CHAPTER ONE

Introduction

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For the American school curriculum, the twentieth century ended like it began, with an intense debate over what schools should teach and how they should teach it. In 1902 John Dewey, who would eventually become the twentieth century's most famous advocate of school reform, wrote about two "sects" fighting over the curriculum. One group sought to "subdivide each topic into studies; each study into lessons; each lesson into specific facts and formulae. Let the child proceed step by step to master each one of these separate parts, and at last he will have covered the entire ground." The other camp, observed Dewey, believed "the child is the starting point, the center, and the end." Because this view focused so intently on the child, Dewey concluded, "It is he and not the subject-matter which determines both the quality and quantity of learning." A student-centered approach required a particular type of pedagogy, Dewey noted with approval, a teaching style recognizing that "learning is active."

Dewey's observations could have been written in 1999. Nearly a century had passed, but neither side had surrendered. Cease-fires had been fleeting. Decade after decade the conflict that Dewey had observed—and later became an important participant in himself—kept recurring. The terms *education progressive* and *education traditionalist* arose as labels for its partisans, who usually kept their squabbles within the walls of the nation's schools of education. Occasionally, however, the disagreement burst into

the headlines, captured the nation's attention, and reminded everyone of the bitterness and rancor in which the politics of education is steeped.

At the end of the century, the debate focused on reading and math. This book is about the public conflict that swirled around these two subjects in the 1990s. The "education sects" that Dewey described so long ago still existed—in reading, in the proponents of "whole language" and "phonics," and in math, in the advocates and opponents of "NCTM math reform," referring to the reform agenda of the National Council of Teachers of Mathematics. The book includes contributions from influential scholars on both sides of the disputes, as well as chapters by distinguished nonpartisans. It examines what fueled the controversies, clarifies adversarial positions, analyzes the politics of the disputes, and investigates how curricular conflicts may have affected policy and practice.

In October 1999 the Program on Education Policy and Governance (PEPG) at Harvard University invited leading scholars to a two-day conference on the math and reading controversies. The meeting was held at the Charles Hotel in Cambridge, Massachusetts, and was jointly sponsored by the John M. Olin Foundation and the Kennedy School of Government's A. Alfred Taubman Center for State and Local Government. A crowd of nearly 100 participants and observers attended.

The papers presented at the conference make up the chapters of this book. They are organized by subject—first math, then reading—and prefaced with an essay by E. D. Hirsch Jr. At the conference, a welcoming dinner was held, with Hirsch as guest speaker. Although Hirsch clearly takes sides in these debates, his remarks offer a philosophical starting place for appreciating all the views expressed in the book. Whether you agree or disagree with Hirsch—or any of the other authors presented here—I think you will see that they agree on one point. The school curriculum is important. What we decide to be the proper content of schooling has significant consequences, not only for today's students and schools, but for tomorrow's society as well.

In the opening chapter, Hirsch argues that the reading and math wars are rooted in an age-old conflict between romantic (progressive) and classical (traditional) orientations toward education. The classical orientation believes in explicit, agreed-upon academic goals for children; a strong focus on discipline and order in the classroom; the primacy of teacher-led instruction; and regular testing to assess student performance. Traditionalists are skeptical that children naturally discover knowledge or will come to know much at all if left to their own devices. Traditionalists are confi-

dent that evidence, analysis, and rational thought are greater assets in the quest for knowledge and virtue than human intuition and emotions.

The romantic tradition reveres nature and natural learning. Instead of establishing explicit academic goals for children, educational progressives value a multitude of learning outcomes. They are more likely to insist on particular instructional approaches for teachers and particular characteristics of the learning environment than on the exact learning to occur, largely because of faith that, in the right setting, the proper learning for each child will unfold. These beliefs are religious, that is, they are based on faith rather than empirical tests of what is true. As Hirsch puts it, "We know in advance, in our bones, that what is natural must be better than what is artificial" and "our natural impulses work providentially for good in ways beyond our comprehending." Standards, rules, hierarchies of skill, rote practice and memorization, and the curriculum are all artificial constructions of culture and society.

Gail Burrill begins the book's math chapters with a call for overhauling an outmoded curriculum. The curriculum reflects its historical time. Burrill argues that progressive reform is essential in mathematics because of the rapid changes in today's society and the future demands that students will face from technological innovations. She points out that the math curriculum is largely an invention of the early twentieth century, when most students completed only eighth grade and advanced courses such as algebra, geometry, and calculus were reserved for the few students who went to college. The NCTM's landmark 1989 document, *Curriculum and Evaluation Standards for School Mathematics*, offers an agenda for reform that Burrill enthusiastically supports. Three critical aspects of math instruction are altered: a shift in content from learning skills and procedures to using math for problem solving, a shift in teaching from disseminating information to stimulating student thinking and inquiry, and a shift in assessment from serving as end-of-the-unit tests to assisting teachers in diagnosing and addressing students' strengths and weaknesses.

Much of the NCTM blueprint is grounded on a progressive theory of teaching and learning known as constructivism. Michael T. Battista argues that scientific research supports constructivist approaches over traditional ways of teaching math. A narrow focus on computation may produce students who are able to come up with the right answers but are unable to explain why the answers are correct or to discern the appropriate calculations to arrive at them. Stressing memorization and imitation over understanding, thinking, and reasoning renders students' knowledge of

mathematics impersonal and shallow. Battista quotes students defending incorrect answers. They possess a blind confidence in the results of procedure, even if the procedures are incorrect and the answers inconsistent with intuition, logic, or concrete reality.

Battista draws a distinction between a simplistic view of constructivism as "discovery" learning, teaching with manipulatives or other nonrigorous forms of teaching that allow students to do whatever they want, and the sophisticated theory and empirical evidence supporting what he calls "scientific constructivism." Math learning occurs as students cycle through phases of action, reflection, and abstraction that allow them to build ever more sophisticated mental models of mathematics. These models are tied to real-world quantities and rooted in interactions with, and the need to explain, one's environment. Battista cites several studies, including one of his own, in which students in constructivist-oriented classrooms improved on achievement tests measuring conceptual understanding or problem-solving skills without a loss in computational ability. Failed math reform programs, Battista concludes, are due to flawed mechanisms for converting theory into practice—teacher training, textbook creation, and teaching—not flaws in the theory of constructivism or the body of research supporting it.

David C. Geary argues that constructivism is theoretically suspect in light of the evolutionary history of the brain. Are human beings hardwired to learn math? Children almost certainly have an inherent sense of numbers, counting, and simple addition and subtraction, competencies that are found in preindustrial cultures and even in limited form among chimpanzees and other primates. Like language, these competencies seem to develop from an innate capacity that is elaborated through a child's natural activities, especially social play. This evolved capacity lays the foundation for children grasping simple arithmetic.

But innate mechanisms are not sufficient to lead children to most of the mathematics taught through formal schooling. Learning how the base-10 system operates, for example, is more difficult than learning rudimentary number-counting skills, just as learning how to read and write is more difficult than learning the language of one's parents. Children are not inherently motivated to study math, Geary argues, which makes the value that the larger society and culture place on academic pursuits, along with a teacher's ability to organize and guide instruction, all the more crucial. Instructional practices that are predicated on children's natural instincts, such as constructivism, are doomed to fail a large proportion of children, Geary concludes.

Do we know anything about how these theories play out in classrooms? Roger Shouse examines data from the National Education Longitudinal Study (NELS:88) and explores whether practices similar to math reformers' recommendations succeed in raising student achievement. He reports several surprising findings. The first is that, in 1990, 62 percent of tenth graders said that their math teachers asked them to "really understand the material, rather than just give an answer" and 77 percent said they were "really challenged" in the subject. Both figures are higher than those from any other academic subject, contradicting the notion that in 1990, about the time of the release of the NCTM standards, rote learning and "drill and kill" methods dominated math instruction.

Does math reform work? In eighth grade the effect of practices usually endorsed by math reformers is a mixed bag. Many practices have a different effect on achievement in schools serving advantaged and disadvantaged populations. Reformers frequently recommend grouping students heterogeneously by ability, for example. But students in detracked, mixed-ability classes evidence lower math achievement, and the negative effect is especially pronounced for students in disadvantaged schools. The effect of calculator use is significantly negative in disadvantaged schools but slightly positive elsewhere. An emphasis on algebra and problem solving boosts achievement in all types of schools.

Shouse also looks at the tenth grade, where some traditional practices are shown to be effective. Achievement gains are associated with learning facts, rules, and problem-solving skills but not from the use of hands-on activities. Textbooks and daily review are helpful, but student discussions are not. Achievement falls when teachers stress "the importance of math in everyday life." Other findings favor reform. Calculators seem to raise achievement, even though computers do not. Negative effects were detected for an emphasis on "speedy computations," a finding any reformer would applaud, and an emphasis on "students' questions about math" and "math concepts" produced positive results.

Adam Gamoran argues that the conflict over the math curriculum poses a false dichotomy between rigorous content and in-depth understanding. Taking the position that they are both desirable, he reviews several studies to show that they are both present in successful math classes. He first details studies by James Stigler of UCLA comparing Japanese and American teachers' instructional styles. The studies suggest that Japanese students' superior math achievement may be due to instructional practice. Japanese math teachers typically present a problem, discuss alternative

solutions generated by students, present a general formula, and then provide time for students to apply the formula while working on problems on their own. American teachers, on the other hand, typically demonstrate how a formula works, then assign practice problems for students to complete. Gamoran argues that the Japanese approach demands content mastery from students while encouraging deeper exploration of the material and allowing students the time to think.

Gamoran describes an American program, Modeling in Mathematics and Science Collaborative, which exhibits many of the Japanese education traits and shows promising results on achievement tests. He reviews the favorable findings of a study by Fred Newmann and colleagues of authentic pedagogy—instructional techniques that combine constructivist principles with the mastery of disciplinary content. He also describes a study of transition courses, where math classes featuring a hands-on, problem-solving curriculum are offered as an alternative to general math classes for students not yet ready for advanced mathematics. These studies suggest that progressive instructional strategies can be effective if directed toward the learning of serious content.

Richard Askey declares his stand in his chapter title: good intentions are not enough. Askey agrees that NCTM reformers are seeking to improve mathematics in schools, but he identifies several flaws in their approach. The NCTM standards do not address the problem that Askey considers the most critical in math reform: the lack of classroom teachers' firm content knowledge. The NCTM also did not examine the math curriculum of other countries or include mathematicians in the writing of the standards.

Askey points out that teaching mathematics well using indirect strategies, methods favored by the NCTM, means that teachers must possess a deeper understanding of the subject than has been expected in the past. Today's elementary grade math texts are written with the awareness that teachers using the books may know little math. Not only do the new reform-oriented texts, which were financed by the National Science Foundation, lack sufficient guidance for teachers, Askey cites several instances where the books also are misleading or promulgate bad mathematics. Including professional mathematicians on editorial boards, not to mention in standards-writing efforts, would help catch such errors. Moreover, the NCTM's stated goal that conceptual understanding should be emphasized over skill development leads texts to spend an unwarranted amount of time on shallow concepts. Only math teachers with a profound under-

standing of their subject, with the kind of proficiency depicted in Liping Ma's *Knowing and Teaching Elementary Mathematics,* will be able to overcome these flaws in the NCTM standards and serve students well.

I am the author of the final math chapter. In it I compare the politics of the NCTM reforms with the politics of the "New Math" in the 1950s and 1960s. Both movements sprang from policy subsystems—influential networks of experts on a particular subject. The math subsystems were powerful enough to convert a reform agenda into adopted policy. Both reforms benefited from focusing events, defining moments that moved public opinion to support changes in school mathematics. For both reforms, after changes in the math curriculum had been implemented in classrooms, strong opposition arose to the new content of mathematics. In the case of the New Math, the criticism proved to be fatal, as it was routed from classrooms in the late 1960s and early 1970s. Although the fate of the NCTM reforms must still unfold, the analysis sheds light on how their popularity changed in the 1990s, from being the universally recognized model for curriculum standards at the beginning of the decade to the subject of ferocious debate at decade's end.

Diane Ravitch begins the book's reading chapters by showing that the debate on how to teach reading extends back to the nineteenth century. The methods of instruction that have dominated are the alphabet method, in which students memorize the letters of the alphabet; phonics, which makes students learn the sounds of letters and combinations of letters; and the holistic methods, in which students learn entire words and sentences, preferably as naturally as possible and without extensive skill instruction.

Three themes run through Ravitch's account. One is that reading instruction premised on some form of phonetic analysis stubbornly resists reformers' efforts to quash it. Another involves children's happiness. As early as the mid-1800s, critics complained of children being taught how to read through laborious drills that focused on memorizing the relationship of sounds and letters—that all students were really learning was to associate reading with drudgery rather than joy. By the Progressive Era of the early twentieth century, John Dewey and other reformers argued that reading instruction should be delayed until age eight to prevent damage to children's nervous systems. In the 1980s "whole language" advocates lodged similar charges against phonics, claiming that it handicaps reading comprehension and produces a lifelong aversion to reading

The third theme pertains to meaning. Supporters of phonics believe that reading for meaning must be temporarily subordinated to the analy-

sis of abstract symbols, specifically, learning how printed letters and words can be converted into audible sounds and words. Once beginning readers acquire these skills, they are able to decode unfamiliar words and then to understand complete words, sentences, paragraphs, and stories. The opposing, progressive view is evident in the "whole word" method of the 1930s, also known as "look-say" because students were trained to look at a word and then say it. Progressives recognized that text is immediately recognizable to fluent readers, but they saw words—not letters or clusters of letters—as the smallest possible unit of learning for nonreaders. Words have meaning; parts of words do not. They thought once an extensive list of words had been learned and were recognizable on sight, beginning readers could then figure out unknown words by their context.

Ravitch shows how phonetic-based instruction has persevered, despite progressives' insistence that it makes children dislike reading, that learning how to read should be anchored in the search for meaning, and that instruction on "the whole" excels over instruction on "the part." She argues that the best elements of both approaches are supported by research and that the two sides should compromise, "declare victory and go home."

Important efforts at compromise occurred in the 1990s. Catherine E. Snow writes about the *Report on Preventing Reading Difficulties in Young Children,* issued by the National Research Council (NRC). Snow chaired the committee that issued this influential 1998 report, heralded by many as staking out common ground on which phonics and whole language supporters could agree. Snow points out that reading research had converged on several points, making the time ripe for compromise, and the committee's charge to focus on preventing reading difficulties also heightened its chances for gaining consensus.

Snow believes the English language's bidirectional complexity—in converting printed spelling to sounds and sounds to spelling—fueled the reading wars. Phonics supporters stress systematic, sequential instruction in how to make these conversions. Successfully converting letters (or graphemes) into sounds (or phonemes) is the defining task of phonemic awareness. Whole language supporters emphasize that decoding text is merely a means to an end and that reading is about constructing meaning from text. The NRC report embraced the principles supporting both positions.

It drew criticism from both sides. Some phonics supporters felt the report did not go far enough in identifying the most reliable research on the topic. They also disagreed with the report's endorsement of invented spelling and its wading into the debate over bilingual education by insisting that

reading instruction first occur in a learner's primary language. Some whole language supporters felt the report neglected the social inequities that hinder literacy, adopted an alarmist tone by focusing on reading difficulties, and subordinated research based on classroom experiences to positivist, quantitative studies. Snow's chapter illustrates the difficulty of resolving these issues within the context of long-standing curriculum disputes.

Margaret Moustafa is sympathetic to the whole language position. She observes that the phonics–whole language debate is often misconstrued as a debate about *whether* letter-sound relationships should be taught. In fact, Moustafa argues, it is about *how* they should be taught. Phonics-based approaches, which she calls "traditional" reading instruction, teaches letter-sound correspondences and print words out of context, then provides children with materials featuring the words that have been taught. In the reading instruction that she favors, referred to as "contemporary" instruction, children are taught letter-sound relationships and new words while encountering them in text. One key difference is that reading skills are not acquired in isolation. Another is that decodable text takes a back seat to content in selecting children's reading materials. The parts-to-whole orientation of traditional instruction is reversed, as children are taught to read text with familiar language via shared reading, followed by letter-sound correspondences in the context of stories with predictable text. Thus reading is presented as a meaningful act even in the initial stages of learning.

Moustafa reviews several studies supporting contemporary reading instruction, focusing primarily on the superiority of teaching reading for meaning. She also argues that those who emphasize phonemic awareness as a prerequisite for reading probably have the direction of causality wrong. Good readers are phonemically aware, Moustafa agrees, but this skill can be acquired after—not necessarily before—one learns to read. She concludes that recent policy swings toward traditional reading instruction are not supported by research but have been propelled instead by misinterpretations of trends in National Assessment of Educational Progress (NAEP) reading scores and the misuse of several studies' findings.

Richard Allington writes about the effect of literacy policy on classroom practice. Like Moustafa, he traces the impetus for policies targeting reading instruction to the establishment of NAEP performance levels, which began in 1990, and to several research reports in the early 1990s. The NAEP scores indicated that large numbers of students were reading below a "basic" level, which alarmed the public. The research reports

were on a variety of topics in reading but were alike in suggesting that certain approaches to instruction had been "proven" effective. As the belief spread that curriculum developers were ignoring scientific findings even as reading proficiency languished, the regulation of reading became a top priority of policymakers. In the 1990s more than 100 bills regulating aspects of reading instruction were introduced in state legislatures.

Allington argues that all this policymaking will have little effect on teaching. He points to past efforts at regulating instruction and the consistent finding of research that teachers are impervious to policy mandates. He also points out the inherent difficulties of implementing curricular reform—the time lag, for instance, between when policy is adopted and new materials actually appear in classrooms—and recommends high-quality longitudinal studies that examine the fidelity of implementation as part of program evaluation.

William Boyd and Douglas Mitchell start by acknowledging that the fight over reading is yet another skirmish in the philosophical dispute between progressive and traditional education. But they also think the 1990s debate was exacerbated by macroeconomic trends, especially public anxiety concerning globalization. This drove utilitarian concerns about U.S. competitiveness and school performance and ultimately spurred the centralization of power in social institutions during the decade. Control over the curriculum was no exception, with state and federal officials assuming greater say over reading instruction. The decade's "reading wars" featured three groups of important actors—education professionals, politicians and policymakers, and public and private interest groups (including parents)—and Boyd and Mitchell describe several "battlefronts" along which the reading wars were fought.

Boyd and Mitchell use this conceptual scheme to explain the rise and fall of whole language in California. Whole language reached its zenith in the state's 1987 English-language arts framework. Although the term *whole language* was never mentioned, several of the framework's key ideas were inspired by whole language—literature-based texts, student-centered instruction, multiculturalism, cooperative learning, and open-ended assessments soliciting student-constructed responses. These themes were placed on the defensive by stresses from globalization, Boyd and Mitchell argue, as the authority of professional educators was diminished by scientists, government officials, and public demand.

As a conclusion to this introduction, I offer five generalizations on the math and reading controversies of the 1990s.

1. The disagreement in math was largely about *what* math should be taught. In reading, it was primarily about *how* reading should be taught. Consequently, the math chapters deal primarily with content and the reading chapters with pedagogy.

2. In terms of policies, opposite philosophies were ascendant in mathematics and reading during the decade. The progressive-oriented NCTM reforms served as the model for most states as they wrote curriculum standards in mathematics. The federal Reading Excellence Act, on the other hand, embraced phonics-based instruction as the only scientifically valid form of teaching reading; this conclusion was backed by studies of the National Institute of Child Health and Human Development, a branch of the National Institutes of Health.

3. The stakes of the debate were ratcheting higher in the 1990s. States and local districts adopted standards defining what students should learn and tied the standards to periodic assessments and accountability plans. Consequently, progressive and traditional educators hauled their disagreements out of the cloistered halls of academia and thrust them before the public, into the hearing rooms of Congress and state legislatures, and onto television and other mass media.

4. Educational ideologies and conventional political ideologies are not a perfect match. The stereotypes are basically correct. Political conservatives tend to favor the traditionalist positions and liberals the progressive views. But not always. E. D. Hirsch Jr. and David Klein, for example, lean toward the left politically but back the traditionalist cause on curriculum. Conservative business groups often trumpet the virtues of cooperative learning; education's "soft skills," such as teamwork; and math reform in line with the NCTM standards—stock tenets of progressive reform.

5. Calls for compromise and a balanced approach are attractive but frequently break down when implemented in classrooms. Teachers are constrained by limited time and resources. When something has to give—and the sacrifice involves phonics or arithmetic or problem solving—those who favor the abandoned content are invariably offended. In addition, the side in political ascendancy is prone to declare that a balanced approach has been achieved. Thus critics of NCTM and the advocates of whole language were less likely to be enthralled with the balanced approaches touted by policymakers at the end of the decade.

The passion with which the following chapters argue, analyze, indict, and defend, and their willingness to describe how things are and how they should be, underscores an important point. Reading and mathematics are the two most important school subjects. Debating how they should be taught reveals our deepest convictions on what constitutes a good education.