

Adding “Place” Value to Your Mathematics Instruction

by Vena M. Long

Place affects value. A coat in the closet is of little value on a cold day. Socks in your pockets do not keep your feet warm. A house on a lake will be more valuable than the same house without the water access. In our decimal numbering system, each “place” differs in value by a power of ten. A 4 used as an exponent affects the value of an expression differently than a 4 used as a factor. When mathematics is placed in the context of a student’s world, it can greatly affect the value both to the learner and the community in which that learning takes place.

John Dewey (1916) argued the importance of place as a critical part of learning. He asserted that from the child’s standpoint, the great waste in school comes from his inability to utilize the experience he brings from out-of-schooling settings, while on the other hand he is unable to apply in daily life what he is learning in school. Dewey suggested that schools should be connected with the rest of life where students learn by engaging in meaningful activities. That is, the isolation of the school—and its isolation from life—prevents students from connecting their learning to their everyday activities, including work.



Buckle, Tennessee. Historically, blue-collar workers in this region reached for the RC Cola and Moon Pie combination as an inexpensive lunch. It became known as the “working man’s lunch” in the 1950s and cost fifteen cents. The students investigating this lunch engage in geometry, measurement, and the use of multiple representations. Moon Pies now come in many sizes and many flavors, providing additional opportunities for data collection and analysis.

In using place-based lessons the teacher may introduce the context and help students recognize and use the mathematics. For example, Knoxville, Tennessee, is the birthplace of Mountain Dew. The packaging has evolved over the years with the early bottles being quite heavy and the glass very thick. Later bottles became lighter and thinner, and then aluminum cans became popular. Studying the ratio of liquid to container over time provides some interesting data. Also the size of the container, in terms of the amount of Mountain Dew sold as a serving, has increased dramatically.

This data provides some valuable practice in working with various representations of number, but also can give students some sense of the obesity



Examples from Appalachia

Real-world problem solving involves engaging students in the identification of school or community issues that they would like to investigate and address. In *Mathematics in Rural Appalachia: Place-Based Mathematics Lessons* (see review on page 12), Jeremy Winters relates how he takes students to the RC Cola and Moon Pie Festival held each year in Bell

issues facing our country. Your area will have its own history that students may or may not be aware of. Tapping into the mathematics of a historical study can greatly enrich your instructions.

Mathematics and social action

Students may play a pivotal role in identifying local problems, current or historical. They may select one as a class focus—studying its characteristics and dynamics, developing potential solutions, and then organizing and participating in efforts to solve the problem. These are all critical aspects of a strong mathematics curriculum.

The teacher becomes a facilitator in this process, correlating the problem to the required curriculum, linking the students to the needed resources, and acting as a general contractor for the ongoing learning and the eventual product—whether it be a solution or merely a clearer understanding of the complexity of the problem. Note that the required curriculum is not ignored or subjugated but rather embedded and learned well.

The Principles and Standards of School Mathematics by the National Council of Teachers of Mathematics (2000) clearly communicates a vision of students' active involvement with mathematics. One way to generate this level of active engagement is to place mathematics in relevant and authentic contexts. For communities and regions to survive economically today, mathematics competency must be developed at high levels. For mathematics competency to be developed, it must be valued. According to *Before It's Too Late* (National Commission on Mathematics and Science Teaching for the 21st Century, 2000), competency in mathematics is necessary to build an economic base because of "the rapid pace of change in both the increasingly interdependent global economy and in the American workforce" (p. 7).

Authentic context for mathematical problem solving lies just outside the door of every classroom. Utilizing the local place, however, requires advance work on the part of the teacher. Because place-based educa-



Opportunities for math questions abound in rural settings, such as, "How many bales of hay can be harvested from this field?"

tion is by its nature specific to particular locales, no single prepared curriculum is appropriate. The examples from our book or those cited above may not translate directly into your classroom. Questions posed and investigated and lessons prepared and taught rarely can be used from year to year. The process must be ongoing and it is a *process*, not a product.

To successfully implement place-based pedagogy, a teacher must first come to understand and separate pedagogy from curriculum. In the political environment in which schooling is funded and held accountable, many voices blend to determine what all students should and must learn. Teachers are but one, albeit very important, voice in this cacophony. However, in the delivery of this curriculum, the teacher must assert the authority of expertise. The teacher must be the determining factor in bringing the curriculum and the learner together through the most relevant and powerful pedagogy available.

In Craig, Colorado, middle school teachers orchestrated unique math-science lessons on the banks of the Yampa River. Temperature, alkalinity, and invertebrate population tests required simple correlational analyses. Students learned how mathematics could be used to improve the quality of the Yampa River, thus improving the quality of life and economics for the Craig community. A class of rural Illinois third graders used mathematics to report the results of their community-wide fire alarm testing service. A small school in South Dakota opened a grocery store several years after the last such operation had closed down. In Wisconsin, a class of sixth graders opened a bookstore that ulti-

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mately generated enough profit to create a community foundation. In all cases, solid mathematics lessons came with the added benefit of contributing to the well-being of the community.

In addition to long-term projects such as those cited above, simpler approaches also produce good results. Place-based pedagogy can begin by addressing current happenings with simple questions. In a farming community during spring rains, a class opener such as “How many acres [hectares] of land would you need to own to have received 1,000,000 gallons [liters] of water in last night’s 1-inch [2.5-centimeter] rainfall?” opens the discussion to good mathematics and locally relevant issues. In a community in which trucking is a big industry, driving a big rig can provide some interesting models for angles of various kinds. Traffic patterns provide interesting culturally diverse models for algebra or geometry class. Through such examples teachers can communicate their respect for the local economy and potentially increase the community’s respect for mathematics learning.

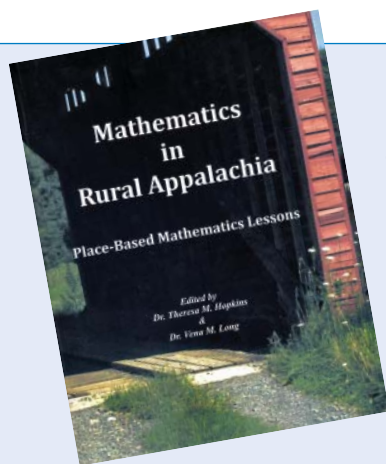
Adding “place” value to mathematics instruction will help teachers and schools find that delicate balance between recognizing the needs of the community and helping their community understand its needs for high mathematics achievement. As students use mathematics to understand their role in their community, they will also come to better understand the role that mathematics plays in their future and the future of their community. ✍

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Mathematics in Rural Appalachia: Place-Based Mathematics Lessons, edited by Theresa Hopkins and Vena Long, is a collection of twenty place-based lesson plans gathered from a doctoral cohort at ACCLAIM, the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics. This is a wonderful resource for choosing curriculum close to home as the basis for mathematics. Although the examples are specific, they can be adapted and applied in many rural communities.

Mathematics in Rural Appalachia: Place-Based Mathematics Lessons. Koinonia Associates. 2009. 166 pages. \$19.00. <http://www.amazon.com>.

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