The New Math and Midcentury American Politics

Christopher J. Phillips

The singer-songwriter Tom Lehrer released *That Was the Year That Was* in 1965. The cover of that album featured a collage of contemporary newspaper headlines, and its list of tracks chronicled a few of the era's cultural landmarks. Along with "Send the Marines," "Wernher Von Braun," and "The Vatican Rag," Lehrer included a tune called "New Math." He intended the song as a brief lesson for parents who were confused by recent changes in their children's arithmetic textbooks. Its lyrics claimed that success in the new curriculum no longer required getting the correct answer, only "understand[ing] what you are doing." "New Math" was a satirical comment on the products of a vast National Science Foundation (NSF) curriculum project. Starting in the late 1950s professional mathematicians and educators worked together to overhaul the nation's mathematics textbooks to include sets, symbolic logic, and new forms of arithmetic; a 1965 *New York Times* report estimated that by that time more than half of the nation's schoolchildren were using books designed or inspired by the NSF reformers. Lavishly supported by the federal government, the new curriculum represented a rapid and fundamental change in how children learned math, but the project was more than just a successful reform effort. Funded to address the exigencies of the Cold War, instituted as part of the Great Society program, yet condemned by conservative elements in the 1970s, the new-math curriculum was a political object. Lehrer's album seamlessly—and accurately—placed the new math among the major events of the mid-twentieth-century United States.[1]

The politicization of the midcentury schoolroom was not particularly surprising. Schools have long been objects and mechanisms of reform, especially between World War II and the presidency of Ronald Reagan, when the nation's public schools became prominent among American institutions. During that period, characterized by increas-

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[1] Tom Lehrer, "Send the Marines," performed by Tom Lehrer, *That Was the Year That Was* (LP record; Reprise R-6179; 1965); Tom Lehrer, "Wernher Von Braun," *ibid*.; Tom Lehrer, "The Vatican Rag," *ibid*.; Tom Lehrer, "New Math," *ibid*. Harry Schwartz, "The New Math Is Replacing Third 'R,'" *New York Times,* Jan. 25, 1965, p. 18.

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ing access to schools and a dramatic rise in the school-age population, reform movements ranging from the National Association for the Advancement of Colored People to Barry Goldwater's coffee klatches used education issues to mobilize parents and citizens of all ideological persuasions into involvement with local and national politics. Calls for educational reform were consequently quite common then, and new curricula were developed in fields from English to physics and in settings from kindergarten to graduate school. As the most widely known educational innovation and as a reform closely tied to federal money and influence, the new math became crucial to (and enmeshed with a legacy of) political and cultural mobilization. It was not coincidental that Morris Kline's 1973 polemic against the new math, *Why Johnny Can't Add,* took its title from Rudolf Flesch's 1955 advocation for a return to phonics, *Why Johnny Can't Read*.[2]

In tracing a political history of the new math through midcentury America, I argue that historians would benefit from a reconceptualization of the importance of a school curriculum in grounding and analyzing political transformations. Elites and laypeople understood that the curriculum embedded ideological claims about the nature of the world and included disciplinary mechanisms for training students to think and act within that world. The decentralized system of education in the United States allowed concerned parents and taxpayers, academics, publishers, teachers, administrators, school board members, and politicians at all levels to have a say in what happened in the nation's classrooms. Aside from a few well-worn examples of the teaching of evolution, the sanitizing of historical events, and concerns over essentially extracurricular educational issues such as school prayer or sex education, discussions of curriculum have been absent from broader political histories. That absence has hindered analysis of the ways the midcentury elementary and secondary school curricula instantiate the rhetoric of cultivating "responsible citizens" or promoting "Western values" and how debates about the curriculum reveal the myriad ways Americans understood and engaged those labels and causes.[3]

The U.S. math curriculum is a particularly perspicacious site for undertaking such an analysis because learning math was equated with learning to think. Since antiquity, the subject has been presented as a set of apparently indisputable facts and as a mechanism for training students in the techniques of rigorous reasoning and problem solving. Historians of science have shown that the evolution of mathematicians' practices altered the benefits (or drawbacks) attached to studying mathematics. More specifically, the cultural histories of concepts such as *fact, certainty,* and *reason* have been deeply intertwined with

[2] William J. Reese, *America's Public Schools: From the Common Schools to "No Child Left Behind"* (Baltimore, 2005), 215. On schools as objects and mechanisms of mobilization, see John L. Rudolph, *Scientists in the Classroom: The Cold War Reconstruction of American Science Education* (New York, 2002); Andrew Hartman, *Education and the Cold War: The Battle for the American School* (New York, 2008); Jonathan Zimmerman, *Whose America? Culture Wars in the Public Schools* (Cambridge, Mass., 2002); Michelle M. Nickerson, *Mothers of Conservatism: Women and the Postwar Right* (Princeton, 2012), 69–102; Ronald Lora, "Education: Schools as Crucible in Cold War America," in *Reshaping America: Society and Institutions, 1945–1960,* ed. Robert H. Bremner and Gary W. Reichard (Columbus, 1982), 223–60; and Sara Diamond, *Not by Politics Alone: The Enduring Influence of the Christian Right* (New York, 1998), 65. For Gallup Poll evidence of the visibility of the new math, see Francis J. Mueller, "Goals for School Mathematics? Educators and Parents Differ," *Virginia Journal of Education,* 63 (Jan. 1970), 21–22. Morris Kline, *Why Johnny Can't Add: The Failure of the New Math* (1973; New York, 1974); Rudolf Franz Flesch, *Why Johnny Can't Read: And What You Can Do about It* (New York, 1955).

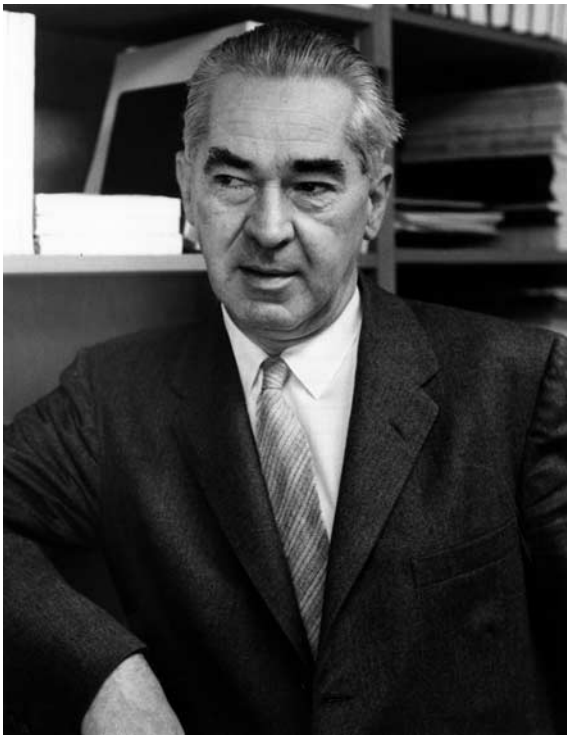
[3] On textbooks as a means of political intervention, see Adam R. Shapiro, *Trying Biology: The Scopes Trial, Textbooks, and the Antievolution Movement in American Schools* (Chicago, 2013); Zimmerman, *Whose America?;* and Joseph Moreau, *Schoolbook Nation: Conflicts over American History Textbooks from the Civil War to the Present* (Ann Arbor, 2003). History of science scholarship has begun to show the relevance of textbooks and pedagogy to understanding broader institutional, epistemic, and cultural changes. See, for example, the special section "Focus: Textbooks in the Sciences," *Isis,* 103 (March 2012), 83–138; and David Kaiser, ed., *Pedagogy and the Practice of Science: Historical and Contemporary Perspectives* (Cambridge, Mass., 2005).

transformations in the nature of mathematics and the authority ascribed to the field. Though it may seem strange to find politics in elementary math curricula—assumed to be merely the locus of the mastery of arithmetic—curricular debates about how and why students should study math were also debates about what counted as rigorous reasoning in general. Contemporaries of the burgeoning new-math movement evaluated its virtues by referring to the politics of how citizens ought to discipline and cultivate their minds, bodies, families, and the state. The transition from broad bipartisan support of the new math to near-universal condemnation of it in less than a decade was caused by significant political transformations in the evaluation of moral and intellectual authority more than by evaluation of curricular efficacy. The transformations were particularly contentious because midcentury Americans worried about the relationship of individual virtues to social order.[4]

At each of its stages—its organization, its implementation, and the reaction to it—the new math was a political intervention. I begin to argue that point by briefly tracing the roots of federal support for curriculum projects used to fight "the cold war of the classrooms." Politicians argued that NSF-sponsored curriculum projects would put discipline back into schools that had "softened" under the influence of progressive educators. In the first section of this article I focus on the most important midcentury curriculum project in mathematics, the School Mathematics Study Group (SMSG), headed by the Yale University mathematician Edward G. Begle. The intellectual and institutional origins of the new math may be traced to that group, but it is also important to note that "the new math" is, in fact, a misnomer. The term refers not to one project but to a number of programs that varied substantially in content and pedagogy. Nevertheless, most contemporary observers of the new math understood it as stable and coherent (and not necessarily consistent with SMSG reforms); that is the sense in which I consider the new math's public reception in the article's second section. To demonstrate how debates about the value of the new math were also debates about how students should be taught to think, I analyze how mathematicians envisioned student training in the new math and how parents and teachers understood the curriculum. The new math's authors emphasized systematic, flexible, open-ended reasoning while its critics argued that students needed the discipline provided by memorized facts and mechanistic techniques. Each viewpoint embraced specific assumptions about the mental habits and social order required in the modern world. The rise and fall of the new math was a story of changing sources of intellectual and moral authority—and ultimately a tale of midcentury America's political ferment.[5]

[4] On the history of mathematics see, for example, Reviel Netz, *The Shaping of Deduction in Greek Mathematics: A Study in Cognitive History* (Cambridge, Mass., 1999); Matthew L. Jones, *The Good Life in the Scientific Revolution: Descartes, Pascal, Leibniz, and the Cultivation of Virtue* (Chicago, 2006); and Joan L. Richards, "Historical Mathematics in the French Eighteenth Century," *Isis,* 97 (Dec. 2006), 700–713. On the connection of science and social order in midcentury America, see Ron Robin, *The Making of the Cold War Enemy: Culture and Politics in the Military-Industrial Complex* (Princeton, 2001); Jamie Nace Cohen-Cole, "The Creative American: Cold War Salons, Social Science, and the Cure for Modern Society," *Isis,* 100 (June 2009), 219–62; Charles Thorpe, *Oppenheimer: The Tragic Intellect* (Chicago, 2006); David Paul Haney, *The Americanization of Social Science: Intellectuals and Public Responsibility in the Postwar United States* (Philadelphia, 2008), 95–117; and Ellen Herman, *The Romance of American Psychology: Political Culture in the Age of Experts* (Berkeley, 1995), 48–81.

[5] Lewis L. Strauss, "Cold War of the Classrooms," *Science Digest,* 39 (Feb. 1956), 33. On midcentury education reforms, see Hartman, *Education and the Cold War;* Gareth Davies, *See Government Grow: Education Politics from Johnson to Reagan* (Lawrence, 2007); Patrick J. McGuinn, *No Child Left Behind and the Transformation of Federal Education Policy, 1965–2005* (Lawrence, 2006); Adam Benjamin Golub, "Into the Blackboard Jungle: Educational Debate and Cultural Change in 1950s America" (Ph.D. diss., University of Texas at Austin, 2004); Hugh Davis Graham, *The Uncertain Triumph: Education Policy in the Kennedy and Johnson Years* (Chapel Hill, 1984); and Diane Ravitch, *The Troubled Crusade: American Education, 1945–1980* (New York, 1983). On the variety of new-math



The Yale University mathematician Edward G. Begle, shown here in 1961, directed the School Mathematics Study Group, the most important midcentury U.S. curriculum project in mathematics. *Courtesy School Mathematics Study Group Records, Dolph Briscoe Center for American History, University of Texas at Austin.*

The Cold War of the Classrooms

The new math arose in the 1950s from two very different institutional settings. The first impetus for the project was a broad movement among educators to reform the way schools prepared secondary students for college-level mathematics. Some programs, such as the University of Illinois Committee on School Mathematics, designed new textbooks and classroom materials while others, such as the College Entrance Examination Board Commission on Mathematics, simply recommended a course of study for high schools. The suggested reforms were surprisingly diverse in their pedagogical approaches, although most were predicated on the assumption that math was too often taught as a set of facts and techniques to be memorized and regurgitated.[6]

programs, see H. Victor Crespy, "A Study of Curriculum Development in School Mathematics by National Groups, 1950–1966: Selected Programs" (Ph.D. diss., Temple University, 1969). On the history of the new-math movement, see Christopher J. Phillips, *The New Math: A Political History* (Chicago, 2014); Robert W. Hayden, "A History of the 'New Math' Movement in the United States" (Ph.D. diss., Iowa State University, 1981); Angela Lynn Evans Walmsley, *A History of the "New Mathematics" Movement and Its Relationship with Current Mathematical Reform* (Lanham, 2003); Bob Moon, *The New Maths Curriculum Controversy: An International Story* (London, 1986); and William Wooton, *SMSG: The Making of a Curriculum* (New Haven, 1965).

[6] Thomas Steven Dupre, "The University of Illinois Committee on School Mathematics and the 'New Mathematics' Controversy" (Ph.D. diss., University of Illinois, 1986), 6–45; College Entrance Examination Board, *Program for College Preparatory Mathematics: Report of the Commission on Mathematics* (New York, 1959). For an example of a pedagogically progressive reform program, see Max Beberman, *An Emerging Program of Secondary School Mathematics* (Cambridge, Mass., 1958).

The new math was also a product of federal attempts to reform science and math curricula, particularly after congressional appropriations committees forced the NSF to expand its purview beyond graduate fellowships and research grants. After its founding in 1950 the NSF had sponsored precollegiate education projects, but by mid-decade those projects were still only in the formative stages, amid fears that focusing on precollegiate activities would "demean" the foundation. Pushed by the appropriations committees, however, the NSF brought together university physics professors and high school physics teachers to form the Physical Science Study Committee (PSSC) in 1956 as part of the NSF Course Content Improvement Program. The Soviet Union's launch of *Sputnik* in October 1957 ensured that educational projects would be well funded through the next decade; NSF appropriations increased nearly threefold, with a disproportionate amount dedicated to curriculum work. In this context, and based on the PSSC model, the SMSG was created the following year. The group transformed disparate curricular reform ideas into a program of national scope and import.[7]

Despite the spur given to federal education funding by the *Sputnik* launch, there was no obvious link between Cold War concerns and U.S. schools. At the time it was not clear why the launch of the satellite demonstrated anything other than misplaced military priorities. The historian Lawrence Cremin noted that "the public blamed the schools, not realizing that the only thing that had been proved, as the quip went at the time, was that their [the Soviet Union's] German scientists had gotten ahead of our German scientists." Furthermore, in the late 1950s federal education reform was not yet big business. The federal government had been involved in broad education initiatives only sporadically; school systems were decentralized and held strong traditions of local control; and individual schools were overwhelmingly small—at midcentury there were still nearly sixty thousand one-teacher schools.[8]

Politicians claimed, however, that the NSF's curriculum programs were justified because the intellectual training offered by schools was critical to national defense. Arkansas senator J. William Fulbright argued that "the heart of the contest with the Soviet Union is education," while New York representative Herbert Zelenko noted that "defense is no longer a matter of muscles and masses. . . . Formulas and equations have taken the place of spears and guns," he observed, and concluded that "education is the true defense." The close connection that politicians made between education and national defense was not universally recognized but was pervasive enough to ensure passage of the National Defense Education Act (NDEA) in 1958, ending decades of congressional reticence to address broad education legislation. To improve science, math, and foreign-language education, the NDEA provided states with loans and grants for the upgrade of teaching methods and materials in those fields. Understood as promoting scientific proficiency, the NDEA and the NSF's curriculum projects could address the problems of making proper use of citizens with advanced scientific education (referred to as scientific manpower) and protecting the

[7] Hillier Krieghbaum and Hugh Rawson, *An Investment in Knowledge: The First Dozen Years of the National Science Foundation's Summer Institutes Programs to Improve Secondary School Science and Mathematics Teaching, 1954–1965* (New York, 1969), 97, 102, 134–35, 160; Rudolph, *Scientists in the Classroom,* 67–68, 83–84; James R. Killian Jr., Sputnik, *Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology* (Cambridge, Mass., 1977), 198; *National Science Foundation Seventh Annual Report for the Fiscal Year Ended June 30, 1957* (Washington, 1958), 73–74.

[8] Lawrence A. Cremin, *The Genius of American Education* (New York, 1965), 11; James B. Conant, *The American High School Today: A First Report to Interested Citizens* (New York, 1959), 37–40; Reese, *America's Public Schools,* 253–54.

nation's military supremacy. The federal government's involvement in education was not a sign of the inevitability of school reform during the 1950s but instead revealed the efficacy of arguments that schools should become a central battle zone of the Cold War.[9]

Federal education reforms addressed teacher salaries or laboratory equipment but were more directly designed to provide rigorous intellectual training. Vannevar Bush, a prime architect of post–World War II arrangements between American scientists and the federal government, warned, "I think the primary thing that needs to happen to us here in this country is that we wake up to the fact that we are in a tough, competitive race where we have got to do a lot of good tough work, and that that begins just as soon as the youngster goes to school." Senators repeatedly asserted that "intellectual discipline is essential to our national purpose" and detailed the "inadequate training and discipline in high schools." Critiques of "inadequate discipline" often centered on the influence of progressive educators who—detractors claimed—had shifted school curricula away from traditional disciplines in favor of more practical studies. In a typical example, New York representative Ralph Waldo Gwinn complained in 1958 that schools suffered from too much "progressive educational material, such as social adjustment, sociology, home economics, bird watching, field trips, and so forth." Despite the power that Gwinn attributed to it, progressive education had barely cohered as a movement by the mid-1950s (and the Progressive Education Association, formed in 1919, would be disbanded in 1955). Progressive educators nevertheless functioned as valuable straw men for critics who insisted that schools should provide rigorous disciplinary training instead of focusing on the practical matters of daily life.[10]

Critics of progressive education were pleased with the School Mathematics Study Group and other NSF curriculum programs because those efforts placed mathematicians in charge of curriculum design. The director of educational programs for the NSF worked with the heads of the American Mathematical Society, the Mathematical Association of America, and the National Council of Teachers of Mathematics to ensure that the nascent SMSG would have the support of the profession. Not surprisingly, however, some reform-minded math teachers resented that federal funds had been withheld until professional mathematicians took over reform efforts. Academic mathematicians had rarely been involved in curriculum design—hence the existence of three professional organizations to split the concerns of teaching from those of research—but with a commitment to fight the Cold War (and with the NSF's promise of time-and-a-half pay for the work)

[9] *Congressional Record,* 85 Cong., 2 sess., Jan. 23, 1958, p. 872; *Ibid*., Aug. 8, 1958, p. 16685. National Defense Education Act, 72 Stat. 1580 (1958). Barbara Barksdale Clowse, *Brainpower for the Cold War: The* Sputnik *Crisis and National Defense Education Act of 1958* (Westport, 1981). On scientific manpower, see Rudolph, *Scientists in the Classroom,* 33–82; David Kaiser, "Cold War Requisitions, Scientific Manpower, and the Production of American Physicists after World War II," *Historical Studies in the Physical and Biological Sciences,* 33 (Fall 2002), 131–59; Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York, 1993); and Daniel Kevles, "Cold War and Hot Physics: Science, Security, and the American State, 1945–1956," *Historical Studies in the Physical and Biological Sciences,* 20 (Fall 1990), 239–64.

[10] *Congressional Record,* 85 Cong., 2 sess., Aug. 13, 1958, p. 17235; U.S. Congress, Senate, Committee on Armed Services, *Inquiry into Satellite and Missile Programs: Part 1,* 85 Cong., 1 sess., Nov. 25, 1957, p. 64; U.S. Congress, Senate, Committee on Labor and Public Welfare, *Science and Education for National Defense,* 85 Cong., 2 sess., Jan. 21, 23, 28–30, Feb. 6, 7, 18–21, 24–27, March 3, 5, 6, 10–13, 1958, p. 881; Rudolph, *Scientists in the Classroom,* 9–32; Lawrence A. Cremin, *The Transformation of the School: Progressivism in American Education, 1876–1957* (New York, 1969), 274–353. For critiques of progressive education, see Arthur Bestor, *Educational Wastelands: The Retreat from Learning in Our Public Schools* (1953; Urbana, 1985); and Howard Ozmon, ed., *Contemporary Critics of Education* (Danville, 1970).

mathematicians joined school teachers each summer to write and edit textbooks under the auspices of the SMSG.[11]

SMSG director Edward G. Begle reiterated the congressional mandate to reform the intellectual training of citizens. In an article written for school principals, he noted that the SMSG would operate under five precepts: "no one can predict what mathematical skills will be important and useful in the future"; "no one can predict exactly what career any particular student will choose"; "teaching which emphasizes understanding, insight, and imagination, without neglecting basic skills, is the best for all students" regardless of their ability or eventual vocation; "any normal individual can appreciate some, at least, of the beauty and power of mathematics"; and "an understanding of the role of mathematics in our society is essential for intelligent citizenship." Begle liked to point to Margaret Mead's claim that a century before it had been possible to predict the skills that would be necessary two or three decades in the future, but that was no longer the case. Students needed intellectual training that was flexible enough for a rapidly changing world. The SMSG would not just be providing students with facts and techniques for future careers but would be training them to be "intelligent citizens."[12]

Begle's insistence on Americans' need for intellectual training drew on a common mid-century trope. Harvard University president James Conant Bryant and university provost Paul H. Buck had launched a formal examination of American liberal education, published in 1945 as *General Education for a Free Society.* That widely noted and influential report was intended to shape high school and college curricula nationwide. It concluded that "the aim of education should be to prepare an individual to become an expert both in some particular vocation or art and in the general art of the free man and the citizen." If "democracy is a *community* of free men," then "the fruit of education is intelligence in action." Similarly, a 1951 National Education Association publication, *Education and National Security,* reminded readers that schools "must educate for moral and spiritual values." National security, the authors emphasized, was not just a matter of teaching the correct skills or developing enough scientists but of promoting "civic intelligence." And the influential 1958 report of the Rockefeller Brothers Fund, *The Pursuit of Excellence: Education and the Future of America,* warned that education "is not just a mechanical process for communication to the young of certain skills and information. It springs from our most deeply rooted convictions. And if it is to have vitality, both teachers and students must be infused with the values which have shaped the system." When properly conveyed, intellectual discipline would cultivate a virtuous citizenry.[13]

[11] For an example of the resentment that reform-minded teachers felt toward the well-funded academic mathematicians, see Bruce Meserve to Edward Begle, Oct. 12, 1965, folder "NCTM 1965–66," box 86-28/60, School Mathematics Study Group Records, 1958–1977 (Archives of American Mathematics, Dolph Briscoe Center for American History, University of Texas at Austin).

[12] E. G. Begle, "The School Mathematics Study Group," *NASSP Bulletin,* 43 (May 1959), 26–31, esp. 27–28; Edward G. Begle speech to National Council of Teachers of Mathematics, New York City, [1958?], transcript, Speeches—E. G. Begle folder, box 86-28/48, School Mathematics Study Group Records.

[13] Committee on the Objectives of a General Education in a Free Society, *General Education in a Free Society: Report of the Harvard Committee* (Cambridge, Mass., 1945), 54, 75–76. Emphasis in original. "New Harvard Plan Backed by Faculty," *New York Times,* Nov. 1, 1945, p. 25; "U.S. High School: Educational Storm Rages over Schools like Denver's East High," *Life,* April 22, 1946, pp. 87–93. Education Policies Commission of the National Education Association, American Association of School Administrators, and Executive Committee of the American Council on Education, *Education and National Security* (Washington, 1951), 15, 18; Rockefeller Brothers Fund, *The Pursuit of Excellence: Education and the Future of America. Panel Report V of the Special Studies Project* (Garden City, 1958), 49.

If the importance of schools in forging intelligent citizens was well established by midcentury, Begle's conception of the role of mathematics in the task was new. The SMSG would make math "a way of thinking rather than a system of artificial devices to solve problems," and the group was not attempting to create future mathematicians nor were its reforms aimed at future math majors. The SMSG originally limited its production to texts for "college-capable" secondary school students, but it eventually also produced books for elementary students, "slow" learners, and "disadvantaged" pupils. These were not polished hard-cover volumes but cheaply produced texts intended as models for commercial publishers and teachers. Criticizing contemporary textbooks as overly rigid, the SMSG wanted to reform the process by which students learned math.[14]

SMSG model textbooks worked by yoking proper intellectual training to a study of what their authors claimed was the underlying nature of mathematics. In this view, "modern" mathematics had been fundamentally reconfigured by developments in the previous decades—such as the establishment of the Nicolas Bourbaki group—and had proven its importance in fields from operations research to biology and computing because it provided powerful ways of organizing and analyzing knowledge. The mathematicians of the SMSG believed that the field should not be taught as a collection of fixed facts and techniques inherited from the ancients but in its modern form (as a logical system of structures). Their resulting texts made it seem as if there was complete agreement on the nature of the discipline, but, in fact, their planned curricular reforms spurred substantial debate among other mathematicians. Rejecting the SMSG's focus on logical structures, these dissenters pointed instead to the importance of mathematics as a fundamental part of scientific inquiry and a source of the technical skills needed to describe and model the natural world.[15]

To reconfigure the presentation of mathematics, the SMSG's textbooks introduced new concepts—from set notation, modular arithmetic, and open sentences to nondecimal number systems. Working with nondecimal bases (for example, number systems based on powers of two, eight, or sixty instead of ten) allowed the authors to emphasize that the "usual" way to represent numbers was only one among many. Modular arithmetic—calculation with a finite set of numbers—similarly demonstrated how elements, operations, and properties could still be defined rigorously, even under a different system of computation. The most well-known example of modular arithmetic is a modified version of "clock arithmetic," where $5 + 3 = 8$ but $5 + 8 = 1$. (Three hours after five o'clock is eight o'clock, but eight hours after five o'clock is one o'clock.) These new concepts were not intended to introduce novel domains of mathematics into school classrooms so much as change the way students learned the traditional material. By knowing about the underlying structure and properties of numbers, students would come to see traditional arithmetic calculations and facts as just one way of reasoning mathematically—that is, logically and structurally.

[14] *National Science Foundation Eighth Annual Report for the Fiscal Year Ended June 30, 1958* (Washington, 1959), 64–66. For Edward G. Begle's conception of the role of mathematics in forging intelligent citizens, see his speeches in Basic Principles, 1958 folder, box 86-28/5, School Mathematics Study Group Records; and folder "Speeches—E. G. Begle," box 86-28/48, *ibid.*

[15] Christopher J. Phillips, "In Accordance with a 'More Majestic Order': The New Math and the Nature of Mathematics at Mid-century," *Isis,* 105 (Sept. 2014). Nicolas Bourbaki is the collective pseudonym under which a group of mathematicians (originally from France) worked to found all math on set theory. On the Bourbaki group, see Maurice Mashaal, *Bourbaki: A Secret Society of Mathematicians,* trans. Anna Pierrehumbert (Providence, 2006); and David Aubin, "The Withering Immortality of Nicolas Bourbaki: A Cultural Connector at the Confluence of Mathematics, Structuralism, and the Oulipo in France," *Science in Context,* 10 (June 1997), 297–342.

SMSG textbooks grounded the training of intelligent citizens in the claim that reliable reasoning in general was like contemporary mathematical reasoning. Paradoxically, most students found math simultaneously boring and difficult precisely because it was being taught only as a set of facts to be memorized. Students "come to us," one of the SMSG volumes of commentary to teachers explained, "with a miscellaneous hodgepodge of disjointed facts and pseudo-facts," and it is the math teacher's job to "straighten out their ideas, to build a reasonable conceptual structure upon which they can hang new facts, to distinguish between that which is significant and that which is not, and, perhaps most important of all, to understand how new knowledge is acquired." The SMSG used an argument, based on the findings of the psychologist Jerome Bruner, that abstract mathematics idealized the structure of students' minds and consequently suggested a homology between mathematics and mental development. Bruner's educational views were derived, somewhat idiosyncratically, from the Swiss psychologist Jean Piaget's conclusion that cognitive development involves "a spontaneous and gradual construction of elementary logico-mathematical structures and that these 'natural' ('natural' in the way that one speaks of the 'natural' numbers) structures are much closer to those being used in 'modern' mathematics than to those being used in traditional mathematics." As a result of this confluence of the mind and mathematics, Bruner claimed that learning about mathematics as mathematicians did—focusing on questions of structure and systems rather than on facts and calculations—meant that the intellectual discipline of a math class might transfer to many other settings. "The teaching and learning of structure," Bruner wrote in *The Process of Education,* "rather than simply the mastery of facts and techniques, was at the center of the classic problem of transfer." While SMSG mathematicians were generally skeptical about the practical value of psychologists—particularly because there did not seem to be much agreement among them on educational topics—Bruner and Piaget effectively provided the SMSG with an answer to critics who thought that students might not be able to cognitively handle the new material: it was natural to think like mathematicians.[16]

The SMSG's focus on the structure of mathematics as the key to its pedagogical intervention distinguished the group from previous reform efforts that had also defined mathematics' usefulness as a product of its transferability beyond its subject matter. A 1923 Mathematical Association of America report on the proper nature and aims of mathematics instruction, for example, reasserted the centuries-old claim that "general mental discipline is a valid aim in education" and also argued that "transfer of training" between disciplines undoubtedly occurred. This plan, however, grounded the link between thinking mathematically and thinking generally in the concept of a mathematical "function." Deemphasizing the technicalities of mathematical functions—and never actually defining *function*—the report's authors promoted "functional thinking" as the discipline's contribution to general reasoning. Just over a decade later, the Progressive Education Association emphasized a similarly transferable role for mathematics but with a completely different justification. This plan suggested that math was useful only when taught as a

[16] "Facts and Theories," in *Mathematics for High School: Geometry, Part 2, Teacher's Commentary,* comp. School Mathematics Study Group (2 vols., New Haven, 1961), II, 515. Jerome Bruner, *The Process of Education* (1960; New York, 1963), 12; Jean Piaget, "Comments on Mathematical Education" in *Developments in Mathematical Education: Proceedings of the Second International Conference on Mathematical Education,* ed. A. G. Howson (Cambridge, Eng., 1973), 79–87, esp. 79. For an example of the skepticism of the School Mathematics Study Group (SMSG) toward psychology, see Jeremy Kilpatrick and James Wilson interview by David L. Roberts, May 24, 1999, transcript, p. 12, box 4RM17, R. L. Moore Legacy Collection, 1890–1900, 1920–2009 (Archives of American Mathematics).

collection of practical, specific skills, and when "divested" of much of its "conventional content and formal organization." Both associations' reforms—previous to those of the SMSG—illustrate the range of ways math might be seen as useful and highlight the novelty of the midcentury movement. The SMSG's program explicitly asserted the importance of learning the structural foundations of mathematical reasoning—rather than any single concept or skill—and did so not only because its architects believed that mathematics was ultimately about structures but also because of the belief that structural learning was uniquely transferable. The SMSG's intervention was not a matter of curricular efficacy but was about the relevance of mathematical knowledge for the cultivation of desirable mental habits.[17]

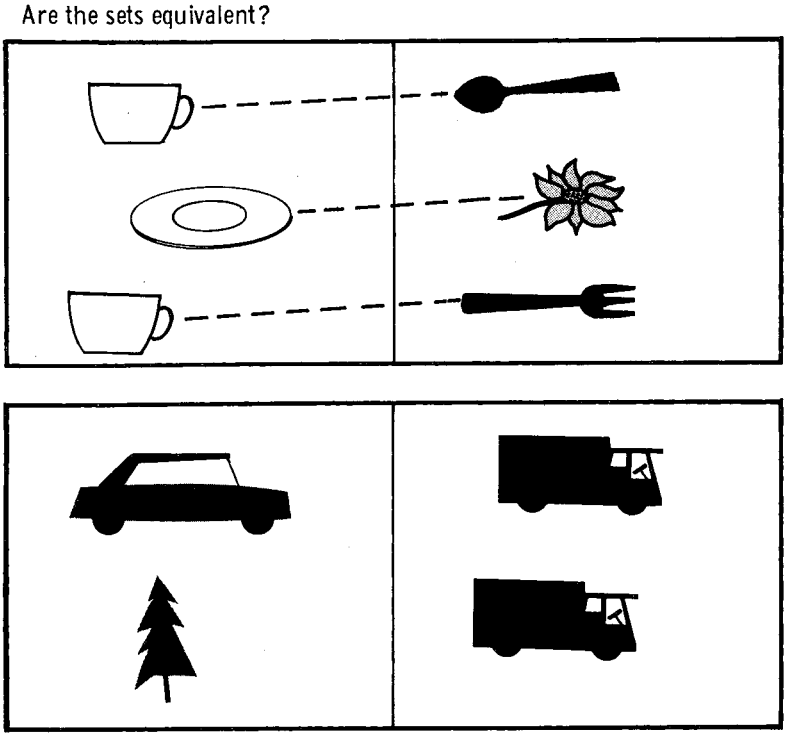
The SMSG's first-grade textbook illustrates how these beliefs worked in practice. Rather than emphasize strict rules of symbolic manipulation or present a large set of rudimentary examples from which students were meant to "infer" the techniques of computation, the text's authors tried to teach students to see arithmetic as instantiating the structure of mathematical knowledge. The text introduced sets of objects and then asked students to compare two different sets by pairing elements. If there was nothing left out after students drew lines between the elements of two sets, those sets were defined as equivalent.

A *number* could then be defined as the signifier or property of equivalent sets. An exercise in comparison through pairing also allowed the introduction of the concept of order: students could rank sets by size based on whether a set had members left out after they paired elements. The tasks of pairing, comparison, and ranking were carefully orchestrated without counting or numerical representation. The textbook acknowledged that some students may already know how to count when they begin school or begin learning the new math, but teachers were still explicitly instructed to direct students to operate only with sets. Addition was similarly explained as the process of "joining" sets: joining a set of flowers to a set of wagons, for example, results in a new set of flowers and wagons. Students eventually associated each of the three sets—the flowers, the wagons, and the flowers and wagons—with a number, and only then were they allowed to write an equation to represent the process of joining. Significantly, the SMSG textbook asserted that counting and arithmetic operations were not primarily symbolic or empirical; rather, the symbols on the page were simply an inscription of conceptual operations with abstract entities.[18]

Although limited to one of the simplest tasks students would face in the new books, the example of addition points to the ways the SMSG replaced the traditional emphasis on rote memorization with an active process of interpretation. Sets provided a procedure—a practice—underlying the usual arithmetic operations and therefore a way to understand what was going on. When the interpretive process was taught correctly, students might see how to arrive at indisputable conclusions without relying on memorization. Students could, of course, have learned and understood arithmetic as a set of rules or facts, but the new math emphasized the structure of the field and the practice of reasoning over the skill of calculation. Students had to obtain the correct answer via the correct process.

[17] National Committee on Mathematical Requirements (under the Auspices of the Mathematical Association of America), *The Reorganization of Mathematics in Secondary Education* (Oberlin, 1923), 8, 72, 90; David Lindsay Roberts, *American Mathematicians as Educators, 1893–1923: Historical Roots of the "Math Wars"* (1997; Boston, 2012), 241–82; Commission on the Secondary School Curriculum of the Progressive Education Association, *Mathematics in General Education: A Report of the Committee on the Function of Mathematics in General Education* (New York, 1940), 11–12.

[18] School Mathematics Study Group, *Mathematics for the Elementary School, Book 1, Part 1: Teacher's Commentary* (Palo Alto, 1965), 1–44, 109–60.

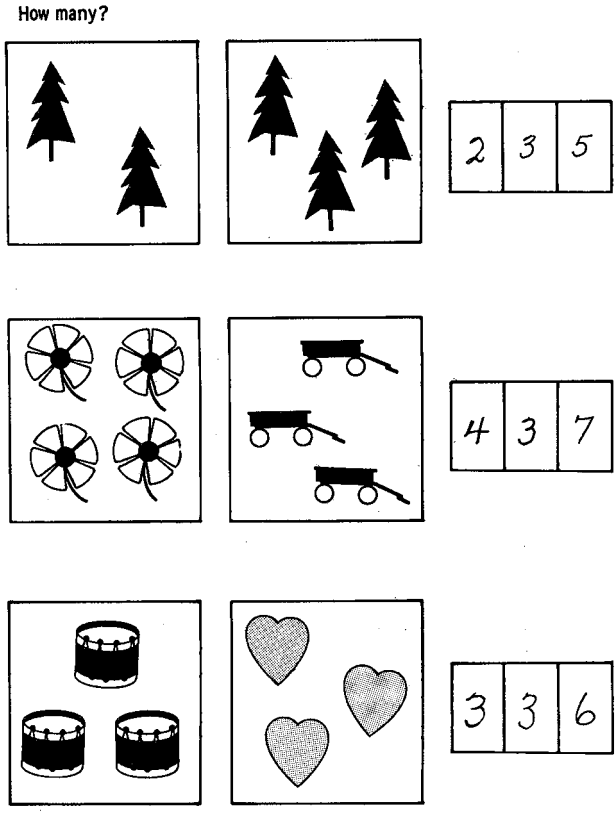


This activity sheet from the School Mathematics Study Group's first-grade textbook asks students to compare sets and pair (rather than count) objects in them. If there are no members from either set left unpaired, the sets are equivalent; equivalence was the basis of the textbook's definition of a number. *Reprinted from School Mathematics Study Group,* Mathematics for the Elementary School, Book 1: Student's Text *(Palo Alto, 1965), 1.*

Not mentioned was whether the new math would aid calculation ability. Begle knew from the outset that rote computational ability might decline among students learning the new math, and he was willing to accept a minor decrease in exchange for greater conceptual understanding and facility with mathematical reasoning. One SMSG member of the ninth-grade writing team explained that "skills *are* important, but never as ends in themselves." As an SMSG textbook writer—and high school math teacher—noted when promoting the new secondary curriculum, "If my students taking the new program can hold their own with traditionally taught students on the traditional tests in the early stages, I am satisfied." Begle suggested that if administrators wanted to raise computational scores artificially, teachers should be told to spend a few minutes drilling students on arithmetic in addition to teaching out of the new textbooks. He concluded, however, that rote computational ability should not be the goal of mathematics instruction.[19]

The new math's connection of academic mathematics with the development of general reasoning skills was recognized from the start. In a 1962 issue of the *American Scholar* the

[19] For the ninth-grade writing team member's comments, see the loose documents in NCTM Issues folder, box 86-28/76, School Mathematics Study Group Records. National Council of Teachers of Mathematics, *The Revolution in School Mathematics: A Challenge for Administrators and Teachers. A Report of Regional Orientation Conferences in Mathematics* (Washington, 1961), 50. Emphasis in original. Jack McCurdy, "Second Look: The New Math—Compounding Old Problems," *Los Angeles Times,* Sept. 27, 1973, pp. 1, 28–29.



This activity sheet from the School Mathematics Study Group's first-grade textbook asks students to join one set of objects to another set of objects to create a third set of those objects combined. Only after weeks of pairing and joining sets are students encouraged to arrive at the traditional symbolism of numerals and equations. *Reprinted from School Mathematics Study Group,* Mathematics for the Elementary School, Book 1, Part 1: Teacher's Commentary *(Palo Alto, 1965), 123.*

cultural critic Benjamin DeMott framed the SMSG's mathematical efforts as a battle between the curriculum designers and those who wished to isolate schools from academic research. While DeMott noted that the SMSG started out as a "shade utopian in character," he believed that the group had "created instruments with the aid of which many thousands of Americans will come, early in life, to a sense of the light and grace of a world once nastily bound in briars." He pointed to the importance of mathematicians in publicizing the true nature of their subject, and he commended SMSG writers for choosing "not to isolate themselves in tight graduate school hives." He recognized that they had not hesitated to accept responsibilities that other professionals had too often delegated to publishers' "drummers" or lesser academicians. DeMott concluded that the SMSG deserved praise and honor rather than abuse, even if it might ultimately fail in the task it undertook, and that the group had a claim to a moderately high rank among the intellectuals of the era. He believed that "exemplary intellectuals of this age" brought knowledge

out of the "briars" of the university and down to the people instead of delegating such work to "third-rate" minds.[20]

DeMott was not alone in his praise for the democratization of elite knowledge. Richard Hofstadter's 1963 *Anti-intellectualism in American Life* lamented that American educators had gradually become estranged from the centers of intellectual development; low-status teachers and their professional organizations had become too focused on preparing students for participation in mass society. Anti-intellectualism, Hofstadter claimed, naturally followed such estrangement. Surveying new and old curricula in the early 1960s, the theologian and philosopher Sterling McMurrin likewise rooted anti-intellectualism in "our failure to value knowledge for its own sake as well as for its uses, to fully respect reason and evidence; it is our willingness to be controlled by passion and emotion and by hearsay and propaganda rather than to make our decisions and determine our actions by the more sure devices of knowledge and disciplined intelligence." Popular delusions spread by hearsay and propaganda, he believed, could be combatted only by the university model of knowledge for its own sake.[21]

Midcentury academics, including the SMSG's mathematicians, commonly suggested their specific fields as models for rational action—particularly as antidotes to the dangers of mass conformity associated with movements such as McCarthyism. The historian David Hollinger has noted that academic science was a "magnificent ideological resource" for intellectuals seeking to define the nature—and relative value—of public or private knowledge. Psychologists and sociologists attempted to measure and understand the risks of "mass society" and its concomitant threats to individual autonomy. Discussion of such threats hit close to home for many teachers and professors, as Senator Joseph McCarthy's supporters had explicitly targeted the work of schools and universities through the mid-1950s. The "disciplined intelligence" that critics claimed was lacking in schools was often simply a code phrase for the sort of intelligence that academics possessed.[22]

Improving students' computation abilities was never the point of the new math. SMSG textbooks were designed to train students to reason mathematically and to help them possess the mental habits of academic mathematicians. Such habits would cultivate intelligent citizens who were prepared for the challenges of midcentury America. Even if never bluntly stated, the SMSG's claim was that American citizens should begin to think more like mathematicians.

Reasoning for the Modern World

The SMSG's model textbooks did not remain in draft form; by the mid-1960s millions of students and teachers faced classes with new textbooks, new methods, and new concepts.

[20] Benjamin DeMott, "The Math Wars," *American Scholar,* 31 (Spring 1962), 296–310, esp. 310.

[21] Richard Hofstadter, *Anti-intellectualism in American Life* (New York, 1963), 299–390; Hartman, *Education and the Cold War,* 91–116; Sterling M. McMurrin, "The Curriculum and the Purposes of Education," in *New Curricula,* ed. Robert W. Heath (New York, 1964), 262–84, esp. 267.

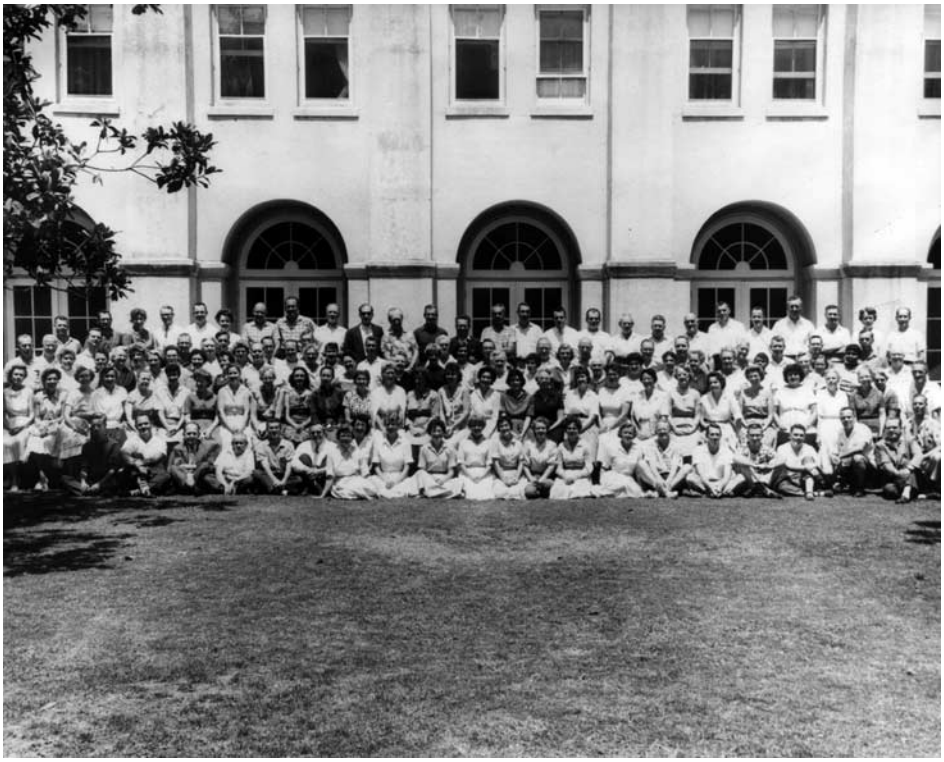
[22] David A. Hollinger, *Science, Jews, and Secular Culture: Studies in Mid-Twentieth-Century American Intellectual History* (Princeton, 1996), 155–74, esp. 160; Jamie Cohen-Cole, "The Reflexivity of Cognitive Science: The Scientist as Model of Human Nature," *History of the Human Sciences,* 18 (Nov. 2005), 107–39; Jamie Cohen-Cole, *The Open Mind: Cold War Politics and the Sciences of Human Nature* (Chicago, 2014), 65–164; S. M. Amadae, *Rationalizing Capitalist Democracy: The Cold War Origins of Rational Choice Liberalism* (Chicago, 2003), 27–82; Haney, *Americanization of Social Science,* 95–117. On Joseph McCarthy and McCarthyism, see Ellen Schrecker, *No Ivory Tower: McCarthyism and the Universities* (New York, 1986); Ravitch, *Troubled Crusade,* 81–113; and Golub, "Into the Blackboard Jungle," 51–98.

On January 25, 1965, the *New York Times* ran a full-page feature, complete with coverage of the philosophy behind the new curricula, experiences in city schools, and a front-page article on the various supporters and critics of the changes. The paper had informational boxes describing Venn diagrams, axiomatic systems, set-theoretic proofs, and modular arithmetic as examples of the new "modern" content. In April 1965 *Business Week* published a series of articles on the profitability of the new-math textbooks for publishers. Even *Parents Magazine,* which only rarely featured explicit discussion of curricula, had a story in the fall of 1965 on parents' use of new-math ideas to prepare children for what they would face in elementary school. Between April 1964 and November 1965, Charles Schulz also made the new math a repeated topic of conversation among Charlie Brown and his young friends in the *Peanuts* cartoon series as they struggled to do the new math with "old math" minds. The National Council of Teachers of Mathematics president estimated (likely with some exaggeration) that nearly 75 percent of high school students and 40 percent of elementary school students nationwide were studying the new math by 1965.[23]

Although new textbooks were introduced in every grade, the process of textbook implementation for secondary schools was very different than for primary schools. With its huge writing teams—nearly four hundred people from thirty-seven states participated in writing sessions by 1966—and a network of testing centers, the SMSG's structure enabled secondary school teachers to acquire firsthand knowledge of the reforms, and many schools incorporated the new high school texts rapidly. Professional organizations of secondary school teachers had been pushing reform efforts for years, and many high school teachers were prepared and willing to switch to the newer books. The SMSG also had close ties to the most successful set of commercial high school texts, the Houghton Mifflin Modern Mathematics series, with a former SMSG writer as its lead author. Elementary-level math teachers, however, were generalists and typically had very little mathematics training beyond what they had learned in high school. District curriculum supervisors, state and local school boards, and superintendents played a far more important role in determining the curriculum and textbooks for elementary grades than for high schools. Publishers aiming to corner the lucrative elementary market rushed titles to press years before groups such as the SMSG had even produced their "model" versions. Despite sales of over 2.6 million SMSG textbooks by 1965, the vast majority were at the seventh-grade level or above. The work of the SMSG's professional mathematicians might have spurred publishers into action, but once they began, publishers proceeded to produce and market textbooks directly to elementary schools.[24]

[23] Schwartz, "New Math Is Replacing Third 'R,'" 18; "New Math Book Sales Add Up: Publishers Find a Profitable Equation in Texts as Teaching Is Revolutionized," *Business Week,* April 10, 1965, pp. 117–20; Rhoda W. Bacmeister, "Preparing Preschoolers for the New Math: Just Playing with a Set of Blocks Gives Them Clues to What They'll Learn Later On in School," *Parents Magazine,* 40 (Sept. 1965), 64, 111–15, esp. 111. For an example of how Charles Schulz used the new math in his comic strip, see, for example, Charles Schulz, *Peanuts,* April 22, 1964, http://www.gocomics.com/peanuts/1964/04/22.

[24] For the SMSG membership, see "List of Participants in the Work of the SMSG, Oct. 1966, box 86-28/68, School Mathematics Study Group Records. On the SMSG's network of writers and testing centers, see Applications folder, 1961–1966, box 86-28/5, *ibid.* On the difference between the dissemination of the new math in elementary and secondary schools, see Phillips, *New Math,* 96–120. Schwartz, "New Math Is Replacing Third 'R,'" 18; "SMSG Gross Sales Report—Yearly July 1–June 30," SMSG Financial Reports—Yearly July–June 30 1961–1970 folder, box 86-28/61, School Mathematics Study Group Records.



The math teachers and mathematicians of the School Mathematics Study Group met every summer to write new textbooks. The group director Edward G. Begle intentionally varied the location of the writing sessions to provide the group national exposure. This writing group, gathered in 1960, was located at Stanford University. *Courtesy School Mathematics Study Group Records, Dolph Briscoe Center for American History, University of Texas at Austin.*

Publishers, administrators, and teachers echoed mathematicians' claims that the new math was necessary to prepare students for the unknown challenges of a rapidly changing world. Despite vast differences in pedagogy and content, new textbook titles in the 1960s claimed almost uniformly to feature a "modern" or "contemporary" approach to the subject. "You cannot walk the middle of the road holding hands with tradition on one side and modernism on the other," one professor of education warned Missouri's teachers. "You have to make a choice." A high school teacher similarly promoted the reforms by saying, "the age of technology is upon us and we must face the changes which accompany it. The young people of today must be prepared to take a role in tomorrow's world. The demands being made upon the youth of today are in many ways different from those placed upon their parents." Another instructor quoted from the *Resourceful Teacher* to remind his colleagues of the technological evidence all around them suggesting that "today's culture is a 'mathematized' culture." Their "challenge" as teachers, therefore, was to "fall in with the times." The "modern teacher, to stay modern, must adopt modern methods and take a fresh, new outlook on methods and approaches. . . . We must be brave and bold and continue with a pioneering spirit." Educators noted that modern mathematics had caused the "explosion of knowledge" at the heart of "today's culture." The sales pitch for the new math mirrored the SMSG's writing philosophy. The curriculum might not help

students add more accurately, but it would prepare them for life in a complex, interdependent, and technologically sophisticated world.[25]

Behind and beyond claims about "modern" math was the larger assumption that the underlying moral and political order could and should change. Claims about the contemporary world took on a specific valence within federal politics as schools were increasingly configured as crucial parts of presidential proposals. In February 1962 John F. Kennedy reminded Americans that although "education is both the foundation and the unifying force of our democratic way of life," "our educational system has failed to keep pace with the problems and needs of our complex technological society." Recognizing new initiatives for classroom building and teacher salaries, Kennedy also praised the "excellent but limited work" of the NSF and promised to expand the funds available for new instructional materials in the 1963 budget. Only a few years later, Kennedy's successor promoted the much broader new-math curriculum as confirmation of the transformative possibilities of the Great Society. In seeking an unprecedented expansion of education funding, Lyndon B. Johnson echoed the rhetorical distinction between tradition and modernity that had been used to promote the new math: "We must demand that our schools increase not only the quantity but the quality of America's education. For we recognize that nuclear age problems cannot be solved with horse-and-buggy learning." Johnson claimed that the three Rs of education needed to be supported by "the three Ts": "teachers who are superior, techniques of instruction that are modern, and thinking about education which places it first in all our plans and hopes." As evidence, Johnson pointed to the "exciting experiments in education" already underway, including that "many of our children have studied the 'new' math." Johnson's comments supported what would become the expansive Elementary and Secondary Education Act of 1965 and signaled that the new math was being heralded as a model federal initiative.[26]

Kennedy's and Johnson's mentions of the new math initially played well on all political sides. The new-math curriculum was widely understood as a positive step in preparing students for the challenges of contemporary America. Liberals appreciated the government's active involvement in improving education while conservatives praised the way the NSF's programs sidestepped progressive educators in favor of scientists and mathematicians. Max Rafferty, the conservative head of education in California and no friend to progressives, wrote approvingly of his state's adoption of new-math textbooks because "the old, comfortable ways are no longer enough." Even Chamber of Commerce member John Miles—vehemently opposed to most forms of federal education aid—agreed that efforts such as the SMSG's should be expanded.[27]

In 1960 politicians of all ideological persuasions had been broadly supportive of the government's attempts to shape the citizenry by promoting disciplined intelligence.

[25] Alvin E. Rolland, "Making the Switch to Modern Mathematics," *School and Community,* 48 (May 1962), 29; Donald F. Define, "Mathematics: Formulation of the Curriculum at Rich Township High School," *Clearing House,* 36 (April 1962), 460–63, esp. 460. For the quotation from the *Resourceful Teacher,* see B. R. Reardon, "I'm for the Modern Math. Here's Why," *Alabama School Journal,* 83 (Jan. 1966), 9.

[26] John F. Kennedy, "Message from the President of the United States Relative to an Educational Program [Feb. 9, 1962]," reprinted in *Modern Viewpoints in the Curriculum: National Conference on Curriculum Experimentation, September 25–28, 1961,* ed. Paul C. Rosenbloom (New York, 1964), 296–303, esp. 296–97, 300; Lyndon B. Johnson's speech in U.S. Congress, Senate, Committee on Labor and Public Welfare, Subcommittee on Education, *Elementary and Secondary Education Act of 1965: Background Material with Related Presidential Recommendations,* 89 Cong., 1 sess., Jan. 25, 1965, pp. 12–14, 16.

[27] Max Lewis Rafferty, *Max Rafferty on Education* (New York, 1968), 77. John Miles quoted in Committee on Labor and Public Welfare, *Science and Education for National Defense,* 1229.

Illinois senator Charles H. Percy explained that "we need the fullest possible development of the capacity to think, to reflect, to weigh and judge, to make choices among alternatives, and to foresee the consequences of these choices. This is the modern mind we need—the mind of the scientist, the key executive, the mathematician." Illinois representative Noah M. Mason noted that "in the good old days—thirty or forty years ago—our American schools used to teach and stress the 'three Rs.' We also insisted upon strict discipline." When prompted to answer whether everyone—not just the talented few—should learn mathematics, National Academy of Sciences president Detlev Bronk replied that everyone needs the ability to think, which can be fostered by "an understanding of some fundamental and relatively few subjects," including mathematics.[28]

The new math took on outsized importance in the mid-1960s when the rhetoric of mathematical ways of thought blended seamlessly with ongoing changes in the management of complex bureaucratic processes and decisions. Mathematical ideas and methods were increasingly incorporated into the highest levels of government, including President Johnson's adoption of Robert McNamara's Planning, Programming, and Budgeting System from the Department of Defense to "rationalize" the appropriations process. From the development of rational choice liberalism to the flourishing of structuralist ideas in the academy, intellectuals in a range of contexts argued that understanding the complexity of the modern world required "structural"—and particularly mathematical—tools. It was entirely fitting that the chair of the National Council of Teachers of Mathematics Subcommittee on the Place of Mathematics in a Changing Society (which published a secondary school curriculum report in 1959) would be J. D. Williams of the RAND Corporation, a company steeped in the notion that rational, calculating minds were needed to face the challenges of the modern world. Local and federal authorities increasingly relied upon the RAND Corporation and similar entities, claiming the need for rational—mathematical—solutions to complex problems. The rapid dissemination of the new math spoke to the attractiveness of the view that "modern" minds ought to employ "rational," "mathematical," and "structural" approaches.[29]

By the mid-1960s the new math had been transformed from a Cold War manpower initiative to a model program of the Great Society. The project's underlying rationale nonetheless remained the same: to address the contemporary problems of society, teachers needed to train citizens to think "correctly."

[28] Committee on Labor and Public Welfare, *Science and Education for National Defense,* 1373; *Congressional Record,* 85 Cong., 2 sess., March 10, 1958, p. 3826; Committee on Labor and Public Welfare, *Science and Education for National Defense,* 18.

[29] On intellectuals' support for structural—particularly mathematical—methods to understand the modern world, see, for example, Amadae, *Rationalizing Capitalist Democracy;* Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore, 2003); Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge, Eng., 2002); Paul Erickson, "Mathematical Models, Rational Choice, and the Search for Cold War Culture," *Isis,* 101 (June 2010), 386–92; Hunter Crowther-Heyck, *Herbert A. Simon: The Bounds of Reason in Modern America* (Baltimore, 2005); David Raymond Jardini, "Out of the Blue Yonder: The RAND Corporation's Diversification into Social Welfare Research, 1946–1968" (Ph.D. diss., Carnegie Mellon University, 1996), 339–41; Alex Abella, *Soldiers of Reason: The RAND Corporation and the Rise of the American Empire* (Orlando, 2008). Rudolph, *Scientists in the Classroom,* 99; Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, 1995); and Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, Mass., 1996). On the role of mathematics in structuralism during this period, see Aubin, "Withering Immortality of Nicolas Bourbaki"; and Jean Piaget, *Le Structuralisme* (Structuralism) (Paris, 1968). For the 1959 subcommittee report, see National Council of Teachers of Mathematics, "The Secondary Mathematics Curriculum: Report of the Secondary School Committee of the National Council of Teachers of Mathematics," *Mathematics Teacher,* 52 (May 1959), 389–417.

"Back to Basics"

After the new math's widely publicized arrival in the mid-1960s, discussions of curriculum were moved behind the closed doors of schoolhouses. Media coverage rapidly died down and, alongside ongoing efforts to acquaint parents with curricular changes, schools quietly put the new textbooks into use. In 1972 the SMSG was disbanded, formally ending the federal math curriculum effort. The consensus about the of work of the SMSG was overwhelmingly positive: the new math had raised the profile and quality of mathematics in schools across the nation. There had been relatively few complaints about the new curriculum aside from substantial concerns that elementary school teachers had not been adequately prepared for the new material. The most vehement content-based critiques had come from a handful of mathematicians who felt that the SMSG and its new-math curriculum emphasized abstract structures over the practical applications of the subject.[30]

Just a few years after the disbanding of the SMSG, however, official perceptions of the new math had decisively soured. Ohio representative John M. Ashbrook channeled rising public discontent when, during a speech to the House of Representatives, he decreed the new math "passé" and lamented the federal government's education programs as failed experiments promoting only academic "frills." He asked: "How much in Federal dollars went to further this innovation? Also, how many other, less well-known 'innovations' have actually hurt schoolchildren?" In late autumn 1973 a *New York Times* article quoted a critic who wholly condemned the new math as an "irresponsible innovation" and noted that administrators were revamping programs and ordering alternate textbooks.[31]

A profound shift in public opinion toward the new math also took place, spurred by a series of well-publicized complaints. The linchpin in the series appeared on the front page of the *Washington Post* in November 1972. The article highlighted the experience of James M. Shackelford, a chemist with the U.S. Environmental Protection Agency and the parent of a fourth grader. Shackelford had opened the pages of his daughter's math textbook only to find problems that he could not solve. He blamed the new math's emphasis on structure over the memorization of facts for his confusion and for the troubling discovery that neither his daughter nor her friends could solve the equation 8 x 9. Despite having a Ph.D. in chemistry, Shackelford claimed that the most abstract math he used was in calculating his family's grocery bill. Although Shackelford's rant was based only on anecdotal evidence, the story struck a chord—one *Washington Post* reader complained that more letters had been printed on the new math than on George McGovern's failed presidential campaign that year. And even members of Congress began citing Shackelford's tale.[32]

Shackelford was just one of many parents and educators starting to express buyer's remorse with the new math. Front-page articles in the *Los Angeles Times* covered a state

[30] The coverage of the disbanding of the SMSG was generally positive, but reporters did acknowledge some persistent critiques. See, for example, Fred M. Hechinger, "Time + Trial = Acceptance," *New York Times,* Aug. 6, 1972, p. E7; and "Lessons of the New Math," *Wall Street Journal,* Aug. 17, 1972, p. 10. For mathematicians' critiques of the SMSG and its curriculum, see Morris Kline, "Math Teaching Reforms Assailed as Peril to U.S. Scientific Progress," *New York University Alumni News,* 7 (Oct. 1961), 1, 3, 8; and Joong J. Fang, *Numbers Racket: The Aftermath of New Mathematics* (Port Washington, 1968).

[31] *Congressional Record,* 93 Cong., 2 sess., March 27, 1974, pp. 8523–25; Mary C. Churchill, "A Drawback Is Found in 'New Math,'" *New York Times,* Nov. 4, 1973, p. 129.

[32] Jay Mathews, "New Math Baffles Old Mathematicians," *Washington Post,* Nov. 15, 1972, p. A1; R. W. Smith, "Letters to the Editor: Culturally It Adds Up," *ibid.*, Dec. 8, 1972, p. A27. For James M. Shackelford's tale used in a congressional speech, see *Congressional Record,* 93 Cong., 1 sess., Feb. 1, 1973, pp. 3076–77.

assemblyman's crusade against the new curriculum and the eventual adoption of a new series of books that reemphasized computation. A 1972 report by the New York State Commission on the Quality, Cost, and Financing of Elementary and Secondary Education (headed by Manly Fleischmann) noted that many students were falling below minimum competence levels in mathematics, and the commission recommended the reestablishment of state guidelines to "swing back" toward computation skills. State officials in New Hampshire asked schools to emphasize computation to make up for the apparent failings of the new textbooks. In May 1973 the *Chicago Tribune* reported that in one suburb using the new math, eighth-grade math scores had been on the decline for three consecutive years. Rounding out the onslaught was the 1973 publication of Morris Kline's *Why Johnny Can't Add,* which gave a professional mathematician's imprimatur to the claim that the reforms were mathematically and pedagogically flawed. Kline had been complaining about trends in curriculum reform for over a decade, but with the publication of his book the criticisms were widely disseminated as evidence for the failings of the new-math program.[33]

Although declining test scores were commonly cited as decisive proof of the new math's failure, such evidence was inconclusive at best. Score decreases through the 1960s and 1970s were greater on verbal tests and were most pronounced among female test takers, leading some critics to speculate that the drop was a consequence of a greater variety and a larger number of test takers. When measured alongside control groups of older Americans, students' computational abilities after learning the new math were comparable to those of the control groups—if not better. Most of the reports on math scores did not distinguish between the effects of different textbooks, despite ample evidence that test scores displayed more variability in effectiveness among new math textbooks than between the new books and the old ones. Studies often found mixed test-score trends, not uniformly negative ones, and results depended on the variables used. Whether test-based evidence was used to imply that teachers were unprepared or that new-math textbooks were inadequate, such results were hardly decisive—especially because there had not been enough testing prior to the implementation of the new math to establish a baseline score for comparison.[34]

Moreover, testing of computational ability missed the point of the curricular reforms. The SMSG's participants had always been willing to accept minor declines in students'

[33] McCurdy, "Second Look," 1, 28–29; Jack McCurdy, "Back to 'Concrete' Addition, Subtraction: State Board Gives 'New Math' a 1-2 Punch," *Los Angeles Times,* May 10, 1974, p. A1; New York State Commission on the Quality, Cost, and Financing of Elementary and Secondary Education, *The Fleischmann Report on the Quality, Cost, and Financing of Elementary and Secondary Education in New York State* (3 vols., New York, 1972), II, 20–22; Harold Faber, "Curriculum Revision: A Continuing Process," *New York Times,* Jan. 8, 1973. For the viewpoints of New Hampshire officials, see Frank Kendig, "Does the New Math Add Up?," *ibid.*, Jan. 6, 1974, p. E14. Ruth Moss, "Perplexing Merry-Go-Round: Does the New Math Add Up to an 'A' or an 'F'?," *Chicago Tribune,* May 7, 1973, p. B13. On the influence of Morris Kline's book, see Edward Edelson, "Reforming the Numbers Racket," *Washington Post,* Feb. 25, 1973, p. BW10.

[34] Annegret Harnischfeger and David E. Wiley, "The Marrow of Achievement Test Score Declines," *Educational Technology,* 16 (June 1976), 5–14; Gina Bari Kolata, "Aftermath of the New Math: Its Originators Defend It," *Science,* 195 (March 1977), 854–57; Kendig, "Does the New Math Add Up?"; Ravitch, *Troubled Crusade,* 311–12; Jack McCurdy, "IQ Scores of California Pupils Drop for 6th Consecutive Year," *Los Angeles Times,* May 11, 1973, p. D1; New York State Commission on the Quality, Cost, and Financing of Elementary and Secondary Education, *Fleischmann Report,* II, chap. 6, pp. 24–25; Edward G. Begle and James W. Wilson, "Evaluation of Mathematics Programs," in *Mathematics Education, Sixty-Ninth Yearbook of the National Society for the Study of Education. Part 1,* ed. Edward G. Begle (Chicago, 1970), 367–404, esp. 393–403; Lee J. Cronbach, "Evaluation for Course Improvement," in *New Curricula,* ed. Heath, 231–48; Ellen Condliffe Lagemann, *An Elusive Science: The Troubling History of Education Research* (Chicago, 2000), 192.

computational abilities as long as their conceptual understanding increased. Everyone in the group thought students needed to learn how to calculate proficiently, but the important questions were how and why students should learn arithmetic. The focus on evidence from test scores ultimately obscured a more important ideological shift: critics claimed that the new math was emblematic of an elite top-down approach to intellectual training that failed because it ignored the value of traditional, discipline-oriented mental habits. Criticism of the new math, like the rhetoric that promoted it, was fundamentally political.

The optimistic belief that federal programs should and could shape the intellectual training of citizens on the basis of how mathematicians thought had dissipated completely by the 1970s. The peak of the new math in 1964 and 1965 tracked—not coincidentally—the high point of public faith in the ability of federal initiatives—particularly in education—to cure the nation's ills. Soon thereafter, baby-boomer elementary and secondary school enrollments declined, high schools and universities became sites of divisive protest movements, and a 1966 report by the sociologist James S. Coleman suggested that socioeconomic levels and local cultures were better indicators of children's future academic achievement than the type of school they attended or the amount of money spent on their education. Daniel Patrick Moynihan's 1967 warning that "young people" have "learned to distrust their government and in many ways to loath their society" presciently spoke of an increasing skepticism of programs that had been trumpeted only a few years prior.[35]

Just as criticism of the new math was reaching its peak the Watergate scandal unfolded and—along with the continuing sagas of the Vietnam War abroad, racial strife at home, and economic stagflation—led to a rapid decline in the public's opinion of governmental initiatives. In the mid-1960s 76 percent of citizens had said they trusted the federal government "most of the time" or "just about always"; that number dropped to 33 percent in the mid-1970s and to 25 percent by the end of the decade. Tellingly, a May 10, 1974, front-page article in the *Los Angeles Times* announcing California's shift away from the new math followed immediately behind a lead story about the opening of the impeachment hearings for Richard M. Nixon. The rhetoric of the Great Society was giving way to deep skepticism about the nation's direction; even the deference shown to academic scientists and the NSF was challenged in the 1970s as Congress effectively ended the Course Content Improvement Program. The expertise of academicians and the elite knowledge produced by research mathematicians no longer had the same caché.[36]

Researchers who interviewed elementary school teachers in the mid-1970s to evaluate the success of the NSF curriculum programs found broad agreement that the concepts of

[35] James S. Coleman et al., *Equality of Educational Opportunity* (Washington, 1966). For student enrollment numbers, see "Enrollment in Public and Private Schools," *www.Allcountries.org,* http://www.allcountries.org/uscensus/247_enrollment_in_public_and_private_schools.html; and "Table 38. Historical Summary of Public Elementary and Secondary School Statistics: 1869–70 to 1992–93," *National Center for Education Statistics,* http://nces.ed.gov/programs/digest/d95/dtab038.asp. Daniel P. Moynihan, *Maximum Feasible Misunderstanding: Community Action in the War on Poverty* (1967; New York, 1969), 203.

[36] Frank Newman, "The Era of Expertise: The Growth, the Spread, and Ultimately the Decline of the National Commitment to the Concept of the Highly Trained Expert, 1945 to 1970" (Ph.D. diss., Stanford University, 1981), 92–161; Nils Gilman, *Mandarins of the Future: Modernization Theory in Cold War America* (Baltimore, 2003), 244–49; Louis Menand, *The Marketplace of Ideas: Reform and Resistance in the American University* (New York, 2010), 77; Brian Balogh, *Chain Reaction: Expert Debate and Public Participation in American Commercial Nuclear Power, 1945–1975* (New York, 1991), 171–301; David C. King and Zachary Karabell, *The Generation of Trust: How the U.S. Military Has Regained the Public's Confidence since Vietnam* (Washington, 2003), 2; McCurdy, "Back to 'Concrete' Addition, Subtraction."

the new math were no longer desirable as a basis for intellectual training. The new math simply did not hold sway with the teachers, if it ever had. Nearly all condemned the new textbooks and many said that they used worksheets and flash cards to enable drills of arithmetic facts. One teacher justified her use of rote exercises by saying, "We are terribly old fashioned and I am proud of it." Another explained that the study of arithmetic should encourage a "work ethic: responsibility, diligence, persistence, thoroughness, neatness"—precisely the sort of discipline deemed necessary for successful citizenship. The NSF interviewers surmised that the teachers were promoting rote arithmetic primarily because of its "socializing value." In fact, the head of a math department in an urban high school bluntly rejected any other use for mathematics instruction. "What I tell my classes is this: the only practical value you'll get out of studying mathematics is to learn to do as you're told."[37]

The rejection of the new math's intellectual justification would result in the "most talked about" education movement of the 1970s: "back to basics." Throughout the country, new schools espousing "basic" or "fundamental" education arose, promising rigor and discipline. The movement spanned many subjects but was particularly focused on condemning recent curricular innovation in mathematics. Unlike the SMSG's emphasis on the flexible, structural thinker, proponents of the basics saw mathematics class as an opportunity for rote drills. Parents clamored for schools to return to fundamental skills, presuming that children's mental habits ought to be shaped by routines of memorization. One mother of a new-math student recalled and praised James Shackelford's complaint by acknowledging that she had been wrong to take for granted that "those in charge of the new math program were experts in the field, and could see things that I evidently did not understand. . . . While theory is nice to know . . . it is more practical that our children learn the basic skills." Critics of the new math conveniently elided the distinction between practical skills—which the SMSG had also hoped its textbooks would promote—and the benefits of drills and rote learning. The strange notation and curious exercises that had been accepted as part of the "modern" structural understanding of mathematics were now rejected as parents and teachers called for a return to "traditional" practices.[38]

News coverage connected a return to basics with discipline writ large. A *Los Angeles Times* story quoted an angry parent's thoughts on his school "going overboard on teaching sets and what they call the new math" and then tied his criticisms to a broader change: "While parents have been told changes in schooling are for the better, many have had difficulty accepting that. They complain of lack of discipline, avoidance of memorization, teaching of 'socialistic values.'" Across the country, schools began to hold daily "character-building" discussions, establish "behavioral adjustment rooms," and—explicitly—teach no new math. The superintendent of one Chicago-area school district responded to concerns about academic quality by proposing a school that would have strict disciplinary standards, a dress code, and homework starting in kindergarten—because it was impossible for children to "learn without order." For back-to-basics proponents, the push for

[37] Robert E. Stake et al., *Case Studies in Science Education,* vol. I: *The Case Reports* (Washington, 1978), chap. 1, p. 29; Robert E. Stake et al., *Case Studies in Science Education,* vol. II: *Design, Overview, and General Findings* (Washington, 1978), chap. 12, pp. 34–35, 25.

[38] "Nostalgia's Child: Back to the Basics," *Phi Delta Kappan,* 58 (March 1977), 521. Gene I. Maeroff, "Issue and Debate: The Return to Fundamentals in the Nation's Schools," *New York Times,* Dec. 6, 1975, p. 58; Barbara Grant, "Basic Skills Absent," *Washington Post,* Nov. 24, 1972, p. A29.

mathematics classes that disciplined students through rote exercises and memorization was inseparable from the broader desire for discipline and order.[39]

How had the new math become a roundly condemned failure only a decade after its widely hailed—if hastily executed—debut? Parents and teachers still thought of mathematics classes as places where mental habits were cultivated. By the mid-1970s, however, the new math had become emblematic of academic, elite knowledge that had failed to solve the nation's ills. The return to fundamentals was not exclusively "restorationist": critics did not wish to reimplement "life adjustment education" and other progressive education initiatives. Even if it was occasionally nostalgic, the promotion of tradition was not a rejection of modern society but rather an alternate way of coping with it. Supporters of the new math had put forward "structural" ways of thinking as solutions to the complicated problems facing the country, but by the 1970s opponents posited that comprehension of unifying structures was less important than the need for knowledge of tried-and-true facts, practices, and habits. Exacerbating the situation was the involvement of "second-generation" new-math parents; the extensive outreach programs initially formulated by the NSF to educate parents about the new math had not existed long enough to keep up with the constant influx of new parents.[40]

The back-to-basics movement was ultimately a collection of local, decentralized efforts without an overarching organization. Despite its name, the Council for Basic Education—formed in the 1950s to promote academic disciplines rather than rote learning—was certainly not uniformly supportive of the movement. Parents and teachers usually took action in individual classrooms, schools, and districts, citing their own experiences but also recycling complaints such as Shackelford's and the arguments posited in *Why Johnny Can't Add*. In some states, parental discontent combined with reports of declining test scores—however spurious their connection to the new math—to convince state boards of education to replace new-math textbooks. The combination of a decentralized system of education and a lack of coordination ensured that the the movement's results were uneven and locally dependent. Even opponents' success in making the new math synonymous with failed curricular reform was incomplete: while publishers quickly removed "new math" from book titles and publicity materials, remnants of the reforms remained buried in textbooks for decades.[41]

Politics of the Mathematical Mind

The reembrace of the basics was never an isolated claim about the value of memorized multiplication tables; it quickly became part of a broader social vision. Opposing the

[39] Lynn Lilliston, "Getting Back to Schooling Fundamentals," *Los Angeles Times,* Jan. 30, 1974, pp. E1, E4. On schools returning to basic skills, see also Meg O'Connor, "At '3-Rs' School on Southside, Goal Strictly Education," *Chicago Tribune,* Sept. 19, 1976, p. 45; Edward B. Fiske, "Suburban Schools Are Evolving 'Basic' Curriculums Geared to 1970s," *New York Times,* June 15, 1977, p. 45; and Thomas Fortune, "Schools Fighting to Regain Trust of Disenchanted Parents," *Los Angeles Times,* Dec. 3, 1972, p. A1.

[40] Lisa McGirr, *Suburban Warriors: The Origins of the New American Right* (Princeton, 2001), 84; Jonathan Reider, "The Rise of the 'Silent Majority,'" in *The Rise and Fall of the New Deal Order, 1930–1980,* ed. Steve Fraser and Gary Gerstle (Princeton, 1989), 243–68. The erosion in emphasis on unifying structures was part of much broader societal transformations. See Daniel T. Rodgers, *Age of Fracture* (Cambridge, Mass., 2011).

[41] Council for Basic Education, *Five Views of the "New Math"* (Washington, 1965); National School Boards Association, *Back-to-Basics. National School Boards Association Research Report 1978-1* (Washington, 1978), 8. Kline, *Why Johnny Can't Add.*

new math equated to opposing transformations of political order. Atlanta public school superintendent Alonzo Crim said in 1975 that "some people are looking for greater regimentation. . . . As they view society in somewhat of a shambles, they feel a more conservative approach is better preparation for their young people." The dean of the College of Education at the University of Illinois diagnosed the problem similarly: "The new math in schools was a symptom of society's disintegration to the public. . . . It was not so much a fear of something new as a fear of losing something old." The teachers' professional journal *Phi Delta Kappan* called the back-to-basics movement "nostalgia's child." Teachers and parents lumped the new math with progressive educational innovations of the 1960s—from open classrooms to audiovisual technology—rather than with other Cold War programs from the 1950s. A review of *Why Johnny Can't Add* concisely captured the waning political potency of the new-math curriculum: "It seems that one of the major concerns of the 1970s will be the dismantling of the great structures that we erected with such pride in the 1960s." "Project Apollo is gone, the Great Society is going fast and Vietnam is dying a lingering death. Morris Kline, a distinguished mathematician, now says that the new mathematics should be added to the list." The new math was portrayed as yet one more of the failures of the 1960s.[42]

Even if the fundamentals movement was initially decentralized, political operatives recognized the potential of harnessing participants' discontent. In the wake of Ronald Reagan's election in 1980 the conservative activist Burton Yale Pines used his *Back to Basics* to explain the transformations that had placed conservatives in power. He believed that the conservative triumph was simply the back-to-basics push writ large. He saw the coffee klatches that California parents organized to support "basic education" school board candidates as no different from other conservative mobilizations. Highlighting the manual "How to Win a School Board Election," Pines suggested that successful national movements often began with local elections. He saw in the 1980 presidential election the hope of the reestablishment of "fundamentals" in schools, communities, and, ultimately, the nation.[43]

Explaining the fall of the new math as merely an element of the gradual triumph of Republican policies is not accurate, however. Despite Pines's thesis, the politics of the new math did not neatly map the distinctions between its supporters and opponents onto those distinctions between progressives and conservatives. The SMSG was initially organized to win the "cold war of the classrooms." On the one hand, then, lumping the new-math project with initiatives of the 1960s Left was misleading. Critics implied that the new math was not rigorous because it emphasized structure over hard facts even though the mathematicians who designed the curriculum and the bipartisan coalition that promoted it had done so on the basis that it brought increased rigor to the math classroom. On the other hand, critics of the new math were correct in linking its promotion and dissemination to the expansion of the liberal state—as one of the new federal incursions

[42] Iver Peterson, "Nation's Schools Renewing Stress on the Basics," *New York Times,* March 3, 1975, p. 38; Larry Green, "'New Math' in New Guise: The Old Math," *Los Angeles Times,* Nov. 28, 1977, p. A6; "Nostalgia's Child," 521; B. D. Colen, "Conservative School Set in Pr. George's," *Washington Post,* Dec. 3, 1974, p. A5; Fred M. Hechinger, "Where Have All the Innovations Gone?," *New York Times,* Nov. 16, 1975, p. 461. For the review of *Why Johnny Can't Add,* see Edelson, "Reforming the Numbers Racket."

[43] Burton Yale Pines, *Back to Basics: The Traditionalist Movement That Is Sweeping Grass-Roots America* (New York, 1982), 99–129, esp. 116.

into what had previously been locally controlled territory. The politics of education was undoubtedly in flux during the 1970s; the push for a return to the basics sat uncomfortably with the desire to hold schools "accountable"—for example, a movement divided on whether "standards" should be set by school boards, states, or the federal government.[44]

Nonetheless, conservatives were able to capitalize on the 1970s back-to-basics movement because they had years of experience using local school concerns as *causes célèbres*. Supporters of the fundamentals were drawing on established structures of opposition to "liberal encroachments" on local schools. Perhaps the best-known conservative curricular activists, Norma Gabler and Mel Gabler, incorporated the removal of the new math from Texas classrooms into their broader campaign against the adoption of so-called subversive and un-American textbooks. Although not all critics of the new math labeled themselves conservatives, late-1960s debates over the introduction of sex education, the reform of history texts and civics books, and the inclusion of new authors in literary anthologies provided a template for those who opposed the new math. Usually presented as part of the "culture wars" and the rise of the Christian Right, these earlier debates were not just about the inclusion of specific beliefs or viewpoints in textbooks. They were also expressions of concern about changing sources of moral authority. Activists in these battles often saw themselves fighting against programs designed by "experts" and "specialist" curriculum designers who disregarded traditional moral values.[45]

A similar concern would eventually be expressed about the new math, as proponents of the basics outlined the importance of replacing the novel textbooks with ones featuring a traditional emphasis on facts and memorization. The new-math controversy was distinctive in how far that type of argument was pushed: parents and other laypeople claimed that they, not mathematicians, should determine the content and nature of mathematical habits of thought. Furthermore, the new math was the only reform effort that rooted federal money directly and explicitly in claims about how students should learn to think. The new-math controversy was also unique in that it forced districts to take a stand—parents could ensure that their children avoided sex education, but every school required a math class.

Those calling for the basics did not simplistically desire a return to the pre-SMSG world but rather the removal of mathematicians, federal bureaucrats, and national politicians from positions of curricular authority. James Shackelford began his crusade against his daughter's textbook with what would become a characteristic move for critics: contacting the school board to demand a hearing on the curriculum. Back-to-basics proponents desired the return of moral authority to teachers, parents, and local school boards.

[44] Ben Brodinsky, "Back to the Basics: The Movement and Its Meaning," *Phi Delta Kappan,* 58 (March 1977), 522–27.

[45] James C. Hefley, *Are Textbooks Harming Your Children? Norma and Mel Gabler Take Action and Show You How* (Milford, 1979), 218; J. Dan Marshall, "With a Little Help from Some Friends: Publishers, Protestors, and Texas Textbook Decisions," in *The Politics of the Textbook,* ed. Michael W. Apple and Linda K. Christian-Smith (New York, 1991), 56–77. On parents' resentment of experts, see Zimmerman, *Whose America?,* 200–206. On public schools and conservative mobilization, see William Martin, *With God on Our Side: The Rise of the Religious Right in America* (New York, 1996); Frances Fitzgerald, *America Revised: History Schoolbooks in the Twentieth Century* (Boston, 1979); Dorothy Nelkin, *Science Textbook Controversies and the Politics of Equal Time* (Cambridge, Mass., 1977); Joan DelFattore, *What Johnny Shouldn't Read: Textbook Censorship in America* (New Haven, 1992); James Moffett, *Storm in the Mountains: A Case Study of Censorship, Conflict, and Consciousness* (Carbondale, 1988); and Edward B. Jenkinson, *Censors in the Classroom: The Mind Benders* (Carbondale, 1979).

Shackelford and other critics represented the conception of the 1970s that Suleiman Osman has called the "decade of the neighborhood": small groups, local organizations, and nonexperts working to take back control from centralized, elite authorities. This conception did not fall strictly along party lines—"local power" movements had backers on the Left and the Right—but those pushing for the fundamentals promoted an overwhelmingly conservative version. In this sense, the new-math backlash should be situated among uprisings over busing in Boston and "not-in-my-backyard" protests in Orange County, California. These were at once conservative causes and manifestations of increasing skepticism about centralized authority and elite knowledge.[46]

The success of fundamentals supporters in taking back some control of the school curriculum from mathematicians was certainly indicative of the falling away of any "liberal consensus" that might have characterized the political culture of the late 1950s and early 1960s. The "conservative turn" of the 1970s has diverse intellectual and cultural roots in anticommunism, laissez-faire economics, law-and-order politics, and religious fundamentalism. The opposition to the new math suggests that the emergence of conservative voters in the 1970s should be understood as involving more than the promotion of particular tenets. Those who spoke out most vividly and forcefully in favor of the basics in education did so in support of specific sources of intellectual and moral authority. Begle and other new-math promoters had envisioned students trained in the structure of mathematical knowledge and able to use that sort of reasoning to solve complex and unforeseeable problems on the model of professional mathematicians. The back-to-basics movement advocated mathematics training based in discipline and tradition but nonetheless geared toward preparing students to meet the challenges of the modern world. In both cases, solutions to the problem of training individual minds were solutions to the problems of social order.[47]

Evaluation of the new math was never solely about measures of efficacy. It was also about the different virtues and vices ascribed to mental discipline. Critics and proponents of the new math assumed that mathematics trained students to think. "Textbooks mold nations"—a credo of the Gablers—would have been as sensible to proponents of the SMSG's curriculum reform in the 1950s as it was to conservatives in the 1970s. No one wanted to eliminate math or reduce its role in the curriculum; instead, the disagreement concerned the relevance of mathematics to the cultivation of citizens. Mathematicians, politicians, teachers, and parents saw the math curriculum as a place where debates over the role of intellectual training were grounded and made explicit.[48]

[46] On busing and suburban territorial uprisings, see, for example, Ronald P. Formisano, *Boston against Busing: Race, Class, and Ethnicity in the 1960s and 1970s* (Chapel Hill, 2004), 88–202; and McGirr, *Suburban Warriors,* 217–61. Suleiman Osman, "The Decade of the Neighborhood," in *Rightward Bound: Making America Conservative in the 1970s,* ed. Bruce J. Schulman and Julian E. Zelizer (Cambridge, Mass., 2008), 106–27; Suleiman Osman, *The Invention of Brownstone Brooklyn: Gentrification and the Search for Authenticity in Postwar New York* (New York, 2011), 233–69.

[47] On the emergence of a liberal consensus and debates surrounding it, see Godfrey Hodgson, *America in Our Time: From World War II to Nixon—What Happened and Why* (Garden City, 1976); and Gary Gerstle, "Race and the Myth of the Liberal Consensus," *Journal of American History,* 82 (Sept. 1995), 579–86. On the diversity of the literature on the conservative turn, see Kim Phillips-Fein, "Conservatism: A State of the Field," *Journal of American History,* 98 (Dec. 2011), 723–43; and Julian E. Zelizer, "Rethinking the History of American Conservatism," *Reviews in American History,* 38 (June 2010), 367–92.

[48] Martin, *With God on Our Side,* 121.

For all the heated rhetoric in congressional debates, professional journals, and media coverage, the new-math episode was less visible and consequential than other contentious events of the period.[49] Even so, it remains a cultural landmark, and Tom Lehrer was correct to include it in an album surveying other seminal events of the day. As a catalyst for debates about how and why children should learn to add, the new math is an important thread between the national political ferment of the midcentury United States and the less visible changes in Americans' views about the sources and nature of intellectual discipline and moral authority.

[49] Many poor school districts did not take part in the new-math debates or the back-to-basics movement because they did not have the funds to buy new textbooks, and their course requirements held steady through the period. See, for example, David L. Angus and Jeffrey E. Mirel, "Mathematics Enrollments and the Development of the High School in the United States, 1910–1994," in *A History of School Mathematics,* ed. George M. A. Stanic and Jeremy Kilpatrick (2 vols., Reston, 2003), I, 441–89, esp. 467–71; Robert E. Reys, R. D. Kerr, and John W. Alspaugh, "Mathematics Curriculum Change in Missouri Secondary Schools," *School and Community,* 56 (Dec. 1969), 6–7, 9; and Margaret V. Daly, "Your Child's School and the 'Back to Basics' Movement," *Better Homes and Gardens,* 57 (April 1979), 15–30, esp. 16.