



Book Series

## *Research in Mathematics Education*

Series Editors

Denisse R Thompson, *University of South Florida*; Mary Ann Huntley, *Cornell University*; Christine Suurtamm, *University of Ottawa*

### **Call for Proposals**

#### **EDITORS**

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Mary Ann Huntley (Cornell University, huntley@math.cornell.edu)

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Scholars in many countries are involved in researching effective approaches to the teaching and learning of mathematics. Each book in the series, *Research in Mathematics Education*, focuses on a theme that is of interest to a broad range of audiences, including researchers, professional development providers, teacher educators, curriculum developers, and classroom teachers.

The editors are currently inviting proposals from a variety of perspectives at all levels of schooling. Any high-quality research that addresses an important issue in mathematics education and is of interest to an international audience will be considered. Some topics for which there is particular interest include (but are not limited to) the following: curriculum, assessment, equity in addressing diverse learners, research on the teaching and learning of particular content strands, teacher education (along the entire continuum, from preparation to induction to professional development of practicing teachers), and models of and research into effectiveness of alternative paths to teacher certification.

The editors also welcome proposals with the purpose of sharing research that has been discussed at conferences in order to make it available to a wide audience. In this way, papers can be presented in more detail or extended further than is often possible at conferences.

#### **Books in this series:**

- International Perspectives on Mathematics Teacher Education
- Researching Pedagogy and Practice with Canadian Mathematics Teachers
- International Perspectives on Mathematics Curriculum
- Digital Curricula in School Mathematics
- Approaches to Studying the Enacted Mathematics Curriculum
- Variability is the Rule
- Language and Mathematics Education
- A Five-Year Study of the First Edition of the Core-Plus Mathematics Curriculum
- Future Curricular Trends in School Algebra And Geometry

- A Decade of Middle School Mathematics Curriculum Implementation
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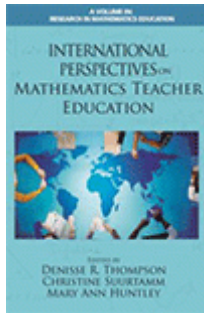
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# International Perspectives on Mathematics Teacher Education

Denisse R Thompson, University of South Florida; Christine Suurtamm, University of Ottawa; Mary Ann Huntley, Cornell University

2021. Paperback 978-1-64802-629-4 \$45.99. Hardcover 978-1-64802-630-0 \$85.99. eBook 978-1-64802-631-7 \$74.

Mathematics teacher education includes the mathematics content teachers need to understand, ways that pedagogical approaches are developed, messages about the nature of mathematics teaching and learning, and interfaces between tertiary preparation and school contexts. Scholars from Sweden, France, Malawi, Singapore, New Zealand, Brazil, the USA, and Canada provide insights for the mathematics education community's understanding of how teacher educators structure, develop, and implement their respective mathematics teacher education programs. Several themes emerged across the chapters, including: varied approaches to developing culturally responsive pedagogies and/or Indigenous perspectives; issues and challenges in fostering partnerships and collaborations; strategies for developing mathematics knowledge for teaching; and preparing flexible and resourceful teachers.

## Praise for International Perspectives on Mathematics Teacher Education:

*"International Perspectives on Mathematics Teacher Education explores different facets of mathematics teacher education in eight countries across five continents. The authors and editors answer important questions and open the door to critical conversations about policies and practices related to mathematics teacher recruitment, preparation, and professional development, among other topics. Every reader will develop new perspectives as they learn how one institution is engaging with Indigenous perspectives while other countries struggle with an insufficient supply of certified teachers. This book clearly demonstrates challenges, constraints, nuances and complexities to initiating and maintaining improvement across systems to enhance the work and spaces of mathematics teachers within different historical, cultural, social, and political contexts. This volume also generates ideas and opportunities for leaders, policymakers, and teacher educators to consider and learn from international colleagues about different approaches to mathematics teacher education practice and policy. Undoubtedly, debates about standards, content and experiences in programs, and accountability structures such as accreditation will continue. It is clear from the insights in this volume that strengthening mathematics teacher education will require stronger collaborations, frameworks, policies, infrastructure, and investments on a global scale and it will be critical to collaborate with and learn from colleagues in international settings. These conversations will require reciprocity, interdependence, and resilience as we pursue the ultimate goal of equipping the field of mathematics teacher education."*

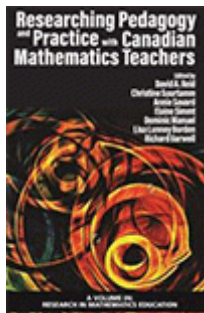
Kathryn Chval

Dean, College of Education

Professor of Mathematics Education

University of Illinois Chicago

**CONTENTS:** Preface. Questions Facing Mathematics Teacher Education: An Introduction to the Volume, *Christine Suurtamm, Mary Ann Huntley, Denisse R. Thompson*. The Crosscurrents of Swedish Mathematics Teacher Education, *Iben Maj Christiansen, Anette de Ron, Andreas Ebbelind, Susanne Engström, Susanne Frisk, Cecilia Kilhamn, Veronica Jatko Kraft, Yvonne Liljekvist, Mathias Norqvist, Rimma Nyman, Lisa Österling, Hanna Palmér, Anna Pansell, Astrid Pettersson, Kerstin Pettersson, Inger Ridderlind, Christina Skodras, Kicki Skog, Lovisa Sumpter*. Teacher Training in Mathematics in France, *Nadine Grapin, Nathalie Sayac*. Mathematics Teacher Education in Malawi, *Everton Lacerda Jacinto, Mercy Kazima, Arne Jakobsen, Raymond Bjuland*. Mathematics Teacher Education in Singapore, *Eng Guan Tay, Berinderjeet Kaur*. Mathematics Teacher Education in Aotearoa New Zealand, *Glenda Anthony, Raewyn Eden*. Education of Teachers who Teach Mathematics in Brazil, *Celi Espasandin Lopes, Adair Mendes Nacarato*. Mathematics Teacher Education in the United States with a Focus on Innovations in Recruitment and Equitable Instructional Practices, *Amy Roth McDuffie, Tariq Akmal, Mary Q. Foote*. Mathematics Teacher Education in Canada: Emerging Possibilities in Engaging with Indigenous Perspectives, *Florence Glanfield, Christopher Charles*. Reflections on Commonalities and Challenges in Mathematics Teacher Education Across Eight Countries, *Mary Ann Huntley, Denisse R. Thompson, Christine Suurtamm*. Biographies.



## Researching Pedagogy and Practice with Canadian Mathematics Teachers

David A Reid, Universitetet i Agder; Christine Suurtamm, University of Ottawa; Annie Savard, McGill University; Elaine Simmt, University of Alberta; Dominic Manuel, University of Alberta; Lisa Lunney Borden, St. Francis Xavier University; Richard Barwell, University of Ottawa

2020. Paperback 978-1-64802-137-4 \$45.99. Hardcover 978-1-64802-138-1 \$85.99. eBook 978-1-64802-139-8 \$74.

The past two decades have seen an increased interest in education, especially in core areas such as mathematics, language and science. This is in part a consequence of the increase in the number of international comparisons of educational outcomes, such as PISA and TIMSS. Much research has focused on the contributions that curricula, financial resources, parental support, and so on, might have on educational outcomes. A factor that seems likely to have a very significant effect on student achievement, teachers' practices and beliefs, has received little attention.

This book reports results from a research program that sought to develop and employ research methods to compare teachers' practices and beliefs across Canada. It provides insight into the challenge of such research, and describes teachers' contexts, beliefs and practices, and how they differ, in four regions and across two languages.

Using a multivocal ethnography approach (Tobin, 1999) teachers were involved in the preparation and discussion of videos of their own teaching and that of others. This approach resulted in not only insights into the teachers' pedagogies and practices, but also opportunities for the teachers to reflect on their own teaching in new ways, and for researchers to reflect on research practices and orientations.

The work is innovative in several ways. In a field crowded with research on teachers' practices, beliefs and knowledge this research helps to unearth the implicit values that underlie the way teachers see teaching itself. Through the process of observation of each other's practice, the teachers became aware of their own pedagogies, giving them new insights into their values and practices. Researchers also engaged in a parallel process of reflection on their own practices as observers of teachers, with similar insights into the values guiding their work.

This book will be of interest to government policy makers, teachers and teacher educators, as well as researchers in Mathematics Education. Members of the AERA SIG in Research in Mathematics Education, the Canadian Mathematics Education Study Group, the NCTM, and provincial Mathematics teacher associations are potential readers.

### **Praise for Researching Pedagogy and Practice with Canadian Mathematics Teachers:**

*What a treasure! This book is an important resource for anyone interested in high quality mathematics teaching. It fills a gap in our understanding of how mathematics is taught across Canada, where students are among the highest performing on international mathematics assessments. The studies reported are conceptually grounded, methodologically rigorous, and filled with nuanced observations of the similarity and variation in classroom teaching across many of the Canadian provinces.*

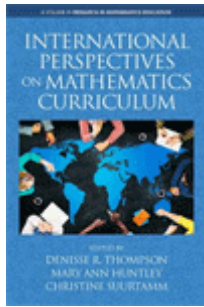
Edward A. Silver

Senior Associate Dean for Research & Graduate Studies

William A. Brownell Collegiate Professor of Education

& Professor of Mathematics University of Michigan

**CONTENTS:** Acknowledgments. Preface, *David A. Reid*. Observing Teachers: Comparing Middle School Teachers' Pedagogies in Four Regions of Canada, *David A. Reid*. **PART I:** Introduction to Part I: Pedagogy as Engagement, *Elaine Simmt*. Nested Noticing: Valuing Voice, *Christine Suurtamm and Brenna Quigley*. Observing Teachers with Different Lenses: Where to Situate Them? *Annie Savard, Dominic Manuel, Sophie Pinard, Scosha Merovitz, and Vandana Chandrasekhar*. Discussing Fractions: Teacher Conversations about their Teaching Practices, *Sophie Pinard, Dominic Manuel, and Annie Savard*. **PART II:** Introduction to Part II: Seeking Similarities in Pedagogy. "I Do That Too" Teachers' Constructions of Shared Mathematics Pedagogy, *Richard Barwell and Lisa Lunney Borden*. Similarities and Differences in Pedagogy: A Thematic Analysis, *Lisa Lunney Borden and Ellen Carter*. Seeking Patterns in Pedagogy: A Topical Analysis, *David A. Reid*. Postscript to Part II: A Commentary on Our Analyses. **PART III:** Introduction to Part III: Reflecting on Observing Teachers. Listening to the Teachers' Perspectives: Dialogue on Research Participation and Growth, *Terry Wan Jung Lin, Annie Savard, Claudia Anzovino, Kathryn Sides Blanchard, and Dominic Manuel*. Researching Mathematics Pedagogy, *Richard Barwell, Lisa Lunney Borden, Dominic Manuel, David A. Reid, Annie Savard, Elaine Simmt, and Christine Suurtamm*. Observing the Observers: Reflections on Our Research, *David A. Reid*. Editor and Author Biographies.



## International Perspectives on Mathematics Curriculum

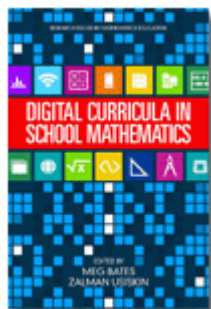
Denisse R Thompson, University of South Florida; Mary Ann Huntley, Cornell University; Christine Suurtamm, University of Ottawa

2018. Paperback 978-1-64113-043-1 \$45.99. Hardcover 978-1-64113-044-8 \$85.99. eBook 978-1-64113-045-5 \$74.

Curriculum can be defined in a variety of ways. It might be viewed as a body of knowledge, a product, or a process. Curricula can differ as they are conceptualized from various theoretical perspectives to address the needs of teachers, students, and the context of schooling. One reason to study curriculum is “to reveal the expectations, processes and outcomes of students’ school learning experiences that are situated in different cultural and system contexts. ... further studies of curriculum practices and changes are much needed to help ensure the success of educational reforms in the different cultural and system contexts” (Kulm & Li, 2009, p. 709).

This volume highlights international perspectives on curriculum and aims to broaden the wider mathematics education community’s understandings of mathematics curriculum through viewing a variety of ways that curricula are developed, understood, and implemented in different jurisdictions/countries. Within this volume, we define curriculum broadly as the set of mathematics standards or outcomes, the messages inherent in mathematics curriculum documents and resources, how these standards are understood by a variety of stakeholders, and how they are enacted in classrooms. The focus is on the written, implied, and enacted curriculum in various educational settings throughout the world.

**CONTENTS:** Preface. What Might Be Learned From Examining Curricular Perspectives Across Countries? *Christine Suurtamm, Mary Ann Huntley, and Denisse R. Thompson*. Primary School Mathematics in the Netherlands: The Perspective of the Curriculum Documents, *Marc van Zanten and Marja van den Heuvel-Panhuizen*. Curriculum in France: A National Frame in Transition, *Ghislaine Guedet, Lætitia Bueno-Ravel, Simon Modeste, and Luc Trouche*. Mathematics Curriculum: The Case of Finland, *Kirsti Hemmi, Heidi Krzywacki, and Anna-Maija Partanen*. Curriculum in Canada: A Fractal Interpretation Using the Case of Alberta, *Elaine Simmt*. Mathematics Curriculum in the United States: New Challenges and Opportunities, *Janine Remillard and Luke Reinke*. A South African Perspective on the Mathematics Curriculum: Towards A Transcending Metacognitive Ideology, *Divan Jagals and Marthie van der Walt*. Discussing the Mathematics Curriculum in Brazil, *Celi Espasandin Lopes and Regina Célia Grando*. The Korean Mathematics Curriculum: Characteristics and Challenges, *Kyeong-Hwa Lee, JinHyeong Park, and Na-Young Ku*. Transcending Boundaries: What Have We Learned? *Mary Ann Huntley, Christine Suurtamm, and Denisse R. Thompson*. About the Editors. About the Contributors.



## Digital Curricula in School Mathematics

Meg Bates, The University of Chicago; Zalman Usiskin, The University of Chicago

2016. Paperback 9781681234113 \$45.99. Hardcover 9781681234120 \$85.99. eBook 9781681234137 \$74.

The mathematics curriculum - what mathematics is taught, to whom it is taught, and when it is taught - is the bedrock to understanding what mathematics students can, could, and should learn. Today’s digital technology influences the mathematics curriculum in two quite different ways. One influence is on the delivery of mathematics through hardware such as desktops, laptops, and tablets. Another influence is on the doing of mathematics using software available on this hardware, but also available on the internet, calculators, or smart phones.

These developments, rapidly increasing in their availability and decreasing in their cost, raise fundamental questions regarding a mathematics curriculum that has traditionally been focused on paper-and-pencil work and taught in many places as a set of rules to be practiced and learned.

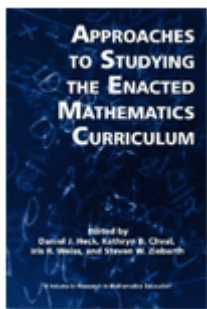
This volume presents the talks given at a conference held in 2014 at the University of Chicago, sponsored by the Center for the Study of Mathematics Curriculum. The speakers - experts from around the world and inside the USA - were asked to discuss one or more of the following topics:



- changes in the nature and creation of curricular materials available to students
- transformations in how students learn and how they demonstrate their learning
- rethinking the role of the teacher and how students and teachers interact within a classroom and across distances from each other

The result is a set of articles that are interesting and captivating, and challenge us to examine how the learning of mathematics can and should be affected by today's technology.

**CONTENTS:** Preface. Welcoming Remarks. **PART I—CREATING DIGITAL CURRICULUM.** Designing Curriculum for Digital Middle Grades Mathematics: Personalized Learning Ecologies, *Jere Confrey*. Developing and Implementing “Smart” Mathematics Textbooks in Korea: Issues and Challenges, *Hee-chan Lew*. Technology-Enhanced Teaching/Learning at a New Level with Dynamic Mathematics as Implemented in the New Cabri, *Jean-Marie Laborde*. The Re-Sourcing Movement in Mathematics Teaching: Some European Initiatives, *Kenneth Ruthven*. Inquiry Curriculum and E-Textbooks: Technology Changes that Challenge the Representation of Mathematics Pedagogy, *Michal Yerushalmy*. **PART II—IMPLEMENTING DIGITAL CURRICULUM.** Connections and Distinctions among Today's Digital Innovations and Yesterday's Innovative Curricula, *Valerie L. Mills*. Technology to Support Mathematics Instruction: Examples from the Real World, *Loretta J. Asay*. We Thought We Knew It All, *Josephus Johnson*. Deeply Digital Curriculum for Deeply Digital Students, *Brian Lemmen*. **PART III—RESEARCHING DIGITAL CURRICULUM.** Analysis of Eight Digital Curriculum Programs, *Jeffrey Choppin*. A Design Experiment of a Deeply Digital Instructional Unit and its Impact in High School Classrooms, *Alden J. Edson*. Keeping an Eye on the Teacher in the Digital Curriculum Race, *Janine Remillard*. New Starting Points for Number Sense Using TouchCounts, *Nathalie Sinclair*. **PART IV—BROADER CONSIDERATIONS ABOUT DIGITAL CURRICULUM.** Digitally Enhanced Learning, *Philip Daro*. Mathematics Standards and Curricula under the Influence of Digital Affordances – Different Notions, Meanings and Roles in Different Parts of the World, *Mogens Niss*. Mathematics Curriculum, Assessment and Teaching for Living in the Digital World: Computational Tools in High Stakes Assessment, *Kaye Stacey*. Mathematics Education is at a Major Turning Point, *David Moursund*. Deeply Digital STEM Learning, *Chad Dorsey*. Closing Remarks, *Zalman Usiskin*.



## Approaches to Studying the Enacted Mathematics Curriculum

Dan Heck, Horizon Research, Inc.; Kathryn Chval, University of Missouri; Iris Weiss, Horizon Research, Inc.; Steven W. Ziebarth, Western Michigan University

2012. Paperback 978-1-61735-877-7 \$45.99. Hardcover 978-1-61735-878-4 \$85.99. eBook 978-1-61735-879-1 \$74.

Curriculum materials are among the most pervasive and powerful influences on school mathematics. In many mathematics classes, student assignments, the questions the teacher asks, the ways students are grouped, the forms of assessment, and much more originate in curriculum materials. At the same time, teachers have considerable latitude in how they use their curriculum materials. Two classes making use of the same materials may differ markedly in what mathematics content is emphasized and how students are engaged in learning that content. This volume considers a variety of research tools for investigating the enactment of mathematics curriculum materials, describing the conceptualization, development, and uses of seven sets of tools. Mathematics education researchers, curriculum developers, teacher educators, district supervisors, teacher leaders, and math coaches will find insights that can improve their work, and guidance for selecting, adapting, and using tools for understanding the complex relationship between curriculum materials and their enactment in classroom instruction.

**CONTENTS:** Preface. Acknowledgments. Introduction, *Daniel J. Heck, Kathryn B. Chval, Iris R. Weiss, and Steven W. Ziebarth*. Instruments Used by the University of Chicago School Mathematics Project to Study the Enacted Curriculum, *Denisse R. Thompson and Sharon L. Senk*. Using Concerns-Based Adoption Model Theory to Develop Tools to Examine Variations in Mathematics Textbook Implementation, *Mary Ann Huntley*. Developing Measures of Fidelity of Implementation for Mathematics Curriculum Materials Enactment, *Daniel J. Heck, Kathryn B. Chval, Iris R. Weiss, and Steven W. Ziebarth*. The Development of Multiple Measures of Curriculum Implementation in Secondary Mathematics Classrooms: Insights From a Three-Year Curriculum Evaluation Study, *James E. Tarr, Melissa D. McNaught, and Douglas A. Grouws*. Measuring Implementation of Instructional Materials to Support Conceptual Understanding and Accumulation of Knowledge, *Jeanne R. Century, Cassie Freeman, and Mollie Rudnick*. A Tool for Analyzing Instructional Practices and Curriculum Materials in the Context of Specific Mathematics Learning Goals, *Linda Dager Wilson and Jo Ellen Roseman*. The Surveys of Enacted Curriculum as a Measure of Implementation, *Jennifer McMaken and Andrew C. Porter*. Issues to Consider in Measuring Enactment of Curriculum Materials, *Daniel J. Heck, Kathryn B. Chval, Iris R. Weiss, and Steven W. Ziebarth*. About the Authors.



## Variability is the Rule A Companion Analysis of K-8 State Mathematics Standards

John P. Smith, Michigan State University

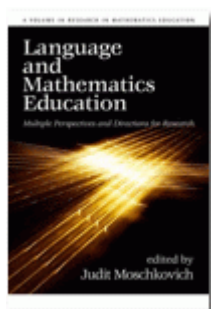
2010. Paperback 978-1-61735-197-6 \$45.99. Hardcover 978-1-61735-198-3 \$85.99. eBook 9781617351990 \$74.

In response to No Child Let Behind, states have developed mathematics curriculum frameworks that outline their intended curriculum for grades K-8. While some have indicated that districts or individual schools may use their framework as a model for specific curricular programs, others have taken a more prescriptive or even mandatory stance. Collectively, these frameworks present a sense of the national mathematics program and what we expect students learn.

This volume follows *The Intended Curriculum as Represented in State Mathematics Curriculum Standards: Consensus or Confusion?* (Reys). While the Reys volume focused on number and operations, algebra and reasoning strands, the Smith volume analyzes geometry, measurement, probability, and statistics strands. It also presents an analysis what verbs used tell us about the cognitive demand of grade level expectations. This volume, even more than the Reys volume, emphasizes the theme of variability in the content, expression, and clarity of grade level expectations across the states.

As the nation moves toward implementation of the Common Core Standards, this volume highlights some of the challenges teachers and other school personnel face in interpreting mathematics grade-level standards as goals for classroom teaching. The shift from 50 state standards to one document does not resolve this basic challenge.

**CONTENTS:** Acknowledgments. 1. Introduction: An Analysis of State Standards in Two Mathematical Domains, *John P. Smith III, Gregory Larnell, and James E. Tarr*. 2. An Analysis of K-8 Measurement Grade Level Expectations, *Sarah E. Kasten and Jill Newton*. 3. The Treatment of Transformations in K-8 Geometry and Measurement Grade Level Expectations, *Sasha Wang and John P. Smith III*. 4. An Examination of K-8 Geometry State Standards Through the Lens of the van Hiele Levels of Geometric Thinking, *Jill Newton*. 5. Verbs and Cognitive Demand in K-8 Geometry and Measurement Grade Level Expectations, *Gregory V. Larnell and John P. Smith III*. 6. The Statistical Process: A View Across K-8 State Standards, *Jill Newton, Aladar Horvath, & Leslie Dietiker*. 7. An Analysis of K-8 Probability Standards, *Shannon Dingman and James E. Tarr*. 8. Major Lessons from the Second Round of Standards Analyses, *John P. Smith III, Glenda T. Lappan, and James E. Tarr*. Appendices. References. About the Authors.



## Language and Mathematics Education Multiple Perspectives and Directions for Research

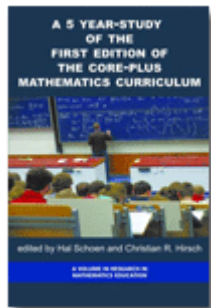
Judit N. Moschkovich, University of California at Santa Cruz

2010. Paperback 978-1-61735-159-4 \$45.99. Hardcover 978-1-61735-160-0 \$85.99. eBook 9781617351617 \$74.

Issues of language in mathematics learning and teaching are important for both practical and theoretical reasons. Addressing issues of language is crucial for improving mathematics learning and teaching for students who are bilingual, multilingual, or learning English. These issues are also relevant to theory: studies that make language visible provide a complex perspective of the role of language in reasoning and learning mathematics. What is the relevant knowledge base to consider when designing research studies that address issues of language in the learning and teaching of mathematics? What scholarly literature is relevant and can contribute to research? In order to address issues of language in mathematics education, researchers need to use theoretical perspectives that integrate current views of mathematics learning and teaching with current views on language, discourse, bilingualism, and second language acquisition. This volume contributes to the development of such integrated approaches to research on language issues in mathematics education by describing theoretical perspectives for framing the study of language issues and methodological issues to consider when designing research studies. The volume provides interdisciplinary reviews of the research literature from four very different perspectives: mathematics education (Moschkovich), Cultural-Historical-Activity Theory (Gutiérrez, Sengupta-Irving, & Dieckmann), systemic functional linguistics (Schleppegrell), and assessment (Solano-Flores). This volume offers graduate students and researchers new to the study of language in mathematics education an introduction to resources for conceptualizing, framing, and designing research studies. For those already involved in examining language issues, the

volume provides useful and critical reviews of the literature as well as recommendations for moving forward in designing research. Lastly, the volume provides a basis for dialogue across multiple research communities engaged in collaborative work to address these pressing issues.

**CONTENTS:** Foreword, *David Pimm*. Preface, *Judit N. Moschkovich*. 1 Language(s) and Learning Mathematics: Resources, Challenges, and Issues for Research., *Judit N. Moschkovich*. 2 Developing a Mathematical Vision: Mathematics as a Discursive and Embodied Practice, *Kris D. Gutiérrez, Tesha Sengupta-Irving, and Jack Dieckmann*. 3 Language in Mathematics Teaching and Learning: A Research Review, *Mary J. Schleppegrell*. 4 Function and Form in Research on Language and Mathematics Education, *Guillermo Solano-Flores*. 5 Recommendations for Research on Language and Mathematics Education, *Judit N. Moschkovich*. Afterword, *Beth Warren*. Contributors.



## A Five-Year Study of the First Edition of the Core-Plus Mathematics Curriculum

Harold Schoen; Steven W. Ziebarth, Western Michigan University; Christian R. Hirsch, Western Michigan University; Allison BrckaLorenz

2010. Paperback 978-1-60752-413-7 \$65.99. Hardcover 978-1-60752-414-4 \$95.99. eBook 9781607524151 \$74.

The study reported in this volume adds to the growing body of evaluation studies that focus on the use of NSF-funded Standards-based high school mathematics curricula. Most previous evaluations have studied the impact of field-test versions of a curriculum. Since these innovative curricula were so new at the time of many of these studies, students and teachers were relative novices in their use. These earlier studies were mainly one year or less in duration. Students in the comparison groups were typically from schools in which some classes used a Standards-based curriculum and other classes used a conventional curriculum, rather than using the Standards-based curriculum with all students as curriculum developers intended.

The volume reports one of the first studies of the efficacy of Standards-based mathematics curricula with all of the following characteristics:

- The study focused on fairly stable implementations of a first-edition Standards-based high school mathematics curriculum that was used by all students in each of three schools.
- It involved students who experienced up to seven years of Standards-based mathematics curricula and instruction in middle school and high school.
- It monitored students' mathematical achievement, beliefs, and attitudes for four years of high school and one year after graduation.
- Prior to the study, many of the teachers had one or more years of experience teaching the Standards-based curriculum and/or professional development focusing on how to implement the curriculum well.
- In the study, variations in levels of implementation of the curriculum are described and related to student outcomes and teacher behavior variables.

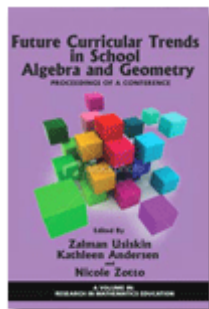
Item data and all unpublished testing instruments from this study are available at [www.wmich.edu/cpmp/](http://www.wmich.edu/cpmp/) for use as a baseline of instruments and data for future curriculum evaluators or Core-Plus Mathematics users who may wish to compare results of new groups of students to those in the present study on common tests or surveys. Taken together, this volume, the supplement at the CPMP Web site, and the first edition Core-Plus Mathematics curriculum materials (samples of which are also available at the Web site) serve as a fairly complete description of the nature and impact of an exemplar of first edition

NSF-funded Standards-based high school mathematics curricula as it existed and was implemented with all students in three schools around the turn of the 21st century.

**CONTENTS:** Preface. Acknowledgments. **PART I: BACKGROUND.** The Core-Plus Mathematics Curriculum: Design and Development. Review of Related Literature. Method and Procedures. Teachers and the Curriculum. **PART II: YEARLY PATTERNS IN STUDENT ACHIEVEMENT.** Achievement Patterns in Year 1: Four Content Strands. Achievement Patterns in Year 2: Algebra and Functions. Achievement Patterns in Year 3: Mathematical Literacy. Achievement Patterns in Year 4: Advanced Mathematics, Reasoning, and Proof. **PART III: ATTITUDES, BELIEFS, AND CONCEPTIONS OF**



**STUDENTS.** Attitudes About the Curriculum and Pedagogy: Years 1 and 2. Beliefs and Conceptions About Mathematics: Years 1-4. **PART IV: POST-HIGH SCHOOL SURVEY, INDIVIDUAL CASES, AND PERSPECTIVES.** Performance in Post-High School Educational Institutions. Longitudinal Experiences of Three Students. Description and Effects of a Local Controversy. Summary and Interpretations.



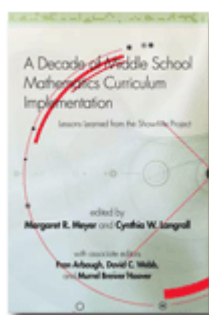
## Future Curricular Trends in School Algebra And Geometry Proceedings of A Conference

Zalman Usiskin, The University of Chicago; Kathleen Andersen; Nicole Zotto

2010. Paperback 978-1-61735-006-1 \$45.99. Hardcover 978-1-61735-007-8 \$85.99. eBook 9781617350085 \$74.

This volume contains papers from the Second International Curriculum Conference sponsored by the Center for the Study of Mathematics Curriculum (CSMC). The intended audience includes policy makers, curriculum developers, researchers, teachers, teacher trainers, and anyone else interested in school mathematics curricula.

**CONTENTS:** Preface. Introduction. Early Algebraic Thinking: The Case of Equivalence in an Early Algebraic Context, *Elizabeth Warren*. A Brief Essay on the Need to Consider the “Superficial” Aspects of Learning Algebra, *Romulo Lins*. Early Algebra, *Maria Blanton*. A Davydov Approach to Early Mathematics, *Barbara J. Dougherty*. Technology and the Yin and Yang of Teaching and Learning Mathematics, *Bernhard Kutzler*. CAS and the Future of the Algebra Curriculum, *Kaye Stacey*. Algebra in the Age of CAS: Implications for the High School Curriculum Examples from the CME Project, *Al Cuoco*. A Perspective on the Future of Computer Algebra Systems in School Algebra, *M. Kathleen Heid*. Three-Dimensional Citizens Do not Deserve a Flatlanders’ Education: Curriculum and 3-D Geometry, *Claudi Alsina*. Manipulating 3-D Objects in a Computer Environment, *Jean-Marie Laborde*. Algebra and Geometry, from Two to Three Dimensions, *Thomas F. Banchoff*. Thoughts on Elementary Students’ Reasoning about 2-D Arrays of Cubes and Polyhedra, *Michael T. Battista*. Linking Geometry and Algebra in the School Mathematics Curriculum, *Keith Jones*. Linking Geometry and Algebra through Dynamic and Interactive Geometry, *Colette Laborde*. Linking Algebra and Geometry: The Dynamic Geometry Perspective, *Nicholas Jackw*. Linking Algebra and Geometry in the Interactive Mathematics Program, *Diane Resek*. Making Future Trends Realities in U.S. Classrooms, *Diane J. Briars*. Tools, Technologies, and Trajectories, *Douglas H. Clements*. Future Trends in School Algebra and Geometry: Reflections on the Vision of Experts, *James Fey*. Thoughts from a Classroom Teacher, *Jim Mamer*. Restoring and Balancing, *William McCallum*. Insights into Dynamic Mathematical Learning Environments, *Sarah J. Hicks, Melissa D. McNaught, and J. Matt Switzer*. Instrumental Genesis and Future Research in School Algebra and Geometry, *Daniel J. Ross*. Closing Remarks, *Zalman Usiskin*. Conference Program and Biographies of Presenters.



## A Decade of Middle School Mathematics Curriculum Implementation Lessons Learned from the Show-Me Project

Margaret R. Meyer, University of Wisconsin-Madison; Cynthia W. Langrall, Illinois State University

2008. Paperback 978-1-60752-012-2 \$45.99. Hardcover 978-1-60752-013-9 \$85.99. eBook 9781607528104 \$74.

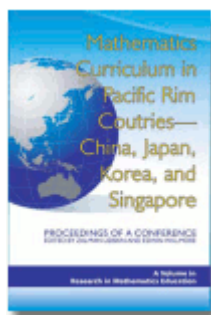
Associate Editors **Fran Arbaugh**, University of Missouri-Columbia, **David C. Webb**, University of Colorado at Boulder and **Murrel Brewer Hoover**, WVSTEM Center @ Marshall University

The purpose of this book is to document the work of the Show-Me Project (1997-2007) and to highlight lessons learned about curriculum implementation. Although the Show-Me Project was charged with promoting the dissemination and implementation of four distinct comprehensive curriculum programs (Connected Mathematics, Mathematics in Context, MathScape, and MathThematics), most of the lessons learned from this work are not curriculum specific. Rather, they cut across the four programs and share commonalities with standards-based curriculum reform at any level. We believe that documenting these lessons learned will be one of the legacies of the Show-Me Project.

We anticipate that the comprehensive nature of this work will attract readers from multiple audiences that include state

and district mathematics supervisors, middle grades mathematics teachers and administrators involved in curriculum reform, as well as mathematics teacher educators. Those about to embark on the review of curriculum materials will appreciate reading about the processes employed by other districts. Readers with interests in a particular curriculum program will be able to trace the curriculum-specific chapters to gain insights into how the design of the curricula relate to professional development, adoption and implementation issues, and teachers' personal experience using the curriculum materials. Individuals who provide professional development at the middle grades level will find chapters that they can use for both general and focused discussions. Teachers at all stages of implementation will recognize their own experiences in reading and reflecting on the stories of teacher change. Mathematics educators will find ideas on how these curricula can be used in the preparation of preservice middle grades teachers.

**CONTENTS:** Preface. **PART I: SETTING THE STAGE.** The Road to Reform, *Robert Reys*. The Genesis of the NSF Curriculum Implementation Centers, *John S. (Spud) Bradley*. The Show-Me Project: A Decade of Support for Standards-Based Curriculum Implementation, *Barbara Reys*. **PART II: ADOPTION CASE STUDIES AND IMPLEMENTATION STORIES.** Teacher Investment in Curriculum Adoption: The Role of Piloting Materials, *Cary Tuckey*. Consensus Building: A Key Component of Curriculum Adoption, *Cheryl Rectanus*. The Critical Work of a Review Committee in Curriculum Adoption, *Leslie E. J. Nielsen*. Informing a State Adoption Process Through Curriculum Implementation, *Murrel Brewer Hoover*. Curriculum Implementation Through Teacher Collaboration, *Chip Sharp*. Curriculum Implementation: Teachers on a Journey, *Carol Den Otter*. The Role of Teacher Leaders in Curriculum Implementation, *Emily R. Fagan and Rhonda K. Weinstein*. Supporting Curriculum Implementation Through Its Ups and Downs, *Linda A. Tetley*. When Things Go Wrong in Curriculum Implementation, *Jane O. Swafford and Cynthia W. Langrall*. Issues of Implementation: Making Mathematics Accessible to All Learners, *Jennifer M. Bay-Williams and Rebecca McGraw*. **PART III: PROFESSIONAL DEVELOPMENT AND TEACHER EDUCATION.** An Overview of Professional Development, *Elizabeth Phillips, Glenda Lappan, Yvonne Grant, and Fran Arbaugh*. Key Features of Connected Mathematics for Professional Development, *Elizabeth Phillips and Glenda Lappan*. Key Features of Mathematics in Context for Professional Development, *David C. Webb*. Key Features of MathScape for Professional Development, *Fred Gross and Emily R. Fagan*. Key Features of Middle Grades Mathematics for Professional Development, *Rick Billstein and Jim Williamson*. Teachers' Needs at Different Phases of Curriculum Implementation, *Fran Arbaugh*. Professional Development for Administrators: What They Need to Know to Support Curriculum Adoption and Implementation, *Margaret R. Meyer and Fran Arbaugh*. A Story of Teacher Growth: Increasing Expectations, *Jane Peterson Porath*. A Story of Teacher Growth: Teacher as Learner, *Barbara Dilegghio*. A Story of Teacher Growth: Making a Difference, *Kelly Watts*. A Story of Teacher Growth: From Telling to Facilitating, *Fabienne Anderson*. Research Mathematician and Mathematics Educator: A Foot in Both Worlds, *Ira J. Papick*. Using NSF-Funded Mathematics Curricula to Enhance Teacher Preparation, *Jeffrey Frykholm*. NSF-funded Mathematics Curricula in the Field: A Preservice Teacher's Opportunity to See Theory in Practice, *Ann Bledsoe*. **PART IV: WHAT HAVE WE LEARNED AND WHERE DO WE GO FROM HERE?** Lessons Learned from the Show-Me Project, *Barbara Reys*. Looking into the Future: Curriculum Challenges for the Next Ten Years, *Margaret R. Meyer and Cynthia W. Langrall*. References.



## Mathematics Curriculum in Pacific Rim Countries - China, Japan, Korea, and Singapore Proceedings of a Conference

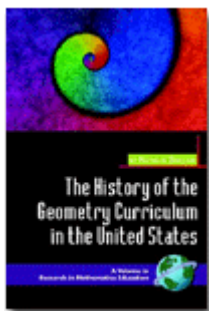
Zalman Usiskin, The University of Chicago; Edwin Willmore, The University of Chicago

2008. Paperback 978-1-59311-953-9 \$45.99. Hardcover 978-1-59311-954-6 \$85.99. eBook 9781607529095 \$74.

This volume contains the proceedings of the First International Curriculum Conference sponsored by the Center for the Study of Mathematics Curriculum (CSMC). The CSMC is one of the National Science Foundation Centers for Learning and Teaching (Award No. ESI-0333879). The countries—China, Japan, Korea, and Singapore (in alphabetical order, which also happens to be the order of their populations)—have each been in the news because of their performance on international tests and/or their economic performance and potential. They also have centralized education ministries that create a single mathematics curriculum framework followed in the entire country. In all these countries, curricula are differentiated for students with different interests, usually around Grade 10 or 11. We think the reader will agree that the papers are of very high quality, befitting the standing of the individuals who were invited, but particularly notable for our international speakers because in three of these countries, English is not the speaker's first language. Following each paper, we have included a short biography of the author(s), so that the reader can understand the perspective of the paper's author.

**CONTENTS:** Preface. Introductions. Education Ministry Perspectives on Mathematics Curriculum, Shigeo Yoshikawa. An Overview of Mathematics Education in Singapore, Soh Cheow Kian. Some Characteristics of the Korean National Curriculum and Its Revision Process, *Hee-Chan Lew*. Mathematics Curriculum Standard of China: Its Process, Strategies, Outcomes and Difficulties, *Sun Xiaotian*. Sixty Years of Mathematics Syllabi and Textbooks in Singapore (1945-2005), *Peng*

Yee Lee. Design and Implementation of Korean Mathematics Textbooks, *JeongSuk Pang*. Curriculum Development in China: Perspectives From Curriculum Design and Implementation, *Jun Li*. Innovations Bringing Degeneration: A Lesson From Historical Analysis of the Revisions of the National Curriculum Standards for Upper Secondary School Math in Japan After World War II, *Ryosuke Nagaoka*. Some Highlights of the Similarities and Differences in Intended, Planned/Implemented, and Achieved Curricula Between China and the United States, *Jinfa Cai*. Transforming Curriculum from Intended to Implemented: What Teachers Need to Do and What They Learned in the United States and China, *Yeping Li*. Translating Elementary School Mathematics Curriculum: Isn't School Mathematics Universal? Tad Watanabe. A Look at Japanese Junior High School Mathematics Textbooks, *Blake E. Peterson*. Exploring Korean Primary Mathematics, *Janice Grow-Maienza and Susan Beal*. Comparing Elementary Mathematics Curricula of Korea and the United States, *Insook Chung*. Singapore Math: Can It Help Close the U.S. Mathematics Learning Gap? *Alan Ginsburg and Steven Leinwand*. Singapore Math: Perspectives and Experiences of a College Professor, *Richard Bisk*. Calculator and Computer Technology in the K-12 Curriculum: Some Observations From a U.S. Perspective, *M. Kathleen Heid*. The Status of Calculator Technology in United States K-8 Mathematics Curriculum: It Depends On How You Look At It, *Kathryn B. Chval*. Mathematics Assessments: Do They Tell Us the Same Thing, *William H. Schmidt*. Some Impacts of Testing on Mathematics Curriculum From K-12: Perspectives, *Chris Cox*. Moving Beyond Myths to Foster International Collaboration: International Conference a Step in the Right Direction, *Diane L. Moore, Jill Newton, and Dawn Teuscher*. Reflections on Assessment, *Angela D. Sutter, Dana C. Cox, and Karen L. Fonkert*. Afterword, *Zalman Usiskin*.



## The History of the Geometry Curriculum in the United States

Nathalie Sinclair, Michigan State University

2008. Paperback 978-1-59311-696-5 \$45.99. Hardcover 978-1-59311-697-2 \$85.99. eBook 9781607527305 \$74.

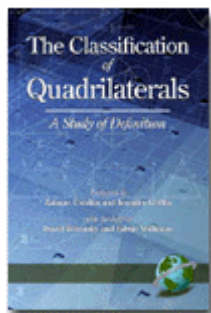
This volume investigates the evolution of the geometry curriculum in the United States over the past 150 years. A primary goal is to increase awareness of the shape and nature of the current geometry curriculum by explaining how things have come to be as they are.

Given the limited access to first-hand accounts of the enacted geometry curriculum during the past 150 years, the monograph relies on textbooks to provide a record of the implemented curriculum at any given point in time. Policy documents can provide insight into the choices made in textbooks by hinting at the issues considered and the recommendations made.

The monograph is organized in a chronological sequence of "notable events" leading to discernable changes in thinking about the geometry curriculum over the past century and a half—roughly the extent of time during which geometry has been taught in American schools. Notable events include important reports or commissions, influential texts, new schools of thought, and developments in learning technologies. These events affected, among other things: content and aims of the geometry curriculum; the nature of mathematical activity as construed by both mathematicians and mathematics educators; and, the resources students are given for engaging in mathematical activity. Before embarking through the notable events, it is necessary to consider the "big bang" of geometry, namely the moment in time that shaped the future life of the geometry curriculum. This corresponds to the emergence of Euclidean geometry. Given its influence on the shape of the geometry curriculum, familiarity with the nature of the geometry articulated in Euclid's *Elements* is essential to understanding the many tensions that surround the school geometry curriculum.

Several themes emerge over the course of the monograph, and include: the aims and means of the geometry curriculum, the importance of proof in geometry, the role of visualization and tactile experiences, the fusion between solid and plane geometry, the curricular connections between geometry and algebra, and the use of motion and continuity.

The intended audience would include curriculum developers, researchers, teachers, and curriculum supervisors.



## The Classification of Quadrilaterals A Study in Definition

Zalman Usiskin, The University of Chicago

2008. Paperback 978-1-59311-694-1 \$45.99. Hardcover 978-1-59311-695-8 \$85.99. eBook 9781607526001 \$74.

This monograph reports on an analysis of a small part of the mathematics curriculum, the definitions given to quadrilaterals. This kind of research, which we call micro-curricular analysis, is often undertaken by those who create curriculum, but it is not usually done systematically and it is rarely published.

Many terms in mathematics education can be found to have different definitions in mathematics books. Among these are “natural number,” “parallel lines” and “congruent triangles,” “trapezoid” and “isosceles trapezoid,” the formal definitions of the trigonometric functions and absolute value, and implicit definitions of the arithmetic operations addition, subtraction, multiplication, and division.

Yet many teachers and students do not realize there is a choice of definitions for mathematical terms. And even those who realize there is a choice may not know who decides which definition of any mathematical term is better, and under what criteria. Finally, rarely are the mathematical implications of various choices discussed. As a result, many students misuse and otherwise do not understand the role of definition in mathematics.

We have chosen in this monograph to examine a bit of mathematics for its definitions: the quadrilaterals. We do so because there is some disagreement in the definitions and, consequently, in the ways in which quadrilaterals are classified and relate to each other. The issues underlying these differences have engaged students, teachers, mathematics educators, and mathematicians. There have been several articles and a number of essays on the definitions and classification of quadrilaterals. But primarily we chose this specific area of definition in mathematics because it demonstrates how broad mathematical issues revolving around definitions become reflected in curricular materials. While we were undertaking this research, we found that the area of quadrilaterals supplied grist for broader and richer discussions than we had first anticipated.

The intended audience includes curriculum developers, researchers, teachers, teacher trainers, and anyone interested in language and its use.



## The Intended Mathematics Curriculum as Represented in State-Level Curriculum Standards Consensus or Confusion?

Barbara Reys, University of Missouri-Columbia

2006. Paperback 1-930608-52-7 978-1-930608-52-8 \$45.99. Hardcover 1-930608-53-5 978-1-930608-53-5 \$85.99. eBook 9781607526209 \$74.

This volume represents a detailed analysis of the grade placement of mathematics learning goals across all state-level curriculum standards published as of May 2005.

The volume documents the varied grade-level mathematics curriculum expectations in the U.S. and highlights a general lack of consensus across states. As states continue to work to improve learning opportunities for all students this report can serve as a useful summary to inform future curriculum decisions. The report is also intended to stimulate discussion at the national level regarding roles and responsibilities of national agencies and professional organizations with regard to curriculum leadership. Serious and collaborative work that results from such discussions can contribute to a more coherent, focused mathematics curriculum for US students

**CONTENTS:** Preface. Executive Summary. Chapter 1: State-level Curriculum Standards - Growth In Authority And Specificity. Chapter 2: Analysis of Number And Operation Grade-level Learning Expectations in State Standards Documents. Chapter 3: Analysis of K-8 Algebra Grade-level Learning Expectations in State Standards Documents. Chapter 4: Analysis of Emphasis on Reasoning In State Standards Documents. Chapter 5: Recommendations For Future

Development of Mathematics Curriculum Standards. References. Appendices. Appendix A: List of State Standards Documents Reviewed. Appendix B: Number of GLEs By State and Content Strand.





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