Leona Schauble

Department of Teaching and Learning
Peabody Campus, Vanderbilt University
165 Wyatt Center, 1930 South Drive
Nashville, TN 37212
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Current Appointment: Professor of Education, Department of Teaching and Learning

Areas of Specialization

The development of everyday and scientific thinking, including scientific practices, including model-based reasoning; causal inference; relation between content knowledge and general processes of inference and induction. Science and mathematics education; the professional development of STEM educators; learning in out of school contexts.

Education

1987-1989:	Postdoctoral Fellow, Learning Research and Development Center, University of Pittsburgh, Pittsburgh, PA
May, 1988:	Ph.D., Developmental and Educational Psychology Columbia University, New York, NY
May, 1981:	M.A., Developmental Psychology Teachers College, Columbia University, New York, NY
May, 1968:	A.B., Bates College, Lewiston, ME

Professional Experience

Present:	Professor of Education, Department of Teaching and Learning Vanderbilt University
2000-2002	Professor, University of Wisconsin-Madison
1996-2000	Associate Professor, University of Wisconsin-Madison
1992-1996	Assistant Professor, Department of Educational Psychology University of Wisconsin-Madison
1989-1992:	Research Scientist, Learning Research and Development Center, University of Pittsburgh
1985-2000:	Consultant, Children's Television Workshop, New York, NY Developed proposals and prototypes for research in media and electronic technologies for education.
1984-1986:	Research Assistant with Dr. Sylvia Scribner, studying notation, representation, and reasoning in workplace settings, City University Graduate Center, New York, NY
1984-1986:	Research Assistant with Dr. Deanna Kuhn studying everyday reasoning and argumentation, Columbia University, New York, NY

1980-1984: Director of Research and Development, Children's Computer Workshop, New York, NY
Planned and implemented research policies and programs for an inter-disciplinary team developing educational applications of interactive technologies. Hired and supervised staff of eight full-time researchers.

1978-1980: Associate Director of Research for *Sesame Street*
Children's Television Workshop, New York, NY
Planned and conducted research on *Sesame Street*, an experimental educational television program for preschoolers. Developed curriculum and helped to guide the educational design of the series, as well as other national and international educational television programs for children and adults. Planned and carried out research and design on other educational media: books, toys, museum displays, computer galleries, games, software, puzzles, magazines, and activity kits.

1969-1980: Researcher and Field Research Coordinator for *Sesame Street*
Children's Television Workshop

1968-1969: Technical Writer, Burlington Management Services Company, NY, NY

Honors and Awards

1988: Miriam Levin Goldberg Dissertation Award, Teachers College, Columbia University

1991-92: National Academy of Education Spencer Fellowship

1996: AERA Raymond B. Cattell Early Career Award

Research and Publications

Publications in Refereed Journals (*Schauble and Lehrer's contributions to publications marked with an asterisk were written with equal contribution; order of authorship is determined solely by alphabetical priority.)

Schauble, L. (1990). Belief revision in children: The role of prior knowledge and strategies for generating evidence. *Journal of Experimental Child Psychology*, *49*(1), 31-57.

Schauble, L., Glaser, R., Raghavan, K., & Reiner, M. (1991). Causal models and experimentation strategies in scientific reasoning. *Journal of the Learning Sciences*, *1*(2), 201-238.

Schauble, L., Klopfer, L. E., & Raghavan, K. (1991). Students' transition from an engineering model to a science model of experimentation. *Journal of Research in Science Teaching, 28*(9), 859-882.

Schauble, L., Glaser, R., Raghavan, K., & Reiner, M. (1992). The integration of

knowledge and experimentation strategies in understanding a physical system. *Applied Cognitive Psychology, 6*, 321-343.

Kuhn, D., Schauble, L., & Garcia-Mila, M. (1992). Cross-domain development of scientific reasoning. *Cognition and Instruction, 9,* 285-327.

Braine, L., G., Schauble, L., Kugelmass, S., & Fell, A. (1993). The representation of depth by children: Spatial strategies and lateral biases. *Developmental Psychology*, *29*(3), 466-479.

Lehrer, R., Horvath, J., & Schauble, L. (1994). Developing model-based reasoning. *Interactive Learning Environments. 4*(3), 218-232.

Schauble, L., Glaser, R., Duschl, R., Schulze, S., & John, J. (1995). Students' understanding of the objectives and procedures of experimentation in the science classroom. *Journal of the Learning Sciences, 4*(2), 131-166.

Derry, S., Levin, J. R., & Schauble, L. (1995). Stimulating statistical thinking through situated simulations. *Teaching of Psychology*, 22, 51-57.

Schauble, L. (1996). The development of scientific reasoning in knowledge-rich contexts. *Developmental Psychology. 32*(1), 102-119.

Penner, D., Giles, N. D., Lehrer, R., & Schauble, L.* (1997). Building functional models: Designing an elbow. *Journal of Research in Science Teaching*, *34* (2), 125-143.

Schauble, L., & Bartlett, K. (1997). Constructing a science gallery for children and families: The role of research in an innovative design process. *Science Education*, *81*(6), 781-793.

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.

Schauble, L., Leinhardt, G., & Martin, L. (1998). Organizing a cumulative research agenda in informal learning contexts. *Journal of Museum Education*, *22*(2 & 3), 3-7.

Penner, D.E., Lehrer, R., & Schauble, L.* (1998). From physical models to biomechanical systems: A design-based modeling approach. *Journal of the Learning Sciences, 7*(3&4), 429-449.

Gleason, M. E., & Schauble, L. (1999). Parents' assistance of their children's scientific reasoning. *Cognition and Instruction, 17*(4), 343-378.

Lehrer, R., & Schauble, L.* (2000). The development of model-based reasoning. *Journal of Applied Developmental Psychology*, *21*(1), 39-48.

Lehrer, R., & Schauble, L.* (2000). Inventing data structures for representational purposes: Elementary grade students' classification models. *Mathematical Thinking and Learning*, *2*(1&2), 51-74.

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. *Educational Researcher, 32*(1), 9-13.

Lehrer, R., & Schauble, L*. (2004). Modeling natural variation through distribution. *American Educational Research Journal. 41*(3), 635-679.

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.

Lehrer, R., Schauble, L., & Lucas, D.* (2008). Supporting development of the epistemology of inquiry. *Cognitive Development*, *23* (4), 512-529.

Lehrer, R., & Schauble, L.* (2009). Images of learning, images of progress. *Journal of Research in Science Teaching, 46*(6), 731-735.

Lehrer, R., & Schauble, L.* (2012). Seeding evolutionary thinking by engaging children in modeling its foundations. *Science Education*, 96(4), 701-724.

Tolliver, E-T., Lucas, D., & Schauble, L. (2013). Young children's thinking about decomposition: Early modeling entrees to complex ideas in science. *Research in Science Education* (DOI 10.1007/s11165-012-9348-4).

Lehrer, R. & Schauble, L.* (accepted for publication). Learning progressions: The whole world is NOT a stage. *Science Education*.

Books

Schauble, L., & Glaser, R., Eds. (1996). *Innovations in learning: New environments in education*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Lehrer, R., & Schauble, L., Eds.* (2001). *Investigating real data in the classroom: Expanding children's understanding of math and science.* New York: Teachers College Press.

National Research Council (2006). *Taking science to school* (Washington, DC: National Academy Press).

Chapters (*Schauble and Lehrer's contributions to publications marked with an asterisk were written with equal contribution; order of authorship is determined solely by alphabetical priority.)

Kuhn, D., Amsel, E., & O'Loughlin, M., with L. Schauble & W. Yotive (1988). *The development of scientific thinking skills.* NY: Academic Press.

Schauble, L. (1990). Formative evaluation in the design of educational software. In B.N. Flagg (Ed.), *Improving electronic learning materials through formative evaluation* (pp. 51-66). Hillsdale, NJ: Erlbaum.

Schauble, L., & Glaser, R. (1990). Scientific thinking in children and adults. In D. Kuhn (Ed.), Developmental perspectives on teaching and learning thinking skills. *Contributions to Human Development, 21,* 9-26.

Voss, J. F., & Schauble, L. (1992). Is interest educationally interesting? An interest- related model of learning. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 101-120). Hillsdale, NJ: Erlbaum.

Glaser, R., Schauble, L., Raghavan, K., & Zeitz, C. (1992). Scientific reasoning across different domains. In E. DeCorte, M. Linn, H. Mandl, & L. Verschaffel, (Eds.), *Computer-based learning environments and problem solving* (pp. 345-371). Berlin: Springer-Verlag.

Schauble, L., Raghavan, K., & Glaser, R. (1993). The Discovery and Reflection Notation: A graphical trace for supporting self regulation in computer-based laboratories. In S. LaJoie & S. Derry (Eds.), *Computers as Cognitive Tools* (pp. 319-337). Hillsdale, NJ: Lawrence Erlbaum Associates.

Schauble, L., Beane, D. B., Coates, G. D., Martin, L. M. W., & Sterling, P. (1996). Outside the classroom walls: Learning in informal environments. In L. Schauble & R. Glaser (Eds.). *Innovations in learning: New environments for education* (pp. 5-24) Hillsdale, NJ: Lawrence Erlbaum Associates.

Lehrer, R., Schauble, L., Carpenter, S., & Penner, D*. (2000). The inter-related development of inscriptions and conceptual understanding. In P. Cobb, E. Yackel, and K. McClain (Eds.). *Symbolizing and communicating in mathematics classrooms: Perspectives on discourse, tools, and instructional design* (pp. 325-360). Mahwah, NJ: Erlbaum.

Lehrer, R., & Schauble, L.* (2000). Model-based reasoning in mathematics and science. In R. Glaser, *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 R. Minstrell and E. Van Zee (Eds.). *Inquiring into inquiry learning and teaching in science* (pp. 80-99). Reston, VA: American Association for the Advancement of Science.

Schauble, L, Leinhardt, G., & Martin, L. (2000). A framework for organizing a cumulative research agenda in informal learning contexts. In J. S. Hirsch & L. H. Silverman (Eds.), *Transforming practice*. Washington, D.C.: Museum Education Roundtable.

Lehrer, R., Schauble, L., & Petrosino, A. J.* (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. 251-277). Mahwah, NJ: Lawrence Erlbaum Associates.

Lehrer, R., & Schauble, L. Strom, D., & Pligge, M.* (2001). Similarity of form and substance: From inscriptions to models. In S. Carver & D. Klahr (Eds.). *Cognition and instruction: 25 years of progress* (pp. 39-74). Mahwah, NJ: Lawrence Erlbaum Associates.

Lehrer, R., & Schauble, L.* (2002). Symbolic communication in mathematics and science: Co-constituting inscription and thought. In J. Byrnes & E.D. Amsel (Eds.), *Language, literacy, and cognitive development: The development and consequences of symbolic communication* (pp. 167- 192). Mahwah, NJ: Lawrence Erlbaum Associates.

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.

Schauble, L. (2002). Cloaking objects in epistemological practices. In S. G. Paris (Ed.), *Perspectives on object-centered learning in museums* (pp. 235-241). Mahwah, NJ: Lawrence Erlbaum Associates.

Lehrer, R., & Schauble, L. (2003).* Origins and evolution of model-based reasoning in mathematics and science. In H. Doerr and R. Lesh (Eds.), *Beyond constructivism: A models and modeling perspective* (pp. 59-70). Mahwah, NJ: Lawrence Erlbaum Associates.

Hall, R., Lehrer, R., Lucas, D., & Schauble, L.* (2004). Of grids and jars: A comparative analysis of representational infrastructure and learning opportunities in middle school and professional science. In Y. Kafai, W. Sandoval, n. Enyedy, A. Nixon, & F. Herrera (Eds.) *Proceedings of the sixth international Conference of the Learning Sciences.* Mahwah, NJ: Lawrence Erlbaum Associates.

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. 29-54). Mahwah, NJ: Lawrence Erlbaum Associates.

Lehrer, R., & Schauble, L.* (2006). Scientific thinking and science literacy. In W. Damon, R. Lerner, K.A. Renninger, and I. E. Sigel, Eds. *Handbook of child psychology, 6th Edition, Volume 4: Child psychology in practice* (pp. 153-196). Hoboken, NJ: John Wiley and Sons.

Lehrer, R., & Schauble, L.* (2006). Cultivating model-based reasoning in science education. In K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. 371-388). Cambridge, MA: Cambridge University Press.

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). 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.

Schauble, L. (2008). Three questions about development. In R. A. Duschl & R.E. Grandy (Eds.), *Teaching scientific inquiry: Recommendations for research and application* (pp. 50-56). Rotterdam, NL: Sense Publishers.

Schauble, L. (2009). The work of constructing connections between research and practice: What we can learn from Isabel Beck. In M. McKeown and L. Kucan, *Bringing reading research to life: Essays in honor of Isabel Beck* (pp. 285-290). New York: Guilford Press.

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.

Lehrer, R., & Schauble, L.* (2010). Seeding evolutionary thinking by engaging children in modeling its foundations. In *Proceedings of the Annual Meeting of the National Association for Research in Science Teaching*, Philadelphia, PA.

Lehrer, R., & Schauble, L.* (2011). Do moments sum to years? Explanations in time. In T. Koschman (Ed). *Theorizing practice: Theories of learning and research into instructional practice* (pp. 349-358). New York: Springer.

Lehrer, R., & Schauble L.* (2011). Invention in the classroom: Designing to support long-term growth and development. In T. Koschman (Ed). *Theorizing practice: Theories of learning and research into instructional practice* (pp. 29-38). New York: Springer.

Lehrer, R., & Schauble, L.* (2012). Supporting inquiry about the foundations of evolutionary thinking in the elementary grades. In J. Shrager and S. Carver (Eds.), *From child to scientist: Mechanisms of learning and development* (pp. 171-205). Washington, DC: APA Press.

Lehrer, R, & Schauble, L. (2013). Representational redescription 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.* (in press). Developing scientific reasoning: The role of epistemic practices. In R. Lerner, L.S. Liben, & U. Mueller, Eds. *Handbook of child psychology, 7th Edition, Volume 2: Cognitive processes within the relational, developmental system* (pp. 1229-1313). Hoboken, NJ: John Wiley and Sons.

Reviews, Proceedings, and Comments

Schauble, L. (1985). The feasibility of a developmental cognitive science: A response to Pea and Kurland. *New Ideas in Psychology, 2*(2), 181-183.

Glaser, R., Raghavan, K. & Schauble, L. (1988). Voltaville, a discovery environment to explore the laws of DC circuits. *Proceedings of the International Conference on Intelligent Tutoring Systems*. Montreal, Canada: University of Montreal.

Mukhopadhyay, S., Resnick, L. B., and Schauble, L. (1990). Social sense-making in mathematics: Children's ideas of negative numbers. *Proceedings of the Psychology in Mathematics Education Conference*, Mexico City, Mexico.

Schauble, L. (1991). Playing with matches. (Invited book review of Vosniadou, S., & Ortony, A., Eds., 1989, *Similarity and analogical reasoning*). *Educational Researcher, 20*(9), 21-22.

Schauble, L. (1993). Where have all the learners gone? (Invited book review of Goodyear, P., Ed., 1991, *Teaching knowledge and intelligent tutoring,* Norwood, NJ: Ablex Publishing). *Educational Computing Research, 8*(4), 541-546.

Schauble, L. (1994). Modularity, representational redescription, and beyond. (Invited book review of A. Karmiloff-Smith, 1992, *Beyond modularity*, Cambridge, MA: The MIT Press). *Human Development, 37* (319-322).

Schauble, L. (1996). Are schools stalling out? (Invited book review of Shank, R. C. & Cleary, C. *Engines for education*, Hillsdale, NJ: Erlbaum). *Journal of Educational Computing Research, 14*(3), 305-310.

Schauble, L. (1997). A little constructive criticism of constructivism. Critique of D. C. Phillips, How, why, what, when, and where: Perspectives on constructivism in psychology and education. *Issues in Education: Contributions from Educational Psychology, 3*(2), 357-261.

Schauble, L. (1998). Thinking about thinking. Commentary for *Contemporary Psychology* on D. R. Olson & N. Torrance (Eds.). *Modes of thought: Explorations in culture and cognition*. Cambridge, Eng.: Cambridge University Press.

Schauble, L. (1999). Syntax or substance? What is scientific reasoning? Commentary for *Human Development* on B. Koslowski. *Theory and evidence: The development of scientific reasoning*. Cambridge, MA: The MIT Press. *Human Development, 42:* 278-281.

Schauble, L. (2003). Scientific thinking: More on what develops. *Human Development.* 46:155-160.

Grants and Funded Research (Schauble and Lehrer's contributions to these projects were equal; order of authorship is determined by alphabetical priority).

1991-92: Schauble, L. Goals and Strategies of Scientific Experimentation, National Academy of Education Spencer Fellowship

1993-94: Schauble, L. Studying the Development of Scientific Experimentation Strategies in Museums, University of Wisconsin Graduate School Research Award

1993-95: University Sponsor for David Penner, James. S. McDonnell Foundation CSEP Postdoctoral Fellow

1994-97: Schauble, L. Children's Museum of Indianapolis, Research for children's science gallery funded by the National Science Foundation

1994-97: Lehrer, R. & Schauble, L., Thinking About Simple Machines: Model-Based Reasoning in Design Contexts, National Science Foundation

1995-98: Lehrer, R. & Schauble, L., Building Bridges Between Mathematics and Science, James S. McDonnell Foundation Cognitive Studies in Educational Practice Program (Co-author, PI)

1998-2003 Lehrer, R., & Schauble, L., Elementary Design Collaborative, National Center for Improving Student Learning in Mathematics and Science. Office of Education Research and Improvement (Co-author).

1999-2002 Schauble, L., & Lehrer, R., Modeling Nature. National Science Foundation

2004-2006 Lehrer, R., Thompson, P., Hall, R., McClain, K., Schauble, ., Wilson, M., & Konold, C.. Constructing data, modeling worlds: Collaborative investigation of statistical reasoning. National Science Foundation. (Co-author, co-PI)

2006-2010 Singer-Gabella, M. & Cartier, J., PIs. Linking teacher preparation to student learning in mathematics and science. (Co-author of the proposal with Singer-Gabella and Lehrer; serving as one of senior personnel on the research team)

2006-2010 Lehrer, R., & Schauble, L. Assessing data modeling. Institute of Education

Sciences (Co-author, co-PI)

2006-2011 Schauble, L., & Lehrer, R. Supporting the development of model-based reasoning. National Science Foundation. (Co-author, PI)

2012- 2013 Lehrer, R., & Schauble, L. Developing and Integrating Spatial Mathematics and Engineering. EAGER Proposal submitted to DRK-12 Program of the National Science Foundation (Co-author, Co-PI)

2013-2016 Lehrer, R., & Schauble, L. Developing Spatial Mathematics and Engineering. Proposal submitted to the DRK-12 Program of the National Science Foundation (Co-author, Co-PI).

Conferences, 2014

Schauble, L. (2014, June). Keynote Panel. *Approaches to studying and modeling learning across setting and time.* W. Penuel, Chair. International Congress of the Learning Sciences (Boulder, CO).

Teaching 2014

MTED 2150: Math Instruction in the Early Grades (8 undergraduates, 5 responding)

EDUC 3160: Scientific Writing (5 PhD students, 4 responding)

Advising

8 undergraduate students (elementary education and early childhood education programs)

PhD Students: Gokul Krishnan (transfer from Sengupta)
Lydia Bentley (co-advising with Ebony McGhee)

PhD Committees:

Jonee Wilson
Seth Jones (Graduated 2014)
Rob Rouse (Graduated 2014)
Michelle Cotterman
Adrian Larbi-Cherif

Service

Profession/National

National Science Foundation Panel Review (2 panels, one in spring and one in fall 2014)

Ad hoc reviewer for 2 NSF proposals
Institute of Educational Sciences Panel Review (MS1)
Chair, Board of Advisors, Learning Research and Development Center
Board of Advisors, Michelle Williams NSF DRK-12 Genetics Project, Michigan state
Board of Advisors, GRADIENT Project (NSF), Science Museum of Minnesota
Board of Advisors, My Night Sky (NSF), Astronomical Society of the Pacific
Board of Advisors for CarbonTIME Project (NSF), Michigan State
Board of Advisors for Innovate to Mitigate Project (NSF), TERC
Board of Advisors for NURTURES Project (NSF), University of Toledo
Board of Advisors for INK-17 (NSF), MIT and TERC

External review for 3 scholars being considered for promotion or promotion and tenure

Provided reviews for the following professional journals: *Journal for Research in Science Teaching, Science Education, Mathematical Thinking and Learning, Journal of the Learning Sciences, Cognition and Instruction, Journal of Science Education and Technology*

Community

USN Teachers. At their request, met once per month with elementary teachers at the University of Nashville and Eakin Elementary School for professional development and study of students' mathematical thinking.

University

Teaching Evaluation Committee. With Mark Schoenfeld in the English Department, I served as co-chair for the university committee charged with reviewing and revising Vanderbilt's procedures for evaluating college teaching.

College

Promotion and Tenure Advisory Committee

Department

Mentor and Review Committee for Amy Palmeri
Mentor and Review Committee for Pratim Sengupta
Mentor and Review Committee for Ilana Horn
Search Committee for Elective Learning Professor of the Practice position