

Richard Lehrer

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EDUCATION

- 1983 Ph.D. University of New York at Albany, Educational Psychology and Statistics
- 1982 University Certificate in School Psychology, University of New York at Albany
- 1976 M.S. University of New York at Albany, Educational Psychology and Statistics
- 1973 B.S. Rensselaer Polytechnic Institute, Biology/Chemistry

RESEARCH INTERESTS

Working in concert with teachers, I focus on the design of classroom learning environments in K-6 education that induct children in epistemic practices in science and in mathematics. Research conducted with Leona Schauble investigates fruitful ways of inducting children into the signature practice of science—invention and revision of models of natural systems. We collaborate with classroom teachers to develop a cumulative science education—a learning progression—by co-designing classroom ecologies where children (K-6) invent and revise models of natural systems, especially ecosystems. Central to these efforts is study of the role of inscriptions and notations, including those made possible by electronic media, as mediating the development of scientific and mathematical reasoning. We also seek to engage children in the design of forms of material and measure that will inform their efforts to represent and model natural systems, so that getting a grip on natural systems and efforts to represent their workings proceed in tandem. A related effort focuses on constructing and modeling data, so that data practices of visualizing, measuring, and modeling variability serve as conceptual resources for science education—as mathematical tools for constructing and organizing forms of evidence that inform and constrain model invention and revision.

The importance of spatial reasoning and visualization in modeling has resulted in a series of investigations of the feasibility of crafting a spatially-centered mathematics education more conducive to the needs of a STEM education. In concert with K-6 teachers, we craft a children's geometry based in bodily experiences of walking, drawing, and building that are subsequently re-described mathematically as coordinate systems, measurement systems, transformations (especially symmetries), and 3- and 2-D structures. Children develop these conceptual systems as they participate in mathematical practices, some of which, such as defining, conjecturing, and explaining why cut across distinct realms of mathematical experience, but others of which, such as constructing geometric structures, are specific to spatial experiences. The work to develop a children's geometry is conducted in diverse settings, and it suggests that thinking about space is a pathway for creating more equitable opportunities for learning mathematics. A portion of this

research now investigates how to incorporate teacher's judgments about children's ways of thinking, generated in the course of everyday classroom activity, into innovative psychometric models that account for individual progress in collective environments. This effort, conducted with Mark Wilson, mines the potential of assessment for informing instruction and creates opportunities to transform the current climate of accountability assessment into one more responsive to teaching and learning.

PROFESSIONAL EXPERIENCE

2017

Professor Emeritus, Research Professor, Vanderbilt University's Peabody College

2009

Frank W. Mayborn Professor, Vanderbilt University's Peabody College

2002

Professor, Department of Teaching and Learning, Vanderbilt University's Peabody College

2001

Bascom Professor, School of Education, University of Wisconsin-Madison.

1992-1999

Professor, Department of Educational Psychology (Cognitive Science in Education) & Department of Curriculum and Instruction (Mathematics Education), University of Wisconsin-Madison.

Associate Director, National Center for Improving Student Learning and Achievement in Mathematics and Science (1996-2001)

Associate Director, National Center for Research in Mathematical Sciences Education (1992-96).

1989-1991

Associate Professor, Department of Educational Psychology, University of Wisconsin-Madison.

Visiting Professor, Carnegie Mellon University. (Fall, 1991)

1984-1989

Assistant Professor, Department of Educational Psychology, University of Wisconsin-Madison.

1977-1984

Consultant, Statistical Analysis. School of Education, University of New York at Albany.
Faculty advisement in research design and method.

Lecturer, Department of Educational Psychology and Statistics, State University of New York at Albany.

School Psychologist, Schalmont Central Schools, Schenectady, N.Y.

Senior Researcher, Board of Cooperative Educational Services of Nassau County, N.Y.

1973-1976

Teacher, Bishop Gibbons High School, Schenectady, N.Y. (Chemistry, Biology, and Unified Science)

Professional Certificates

Psychologist (New York State)

School Psychologist (New York State)

Secondary School Teacher: Mathematics, Sciences (New York State)

Teaching (past classes)

Vanderbilt University

MTED 2100 Young Children's Mathematical Thinking and Learning [Portions taught to 80 K-5 teachers, Singapore Ministry of Education, November, 2010]

MTED 2250 Teaching Mathematics in the Elementary School

MTED 2800 Geometry & Mathematical Visualization

EDUC 3120 Learning and Instruction

EDUC 3150 Epistemological Foundations of Mathematics and Sciences

University of Wisconsin-Madison

Cognition & Classroom Learning [Two semester introduction to cognition and instruction]

Designing Learning Environments [Teachers design and test classroom learning environments]

Lego Logo [Summer institute for teachers and children focusing on cognitive apprenticeship]

Model-Based Reasoning in Mathematics and Science [Seminar]

Membership in Professional Organizations

American Educational Research Association

National Academy of Education

National Council of Teachers of Mathematics

Current/Recent Service

Advisory Editor (Editorial Board):

Cognition and Instruction

Member, Advisory Board, James S. McDonnell Foundation, Teachers as Learners Program

Member, National Academy of Sciences Committee on *Developing Assessments of Science Proficiency in K-12*.

Member, National Academy of Sciences/National Academy of Engineering Committee on *Integrated STEM Education*. National Academy of Engineering and National Research Council. (2014). *STEM Integration in K-12 Education: Status, Prospects, and an Agenda for Research*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18612>

Member, National Academy of Sciences/National Academy of Engineering Committee, *Understanding and Improving K-12 Engineering Education in the United States* (07-09).

Member, Standing review panel for mathematics and science, Institute of Education Sciences, U. S. Department of Education (06-10).

Member, Vanderbilt University Promotion and Tenure Committee (05-08, Chair, 08-09).

Member, Consortium for Policy Research in Education committee to advise national science education standards writers in light of research on learning progressions (10-11).

Reviewer, National Research Council, *Framework for K-12 Science Education: Practices, Cross-cutting Concepts, and Core Ideas* (2011).

Conference Co-organizer, Jean Piaget Society, *Cultural Supports for Developing Mathematical and Scientific Reasoning*, June, 2011, Berkeley, CA.

Past Service

Co-Editor, *Cognition and Instruction* (9/02-5/08)

Advisory Editor (Editorial Board):

American Educational Research Journal
Educational Researcher
Journal for Research in Mathematics Education
Journal of Educational Psychology

Member, Committee on Test Design for K-12 Science Achievement, National Research Council. *Systems for State Science Assessment*.

Member, Committee on Cognitive Science and Assessment, National Research Council. *Knowing What Students Know*.

Member, National Academy of Sciences/National Academy of Engineering Study Group,
Understanding and Improving K-12 Engineering Education in the United States.

Member, *Advisory Board*, National Science Resources Center, Smithsonian Institute

Member, American Statistical Association/National Science Foundation, *Using statistics effectively in mathematics education research*. American Statistical Association, Washington, D. C.

AWARDS

- 2016 Thinker in Residence, Deakin University, Australia.
- 2015 Member, National Academy of Education.
- 2012 Fellow, American Educational Research Association.
- 2011 Distinguished Alumni Award, University of New York at Albany.
- 2011 Distinguished Reviewer Award for Research in Education (RER), American Educational Research Association.
- 2009 Frank W. Mayborn Chair, Vanderbilt University's Peabody College.
- 2009 Distinguished Contributions in Applications of Psychology to Education, American Psychological Association.
- 2007 Distinguished Reviewer Award, American Educational Research Journal (AERJ), American Educational Research Association.
- 2006 Visiting Scholar, Australian Centre for Educational Studies, Macquarie University
- 2001 Sears-Bascom Chair, University of Wisconsin-Madison.
- 1999 Vilas-Associate Professor, University of Wisconsin-Madison.
- 1983 President's Distinguished Dissertation Award, University of New York at Albany.

RESEARCH AND DEVELOPMENT ACTIVITIES

Note: All grants involving L. Schauble are fully collaborative, although agencies demand that one of us be called principal investigator.

Title: *Interdisciplinary Approach to Enrich Mathematics and Science Learning*
 PI: Russell Tytler
 Co-PI: Richard Lehrer, Joanne Mulligan, Vaughn Prain, Leona Schauble, Peta White
 Agency: Australian Research Council
 Date: January, 2018-December 2021

Title: *Modeling Assessment to Enhance Teaching and Learning*
 PI: Richard Lehrer (in collaboration with Mark Wilson)
 Co-PI: Corey Brady, Leona Schauble
 Agency: National Science Foundation
 Date: January, 2017-December 2021
 Amount: \$2,023,315 (Vanderbilt portion)

Title: *Understanding Space Through Engineering Design*

PI: Richard Lehrer
 Co-PI Leona Schauble, David Henderson
 Agency: National Science Foundation
 Date: September, 2013-August 2016
 Amount: \$1,499,000

Title: *Spatial Mathematics, Engineering, and Science:
 Toward an Integrated STEM Education*

PI: Richard Lehrer
 Co-PI David Henderson, Leona Schauble
 Agency: National Science Foundation
 Date: August, 2012-July, 2013
 Amount: \$298,000

Title: *Innovative Computer-based Formative Assessment via a Development,
 Delivery, Scoring and Report Generating System*

PI: Mark Wilson
 Co-PI Richard Lehrer
 Agency: Dept of Education, Institute of Education Sciences
 Date: July, 2012-June, 2015
 Amount: \$550,000 (subcontract)

Title: *Data Modeling Supports the Development of Statistical Reasoning
 (R305A110685)*

PI: Richard Lehrer
 Co-PI Mark Lipsey, Mark Wilson
 Agency: Dept of Ed, Institute of Education Sciences
 Date: July, 2011-June, 2015
 Amount: \$3,705,980

Title: *Physical Science Comes Alive: Exploring Things that Go*

PI: Gary Benenson
 Co-PI Richard Lehrer
 Agency: National Science Foundation
 Date: October 2007-September 2011
 Amount: \$540,000 (subcontract)

Title: *Assessing Data Modeling and Statistical Reasoning*

Co-PI: Leona Schauble, Mark Wilson
 Agency: Dept of Ed, Institute of Education Sciences
 Date: July 2006 - July 2010 (*no-cost extension through July 2011*)
 Amount: \$1,600,0000

Title: *Supporting the Development of Model-based Reasoning*

Co-PI Leona Schauble
 Agency: National Science Foundation
 Date: July 2006 - June 2009

Amount: \$1,700,000
 Supplement: June 2009 - May 2011
 Amount: \$194, 879

Title: *Model Chance*
 PI: Cliff Konold
 Co-PI: Richard Lehrer
 Agency: National Science Foundation
 Date: June 2005 - June 2008
 Amount: \$378,898.00 (subcontract)

Title: *Constructing Data, Modeling Worlds: Collaborative Investigation of Statistical Reasoning.*
 Co-PI: Rogers Hall, Cliff Konold, Leona Schauble, Mark Wilson
 Agency: National Science Foundation
 Date: January, 2004 to January, 2007
 Amount: \$1,600,000

Title: *A Multi-constituency Initiative for Coordinating and Directing Curriculum Development, Assessment, and Research for the Teaching and Learning of Probability and Statistics, K-12.*
 Co-PI: Tim Kelly
 Agency: Spencer Foundation
 Date: June 2000 to January 2001
 Amount: \$50,000

Title: *Technology-Enhanced Learning of Geometry in Elementary Schools*
 PI: Daniel Lynn Watt
 Co-PI: Douglas Clements, Richard Lehrer
 Agency: National Science Foundation
 Date: October, 1999 to June, 2003
 Amount: \$850,000

Title: *Modeling Nature: A Route to Understanding Central Themes in Elementary and Middle School Science*
 Co-PI: Leona Schauble
 Agency: National Science Foundation
 Date: June, 1999 to September 2002
 Amount: \$1,100,000

Title: *National Center for Improving Student Learning and Achievement in Mathematics and Science*
 Director: Thomas A. Romberg
 Agency: Office of Educational Research and Improvement, U. S. Department of Education
 Date: March, 1996 to June, 2001
 Amount: \$12,500,000

Title: *Teaching and Learning Geometry for Understanding*

Agency: National Science Foundation
 Date: September, 1995 to September 1996
 Amount: \$96,825

Title: *Building Bridges Between Mathematics and Science*
 Co-P.I.: Leona Schauble
 Agency: James S. McDonnell Foundation
 Date: June, 1995 to August, 1998
 Amount: \$540,000

Title: *Thinking About Simple Machines: Model-Based Reasoning in Design Contexts*
 Co-P.I.: Leona Schauble
 Agency: National Science Foundation
 Date: September, 1994 to August, 1997
 Amount: \$502,000

Title: *Hypermedia-based Instruction for Teachers' Professional Development*
 Agency: National Science Foundation, Subcontract with co P.I.s, Elizabeth Fennema and Thomas Carpenter.
 Date: January, 1993 to August, 1994

Title: *Learning and Teaching Geometry*
 Agency: National Center for Research in Mathematical Sciences Education (Thomas Romberg, Director), Office for Educational Research and Improvement
 Date: January, 1992 - June, 1995
 Amount: \$420,000

Title: *Hypermedia-based Instruction for Magnetic Resonance Imaging*
 Agency: General Electric Corporation - Medical Division
 Date: June, 1991 - May, 1992
 Amount: \$92,500

Title: *Using Hypermedia to Train School Psychologists as Consultants*
 Co-PI: Thomas Kratochwill, Stephen Elliott
 Agency: Wisconsin Department of Public Instruction, Iowa Department of Public Instruction
 Date: Sept. 1991 - June, 1992
 Amount: \$14,289.47

Title: *Hypermedia and Knowledge Design: A New Paradigm for Instruction*
 Agency: University of Wisconsin Outreach Initiative
 Date: June, 1990 to August, 1991
 Amount: \$15,000.00

Title: *History by Design*

- Agency: Robert M. La Follette Institute of Public Affairs
 Date: July, 1990 to September, 1991
 Amount: \$12,969.00
- Title: *Children's and Adolescent's Conceptions of Human and Computer Intelligence*
 Agency: University of Wisconsin-Madison, Graduate School Research Committee
 Date: January, 1989 to December, 1989
 Amount: \$7,983.00
- Title: *Meno: A Tool for Knowledge Development in Geometry*
 Agency: Ameritech Foundation
 Date: January, 1989 to December, 1989
 Amount: \$10,852.00
- Title: *Children's Perceptions of Educational Software*
 Agency: International Business Machines
 Date: September, 1987 to June, 1988
 Amount: \$16,000.00
- Title: *Graphical Displays of Cognitive Processes*
 Agency: International Business Machines, Project TROCHOS, Instructional Computing
 Date: September, 1987 to July, 1988
 Amount: \$21,000.00
- Title: *Cognitive Consequences of Logo-based Instruction*
 Agency: Spencer Foundation
 Date: September, 1986 to August, 1987
 Amount: \$7,500
- Title: *Inquiry-based Instruction with Logo*
 Agency: University of Wisconsin-Madison Graduate Research Committee
 Date: July, 1985 to June, 1986
 Amount: \$13,000.00

PUBLICATIONS

Articles in Refereed Journals

Note: **All authorship with L. Schauble is fully collaborative**

Kobiela, M., & Lehrer, R. (in press). Supporting dynamic conceptions of area and its measure. *Mathematical Thinking and Learning*. DOI: 10.1080/10986065.2019.1576000

Jones, R. S., Lehrer, R., & Kim, M.-J. (2017). Critiquing statistics in student and professional worlds. *Cognition and Instruction*, 35(4), 317-336. DOI: [10.1080/07370008.2017.1358720](https://doi.org/10.1080/07370008.2017.1358720)

- Lehrer, R. (2017). Modeling signal-noise processes supports student construction of a hierarchical image of sample. *Statistics Education Research Journal*, 16 (2), 64-85.
- Lehrer, R., & Schauble, L. (2017). Children's conceptions of sample in local ecosystem investigations. *Science Education*, 701-724. DOI: 10.1002/sce.21297
- Kobiela, M., & Lehrer, R. (2015). The co-development of mathematical concepts and the practice of defining. *Journal for Research in Mathematics Education*, 46 (4), 423-454.
- Lehrer, R. (2015). Designing for development. *Human Development*, 58, 45-49. DOI: 10.1159/000373867
- Lehrer, R., & Schauble, L. (2015). Learning progressions: The whole world is not a stage. Invited commentary, *Science Education*, 99 (3), 432-437. DOI: 10.1002/sce.21168
- Lehrer, R., Kobiela, M., & Weinberg, P. (2013). Cultivating inquiry about space in a middle school mathematics classroom. *International Journal on Mathematics Education (ZDM)*, 45, 3, 365-376.
- Bolger, M.S., Kobiela, M.A., Weinberg, P.J., & Lehrer, R. (2012). Children's mechanistic reasoning about physical devices composed of assemblies of linkages. *Cognition and Instruction*, 30 (2), 170-206.
- Lehrer, R., & Schauble, L. (2012). Seeding evolutionary thinking by engaging children in modeling its foundations. *Science Education*, 96(4), 701-724.
- Lehrer, R., Kim, M. J., & Jones, S. (2011). Developing conceptions of statistics by designing measures of distribution. *International Journal on Mathematics Education (ZDM)*, 43 (5), 723-736.
- Lehrer, R. (2009). Designing to develop disciplinary knowledge: Modeling natural systems. *American Psychologist*, 64(8), 759-771.
- Lehrer, R., & Kim, M. J. (2009). Structuring variability by negotiating its measure. *Mathematics Education Research Journal*, 21, 116-133.
- Lehrer, R., & Schauble, L. (2009). Images of learning, images of progress. *Journal for Research in Science Teaching*, 46 (6), 731-735.
- Lehrer, R., Schauble, L., & Lucas, D. (2008). Supporting development of the epistemology of inquiry. *Cognitive Development*, 24, 512-529.
- Lehrer, R., Kim, M., & Schauble, L. (2007). Supporting the development of conceptions of statistics by engaging students in modeling and measuring variability. *International Journal of Computers for Mathematics Learning*, 12, 195-216.
- Seymour, J., & Lehrer, R. (2006). Tracing the evolution of pedagogical content knowledge as

- the development of interanimated discourses. *Journal of the Learning Sciences*, 15 (4), 551-584.
- Lucas, D., Broderick, N., Lehrer, R., & Bohanan, R. (2005). Making the grounds of scientific inquiry visible in the classroom. *Science Scope*, 29 (3), 39-42.
- Lehrer, R., & Schauble, L. (2004). Modeling natural variation through distribution. *American Educational Research Journal*, 41(3), 635-679.
- Lesh, R., & Lehrer, R. (2003). Models and modeling perspectives on the development of students and teachers. *Mathematical Thinking and Learning*, 5 (2 & 3), 109-129.
- Petrosino, A., Lehrer, R., & Schauble, L. (2003). Structuring error and experimental variation as distribution in the fourth grade. *Mathematical Thinking and Learning*, 5 (2&3), 131-156.
- Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in education research. *Educational Researcher*, 32 (1), 9-13.
- Lehrer, R., Strom, D., & Confrey, J. (2002). Grounding metaphors and inscriptional resonance: Children's emerging understanding of mathematical similarity. *Cognition and Instruction*, 20, 359-398.
- Strom, D., Kemeny, V., Lehrer, R., & Forman, E. (2001). Visualizing the emergent structure of children's mathematical argument. *Cognitive Science*, 25, 733-773.
- Horvath, J., & Lehrer, R. (2000). The design of a case-based hypermedia teaching tool. *International Journal of Computers for Mathematical Learning*, 5, 115-141.
- Jacobson, C., & Lehrer, R. (2000). Teacher appropriation and student learning of geometry through design. *Journal for Research in Mathematics Education*, 31, 71-88.
- Lehrer, R., & Curtis, C. L. (2000) Why are some solids perfect? Conjectures and experiments by third graders. *Teaching Children Mathematics*, 6, 324-329.
- Lehrer, R., & Schauble, L. (2000). Inventing data structures for representational purposes: Elementary grade students' classification models. *Mathematical Thinking and Learning*, 2, 49-72.
- Lehrer, R., & Schauble, L. (2000). The development of model-based reasoning. *Journal of Applied Developmental Psychology*, 21(1), 39-48.
- Penner, E., & Lehrer, R. (2000). The shape of fairness. *Teaching Children Mathematics*, 7(4), 210-214.
- Lehrer, R., Lee, M., & Jeong, A. (1999). Reflective teaching of Logo. *Journal of the Learning Sciences*, 8, 245-288.

- Erickson, J., & Lehrer, R. (1998). The evolution of critical standards as students design hypermedia documents. *Journal of the Learning Sciences*, 7, 351-386. [Equal contribution of authors.]
- Koehler, M., & Lehrer, R. (1998). Designing a hypermedia tool for learning about children's mathematical cognition. *Journal of Educational Computing Research*, 18(2), 123-145.
- Lehrer, R., & Schauble, L. (1998). Reasoning about structure and function: Children's conceptions of gears. *Journal of Research in Science Teaching*, 35(1), 3-25.
- Penner, D. E., Lehrer, R., & Schauble, L. (1998). From physical models to biomechanics: A design-based modeling approach. *Journal of the Learning Sciences*, 7, 429-449.
- Lehrer, R., & Shumow, L. (1997). Aligning the construction zones of parents and teachers for mathematics reform. *Cognition and Instruction*, 15(1), 41-83.
- Penner, D. E., Giles, N. D., Lehrer, R., & Schauble, L. (1997). Building functional models: Designing an elbow. *Journal of Research in Science Teaching*, 34(2), 1-20.
- Lehrer, R., & Romberg, T. (1996). Exploring children's data modeling. *Cognition and Instruction*, 14, 69-108.
- Nitabach, E., & Lehrer, R. (1996). Developing spatial sense through area measurement. *Teaching Children Mathematics*, 8, 473-476.
- Lehrer, R., Horvath, J., & Schauble, L. (1994). Developing model-based reasoning. *Interactive Learning Environments*, 4, 218-232.
- Lehrer, R., Erickson, J., & Connell, T. (1994). Learning by designing hypermedia documents. *Computers in the schools*, 10(2/3), 227-254.
- Lehrer, R., & Littlefield, J. (1993). Relationships among cognitive components in Logo learning and transfer. *Journal of Educational Psychology*, 85, 317-330. [Equal contribution of authors.]
- Amundson, R., Serlin, R. C., & Lehrer, R. (1992). On the threats that do *not* face educational research. *Educational Researcher*, 21(9), 19-24.
- Carver, S. M., Lehrer, R., Connell, T., & Erickson, J. (1992). Learning by hypermedia design: Issues of assessment and implementation. *Educational Psychologist*, 27, 385-404.
- Lehrer, R. (1992). New directions in technology-mediated learning. *Educational Psychologist*, 27, 287-290.
- Lehrer, R., & Franke, M. L. (1992). Applying personal construct psychology to the study of teachers' knowledge of fractions. *Journal for Research in Mathematics Education*, 23, 223-241.

- Middleton, J. A., Littlefield, J., & Lehrer, R. (1992). Gifted students' conceptions of academic fun: An examination of a critical construct for gifted education. *The Gifted Child Quarterly*, 36(1), 38-44.
- Lehrer, R., & Littlefield, J. (1991). Misconceptions in Logo: The role of instruction. *Journal of Educational Psychology*, 83, 124-133. [Equal contribution of authors.]
- Lehrer, R., Serlin, R. C., & Amundson, R. (1990). Knowledge or certainty? A reply to Cziko. *Educational Researcher*, 19(6), 16-19.
- Salmon, D., & Lehrer, R. (1991). Experience and representation of the consultant role: Exploring the implicit theories of school psychology trainers and students. *School Psychology Quarterly*, 6, 112-130.
- Lehrer, R., Randle, L., & Sancilio, L. (1989). Learning pre-proof geometry with Logo. *Cognition and Instruction*, 6, 159-184.
- Salmon, D., & Lehrer, R. (1989). School consultants' implicit theories of action. *Professional School Psychology*, 4, 173-187.
- Lee, O., & Lehrer, R. (1988). Conjectures concerning the origins of misconceptions in Logo. *Journal of Educational Computing Research*, 4, 87-105.
- Lehrer, R., Guckenberger, T., & Lee, O. (1988). A comparative study of the cognitive consequences of inquiry-based Logo instruction. *Journal of Educational Psychology*, 80, 543-553.
- Simon, J., & Lehrer, R. (1988). The relationship of audiometric measures to performance on a preschool developmental screening instrument. *Journal of Applied Developmental Psychology*, 9, 107-123.
- Lehrer, R., & DeBernard, A. (1987). The language of learning and the language of computing. *Journal of Educational Psychology*, 79, 41-48.
- Lehrer, R., & Randle, L. (1987). Problem solving, metacognition and composition: The effects of interactive software for first-grade children. *Journal of Educational Computing Research*, 3, 401-425.
- Lehrer, R., Levin, B. B., DeHart, P., & Comeaux, M. (1987). Voice-feedback as a scaffold for writing: A comparative study. *Journal of Educational Computing Research*, 3, 335-353.
- Lehrer, R., Harckham, L. D., Archer, P., & Pruzek, R. M. (1986). Microcomputer-based instruction in special education. *Journal of Educational Computing Research*, 2, 337-355.
- Lehrer, R. (1986). Logo as a strategy for developing thinking? *Educational Psychologist*, 21, 121-137.
- Mancuso, J. C., Litchford, G., Wilson, S., Harrigan, J., & Lehrer, R. (1983). Inferences of mental illness from noninvolvement. *Journal of Personality*, 51, 49-61.

Walmsley, S., Scott, K., & Lehrer, R. (1981). Effects of document simplification on the reading comprehension of the elderly. *Journal of Reading Behavior*, 13, 237-247.

Book Chapters

Note: All authorship with L. Schauble is collaborative.

Lehrer, R., & Schauble, L. (2019). Learning to play the modeling game. In A. Upmeyer, D. Belzen, D. Kruger, & J. van Driel (Eds.), *Towards a competence-based view on models and modeling in science education*. (pp 221-236). Cham, Switzerland: Springer.

Lehrer, R., & Schauble, L. (2018). The dynamic material and representational practices of modeling. In T. Amin and O. Levrini (Eds.), *Converging perspectives on conceptual change* (pp. 163-170). New York: Routledge.

Lehrer, R., & English, L. (2018). Introducing children to modeling variability. In Ben-Zvi, D., Makar, K., & Garfield, J., (Editors). *International Handbook of Research in Statistics Education* (pp.229-260). Voorburg, the Netherlands: Springer.

Kim, M-J. & Lehrer, R. (2015). Using learning progressions to design instructional trajectories. In C. Suurtamm (Ed.), *Annual Perspectives in Mathematics Education (APME) 2015: Assessment to Enhance Teaching and Learning*. (pp. 27-38). Reston, VA: National Council of Teachers of Mathematics.

Lehrer, R. & Schauble, L. (2015). Developing scientific thinking. In L. S. Liben & U. Müller (Eds.), *Cognitive processes*. Volume 2 of the *Handbook of child psychology and developmental science* (7th ed., pp. 671-714). Editor-in-chief: R. M. Lerner. Hoboken, NJ: Wiley.

Lehrer, R., Kim, M-J., Ayers, E., & Wilson, M. (2014). Toward establishing a learning progression to support the development of statistical reasoning. In J. Confrey and A. Maloney (Eds.), *Learning over Time: Learning Trajectories in Mathematics Education*. (pp. 31-59). Charlotte, NC: Information Age Publishers.

Lehrer, R. (2013). A learning progression emerges in a trading zone of professional community and identity. In R. L. Mayes and L. L. Hatfield (eds.), *Quantitative Reasoning in Mathematics and Science Education, Volume 3*. (pp. 173-186). Laramie, WY: University of Wyoming.

Lehrer, R., & Lesh, R. (2013). Mathematical learning. In I. B. Weiner (Ed.), *Handbook of Psychology*, 2nd edition. (pp. 283-320). New York: Wiley.

Lehrer, R., & Schauble, L. (2013). Representational re-description as a catalyst of conceptual change. In B. M. Brizuela and B. E. Gravel (Eds.), *“Show me what you know”: Exploring student representations across STEM disciplines* (pp. 244-249). New York: Teachers College Press

- Lehrer, R., & Schauble, L. (2012). Supporting inquiry about the foundations of evolutionary thinking in the elementary grades. In J. Shrager & S. Carver (Eds.), *From child to scientist: Mechanisms of learning and development* (pp. 171-205). Washington, DC: APA Press.
- Lehrer, R., & Pfaff, E. (2011). Designing a learning ecology to support the development of rational number: Blending motion and unit partitioning of length measures. In Y. Dai (Ed.), *Design research on learning and thinking in educational settings: Enhancing intellectual growth and functioning*. (pp. 131-160). New York: Routledge.
- Lehrer, R., & Schauble, L. (2010). What kind of explanation is a model? In M.K. Stein (Ed.), *Instructional Explanations in the Disciplines* (pp. 9-22). New York: Springer.
- Konold, C., & Lehrer, R. (2008). Technology and mathematics education: An essay in honor of Jim Kaput. In L. D. English (Ed.), *Handbook of International Research in Mathematics Education* (2nd ed). (pp 49-72). Philadelphia: Taylor & Francis. [equal contribution of authors]
- Boester, T., & Lehrer, R. (2007). Visualizing algebraic reasoning. In J. Kaput, D. W. Carraher, & M. Blanton (Eds.), *Algebra in the early grades*. (pp. 211-234). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., & Schauble, L. (2007). A developmental approach for supporting the epistemology of modeling. In W. Blum, P. L. Galbraith, H-W. Henn, & M. Niss (Eds.), *Modeling and applications in mathematics education*. (pp. 153-160). New York: Springer.
- Lehrer, R., & Schauble, L. (2007). Contrasting emerging conceptions of distribution in contexts of error and natural variation. In M. Lovett & P. Shah (Eds.), *Thinking with Data*. (pp 149-176). New York: Taylor & Francis.
- Lehrer, R., & Schauble, L. (2006). Cultivating model-based reasoning in science education. In R. Keith Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp. 371-387). Cambridge: Cambridge University Press.
- Lehrer, R., & Schauble, L. (2006). Scientific thinking and science literacy. In W. Damon, R. Lerner, K. Anne Renninger, & I. E. Sigel, (Eds.), *Handbook of Child Psychology, Sixth Edition, Volume Four: Child Psychology in Practice*. (pp 153-196). Hoboken, NJ: John Wiley & Sons.
- Lehrer, R., & Schauble, L. (2005). Developing modeling and argument in elementary grades. In T. A. Romberg, T.P. Carpenter, & F. Dremock (Eds.) *Understanding mathematics and science matters*. (pp 29-53). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R. (2003). Developing understanding of measurement. In J. Kilpatrick, W. G. Martin, & D. E. Schifter (Eds.), *A research companion to principles and standards for school mathematics*. (pp.179-192). Reston, VA: National Council of Teachers of Mathematics.
- Lehrer, R., & Lesh, R. (2003). Mathematical learning. In W. Reynolds & G. Miller (Eds.),

- Comprehensive handbook of psychology*, Volume 7. (pp. 357 –391). New York: John Wiley.
- Lehrer, R., & Schauble, L. (2003). Origins and evolution of model-based reasoning in mathematics and science. In R. Lesh & H. M. Doerr (Eds.), *Beyond constructivism: A models and modeling perspective on mathematics problem-solving, learning, and teaching*. (pp. 59-70). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Jaslow, L., & Curtis, C. (2003). Developing understanding of measurement in the elementary grades. In D. H. Clements & G. Bright (Eds.), *Learning and Teaching Measurement. 2003 Yearbook*. (pp. 100-121). Reston, VA: National Council of Teachers of Mathematics.
- Jacobson, C., & Lehrer, R. (2002). Teacher appropriation and student learning of geometry through design. In J. Sowder & B. Schappelle (Eds.), *Lessons learned from research*. Reston, VA: National Council of Teachers of Mathematics.
- Lehrer, R., & Pritchard, C. (2002). Symbolizing space into being. In K. Gravemeijer, R. Lehrer, B. van Oers, & L. Verschaffel (Eds.), *Symbolization, modeling and tool use in mathematics education*. (pp. 59-86). Dordrecht, Netherlands: Kluwer Academic Press.
- Lehrer, R., & Schauble, L. (2002). Symbolic communication in mathematics and science: Co-constituting inscription and thought. In E. D. Amsel & J. Byrnes (Eds.), *Language, literacy, and cognitive development. The development and consequences of symbolic communication*. (pp. 167-192). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Giles, N., & Schauble, L. (2002). Data modeling. In R. Lehrer & L. Schauble (Eds.), *Investigating real data in the classroom: Expanding children's understanding of math and science*. (pp. 1-26). New York: Teachers College Press.
- Schauble, L., Gleason, M., Lehrer, R., Bartlett, K., Petrosino, A., Allen, A., Clinton, C., Ho, E., Jones, M., Lee, Y., Phillips, J., Siegler, J., & Street, J. (2002). Supporting science learning in museums. In G. Leinhardt, K. Crowley, & K. Knutson. (Eds.) *Learning conversations: Explanation and identity in museums* (pp. 425-452). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Schauble, L., & Petrosino, A. (2001). Reconsidering the role of experiment in science education. In K. Crowley, C. Schunn, & T. Okada (Eds.), *Designing for science: Implications from everyday, classroom, and professional settings*. (pp. 251-278). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Lehrer, R., Schauble, L., Strom, D., & Pligge, M. (2001). Similarity of form and substance: Modeling material kind. In D. Klahr & S. Carver (Eds.), *Cognition and instruction: 25 years of progress*. (pp. 39-74). Mahwah, NJ: Lawrence Erlbaum Associates.
- Erickson, J., & Lehrer, R. (2000). What's in a link? Student conceptions of the rhetoric of association in hypermedia composition. In S. Lajoie (Ed.), *Computers as cognitive tools* (Vol. 2). (pp. 197-226). Mahwah, NJ: Lawrence Erlbaum Associates. [Equal contribution of authors.]

- Lesh, R., & Lehrer, R. (2000). Iterative refinement cycles for videotape analyses of conceptual change. In A. Kelly & R. Lesh (Eds.), *Research design in mathematics and science education* . (pp. 665-708). Dordrecht, Netherlands: Kluwer Academic Press.
- Lehrer, R., & Schauble, L. (2000). Modeling in mathematics and science. In R. Glaser (Ed.), *Advances in instructional psychology* (Vol. 5). (pp. 101-159). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Carpenter, S., Schauble, L., & Putz, A. (2000). Designing classrooms that support inquiry. In J. Minstrell & E. V. Zee (Eds.), *Inquiring into inquiry learning and teaching in science* (pp. 80-99). Washington, D.C.: American Association for the Advancement of Science.
- Lehrer, R., Schauble, L., Carpenter, S., & Penner, D. E. (2000). The inter-related development of inscriptions and conceptual understanding. In P. Cobb, E. Yackel, & K. McClain (Eds.), *Symbolizing and communicating in mathematics classrooms: Perspectives on discourse, tools, and instructional design* (pp. 325-360). Mahwah, NJ: Lawrence Erlbaum Associates.
- Carpenter, T. P., & Lehrer, R. (1999). Teaching and learning mathematics with understanding. In E. Fennema & T. R. Romberg (Eds.), *Mathematics classrooms that promote understanding* (pp. 19-32). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., & Romberg, T. A. (1999). Springboards to geometry. In V. Villani & C. Mammana (Eds.), *Perspectives on the teaching of geometry for the 21st century* (pp. 62-71). Dordrecht, Netherlands: Lkeuwer Academic Publishers.
- Lehrer, R., Jacobson, C., Kemeny, V., & Strom, D. (1999). Building on children's intuitions to develop mathematical understanding of space. In E. Fennema & T. A. Romberg (Eds.), *Mathematics classrooms that promote understanding* (pp. 63-87). Mahwah, NJ: Lawrence Erlbaum Associates.
- Horvath, J. K., & Lehrer, R. (1998). A model-based perspective on the development of children's understanding of chance and uncertainty. In S. P. LaJoie (Ed.), *Reflections on statistics: agendas for learning, teaching and assessment in K-12* (pp. 121-148). Mahwah, NJ: Lawrence Elrbaum Associates.
- Lehrer, R., Jenkins, M., & Osana, H. (1998). Longitudinal study of children's reasoning about space and geometry. In R. Lehrer & D. Chazan (Eds.), *Designing learning environments for developing understanding of geometry and space* (pp. 137-167). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Jacobson, C., Thoyre, G., Kemeny, V., Strom, D., Horvath, J., Gance, S., & Koehler, M. (1998). Developing understanding of geometry and space in the primary grades. In R. Lehrer & D. Chazan (Eds.), *Designing learning environments for developing understanding of geometry and space* (pp. 169-200). Mahwah, NJ: Lawrence Erlbaum Associates.

- Towell, G., & Lehrer, R. (1995). A knowledge-based model of geometry learning. In T. Petsche, S. J. Hanson, & J. Shavlik (Eds.), *Computational learning theory and natural learning systems* (pp. 54-74). Cambridge, MA: MIT Press. (Revision of earlier piece.)
- Lehrer, R., Erickson, J., & Connell, T. (1994). Learning by designing hypermedia documents. In W. M. Reed, J. K. Burton, & M. Liu (Eds.), *Multimedia and megachange: New roles for educational computing* (pp. 227-254). New York, NY: Haworth Press.
- Towell, G., & Lehrer, R. (1993). A knowledge-based model of geometry learning. In S. J. Hanson, J. D. Cowan, & C. L. Giles (Eds.), *Advances in neural information processing systems* (pp. 887-894). San Mateo, CA: Morgan Kaufmann.
- Lehrer, R. (1993). Authors of knowledge: Patterns of hypermedia design. In S. Lajoie & S. J. Derry (Eds.), *Computers as cognitive tools* (pp. 197-227). Hillsdale, NJ: Erlbaum.
- Lehrer, R. (1989). Computer-assisted strategic instruction. In C. B. McCormick, G. E. Miller, & M. Pressley (Eds.), *Cognitive strategy research: From basic research to educational applications* (pp. 303-320). New York, NY: Springer-Verlag.
- Lehrer, R., Guckenberger, T., & Sancilio, L. (1988). Influences of Logo on children's intellectual development. In R. E. Meyer (Ed.), *Teaching and learning computer programming: Multiple research perspectives* (pp. 75-110). Hillsdale, NJ: Erlbaum.
- Lehrer, R. (1988). Characters in search of an author: The self as a narrative structure. In J. C. Mancuso & M. Shaw (Eds.), *Cognition and personal structure: Computer access and analysis* (pp. 195-228). New York, NY: Praeger Press.
- Mancuso, J. C., & Lehrer, R. (1986). Cognitive processes in socializing reactions to rule violation. In R. D. Ashmore & D. M. Brodzinsky (Eds.), *Thinking about the family* . (pp. 67-93). Englewood Cliffs, NJ: Lawrence Erlbaum Associates.
- Eimer, B., Mancuso, J. C., & Lehrer, R. (1983). A constructivist theory of reprimand as it applies to child rearing, *Proceedings of the Eleventh Annual interdisciplinary UAP-USC Piagetian Theory and the Helping Professions Conference* . Los Angeles, CA: University of Southern California Press.
- Anastasiow, M., & Lehrer, R. (1982). Adolescent development: Systems and their interactions. In N. Anastasiow (Ed.), *The adolescent parent* (pp. 13-32). Baltimore, MD: Paul Brooks.

Books

- Lehrer, R. & Slovin, H. (2014). *Geometry: Essential Understandings in Grades 3-5*. Reston, VA: National Council of Teachers of Mathematics.
- Lehrer, R. (2014, Section editor, Learning) In Lederman, N. G. & Abell, S. K. (Eds.), *Handbook of research on science education*, Volume II. New York: Taylor and Francis, Routledge.
- Gravemeijer, K., Lehrer, R., van Oers, B., & Verschaffel, L. (2002, Eds.), *Symbolization, modeling and tool use in mathematics education*. Dorchedt, Netherlands: Kluwer Academic Press.
- Lehrer, R., & Schauble, L. (2002, Eds.). *Investigating real data in the classroom: Expanding children's understanding of math and science*. New York: Teachers College Press. (Spanish Translation, Publicaciones M.C.E.P., Sevilla, Spain)
- National Research Council (2001). *Knowing what students know. The science and design of educational assessment*. Washington, D.C.: National Academy Press. [Jim Pellegrino, Robert Glaser, Co-Chairs.]
- Lehrer, R., & Chazan, D. (1998, Eds.). *Designing learning environments for developing understanding of geometry and space*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lehrer, R., Littlefield, J., Wottreng, B., & Youngerman, N. (1993). *Seeding mindstorms: Using LogoWriter in the elementary classroom*. (Revised edition) Fontana, WI: B & B Publishing.
- Lehrer, R., Littlefield, J., & Wottreng, B. (1991). *Seeding mindstorms: Using LogoWriter in the elementary classroom*. Fontana, WI: B & B Publishing.

Reviews

- Lehrer, R. (2000). Developing mathematical skills: What develops, and why? *American Journal of Psychology, Winter*, 649-652. [Review of C. Donlan (Ed.), *The development of mathematical skills*.]
- Lehrer, R. (1998). Models as explanations. [Review of A. H. Schoenfield, *Toward a theory of teaching-in-context*]. *Issues in Education*.
- Lehrer, R. (1998). Let's rethink the primary school mathematics curriculum. [Commentary on the book by S. Griffin and R. Case, *Re-thinking the primary school math curriculum: An approach based on cognitive science*]. *Issues in Education*.
- Lehrer, R. (1997). [Review of *Cognition on Cognition*]. *International Journal of Neural Systems*.
- Lehrer, R. (1995). [Review of N. Negroponte, *Being digital*]. *Journal of Educational Computing Research*, 13, 207-209.

- Lehrer, R. (1992). Design goes to school. [Review of I. Harel, *Children designers*]. *Journal of Educational Computing Research*, 8, 255-258.
- Lehrer, R. (1990). [Review of Suffolk Reading Scale. In J. J. Kramer & J. C. Conoley (Eds.), *The Eleventh Mental Measurement Yearbook*].
- Lehrer, R. (1990). [Review of Progressive Achievement Tests in Reading: Reading Comprehension and Reading Vocabulary]. In J. J. Kramer & J. C. Conoley (Eds.), *The Eleventh Mental Measurement Yearbook*.
- Yussen, S. R., & Lehrer, R. (1989). [Review of G. Forman & P. B. Pufall (Eds.), *Constructivism in the computer age*]. *Educational Technology*, 29, 55-56.
- Lehrer, R. (1985). [Review of *Preschool screening: To refer or not to refer? That is the question. Or is it?*] *Contemporary Psychology*, 30, 565-566.

Technical Reports

- Lehrer, R., & Konold, C. (2010, Winter). *Modeling chance and developing conceptions of data and statistics*. White paper for the National Standards for Mathematics Education, Modeling, and Probability and Statistics Writing Teams.
- Lehrer, R. (2000, Winter). *Measurement*. White Paper prepared for the Standards 2000 Group of the National Council of Teachers of Mathematics, Reston, VA.
- Lehrer, R. (1999, Summer). *Development of reasoning about space and geometry, K-8*. Brief prepared for the National Academy of Sciences National Research Council, Washington, D. C.
- Lehrer, R., Petrosino, A., & Koehler, M. (1997, Summer). *Hypermedia technologies for case-based teacher education*. White Paper prepared for the Technology Standards Group of the National Council of Teachers of Mathematics, Reston, VA.
- Modeling in Mathematics and Science Collaborative. (1997, Summer). *Children's work with data*. Wisconsin Center for Education Research, Madison, WI.
- Lehrer, R., & Jacobson, C. (1994, Winter). *Geometry in the primary grades*. (NCRMSE Research Review: The teaching and learning of mathematics, 3(1), 4-14).
- Lehrer, R., Fennema, E., Carpenter, T., & Ansell, E. (1992, April). *Cognitively guided instruction in geometry*. Wisconsin Center for Education Research, Madison, WI.
- Towell, G. G., Lehrer, R., & Shavlik, J. (1990, March). *A model of learning geometric reasoning*. (Computer Sciences Technical Report #923), University of Wisconsin-Madison.

Media/Software Productions

KidViz (<https://kidviz.app.vanderbilt.edu/>) Measurement and geometry web site

Developing and Integrating Spatial Mathematics and Engineering Design

(<http://disme.org>)

Learning and Assessing Data Modeling (web site: <http://modelingdata.org>)

Case-based Hypermedia Tool for Teachers' Professional Development (designed by Matthew Koehler).

Learning About Area Measure (video).

Learning About Length Measure (video).

Geometry Through Design (video).

HyperAuthor (Hypermedia authoring tool).

PAPER PRESENTATIONS AT PROFESSIONAL MEETINGS

Note: All presentations with Leona Schauble are collaborative.

Lehrer, R. & Taimina, D. (2020, January). *What stays the same? Children's explorations of line and polygon on plane, cylinder, sphere and hyperbolic plane*. Paper presented at a special session of the Joint Mathematics Meetings of the American Mathematical Association in honor of David W. Henderson. Denver, CO.

Lehrer, R. (2020, January). *Inducting children into the epistemology of modeling*. Invited address, Episteme 8, Eighth International Conference to Review Research in Science, Technology and Mathematics Education. Homi Bhabha Centre for Science Education, Mumbai, India.

Lehrer, R. (2019, November). *Fostering epistemological junctures when designing for interdisciplinary learning*. Invited address, Connecting Mathematics and STEM Education: Opportunities, Challenges, and Teacher Education, Foshan University, Foshan, China.

Lehrer, R. (2019, October). *Designing for epistemic development*. Invited address, University of Calgary, Werklund School of Education, Calgary, Canada.

Lehrer, R. (2019, March). *Fostering epistemological junctures when designing for interdisciplinary learning*. Invited address, Conference on Interdisciplinarity in STEM Education, Deakin University, Melbourne, Australia.

Lehrer, R. (2018, September). Discussant for L. Shepard, *Assessments for Classroom Teaching and Learning*, and for W. Penuel & D. Watkins, *Building a System of Assessment in a School System to Promote Equity and Epistemic Justice*. Workshop on Educational Assessment as Useful and Useable Evidence, National Academy of Education and American Academy of Political & Social Science, Philadelphia, PA.

Bakker, A., & Lehrer, R. (2018, August). *Design-based research*. Invited day-long seminar. European Association for Research on Learning and Instruction, SIG 17 & 25 (Ontology and Epistemology) Cambridge, UK.

Lehrer, R. (2018, August). *Modeling and methodology*. Discussant, A. Bikner-Ahsbabs & A. Bakker (organizers) symposium, "How methodology and theory push each other forward." European Association for Research on Learning and Instruction, SIG 17 & 25 (Ontology and Epistemology). Cambridge, UK.

Lehrer, R. (2018, April). *Contrasting perspectives on multiplication: Intuitive grounds of formalism*. Discussant, A. Izsak, K. Jacobson and K. Tillema, *Contrasting perspectives on multiplication, area, and combinatorial problems*. Research Conference of the National Council of Teachers of Mathematics, Washington, DC.

Lehrer, R. (2018, April). *Relating talk and learning*. Discussant, D. Clarke (organizer), What

- is the value of classroom talk? Symposium conducted at the annual meeting of the American Educational Research Association, New York City, NY.
- Lehrer, R. (2018, April). *Backstage underpinnings of validity*. Discussant for M. Wilson Division D, Robert L. Linn Distinguished Address Award, Developing an essential feature of test validity arguments: Alignment among the test design, interpretation of test outcomes and evidence for validity. American Educational Research Association, New York City, NY.
- Shinohara, M., & Lehrer, R. (2018, April). *Becoming statistical: Students' views of their participation in practices of visualizing, measuring and modeling distribution*. Paper presented at the annual meeting of the American Educational Research Association, New York City, NY.
- Wilson, M., Perman, G., & Lehrer, R. (2018, April). *A learning structure involving requirements among dimensions for statistics and modeling*. Paper presented at the annual meeting of the National Council on Measurement in Education, New York City, NY.
- Lehrer, R. (2017, September). *Considering epistemological junctions when designing for interdisciplinary learning*. Paper presented at the European Association for Research on Learning and Instruction, Tampere, Finland.
- Shinohara, M., & Lehrer, R. (2017, July). *Narrating lines of practice: Students' views of their participation in statistical practice*. Paper presented at the Tenth International Research Forum on Statistical Reasoning, Thinking, and Literacy (SRTL 10). Rotorua, New Zealand.
- Lehrer, R., Jones, S., Pfaff, E., & Shinohara, M. (2016, November). *Constituting experiment*. Invited keynote address, Contemporary Approaches to Research in Mathematics, Science, Health and Environmental Education. Deakin and Melbourne Universities, 19th Annual Symposium, Melbourne, Australia.
- Lehrer, R. (2016, October). *Integrating STEM education?* Invited keynote address, Putting STEM Education Under the Microscope. STEM Ed Forum, Deakin University, Melbourne, Australia.
- Lehrer, R. (2016, October). *Perspectives on integrating elementary STE(A)M education*. Invited keynote address, STEM Education Conference: Building STEM Capability in Schools. Waurin Ponds, Australia.
- Lehrer, R., Schauble, L., & Holmes, A. (2016, July). *Transitions in teachers' pedagogical practices and conceptions of measurement support children's conceptual change*. Paper presented at the 13th International Congress on Mathematical Education (ICME-13), Hamburg, Germany.
- Lehrer, R., Schauble, L., Wongkamalasai, M., Henderson, D. W. & Taimina, D. (2016, April). *Articulating transformations in contexts of building and artistic design*. Paper presented as part of a symposium, *Broadening What Counts as Mathematics in Mathematics Education* during the annual meeting of the American Educational Research Association, Washington, D. C.

- Lehrer, R., Holmes, A., Taimina, D., & Henderson, D. W. (2016, April). Defining on plane, cylinder, sphere and hyperbolic plane. Paper presented as part of a symposium, *Studies of Children's Emerging Sense of Space and Measure* during the annual meeting of the National Council of Teachers of Mathematics Research Conference, San Francisco, CA.
- Lehrer, R. (2016, March). *Grounding K-5 mathematics education in experience of space*. Invited address, University of Haifa, Israel.
- Lehrer, R. (2016, February). *Grounding K-5 mathematics education in experience of space: Building foundations of STEM education*. Invited presentation, 10th Annual TN STEM Education Research Conference, Murfreesboro, TN.
- Lehrer, R. (2015, July). *Developing practices of model-based informal inference*. Invited Address, Ninth International Research Forum on Statistical Reasoning, Thinking, and Literacy (SRTL9). Paderborn, Germany.
- Cotterman, S., Lehrer, R., & Schauble, L. (2014, July). *Sampling in the wild*. Paper presented at the 9th International Conference on Teaching Statistics, Flagstaff, AZ.
- Lehrer, R., Jones, R. S., & Kim, M. J. (2014, July). *Model-based informal inference*. Paper presented at the 9th International Conference on Teaching Statistics, Flagstaff, AZ.
- Lehrer, R. (2014, June) *Knitting design research across settings and communities of practice*. Paper presented at the biannual conference of the International Conference of the Learning Sciences, Boulder, CO.
- Lehrer, R., Kim, M.-J., & Jones, R. S. (2014, April). Model-based informal inference. Paper presented as part of a symposium, *Connecting Data and Chance through Modeling*, (C. Konold, Chair), National Council of Teachers of Mathematics, New Orleans.
- Lehrer, R. & Schauble, L. (2014, April). *Practicing science. Children invent and revise models of local ecosystems*. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.
- Lehrer, R., & Penner, E. (2013, December). *Supporting the development of models and modeling*. Invited Paper/workshop presented at STEM Smart: Lessons Learned from Successful Schools, National Science Foundation, Washington, D.C.
- Lehrer, R. (2013, September). *Measuring across multiple dimensions: How can we measure the ability to engage in science practices in the context of rich content?* Panel moderator/presenter, Invitational Research Symposium on Science Assessment, Washington, D.C. (Council of Chief State School Officers, College Board)
- Lehrer, R., & Petrosino, A. (2013, August). *Data modeling: From design experiments to large-scale implementation*. Invited paper, presented at the Waterbury Summit on Future Directions in Science Education, Pennsylvania State University.
- Kobiela, M., & Lehrer, R. (2013, April). *Investigating the co-development of mathematical knowledge and the practice of defining in a middle school classroom*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco,

CA.

- Lehrer, R. (2013, April). Chair/Organizer, Symposium, *A learning progression emerges in a trading zone of professional community and identity*. Annual meeting of the American Educational Research Association, San Francisco, CA.
- Lehrer, R., Jones, S. R., Pfaff, E., & Shinohara, M. (2013, April). *Modeling data: A learning progression for supporting the development of statistical reasoning*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Rouse, R., & Lehrer, R. (2013, April). *Building knowledge through troubleshooting in a reverse engineering context*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Lehrer, R. (2013, April). *Approaching the practice of data analysis and interpretation by engaging students in the invention and revision of models: Implications for pedagogical practice and assessment*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Lehrer, R., & Schauble, L. (2013, April). Understanding evolution as a modeling enterprise. In K. Metz (Chair), *Designing for the teaching and learning of evolution in elementary and middle school*. Symposium presented at the Annual Meeting of the National Association for Research in Science Teaching, Rio Grande, Puerto Rico.
- Kobiela, M., & Lehrer, R. (2012, July) *Establishing a mathematical practice in a middle school classroom*. Paper presented at the 10th International Conference of the Learning Sciences, Sydney, Australia.
- Rouse, R., & Lehrer, R. (2012, July). *Engaging in design: Reflections of young paper engineers*. Paper presented at the 10th International Conference of the Learning Sciences, Sydney, Australia.
- Lehrer, R. (2012, June). *A learning progression emerges in a trading zone of professional community and identity*. Invited address, International STEM Research Conference: Quantitative Reasoning in Mathematics and Science Education. Savannah, GA.
- Lehrer, R. (2012, April). *Designing for and representing the development of epistemic practices in classroom communities*. Chair, Symposium presented at the annual meeting of the American Educational Research Association, Vancouver, British Columbia, CA.
- Lehrer, R., Wilson, M., Ayers, E., & Kim, M-J. (2011, September). *Assessing data modeling and statistical reasoning*. Paper presented at the Fall Conference, Society for Research on Educational Effectiveness (SREE), Washington, DC.
- Lehrer, R., & Schauble, L. (2011, June). *Data modeling with children*. Invited workshop, 2011 Summer Leadership Institute, National Science Education Leadership Association (NSELA), Johnson City, TN.
- Lehrer, R. (2011, April). Discussant, *Research in Statistics Education: Current Efforts and future directions*. Symposium presented at the research pre-session of the annual meeting of the National Council of Teachers of Mathematics, Indianapolis, IN.

- Lehrer, R. (2011, April). Discussant, *New directions in Research in Geometry Education*. Symposium presented at the research pre-session of the annual meeting of the National Council of Teachers of Mathematics, Indianapolis, IN.
- Lehrer, R., & Wilson, M. (2011, April). Developing assessments of data modeling: Construct maps as boundary objects. In *Measuring a Learning Progression for Data Modeling: Psychometric Modeling and Issues*. Symposium presented at the joint meeting of the American Educational Research Association and the National Council on Measurement in Education, New Orleans, LA.
- Lehrer, R., & Konold, C. (2011, April). *Learning to reason about variability and chance by inventing measures and models*. Invited address, National Association for Research in Science Teaching, Orlando, FL.
- Bolger, M.S., Weinberg, P.J., Kobiela, M.A., Rouse, R.J., Lehrer, R. (2011, April). *Embodied experiences as a resource for children's mechanistic and mathematical reasoning in an engineering curriculum*. Paper presented at the 2011 Meeting of the National Association for Research in Science Teaching: Orlando, FL
- Kobiela, M.A., Bolger, M.S., Weinberg, P.J., Lehrer, R. (2010). *Mathematizing an engineering curriculum through embodiment*. Paper presented at P-12 Engineering and Design, Education Research Summit. Institute for P-12 Engineering Research and Learning: Seaside, OR.
- Lehrer, R., & Kobiela, M. (2010, November). *A spatial measure model for number and arithmetic operations on number*. Invited address, Ministry of Education, Singapore.
- Lehrer, R. (2010, November). *A multidimensional learning progression to guide instruction, assessment and professional development*. Invited presentation, Designing Technology-Enabled Diagnostic Assessments for K-12 Mathematics. Friday Institute, Raleigh:NC.
- Lehrer, R., Kim, Min-Joung, & Konold, C. (2010, July). *How students' spontaneous use of statistical tools shapes their thinking about precision*. Paper presented at the International Conference on Teaching Statistics 8, Ljubljana, Slovenia.
- Bolger, M.S., Kobiela, M.A., Weinberg, P.J., Lehrer, R. (2010). *Embodied experiences within an engineering curriculum*. Proceedings of the 9th International Conference of the Learning Sciences (ICLS 2010), Vol. 1, 706-713. International Society of the Learning Sciences: Chicago, IL.
- Zhou, W., & Lehrer, R. (2010, May). *IRT modeling of students' theories of linear measurement*. Paper presented at the annual meeting of the American Educational Research Association, Denver, CO.
- Kobiela, M., Lehrer, R., VandeWater, E. (2010, May). *Students' developing conceptions of area via partitioning and sweeping*. Paper presented at the annual meeting of the American Educational Research Association, Denver, CO.

- Lehrer, R. (2010, April). *Constructing a multidimensional learning progression for data modeling*. Symposium presented at the annual meeting (research pre-session) of the National Council of Teachers of Mathematics, San Diego, CA.
- Lehrer, R. & Schauble, L. (2010, March). *Seeding evolutionary thinking by engaging children in modeling its foundations*. Paper presented at the National Association for Research in Science Teaching, Philadelphia, PA.
- Bolger, M., Kobiela, M., Weinberg, P., & Lehrer, R. (2009, November). *Children's reasoning about motion in systems of linkages and levers*. Paper presented at the National Science Foundation Annual Principal Investigators Meeting, Washington, D.C.
- Lehrer, R. (2009, August). *Designing to develop disciplinary dispositions: Modeling natural systems*. Invited address, Annual Meeting of the American Psychological Association, Toronto, CA.
- Bolger, M., Kobiela, M., Weinberg, P., & Lehrer, R. (2009, June). *Analysis of children's mechanistic reasoning about linkages and levers in the context of engineering design*. Paper presented at the 2009 American Society for Engineering Education (ASEE) Annual Conference and Exposition. Austin, TX.
- Kim, M. J., Zhou, W., Dray, A., Walker, L., Lehrer, R. & Wilson, M. (2009, June). *Assessing data modeling and statistical reasoning*. Poster session presented at the annual meeting of the Institute of Education Sciences Research Conference, Washington D.C.
- Lehrer, R. (2009, May). *Designing instruction to support the development of statistical reasoning*. Invited paper, Banff International Research Station for Mathematical Innovation and Discovery, Probabilistic Models of Cognitive Development. Banff, CA.
- Konold, C., & Lehrer, R. (2009, April). *Modeling repeated measures as an entrée into data analysis*. Workshop conducted for National Council of Teachers of Mathematics, Research Pre-session, Washington, D. C.
- Confrey, J. & Lehrer, R. (2009, March). *Comparing and contrasting two approaches to fractions in one dimension: The number line and measurement of lengths*. Proposal developed for the NSF sponsored Science, Technology, Engineering and Mathematics Symposium, West Palm Beach, FL.
- Lehrer, R. (2009, February). *Improving statistics education: Children invent representations, measures and models of variability*. Invited poster presentation, National Science Foundation, Washington, D. C. [selected for NSF media day]
- Dray, A., Weinberg, P., Lehrer, R., & Wilson, M. (2008, June) *Assessing data modeling in middle school students*. Poster session presented at the annual meeting of the Institute of Education Sciences Research Conference, Washington D.C.
- Lehrer, R. (2008, April). *Reflections on situating research in practice*. Paper presented at the research pre-session of the annual meeting of the National Council of Teachers of Mathematics, Salt Lake City, Utah.

- Lehrer, R. (2008, April). Discussant for J. Smith, L. Dietiker, H. Figueras, K Lee, L. Males, A. Mosier, & G. Sisman, *Assessing the Curricular Contributions to Poor Measurement Learning*. Symposium conducted at the research pre-session of the annual meeting of the National Council of Teachers of Mathematics, Salt Lake City, Utah.
- Lehrer, R. (2008, March). Math stories. Expanding the modeling space. Discussant, *Stories of mathematics instruction, rich media technologies, and their uses to understand and improve teaching* (P. Herbst, symposium organizer). Paper presented at the annual meeting of the American Educational Research Association, New York City.
- Gresalfi, M., & Lehrer, R. (2008, March). *You want to try to prove it and show what you did and all that: An analysis of disciplinary and interpersonal positioning in a 5th grade mathematics classroom*. Paper presented at the annual meeting of the American Educational Research Association, New York City.
- Knapp, N., Lehrer, R., & Schauble, L. (2008, March). *Designing to promote understanding of mathematics teaching and learning for pre-service teachers*. Paper presented at the annual meeting of the American Educational Research Association, New York City.
- Kobiela, M., Weinberg, P., & Lehrer, R. (2008, March). *Developing a culture of mathematical inquiry in an urban sixth grade classroom*. Paper presented at the annual meeting of the American Educational Research Association, New York City.
- Lehrer, R., Schauble, L., Lucas, D., Henrie, A., Taylor, R., & Knapp, N. (2008, March). *Development of models and modeling in the life sciences*. Poster presented at the annual meeting of the American Educational Research Association, New York City.
- Lehrer, R. (2008, February). *Designing instruction to support the development of statistical reasoning*. Invited lecture, Pittsburgh Science of Learning Center, Carnegie Mellon University, Pittsburgh, PA.
- Lehrer, R. (2007, November). *Learning to reason about variability and chance by inventing measures and models*. Inaugural address, Moore Lecture Series, Friday Institute for Educational Innovation, College of Education, NC State University, Raleigh, NC.
- Lehrer, R. (2007, October). *Developing relations among distinct disciplinary practices: Mathematics, science, and engineering*. National Research Council, Committee on Understanding and Improving K-12 Engineering Education in the United States.
- Lehrer, R. (2007, July). *Introducing students to data representation and statistics*. Invited keynote address, Annual Meeting of the Mathematics Education Research Group of Australasia, Hobart, Tasmania.
- Lehrer, R. (2007, July). *Developing spatial mathematics*. Invited keynote address, Annual Meeting of the Australian Association of Mathematics Teachers, Hobart, Tasmania.

- Lehrer, R., & Schauble, L. (2007, April). *Supporting the development of model-based reasoning*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Lehrer, R. (2007, April). *Collaboration at the boundaries: Brokering learning and assessment improves student achievement*. [Chair and Organizer] Symposium presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Lehrer, R. (2007, January). *Modeling nature: Designing a science education around the invention and revision of models*. Invited Address, Colloquium Series of the Learning Sciences Institute, Vanderbilt University, Nashville, TN.
- Lehrer, R. (2006, November). *Introducing students to distribution and chance via repeated measure*. Invited lecture, Department of Mathematics, Michigan State University, East Lansing, MI.
- Lehrer, R. (2006, June). *Measurement affords a conceptual terrain for developing mathematical and scientific reasoning*. Invited address, Centre for Research in Mathematics and Science Education at Macquarie University, Sydney, Australia.
- Lehrer, R. (2006, May). *Conceptual change in science is coordinated with children's developing conceptions of measure*. Invited address, Institute for Learning Sciences, Rutgers University, Newark, NJ.
- Lehrer, R. (2006, April). Discussant for: *Connecting Discourse, Teaching, and Curriculum* (Beth Herbel-Eisenmann, Chair). Research symposium presented at the annual meeting of the National Council of Teachers of Mathematics, St. Louis, MO.
- Lehrer, R. (2006, April). Participant (with K. Sawyer, C. Weinstein, Gerunda Hughes), Graduate Student Council Division C Fireside Chat. *Getting the Word Out about Your Research: Emerging Scholars and Publishing in Public Forums*. American Educational Research Association, San Francisco, CA.
- Lehrer, R. (2006, April). *Learning progressions and assessment*. In M. Wilson (Chair), *Systems for state science assessment*. (overview of NRC report). American Educational Research Association, San Francisco, CA.
- Lehrer, R., Konold, C., & Kim, M. (2006, April). *Constructing data, modeling chance in the middle school*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Schauble, L., & Lehrer, R. (2005, December). *Taking a modeling approach to science instruction*. Invited address, Council for Elementary Science International, National Science Teachers Association, Nashville, TN.
- Lehrer, R., & Schauble, L. (2005, November). *Modeling nature*. Invited address, *Ninth Annual Science and Math Teachers Conference*, American University of Beirut, Beirut, Lebanon.

- Knapp, N. & Lehrer, R. (2005, June). *Changes in children's conceptions of spatial measure: Coordinating talk and inscription*. Paper presented in *Understanding, building, and using symbolic representations of space and time*. (M. Wiser, Organizer). *35th Annual Meeting of the Jean Piaget Society, Vancouver, Canada*.
- Lehrer, R. (2005, May). *Modeling nature: Introducing children to practices and concepts of science*. Invited paper, Center for Education, National Academy of Science, Washington, D. C.
- Lehrer, R. (2005, February). *Developing spatial mathematics*. Invited address, Numeracy and Mathematics Facilitators' National Conference, Auckland, NZ.
- Hall, R., Lehrer, R., Lucas, D., & Schauble, L. (2004, June). *Of grids and jars: A comparative analysis of representational infrastructure and learning opportunities in middle school and professional science*. Sixth International Conference of the Learning Sciences, Santa Monica, CA.
- Lehrer, R., & Schauble, L. (2004, June). *Contrasting emerging conceptions of distribution in contexts of error and natural variation*. The 33rd Carnegie Symposium on Cognition, "Thinking with Data," Pittsburgh, PA.
- Lehrer, R., Catley, K., & Reiser, B. (2004, May). *Tracing a trajectory for developing understanding of evolution*. Invited paper for the National Research Council Committee on Test Design for K-12 Science Achievement, Washington, D. C.
- Lehrer, R. (2004, April). *Developing modeling and argument in K-8 schooling*. Invited address, PRISM Institute, Georgia Institute of Technology, Atlanta, GA.
- Lehrer, R., & Schauble, L. (2004, April). *Modeling aquatic systems: Contexts and practices for supporting inquiry, agency and epistemology*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Lehrer, R. (2003, December). *Longitudinal study of the development of concepts of volume and its measure*. Invited Colloquium, Syracuse University, Department of Mathematics, Syracuse, NY.
- Lehrer, R., & Schauble, L. (2003, August). *Distribution as a resource for science education*. Paper presented at the European Association for Research on Learning and Instruction, Padova, Italy.
- Seymour, J., & Lehrer, R. (2003, August). *Pedagogical content knowledge as interanimation of discourses*. Paper presented at the annual meeting of the American Psychological Association, Toronto, CA.
- Lehrer, R., & Schauble, L. (2003, April). *Designing communities of practice*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Lehrer, R. (2003, February). *Inscriptions, talk, and conceptual change*. Invited presentation, Wintertext Conference, Jackson's Hole, Wyoming.

- Lehrer, R. (2002, October). *Shaping space*. Invited address to the Illinois Council of Teachers of Mathematics, Peoria, IL.
- Lehrer, R. (2002, October). *Thinking with and about data*. Invited address to the 2nd Biennial Cognitively Guided Instruction National Conference, St. Paul, MN.
- Lehrer, R. (2002, September). *Research on learning: Implications for curriculum evaluation*. Invited presentation, National Research Council, Washington, D.C.
- Lehrer, R. (2002, February.) *Distribution: Modeling error and natural variation in the elementary grades*. Paper presented at the US-Russia Forum on Elementary Mathematics, Honolulu, Hawaii.
- Lehrer, R. (2002, February). *Developing understanding of measurement and geometry*. Paper presented at the US-Russia Forum on Elementary Mathematics, Honolulu, Hawaii.
- Lehrer, R. (2001, June). *Mind tools*. Invited address, Federal University of Bahia, Salvador, Brazil.
- Lehrer, R. (2001, April). *Children's work with data*. In T. Kelly (Chair), *Involving teachers in research on students' statistical understanding*. Symposium conducted at the 79th annual meeting of the National Council of Teachers of Mathematics, Orlando, FL.
- Lehrer, R., & Schauble, L. (2001, April). *Accounting for contingency in design experiments*. In P. Cobb (Chair), *Design experiments, or engineering prototypes of interactive learning environments in science and mathematics*. Symposium conducted at the annual meeting of the American Educational Research Association, Seattle, WA.
- Schauble, L., & Lehrer, R. (2001, April). *Distributions as signatures of growth*. In R. Lehrer (Chair), *Developing conceptions of variability and distribution*. Symposium conducted at the annual meeting of the American Educational Research Association, Seattle, WA.
- Lehrer, R., & Schauble, L. (2000, July). *Distributions as signatures of biological processes*. Paper presented at the PCMI working group meeting on the Growth and Development of Student Reasoning about Data and Chance, Institute for Advanced Study, Princeton, NJ.
- Lehrer, R. (2000, April). *Designing for development*. In E. Forman (Chair), *Strengths and challenges of developmental approaches to research in education*. Symposium conducted at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Pritchard, C. (2000, April). *Building on experiences of large-scale space to develop coordinate geometry*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Schauble, L. (2000, April). *Designing for teacher community*. In J. Confrey (Chair), *Implementation research supporting the development of teacher professional*

- communities and improved student learning*. Symposium conducted at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Petrosino, A., Lehrer, R., & Schauble, L. (2000, April). *Distribution: A foundational resource for experiment in science education*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Schauble, L. (1999, October). *Scientific reasoning as modeling: the development of representational competence*. In D. Klahr (Chair), *The development of scientific reasoning processes*. Symposium conducted at the first annual meeting of the Cognitive Development Society, Chapel Hill, N.C.
- Koehler, M. J., Petrosino, A. J., & Lehrer, R. (1999, June). *Elements of case design for hypermedia environments in teacher education*. Paper presented at the World Conference on Educational Multimedia, Seattle, WA.
- Lehrer, R., Schauble, L., Strom, D., & Pligge, M. (1999, June). *Similarity of form and substance: From inscriptions to models*. Paper presented at the Carnegie Symposium, Pittsburgh, PA.
- Lehrer, R., & Schauble, L. (1999, April). *The long-term development of knowledge: Coherence and cumulation in students' science learning*. In R. Lehrer & L. Schauble (Co-chairs), *What have we learned from science education reform?* Symposium conducted at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Lehrer, R., & Schauble, L. (1999, April). *What counts as different? Reasoning about distributions and difference in the fifth grade*. In N.D. Enyedy (Chair), *Stochastics: Improving student understanding of probability and statistics through the use of technology*. Symposium conducted at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Strom, D., & Lehrer, R. (1999, April). *The epistemology of generalization*. In J. Kaput (Chair), *Toward a research base for algebra reform beginning in the early grades*. Symposium conducted at the annual meeting of the American Educational Research Association, Montreal, Canada.
- Lehrer, R., & Schauble, L. (1998, August). *Data modeling*. In R. Lehrer (Chair), *Modeling in Mathematics and Science Education*. Tutorial presented at the annual meeting of the Cognitive Science Society, Madison, WI.
- Battista, M. & Lehrer, R. (1998, July). *Investigating student thinking about the mathematics of space and geometry*. Invited presentation at the Institute for Advanced Study-Mathematics Institute, Park City, Utah.
- Lehrer, R. (1998, June). *Evolution of notation and argument*. Invited paper presented at the International Conference on Modeling and Symbolizing in Mathematics Education, Freudenthal Institute, Utrecht, Netherlands.

- Lehrer, R., & Schauble, L. (1998, June). *The interrelated development of inscriptions and conceptual understanding*. Invited presentation at the annual meeting of the Jean Piaget Society, Chicago, IL.
- Lehrer, R. (1998, May). *Mathematizing space in the primary grades*. Paper/Workshop presented at the annual Green Lake Conference of the Wisconsin Mathematics Council, Green Lake, WI.
- Lehrer, R., & Schauble, L. (1998, April). *Developing a community of practice for reform of mathematics and science*. In P. Grossman (Chair), *Researching change in teachers' professional communities: Methodological and theoretical dilemmas*. Symposium conducted at the annual meeting of the American Educational Research Association, San Diego, CA.
- Lehrer, R., & Schauble, L. (1998, April). *Inventing data structures for representational purposes: Elementary-grade students' classification models*. In L. Schauble (Chair), *Challenges and opportunities of a modeling curriculum*. Symposium conducted at the annual meeting of the American Educational Research Association, San Diego, CA.
- Forman, E., Dobransky-Fasiska, D., Strom, D., & Lehrer, R. (1998, April). *Learning to participate in mathematical arguments*. In R. Lehrer (Chair), *Mathematizing space in the primary grades*. Symposium conducted at the annual meeting of the American Educational Research Association, San Diego, CA.
- Erickson, J., & Lehrer, R. (1998, April). *The evolution of critical standards as students design hypermedia documents*. In S. Williams (Chair), *Learning through Problem Solving*. Symposium conducted at the annual meeting of the American Educational Research Association, San Diego, CA.
- Erickson, J., & Lehrer, R. (1997, August). *Students' evolution of critical standards about design*. In *Psychology of Developing Software for Children*. Symposium conducted at the annual meeting of the American Psychological Association, Chicago, IL.
- Lehrer, R., & Schauble, L. (1997, April). *The inter-related development of inscriptions and conceptual understanding*. In D. Klahr (Organizer), *Multiple-Space Search in Scientific Reasoning: Developmental Implications*. Symposium conducted at the Society for Research in Child Development, Washington, D.C.
- Lehrer, R., & Schauble, L. (1996, September). *The development of model-based reasoning*. Invited presentation to the Committee in Development in the Sciences of Learning, National Academy of Sciences National Research Council, Washington, D.C.
- Shumow, L.B., & Lehrer, R. (1996, April). *Effects of a parent education program about children's problem solving in the context of mathematics reform*. In R. Elardo (Chair), *Parent Involvement Activities and Effects*, Symposium conducted at the American Educational Research Association, New York, NY.
- Penner, D., Giles, N., Lehrer, R., Schauble, L. (1996, April). *Building functional models: Designing an elbow*. In Susan William (Chair) *Learning Through Design: Contextualizing*

Inquiry for Science and Mathematics, Symposium conducted at the American Educational Research Association, New York, NY.

- Lehrer, R., Shumow, L. B., Thoyre, G., & Kemeny, V. (1996, April). *Constructing the mathematical self*. In Teresa Garcia (Chair) *Student Beliefs, Self-Processes and Self-Regulated Learning*, Poster session presented at American Educational Research Association, New York, NY.
- Lehrer, R., & Schauble, L. (1996, April). *The development of model-based reasoning in mathematics and science*. In Richard Duschl and Kathleen Metz, (Co-chairs), *Design Experiments in Children's Science Education*. Symposium conducted at the American Educational Research Association, New York, NY.
- Lehrer, R., Kemeny, V., & Gance, S. (1996, April). *Children model the structure of space: From cereal boxes to epistemology*. In Carol Kehr Tittle (Chair), *Evaluating Mathematics and Science Reform in School Classrooms: The Role of Theories in Frameworks for Evaluation*. Symposium conducted at American Educational Research Association, New York, NY.
- Lehrer, R., & Jacobson, C. (1996, April). *Modeling to reform teaching and learning in mathematics and science*. Invited address, Schools in the 21st Century, San Antonio, TX.
- Lehrer, R., & Romberg, T. (1995, October). *Mathematizing children's informal understanding of space*. Presented at ICMI Study Group, Perspectives on the Teaching of Geometry for the 21st Century, Catania, Italy.
- Schauble, L., & Lehrer, R. (1995, April). *Thinking about simple machines: Model-based reasoning in design contexts*. In E. D. Amsel (Chair), *The development of scientific reasoning*. Symposium conducted at the Biennial Meeting of the Society for Research in Child Development, Indianapolis, IN.
- Schauble, L., & Lehrer, R. (1995, April). *The development of model-based reasoning*. Paper presented at the Annual Meeting of the National Association of Research on Science Teaching, San Francisco, CA.
- Lehrer, R., & Erickson, J. (1995, April). *Contextual considerations for technology-aided learning*. In Michael Pressley (Chair), *Psychological Learning Issues in Technology-Based Learning Environments*, Symposium conducted at the American Educational Research Association, San Francisco, CA.
- Lehrer, R., & Jacobson, C. (1995, April). *Classical and classroom views of the development of spatial thinking*. Paper presented at the American Educational Research Association, San Francisco, CA.
- Lehrer, R., & Shumow, L. B. (1995, April). *Aligning the construction zones of parents and teachers: The case of mathematics reform*. Paper presented at the American Educational Research Association, San Francisco, CA.

- Lehrer, R. (1994, June). *Geometry in the primary grades?* Invited paper presented at the Project for the Improvement of Mathematics Conference, Marquette University, Milwaukee, WI.
- Lehrer, R., & Schauble, L. (1994, April). *The embedded history of classroom learning*. In Ellice Forman (Chair), *Integrating the cognitive and the social in the construction of mathematical and scientific knowledge*. Symposium conducted at the American Educational Research Association, New Orleans, LA.
- Lehrer, R. (1994, April). *Teaching geometry for understanding*. Paper presented at the annual meeting of the National Council for Teachers of Mathematics, Indianapolis, IN.
- Lehrer, R. (1994, April). *New directions for teaching and learning geometry*. Symposium chair and organizer. American Educational Research Association, New Orleans, LA.
- Jacobson, C., Potts, M., & Lehrer, R. (1994, April). Cognitively guided instruction in geometry: Informed discourse, the window into the why. In *New Directions for Teaching and Learning Geometry*. Symposium conducted at the American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Shumow, L. (1993, April). Teaching as assisted performance: Comparing the construction zones of parents and teachers. In *Bridging the Gap between Radical Constructivism and Cognitive Theory*. Symposium conducted at the American Educational Research Association, Atlanta, GA.
- Lehrer, R., Osana, H., Jacobson, C., & Jenkins, M. (1993, April). *Children's conceptions of geometry in the primary grades*. Paper presented at the American Educational Research Association, Atlanta, GA.
- Lehrer, R., & Horvath, J. (1993, April). Cognitive models of authentic assessment. In *Moving beyond the Rhetoric about Authentic Assessment in Mathematics*. Symposium conducted at the American Educational Research Association, Atlanta, GA.
- Lehrer, R., Erickson, J., & Connell, T. (1993, April). The restless text. Student authoring with hypermedia tools. In *Learner Interactions in the New Electronic Writing Space*. Symposium conducted at the American Educational Research Association, Atlanta, GA.
- Jeong, A., & Lehrer, R. (1993, April). *Teaching kinematics and graph interpretation with computer simulations and dynamic notations*. Paper presented at the American Educational Research Association, Atlanta, GA.
- Towell, G., & Lehrer, R. (1992, December). *A knowledge-based model of geometry learning*. Paper presented at the Sixth Annual Neural Information Processing Systems Natural and Synthetic, Denver, CO.
- Lehrer, R. (1992, August). *Back to the future: Logo and the development of spatial sense*. Paper presented at the 7th International Congress for Mathematics Research, Quebec City, Canada.

- Reynolds, T., Bonk, C., & Lehrer, R. (1992, April). *Conceptual change from essay and summary writing in eighth-grade social studies*. Paper presented at the American Educational Research Association, San Francisco, CA.
- Lehrer, R., Erickson, J., & Connell, T. (1992, April). A researcher's approach to assessing knowledge design in history. In *Assessing Cognitive skills as Students Design Multimedia Presentations: Teacher and Researcher Perspectives*. Symposium presented at the American Educational Research Association, San Francisco, CA.
- Lehrer, R. (1992, March). *Learning by design*. Invited presentation at the Robert M. LaFollette Institute of Public Affairs, Madison, WI.
- Littlefield, J., & Lehrer, R. (1991, April). *A model of the cognitive components of Logo: Implications for performance and transfer*. Society for Research in Child Development, Seattle, WA.
- Lehrer, R., Lee, A., & Jeong, A. (1991, April). *Reflective teaching of Logo*. American Educational Research Association, Chicago, IL.
- Lehrer, R. (1991, April). *History by design*. American Educational Research Association, Chicago, IL.
- Loef, M., & Lehrer, R. (1990, April). *Understanding of teachers' knowledge of fractions*. American Educational Research Association, Boston, MA.
- Lehrer, R., & Yussen, S. R. (1990, April). *Computer experience and children's theories of mind*. American Educational Research Association, Boston, MA.
- Lehrer, R., & Littlefield, J. (1990, April). *Changes across time in the cognitive structure of Logo knowledge*. American Educational Research Association, Boston, MA.
- Lehrer, R., & Yussen, S.R. (1989, April). *Children and adolescents' conceptions of computer and human intelligences*. Society for Research in Child Development, Kansas City, MO.
- Lehrer, R., Knight, W., Sancilio, L., & Love, M. (1989, March). *Software to link actions and descriptions in pre-proof geometry*. American Educational Research Association, San Francisco, CA.
- Lehrer, R., & Littlefield, J. (1989, March). *Misconceptions in Logo: The role of instruction*. American Educational Research Association, San Francisco, CA.
- Rembold, K. L., & Lehrer, R. (1988, August). *The development of young children's choices in analogical problem solving*. American Psychological Association, Atlanta, GA.
- Lehrer, R., & Yussen, S. (1988, April). *Conceptions of computer and human intelligence*. In *Children's and Adult's Conceptions of Mental Processes and Events*, Symposium conducted at the American Educational Research Association, New Orleans, LA.

- Lehrer, R., Randle, L., & Sancilio, L. (1988, April). *Learning pre-proof geometry with Logo*. American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Koedinger, K. (1988, April). *Cognitive structure by fuzzy induction*. American Educational Research Association, New Orleans, LA.
- Lehrer, R., & Guckenberger, R. (1988, April). *Children's perceptions of educational software: Theory and methods*. American Educational Research Association, New Orleans, LA.
- Lehrer, R. (1988, November). *Linking action and description in pre-proof geometry*. Invited paper presented at the annual meeting of the Psychology of Mathematics Education (PME), Dekalb, IL.
- Lehrer, R. (1988, April). *Logo and pre-proof geometry: The Meno revisited*. In *Learning of geometry through Logo: Three perspectives*, Research symposium sponsored by the Research Advisory Committee of National Council of Teachers of Mathematics, Chicago, IL.
- Lehrer, R., & Randle, L. (1987, May). *Turtle for two: Collective Logo*. Paper presented at the annual meeting of the Piaget Society, Philadelphia, PA.
- Lehrer, R., Guckenberger, T., & Lee, O. (1987, April). *A comparative study of the cognitive consequences of Logo-guided instruction in the third grade*. American Educational Research Association, Washington, D.C.
- Lehrer, R., & Comeaux, M. (1987, April). *A developmental study of the effects of goal constraints on composition*. American Educational Research Association, Washington, D.C.
- Lehrer, R. (1987, July). *Robots as tools for thought*. Invited presentation at the Schoolhouse Robotics Conference, Madison, WI.
- Lehrer, R. (1987, June). *A fool's commentary*. Invited discussant for the NSF Working Conference in Geometry, Syracuse, NY.
- Lehrer, R., & Smith, P. C. (1986, April). Logo learning: Are two heads better than one? In *Effects of Logo-Mediated Instruction in Mathematics and Problem Solving*, Symposium conducted at the American Educational Research Association, San Francisco, CA.
- Lehrer, R., & Smith, P. C. (1986, April). Logo learning: Is more better? In *Effects of Logo-Mediated Instruction in Mathematics and Problem Solving*, Symposium conducted at the American Educational Research Association, San Francisco, CA.
- Lehrer, R., Levin, B. B., Comeaux, M., & DeHart, P. (1986, April). *Writing scaffolds for young children: A comparative study*. American Educational Research Association, San Francisco, CA.
- Lehrer, R. (1986, October). *New information technologies and the social sciences: The human element*. Paper presented at the Laser Active '86: Interactive Information Technologies-Challenges and Applications for Education, Research and Training. Boston, MA.

- Comeaux, M., & Lehrer, R. (1986, April). *The mind of a writer: A cognitive model of computer-assisted composition*. American Educational Research Association, San Francisco, CA.
- Lehrer, R., Harckham, L., & Archer, P (1985, April). *Microcomputer-based instruction for special needs children: First year findings*. American Educational Research Association, Chicago, IL.
- Lehrer, R., & DeBernard, A. (1985, April). *The language of learning and the language of computing: The perceptual-language model*. American Educational Research Association, Chicago, IL.
- Lehrer, R. (1984, October). *A cognitive-distancing model for microcomputer-based instruction*. Northeast Educational Research Association, Ellenville, NY.
- Lehrer, R. (1984, April). *Generalized discriminant analysis via Bayesian regression with structural priors*. American Educational Research Association, New Orleans, LA.
- Hess, A. M., & Lehrer, R. (1984, April). *A causal model of cognitive processes and reading comprehension*. American Educational Research Association, New Orleans, LA.
- Lehrer, R. (1983, April). *Novice problem solving skills: Relations among formal operations, representation, and performance*. American Educational Research Association, Montreal, Canada.
- Eimer, B. N., Mancuso, J. C., & Lehrer, R. (1983, April). *Developmental differences in boys' judgments about parental disciplinary behavior*. Society for Research in Child Development, Detroit, MI.
- Lehrer, R. (1982, August). *A features model of friendship*. Paper presented at the annual meeting of the American Psychological Association, Washington, D. C.
- Simon, J., Larsen, C., & Lehrer, R. (1982, March). *Preschool developmental screening program: The relationship between audiometric measures to performance on cognitive and language tasks*. New England Research Organization, Amherst, MA. Received best paper award. Also an invited presentation for distinguished papers from the Regional Research Associations at American Educational Research Association, New York.
- Lehrer, R. (1982, March). *A chronometric analysis of the acquisition of cognitive structure*. American Educational Research Association, New York City.
- Lehrer R., & Pruzek, R. M. (1981, April). *Item domains as fuzzy sets: Judgmental and response data correspondence*. American Educational Research Association, Los Angeles, CA.
- Lehrer, R., Heinegg, R., & Clark, C. (1981, April). *The child's concept of the present*. Society for Research in Child Development, Boston, MA.
- Lehrer, R. (1981, April). *Assessing developmental hypotheses with cross classified data: Log linear models*. American Educational Research Association, Los Angeles, CA.

Lehrer, R., & Rabinowitz, S. N. (1980, April). *A comparison of methods for the assessment of group and individual cognitive structure*. American Educational Research Association, Boston, MA.

Pruzek, R. M., & Lehrer, R. (1979, April). *Generalized canonical analysis of relationships among qualitative variables*. American Educational Research Association, San Francisco, CA.

