

ERIN MARIE FURTAK

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EDUCATION

- 2002 – 2006 **Stanford University**, School of Education, Stanford, California
Ph.D. in Curriculum and Teacher Education, Science Education
Dissertation: The Dilemma of Guidance in Scientific Inquiry Teaching
- 1999 – 2001 **University of Denver**, Denver, Colorado
M.A. in Education
Specialization in Technology in Education
- 1995-1999 **University of Colorado**, Boulder, Colorado
B.A. in Biological Sciences - Environmental, Population, and Organismic Biology

PROFESSIONAL EXPERIENCE

- 2008 - **Assistant Professor**, Curriculum and Instruction, School of Education
University of Colorado, Boulder, Colorado
- 2006 - 2008 **Research Scientist**, Max Planck Institute for Educational Research, Berlin,
Germany
- 2006 - 2007 **Guest Researcher**, Leibniz Institute for Science Education, Kiel, Germany
- 2005 - 2006 **University Supervisor and Teaching Assistant**, Stanford Teacher Education
Program
- 2002 – 2006 **Research Assistant**, Stanford Education Assessment Laboratory, Stanford
University, California
- 2000 – 2002 **Science Teacher**, Wheat Ridge Senior High School, Wheat Ridge, Colorado

REFEREED JOURNAL PUBLICATIONS

14. Furtak, E. M., Hardy, I., Beinbrech, C., Shavelson, R. J., & Shemwell, J. T. (2010). A Framework for Analyzing Evidence-Based Reasoning in Science Classroom Discourse. *Educational Assessment, 15*(3-4), 175-196.
13. Shemwell, J. T., & Furtak, E. M. (2010). Science Classroom Discussion as Scientific Argumentation: A study of conceptually rich (and poor) student talk. *Educational Assessment, 15*(3-4), 222-250.
12. Brown, N. J. S., Furtak, E. M., Timms, M., Nagashima, S. O., & Wilson, M. (2010). The Evidence-Based Reasoning Framework: Assessing Scientific Reasoning. *Educational Assessment, 15*(3-4), 142-174.

11. Furtak, E. M., & Alonzo, A. C. (2010). The Role of Content in Inquiry-Based Elementary Science Lessons: An Analysis of Teacher Beliefs and Enactment. *Research in Science Education*, 40(3), 425-449.
10. Furtak, E. M., & Ruiz-Primo, M. A. (2008). Making Students' Thinking Explicit in Writing and Discussion: An Analysis of Formative Assessment Prompts. *Science Education*, 92, 799-824.
9. Furtak, E. M., Ruiz-Primo, M. A., Shemwell, J. T., Ayala, C. C., Brandon, P., Shavelson, R. J., Yin, Y. (2008). On the Fidelity of Implementing Embedded Formative Assessments and its Relation to Student Learning. *Applied Measurement in Education*, 21(4), 360-389.
8. Ayala, C. C., Shavelson, R. J., Ruiz-Primo, M. A., Brandon, P., Yin, Y., Furtak, E. M., Young, D.B., & Tomita, M.K. (2008). From Formal Embedded Assessments to Reflective Lessons: The development of formative assessment suites. *Applied Measurement in Education*, 21(4), 315-334.
7. Brandon, P., Young, D. B., Shavelson, R. J., Jones, R., Ayala, C. C., Ruiz-Primo, M. A., Yin, Y., Tomita, M.K., & Furtak, E.M. (2008). Lessons Learned from the Process of Curriculum Developers' and Assessment Developers' Collaboration on the Development of Embedded Formative Assessments. *Applied Measurement in Education*, 21(4), 390-402.
6. Shavelson, R. J., Young, D. B., Ayala, C. C., Brandon, P. R., Furtak, E. M., Ruiz-Primo, M. A., Tomita, M.K. & Yin, Y. (2008). On the Impact of Curriculum-Embedded Formative Assessment on Learning: A collaboration between curriculum and assessment developers *Applied Measurement in Education*, 21(4), 295-314.
5. Yin, Y., Shavelson, R. J., Ayala, C. C., Ruiz-Primo, M. A., Brandon, P., Furtak, E. M., Tomita, M.K., & Young, D.B. (2008). On the Impact of Formative Assessment on Student Motivation, Achievement, and Conceptual Change. *Applied Measurement in Education*, 21(4), 335-359.
4. Ruiz-Primo, M.A. & Furtak, E.M. (2007). Exploring Teachers' Informal Formative Assessment Practices and Students' Understanding in the Context of Scientific Inquiry. *Journal of Research in Science Teaching*, 44(1), p. 57-84
3. Ruiz-Primo, M.A. & Furtak, E.M. (2006). Informal Formative Assessment and Scientific Inquiry: Exploring Teachers' Practices and Student Learning. *Educational Assessment*, 11(3 & 4), p. 237-263.
2. Furtak, E.M. (2006). The Problem with Answers: An exploration of guided scientific inquiry teaching. *Science Education*, 90(3), p. 453-467.
1. Furtak, E.M & Ruiz-Primo, M.A. (2005, January). Questioning Cycle: Making Students' Thinking Explicit During Scientific Inquiry. *Science Scope*, p. 22-25.

REFEREED BOOK CHAPTERS

Furtak, E. M., Thompson, J., Braaten, M., & Windschitl, M. (accepted for publication). Learning Progressions to Support Ambitious Teaching Practices. In A. C. Alonzo & A. W. Gotwals (Eds.), *Learning Progressions in Science*. The Netherlands: Sense Publishing.

Ruiz-Primo, M. A., Furtak, E. M., Ayala, C. C., Yin, Y., & Shavelson, R. J. (2009). On the

Impact of Formative Assessment on Student Science Learning and Motivation. In H. L. Andrade & G. J. Cizek (Eds.), *Handbook of Formative Assessment* (pp. 139-158). New York: Routledge.

REFEREED CONFERENCE PROCEEDINGS

- Furtak, E. M., Morrison, D. L., Henson, K., & Roberts, S. A. (2010, July). *Centering a Professional Learning Community on a Learning Progression for Natural Selection: Transforming Community, Language, and Instructional Practice*. Paper presented at the International Conference of the Learning Sciences, Chicago, IL.
- Furtak, E. M. (2009, June). *Toward Learning Progressions as Teacher Development Tools*. Paper presented at the Learning Progressions in Science, Iowa City, IA.

REFEREED BOOKS

- Furtak, E.M. (2009). *Formative Assessment for Secondary Science Teachers*. Thousand Oaks, CA: Corwin Press.

NON-REFEREED BOOKS

- Furtak, E.M. (2008). *The Dilemma of Guidance: An Exploration of Scientific Inquiry Teaching*. Saarbrücken, Germany: VDM Verlag Dr. Müller.

INVITED BOOK CHAPTERS

- Furtak, E. M., Shavelson, R. J., Shemwell, J. T., & Figueroa, M. (In Press). *To Teach or Not to Teach Through Inquiry: Is that the question?* J. Shrager, S. Carver, and K. Dunbar (Eds.), *From Child to Scientist*. Washington, DC: APA Press.
- Furtak, E. M., & Shavelson, R. J. (2009). Guidance, Conceptual Understanding, and Student Learning: An Investigation of Inquiry-Based Teaching in the US. In T. Janik & T. Seidel (Eds.), *The Power of Video Studies in Investigating Teaching and Learning in the Classroom* (pp. 181-203). Munich: Waxmann.
- Shavelson, R. J., Yin, Y., Furtak, E. M., Ruiz-Primo, M. A., Ayala, C. C., Young, D. B., et al. (2008). On the Role and Impact of Formative Assessment on Science Inquiry Teaching and Learning. In J. Coffey, R. Douglas & C. Stearns (Eds.), *Assessing Science Learning* (pp. 21-36). Arlington, VA: NSTA Press.

COMMISSIONED PAPERS AND TECHNICAL REPORTS

- Furtak, E.M. (2006). *Formative Assessment in K-8 Science Education: A Conceptual Review*. Commissioned paper for the Committee on Science Learning, Kindergarten through Eighth Grade, National Research Council.
- Ruiz-Primo, M.A. & Furtak, E.M. (2004). *Informal Assessment of Students' Understanding of Scientific Inquiry*. CSE Technical Report 639. Center for Research on Evaluation, Standards, and Student Testing/UCLA.

OTHER PUBLICATIONS

- Klymkowsky, M., & Furtak, E. M. (2009). How the Incoherent State of Science and Mathematics Education Undermines Biological (and Scientific) Literacy [Op-Ed]. *Colorado Higher Ed News*.
- Furtak, E.M. (2004, December 1). Standardized Science: Mandatory Testing's Impact on Teaching and Learning [Letter to the Editor]. *Education Week*, p. 41.

REFEREED JOURNAL ARTICLES UNDER REVIEW

- Furtak, E. M., Morrison, D. L., Henson, K., Roberts, S. A., & Malone, S. (under review). Linking an Educative Learning Progression for Natural Selection to Teacher Practice: Results of an Exploratory Study. *Journal of Research in Science Teaching*.
- Furtak, E. M. & Kunter, M. (under review). Effects of Autonomy Supportive Science Teaching on Student Learning and Motivation. *Journal of Experimental Education*.

CONFERENCE PAPERS

- Furtak, E.M., Roberts, S.A., Morrison, D.M., Henson, K. & Malone, S. (2010, May). *Linking an educative learning progression to teacher practice: results of an exploratory study*. Paper presented at the annual meeting of the American Educational Research Association, Denver, CO.
- Furtak, E. M., Shavelson, R. J., Shemwell, J. T., & Figueroa, M. (2009, October). *To Teach or Not to Teach Through Inquiry: Is that the question?* Paper presented at 'From Child to Scientist: A festschrift to honor the scientific and educational contributions of David Klahr', Pittsburgh, PA.
- Furtak, E. M., Hardy, I., Beinbrech, C., Shemwell, J. T., & Shavelson, R. J. (2009, August). *A Framework for Analyzing Reasoning in Science Classroom Discourse*. Paper presented at the 13th Biennial Conference of the European Association for Research in Learning and Instruction, Amsterdam, Netherlands.
- Furtak, E. M., Kunter, M., & Hardy, I. (2009, August). *Effects of Autonomy Supportive Teaching on Student Learning and Motivation: Results of a Small Experimental Study*. Paper presented at the 13th Biennial Conference of the European Association for Research in Learning and Instruction, Amsterdam, Netherlands.
- Furtak, E. M., Seidel, T., Iverson, H., & Briggs, D. C. (2009, August). *Recent Experimental Studies of Inquiry-Based Teaching: A meta-analysis and review*. Paper presented at the 13th Biennial Conference of the European Association for Research in Learning and Instruction, Amsterdam, Netherlands.
- Shemwell, J. T., & Furtak, E. M. (2009, August). *Problems with Argumentation for Conceptual Science Learning: When Arguments and Explanations Diverge*. Paper presented at the 13th Biennial Conference of the European Association for Research in Learning and Instruction, Amsterdam, Netherlands.
- Furtak, E. M. (2009, April). *Learning Progressions to Support Teacher Learning*. Paper presented at the Annual Meeting of the American Educational Research Association.
- Shemwell, J. T., & Furtak, E. M. (2009, April). *Argument-Driven Formative Assessment for Conceptual Science Learning*. Paper presented at the Annual Meeting of the American

Educational Research Association.

- Furtak, E.M. & Seidel, C.M. (2008, April). *Recent Experimental Studies of Inquiry-Based Teaching: A meta-analysis and review*. Paper presented at the meeting of the National Association of Research in Science Teaching Annual Meeting, Baltimore, Maryland.
- Furtak, E.M. (2008, March). *Guidance, Conceptual Understanding, and Student Learning: Enactment of an Inquiry-Based Science Curriculum*. Paper presented at the American Educational Research Association Annual Conference, New York, New York.
- Furtak, E.M., Hardy, I., Beinbrech, C., Shavelson, R.J., & Shemwell, J.T. (2008, March). *A Framework for Analyzing Reasoning in Science Classroom Discourse*. Paper presented at the American Educational Research Association Annual Conference, New York, New York.
- Furtak, E.M. (2007, August). *The Nature of Guidance and the Development of Conceptual Understanding in Inquiry-Based Science Lessons in the US: A Study of Four Middle School Teachers*. Paper presented at the 12th Biennial Conference of the European Association for Research on Learning and Instruction, Budapest, Hungary.
- Furtak, E.M. & Alonzo, A.C. (2007, August). *The Role of Content in Inquiry-Based Science Lessons: An Analysis of Beliefs and Enactment Among a Sample of US Science Teachers*. Paper presented at the 12th Biennial Conference of the European Association for Research on Learning and Instruction, Budapest, Hungary.
- Furtak, E. M., & Ruiz-Primo, M. A. (2007, April). *Effectiveness of Four Types of Formative Assessment Prompts in Providing Information About Students' Understanding in Writing and in Discussions*. Paper presented at the American Educational Research Association Annual Conference, Chicago, Illinois.
- Ruiz-Primo, M. A., & Furtak, E. M. (2006, April). *Teacher Informal Assessment Practices and Their Impact on Students' Learning*. Paper presented at the American Educational Research Association Annual Conference, San Francisco, California.
- Furtak, E.M. (2005, April). *Problems with Answers: A study of teachers providing concepts, expecting results, and withholding explanations in guided classroom inquiry*. Paper presented at the Stanford University School of Education Student Research Conference, Stanford, California.
- Furtak, E.M. (2005, April). *On the Implementation of Science Inquiry in a Highly Teacher- and Curriculum-Directed Activity: A Study of Teachers Providing and Withholding Answers*. Paper presented at the meeting of the National Association of Research in Science Teaching Annual Meeting, Dallas, Texas.
- Ruiz-Primo, M.A., Tomita, M., Furtak, E.M., Schatz, C. & Dolle, J. (2005, April). *A Multi-Method and Multi-Source Approach for Studying Fidelity of Implementation*. Paper presented at the American Educational Research Association Annual Conference, Montreal, Canada.
- Ruiz-Primo, M.A., Yuan, K., Furtak, E.M., & Shavelson, R. (2005, April). *On the Validity of Teacher Logs as a Source of Information About Informal Classroom Assessment Practices*. Paper presented at the American Educational Research Association Annual Conference, Montreal, Canada.
- Ruiz-Primo, M. A., & Furtak, E. M. (2004, April). *Informal Assessment of Students' Understanding of Scientific Inquiry*. Paper presented at the American Educational

Research Association Annual Conference, San Diego, California.

McColskey, W., Parke, H., Furtak, E.M., & Butler, S. (2003, April). *A Structured Professional Development Approach to Unit Study: The experiences of 200 teachers in a national teacher development project*. Paper presented at the American Educational Research Association Annual Conference, Chicago, Illinois.

INVITED LECTURES

Furtak, E.M. Transforming the teaching of natural selection through a teacher learning community (1 h invited seminar). Seminar for the Math and Science Signature Learning Area. Invited by Leo Bruderle, University of Colorado Denver, November 2010.

Furtak, E.M. Transforming the teaching of natural selection through a professional learning community (1 h invited lecture). Modern Biology Goes to School Symposium. Invited by Elsbeth Stern, Professor, Swiss Federal Institute of Technology, Zürich, Switzerland, June 2010.

Differentiation: Teaching in Heterogeneous Classrooms (1 h invited lecture). Invited by Peggy Bleyberg-Shor, Director, Hillel Academy, Kingston, Jamaica; hosted by Ministry of Education, October, 2009.

Formative Assessment and Student Learning: What does the research say? (1.5 h keynote address). Invited by Patricia McClure, Florida Science Academy Network Meeting, Orlando, FL, September, 2009.

Formative Assessment for Biology Teachers (2 h keynote address). Invited by Michael Dougherty, Geneticist-Education Network of Alliances Summer Institute, June, 2009.

If Formative Assessment is Such a Great Idea, Why Isn't Everyone Doing It? (1 h invited colloquium). School of Education Colloquium Series, April, 2009.

Learning Progressions for Teacher Development (1.25 h invited lecture). Invited by Alicia C. Alonzo, University of Iowa School of Education. 07S:350: Science Education Seminar: Learning Progressions, April, 2009.

Formative Assessment in the Science Classroom (1.5 h invited lecture). Invited by April Luehmann, Margaret Warner School of Education and Human Development at the University of Rochester. ED 474: Implementing Reform in Science Education, October, 2007.

GRANTS AND FELLOWSHIPS

CAREER: Educative Learning Progressions as Tools for Teacher Development (ELEvATE), National Science Foundation (Award #0953375), \$656,375, 2010-2014 (Principal Investigator).

Professional Learning as Leadership: Building Capacity in High School Biology Teaching, Outreach Committee, Continuing Education and Professional Studies, University of Colorado at Boulder, \$5,000, 2010-2011 (Principal Investigator).

More Pie: Essays on Entering Academia, Spencer Foundation, \$40,000, 2010-2011 (Principal Investigator).

Making the Global Local: Colorado Climate Literacy for Secondary Science Teachers, Outreach Committee, Continuing Education and Professional Studies, University of Colorado at Boulder, \$5,000, 2009-2010 (Principal Investigator).

A Circle of Life on Earth: A Tutorial Linking of Deep-Time, Geological Processes, and Phylogeny, ASC Dean's Fund for Excellence Committee, Arts and Sciences Support of Education Through Technology, \$4,000, 2009-2010 (Co-Principal Investigator).

Learning Progressions as Tools for Developing Content Knowledge for Teaching, Knowles Science Teaching Foundation, Research Fellowship, \$110,000, 2007-2010 (Principal Investigator).

Reforming Teaching and Learning of Science and Mathematics in Germany: A dual research affiliation with educational leaders in Kiel and Berlin, Alexander von Humboldt Foundation, German Chancellor Scholarship, 2006-2007.

Discussions in Guided Science Inquiry Teaching: A Study of Four Middle School Physical Science Classrooms, Stanford University, Small and Competitive Research Training Grants, \$6,500, 2005.

AWARDS AND HONORS

- 2009 **Chancellor's Faculty Award for Excellence in STEM Education**, I³: Towards An Institute for STEM Education, University of Colorado, Boulder
- 2009 **Faculty Appreciation Award**, Office of Diversity, Equity, & Community Engagement, University of Colorado, Boulder
- 2002-2003 **Maxima A. Dandoy Fellowship**, Stanford University
- 1999 **Graduate with Distinction**, University of Colorado, Boulder
- 1996-1997 **Dean's Scholar Awards**, University of Colorado, Boulder

PROFESSIONAL SERVICE

- Editorial Board Member Educational Assessment (2010 - present)
Journal of Research in Science Teaching (2009-2012)
- Ad Hoc Reviewer American Educational Research Association
International Journal of Science Education
Journal of the Learning Sciences
Journal of Teacher Education
Science
Science Education
Teaching and Teacher Education