

Encouraging Progressive Pedagogy

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Should a high school graduate be able to reconcile a bank statement and locate where mistakes occurred? Understand that clusters of cancer occurrences in one city can occur by chance? Recognize that opinion poll results can be biased by poor wording of questions and the sample that pollsters used?

To reformers eager for high school and college graduates to be quantitatively literate (or functionally numerate), the answer is an emphatic yes. After all, although numbers are deeply embedded in our daily lives, the available evidence indicates low levels of numeracy among U.S. high school and even college graduates. From making sense of the school district's most recent test scores published in the daily paper, to parsing each presidential candidate's statistics on using the budget surplus to strengthen Social Security, to putting into plain words the doctor's estimate of your father's chances of surviving the spread of prostate cancer, numbers are everywhere.

Not mere background noise, numbers demand active sense-making. Just as verbal literacy gives students the tools to think for themselves, to question experts, and to make civic decisions, quantitative literacy does exactly the same in a world increasingly drenched in charts, graphs, and data.

During the past two decades of intense and sustained school reform led by an alliance of corporate executives, educators, and public officials from both political parties, two points have become increasingly clear. First, ever since 1983 when *A Nation at Risk* was published, the agenda of educational reform has concentrated on ensuring that public schools

prepare workers for a highly competitive, information-based global economy. The prevailing strategy has been to raise graduation requirements by adding more mathematics and science, establish uniform curriculum standards for all students, create performance standards to measure subject-matter proficiency through standardized tests, and, most recently, to hold students, teachers, and principals personally responsible for achieving benchmarks on national tests.

As a result, high school graduates in 2000 took more mathematics and science courses, did more mathematics and science homework, and read from “better” mathematics and science textbooks than did their forebears. Today’s teachers who are certified to teach mathematics and science are familiar with the new mathematics and science curriculum standards that began appearing in the late 1980s. And test scores have improved on national and international standardized tests in mathematics and science, although not to the degree desired.

Second, this reform agenda of binding public schools to the nation’s economy has led inexorably to producing traditional schools and classrooms that in decorum, subject matter, and teaching style would make the grandparents of today’s students feel at home. Within this overall climate of heightened concern for preparing students for college and information-based workplaces and increased emphasis on the newest technologies, mathematics and science teachers still lecture, require students to take notes, assign homework from texts, and give multiple-choice tests. If anything, in the past few years mathematics and science classrooms, while awash in graphing calculators and computers, have largely experienced a resurgence of traditional ways of teaching and learning. Those reformers who believed that students should take more mathematics and science and be held accountable for what they learned in these courses have certainly had their wishes fulfilled.

Two Challenges to the Case Statement

In making its compelling case for functional numeracy, however, “The Case for Quantitative Literacy” acknowledges that more mathematics and science will not automatically lead to numeracy. Quantitative illiteracy cannot be overcome by introducing more subject matter. As wise as their

arguments are and as passionately as they believe in the importance of numeracy, the authors still overlook the basic historical lessons to be drawn from earlier reforms in curriculum and pedagogy, especially those of the past two decades. I offer just two lessons that the case statement neglects to consider.

Lesson 1: Curriculum and pedagogy are inseparable. If anything has been established in the history of teaching, it is the simple fact that a teacher's knowledge of content seldom guarantees that he or she can structure and communicate that knowledge in ways that enable a diversity of learners (particularly those who are compelled to attend classes) to understand and apply the knowledge that has been learned. How teachers teach matters. Policymakers who add subjects to the curriculum or extend the amount of time that students spend on subjects are, at best, establishing prior conditions for learning, not learning itself. Pedagogy, the art and science of teaching, is as essential to learning as fuel is to moving a car.

Lesson 2: The quest for numeracy is a plea for progressive pedagogy in schools. Historically, tensions between traditional and progressive views of teaching and learning have pervaded every subject in the curriculum. The history of mathematics, science, reading, writing, social studies, English, and foreign language as subjects taught in public schools has oscillated between pedagogical reforms under which teaching the subject depended heavily on traditional direct methods of instructions (e.g., lectures, question-and-answer recitations, careful reading of text, frequent tests on content) and progressive methods (e.g., connecting content to real-life situations, lighter coverage of topics, an emphasis on understanding concepts rather than facts, integrating content across disciplinary boundaries).

If the standards issued by the National Council of Teachers of Mathematics (NCTM) in the late 1980s (NCTM, 1989) urged on teachers a progressive pedagogy in mathematics teaching and assessment, both the recent revision of those standards (NCTM, 2000), which placed increased stress on basic arithmetic and accuracy, and the current climate signal that a shift in classrooms toward traditional methods has occurred and is more acceptable now. The case statement is an unabashed and persuasive

lawyer's brief advocating more progressive approaches at a time when current reform agendas emphasize traditional pedagogy.

Implications

What are the implications of these two lessons for the case statement? In the past two decades the academic curriculum has been vocationalized; that is, more academics, more tests, more accountability have targeted only one goal of public schools equipping high school graduates for the workplace. Accompanying this emphasis has been a strengthening of traditional structures of schooling and classroom pedagogy. For me, the most obvious implication is that those who advocate quantitative literacy need to divorce themselves from the alliance that has vocationalized public schools and align themselves with other reformers who want more from their public schools than preparing workers and who understand that the prevailing structures of schooling influence how teachers teach.

Such school reformers, for example, see the primary goal of tax-supported public schools as nourishing civic virtue and participation in democratic institutions. They seek deep changes in how schools are organized and governed to make them consistent with the broader purposes of schools in a democracy. Proponents of numeracy need to join those civic-minded and pedagogical reformers who call for tighter connections between formal schooling and life experiences. They need to form alliances with teachers and administrators who want to restructure schools to make teaching consistent with quantitative literacy.

What the authors of the case statement offer is a sophisticated call for a more progressive pedagogy. All of the astute examples offered speak to the pervasiveness of numeracy in our daily lives rather than the compartmentalization of numbers into academic subjects. The statement makes a strong case for the relevance of teachers' expertise in choosing what content and which approaches will get students to learn. The statement also argues for broader and different reforms than those now popular. Without recognizing explicitly that this passionate call for quantitative literacy runs counter to the present direction in school reform, the authors risk having the statement become just another document that garners a few news stories when it is published and then disappears until a doctoral student, years later, footnotes their valiant position statement in a dissertation.

The rationale for quantitative literacy is compelling. I am convinced that it is crucial for U. S. schools and for a democratic citizenry fulfilling its civic duties. Those who drafted this statement need to be clear that their call for numeracy is a call for a different, more salient pedagogy than now exists. Once this is made explicit, the authors can then begin to mobilize educators and citizens who share their ideals.

REFERENCES

- National Council of Teachers of Mathematics. *Curriculum and Evaluation Standards for School Mathematics*. Reston, VA: National Council of Teachers of Mathematics, 1989.
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