i.e., <i>knowing how, when, and where knowledge applies</i>)	<ul style="list-style-type: none"> Find a solution to a problem by devising an appropriate method of approach 	1%

Figure 2. Cognitive demands, types of tasks, and percentage of assessment items requiring these demands.

The Assessment report recommends a new generation of geography assessments that require educators and developers to adopt a new approach to assessment development. Existing geography assessments focus almost exclusively on students’ abilities to recall factual knowledge and therefore, a new generation of assessments are needed to evaluate 21st century geographic knowledge and skills, including geographic practices. The committee developed a framework and process for assessment development as well as an illustrative model for a high school end-of-unit exam on human settlement. The framework serves as a blueprint for assessment developers to define performances – both select response and constructed response – that blend geography content with geography cognitions, including geographic practices. Using the framework, assessment tasks evaluate both knowledge and skills of students in the context of geography concepts. Figure 1 outlines a cluster of three assessment items that might be developed using the framework for a high school assessment. (See full report for framework and illustration.)

	Item 1	Item 2	Item 3
Content	The nature of settlement is influenced by the interaction of characteristics of populations and physical environments.	The nature of settlement is influenced by the interaction of characteristics of populations and physical environments.	The nature of settlement is influenced by the interaction of characteristics of populations and physical environments.
Cognition	Identify geographic data that can help to answer a question or solve a problem.	Find and describe spatial and temporal patterns in data, or find data that match a pattern, to help answer a question or solve a problem.	Construct an explanation or prediction for phenomena by comparing data to a model or theory.
Cognitive Demand	strategic	schematic	Schematic
Item Format	constructed response – short answer	selected response	constructed response
Performance Expectation	Identify resources and data that would help answer a question about impact of policy decisions made for a settlement on how the	Describe patterns or relationships shown between the maps using concepts of density and gradient.	Make a prediction about how policy decisions made for a settlement will impact the population and landscape using observations about their

	<p>population interacts with the physical environment.</p> <p>A city has a problem that people are not recycling plastic bottles, and the bottles are ending up in the rivers and lakes. The city officials are trying to determine if they should institute a deposit fee, so they have asked your class to determine if a refundable bottle deposit would be an effective strategy for increasing recycling rates. Use the two maps below to analyze how effective bottle deposit fees have been in other regions.</p> <ol style="list-style-type: none"> 1. One map shows the distribution of deposit fees for plastic bottles. 2. The other map shows the incidence of plastic bottles in watersheds (landfill). The map needs to make watersheds clear so that students can identify a relationship between rivers and density of bottles on the landscape. <p>Is there any other information you would need to perform this analysis?</p>	<p>Compare the two maps. Are there patterns to where most bottles are found and the fewest bottles are found across the region? Where the bottles are, are there any patterns to where they appear within the landscape?</p> <ul style="list-style-type: none"> - Students should note where the highest density of bottles occur relative to areas where deposit fees are charged. - Students should note where the highest density of bottles occur relative to watershed features. 	<p>relationship.</p> <p>Justify whether a bottle deposit would be an effective strategy increasing recycling rates using patterns observed in the maps.</p>
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Figure 1. Assessment examples using the *21st Century Assessment Framework for the Geographical Sciences (AFGS21)*

Furthermore, the committee recommends a substantial investment in conducting and disseminating research on the nature of understanding and reasoning with geographic concepts, and performing geographic practices to inform assessment design. They recommend that a set of shared frameworks and assessments be developed to serve assessment needs across a broad range of instructional improvement efforts. Training and professional development is also needed to develop a corps of professionals with expertise in geography education and in assessment design, and to prepare teachers and policy makers to use and learn from these new assessments.

Improving Research in Geography Education

The Geography Education Research committee explored the status of current research in geography education, identified gaps, and suggests priorities for such research. They began with these questions: *What areas of research will be most effective in improving geography education at a large scale?* and *What strategies and methodologies can relevant research communities develop and adopt to maximize the cumulative impact of education research in geography?*

In response, the committee determined that geography education needs a focused, systematic research agenda. They recommend an action plan organized around these four research questions in order to align curriculum, instruction, and assessment models, establish coherent learning sequences rooted in the cognitive strategies used by learners, and promote effective models of teaching:

- How do geographic knowledge, skills, and practices develop across individuals, settings, and time?
- How do geographic knowledge, skills, and practices develop across the different elements of geography?
- What supports or promotes the development of geographic knowledge, skills, and practices?
- What is necessary to support the effective and broad implementation of the development of geographic knowledge, skills, and practices?

Research communities are encouraged to develop studies that align with these key research questions, are situated in a problem context, focus on core ideas, practices, and knowledge about skills of geography, draw from research about cross-cutting themes and foundational concepts from other disciplines, and use common tasks, measures, and assessments. Research priorities for geography education were identified, and include learning progressions, effective teaching, exemplary curricula, impact of fieldwork, and teacher preparation.

Conclusion

This two-year research project surfaced today's concerns about geography education across the grades and subject areas. The inclusion of science educators, assessment specialists, researchers, and practitioners helped geographers and geography educators better articulate issues with teaching, learning, and assessment in this discipline. The process allowed committee members to draw upon solutions and research in other disciplines, and reinforce the importance of geography education as preparation for a contemporary world in which practical skills, inquiry strategies, and geographic concepts are necessary to adequately address personal, community, and global issues.

These reports are available online, but they only serve to chart the course for improved geography education. The real work comes when teachers, administrators, teacher educators, researchers, developers, policy makers, and funders implement these recommendations to better serve students in our K-12 education system.

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