

**Catherine C. Chase**  
Department of Human Development  
Cognitive Studies Program  
Teachers College, Columbia University  
New York, New York  
chase@tc.edu

## EDUCATION

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- 2011      **Stanford University School of Education**, Stanford, CA.  
**Ph.D.**, Learning Sciences and Technology Design.  
Advisor: Daniel Schwartz.
- 2003      **Brooklyn College, City University of New York**, Brooklyn, NY.  
**M.S.Ed.** in Elementary Education.
- 2000      **Stanford University**, Stanford, CA.  
**B.A.** in Psychology with Honors.  
**B.S.** in Biology, double major.

## RESEARCH INTERESTS

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- Cognition, learning, and transfer in STEM domains
- The design of novel instructional methods that teach deep domain principles
- Student motivation and its relationship to instructional methods and learning outcomes
- Technology-based classroom interventions such as Teachable Agents, simulations, and games

## SELECTED PROFESSIONAL EXPERIENCE

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- 2011- 2013      **Postdoctoral Scholar.** Departments of Psychology and Human Computer Interaction, Carnegie Mellon University, Pittsburgh, PA. Advisors: Vincent Aleven and David Klahr. Worked on a variety of projects related to science learning in elementary and post-secondary education. Studies focused on the design of instruction with contrasting examples. The work took place in various learning contexts from educational games to online learning environments to more traditional classroom activities.
- 2006-2011      **Graduate Research Assistant.** AAA Lab, Stanford Center for Innovations in Learning. Advisor: Daniel Schwartz. Explored the use of novel technology-based learning environments such as Teachable Agents, simulations, and educational games to teach middle school science topics. Research focused on how the social context and activity structure can influence motivation and learning.
- 2003-2006      **Middle School Science Teacher.** Packer Collegiate Institute, Brooklyn, NY. Packer is one of Brooklyn's top three independent schools. As a laptop-based school, instruction focuses on innovative use of technology in the classroom. Developed and executed original, student-centered curriculum for 7<sup>th</sup> and 8<sup>th</sup> grade Science classes, focusing on human biology, ecology, energy, chemistry, physics, and technology.
- 2001-2003      **Elementary School Science Teacher.** Public School 327, CSD 23, Brooklyn, NY. P.S. 327 is one of the lowest performing schools in New York City with 90% of students qualifying for free and reduced-price lunch and 95% minority students. Developed unique, standards-based curriculum and led instruction in life, physical, and earth sciences to grades K-6 and special-needs children. Led effort to support classroom teachers in integrating science instruction into their curricula. Raised standardized science test scores from 22% to 55% of students earning passing scores.

## AWARDS AND HONORS

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- 2012            **Best paper award** at the 2012 International Conference of the Learning Sciences. *The interplay of chance and skill: Exploiting a common game mechanic to enhance learning and persistence.*
- 2011-13        Institute for Education Sciences Fellowship, Program in Interdisciplinary Education Research
- 2010            Spencer Dissertation Fellowship Finalist
- 2006-07        Myrtie M. Gifford Fellowship
- 2001-03        New York City Teaching Fellowship

## PUBLICATIONS

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- Chase, C.C., Chin, D.B., Oppezzo, M.A., & Schwartz, D.L. (2009). Teachable Agents and the Protégé Effect: Increasing the effort towards learning. *Journal of Science Education and Technology, 18*(4), 334-352.
- Schwartz D.L., Chase C.C., Chin D.B., Oppezzo M.A., Kwong H., Okita S., Biswas G., Roscoe R.D., Jeong H., & Wagster J.D. (2009). Interactive metacognition: Monitoring and regulating a teachable agent. In D.J. Hacker, J. Dunlosky, & A.C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 340-358). New York: Taylor and Francis.
- Chase, C.C., Shemwell, J.T., & Schwartz, D.L. (2010). Explaining across contrasting cases for deep understanding in science: An example using interactive simulations. *Proceedings of the 2010 International Conference of the Learning Sciences.*
- Chin, D.B., Dohmen, I.M., Cheng, B.H., Oppezzo, M.A., Chase, C.C., & Schwartz, D.L. (2010). Preparing students for future learning with Teachable Agents. *Educational Technology Research and Development, 58*(6), 649-669.
- Schwartz, D.L., Chase, C.C., Oppezzo, M.A., & Chin, D.B. (2011). Practicing versus inventing with contrasting cases: The effects of telling first on learning and transfer. *Journal of Educational Psychology, 103*(4), 759-775.
- Chi, M.T.H., Roscoe, R., Slotta, J., Roy, M. & Chase, C.C. (2012). Misconceived causal explanations for emergent processes. *Cognitive Science, 36*(1), 1-61.
- Schwartz, D.L., Chase, C.C., & Bransford, J.D. (2012). Resisting overzealous transfer: Coordinating previous successful routines with needs for new learning. *Educational Psychologist, 47*(3), 204-214.
- Chase, C.C. (2012). The interplay of chance and skill: Exploiting a common game mechanic to enhance learning and persistence. *Proceedings of the 2012 International Conference of the Learning Sciences.* [Won best paper award].
- Chase, C.C. (2013). Motivating expertise: Equipping novices with the motivational tools to move beyond failure. To appear in J.J. Staszewski (Ed.), *Expertise and skill acquisition: The impact of William G. Chase.* New York: Psychology Press.

Shemwell, J., Chase, C.C., & Schwartz, D.L. (under review). Seeking the general explanation: Revising the wisdom of Francis Bacon.

## CONFERENCE PRESENTATIONS AND POSTERS

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Chase, C.C. & Schwartz, D. L. (2008, February). *Teaching to learn: The impact of Teachable Agents on achievement goals and motivation*. Poster presented at the annual Inter-Science of Learning Center (ISLC) student and post-doc conference, Pittsburgh, PA.

Chase, C.C., Chin, D.B., Cheng, B., Oppezzo, M.A., & Schwartz, D. L. (2008, March). *Learning with Teachable Agents: A look at production feedback*. Paper presented at the annual meeting of the American Educational Research Association (AERA), New York, NY.

Oppezzo, M.A., Chase, C.C., Chin, D.B., & Schwartz, D. L. (2008, March). *Homework - work = future learning: Using informal learning structures to enhance formal education*. Paper presented at the annual meeting of the American Educational Research Association (AERA), New York, NY.

Chin, D.B., Chase, C.C., Oppezzo, M.A., Kwong, H.Y., & Schwartz, D.L. (2008, June). *Sociable Learning Technologies: Teachable Agents to enhance feedback, assessment, and future learning*. Poster presented at the annual Institute of Education Sciences (IES) research conference, Washington, DC.

Chase, C.C. *Positioning novices as relative experts: Motivating expert behaviors*. (2009, June). Paper presented at the 36<sup>th</sup> Carnegie Symposium on Cognition, Pittsburgh, PA.

Chase, C.C., Chin, D.B., Oppezzo, M.A., & Schwartz, D.L. (2009, June). *Teachable Agents and the Protégé Effect: Increasing the effort towards learning*. Poster presented at the annual Institute of Education Sciences (IES) research conference, Washington, DC.

Chase, C.C., Chin, D.B., Oppezzo, M.A., & Schwartz, D.L. (2009, August). *Teachable Agents and the Protégé Effect: Increasing the effort towards learning*. Paper presented at the annual meeting of the European Association for Research on Learning and Instruction (EARLI), Amsterdam, Netherlands.

Chase, C.C., Chin, D.B., Oppezzo, M.A., Dohmen, I., & Schwartz, D.L. (2009, November). *The Protégé Effect: Increasing the effort towards learning with Teachable Agents*. Poster presented at the National Science Foundation's annual Science of Learning Centers awardees meeting, Washington, D.C.

Chase, C.C., Chin, D.B., Gresalfi, M., & Schwartz, D.L. (2010, May). *Why instruction supports or hinders transfer in physics*. Paper presented at the annual meeting of the American Educational Research Association (AERA), Denver, CO.

Chase, C.C. & Schwartz, D.L. (2010, July). *Inventing with contrasting cases: An instructional method that improves students' uptake of big ideas*. Poster presented at the Physics Education Research Conference (PERC), Portland, OR.

Chase, C.C., Chin, D.B., Oppezzo, M.A., & Schwartz, D.L. (2011, September). Learning for the sake of a digital protégé: An analysis of students' think-alouds as they engage with a Teachable Agent. Poster presented at the Socializing Intelligence Through Talk and Dialogue Conference, Pittsburgh, PA.

Chase, C.C. (2012, May). Exploiting game mechanics to promote persistence and risk-taking in the face

of failure. Paper presented at the annual meeting of the National Council of Teachers in Mathematics (NCTM), Philadelphia, PA.

Chase, C.C., Shemwell, J.T., & Schwartz, D.L. (2012, May). Critical ingredients of contrasting case instruction. Paper presented at the annual meeting of the American Education Research Association (AERA), Vancouver, Canada.

Christel, M.G., Stevens, S. M., Maher, B.S., Brice, S., Champer, M., Jayapalan, L., Chen, Q., Jin, J., Hausmann, D., Bastida, N., Zhang, X., Alevan, V., Koedinger, K., Chase, C., Harpstead, E., & Lomas, D. (2012, July). RumbleBlocks: Teaching science concepts to young children through a Unity game. 17<sup>th</sup> International Conference on Computer Games (CGAMES).

## RESEARCH PROJECTS

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- 2006-2011     **Teachable Agent Project.**  
PIs: Daniel Schwartz, Stanford University, Gautam Biswas, Vanderbilt University.  
The Teachable Agent is a software learning environment in which students learn by teaching a computer character. Studies focus on the unique learning and motivational benefits of using the Teachable Agent system, the social aspects of learning, and the potential added value of Teachable Agents for standard classroom practice.
- 2008-present   **Invention Activities Project.**  
Collaborator: Daniel Schwartz, Stanford University.  
Invention activities invite students to generate an external representation of an underlying principle that exists across many examples of a phenomenon. Example cases are designed for optimal contrasts to encourage perception of the principle and flexible understanding that is easily applied to novel problems. Studies focus on the unique perceptual and transfer benefits of learning with invention as compared to more conventional instructional methods, like tell-and-practice.
- 2009-2011     **PhET Interactive Science Simulations.**  
PIs: Daniel Schwartz, Stanford University; Carl Wieman & Kathy Perkins, University of Colorado.  
PhET interactive science simulations ([phet.colorado.edu](http://phet.colorado.edu)) have great potential for classroom use, but models for their use are scarce. This project focused on building and evaluating instructional approaches that can be used in conjunction with simulations, largely in middle school classrooms.
- 2009-2011     **Choice-based Assessments Project.**  
PIs: Daniel Schwartz, Stanford University and Gautam Biswas, Vanderbilt University.  
The goal of this project is to create a novel technology-based learning environment, predicated on the idea that students' learning choices are predictive of their learning outcomes. Design work focused on building an interactive, adaptive environment that would respond to student actions, encouraging them to select "good" while avoiding "bad" choices. Research aims to determine whether this choice-adaptive environment is effective in shaping student behaviors and enhancing learning.
- 2011-2013     **ENGAGE Project.**  
PI: Vincent Alevan, Carnegie Mellon University.  
This project aims to bring learning experts and game designers together to build an educational game that is both entertaining and instructive. The games we build are designed to teach physics to grades K-3. In addition to increasing proficiency in science content, the project aims to teach science inquiry and socio-emotional learning skills.

2011-2013

**Learning with contrasting examples.**

Collaborators: David Klahr, David Yaron, and Steven Dow, Carnegie Mellon University. This work is comprised of three separate projects with collaborators in psychology, chemistry, and human-computer interaction departments. The work explores the design of instruction around contrasting examples with an eye towards developing technology-based instruction around contrasts. This research is being conducted with elementary and adult students learning experimental design, chemistry, and visual design.

**PROFESSIONAL AFFILIATIONS**

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American Association of Physics Teachers (AAPT)  
American Educational Research Association (AERA)  
European Association for Research on Learning and Instruction (EARLI)  
International Society of the Learning Sciences (ISLS)  
Learning in Informal and Formal Environments (LIFE)  
Pittsburgh Science of Learning Center (PSLC)