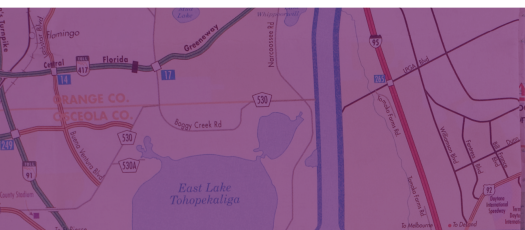




# Charting the Course

A Road Map for 21st Century Geography Education



Executive Overview | [www.natgeoed.org/roadmap](http://www.natgeoed.org/roadmap)



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## This executive overview was created by the Road Map for 21st Century Geography Education Project.

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The Road Map for 21st Century Geography Education Project is a collaboration between the National Geographic Society, the Association of American Geographers, the National Council for Geographic Education, and the American Geographical Society. The recommendations expressed in the reports are those of the committee members and do not necessarily reflect the views of these organizations.

Information about the project and copies of the complete reports are available at: [www.natgeoed.org/roadmap](http://www.natgeoed.org/roadmap)

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# Charting the Course

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## A Road Map for 21st Century Geography Education

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This document provides an overview of the three Road Map Project reports on Assessment, Instructional Materials and Professional Development, and Geography Education Research.

**ABOUT THE ROAD MAP PROJECT:** Funded by a grant from the National Science Foundation, the Road Map Project responds to the growing recognition among business leaders and policy makers that Americans lack the critical geographic understanding and reasoning skills that will be required for careers and civic life in the 21st century. Over the course of 2 years, the Road Map Project brought together experts in geography, science, education, and research from across the U.S. to create a set of landmark reports focusing on key issues for educational improvement: instructional materials for students, education of teachers, assessment in geography, and a research agenda for geography education.

**These Road Map reports chart a course for the large-scale improvement of K-12 geography education in the U.S.**

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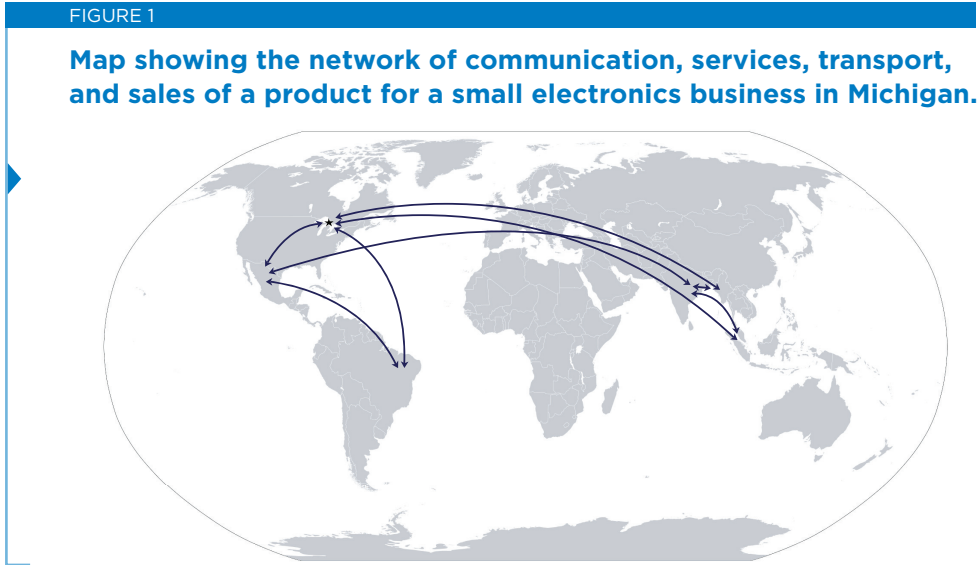


# PROJECT OVERVIEW

**A Need for Geographic Literacy:** Globalization demands that people understand the dynamic relationships between people and places around the world. However, few Americans are geographically literate.

The increasing interconnectedness of the 21st century marketplace demands an unprecedented degree of geographic literacy. Indeed, a small electronics business in Michigan (Figure 1) might source materials in Thailand and Indonesia, transport them to India to manufacture parts, ship the parts to Mexico for final assembly, and ultimately market the product for sale in Brazil. Understanding of cultures, economies, political systems, and environmental variables is essential for a business to successfully navigate this process. Moreover, the ability to predict impacts on this supply chain from disruptions due to political turmoil, economic fluctuations, and the rising frequency of intense weather events may dictate the success or failure of a business.

Likewise, geographic literacy is necessary for decision-making on a local scale. For instance, members of a community faced with choices about managing local undeveloped land must be prepared to reason beyond direct economic benefits of development to potential indirect impacts on natural resources such as clean water, erosion, and air pollution, as well as on other businesses that depend on those resources, health care, property values, and other far-reaching effects across the human and environmental systems. The ability to reason about these interacting systems is crucial for making well-founded decisions that balance costs against benefits.



Although the need for geographic literacy is critical for the workforce, civic engagement, and personal decision making, students are not being adequately prepared for these demands. Too few schools offer geography education beyond map reading and memorizing place names, and the combination of too little geography instruction and too much attention to rote knowledge over geographic reasoning has led to unacceptably low levels of

competency with basic geographic concepts. The 2010 National Assessment of Educational Progress (NAEP) revealed that fewer than 30% of American twelfth-grade students were performing at a proficient level (Figure 2), while over 70% of the students showed only partial or no mastery of geography concepts. These troubling results call attention to widespread concern among geography educators that the preparation of geography

“*K-12 geography education is critical preparation for civic life and careers in the 21st century. It is also essential for postsecondary study in a wide range of fields, from marketing and environmental science, to international affairs and civil engineering.*”

Assessment Report, p. 18







# ASSESSMENT REPORT

Geography assessments have the potential to be critical tools for improving geography education; information from assessments can guide decision making for classroom instruction, academic program planning, program evaluation, and educational research.

## Classroom Instruction

Assessments help teachers monitor their students' learning and adjust instruction to meet students' needs.

## Program Evaluation

Assessments help schools and policy makers determine how effective instructional materials and approaches are in practice.

## Academic Program Planning

Assessments help educators design appropriate academic programs that serve the diverse needs of students.

## Educational Research

Assessments help researchers improve our understanding of best practices for teaching and learning concepts and skills.

Information collected from assessments can be used to guide decision making about educational improvement, but only if the assessments probe behaviors that are closely aligned to the educational goals. Therefore, for assessments to help geography education meet the goals laid out in *Geography for Life*, they must not only evaluate students' content knowledge, but also their ability to answer questions and solve problems by reasoning with geographic evidence.

**The Assessment Committee evaluated the current status of geography assessment. This study revealed widespread weaknesses in existing assessments.**

### Geography assessments currently:

- focus on just a few areas of geography content
- rarely evaluate how well students are able to apply their geographic knowledge
- evaluate students' competencies at only the lowest cognitive levels
- frequently have technical flaws

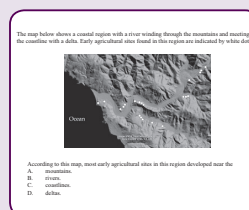
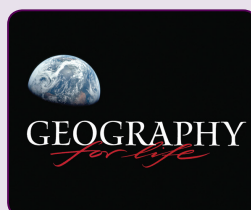
We need a new generation of assessments that are better measures of our progress toward the goals of geography education.

## Assessment design for decision making

Performance expectations articulate specific knowledge and skill competencies central to geographic literacy.

Assessments capture the range of competencies and follow the principles of high quality design.

Data from assessments inform decisions about improving geography teaching and learning.





The Road Map Project Assessment Committee presents a new framework to guide the development of high-quality geography assessments that can support the improvement of geography education: the *21st Century Assessment Framework for the Geographical Sciences* (AFGS21).



## The 21st Century Assessment Framework for the Geographical Sciences :

### Presents a Process

It presents a process for articulating performance expectations that probe students' knowledge about geographic concepts and the use of this knowledge to answer geographic questions and solve geographic problems.

### Organizes Information

It organizes information about item characteristics, ensuring that students are given a variety of opportunities to show what they know and can do.

### Provides a Structure

It provides a structure to systematically select a representative sample of performance expectations to create an assessment instrument.

## Recommendations to improve assessment in geography education:

**Assessment developers** and **education practitioners** should use the AFGS21 framework to develop high-quality assessments to monitor students' progress, as well as the effectiveness of geography curricula and programs.

**State** and **national policy makers** should conduct frequent evaluations of the status of geographic literacy, and additional resources should be allocated to improving existing large-scale evaluation instruments.

**The geography education community** should develop frameworks and assessments for topics of broad applicability and high need that can be leveraged across multiple improvement efforts (e.g., spatial data analysis).

**Education administrators** should invest in training and professional development to increase the number of geography professionals with expertise in assessment design, as well as teachers and policy makers who understand how to use assessments to inform decision making.

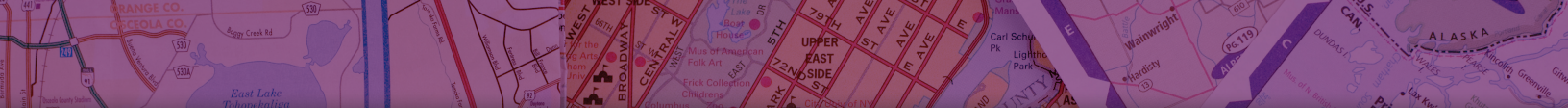


*We believe that assessment must be integrally connected with teaching and learning. Each may move to the forefront at different points in time, but they must maintain a strong link to the others. In this report, we focus... [on using] evidence from assessment [to] inform and improve teaching and learning.*

Assessment Report, p. 28







# A NEW GENERATION OF GEOGRAPHY ASSESSMENT

The Assessment Committee's report is grounded in the belief that although assessments can be vital tools for improving K-12 geography education, this potential is not being realized. The public perception tends to be that assessments are an endpoint, something done after instruction as a way of ranking students by achievement, but they can serve a much more important role.

“*Geography for Life describes a vision of geographic education in which students use spatial analytical skills to reason about people, places, and connections among them, but we find that assessments present a much narrower view of expectations for geographic literacy. Therefore, we see an enormous opportunity to use assessment as a mechanism to shift geography education closer to the version of geographic literacy captured by Geography for Life.*

Assessment Report, p. 45

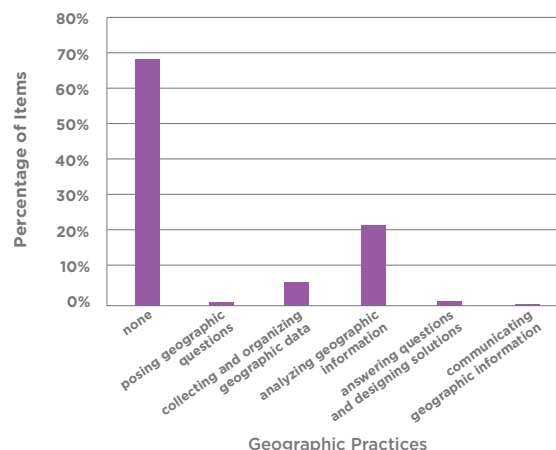
Assessment is a way of generating information for decision making. Information from assessments can be used to guide decisions about instructional practice, allocation of resources, and educational policy. In addition, the structure and content of assessment plays an important role in communicating to teachers, students, and others what it means to be proficient with the subject at hand. However, if assessments are to be used reliably for these purposes, they must closely align to the goals of geography education, and they must be technically sound.

## Existing geography assessments focus almost exclusively on students' ability to recall factual knowledge:

- Over 44% of geography assessments focus on just *three* of the sixteen geography content standards in *Geography for Life*.
- Only one geographic practice, analysis of geographic information, is assessed in more than 5% of geography items **(Figure 3)**.
- Almost all large-scale geography assessment items simply ask students to perform factual recall or gather information from maps, graphs, and texts; only 5% require higher-order cognitive demands.

FIGURE 3

### Frequency distribution of geographic practices in large-scale geography assessments (n=412).





**A new generation of assessments are needed to evaluate 21st century geographic knowledge and skills.**

The committee presents a new framework for designing geography assessments: the *21st Century Assessment Framework for the Geographical Sciences* (AFGS21).

- AFGS21 facilitates the development of assessments that systematically measure competencies required to answer geographic questions and solve geographic problems.
- AFGS21 helps developers define assessable performances that blend geography content and geography cognition (including geographic practices; see **Figure 4**).
- AFGS21 is intended to be used as a blueprint to create a new generation of assessment frameworks targeted to specific purposes—frameworks that generate assessments with higher fidelity to the goals for geographic literacy and the principles of assessment development.

FIGURE 4

**Matrix for articulating performance expectations that target a combination of geography knowledge and skills.**

		Geography Content		
Geographic Cognition	Knowing & Understanding			
	Geography Practices			

**A process for using the AFGS21**

To illustrate how to use AFGS21 as a blueprint, a framework development team recorded their process for using the general AFGS21 to create an assessment framework for a high school end-of-unit exam on human settlement. The team models each stage of this process, from selection of the targeted subset of content and cognition to writing specifications for assessment developers. See the full Assessment Report for this illustration.

**Recommendations to route a new generation of geography assessments:**

1. **Adopt a new approach to assessment development.** Existing assessments fail to evaluate the kinds of thinking and reasoning that geographic literacy demands, which limits their utility for improving geography education. A new approach to assessment development using AFGS21 will help to align future assessments with the goals of geography education and the principles of high quality assessment design.
2. **Build a knowledge base on assessment in geography.** A substantial investment should be made in conducting and disseminating research on the nature of understanding and reasoning with geography concepts, and performing geography practices to inform assessment design. In turn, this research should form the foundation of a new generation of classroom resources that integrate these assessments as tools to facilitate and improve learning geography.
3. **Leverage resources.** A set of shared frameworks and assessments should be developed to serve assessment needs across a broad range of instructional improvement efforts. These should be addressed to areas of high need and broad applicability (e.g., spatial data analysis and K-5 geography education).
4. **Develop human resources.** An investment should be made in training and professional development programs 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.

# INSTRUCTIONAL MATERIALS AND PROFESSIONAL DEVELOPMENT REPORT

The U.S. would benefit from a geographically literate citizenry who are knowledgeable about other people and places around the world and within their own communities. However, the amount of geography instruction that students are receiving, the preparation of their teachers to teach geography, and the quality of instructional materials are inadequate to prepare students for the demands of the modern world.



In order to improve geography education, we need:

- More instructional time for geography
- High quality instructional materials
- Better preparation of teachers

The Instructional Materials and Professional Development recommendations are designed to:

1. **Support student learning**
2. **Support teacher learning**
3. **Support collaboration and change**

## Recommendations to support student learning:

- Teach the big ideas and practices of geography
- Design materials using strategies that build on student knowledge and challenge student thinking
- Develop materials that engage *all* learners in meaningful explorations of geography

## Examples of big ideas in geography

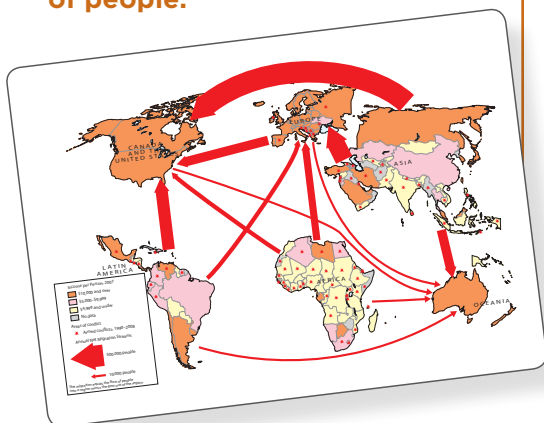
- Maps and other representations communicate spatial information about people, places, and environments.
- There are advantages and disadvantages of location.
- Push and pull factors influence movement of people.
- Humans modify the environment, and this has consequences.

## Integrate the learning of big ideas with geographic practices

- Posing geographic questions
- Acquiring geographic information
- Organizing geographic information
- Analyzing geographic information
- Answering questions and designing solutions
- Communicating geographic information

FIGURE 5

**This map of human migration illustrates the big idea in geography that push and pull factors influence the movement of people.**







## Recommendations to support teacher learning:

- Create instructional materials that are learning tools for teachers
- Offer coherent professional development with clear and measurable goals
- Prepare teachers to teach geography across subjects and grade levels
- Initiate learning in teacher preparation programs

### In order to improve geography instruction, teachers need...

- More knowledge about contemporary geography and how to teach it
- Better professional development that includes active and hands-on experiences
- More capacity to integrate learning and assessment across the curriculum in geography, social studies, and science



A participant in the National Teacher Leadership Academy maps a watershed.

## Recommendations to support collaboration and change:

- Fund research and evaluation
- Create opportunities for authentic collaboration
- Develop and disseminate tools and exemplars



### Research Questions we Need Answers to:

How do students learn the big ideas of geography?

How does professional development impact teacher practice and student achievement?



### Opportunities for Collaboration:

Geographers, researchers, and educators can collaborate in the design of materials and professional development.

Educators, professional development providers, and instructional materials developers need strong exemplars to illustrate the new vision of geography.



### Examples of Needed Tools and Exemplars:

Videocases for teacher education and professional development

Illustrative instructional materials and process for assessing the quality of materials

Maps of student learning progressions around geographic concepts



# A VISION FOR GEOGRAPHY CLASSROOMS

The charge to the Instructional Materials and Professional Development Committee was to create recommendations and guidelines to support the key knowledge, practices, and dispositions that students and educators must possess; strategies for supporting the professional development of educators; and the design of engaging and effective instructional materials in geography.

Responding to this charge, the Instructional Materials and Professional Development Committee created a vision for teaching and learning and proposed recommendations to improve the current state of instruction in geography.

As they began their work, the Committee wrestled with—and resolved—two important issues:

- Students don't get very much instruction in geography. In elementary schools, reading and math come first. In secondary schools, it's rare to find geography as a requirement. The resolution: **Be collaborative.** *Geography should be taught wherever it is found—whether in math, science, social studies, literature, technology, or the arts.*
- New materials are often introduced without professional development, and professional development occurs without the benefit of exemplary materials and instructional practices. The resolution: **Be strategic.** *Instructional materials and professional development should be integrated for best results.*

Developers, educators, and policy makers can use the recommendations and guidelines to assist them in designing, sharing, and implementing instructional materials and professional development programs that support effective teaching and learning in geography.



## Vision for Geography Classrooms

### Imagine a classroom where...

- ...learning activities are engaging, student centered, hands-on, and focused on student thinking and experiences with real-world issues;
- ...students investigate problems and solutions through fieldwork and geospatial technologies, such as web-based GIS and remotely sensed images;
- ...students learn how to collect, organize, and analyze geographic data to make decisions and actively participate in their local communities;
- ...students analyze maps, photographs, graphs, and charts to better understand patterns and distributions of geographic phenomena;
- ...students use their knowledge of geography to better understand other subject areas and to make informed decisions in their everyday lives; and
- ...a skilled and knowledgeable teacher, well-prepared and committed

### The ten recommendations are organized into three categories:

**Recommendations 1-3:** Support student learning in geography by teaching the big ideas and practices, using strategies that build on student knowledge and challenge their thinking, and developing materials to engage learners in meaningful explorations of geography.

**Recommendations 4-7:** Support teacher learning in geography with instructional materials that are learning tools for both teachers and students, and develop coherent professional development with clear and measurable goals focused on contemporary geography. Teacher preparation programs should emphasize teaching geography across subjects and grade levels.

**Recommendations 8-10:** Improve geography education systemically and exponentially by funding research, creating opportunities for authentic collaboration, and developing and disseminating tools and exemplars.



## Support Student Learning

**Recommendation 1:** Focus instructional materials on big ideas and practices of contemporary geography across subjects and grade levels.

**Recommendation 2:** Design instructional materials that build upon students' prior geographic knowledge and experience and challenge students' thinking.

**Recommendation 3:** Develop instructional materials that use teaching strategies to engage all learners in meaningful explorations of geography.



## Support Teacher Learning

**Recommendation 4:** Design instructional materials to be learning tools for teachers.

**Recommendation 5:** Develop and implement professional development programs that enrich teachers' knowledge of contemporary geography and how to teach it.

**Recommendation 6:** Design and implement coherent and sustained professional development programs with clear and measurable goals.

**Recommendation 7:** Enhance preservice teacher education programs to emphasize teaching geography across subjects and grade levels.



## Support Large Scale Collaboration and Change

**Recommendation 8:** Develop and fund extensive research and evaluation in geography instructional materials and professional development.

**Recommendation 9:** Create opportunities for sustained and authentic collaboration among geographers, education researchers, and practitioners.

**Recommendation 10:** Design and disseminate tools and exemplars to inspire and support educators, developers, and policy makers in leading the implementation of these recommendations.



“Geography can be a great equalizer. Every child has a “place” and knows something of the world around her or him. This common base of experience—place—is a core theme in geography...”

Instructional Materials and Professional Development Report, p. 30





# GEOGRAPHY EDUCATION RESEARCH REPORT

The Geography Education Research Committee of the Road Map Project was asked to respond to two charges:

- What areas of research will be most effective in improving geography education at a large scale?
- What strategies and methodologies can relevant research communities develop and adopt to maximize the cumulative impact of education research in geography?



## Geography Education Research Needs:

- focus
- coordination
- rigor

## Charge 1: What areas of research will be most effective in improving geography education at a large scale?

Geography education needs a focused, systematic research agenda. A long-range plan for action organized around four key research questions will allow geography educators to:

- align curriculum, instruction, and assessment models,
- establish coherent learning sequences rooted in a richer understanding of the cognitive strategies employed by learners, and
- promote effective models of teaching.

To reach a more in-depth understanding of how students learn geography, the Geography Education Research Committee proposed four key research questions, each providing an analysis of a different aspect of one or more of the practices of geography.

## Key Research Questions for Geography Education

- 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?

## Geographic Practices

- Formulate Geographic Questions
- Acquire, Organize and Analyze Geographic Information
- Explain and Communicate Geographic Patterns and Processes



## Charge 2: What strategies and methodologies can relevant research communities develop and adopt to maximize the cumulative impact of education research in geography?

Building capacity in geography education research will require additional financial support beyond what is currently available. New investments in geography education research should be prioritized to maximize cumulative impact. The Committee recommends connecting the relatively small community of geographers and others who conduct research in geography education with the broader community of scholars from the learning sciences, education, and related fields. The report on Geography Education Research encourages studies that

- align to the key research questions suggested previously;
- are situated in a problem context;
- focus on the core ideas, practices, knowledge and skills of geography;
- draw from research about cross-cutting themes and foundational concepts from other disciplines; and
- use common tasks, measures, and assessments.



Participants at the National Academy for Curriculum Leadership discuss data on student learning.



### Strategies to Build Capacity

- Tap research from **related fields**
- Organize research around a coordinated set of **priorities**
- Develop lines of research to **maximize the impact**

#### Building on Research from Related Fields

- Consult education research in related fields, including science and mathematics education
- Conduct research in learning progressions and related instructional interventions in geography

#### Research Priorities for Geography Education

- Learning progressions
- Effective teaching
- Exemplary curricula
- Impact of fieldwork
- Teacher preparation

#### Maximizing Impact of Research Programs

- Use interdisciplinary and multidisciplinary approaches
- Follow established principles for scientific research
- Study exemplary programs, curricula, tasks, measures and assessments
- Build partnerships with researchers in related disciplines



# MAXIMIZING THE IMPACT OF RESEARCH

In the process of developing the report, the Geography Education Research Committee reviewed current research in geography education and found that it is unfocused, parochial, and disconnected from other education research.

In order to reverse this trend, the Geography Education Research Committee developed a set of specific recommendations for researchers, educators, policy makers, and funders about the actions required to further develop and expand research in geography education. The recommendations summarize and focus attention to needs identified by the Committee in the report. The goal of these recommendations is to improve learning and teaching in geography to develop a geographically proficient and literate society.

“It is clear that geography education needs a focused, systematic research agenda.”

Geography Education Research  
Report, p. 56



Participants at the National Academy for Curriculum Leadership analyze data to make decisions about curriculum design.

## What areas of research will be most effective in improving geography education at a large scale? The Committee recommends...

**Recommendation 1:** Research to systematically identify learning progressions in geography both within and across grade bands (e.g., K-4, 5-8, 9-12). Empirical research that tests hypothetical learning progressions will advance understanding of student learning and provide guidance to the design of standards, assessments, and shared tasks and activities.

**Recommendation 2:** Research that examines the components and characteristics of exemplary geography curricula. Well-designed, systematic research is needed to expand the understanding of cognitive foundations, task characteristics, and organizational conditions that inform the design, implementation, and evaluation of geography curriculum.

**Recommendation 3:** Research to investigate the characteristics of effective geography teaching.

Research is needed to identify what practices characterize effective geography teaching, how teachers' pedagogical decisions impact student achievement and performance, and which instructional strategies promote and support geography learning most effectively.

**Recommendation 4:** Research on fieldwork and its impact on learning geography knowledge, skills, and practices. Issues include how to incorporate fieldwork into formal and informal learning environments, and how to measure and optimize its effectiveness—particularly with respect to geo-spatial and multimedia technologies.

**Recommendation 5:** Research on teacher preparation in geography with the goal of determining what is needed to produce educators able to understand, and teach for student mastery of, the content and practices of geography. Attention is needed to content and pedagogical knowledge; the integration of geography into preservice teacher preparation; the impact of licensure in science or social studies; the use and effectiveness of inservice programs; and the impact of teacher beliefs about geography.





## What strategies and methodologies can relevant research communities develop and adopt to maximize the cumulative impact of education research in geography?

### The Committee recommends...

**Recommendation 6:** Geography education researchers take interdisciplinary and multidisciplinary approaches, drawing on relevant research results. Models of interdisciplinary cooperation can provide guidance for future work, such as the Spatial Intelligence and Learning Center (SILC), which has focused on the role of spatial thinking in STEM education.

**Recommendation 7:** Geography education researchers follow established principles for scientific research in education (NRC, 2002) and collect data scientifically from large samples of students in schools, other natural learning environments, and laboratory settings. Collectively, geography education research lacks large-scale and longitudinal studies. This trend must be reversed.

**Recommendation 8:** Geography education researchers develop and study exemplary programs, curricula, tasks, measures, and assessments in order to build the body of knowledge about effective geography teaching and learning. For example, exemplars in cognitive science and education research have helped develop our understanding of individual learning differences (NRC, 2001).

**Recommendation 9:** Geography education researchers build partnerships with formal (teachers and administrators in school districts) and informal educators to conduct research in a range of learning contexts and to share findings among the community of geography education researchers. Teachers and students should be treated as research partners, not research subjects. Researchers and educators should engage in replicable action research; ground research in learning theory; and attack problems that are of interest to a wide variety of practitioners who teach in diverse contexts.

**Recommendation 10:** The creation or designation of an institution to coordinate the implementation, dissemination, and knowledge transfer of research results. What is required is an institution that regularly considers the status of research in geography education in relation to the key questions of the research agenda; assesses when sufficient amounts of empirical evidence exist to shape decision making in educational practice; recommends further research in areas where knowledge remains deficient; and provides models to translate research into practices that will improve teaching and learning.

**Recommendation 11:** Development of “learning research” opportunities. Pre- and post-doctoral training programs, similar to the National Science Foundation’s Fostering Interdisciplinary Research on Education (FIRE), will prepare participants for a range of career opportunities that will promote and disseminate geography education research.

**Recommendation 12:** Development and publication of a handbook that includes online tools and exemplars and suggests areas in need of additional research. This publication should cover geography education research methods, questions about the use of geospatial technologies in teaching geography, connections with science and social science education research, and the design of standards, assessments, instructional tasks, and activities.

**Recommendation 13:** The National Assessment of Educational Progress (NAEP) Geography assessment be conducted at more frequent and regular intervals and that more funding for greater analysis of the test result be provided. NAEP is administered so infrequently that cohort and longitudinal studies are currently impossible. The Committee also suggests partnerships with assessment providers to improve geography assessments and geography items embedded in other subject tests.

“Close attention to the content knowledge and pedagogical content knowledge necessary for effective teaching of geography concepts, skills, and practices to foster geographic literacy is needed.”

Geography Education Research  
Report, p.59



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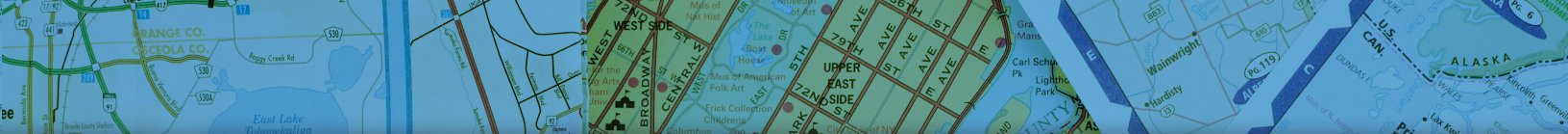
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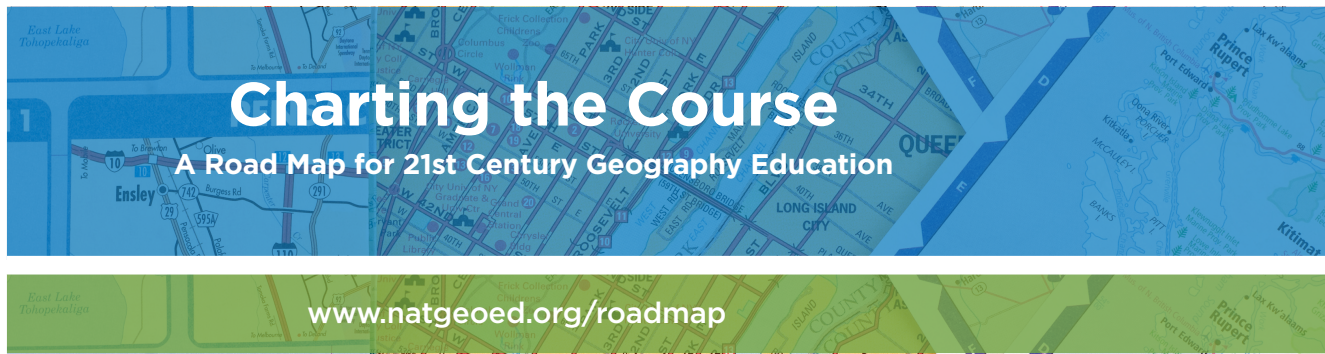
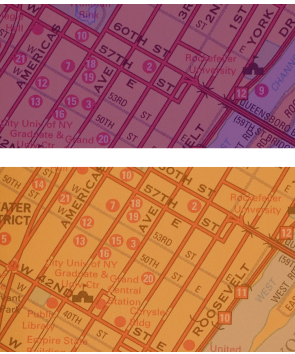
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**About the Road Map Project:** Funded by a grant from the National Science Foundation, the Road Map Project responds to the growing recognition among business leaders and policy makers that Americans lack the critical geographic understanding and reasoning skills that will be required for careers and civic life in the 21st century. Over the course of 2 years, the Road Map Project brought together experts in geography, science, education, and research from across the U.S. to create a set of landmark reports focusing on key issues for educational improvement: instructional materials for students, education of teachers, assessment in geography, and a research agenda for geography education.