

Randi A. Engle

RAEngle@berkeley.edu

Education

- Ph.D., Stanford University School of Education: Symbolic Systems in Education 6/00
- A.B., Dartmouth College: Mathematics and Psychology, two majors (cum laude) 6/90

Professional Experience

- Assistant Professor, Graduate School of Education, UC-Berkeley 7/05-present
Cognition and Development: Education in Mathematics, Science & Technology (EMST)
Undergraduate Major in Cognitive Science (since 1/06)
Search for Excellence in Science and Mathematics Education (SESAME, since 7/06)
- Research Associate, Learning Research & Development Ctr., Univ. of Pittsburgh 5/01-6/05
Supervisors: Mary Kay Stein, Margaret S. Smith, Michelene T. H. Chi, and Cynthia Coburn
- Instructor, School of Education, University of Pittsburgh 9/02-12/02, 9/04-12/04
- Post-Doctoral Scholar, Stanford University 7/00-7/01
Supervisor: James G. Greeno
- Research Assistant, Psychology and Education, Stanford University 9/91-6/00
Supervisors: Herbert H. Clark and James G. Greeno
- Teaching Assistant, Psychology and Symbolic Systems, Stanford University 9/93-6/94
Supervisors: Barbara Tversky, Herbert H. Clark, and James G. Greeno

Fellowships and Awards

- Fellow, Workshop on Quasi-Experimental Design and Analysis in Education 6/06
- NSF Junior Faculty Fellow, International Conference of the Learning Sciences 6/04
- Spencer Foundation Dissertation Fellowship for Research Related to Education 9/95-9/96
- NSF Graduate Fellowship in Psychology and Cognitive Science 9/91-9/94
- Co-winner, Thayer Mathematics Competition, Dartmouth College 6/87

Grants

- Principal Investigator, Hellman Family Faculty Fund Award, "Framing learning contexts to promote transfer: An experimental study" (\$39,000) 7/08-present
- Principal Investigator, Junior Faculty Grant, Committee on Research, UC Berkeley 7/06-7/07
"Framing learning activities to promote transfer-of-learning" (\$7,000)
- Co-investigator with James G. Greeno on Spencer Foundation Grant 3/98-7/01
"Learning to use and understand concepts during project-based activity" (\$450,500)

Research Experience

Assistant Professor, Graduate School of Education, UC-Berkeley 7/05-present

- Framing learning contexts to promote the transfer-of-learning
Student collaborators: Sharla Roberts, Pauline Huang, Phi Nguyen, Adam Mendelson, Pamela Yee, Jonathan Strasser, Melissa Pandika, Amy Storniaolo, and Xenia Meyer
- Towards a model of differential influence in discussions: The role of student negotiations around authority, the conversational floor and interactional space
Student collaborators: Maxine R. McKinney de Royston, Jennifer Langer-Osuna, Paul Mazzei, Jill Bergan, Pauline Huang, and Ernest Shen
- Supporting underrepresented students' success in undergraduate calculus: Investigating four hypotheses for the success of a Professional Development Program calculus section
Student collaborators: Aditya Adiredja, Danielle Champney, Pegah Ghaneian, Niral Shah, Amy Huang (UC Davis), Kim Seashore, Mark Howison, Danae Towne, Heather Bergmann, and Sarah Salazar
- Fostering productive engagement in curriculum design by multiple stakeholders: the Middle-school Mathematics through Applications Project

Research Associate, LRDC, University of Pittsburgh 5/01-6/05

- ASTEROID: Teachers' learning of mathematics and pedagogy from discussions in a series of innovative practice-based content-focused method courses
Supervisors and collaborators: Margaret S. Smith, Gaea Leinhardt, and Mary Kay Stein
- Developing a situative theory of transfer: The importance of how learning situations are framed
- MacArthur Network on Teaching and Learning: Integrating research and reform in the Middle-school Mathematics through Applications Project (MMAP) & other design experiments
Supervisors and collaborators: Mary Kay Stein and Cynthia Coburn
- Productive disciplinary engagement of beginning teachers with educational psychology: Comparing alternative ways of orchestrating case-based discussions
Collaborator: Robert B. Faux
- Students' understandings of complex, emergent processes (through 8/02)
Supervisor: Michelene T. H. Chi

Post-Doc, Stanford University 7/00-7/01

- Guiding principles for fostering productive disciplinary engagement: Explaining an emergent argument in a community of learners classroom
Supervisor and collaborator: James G. Greeno
Other collaborators: Faith R. Conant, Frederick D. Erickson, Muffie Wiebe

Research Assistant, Stanford University

9/91-6/00

- Conceptual learning through discourse in project-based mathematics and science classrooms
Supervisor: James G. Greeno
- Managing disagreements in mathematical explanations about geometry
Supervisor: James G. Greeno
- Students' learning about linear functions and their representations
Supervisor: James G. Greeno
- Constructing shareable analogical models by combining speech, gestures and diagrams in instructional explanations
Supervisor: Herbert H. Clark

Teaching Experience**Assistant Professor, University of California, Berkeley**

- Education 221A/290C: Towards Ambitious Instruction in Mathematics: Spr 06, Fall 07, Fall 08
Research into Practice
- Education 293V/290C: Video-Analysis Seminar Spr 07-present
- Education 290C: Alternative Perspectives on the Transfer-of-Learning Spr 07
- Education 229D/290C: Discourse and Learning in Math and Science Classrooms Fall 06
- Education 223B: The Discourse, Interaction and Learning Lab Fall 05-present
- Education 290C: Exploring Issues of Agency, Identity, and Authority in Mathematics and Science Education Fall 05
- Faculty Reader/Examiner for 1 undergraduate honors thesis, 9 MA theses, 8 PhD pre-qualifying papers, 1 PhD dissertation proposal, 4 PhD pre-qualifying oral exams, and 3 sets of first year exam essays Fall 05-present
- Faculty Mentor, Spencer Research Training Grant research center Fall 07-Spr 08

Instructor, University of Pittsburgh

- Education 2000: Psychology of Learning and Development (for MAT program) Fall 04
- Education 2000: Psychology of Learning and Development (for MAT program) Fall 02

Freshman Advisor, Stanford University

9/99-6/00

Academic advisor for 9 freshmen interested in the social sciences

Teaching Assistant, Stanford University

- Psychology 146: Language and Thought (Instructor: Herbert H. Clark) Fall 94
- Psychology 106: Cognitive Psychology (Instructor: Barbara Tversky) Spring 94
- Education 20: Intelligence, Information & Learning (Instructor: James Greeno) Fall 93

Classroom Teacher, Ft. Defiance Elementary School, Ft. Defiance, AZ 4/88-6/88
Taught math and reading to K & 1st graders in a bilingual program on the Navajo Reservation

Classroom Teacher, East Hill Farm and School, Andover, VT 8/87-3/88
Taught high school geometry and middle school social studies

Academic Service

Reviewing

Journals:

Editorial Board, *The Journal of the Learning Sciences*

Ad hoc Reviews, *American Educational Research Journal*; *Cognition and Instruction*;
Cognitive Science; *Human Development*, *Journal for Research in Mathematics*
Education; *Journal of Pragmatics*; *Mathematical Thinking and Learning*

Conferences: AERA; Cognitive Science; International Society of the Learning Sciences,
NCTM Research Pre-Session, Winter Conference on Discourse, Text & Cognition

Grant Proposals: NSF REESE and ITR programs; NASA Intelligent Systems Program

Other Professional Service

Discussant Remarks at: ICLS 2008; AERA 2005, 2006, 2007, 2009.

Participant, NSF Workshop "Standards for Video Research in the Learning Sciences,"
Arlington, VA, December 2005.

Planning committee for Festschrift for James G. Greeno, Association for Psychological
Sciences, New York, NY, May 2006.

Selected University Service

Committees: EMST Curriculum (05-present), SESAME 1st Year Exam (06-08), GSE
Personnel (06-07), GSE Professional Practice (07-08), GSE Academic Review (08-09)

Keynote Speaker: UC Berkeley Faculty and Staff "Teaching, Learning and Technology
Symposium" (May 07), UC Berkeley Graduate Student Instructor Orientation (Jan 08)

Representative of UC Berkeley Mathematics Education PhD Programs at the National
Conference on Doctoral Programs in Mathematics Education, Kansas City, MO (Sept. 07)

Professional Affiliations

- AERA: American Educational Research Association
- Cognitive Science Society
- ISLS: International Society of the Learning Sciences
- NCTM: National Council of Teachers of Mathematics

Journal Articles

- Engle, R. A. (2006). Framing interactions to foster generative learning: A situative explanation of transfer in a community of learners classroom. *The Journal of the Learning Sciences*, 15(4), 451-498.
- Engle, R. A. (2007). Leadership in the dance of agency during productive disciplinary engagement. *Cultural Studies in Science Education*, 2, 210-218.
- Engle, R. A. & Conant, F. C. (2002). Guiding principles for fostering productive disciplinary engagement: Explaining an emergent argument in a community of learners classroom. *Cognition and Instruction*, 20(4), 399-483.
- Engle, R. A. & Faux, R. B. (2006). Fostering substantive engagement of beginning teachers in educational psychology: Comparing two methods of case-based instruction. *Teaching Educational Psychology*, 1(2), 3-24.
- Siegler, R. S. & Engle, R. A. (1994). Studying change in developmental and neuropsychological contexts. *Cahiers de Psychologie Cognitive / Current Psychology of Cognition*, 13, 321-349.
- Smith, M. S., Hughes, E. K., Engle, R. A. & Stein, M. K. (in press). Orchestrating discussions of challenging tasks: Keeping your eye on the mathematics to be learned. *Mathematics Teaching in the Middle School*.
- Stein, M. K., Engle, R. A., Smith, M. S. & Hughes, E. K. (2008). Orchestrating productive mathematical discussions: Five practices for helping teachers move beyond show and tell. *Mathematical Thinking and Learning*, 10(4), 313-340.

Article Under Review

- Engle, R. A., McKinney de Royston, M. & Langer-Osuna, J. (submitted). *Toward a model of differential influence in discussions: Negotiating quality, authority, and access within a student-led argument*.

Selected Articles In Preparation

- Engle, R. A. (in preparation). *Principles supporting productive professional collaborations: Explaining three contrasting cases*.
- Engle, R. A. & Adiredja, A. P. (in preparation). *Growing the cognitive demand of mathematical tasks: The role of problematizing*.
- Engle, R. A., Nguyen, P. D., & Mendelson, A. (in preparation). *Evidence that framing learning contexts affects transfer: A tutoring experiment*.

Conference Proceedings Papers

- Adiredja, A. P., Engle, R. A., Champney, D., Huang, A., Howison, M., Shah, N. & Ghaneian, P. (2008). Explaining student success in one PDP calculus section: A progress report. In *Proceedings of the 11th Conference on Research in Undergraduate Mathematics Education*.
- Engle, R. A. (1998a). Combining gesture, speech, diagrams, and demonstrations in explaining how locks work. In S. Santi, I. Guaitella, C. Cavé, & G. Konopczynski (Eds.), *Oralité et*

- gestualité: Communication multimodale, interaction* (pp. 525-530). Paris: L'Harmattan.
- Engle, R. A. (1998b). Not channels but composite signals: Speech, gesture, diagrams and object demonstrations are integrated in multimodal explanations. In M. A. Gernsbacher & S. J. Derry (Eds.), *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society* (pp. 321-326). Mahwah, NJ: Erlbaum.
- Engle, R. A. (2008). Establishing collaborations in design-based research projects: Insights from the origins of the MMAP project. *Proceedings of the International Conference of the Learning Sciences*. Utrecht, Netherlands.
- Engle, R. A. & Greeno, J. G. (1994). Managing disagreement in intellectual conversations: Coordinating social and conceptual concerns in the collaborative construction of mathematical explanations. In A. Ram & K. Eiselt (Eds.), *Proceedings of the Sixteenth Annual Conference of the Cognitive Science Society* (pp. 266-271), Hillsdale, NJ: Erlbaum.
- Engle, R. A., Langer-Osuna, J. & McKinney de Royston, M. (2008). Toward a model of differential influence in discussions: Negotiating quality, authority, and access within a heated classroom argument. In B. C. Love, K. McRae & V. M. Sloutsky (Eds.), *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (2010-2015). Austin, TX: Cognitive Science Society.
- Engle, R. A., Roberts, S., Nguyen, P. D., Yee, P. & the Framing Transfer Research Group (2008). A design-based approach to experimental design: Investigating hypotheses about how framing influences transfer. *Proceedings of the International Conference of the Learning Sciences*. Utrecht, Netherlands.
- Greeno, J. G., Benke, G., Engle, R. A., Lachapelle, C. & Wiebe, M. (1998). Considering conceptual growth as change in discourse practices. In M. A. Gernsbacher & S. J. Derry (Eds.), *Proceedings of the Twentieth Annual Conference of the Cognitive Science Society* (pp. 442-447). Mahwah, NJ: Erlbaum.
- Greeno, J. G. & Engle, R. A. (1995). Combining analyses of cognitive processes, meanings, and social participation: Understanding symbolic representations. In J. D. Moore & J. F. Lehman (Eds.), *Proceedings of the Seventeenth Annual Conference of the Cognitive Science Society* (pp. 591-596), Hillsdale, NJ: Erlbaum.
- Greeno, J. G., Engle, R. A., Kerr, L. K. & Moore, J. L. (1993). Understanding symbols: A situativity-theory analysis of constructing mathematical meaning. In *Proceedings of the Fifteenth Annual Conference of the Cognitive Science Society* (pp. 504-509). Hillsdale, NJ: Erlbaum.

Book Chapters

- Engle, R. A. (in press). The Middle-school Mathematics through Applications Project: Supporting productive collaborations during two different phases of curriculum design. In C. E. Coburn & M. K. Stein (Eds.), *Research and practice in education: Building alliances, bridging the divide*. Lanham, MD: Rowman & Littlefield.
- Engle, R. A., Conant, F. C. & Greeno, J. G. (2007). Progressive refinement of hypotheses in video-supported research. In R. Goldman, R. Pea, B. Barron & S. Derry (Eds.), *Video research in the learning sciences*. Mahwah, NJ: Erlbaum. To be translated into French in L.

Veillard & A. Tiberghien (Eds.), *Instrumentation de la Recherche en Éducation: Le Cas du Développement d'Une Base de Données de Vidéo de Situations d'Enseignement et Apprentissage VISA*.

Greeno, J. G., McDermott, R., Cole, K., Engle, R. A., Goldman, S., Knudsen, J., Lauman, B., & Linde, C. (1999). Research, reform, and aims in education: Modes of action in search of each other. In E. C. Lagemann & L. S. Shulman (Eds.), *Issues in Education Research* (pp. 299-335). San Francisco, CA: Jossey-Bass.

Voss, J. S., Wolfe, C. R., Lawrence, J. A. & Engle, R. A. (1991). From representation to decision: An analysis of problem solving in international relations. In R. J. Sternberg & P. A. Frensch, (Eds.), *Complex problem solving: Principles and mechanisms* (pp. 119-158), Hillsdale, NJ: Erlbaum.

Technical Reports and Theses

Barron, B. & Engle, R. A. (2007). Analyzing data derived from video records. In S. J. Derry (Ed.), *Guidelines for video research in education: Recommendations from an expert panel* (pp. 24-43, 79-80). Chicago: Data Research Development Center. Available at: <http://drdc.uchicago.edu/what/video-research.html>

Engle, R. A. (2006). *Engaging diverse stakeholders in innovative curriculum design and research: The case of the Middle-school Mathematics through Applications Project (1990-2002)*. Pittsburgh, PA: Learning Research and Development Center. Available at: <http://www.lrdc.pitt.edu/metastudy/PDF/MMAPCase0706.pdf>.

Engle, R. A. (2003a, July). *Due Diligence Report for Fostering Communities of Learners* (32 pages). Technical report about mini-case for MacArthur Network on Teaching and Learning.

Engle, R. A. (2003b, July). *Due Diligence Report for the Middle-school Mathematics through Applications Project* (52 pages). Technical report about mini-case for MacArthur Network on Teaching and Learning.

Engle, R. A. (2000). *Toward a theory of multimodal communication: Combining speech, gestures, diagrams, and demonstrations in instructional explanations*. Dissertation, Symbolic Systems in Education Program, Psychological Studies in Education, School of Education, Stanford University.

Engle, R. A. (1990). *Learning after acalculia: One subject's journey towards a conceptual understanding of the number system*. Honors thesis, Dept. of Psychology, Dartmouth College.

Engle, R. A., McKinney de Royston, M., & Langer-Osuna, J., Bergan, J. & Mazzei, P. (2007). *From positioning to differential influence in a student-led argument: Students negotiating authority, the conversational floor, and interactional space*. Technical report, Discourse Interaction and Learning Lab, Graduate School of Education, University of California at Berkeley.

Selected Presentations

- Engle, R. A. (submitted). The productive disciplinary engagement framework: Origins, key concepts, and current developments. In R. A. Engle (Organizer), and C. Buty (Chair), *Developing and challenging the productive disciplinary engagement framework*. Symposium submitted for the European Association for Research on Learning and Instruction (EARLI) Conference, Amsterdam, August 2009.
- Engle, R. A. (2007, April). *Dynamics of positioning: Perspectives on students' participation in relation to each other, academic disciplines, and classroom settings*. Symposium organized at the annual meeting of the American Educational Research Association, Chicago, IL.
- Engle, R. A. (2004, April). Revisiting previous discussions to deepen teachers' engagement with mathematics and pedagogy. In M. S. Smith (Chair), *Developing a knowledge base for teaching: Learning content and pedagogy in a course on patterns and functions*. Poster symposium at the annual meeting of the American Educational Research Association, San Diego, CA.
- Engle, R. A. (2002, June). Using gesture location to distinguish situation models. In J. B. Bavelas (Chair), *The role of gestures in conversational grounding*. Symposium at Gesture: The Living Medium, Austin, TX, June 5-8, 2002. Video and slides available upon request.
- Engle, R. A. (2001a, April). *Successful transfer from only one specific problem: The importance of how learning events are framed*. Poster presented at the Society for Research in Child Development (SRCD), Minneapolis, April 19-22, 2001.
- Engle, R. A. (2001b, January). *Toward a discourse-oriented theory of conceptual learning and transfer*. Talk presented at the Winter Conference on Discourse, Text, and Cognition, Jackson, WY, January 27-30, 2001.
- Engle, R. A. (2000b, July). *Using shared physical space to ground analogical models*. Talk presented at the Society for Text and Discourse conference, Lyon, France, July 19-21, 2000.
- Engle, R. A. (1999a, April). Conceptual learning through discourse: One teacher's role in supporting small group project work in an FCL classroom. In J. G. Greeno, A. L. Brown & J. C. Campione (Chairs), *Cognitive and social-interactive aspects of conceptual growth*, Symposium at the American Educational Research Association, Montreal, April 19-23, 1999.
- Engle, R. A. (1999b). *Grounding analogical models in interactional space: The role of gestures, diagrams, physical demonstrations, and language*. Invited talk at the Institute of Cognitive Studies, UC-Berkeley, March 5, 1999.
- Engle, R. A. & Adirejda, A. (2008, April). *Growing the cognitive demand of mathematical tasks*. Paper presented at the Research Pre-Session of the National Council of Teachers of Mathematics (NCTM) Conference, Salt Lake City.
- Engle, R. A. & Chi, M. T. H. (2002, August). Categorization of emergent processes by students at different levels of expertise. In W. D. Gray and C. D. Schunn (Eds.), *Proceedings of the Twenty-Fourth Annual Conference of the Cognitive Science Society* (p. 1001). Mahwah, NJ: Erlbaum.
- Engle, R. A., Conant, F. R., Wiebe, M., Erickson, F. D., & Greeno, J. G. (2000, April). "We all had this big old argument": FCL design principles supporting deep intellectual engagement. In

- J. G. Greeno (Chair), *Learning in interaction: Constructing understanding of subject-matter content in activity*, Symposium presented at the American Educational Research Association, New Orleans, LA.
- Engle, R. A. & Faux, R. B. (2004, April). *Towards productive disciplinary engagement of beginning teachers in educational psychology: Comparing two methods of case-based instruction*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Engle, R. A. & Goldman, S. (2006, May). Collaborating to support innovations in theory and practice: The Middle-school Mathematics through Applications Projects (MMAAP). In V. Shalin (Organizer), *Festschrift for James G. Greeno*. Association for Psychological Science (APS) conference, New York, NY.
- Engle, R. A. & Greeno, J. G. (2003, April). Framing interactions to foster productive learning. In K. Beach (Chair), *Sociocultural, semiotic, situative, and activity theoretic alternatives to the transfer metaphor: New understandings of how knowledge generalizes*. Symposium presented at the American Educational Research Association, Chicago, IL.
- Engle, R. A. & McKinney de Royston, M. (2007, December). A situative approach to the progressive refinement of hypotheses in video-supported research. In A. Tiberghien & G. Sensevy (organizers), *Journées Visa: Vidéo de Situations d'Enseignement et d'Apprentissage*. A conference on video-based research in classrooms and teacher education sponsored by the French INRP. École Normale Supérieure, Lyon, France.
- Engle, R. A., Mendelson, A. & Nguyen, P. D. (to appear). Evidence for causal effects of framing learning contexts on transfer: An experiment about human body systems. In R. A. Engle & J. Lobato (Organizers), *Transfer in context: Empirical investigations of novel explanatory mechanisms for mediating the transfer-of-learning*.
- Engle, R. A. & Smith, M. S. (2007, January). *Orchestrating productive mathematical discussions of student responses: Helping teachers move beyond 'showing' and 'telling'*. Paper presented at the Association for Mathematics Teacher Educators Eleventh Annual Conference, Irvine, CA.
- Engle, R. A. & Stein, M. K. High leverage routines and the five practices. In M. Lampert & E. Kazemi (organizers) *Conceptualizing and using routines of practice in mathematics teaching to advance professional education*. A working conference sponsored by the Spencer Foundation, University of Michigan, Ann Arbor, MI.
- Faux, R. B. & Engle, R. A. (2005, April). Nurturing beginning teachers' use of theory: The role of case-based discussions. In D. Y. Dai & R. A. Engle (Organizers), *Educational Psychology and Teacher Education: Case Methods as a Bridge*. Symposium presented at the American Educational Research Association, Montreal, Canada.
- Stein, M. K., Hughes, E., Engle, R. A. & Smith, M. S. (2003, April). What and how teachers learn from narrative cases: An example of teachers' learning to use student responses in pedagogically productive ways. In M. S. Smith (Chair), *Studying teacher learning from cases and other practice-based materials*. Symposium presented at the American Educational Research Association, Chicago, IL.