



# Foreword

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**I**N THE past two decades, our profession has seen an explosion of interest in *discourse* as a feature of precollege mathematics classrooms. Whether focused specifically on discourse, or more generally on the notions of mathematical communication and conversation in mathematics classrooms, the strong interest in this aspect of mathematics education is evident in published research papers, in the texts and syllabi associated with teacher preparation courses, and even in such policy documents as the frameworks of state curricula.

In some ways this dramatic growth of professional interest in discourse is not surprising. Although mathematics classrooms have long been places where students learned (or, more commonly, failed to learn) alone and in silence, communication and discourse have had a central place in reformers' vision of desirable mathematics teaching portrayed in early NCTM *Standards* documents (NCTM 1989, 1991). In contrast with the conventional view of mathematics teaching as a transmission of knowledge from the teacher to the students in a classroom, these documents suggest an alternative vision of mathematics classrooms, in which students engage with mathematical ideas and actively construct their understanding. In the conventional version of classroom mathematics, the chief tasks of teaching are transmitting knowledge and ascertaining that students have acquired accurate versions of the transmitted knowledge. In contrast, in the reform-inspired vision of mathematics classrooms, the role of the teacher is diversified to include posing worthwhile and engaging mathematical tasks; managing the classroom intellectual activity, including the discourse; and helping students understand mathematical ideas and monitor their own understanding. Thus, the new role envisioned for mathematics teachers is one closely tied to issues of communication.

*Professional Standards for Teaching Mathematics* (NCTM 1991) identifies six standards for teaching mathematics, of which one is “the teacher’s role in discourse.” To elaborate this standard, many aspects of a teacher’s role in discourse are identified: “posing questions and tasks that elicit, engage and challenge each student’s thinking; listening carefully to each student’s ideas; asking students to clarify and justify their ideas orally and in writing; deciding what to pursue in depth from among the ideas that students bring up during a discussion; deciding when and how to attach mathematical notation and language to students’ ideas; deciding when to provide information, when to clarify an issue, when to model, when to lead, and when to let a student struggle with a difficulty; and monitoring students’ participation in discussions and deciding when and how to encourage each student to participate” (p. 35).

Interest in communication is both more widespread and more central to efforts to reform mathematics education than ever before. Nevertheless, realizing that communication is a central issue for mathematics education is necessary but not sufficient to ensure more frequent use of communication-rich mathematics teaching than has been typical in the past. As Anna Sfard so cleverly put it, “There is more to discourse than meets the ears” (Sfard 2002, p. 13). Even though interest in, and commitment to, communication in mathematics instruction are high, many teachers may struggle with the challenges of implementing these ideas to create the new version of mathematics instruction that occurs in classrooms that are true discourse communities.

As we have come to learn in the past two decades, teaching mathematics with a focus on discourse is a complex, multifaceted undertaking. Mathematics teachers must know, for example, when to simply present information and when to withhold it; when to provide explanations and when to elicit them from students; when to supply notation and language for shared use in the class and when to encourage students to invent symbols; and when to encourage students to speak freely and when to monitor their ideas and challenge them to justify their thinking. As Peg Smith and I noted some years ago, *Professional Standards for Teaching Mathematics* (NCTM 1991) “provides a wonderful image of a ‘last stop’ on a long journey—classrooms as mathematical discourse communities—but it says little about the various paths along which teachers might travel to arrive there or about the challenges they may encounter along the way” (Silver and Smith 1996, p. 21).

To make progress as a field in realizing the vision of communication-rich mathematics classrooms, mathematics educators must understand

not only that challenges are inevitable but also that those challenges will usually not have a single, clear, correct resolution but rather, will present multiple, sometimes confusing or seemingly contradictory, options to consider. As a field we need to understand much more about how the myriad embedded issues play out in classrooms and how they can be managed in ways that let teachers accomplish their instructional goals and that promote students' learning. In our common endeavor to build the knowledge we need to make progress, mathematics teachers who are trying to create classroom discourse communities are essential partners of researchers into communication and discourse in mathematics classrooms.

In this book, the reader will find valuable examples drawn from the work of teachers who have taken seriously the ideas of communication, conversation, and discourse as essential elements of mathematics teaching and learning in the classroom. In each chapter we are privileged to gain access to one teacher's encounter with an important facet of mathematics classroom discourse. In these detailed portraits of teaching, we see how discourse issues and challenges interact with the core work of mathematics teaching: posing problems for students to work on in class, supporting students' productive engagement with mathematical tasks, sharing with students the intellectual work of doing mathematics in the classroom, and analyzing and discussing students' solutions. Incredible richness is found in these chapters—a richness of detail about teaching that is often absent in academic treatments of discourse issues.

Beyond the value of the individual contributions, a special contribution is made by the collective work. Throughout this volume we glimpse a project that engaged teachers in studying and improving teaching. This book offers an all-too-rare portrayal of teachers actively engaged, both individually and collectively, in analyzing mathematics teaching with the goal of improving it.

In this book we also find a valuable example of how mathematics teaching might be improved over time. In the United States, teaching is not commonly treated as an enterprise that can be improved through collective inquiry. Teaching is typically viewed as an individual chore, with each teacher figuring out what works best for him or her. This view appears to doom us to mediocre mathematics teaching forever, depending as it does on whatever teachers can figure out on their own. This view ignores the fact that teachers can improve their practice by carefully studying what they do, learning how they can do it better, and sharing their experiences with others in the field. By engaging all teachers

in studying teaching, the profession as a whole can improve, and in turn, the learning opportunities of students in all classrooms can improve. What makes this book even more remarkable is that the teachers who contributed to this work are secondary school mathematics teachers, a cohort often viewed as uninterested in, and unresponsive to, calls for the reform of mathematics teaching.

Mathematics teaching is a complex, intellectually demanding practice. Improving this practice is equally complex. Mathematics teaching will improve only through the persistent, focused work of teachers who not only do it but also study what they do with an eye toward improving it over time. Researchers and scholars can be partners with teachers in this work, but I would argue that the locus of improvement will likely be the teachers themselves and not the scholars. The editors of this book have provided a paradigm for the profession in how collective inquiry might be organized and orchestrated toward the improvement of teaching.

Reprising the metaphor of the long journey evoked earlier, this book demonstrates what can be accomplished if teachers commit to the value of making the journey, understand that challenges and dilemmas await them along the way, and join with colleagues locally and in the larger mathematics education community. This book offers valuable guidance for the profession—the kind that points to the details of teaching that matter, that does not diminish the intellectual challenge of this work, and that invests in teachers to lead the profession toward improvement.

## References

- National Council of Teachers of Mathematics (NCTM). *Curriculum and Evaluation Standards for School Mathematics*. Reston, Va.: NCTM, 1989.
- . *Professional Standards for Teaching Mathematics*. Reston, Va.: NCTM, 1991.
- Sfard, Anna. “There Is More to Discourse Than Meets the Ears: Looking at Thinking as Communicating to Learn More about Mathematics Learning.” *Educational Studies in Mathematics* 46 (2002): 13–57.
- Silver, Edward A., and Margaret S. Smith. “Building Discourse Communities in Mathematics Classrooms: A Worthwhile but Challenging Journey.” In *Communication in Mathematics: K–12 and Beyond*, 1996 Yearbook of the National Council of Teachers of Mathematics (NCTM), edited by Portia C. Elliott and Margaret J. Kenney, pp. 20–28. Reston, Va.: NCTM, 1996.