

The World in Spatial Terms: Mapmaking and Map Reading

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Maps and mapping activities are essential in the primary grades. Maps are truly ubiquitous today, as evidenced by the popularity of websites such as Google Earth and Mapquest, and by devices such as Global Positioning System (GPS) units in cars, planes, and boats. Maps can give visual settings to our travel stories and historical narratives. Maps help us find our way in our neighborhood and in our world. Maps can display huge amounts of information in a very small space. Maps are springboards to inquiry and are therefore essential in any elementary classroom. In the following article, we describe research concerning mapmaking and map reading in the elementary classroom and also provide practical considerations for teaching how to construct and read maps.

Young Children's Perspective in Mapmaking

A first-grade performance objective in mapmaking may seem (to teachers unskilled in the teaching of geography) to be simply a drawing exercise. A typical example reads

Construct a map of a familiar place (e.g., classroom, bedroom, playground) that includes a compass rose, symbols, and key/legend.¹

An experienced teacher of geography realizes that to complete this task successfully, a child needs several fundamental spatial skills. For instance, **Figure 1** shows a typical drawing that is a hybrid of two perspectives: horizontal (trees and house) and bird's eye view (path). This is a common combination of perspectives often seen in children's map-like drawings.

Younger children also find it hard to relinquish what they may consider to be the defining features of some objects (such as legs on a table) even if they are not visible to the child when looking down. This difficulty can persist into late childhood when a child attempts, for example, to draw the plan of a tall chimney or steeple. The aerial view alone just doesn't capture the essential characteristic of the building, i.e. its height, so it doesn't feel correct or complete to the child.

In *Learning and Teaching with Maps*, Patrick Wiegand describes issues young children often have in creating and understanding maps.² His work on children's spatial perspectives provides insight into how our youngest students perceive the world around them when attempting to map it. I (J.P.) recommend using architectural blueprints of a house to help with perspective. If the doors and windows are highlighted on the blueprints, students can practice viewing the page from above. It helps them see themselves as a part of a larger picture. Mapmaking helps them organize their world.

To assist novice teachers of geography, the Arizona Geographic Alliance (AzGA) has created two maps as part of the lesson "Shape of My World."³ This lesson teaches children how to draw a map of the classroom by using two graphics that make the bird's eye view (view from above) perspective clearer for young children. **Figure 2** represents a classroom from bird's eye view, with the tops of common classroom items being shown. **Figure 3** demonstrates the transition from pictures to shapes (symbols) only.

Understanding of Orientation and Scale

When do students understand the orientation of the map? "Children as young as three years could read a map aligned inside a room, but the ability to compensate for a rotated map did not develop until age five."⁴ Thus, even the youngest students can use a map to locate an object or place in their classroom. Later, teachers should spend time on teaching compass directions with the use of a map of a larger area (state, nation, etc.). Teachers should point out that north does not have to be "at the top of the map," even though it often is. A good idea is to place compass labels (north, south, east, west) on classroom walls. The most effective way to teach orientation is to take the students outdoors for the lesson. So, in addition to classroom practice, "playground practice" is in order. What do you see to the west of the school? From our city, what direction are the mountains?

Barbara Bartz Petchenik, a cartographer of children's maps, points out that scale is a difficult aspect of map interpretation for children. Statements such as "one inch equals 340 miles" are especially confusing.⁵ Yet one of the primary functions of a map is to determine distance. Therefore, in order to ensure that students use a map effectively, learning how use a map scale should begin in the primary grades. Scale can be introduced to very young children using non-standard measurement. An example could be 1 paper clip = 1 yarn length. In this case, the yarn length was used for the actual measurement. Progressing to standard measurement is more easily understood with this previous introduction.



Figure 1
Map-like drawing that uses two perspectives. Taken from a lesson in which students drew “a route from Little Red Riding Hood’s house to the Grandmother’s house.”

It is logical that maps used in U.S. primary schools would favor miles as the unit of measurement. In the intermediate grades, after students have learned to use metric measurements and to convert between systems, adding kilometers to the scale would be appropriate.⁶

Other Map Elements

A map drawn by first or second graders should have the following map elements: Title, Orientation, Author (cartographer), Date, and Symbols (or Scale), which create the acronym TOADS. As students progress to higher grades, the acronym extends to DOGSTAILS with Grid, Scale, Index, and Legend being added. A variation is to have the “S” stand for Situation (the relationship of one location to another). This long-standing list of elements is writ-

ten up in a lesson plan based on the work of several teachers of geography and can be found at alliance.la.asu.edu/azga/ (Click on “Lesson Plans” and enter “dogs tails” as two words in the key word search.)

Research has shown that young children can understand the use of symbols on maps. One study found that children between the ages of 4–6 who had no formal training in map reading could name the common conventional symbols on a map, even on a map that had no key.⁷ Children can, however, misinterpret symbols on a map. Dotted lines on a map might indicate a footpath, or they could be showing a municipal boundary. A car icon on a map could represent a parking lot, or it could indicate an area where cars are produced. Only a map key or legend can resolve such ambiguities.⁸ Having stu-

dents read the legend first, before answering questions about the map, is an essential step of map reading.

First and second graders can use alphanumeric grids (as seen along the edges of road maps). There are tactile approaches to teaching the use of a grid, such as organizing your classroom as a grid, with student seats located according to the coordinates. Strings can be placed horizontally and vertically over a map, so students can trace their fingers over the lines to locate a point. Eventually, the alphanumeric grid is replaced with lines of latitude and longitude, usually about grade 4 or 5.

In some state geography standards for the primary grades, students are expected to locate a variety of human features (i.e., roads, dams, and cities) and physical features (i.e., rivers, peninsulas, and oceans) on a map.⁹ A copyright-free collection of maps illustrating various human and physical features is available from the Arizona Geographic Alliance.¹⁰ One can download a labeled, blank, and color version of each map. **Figure 4** demonstrates the color version of a map showing physical features that are to be located by third graders in Arizona. Use of these maps should go hand-in-hand with illustrations, real and fictional, so that students have a clearer idea of what an actual landscape is like beyond the “flat representation” of a single map.

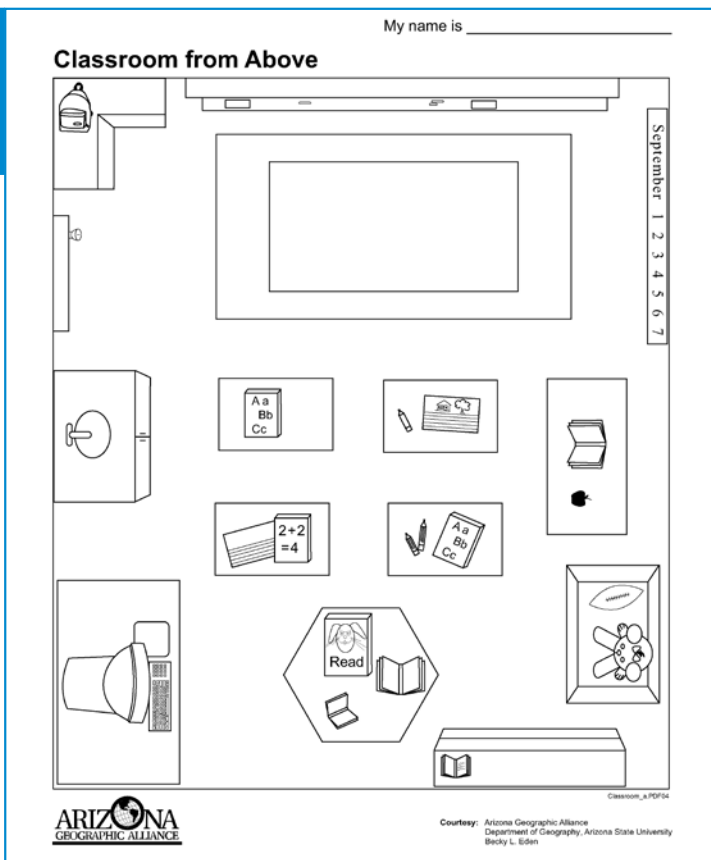
A final consideration is the quality of maps that should be used in primary classrooms. There are several elements to consider. Maps should:

- ▶ Copy well on school copiers. Color images do not reproduce well.
- ▶ Be at least 8.5 by 11 inches. Small maps often available on the Internet are not suitable.
- ▶ Have enough blank space for students to label items on the map.
- ▶ Be simple and uncluttered, but fundamentally accurate.

Conclusion

A cursory look through a newspaper, a visit to a popular Internet site, a ride on mass transit, a glance at the dashboard of

Figure 2
Bird’s eye view of a classroom showing small items on the top of furniture.

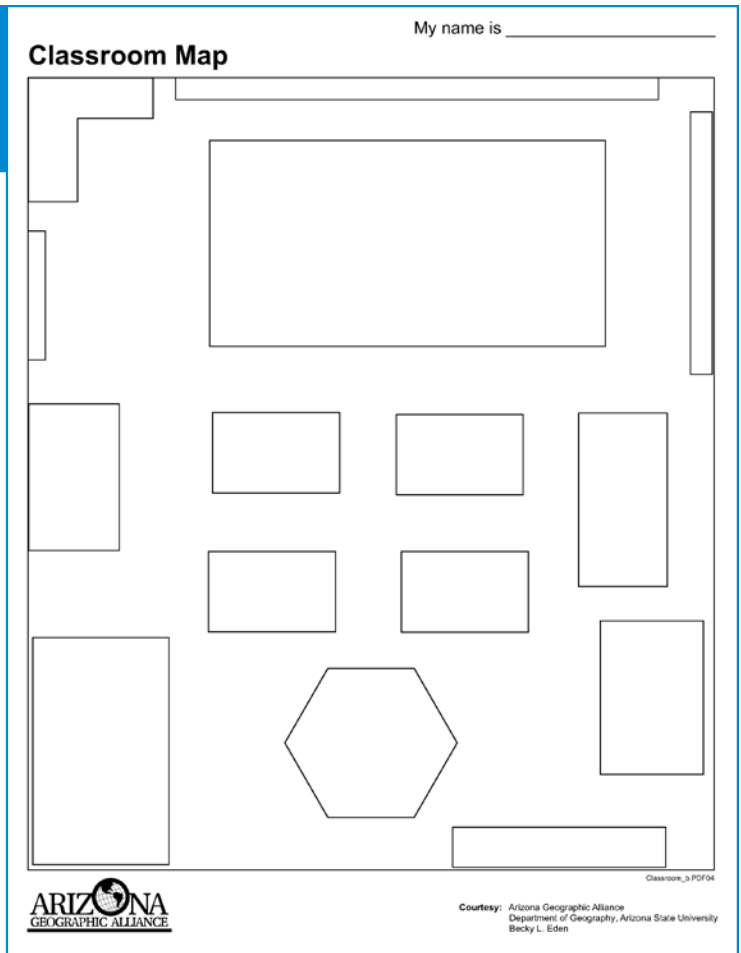


a car, or calling up a weather function on a cell phone can reveal the growing popularity of maps—both on paper and on screen. Maps are everywhere. Both research and experience bear out that our youngest learners can learn to use and create simple maps. Given the ubiquity of maps and the fact that their use is going to continue to expand, it is vital that our students learn to understand them from an early age. As this article has pointed out, there are resources available to help teachers teach primary students how to read and create maps. If we truly are in the business of preparing students for life, then teaching maps should be a component of any elementary program. 🗺️

Notes

1. Arizona State Social Studies Standard found at www.ade.state.az.us/standards/sstudies/articulated/ (Click on Social Studies Strand 4 Geography. Go to first grade.)
2. Patrick Wiegand, *Learning and Teaching with Maps* (London: Routledge, 2006) 45.
3. The lesson plan and maps from “Shape of My World” can be found at alliance.la.asu.edu/azga/ (Click on “GeoMath” and then “K-3 Sample.”)
4. Neil Bluestein and Linda Acredolo, “Developmental Changes in Map-reading Skills,” *Child Development* 79, no. 50 (1979): 691-7.
5. Barbara Bartz, “Maps in the Classroom,” *Journal of Geography* 69, no.1 (1970): 18-24.
6. An example of a primary road map using only miles can be found at alliance.la.asu.edu/azga/. (Click on “Maps” and scroll down to the bottom for “Elementary Arizona Road Map.”) An example of a primary/intermediate level road map using kilometers and miles for California can be found at the same site.
7. Patrick Wiegand, *Children and Primary Geography* (London: Cassell, 1993) 20.
8. Sarah W. Bednarz, Gillian Acheson, and Robert S. Bednarz, “Maps and Map Learning in Social Studies,”

Figure 3
Bird's eye view of a classroom using only symbols.



- Social Education* 70, no.7 (2006): 400-1.
9. Examples of human and physical features that children are expected to locate can be seen in the Arizona State Social Studies Standards, www.ade.state.az.us/standards/sstudies/articulated/ (Click on “Social Studies Strand 4 Geography.” Go to Grades 1-4.)
 10. For copyright-free maps for grades 1-4 showing human and physical features, go to alliance.la.asu.edu/azga/ (Click on “Maps” and scroll to the bottom of the page.)

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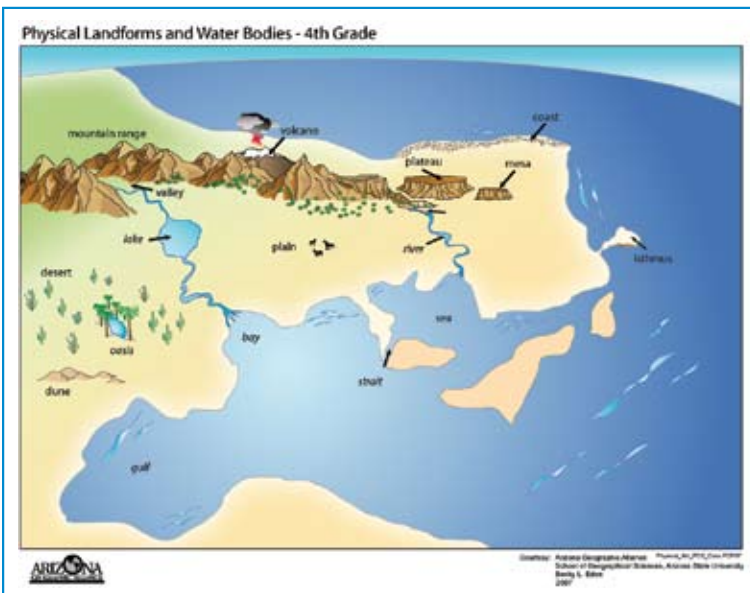


Figure 4
Color version of a map to help fourth grade students learn physical features such as a mountain range, coast, and strait.