
PREFACE

Perspectives on Curricular Change is a collection of edited interviews with users of 13 *Standards*-based, comprehensive curriculum programs. Three books make up the series, providing perspectives from teachers, administrators, and developers on these curricula at the elementary, middle, and high school levels. *Perspectives on Curricular Change* aims to provide readers with a better understanding of the ways *Standards*-based curricula differ from traditional textbooks, and to offer a glimpse into the experiences of real people who have implemented these programs in their schools or classrooms. The 13 curriculum programs featured in the *Perspectives* series are listed on page 2.

In this series, there are four first-person narratives for each of the curriculum programs. The first features the developer's perspective, which sets some history and context about the program. Two teachers' perspectives follow, and an administrator's perspective closes the set—together these perspectives paint a picture of each program's use within schools and classrooms. To understand more about the genesis of this series, see the "Creating *Perspectives on Curricular Change*" section on page 5.

The 13 curriculum programs featured in the *Perspectives* series were all developed in response to the NCTM *Standards*. Below, we share some history about the *Standards* and the development of these programs, to set a context for the perspectives and stories that follow.

A Brief History

Starting in 1989, the National Council of Teachers of Mathematics (NCTM) issued a set of standards for mathematics teaching and learning. The set included three volumes: *Curriculum and Evaluation Standards for School Mathematics* (1989), *Professional Standards for Teaching Mathematics* (1991), and *Assessment Standards for School Mathematics* (1995).

Constructed from the research and practice of mathematics educators nationwide, the *Standards* broke new ground in education. For years, classroom teachers, researchers, curriculum developers, mathematicians, and professional developers had been examining student learning in mathematics classrooms. This work suggested more effective ways of supporting student learning—for example, some found that allowing students to explore a problem together in a small group encouraged students to consider alternative strategies for approaching problems. NCTM created a Commission on Standards for School Mathematics to help focus theories like this into a unified set of beliefs about the teaching and learning of mathematics. In 1989, NCTM articulated its vision for improving mathematics education by issuing *Curriculum and Evaluation Standards for School Mathematics*, referred to as the NCTM *Standards*.

The resulting NCTM *Standards* defined goals for mathematical literacy and competence for all students, not just those headed toward college degrees in scientific fields. The *Standards* articulated a specific and extensive set of goals and expectations for school mathematics centered around the vision that all students can learn and understand important mathematics concepts and processes. Students would become better mathematical thinkers, argued the *Standards*, if they learned to reason mathematically and understand and communicate about

central mathematical ideas like functions or proportional reasoning. But better learning would require a different type of teaching. NCTM challenged educators to use the *Standards* as a basis for improving mathematics instruction. They encouraged teachers to build their classroom instruction around student inquiry in mathematics by engaging students in active exploration of and reasoning about mathematical problems. In this way, the *Standards* set new goals—both content and pedagogical goals—for exemplary mathematics education.

In the decade since the publication of the NCTM *Standards*, their influence has been strong. Schools nationwide have worked to understand and implement “*Standards-based*” instruction. Ten years of use and interpretation of the *Standards* informed NCTM’s *Principles and Standards for School Mathematics* (PSSM). Released in April 2000, PSSM further refined both the content and process standards that first appeared in the 1989 *Standards*. PSSM describes the importance of helping students develop conceptual understanding and flexibility in five major strands of mathematics (number and operations, algebra, geometry, measurement, data analysis, and probability). Through the five process standards (problem-solving, reasoning and proof, communication, connections, and representation), the *Standards* also focus on appropriate ways for students to develop important mathematical knowledge and skills. Additionally, PSSM defined six “principles” for school mathematics—beliefs about equity, curriculum, teaching, learning, assessment, and technology—that shape and inform the *Standards*. Through the revision and refinement of the *Standards* and the release of PSSM, NCTM continues to work on improving mathematics education in the United States.

NSF-funded, *Standards-based*, comprehensive mathematics curriculum programs:

- *Everyday Mathematics*
- *Investigations in Number, Data and Space*
- *Math Trailblazers*
- *Connected Mathematics* (CMP)
- *Mathematics in Context*
- *MathScape: Seeing and Thinking Mathematically*
- *MATHThematics* (STEM)
- *Middle-school Mathematics through Applications* (MMAP)
- *Contemporary Mathematics in Context* (Core-Plus)
- *Interactive Mathematics Program* (IMP)
- *MATH Connections: A Secondary Mathematics Core Curriculum*
- *Mathematics: Modeling Our World* (ARISE)
- *SIMMS Integrated Mathematics*

Translating the *Standards* into Practice

The developers of the 1989 *Curriculum and Evaluation Standards for School Mathematics* intended the *Standards* to be a blueprint for the design and revision of instructional materials that would support teachers in enacting the vision of the *Standards*. Translating these *Standards* into practice required a new generation of curriculum materials that would help teachers apply the *Standards* in their classrooms; revising existing textbooks could not effect the kinds of changes to content and pedagogy advocated by the *Standards*. Therefore, the National Science Foundation (NSF) earmarked funding in 1990 and solicited proposals for the development of new instructional materials based on the *Standards*. New curriculum materials were crucial for implementation of the *Standards*—developers could design materials to interpret the *Standards’* recommended sequencing of mathematical ideas into a coherent and carefully crafted series of lessons appropriate for students.

Thirteen projects were funded to develop comprehensive, multi-year, *Standards-based* mathematics programs—three projects at the elementary level, and five each at the middle and high school levels. The resulting curricula are the programs represented in the *Perspectives on Curricular Change* series.

The development teams, based at universities and nonprofit educational research and development organizations, included university faculty, practicing teachers, experienced curriculum developers, educational researchers, and technology experts. All of the teams based their writing on the *Standards*, but each program developed into a unique set of materials. Some programs emphasized applications of mathematics or placed mathematics problems in real-world contexts. Others focused on integrating mathematical ideas, or more strongly utilized technology as a learning tool.

The developers knew that, as they created the programs, it was important to see how they worked in classrooms—the materials needed to be effective for both students’ and teachers’ use. Each team piloted and field-tested their program extensively in a range of classrooms. This process—writing, field-testing, and revising—extended over five to six years for all of the 13 programs. During that time period, the writing teams and many of the teachers with whom they worked closely grew as a community, working together on the challenges of designing these materials and supporting their use in schools.

Themes in *Perspectives on Curricular Change*

The narratives in *Perspectives on Curricular Change* were distilled from interviews with people in diverse regions and school settings. Each story seeks to paint a realistic picture of one person’s experience with *Standards*-based reform, so the edits have not altered each interviewee’s unique voice and tone. Despite their differences, however, these individual voices raised some common themes within their stories.

Viewing the teaching and learning of mathematics differently. Shaped by the philosophies of the *Standards*, these 13 curriculum programs create new expectations for students and teachers of mathematics. Interviewees explain the ways these programs have created shifts in perspectives—in their classrooms, schools, and districts—about teachers’ instructional practice and about students’ learning. Teachers tell of identifying new goals for student learning, as well as new professional goals for themselves and their colleagues. Administrators relate the new ways they’ve had to adapt their support and supervision of teachers’ transitions in practice. Many of the stories explain how use of the new curriculum spurred a philosophical change within the school or district.

Thinking strategically about implementation. The teachers, administrators, and curriculum developers who were interviewed—at all grade levels and for all programs—stress the importance of planning strategically for new program implementation. Their stories represent a growing body of knowledge about ways to choose and use new curricula wisely. Since effective use of these programs requires such substantial changes for teachers, students, administrators, and parents, thoughtful implementation is a must: timelines must be carefully planned, high-quality teacher support must be designed and delivered, parents and community members must be kept informed, and new instructional tools, including calculators and manipulatives, must be purchased and used. As the stories illustrate, selecting a new program is only the beginning of the change process—ultimately, students’ success may depend less on which program is selected, and more on how well the new program is used.

Providing support for teachers. The perspectives featured describe ways teachers’ classroom practice should change to support successful implementation of these curricula. For many teachers, these changes are significant and daunting, so professional development to prepare and support them is a necessity. Teacher training needs to balance attention to the practical—How do I make this work in my classroom?—with attention to the big ideas—How are the mathematics content and pedagogical approach different with this new program? For many of the interviewees, the support offered to teachers extends beyond formal workshops to include more informal resources, like building-based assistance with day-to-day classroom needs, or collegial networks of teachers who talk together about the implementation experience. These supports—or their absence—greatly impact the implementation climate in each district.

Building support among stakeholders. Many of the stories in the *Perspectives* emphasize the importance of building support for the curriculum change, not only among mathematics teachers, but also among other members of the school community. Parents need careful introduction to the new materials, which look so different from the mathematics textbooks used when they were in school. Administrators must understand the new program in order to provide appropriate support, and teachers of other subjects need to understand how the new mathematics curriculum's different approach to teaching and learning might affect their own classes. Interviewees share lessons learned by their schools about when and how to inform and involve different stakeholders most effectively.

Aligning the elements of implementation. The stories in *Perspectives* underscore the need for those in leadership roles—math coordinators, principals, lead teachers, and others—to carefully consider how the various pieces of the math program fit together. What are the mathematical goals for students in the district? How are students assessed? What resources are available for purchasing materials and supporting teachers? How do all of these pieces affect—and how are they affected by—the selection and use of new curriculum materials? Perfect alignment of all of these elements is difficult to achieve, but the interviewees emphasize the importance of having school or district leaders committed to working actively toward the best alignment possible.

Creating *Perspectives on Curricular Change*

From winter 1998 through summer 1999, staff from the K–12 Mathematics Curriculum Center interviewed teachers and administrators whose schools or districts had implemented each curriculum featured in *Perspectives on Curricular Change*. We chose interview candidates who had been significantly involved in their school’s or district’s selection and implementation process. We felt that interviews with teachers would help provide pictures of these programs’ real use in classrooms, and administrators would share distinct perspectives on administrative issues accompanying the use of these programs. We asked all interviewees to be candid and detailed about their experiences. In selecting interviewees, we strove to represent a range of realistic—rather than particularly exemplary—implementation experiences, as well as different types and sizes of schools and districts. When possible, we tried to interview people from varied geographic regions for each program.

We also interviewed one or two developers from each program. In these interviews, we hoped to learn some of the history and philosophy from which each program was created. The interviews focus significantly on developers’ beliefs about mathematics and student learning, as well as how those beliefs guided the development of the programs. They describe the mathematical development and instructional approach within each program, and highlight recommendations for implementation.

We felt that the speaker’s voice was an important component of each interview. All of the interviews were tape-recorded and transcribed; from the transcripts, we edited each interview into a more succinct narrative. We took special care to maintain each individual’s spoken tone in the edited narratives.

Please note that each perspective included in this series is solely the perspective of the person interviewed, and does not necessarily represent the perspective or opinion of the school, district, or community from which that person speaks. All interviewees have read their edited interview and approved its inclusion in this series.

Using *Perspectives on Curricular Change*

The *Perspectives on Curricular Change* series is intended to be a resource for districts considering or using *Standards*-based mathematics curricula. The series can supplement other resources for learning about these curricula, including guides for strategic implementation of standards-based instructional materials, and more comprehensive sources of information about individual curriculum programs.¹

Perspectives on Curricular Change can be used for the following:

- showing teachers the ways these programs change their classroom practice;
- highlighting changes in content and pedagogy embedded in these programs;
- introducing new expectations for what students should know and be able to do in mathematics classrooms;
- helping district stakeholders understand the changes these materials bring to mathematics instruction; and
- sharing lessons districts have learned about designing selection and implementation plans for these new curricula.

¹ A K–12 Mathematics Curriculum Center resource, *Choosing a Standards-Based Mathematics Curriculum* (Goldsmith, Mark, Kantrov), provides in-depth guidance and practical tools for selecting and implementing curricula. Available from Heinemann; to order, call (800) 793-2154.