

# CHRISTIAN DIETER SCHUNN

STEM learning      Web-based peer interaction and instruction  
Improvement science for instruction      Engagement and learning

## CONTACT

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## WORK

<i>University of Pittsburgh</i> 2001– Institute for Learning Psychology; Learning Sciences and Policy; Intelligent Systems Learning Research & Development Center	Co-Director, 2016–2021; Research Liaison 2022– Assistant 2001; Associate 2006; Professor 2011– Research Scientist 2001; Senior Scientist 2011–
<i>Northeast Normal University</i> 2019–2024 School of Foreign Languages	Visiting Professor
<i>George Mason University</i> 1998–2001 Psychology	Assistant Professor

## EDUCATION

1996–98      Postdoc, Psychology, Carnegie Mellon University (*Advisors: John Anderson, Lynne Reder*)  
1993–95      PhD, Psychology, Carnegie Mellon University (*Advisor: David Klahr*)  
1990–93      MS, Psychology, Carnegie Mellon University  
1987–90      BS, Honors Psychology, Minors in Mathematics and Computer Science, McGill University

## LEARNING MATERIALS

<i>Writing:</i> SWoRD/Peerceptiv	<i>Biology:</i> Designer Bacteria; Gecko; Stinkbug
<i>Robotics:</i> Dancing Robots; Robots in Motion	<i>Chemistry:</i> Heating & Cooling
<i>Badging:</i> CS2N.org	<i>Physics:</i> Alarm Systems; Lift Systems; Launcher

## HONORS AND AWARDS

*Society Fellowships*  
Association for Psychological Science, 2014      American Association for the Advancement of Science, Section Q, 2011  
American Psychology Association, Division 3, 2009      International Society for Design & Development in Education, 2006

*Journal Awards*  
*Design Studies* Best Paper Award 2015 (with Joel Chan)  
John R. Hayes Award for the best article in *Journal of Writing Research* 2008–2010 (with Patchan & Charney)

*Conference Awards*  
Best Paper Award at *UMAP 2017* (with Guerra-Hollstein, Barria-Pineda, Bull & Brusilovsky)  
Best Paper Award at the *35<sup>th</sup> Computers and Information in Engineering Conference* (with Egan, Cagan, & LeDuc)  
Best Paper Award at the *24<sup>th</sup> International Conference on Design Theory and Methodology* (with Fu, Chan, Cagan, Kotovsky, Wood)  
Best work at the *ED-Media 2003* conference (with Kwangsu Cho), Hawaii, 2003

## EXTERNAL GRANTS

*Current — \$18,397,271*

- Effective, Coherent, and Equitable Implementation of Go Math! In El Pason Region 19.* Bill & Melinda Gates Foundation. CoPI with J. Dostilio, R. Correnti, B. Strawhun, L. Speranzo. \$3,470,700.
- Developing a Context-Integrated Mindset / Belonging Intervention to Eliminate Demographic-based Underperformance in Challenging Large Lecture Undergraduate Courses.* Institute of Education Sciences. CoPI with K. Binning, L. DeAngelo, E. McGreevy, R. Toutkoushian, \$1,999,657.
- Course-based Adaptations of an Ecological Belonging Intervention to Transform Engineering Representation at Scale.* National Science Foundation. CoPI with K. Binning, L. DeAngelo, E. McGreevy, A. Godwin, \$2,202,844.
- University of Pittsburgh/Institute for Learning Network for School Improvement (9th Grade On Track).* Bill & Melinda Gates Foundation. CoPI with T. Petrosky, J. Russell, D Thompson-Dorsey, R. Apodaca, & S. DeMartino. \$8,224,070.

5. *Teacher Learning to Enact Productive Discussions in Mathematics and Literacy*. James S. McDonnell Foundation. Co-PI with M. K. Stein, J. Russell, R. Correnti, & L. Matsumura. \$2,499,651.
- Prior — \$75,482,363
6. *Build, Understand, & Tune Interventions that Cumulate to Real Impact*. National Science Foundation, DUE-1524575, Co-PI with T. Nokes-Malach, B. Rottman, K. Binning, E. Votruba-Drzal, C. Singh, J. Grabowski, & N. Kaufmann, \$1,795,922.
  7. *Studying the Malleability and Impact of Science Learning Activation*. National Science Foundation, DRL-1348468. PI, CoPIs R. Dorph & M. Cannady. \$1,479,490.
  8. *Changing Culture in Robotics Classroom*. National Science Foundation, DRL-1416984, PI, CoPI R. Shoop, \$1,568,244.
  9. *Understanding and improving curriculum materials design practices for effective large-scale implementation in science*. National Science Foundation, DRL-1251562, PI, coPIs D. Bernstein, S. Mckenney, B. Drayton, J. Barber, \$1,401,043.
  10. *Building a theory of badges for computer science education*. National Science Foundation, CNS-1339085, PI, CoPI R. Shoop, \$600,000.
  11. *DDIG Understanding the Impact of Sources of Inspiration in Creative Design: The Role of Conceptual Distance*. National Science Foundation, SBE- 1360013. PI, 06/01/14-12/01/15, \$15,261.
  12. *Teaching Writing and Argumentation with AI-supported Diagramming and Peer Review*. National Science Foundation, IIS-1122504, Co-PI with K. Ashley & D. Litman, 09/01/11–08/31/16, \$1,349,986.
  13. *Intelligent Scaffolding of Peer Review of Writing*. Institute of Education Sciences, R305A120370, Co-PI with D. Litman, A. Godley and K. Ashley, 7/1/12–6/30/15, \$1,498,941.
  14. *Modeling Engineered Levers for the 21st Century Teaching of STEM*. National Science Foundation, DRL-1027629, PI, CoPI M. K. Stein. 09/01/10–08/31/15, \$2,593,766.
  15. *Connecting Research and Teaching Through Product Innovation: Quality of Life Technology RET Site*. National Science Foundation, EEC-1161880. Co-PI with J. Pearlman, 10/1/12–9/30/15, \$518,179.
  16. *Educational Design & Development: Planning for a STEM Learning Research Transformation*. National Science Foundation, DRL-1216850, Co-PI with F. Davis, 5/15/12–5/30/14, \$49,548.
  17. *Activation Design Follows: Building Learning Pathways for Pittsburgh's Youth*. The Grable Foundation. Co-PI with K. Crowley. 6/1/12–5/30/14, \$198,780.
  18. *Center for the Study of Activated Science Learners*. Gordon and Betty Moore Foundation, #2820 and #3341, PI, CoPIs K. Crowley, R. Dorph, and P. Shields. 02/01/11 – 11/1/13, \$3,999,646.
  19. *The 21st Century Research and Development Center on Cognition and Science Education*. Institute of Education Sciences, R305C080009, Co-PI with J. Merlino, A. Porter, J. Cromley, N. Newcombe, and T. Nokes, 7/1/08–6/30/14, \$9,995,038.
  20. *The Robot Algebra Project*. National Science Foundation, DRL-1029404, PI, CoPIs M. K. Stein and R. Shoop. 09/01/10–08/31/13, \$449,969 Pitt Contract.
  21. *Fostering Innovation through Robotics Exploration*. Defense Advanced Research Projects Agency, FA8750-10-2-0165, Co-PI Investigator with R. Shoop, A. Corbett, K. Koedinger, W. Dann, H. Choset, M. Veloso, and L. Levin. 07/14/10–9/30/13, \$328,364 Pitt subcontract.
  22. *Advanced Analogical Search with Integrated Function and Form: The Verrocchio Project*. National Science Foundation, CMMI-0855293, Co-PI with J. Cagan and K. Wood, 07/01/09–06/30/13, \$450,000.
  23. *Learning Pathways for Activation in Pittsburgh*. The Sprout Fund. Co-PI with K. Crowley. 9/1/12–4/30/13, \$50,000.
  24. *Computer Science Student Network Badge System*. MacArthur Foundation, HASTAC/MacArthur Digital Media and Learning Badges for Lifelong Learning, Co-PI with R. Shoop, 4/1/12–3/31/13, \$175,000.
  25. *Training in Arithmetical Fluency*. National Science Foundation, EHR-0815945, Co-PI with J. Fiez, 9/1/08–8/31/12, \$1,241,567.
  26. *Assessing the Young Activated Science Learner*. Gordon and Betty Moore Foundation, #2589, PI, CoPIs K. Crowley and R. Dorph. 06/14/10 – 09/30/11, \$380,000.
  27. *Connecting Research and Teaching Through Product Realization: The Pittsburgh Quality of Life RET Site*. National Science Foundation, EEC-0808675, Co-PI with M. Lovell, A. Landis, and S. Balouris, 6/1/08–12/30/11, \$489,700.
  28. *Integrating Social and Cognitive Elements of Discovery and Innovation*. National Science Foundation, SBE-0830210, PI, 9/1/08–8/31/11, \$214,556.
  29. *Biologically Accelerated Learning Technology (BALT) Phase II*. Defense Advanced Research Projects Agency, NBCHC070104, Co-PI with W. Schneider, N. Tokowicz, J. Moss, and T. Huppert, 1/1/09–12/31/10, \$2,360,000.
  30. *Workshop on Confidential Data Collection for Innovation Analysis in Organizations*. National Science Foundation, SBE 0943337. PI, 9/15/09–9/15/10, \$50,312.
  31. *Design Tools to Cognitive Processes to Innovation*. National Science Foundation, SBE-0738071. PI, 1/1/08–06/31/10, \$373,985 and \$74,732 supplement (SBE-0823628).
  32. *University of Pittsburgh for Research Experience for Teachers Innovation Generation grant*. Motorola Foundation. Co-PI with M. Lovell, 1/1/08–12/31/09, \$50,000.
  33. *Biologically Accelerated Learning Technology*. Defense Advanced Research Projects Agency, Co-PI with W. Schneider, N. Tokowicz, and K. VanLehn, 3/1/07–9/30/08, \$1,168,781.
  34. *Robotics Corridor*. National Science Foundation, DUE-0703104, PI on Subcontract, 5/1/07–4/30/10, \$149,729 subcontract.
  35. *Evaluation of a Robotics Curriculum*. Heinz Foundation, PI on Subcontract, 1/1/07–12/31/07, \$38,054 subcontract.
  36. *Evaluation of Open Learning Initiative Logic & Proofs*. Hewlett Foundation, PI on Subcontract, 1/1/07–12/31/07, \$43,350 subcontract.
  37. *Materials for Innovative Design into Urban High Schools*. Snee-Reinhardt Foundation. PI, 9/1/06–8/31/07, \$20,350.
  38. *Center for e-Design: IT Enabled Infrastructure and Technology*, National Science Foundation, Co-PI with M. Lovell, 7/06–6/08, \$160,000.
  39. *Towards a Science of Innovative Design*. National Science Foundation, BCS-0638451. PI, 9/1/06–8/31/08, \$160,000.
  40. *Workshop on the Scientific Basis of Individual and Team Innovation and Discovery*. National Science Foundation. PI, 5/1/06, \$35,696.
  41. *Predictive Theories for Better Displays of Uncertainty in Complex Visual Problem Solving*. Office of Naval Research, N000140610053. PI, 10/1/05–12/30/07, \$171,600.

42. *Bringing Innovative Design into Urban High Schools on a Sustainable Basis: The University of Pittsburgh Innovative Design RET Site*. National Science Foundation, EEC-0502035. Co-PI with M. Lovell, 4/1/05–3/31/08, \$400,000.
43. *The Impact of a Technology-Scaffolded Peer Evaluation Writing System on Writing Skills and Course Content Knowledge*. A. W. Mellon Foundation. PI, 1/1/04–12/31/06, \$350,000.
44. *ACT-R/S and the Role of Mental Transformations in Complex and Map-Mediated Navigation*. Office of Naval Research, N000140210113. PI, 10/1/03–9/30/06, \$337,044.
45. *SCALE: Systemwide Change for All Learners and Educators*. National Science Foundation, EHR-0227016. Co-PI with L. Resnick, T. Millar, A. Porter, & K. Lesley, 01/01/03–12/31/07, \$35,000,000.
46. *Complex Problem-Solving with Certain Representations of an Uncertain World*. Office of Naval Research, N000140310061. PI, 10/1/02–9/30/05, \$237,718.
47. *Model-assisted reasoning in science: Effects of model-centered instruction on middle school students' modeling abilities*. National Science Foundation. Co-PI with K. Raghavan, 7/1/02–6/30/05, \$1,021,343.
48. *Modeling distant psychological space in complex problem solving*. Office of Naval Research. PI, 6/1/00–8/31/03, \$194,982.
49. *Learning leadership skills in distributed training scenarios: Diagnosing strategies in scenarios using Latent Semantic Analysis*. Army Research Institute. PI. 9/1/00–8/31/02, \$179,099.
50. *The role of environmental awareness and private speech in adapting and controlling behavior in children with autism*. Autism Society of America Foundation. PI, Co-PI A. Winsler, 10/1/00–9/30/02, \$50,000.
51. *CyberE: Cyber environment for organizational adaptability*. Lucite/National Security Agency, Co-PI with J. Foreman & D. Rine, 11/1/00–10/31/01, \$138,916.
52. *Cross-cultural views of collaborative research*. Mitsubishi Bank Foundation. Co-PI with T. Okada & K. Crowley, 9/1/94–8/31/98, \$54,000.

## NATIONAL AND INTERNATIONAL PROFESSIONAL SERVICE

### International Society for Design & Development in Education

*Chair of Executive Committee*, 2011–14, 2021 – present; *Chair of the Eddie Prize committee*, 2010–14; *Chair of Membership Committee*, 2014–20

### National Academy of Engineering / National Research Council Committee Member

*K-12 Engineering Education*, 2007–09; *K-12 Engineering Education Standards*, 2008–10; *Adaptability and Resilience to Change*, 2017–18

### Grant Reviewing Panel Member

NSF (SBE, EHR, CISE), IES, Deutsche Forschungsgemeinschaft, Swiss National Science Foundation, Leibniz Gemeinschaft

### Editorial Board Member (current only)

*Journal of Educational Psychology*, 2008 – present; *Cognitive Science*, 2005 – present; *International Journal of STEM Education*, 2013 – present  
*Design Studies*, 2020 – present; *Instructional Science*, 2020 – present; *ETR&D*, 2022 – present

### Conference Organizer

*International Society for Design and Development in Education*, Boston, MA, Sept, 2011; Pittsburgh, PA, Sept, 2019; Virtual, March 2021  
*Computer-Supported Peer Review in Education: Synergies with Intelligent Tutoring Systems*, Pittsburgh, PA, June, 2010  
*Workshop on Confidential Data Collection for Innovation Analysis in Organizations*. Redmond, WA, September, 2009  
*Innovation and Discovery Workshop: The Scientific Basis of Individual and Team Innovation and Discovery*. Ballston, VA, May 2006  
*The 4<sup>th</sup> and 6<sup>th</sup> International Conferences on Cognitive Modeling*. Fairfax, VA, July, 2001; Pittsburgh, PA, July, 2004  
*The 24<sup>th</sup> Annual Meeting of the Cognitive Science Society*. Fairfax, VA, August, 2002  
*Designing for Science*. Pittsburgh, PA, April, 1998

## TEACHING EXPERIENCE (last 10 years)

### Graduate

Design of Educational Systems, 2012,15,16,18  
Foundations of Cognition, 2011,13  
Problem-based Learning, 2016  
Learning, 2020

### Undergraduate

Cognitive Psychology, 2012,14,16,17,18,19,21,22

## GRADUATE STUDENTS & POSTDOCS

### Graduate student advisees

#### *University faculty positions*

Kwangsung Cho, Psy, PhD 2005 (Yonsei Univ., Korea)  
Melissa Patchan, Psy, PhD 2011 (West Virginia Univ.)  
Sam Abramovich, LSAP PhD 2013 (SUNY Buffalo)  
Paul Egan, Engr PhD 2014 (Texas Tech)  
Joel Chan, Psy, PhD 2014 (U of Maryland)  
Anita Schuchardt, LSAP, PhD 2016 (U of Minnesota)  
Paulette Vincent-Ruz, LSAP 2019 (New Mexico State)

#### *Industry and Non-profit R&D positions*

Lelyn Saner, Psy, PhD 2008 (Booz Allen Hamilton)  
Anthony Harrison, Psy, PhD 2008 (Naval Research Labs)  
Xiaohui Kong, ISP, PhD 2009 (Telle AI)  
Eli Silk, Cognitive Studies PhD 2011 (Rutgers Univ.)  
Jooyoung Jang, Psy PhD 2013 (Coupang)  
Meghan Bathgate, Psy, PhD 2016 (Yale Univ.)  
Ross Higashi, LSAP, PhD 2018 (CMU)  
Allison Liu, Psy, PhD 2018 (WPI)  
Eben Witherspoon, LSAP 2019 (AIR)  
Jarrod Moss 2007-8 (Mississippi State)  
Susannah Paletz, 2008-11 (Univ. of Maryland)  
Adar Ben-Eliyahu 2011-12 (Univ. of Haifa, Israel)  
Arava Kallai 2010-13 (Yezreel Valley College, Israel)  
Kathy Malone, 2014 (Nazarbayev University, Kazakhstan)

### Postdoc advisees

#### *University faculty positions*

Brad Morris 2001-2 (Kent State)  
Xornam Apedoe 2005-8 (University of San Francisco)  
Michelle Ellefson 2005-7 (Cambridge Univ., UK)

Lisa Fazio, 2013-14 (Vanderbilt University)  
Miray Tekkumru Kisa, 2014-15 (Florida State)  
Dana Miller-Cotto, 2017-19 (Kent State)  
Yong Wu (Beijing University of Posts and Telecom., China)

*Current*

JoeAnn Nguyen  
Crystal Menzies

*Industry and Non-profit R&D positions*

Laura Moin 2003-5 (Pearson)  
Yaron Doppelt 2003-5 (Israeli Ministry of Education)  
Matt Mehalik 2003-5 (Breathe Pittsburgh)  
Alicia Chang 2008-10 (Google Education)  
Charles Cox 2010-12 (Penn State)  
Jordan Lippman 2011-13 (Collaboration Nation)  
Amanda Crowell 2011-13 (Crowell Coaching)  
Louis Alfieri, 2010-14 (Vertex Education)  
Li Sha 2011-14 (Simon Frasier Univ., Canada)  
Alok Baikadi, 2013-16 (ETS)  
Natalie Pareja Roblin 2013-17 (Univ. of Amsterdam, Netherlands)  
Yao Xiong, 2017-18 (ICL Learning)  
Aaron Anthony, 2019-20 (Univ. of Pitt.)  
Mallory Avery (Monash Univ., Australia)



## EDITED VOLUMES & PROCEEDINGS

- Derry, S. J., Schunn, C. D., & Gernsbacher, M. A. (Eds.) (2005). *Interdisciplinary Collaboration: An Emerging Cognitive Science*. Mahwah, NJ: Erlbaum.
- Schunn, C. D., Lovett, M. C., Munro, P., & Lebiere, C. (Eds.) (2004). *Proceedings of the 2004 Sixth International Conference on Cognitive Modeling*. Mahwah, NJ: Erlbaum.
- Gray, W. D., & Schunn, C. D. (Eds.) (2002). *Proceedings of the 24<sup>th</sup> Annual Meeting of the Cognitive Science Society*. Mahwah, NJ: Erlbaum.
- Altmann, E. M., Cleeremans, A., Schunn, C. D., & Gray, W. D. (Eds.) (2001). *Proceedings of the 2001 Fourth International Conference on Cognitive Modeling*. Mahwah, NJ: Erlbaum.
- Crowley, K., Schunn, C. D., & Okada, T. (Eds.) (2001). *Designing for Science: Implications from Professional, Instructional, and Everyday Science*. Mahwah, NJ: Erlbaum.

## SELECTED JOURNAL ARTICLES

### STEM Learning

- Cannady, M. A., Vincent-Ruz, P., Chung, J. M., & Schunn, C. D., (2019). Scientific sensemaking supports science content learning across disciplines and instructional contexts. *Contemporary Educational Psychology*, 59, 101802. 10.1016/j.cedpsych.2019.101802
- Pareja Roblin, N., Schunn, C., & McKenney, S. (2018). What are critical features of science curriculum materials that impact student and teacher outcomes? *Science Education*, 102(2), 260-282. 10.1002/sce.21328
- Schuchardt, A., & Schunn, C. D. (2016). Modeling scientific processes with mathematics equations enhances student qualitative conceptual understanding and quantitative problem solving. *Science Education*, 100(2), 290–320. 10.1002/sce.21198
- Tekumru-Kisa, M., Stein, M. K., & Schunn, C. D. (2015). A framework for analyzing cognitive demand and content-practices integration: Task analysis guide in science. *Journal of Research in Science Teaching*, 52(5), 659-685. 10.1002/tea.21208

### STEM Reasoning

- Paletz, S., Chan, J., & Schunn, C. D. (2017). Dynamics of micro-conflicts and uncertainty in successful and unsuccessful design teams. *Design Studies*, 50, 39-69. 10.1016/j.destud.2017.02.002
- Chan, J., Dow, S. P., & Schunn, C. D. (2015). Do the best design ideas (really) come from conceptually distant sources of inspiration? *Design Studies*, 36, 31-58. 10.1016/j.destud.2014.08.001

### Web-based Peer Interaction

- Zong, Z., Schunn, C. D., & Wang, Y. (2021). What aspects of online peer feedback robustly predict growth in students' task performance? *Computers in Human Behavior*, 124, 106924. 10.1016/j.chb.2021.106924
- Wu, Y. & Schunn, C. D. (2021). The effects of providing and receiving peer feedback on writing performance and learning of secondary school students. *American Educational Research Journal*, 58(3), 492-526. 10.3102/0002831220945266
- Patchan, M. M., Schunn, C. D., & Clark, R. J. (2018). Accountability in peer assessment: examining the effects of reviewing grades on peer ratings and peer feedback. *Studies in Higher Education*, 43(12), 2263-2278. 10.1080/03075079.2017.1320374
- Schunn, C. D., Godley, A. J., & DeMartino, S. (2016). The reliability and validity of peer review of writing in high school AP English classes. *Journal of Adolescent & Adult Literacy*, 60(1), 13–23. 10.1002/jaal.525

### Engagement and Learning

- Witherspoon, E., & Schunn, C. D. (2020). Locating and understanding the largest gender differences in pathways to science degrees. *Science Education*, 104(2), 144-163. 10.1002/sce.21557
- Whitcomb, K. M., Kalender, Z. Y., Nokes-Malach, T. J., Schunn, C. D., & Singh, C. (2020). Comparison of self-efficacy and performance of engineering undergraduate women and men. *International Journal of Engineering Education*, 36(6), 1996–2014.
- Witherspoon, E., Vincent-Ruz, P., & Schunn, C. D. (2019). When making the grade isn't enough: The gendered nature of pre-med science course attrition. *Educational Researcher*, 48(4), 193-204. 10.3102/0013189X19840331
- Liu, A. S., & Schunn, C. D. (2018). The effects of school-related and home-related optional science experiences on science attitudes and knowledge. *Journal of Educational Psychology*, 110(6), 798-810. 10.1037/edu0000251

## ALL JOURNAL ARTICLES, BOOK CHAPTERS, & TRADE PUBLICATIONS (students & postdocs)

### STEM Learning

- S Miller-Cotto, D., & Schunn C. D. (In press). Mind the gap: How a large-scale course re-design in economics reduced performance gaps. *The Journal of Experimental Education*. 10.1080/00220973.2020.1805717

- S Tekkumru-Kisa, M., Stein, M. K., & Schunn, C. D. (In press). Identifying cognitively demanding science tasks to provide opportunities for students to engage in three-dimensional learning. *The Science Teacher*.
- M Witherspoon, E. B., Ferrer, N. B., Correnti, R., Stein, M. K., & Schunn, C. D. (2021). Coaching that supports teachers' learning to enact ambitious instruction. *Instructional Science*, 49, 877–898. 10.1007/s11251-021-09536-7
- S Apedoe, X., S., Ellefson, M. R. & Schunn, C. D. (2021). Supporting conceptual change in chemistry through design-based learning: The heating/cooling system unit. In M. DeVries & I. Henze-Rietveld (Eds.), *Design-Based Concept Learning in Science and Technology Education*.
- S Liu, A. S., & Schunn, C. D. (2020). Predicting pathways to optional summer science experiences by socioeconomic status and the impact on science attitudes and skills. *International Journal of STEM Education*, 7, 49. 10.1186/s40594-020-00247-y
- S Drayton, B., Bernstein, D., Schunn, C. D., & McKenney, S. E. (2020). Consequences of curricular adaptation strategies for implementation at scale. *Science Education*, 104(6), 983-1007. 10.1002/sce.21595
- S Vincent-Ruz, P., Meyer, T., Garrett-Roe, S. & Schunn, C. D. (2020). Short and long-term effects of POGIL in a large enrollment General Chemistry course. *Journal of Chemical Education*, 97(5), 1228-1238. 10.1021/acs.jchemed.9b01052
- T Hosseini, R., Akhuseyinoglu, K., Brusilovsky, P., Malmi, L., Pollari-Malmi K., Schunn, C. D., & Sirkiä, T. (2020). Improving engagement in program construction examples for learning python programming. *International Journal of Artificial Intelligence in Education*, 30 (2), 299-236. 10.1007/s40593-020-00197-0
- E Whitcomb, K. M., Kalender, Z. Y., Nokes-Malach, T. J., Schunn, C. D., & Singh, C. (2020). Laying a foundation for success in engineering coursework: A predictive curriculum model. *International Journal of Engineering Education*, 36(4), 1340–1355.
- S Cannady, M. A., Vincent-Ruz, P., Chung, J. M., & Schunn, C. D., (2019). Scientific sensemaking supports science content learning across disciplines and instructional contexts. *Contemporary Educational Psychology*, 59, 101802. 10.1016/j.cedpsych.2019.101802
- S Tekkumru-Kisa, M., Schunn, C. D., Stein, M. K., & Reynolds, B. (2019). Change in thinking demands for students across the phases of a science task: An exploratory study. *Research in Science Education*, 49(3), 859-883. 10.1007/s11165-017-9645-z
- S Tekkumru-Kisa, M., & Schunn, C. D. (2019). Integrating a space for teacher interaction into an educative curriculum: Design principles and teachers' use of the iPlan tool. *Technology, Pedagogy and Education*, 28(2), 133-155. 10.1080/1475939X.2019.1595707
- M Quintana, R., & Schunn, C. D. (2019). Who benefits from a foundational logic course? Effects on undergraduate course performance. *Journal of Research on Educational Effectiveness*, 12(2), 191-214. 10.1080/19345747.2018.1543372
- T Huang, X., Wang, Y., Schunn, C. D., Zou, Y., & Ai, W. (2019). Redesigning flipped classrooms: A learning model and its effects on student perceptions. *Higher Education*, 78, 711–728. 10.1007/s10734-019-00366-8
- T Witherspoon, & Schunn, C. D. (2019). Teachers' goals predict computational thinking gains in robotics. *Information and Learning Science*, 120(5/6), 308-326. 10.1108/ILS-05-2018-0035
- S Betancur, L., Rottman, B. M., Votruba-Drzal, E., & Schunn, C. D. (2019). Analytical assessment of course sequencing: The case of methodological courses in psychology. *Journal of Educational Psychology*, 111(1), 91-103. 10.1037/edu0000269
- All McKenney, S. E., & Schunn, C. D. (2018). How can educational research support practice at scale? Attending to educational designer needs. *British Educational Research Journal*, 44(6), 1084-1100. 10.1002/berj.3480
- T Guerra, J., Schunn, C. D., Bull, S., Barria-Pineda, J., & Brusilovsky, P. (2018). Navigation support in complex open learner models: Assessing visual design alternatives. *New Review of Hypermedia and Multimedia*, 3, 160-192. 10.1080/13614568.2018.1482375
- S Betancur, L., Votruba-Drzal, E., & Schunn, C. D. (2018). Socioeconomic gaps in science achievement. *International Journal of STEM Education*, 5, 38. 10.1186/s40594-018-0132-5
- S Pareja Roblin, N., Schunn, C., Bernstein, D., & McKenney, S. (2018). Exploring shifts in the characteristics of US government-funded science curriculum materials and their (unintended) consequences. *Studies in Science Education*, 54(1), 1-39. 10.1080/03057267.2018.1441842
- E Mandala, M., Schunn, C. D., Dow, S., Goldberg, M., & Perlman, J. (2018). Uncovering the practices, challenges, and incentives for engineering design faculty. *International Journal of Engineering Education*, 34(4), 1314-1324.
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## Web-based Peer Interaction

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## INVITED TALKS

- How do we provide teachers with focused feedback from their students to improve their instruction? Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, December 2021.
- Growth mindset-belongingness interventions to address motivational concerns in students. Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, December 2021.
- To match or not to match: can we optimize learning from peer feedback by wise reviewer-reviewee pairings? Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, November 2021.
- Game-theory and peer feedback: do students fall victim to the “tragedy of the commons”? Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, November 2021.
- Re-evaluating the connection of peer feedback to the zone of proximal development. Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, November 2020.
- The kinds of experiences with peer feedback that improve ability to give peer feedback. Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, October 2020.
- What kind of peer feedback activities improve writing ability? Applying the ICAP theory to reveal new empirical patterns. Invited lecture presented the Foreign Languages Training Center, Northeast Normal University, Changchun, China, October 2020.
- Transforming frenemies to collaborators: Automated and peer feedback. Invited *AI Seminar Series* talk. Carnegie Mellon University. Pittsburgh, PA, October 2020.
- Improvement science for first year students. Invited workshop presentation. University of Pittsburgh, Bradford. Bradford, PA, October 2019.
- Stealth assessments & 2 important findings. Keynote presented at the *2019 SEISMIC Summer Meeting*. Ann Arbor, MI, June 2019.
- The role of practical measurement in improvement science. Keynote presented at the *IFL 2019 Leader Summit*. Pittsburgh, PA, June 2019.
- Learning from peer assessment. Keynote presented at the *2019 Conference on Informatization of Foreign Language Education*, Shenzhen, China, May 2019.
- Errors in peer assessment: When do they tend to occur? Invited lecture presented to the Foreign Languages Training Center, Northeast Normal University, Changchun, China, May 2019.
- Cross-cultural perspectives on peer assessment: Investigating MOOC data for variation in feedback content. Invited lecture presented to the Foreign Languages Training Center, Northeast Normal University, Changchun, China, May 2019.

Accountability in peer assessment: what kinds of pressures on students improve peer assessment? Invited lecture presented to the Foreign Languages Training Center, Northeast Normal University, Changchun, China, May 2019.

The importance of multi for writing revision in multi-peer assessment. Invited lecture presented to the Foreign Languages Training Center, Northeast Normal University, Changchun, China, May 2019.

When is peer assessment reliable and valid?—A large scale cross-context study. Invited lecture presented to the School of Foreign Languages, Northeast Normal University, Changchun, China, May 2019.

Integrating mathematics into core high school biology in ways that deepen science & mathematics at scale. Invited talk presented to the Weizmann Institute, Rehovot, Israel, May 2018.

Scientific sensemaking: A critical resource for science learning in school. Invited talk presented to the Educational Testing Service, Princeton, NJ, January 2018.

What kinds of models are most powerful for supporting science learning?: Models that integrate mechanism. Invited talk presented at the *Berkeley Graduate School of Education Fall 2017 Colloquium Series*. Berkeley, CA, November 2017.

Engineering in/and/or for science education. Invited talk given at *National Academy of Science Workshop on Science Investigations and Engineering Design for Grades 6-12*. Washington, DC, November 2017.

Adaptability in individuals. Invited talk given at *National Academy of Engineering Workshop on Preparing the Engineering and Technical Workforce for Adaptability and Resilience to Change*. Washington, DC, November 2017.

Designing effective curricular materials: What actually matters? Invited talk presented at the *Gordon Research Conference: Chemistry Education Research & Practice*. Lewiston, ME, June 2017.

Modeling as an approach for integrating math and science learning. Invited research talk presented to *STEM education research group*, Bahcesehir University. Istanbul, Turkey, June 2017.

Core features of transformative STEM Learning. Invited talk presented at the *BAUSTEM Graduation Ceremony*. Istanbul, Turkey, June 2017.

TASA vision for learning: The power of talk to increase evidence-based learning. Keynote presentation given together with Lauren Resnick at the *TASA 2017 Midwinter Conference*. Austin, TX, January 2017.

How analogies propel team creativity and problem solving. Invited presentation to the *Molecular Biophysics/Structural Biology Seminar Series*, Pittsburgh, January 2017.

Cognitive science principles go to middle school science: How do they work in the real world? *Cognitive science colloquium series* speaker. Villanova, November 2016.

How analogies propel team creativity and problem solving. Invited talk at the *Second Annual RoBUST Symposium - The Science of Team Science*. Wayne State University, October 2016.

A science on inspirational examples in design. Invited talk at the *Congresso Internacional De Investigación en Diseño*, Universidad Nacional de Colombia, Bogota, Colombia, August 2016.

What kinds of models are most powerful for supporting science learning?: Models that integrate mechanism. Invited talk at the *Modeling and Model-Based Reasoning in STEM Conference*, Purdue University, Purdue, IN, August 2016.

Coordinating diverse assessment evidences using digital badges. Invited talk at the *GIFT Symposium*, Princeton, NJ, May 2016.

Social learning via web-based reciprocal peer review. Invited talk at *Learning in Social Contexts*, Pittsburgh, PA, May 2016.

Analogy as the central workhorse for creativity and problem solving in teams. Invited plenary at the *2016 Science of Team Science (SciTS) Conference*, Phoenix, AZ, May 2016.

Analogies in the wilds of engineering creativity. Invited talk at *Engineering a Better Future: Engineering, Social Science and Innovation*, Pittsburgh, PA, April 2016.

Teaching writing in chemistry—Strategies that reduce instructor load and improve learning. Chemistry Colloquium, Dept. of Chemistry, University of Pittsburgh, March 2016.

What kinds of examples inspire creativity? Invited talk, Dept. of English, Jilin University, Changchun, China, November 2015.

Using SWoRD peer review to transform writing instruction. Invited talk, School of Foreign Languages, Northeast Normal University, Changchun, China, November 2015.

What is the most efficient method to score writing?: Computer-based scoring vs. computer-assisted peer scoring. Invited talk, School of Foreign Languages, Northeast Normal University, Changchun, China, November 2015.

The science and art of science paper writing, submission, and publishing. Invited talk, School of Foreign Languages, Northeast Normal University, Changchun, China, November 2015.

How to motivate students' lifelong interest in the sciences? Invited talk, School of Foreign Languages, Northeast Normal University, Changchun, China, November 2015.

Strategic roles of leadership and information systems in adaptive team expertise: A quantitative case study of the mars exploration rover teams. Invited talk presented to the *Networking and Information Technology R&D SEW Group*, Arlington, VA, May 2015.

The power of peer feedback. Keynote talk presented at *Writing in ELA and Mathematics: Setting Students Up for Success*. Baltimore, MD, May 2015.

When (and why) do mathematical representations help students think scientifically? Keynote talk at *Diagrams as Vehicles of Scientific Reasoning*, Pittsburgh, PA, April 2015.

How does the nature of badge content affect badge value to learning? Invited presentation to TiER1 Performance. Covington, KY, March 2015.

Principles of cognitive science: Instructional judo for improved math and science learning. Keynote address presented at the *Math Science Collaborative Network Connections* event, Pittsburgh, PA, February 2015.

The feedback bottleneck problem in CC and NGSS: Can scaffolded student peer review be the savior? Invited presentation to the RAND Psychology Speaker Series, Pittsburgh, PA, November 2014.

When STEM integration improves performance in both science and mathematics: The good, the bad, and the ugly of Mendelian inheritance. Invited colloquium, School of Education, University of Delaware, Newark, DE, November 2014.

Measuring the right things: Where do you want your learners to go? Symposium presentation at the *2014 NSF AISL PI Meeting*. Washington, DC, August 2014.

Spatial mechanisms at play: Thinking and learning with physical robots. Keynote talk presented at the *1<sup>st</sup> Pennsylvania Spatial Cognition Symposium*. State College, PA, May 2014.

The impact of cognitive science principles on middle school science learning: The outcomes of a large randomized control trial study. Invited talk given to the School of Education, University of Tokyo. Tokyo, Japan, November 2013

Bridging Formal and Informal Science Learning through the Concept of Activation. Invited talk given at *Activating Inspiration and Creativity: The Tokyo International Symposium for Informal Learning in Art, Science, and Technology*. Tokyo, Japan, November 2013.

Linguistics research/practice in peer review. Invited talk given to the School of Foreign Languages, Beihang University, Beijing China, August 2013.

Engineering high school biology into the 21st Century. Invited talk presented at *STEMSmart: Lessons Learned from Successful Schools*. Atlanta, GA, June 2013.

The search spaces of adaptive expertise in large team science. Invited talk presented at the *Symposium on Cognitive Systems and Discovery Informatics*. Mountain View, CA, June 2013.

Learning to write in college chemistry labs: How to make peer review work. Invited talk presented at the *Gordon Research Conference: Chemistry Education Research & Practice*. Newport, RI, June 2013.

Psychology of science and engineering. Invited talk presented at the *Art & Science of Science and Technology Forum & Roundtable*. Sandia National Laboratories, Albuquerque, NM, June, 2013

Teaching science with math & engineering in diverse classrooms. Invited talk presented at *STEM Smart: Lessons Learned from Successful Schools*. Baltimore, MA, March, 2013

Optimizing example distance to improve engineering ideation. Invited presentation at *Open Innovation: The Journey from Ideation to Innovation*. Austin, TX, November, 2012

The transfer between formal and informal learning environments in science. Invited plenary presentation at the *Annual Great Lakes Planetarium Association Conference*, Pittsburgh, PA, October, 2012

Science Activation. Invited plenary presentation at the *2012 National Conference on Summer Learning*, Pittsburgh, PA, October, 2012

Optimizing example distance to improve engineering ideation. Invited plenary presentation at the *SciSIP Principal Investigators' Conference*, Washington, DC, September, 2012

Strategic visual support can inspire or hinder teams: What underlies these effects? Invited talk at *International Forum of Visual Practitioners 2012 Conference*, Pittsburgh, July, 2012

Gap-closing benefits from design-based learning and the role of the administrator. Invited talk at *The Cincinnati Engineering Enhanced Math and Science Program (CEEMS) Administrators' Academy*, Cincinnati, OH, July, 2012

Insights from the learning sciences for measuring for innovation in education. Invited talk at the Grantmakers for Education Member Briefing, *A Renaissance of Wonder: Supporting Creativity through Digital Media and Learning*, Pittsburgh, PA, April, 2012

Learning to argue scientifically using computer and web-based peer feedback. Invited talk at the *LTAC Frontier Lecture Series*, Texas A&M University, February, 2012

Obtaining wisdom via scaffolded peer review. Invited talk at the *iSchool Colloquium Series*, University of Pittsburgh, December, 2011

Motivating students in & out of classrooms, Invited talk to the *Faculty Development Series* of the Center for Instructional Development & Distance Education, University of Pittsburgh, October, 2011

Science Learning Activation: A new framework for building gender equity. Invited talk at Ewha Womans University, Seoul, South Korea, April, 2011

On the benefits and pitfalls of analogies for innovative design. Invited talk at Sungkyunkwan University, Department of Interactional Studies, Seoul, South Korea, March, 2011

Design principles for adding game-like features to Robo Math. Invited talk at the *Center for Advanced Technology in Schools (CATS) Workshop For Research on Games and Learning*, Los Angeles, CA, January, 2011

What makes engineering teams succeed? Better consideration of options. Invited talk at the *3rd biennial conference of the International Society for Psychology of Science and Technology*, Berkeley, CA, August, 2010

What does it mean for cognitive psychologists to study groups of scientists at work?: The interplay of cognitive and social processes. Invited talk at the *2<sup>nd</sup> Purdue Symposium on Psychological Sciences*, West Lafayette, IN, June, 2010

Standards in K-12 Tech Literacy and Engineering: Implications for Design and Research. Invited symposium presentation at the *2009 NSF DR-K12 PI Meeting*. Washington, DC, November, 2009

Engineering in/&/or/for science education. Invited talk at the *2009 Carnegie Symposium From Child to Scientist: Mechanisms of Learning and Development*. Pittsburgh, PA, October, 2009

Peer reviewers as effective audience, teacher, and learner. Keynote speaker to the *Fifth Biennial Conference of the European Association for the Teaching of Academic Writing*. Coventry, England, July, 2009

Diving deeper into the black box: Sampling from automated video collection to understand what influences innovation processes. Invited symposium presentation at *Advancing the Study of Innovation and Globalization in Organizations*. Nuremberg, Germany, July, 2009

Learning experiment design and analysis from worked examples. Invited symposium presentation at the *Council of Science Editors 52<sup>nd</sup> Annual Meeting*. Pittsburgh, PA, May, 2009

From tools to innovation: What cognitive processes lie in between? Invited talk at the *Purdue Mechanical Engineering Graduate Seminar*. West Lafayette, IN, December, 2008

Analogies between science and design: What models of science can learn from models of engineering design? Invited talk given at the *Symposium on Computational Approaches to Creativity in Science*. Palo Alto, CA, March, 2008

The science of educational reform: The case of writing in the disciplines. Keynote talk to the *2008 Educational Research Exchange*. Kent, OH, March, 2008

Do universities teach thinking? Invited talk at the *Kent State Learning Communities Series*. Kent, OH, October, 2004

Learning to be a good reviewer through scaffolded classroom-based reciprocal evaluation. Invited mini-session presentation to the *2004 APA Education Leadership Conference*. Washington, DC, September, 2004

Using model-based reasoning in psychology education. Invited plenary panel presentation to the *2004 APA Education Leadership Conference*. Washington, DC, September, 2004

Models of seeing with visualizations. Invited panel presentation at the *Human Systems Integration Symposium*. Newport, RI, May, 2004

Supporting collaborative scientific discovery. Invited talk at the *NASA Information Science HCC review meeting*. Pittsburgh, PA, March, 2003

On the value of fitting models to data. Paper presented at the *Digital Human Modeling for Design and Engineering Conference*. Crystal City, VA, June, 2001

Psychologist in a box: Capturing the skills of the expert scientist using ACT-R. Invited talk given at the *Navy Center for Applied Research in Artificial Intelligence Seminar Series*, Naval Research Lab, October, 2000

Mechanisms of adaptivity: Insights from dogs who can't learn new tricks. Invited talk given to the *Psychology Department Lecture Series*, University of Maryland, College Park, September, 2000

What makes collaborations across a distance succeed?: The case of the Cognitive Science community. Invited talk given to the Psychology Institute, Basel, Switzerland, July, 2000

Now they see the point: Improving science reasoning through making predictions. Invited talk given to the Psychology Institute, Basel, Switzerland, July, 2000

What gestures reveal about the scientist's mind. Invited talk given at the *Krasnow Institute Lecture Series*, Fairfax, VA, November, 1999

Acquiring expertise in science: What, when, and how. Invited talk given to the Psychology Institute, Basel, Switzerland, June, 1998

*Note:* I no longer track regular conference talks, papers, and posters.