

Eli M. Silk

Curriculum Vitae

Rutgers, The State University of New Jersey
Graduate School of Education
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Education

Ph.D., *University of Pittsburgh*. Cognitive Studies in Education, 2011.

B.A., *Swarthmore College*. Honors Computer Science major and Education minor, 2001.

Academic Appointments

Assistant Professor of Practice. *Department of Educational Psychology, Graduate School of Education, Rutgers, The State University of New Jersey*. Coordinator for Design of Learning Environments concentration of the Education Doctorate (Ed.D.) program. 2014-Present.

Research Fellow. *Center for Research on Learning and Teaching in Engineering, School of Engineering, University of Michigan*. Investigating Impacts on the Ideation Flexibility of Engineers. Supervised by Shanna R. Daly. 2013-2014.

Other Professional Experience

Research Associate. *Center for Highly Interactive Classrooms, Curricula & Computing in Education (hi-ce), School of Education, University of Michigan*. Developing an Empirically-Tested Learning Progression for the Transformation of Matter to Inform Curriculum, Instruction and Assessment Design. Supervised by Shawn Y. Stevens. 2011-2012.

Graduate Student Researcher. *Learning Research and Development Center, University of Pittsburgh*. Fostering Innovation through Robotics Exploration. Supervised by Christian D. Schunn. 2010-2011.

Graduate Student Researcher. *Learning Research and Development Center, University of Pittsburgh*. Robotics Corridor Project. Supervised by Christian D. Schunn. 2007-2010.

Graduate Student Researcher. *Learning Research and Development Center, University of Pittsburgh*. System-Wide Change for All Learners and Educators (SCALE) Project. Supervised by Christian D. Schunn. 2003-2007.

Research Consultant. *Department of Psychology, University of Pittsburgh.* Survey of Interpersonal Influence. Supervised by Wolfgang Scholl. Fall 2004.

Research Programmer. *Department of Psychology, Carnegie Mellon University.* Supervised by John R. Anderson. 2001-2003.

Undergraduate Research Assistant. *Department of Engineering, Swarthmore College.* Swarthmore College Robot Team. Supervised by Bruce A. Maxwell and Lisa A. Meeden. 1999-2000.

Publications

Refereed Journal Papers

1. **Silk, E. M.**, Schunn, C. D., & Strand Cary, M. (2009). The impact of an engineering design curriculum on science reasoning in an urban setting. *Journal of Science Education and Technology*, 18(3), 209-223. doi: 10.1007/s10956-009-9144-8
2. Doppelt, Y., Schunn, C. D., **Silk, E. M.**, Mehalik, M. M., Reynolds, B., & Ward, E. (2009). Evaluating the impact of a facilitated learning community approach to professional development on teacher practice and student achievement. *Research in Science & Technological Education*, 27(3), 339-354. doi: 10.1080/02635140903166026
3. Doppelt, Y., Mehalik, M. M., Schunn, C. D., **Silk, E.**, & Krysinski, D. (2008). Engagement and achievements: A case study of design-based learning in a science context. *Journal of Technology Education*, 19(2), 22-39.
4. Qin, Y., Carter, C. S., **Silk, E. M.**, Stenger, V. A., Fissell, K., Goode, A., & Anderson, J. R. (2004). The change of the brain activation patterns as children learn algebra equation solving. *Proceedings of the National Academy of Sciences, USA*, 101(15), 5686-5691. doi: 10.1073/pnas.0401227101
5. Maxwell, B. A., Meeden, L. A., Addo, N. S., Dickson, P., Fairfield, N., Johnson, N., Jones, E. G., Kim, S., Malla, P., Murphy, M., Rutter, B., & **Silk, E. M.** (2001). REAPER: A reflexive architecture for perceptive agents. *AI Magazine*, 22(1), 53-66.

Book Chapters and Other Papers

1. Schunn, C. D., **Silk, E. M.**, & Apedoe, X. S. (2012). Engineering in/&/or/for science education. In S. Carver & J. Shrager (Eds.), *The Journey from Child to Scientist: Integrating Cognitive Development and the Education Sciences*. Washington, D.C.: American Psychological Association.
2. **Silk, E. M.** (2012, January). *Ends and Means: A Framework for Design, Make, and Play Learning Activities*. Paper commissioned by the New York Hall of Science's Sara Lee Schupf Family Center for Play, Science, and Technology Learning. Paper presented at the

January 13, 2012 *Design, Make, Play – Growing the Next Generation of Science Innovators* workshop, New York, NY, USA.

3. **Silk, E. M.**, & Schunn, C. D. (2011, September). *A cognitive perspective on integrated STEM learning*. Paper commissioned for the National Academy of Engineering/National Research Council's *Committee on Integrated STEM Education* as part of the project *Toward Integrated STEM Education: Developing A Research Agenda*. Paper presented at the September 27, 2011 meeting, Washington, DC, USA.
4. **Silk, E. M.** (2011). *Resources for learning robots: Environments and framings connecting math and robotics*. Ph.D. Dissertation, University of Pittsburgh, Pittsburgh, PA. Available from ProQuest Dissertations and Theses database (Publication No. AAT 3485771).
5. Schunn, C. D., & **Silk, E. M.** (2011). Learning theories for engineering and technology education. In M. Barak & M. Hacker (Eds.), *Fostering Human Development through Engineering and Technology Education* (pp. 3-18), Rotterdam: Sense Publishers.
6. **Silk, E. M.**, Higashi, R., Shoop, R., & Schunn, C. D. (2010). Designing technology activities that teach mathematics. *The Technology Teacher*, 69(4), 21-27.
7. **Silk, E. M.**, Schunn, C. D., & Shoop, R. (2009). Synchronized robot dancing: Motivating efficiency & meaning in problem-solving with robotics. *Robot Magazine*, 17, 74-77.
8. **Silk, E. M.**, & Schunn, C. D. (2008, January). *Core concepts in engineering as a basis for understanding and improving K-12 engineering education in the United States*. Paper commissioned for the report *Engineering in K-12 Education: Understanding the Status and Improving the Prospects* and presented at the National Academy of Engineering/National Research Council workshop on K-12 Engineering Education, Washington, DC, USA.

Refereed Conference Papers/Presentations/Posters

1. Jablokow, K. W., Teerlink, W., Yilmaz, S., Daly, S. R., & **Silk, E. M.** (2015, June). The impact of teaming and cognitive style on student perceptions of design ideation outcomes. Paper accepted to be presented at the American Society for Engineering Education (ASEE) Annual Conference, Seattle, WA, USA.
2. Jablokow, K. W., Teerlink, W., Yilmaz, S., Daly, S. R., **Silk, E. M.**, & Wehr, C. (2015, August). Ideation variety in mechanical design: Examining the effects of cognitive style and design heuristics. Paper accepted to be presented at the ASME 2015 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2015), Boston, MA, USA.
3. Wright, S., **Silk, E. M.**, Daly, S. R., Jablokow, K. W., Yilmaz, S., & Teerlink, W. (2015, June). *Exploring the effects of problem framing on solution shifts: A case analysis*. Paper accepted to be presented at the American Society for Engineering Education (ASEE) Annual Conference, Seattle, WA, USA.

4. Yilmaz, S., Rosenberg, M. N., Daly, S. R., Jablokow, K. W., **Silk, E. M.**, & Teerlink, W. (2015, June). *Impact of problem contexts on the diversity of design solutions: An exploratory case study*. Paper accepted to be presented at the American Society for Engineering Education (ASEE) Annual Conference, Seattle, WA, USA.
5. **Silk, E. M.**, Daly, S. R., Jablokow, K. W., Yilmaz, S., & Rosenberg, M. (2014, June). *The design problem framework: Using adaptation-innovation theory to construct design problem statements*. Paper presented at the American Society for Engineering Education (ASEE) Annual Conference, Indianapolis, IN, USA. ** Won award for Professional Interest Council (PIC) II best paper and was a finalist for Design in Engineering Education (DEED) division best paper.
6. Yilmaz, S., Daly, S. R., Jablokow, K. W., **Silk, E. M.**, & Rosenberg, M. (2014, June). *Investigating impacts on the ideation flexibility of engineers*. Poster presented at the American Society for Engineering Education (ASEE) Annual Conference, Indianapolis, IN, USA.
7. **Silk, E. M.**, Daly, S. R., Jablokow, K. W., Yilmaz, S., & Rosenberg, M. (2014, April). *Interventions for ideation: Impact of framing, teaming, and tools on high school students' design fixation*. Paper presented at the 2014 annual meeting of the American Educational Research Association (AERA), Philadelphia, PA, USA.
8. **Silk, E. M.**, Higashi, R., & Schunn, C. D. (2011, June). *Resources for robot competition success: Assessing math use in grade-school-level engineering design*. Paper presented at the annual meeting of the American Society for Engineering Education, Vancouver, BC, Canada.
9. **Silk, E. M.**, & Schunn, C. D. (2011, June). *Calculational versus mechanistic mathematics in propelling the development of physical knowledge*. Paper presented at the 41st annual meeting of the Jean Piaget Society, Berkeley, CA, USA.
10. **Silk, E. M.**, & Schunn, C. D. (2011, April). *Resources for learning robots: Facilitating the incorporation of mathematical models in students' engineering design strategies*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA, USA.
11. **Silk, E. M.**, & Schunn, C. D. (2008, June). *Using robotics to teach mathematics: Analysis of a curriculum designed and implemented*. Paper presented at the annual meeting of the American Society for Engineering Education, Pittsburgh, PA, USA.
12. **Silk, E. M.**, & Schunn, C. D. (2008, April). *Utilizing contrasting cases to target science reasoning and content in a design-for-science unit*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Baltimore, MD, USA.
13. **Silk, E. M.**, Schunn, C. D., & Strand Cary, M. (2007, April). *The impact of an engineering design curriculum on science reasoning in an urban setting*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, New Orleans, LA, USA.

14. **Silk, E. M.**, & Schunn, C. D. (2006). Learning science by participating in design: A case where multiple design subgoals interfere with systematic progress. In S. Barab, K. Hay, & D. Hickey (Eds.), *Proceedings of the 7th International Conference of the Learning Sciences* (pp. 988-989). Bloomington, IN: International Society of the Learning Sciences.
15. Doppelt, Y., **Silk, E. M.**, Mehalik, M. M., Schunn, C. D., Reynolds, B., & Ward, E. (2006, April). *Evaluating the impact of a facilitated learning community approach to professional development on student achievement*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Francisco, CA, USA.

Conference Workshop Papers/Presentations

1. Maxwell, B. A., Meeden, L. A., Addo, N. S., Dickson, P., Fairfield, N., Johnson, N., Jones, E. G., Kim, S., Malla, P., Murphy, M., Rutter, B., & **Silk, E. M.** (2000). REAPER: A reflexive architecture for perceptive agents. *Proceedings of the AAI Workshop on Robotics*. Menlo Park, CA: AAI Press.
2. Maxwell, B. A., Meeden, L. A., Addo, N. S., Brown, L., Dickson, P., Ng, J., Olshfski, S., **Silk, E. M.**, & Wales, J. (1999). Alfred: The Robot Waiter Who Remembers You. *Proceedings of the AAI Workshop on Robotics*. Menlo Park, CA: AAI Press.

Invited Conference Presentations

1. Silk, E. M., Schunn, C. D., Higashi, R., Shoop, R., Dietrich, A., & Reed, R. (2007, August). *The use of robotics to teach mathematics*. Robotics Educators Conference, Butler, PA, USA.

Teaching Experience

University Teaching Experience

Department of Educational Psychology, Rutgers, The State University of New Jersey
Psychology of Learning, Fall 2014.
Learning through Problem Solving, Fall 2014.

Department of Psychology, University of Pittsburgh
Cognitive Psychology for Majors, Laboratory Section, Fall 2010.

Psychology in Education Department, University of Pittsburgh
Psychology of Learning and Development, Fall 2006 and Fall 2007.

Department of Instruction and Learning, University of Pittsburgh
Teaching Assistant and Guest Lecturer, Elementary Science Methods, instructed by Jennifer L. Cartier, Fall 2005.

Department of Psychology, University of Pittsburgh
Teaching Assistant and Guest Lecturer, Cognitive Psychology for Non-majors, instructed by Christian D. Schunn. Spring 2005.

Other Teaching Experience

Madison Metropolitan School District, Madison, WI

Professional Development Workshop Facilitator, The Electronic Alarm System Unit, Fall 2005.

Strath Haven High School, Wallingford, PA

Student Teacher, Supervised by K. Ann Renninger and Joseph Blass, taught three sections of Computer Programming, two introductory and one Advanced Placement, in a suburban high school using C++. Fall 2002.

Academic Service

Grant Reviewing

Panelist. *National Science Foundation (NSF) Division of Research on Learning in Formal and Informal Settings (DRL)*. 2014.

Journal Reviewing

Reviewer. *Journal of Women and Minorities in Science and Engineering (JRLWMSE)*. 2009.

Reviewer. *Journal of Research in Science Teaching (JRST)*. 2007, 2008.

Conference Reviewing

Reviewer. *American Educational Research Association (AERA) Annual Meeting*. 2007-2010, 2013-2015.

Reviewer. *American Society for Engineering Education (ASEE) Annual Meeting*. 2010-2015.

Reviewer. *Cognitive Science Society (CogSci) Annual Meeting*. 2011-2012.

Reviewer. *International Conference of the Learning Sciences (ICLS) Annual Meeting*. 2008, 2010.

Reviewer. *National Association for Research in Science Teaching (NARST) Annual Meeting*. 2007-2012.

Other Relevant Activities

Interviewer. *A+ Schools, Pittsburgh, PA*. Community volunteer for the *School Works* program to interview Pittsburgh's city school principals and collect data on staffing, training, coursework, support services, resources and learning opportunities for students. 2009, 2010.

Eli M. Silk

Math Tutor, *Westinghouse High School and Wilkinsburg High School, Pittsburgh, PA.*
Sponsored by Pittsburgh Science of Learning Center, tutored Algebra I and II students using
Cognitive Tutors. 2005-2006.