

Geography and the Common Core: *Teaching Mathematics and Language Arts from a Spatial Perspective*

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Question to high school student: "Where is the Berlin Wall?"

Answer: "The former Soviet Union."

Question to another high school student: "What is the largest country in South America?"

Answer: "Africa."

Excerpts from Jay Leno's "Jaywalking"
(Johnson, 2010)

As demonstrated above, Americans often make light of the fact that, as a general population, we do not know much about geography. Although clearly intended to evoke laughter, Jay Leno's "Jaywalking" sketches found people with very little knowledge of geography. Although the show is not intended to provide scientific evidence of Americans' general lack of geographic knowledge, the producers of the show did not have to look far to find people who cannot answer basic questions about geography. In fact, Americans' lack of geographic proficiency is well-documented (de Blij, 2005; National Geographic Education, 2013). To wit, the 2010 National Assessment of Educational Progress indicates that fewer than 30% of American students were proficient in geography, and that more than 70%

of 4th, 8th, and 12th graders were unable to even perform at grade level in geography (National Center for Education Statistics, 2011). Furthermore, in the 17 years that the NAEP has been administered, there has been very little improvement in students' geography scores.

Americans' lack of geographic competence is becoming a matter of increasing urgency. Knowledge of geography is essential for a range of decisions including personal decisions, such as where to build a house, to matters of global importance, like where and how to dispose of toxic waste, for instance. As noted in the *Roadmap for 21st Century Geography Education*, the dismal state of K-12 geography education is "a threat to our country's well-being, and by extension, the well-being of the global community" (Edelson, Shavelson, & Wertheim, 2013, p. 17). Despite the insufficient time and resources that are spent on geography education in the schools, the ability to think geographically and perform geographic skills is becoming increasingly vital for effective citizenship in a democratic society and interdependent world.

Even though geography is afforded little time in schools (thus the general lack of geographic knowledge of the American population), there is hope for geography education: the Common Core State Standards (CCSS). Although not explicitly stated, the CCSS has the potential to advance geography education. This article describes the link between the CCSS and geography, and how teachers can teach geography that addresses the CCSS for English Language Arts and Mathematics.

Spatial Thinking is the Link

Just as teaching history engenders historic thinking, teaching geography should generate spatial thinking. Coming to understand the world from a spatial perspective is the ultimate goal of geography education. In the most basic sense, spatial thinking is the ability and tendency to think in terms of place; to possess an understanding of the relationship and connections between space and time and between humans and their environment. After an exhaustive review of neuroscience literature, Gersmehl and Gersmehl (2006) conclude that the human brain naturally attempts to make spatial connections while learning and moving throughout the environment. They note that the human brain is “hard wired” to think spatially. That is, humans naturally try to determine how one place influences another, how places are similar or different from one another, and how conditions change from one place to another, for instance. Thinking spatially is natural, they conclude.

If spatial thinking indeed comes naturally and since geographic knowledge is becoming increasingly vital for productive citizenship in today’s world, then enhancing geographic education in schools is essential. With the emergence of the CCSS, there are now multiple opportunities to teach from a spatial perspective.

Spatial thinking helps further the CCSS goal of providing a well-rounded education that focuses

on critical thinking and the knowledge needed for later life. Spatial thinking allows us to make connections and understand relationships between humans and the world around them. It also helps students to recognize the connections among the content areas taught in school. Relatedly, the CCSS stresses interdisciplinary thinking and scaffolding knowledge so that new knowledge is built upon the foundation of previously learned information in all areas.

CCSS for English Language Arts (ELA) and Spatial Thinking

The National Geographic Education Foundation has created a guide that shows the alignment between the CCSS for ELA and geography (National Geographic, 2013). There is a clear connection between ELA and geography once we apply five geographic skills to literature. The five geographic skills:

- Asking Geographic Questions
- Acquiring Geographic Information
- Organizing Geographic Information
- Analyzing Geographic Information
- Answering Geographic Questions

Applying these geographic skills while teaching the features of nonfiction texts (listed below) enhances spatial thinking while promoting literacy understanding.

- Problem/Solution
- Cause/Effect
- Compare/Contrast
- Description/List
- Time order/Sequence

Utilizing the five geographic skills when examining non-fiction literature enriches the literature, while incorporating spatial thinking. For example, the CCSS suggests using primary sources, such as Martin Luther King, Jr’s “Letter from Birmingham” in learning literary elements and historic events. The primary sources connect the literature to real events. From a spatial perspective, teachers can point out that in “Letter



from Birmingham,” King refers to multiple places throughout time that brought him to the place in which he wrote the letter: Birmingham, AL. Students can apply the five geographic skills as much as possible or, at a basic geographic level, they can simply examine why he wrote the letter *from that place* and why he wrote it *at that time*. Applying the five skills as much as possible to this lesson provides an opportunity for critical analysis that ties together spatial and temporal aspects of a very important historic event, and provides a spatial dimension to learning that goes beyond literary elements.

Geographic skills can also be applied to fictional texts. From a literary perspective, learning the elements of story are essential in developing deep understanding of fiction. However, a spatial perspective and the elements of a story are compatible and can be taught together. For instance:

Geography

Elements of a story

The World in Spatial Terms	Sequence, Order of Events, Plot
Places and Regions	Locations, Setting, Symbolism
Physical Systems	Tone, Character, Symbolism, Setting
Human Systems	Character
Environment and Society	Plot, Conflict, Theme
Uses of Geography	Point of View, Message, Moral

Providing experiences where students make spatial connections between the disciplines in that they make historic and literary connections, for instance, also addresses the CCSS while enhancing geographic knowledge.

There is evidence that teaching geography while reinforcing reading and writing increases reading achievement in the elementary grades. Using the Arizona Geographic Alliance’s *GeoLiteracy* programs (http://geoalliance.asu.edu/azga_site/), researchers found that students who were taught lessons from these integrated programs achieved at higher levels in reading comprehension than students who were not taught through *GeoLiteracy* (Hinde, et al., 2007; Hinde, E. R., Osborn Popp, S. E., Jimenez-Silva, M., & Dorn, R. I., 2011). A finding from those studies also revealed that teaching geography not only promotes geographic knowledge, but also improves read-

ing comprehension in elementary schools. The studies indicated that there is no research-based justification for cutting social studies, particularly geography, out of the elementary curriculum in order to increase time to teach reading in efforts to increase reading achievement. In fact, cutting geography out of the curriculum could actually impede reading achievement in the upper elementary and middle school grades.

CCSS for Mathematics and Spatial Thinking

The CCSS for Mathematics (CCSSM) aims to engage students in eight mathematical practices that are threaded throughout all mathematics teaching in every grade. The CCSSM focuses on helping students balance procedure and understanding. That is, they help students gain a deep understanding of mathematics so students do



not have to rely on procedures or memorization. Traditionally, often students would memorize a formula and apply it to a mathematics problem. The eight practices provide deeper understanding so that reliance on memorization of formulas will not be necessary in order to achieve the desired mathematical outcomes.

The eight practices are:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

The eight practices can be applied with spatial thinking as well. For example, a simple mathematics/geography lesson involves comparing the temperature of a day in July in Death Valley to the temperature of the same July day in Volstok, Antarctica. Through this lesson, students can come to understand the differences in seasons, how to calculate with negative and positive integers, examine reasons few people live in both places, and more. Applying as many of the eight practices as possible to this problem and others like it provides real-world examples for meaningful mathematics practice – and, importantly, students think about mathematics in terms of place.

Research indicates that integrating mathematics with geography improves both geographic and mathematical knowledge in elementary grades (Ekiss, Dorn, Hinde, Douglass, & Trapido-Lurie, 2011). The study showed that elementary students who were taught using a curriculum that taught geography while reinforcing mathematics skills demonstrated significant mathematics improvement from pretest to posttest. Interestingly, the teachers involved in the study reported that

they enjoyed the creative process that integrating mathematics and geography engender and that they felt more comfortable teaching mathematics when it is connected to real world examples.

It is important to note that helping students think spatially through literature or mathematics must be done explicitly. That is, students should understand that the objective of learning is to learn geography as well as mathematics or literature. The goal of thinking spatially is best achieved when students are clear that this kind of thinking is important as they navigate the world around them, and is connected to their learning of other disciplines and skills.

Conclusion

Geography education has long been neglected in American classrooms. As noted above, studies show that American students lack fundamental geographic knowledge. This lack of knowledge is becoming increasingly urgent as the world continues to grow in interdependence.

The Common Core State Standards are an opportunity to revive geographic education in the schools. By focusing on developing spatial understanding that is the foundation of geographic learning, teachers can incorporate geography into all aspects of the curriculum. This article is not purporting, though, that geography should only be taught when integrated into mathematics and literacy. It is still vital that geography content and skills be afforded some time in the curriculum on its own. The point is, that at this time in the history of the schools, knowing that geographic knowledge enhances and even increases achievement in other content areas and that knowledge of geography is vital in becoming a productive member of society, teachers can embrace the teaching geography while addressing the CCSS in English Language Arts and Mathematics.

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