

PREFACE

In the last decade, there have been significant advances in the study of students' learning and problem solving in mathematics and in the study of classroom instruction. For the most part, however, these two programs of research have been conducted in relative isolation from one another. There is a growing awareness among researchers that an integrated program of research is needed that takes into account what we know about students' learning and what we know about classroom instruction. This monograph represents the efforts of researchers with diverse backgrounds to address the problem of developing a unified paradigm for studying teaching that builds upon both cognitive and instructional research.

The papers in this monograph approach the problem from different perspectives. Three papers are concerned with how explicit knowledge about students' thinking may be applied to the study of classroom instruction. Carpenter and Fennema as well as Cobb, Yackel, and Wood discuss how knowledge about children's thinking and problem solving may be used to design and study instruction in classrooms. Hiebert and Wearne consider the same basic problem, but they are primarily concerned with the level of knowledge about students' thinking that is necessary to draw implications for instruction. Lampert as well as Post, Harel, Behr, and Lesh build more upon the methods of cognitive research than upon the knowledge gained from that research. They discuss research programs in which paradigms based on cognitive research are applied to the study of classroom instruction and teachers' mathematical

knowledge. Starting with the perspective of a researcher involved in the study of teaching, Grouws points out the importance of building on recent research on classroom instruction in mathematics as well as on cognitive research. The paper by McLeod argues that we must consider affective as well as cognitive factors in our research, and Secada cautions that knowledge of diverse groups must be part of the research equation.

This monograph grew out of a conference sponsored by the National Center for Research in Mathematical Sciences Education (NCRMSE), which is supported by the United States Office of Educational Research and Improvement. The mission of the Center is to provide a research base for the reform movement in school mathematics. The Center is organized into two working groups: The Instruction/Learning Working Group and the Curriculum/Assessment Working Group. The basic problem being addressed by the Instruction/Learning Work Group is how to build relationships between current research on students' cognition and problem solving and research on instruction. The Curriculum/Assessment group is addressing some of the fundamental assumptions and issues raised by the current reform movement, studying current curricular and assessment practices, and investigating the influence of assessment on the curriculum.

The First Wisconsin Symposium for Research on Teaching and Learning Mathematics took place in May 1988 in Madison, Wisconsin, and was sponsored by the Instruction/Learning Work Group. The conference brought together researchers engaged in the study of students' thinking and problem solving and researchers engaged in the study of teaching. The goal of the conference was to initiate a dialogue among researchers with diverse backgrounds who were concerned with the problem of integrating cognitive and instructional research in mathematics education in order to provide direction to research in this area. The papers included in this volume represent only a part of that discussion.

We are indebted to a number of individuals for the success of the conference and the production of this volume. We would like to thank Randolph Philipp and Deborah Carey for their skillful handling of the many administrative details of the conference. We also would like to thank Geri McGinnis for typing the manuscripts and assisting with the conference in a variety of ways. Finally, we thank the entire staff at the Wisconsin Center for Education Research for facilitating not only the conference, but all of the work conducted by the Center.