Nicole R. Hallinen

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Education

2015 PhD, **Stanford Graduate School of Education**
Learning Sciences & Technology Design
Developmental & Psychological Sciences
Dissertation: *The importance of mathematics and well-chosen examples when preparing students for future learning in simple physics*
Advisor: Daniel Schwartz
Committee: Carl Wieman, Jennifer Langer-Osuna, Shelley Goldman

2009 BS, Psychology, **Carnegie Mellon University**
Honors Thesis: *Creating an online tutor for fractions*
Advisor: Robert Siegler

2009 BA, French & Francophone Studies, **Carnegie Mellon University**
Thesis: *I was playing when I learned: A narrative game for French aspectual distinction*
Advisors: Bonnie Youngs, Christopher Jones
Undergraduate Minor: European Studies

Research Interests

Math & science learning, transfer, human induction, contrasting cases, category learning, generalization, task design, physics education, algebra learning, story problems, games & simulations, number sense

Research Experience

2016 – IES Postdoctoral Fellow, **Temple University**
Advisors: Julie Booth, Nora Newcombe, Elizabeth Gunderson

2009-15 Graduate Research Assistant, **Stanford Graduate School of Education**

2005-09 Undergraduate Research Assistant, **Carnegie Mellon Psychology Department**

2008-09 Human-Computer Interaction Research, **Pittsburgh Science of Learning Center (PSLC)**

2005-09 Design, Programming, & Learning Research, **Carnegie Mellon Online Writing Tutor**

2009 Research Internship on Language Learning Software, **Rosetta Stone, Inc.**

Publications

Journal Publication

Kuo, E., **Hallinen, N.R.**, & Conlin, L.D. (2017). When procedures discourage insight: Epistemological consequences of prompting novice physics students to construct force diagrams. *International Journal of Science Education, 39*(7), 814-839.

Conlin, L.D., Kuo, E., & **Hallinen, N.R.** *(accepted).* The significance of null results in physics education research. *Physical Review: Physics Education Research.*

Manuscripts Under Review

Hallinen, N.R. & Booth, J.L. *(under review)* The story for proportions: Does representation influence problem solving for algebraic proportions?

Hallinen, N.R. *(under review)* Shaping definitions: Nonexamples facilitate explicit learning of defining features in geometry.

Hallinen, N.R. & Schwartz, D.L. *(under review)* How oversimplified materials can undermine the learning and transfer of mathematical thinking in physics problems.

Hallinen, N.R., Sprague, L., Blair, K.P., & Newcombe, N. *(under review)* Inventing a solution buffers against negative transfer.

Manuscripts in Preparation

Hallinen, N.R., Gibbs, T., Booth, J.L. & Newton, K.J. Revisiting the gatekeeper's doorman: Fraction knowledge predicts algebra performance across the middle grades.

Hallinen, N.R. & Booth, J.L. Arithmetic worked examples support transfer to algebra.

Black, C.J., Hildebrand, L.E., **Hallinen, N.R.**, & Gunderson, E.A. More is not always better: High working memory hinders performance on an approximate symbolic calculation task.

Book Chapter

Hayes, J.R., Bajzek, D.M., Brooks, J., Reyes, B., **Hallinen, N.,** & Steinberg, E.R. (2007). Developing an online writing tutor to improve technical-writing skills in engineering and science students. In G. Rijlaarsdam (Series Ed.) and D. Alamargot, P. Terrier, & J.-M. Cellier (Vol Eds.), Studies in Writing, Vol. 21, Written Documents in the Workplace, 107-123.

Refereed Proceedings

Hallinen, N.R. & Booth, J.L. (2018, June). Don't just do it, explain it: A 5th grade worked examples curriculum supports transfer to algebra content. In J. Kay and R. Luckin (Eds.) *Rethinking learning in the digital age: Making the Learning Sciences count: The International Conference of the Learning Sciences (ICLS),* London, UK.

Kaser, T., **Hallinen, N.R.**, & Schwartz, D.L. (2017, March). Modeling exploration strategies to predict student performance within a learning environment and beyond. In *Proceedings of the Seventh International Learning Analytics & Knowledge Conference,* pp. 31-40.

Kuo, E., **Hallinen, N.R.**, & Conlin, L.D. (2015, July). How prompting force diagrams discourages student use of adaptive problem-solving shortcuts. In Churukian, A.D., Jones, D.L., & Ding, L. (Eds.), *2015 Physics Education Research Conference Proceedings,* College Park, MD, July 29-30, 2015, pp. 183-186.

Blair, K., Pfaffman, J., Cutumisu, M., **Hallinen, N.**, & Schwartz, D. (2015, April). Testing the effectiveness of an iPad math game. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems,* pp. 727-734.

Hallinen, N.R., Baldinger, E., & Selling, S.K. (2014, July). The role of examples and nonexamples in defining. In Liljedahl, P., Nicol, C., & Allan, D. (Eds.) In *Proceedings of the 38th Conference of the International Group for the Psychology of Math Education and the 36th Conference of the North American Chapter of the Psychology of Mathematics Education,* Vancouver, Canada, p. 92.

Hallinen, N.R. (2013, November). Supporting inductive learning to reduce overgeneralization. In Martinez, M. & Castro Superfine, A. (Eds.), *Proceedings of the 35th Annual Meeting of the North American Chapter of the International Group for the Psychology of Math Education,* Chicago, IL, pp. 276-279.

Conlin, L., **Hallinen, N.R.**, & Schwartz, D.L. (2014, June). Supporting middle schoolers' use of inquiry strategies for discovering multivariate relations in interactive physics simulations. In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.). *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS),* Boulder, CO, pp. 31-37.

Hallinen, N.R., Blair, K.P., Chin, D.B., & Schwartz, D.L. (2014, June). Using contrasting cases for generation and instruction. In I. Glogger (Symposium Chair), *Combining generation and direct instruction to prepare students to transfer big ideas across school topics.* In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.). *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS),* Boulder, CO, pp. 1179-1188.

Hallinen, N.R., Cheng, J., Chi, M., & Schwartz, D.L. (2014, June). Tug of War – What is it good for? Measuring student inquiry choices in an online science game. In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.). *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS),* Boulder, CO, pp. 1645-1646.

Hallinen, N., Walker, E., Wylie, R., Ogan, A., & Jones, C. (2009, July). I was playing when I learned: A narrative game for French aspectual distinctions. *Proceedings of Workshop on Intelligent Educational Games, 14th International Conference on Artificial Intelligence in Education.* Brighton, UK, pp. 117-120.

Conference Presentations and Posters

Sprague, L.N., **Hallinen, N.R.**, Blair, K.P., & Newcombe, N.S. (2019, June). Inducing a mathematical formula buffers against overgeneralization. Poster session to be presented at the *Mathematical Cognition and Learning Society*, Ottawa, ON.

Ham, L., **Hallinen, N.R.**, & Gunderson, E.A. (2017, October). The influence of narrative context on children's proportional reasoning performance. Poster session presented at the *Cognitive Development Society*, Portland, OR.

Hallinen, N.R. & Booth, J.L. (2017, October). More to the story: Students' performance on equations and story problems involving algebraic proportions. Poster session presented at the *Cognitive Development Society*, Portland, OR.

Hallinen, N.R. & Schwartz, D.L. (2017, July). Choosing the right examples: How contrasting cases can affect learning and future learning. In **N.R. Hallinen** (Chair) *Contrasting cases and invention activities in PER: Grounding students' understanding of conceptual and mathematical relations in physical contexts.* Symposium conducted at the Physics Education Research Conference, Cincinnati, OH.

Hallinen, N.R., Newcombe, N.S., & Dziembowski, Z. (2017, July). Constraining mathematically-correct answers to physically-appropriate solutions: The role of sketching and problem-solving frameworks. In N.G. Holmes (Chair) *Math for making sense or math for making answers?* Symposium conducted at the Physics Education Research Conference, Cincinnati, OH.

Black, C., **Hallinen, N.R.**, & Gunderson, E.A. (2017, April). High working memory hinders initial performance on approximate symbolic calculation, but practice leads to a strategy shift. Poster session presented at the *Society for Research in Child Development*, Austin, TX.

Hamdan, N., Ham, L., **Hallinen, N.R.**, & Gunderson, E.A. (2017, April). Linear measurement skill mediates the relation between mental transformation and number line estimation in young children. Poster session presented at the *Society for Research in Child Development*, Austin, TX.

Hallinen, N.R. & Booth, J.L. (2016, December). Does solving for X help you solve in context? Investigating component skills that contribute to word problem solving performance in algebra. Poster session presented at the *IES PI Meeting*, Washington, DC.

Hallinen, N.R. & Schwartz, D.L. (2016, November). Knowing When It No Longer Works: One benefit of inducing a solution. Poster session presented at the *Annual Meeting of the Psychonomic Society*, Boston, MA.

Hallinen, N.R., Newcombe, N.S., & Dziembowski, Z. (2016, July). Drawing attention: Do sketching and problem-solving frameworks support student thinking? Poster session presented at the *Physics Education Research Conference*, Sacramento, CA.

Hallinen, N.R. (2016, April). Examples and mathematics: How to design physics materials for learning and transfer. Invited poster session presented at the 2016 *Annual Meeting of the American Educational Research Association*, Washington, DC.

Hallinen, N.R., Blair, K.P., Tsang, J.M., & Schwartz, D.L. (2013, May). I have a hammer. Is that a nail? Inducing mathematical structure to reduce negative transfer. *Annual Meeting of the American Educational Research Association*, San Francisco, CA.

Blair, K.P., Tsang, J. T., **Hallinen, N.**, Rosenberg-Lee, M., Menon, V., & Schwartz, D. L. (2013, May). Extending natural number understanding to the integers: Cross-disciplinary research in education, neuroscience, and cognitive science. *Annual Meeting of the American Educational Research Association*, San Francisco, CA.

Hallinen, N.R., Chi, M., Chin, D.B., Prempeh, J., Blair, K.P. & Schwartz, D.L. (2012, August). Applying cognitive developmental psychology to middle school physics learning: The rule assessment method. *Proceedings of the Physics Education Research Conference,* Philadelphia, PA.

Chi, M., Chin, D.B., **Hallinen, N.R.**, & Schwartz, D.L. (2012, August). A comparison of two instructional models using contrasting cases. Poster session presented at the *Physics Education Research Conference*, Philadelphia, PA.

Hallinen, N., Semmens, R., Dohmen, I., Chin, D.B., & Chase, C. (2012, April). Express yourself: Math learning in the context of communication. Poster session presented at the *Annual Meeting of the American Educational Research Association*. Vancouver, Canada.

Dohmen, I.M., **Hallinen, N.R.**, Schwartz, D.L., Chase, C.C., Chin, D.B., Semmens, R., & Shemwell, J.T. (2011, March). Communicating through math and measurement. Poster session presented at the *Annual inter-Science of Learning Conference*, Washington, DC.

Hallinen, N.R. (2010, December). Does negative integer instruction transfer to negative rational numbers? Poster session presented at *Stanford Psychological Studies in Education Student Poster Session*, Stanford, CA.

Hallinen, N.R. (2008, November). Effective, interesting, useful? An evaluation of the Carnegie Mellon Online Writing Tutor. *Association for the Advancement of Computer Education (AACE) E-Learn World Conference on E-Learning*, Las Vegas, NV.

Awards & Fellowships

Cisco Systems Stanford Graduate Fellowship (SGF) *3 years of graduate tuition support and stipend*	
Gretchen Goldsmith Lankford Teaching Award	$2,500
Andrew Carnegie Society Scholar	$2,000
CMU Undergraduate Presentation Travel Award	$250
CMU Small Undergraduate Research Grants	$300, $370
Vira I. Heinz Scholarship for Global Leadership	$5,000

Teaching Experience

Temple University College of Education
2016 Guest Lecturer on Learning & Transfer: Learning Theories

San Jose State University Laurie College of Education
2015, 2013 Instructor: Research Methods in Child Development

Stanford University Graduate School of Education
2015, 2014 Teaching Assistant: Core Mechanics for Learning
2015 Guest Lecturer on Inventing Activities: Curriculum & Instruction in Mathematics
2012 Teaching Assistant: Induction, Proof, Discovery, & Statistics

Carnegie Mellon University Dietrich College of Humanities and Social Sciences
2009 Teaching Assistant: Introduction to Psychology
2009, 2008 Writing Assistant: Intermediate French II

Invited Presentation

2016 Temple University Educational Research Seminar:
"Instructional backfires: The risks of over-scaffolded math and science learning materials"

Academic Service

Ad-hoc Reviewer

Cognitive Processing
Cognitive Research: Principles and Implications
Journal of Experimental Education
Journal of Experimental Psychology: Applied
Journal of Mathematical Behavior
Journal of Research on Educational Effectiveness
Mathematical Thinking and Learning
Physical Review: Physics Education Research

Conference Reviewer or Session Chair

American Educational Research Association
Cognitive Development Society
Psychology of Math Education
Physics Education Research Conference

Mentorship and Outreach

Presenter, Franklin Institute Science After Dark
Temple Undergraduate Research Mentor (8+ research assistants)
Consultant and mentor, Nomster Chef (Ashley Moulton, Stanford LDT MA student)
Stanford Pre-Education Society Mentor (undergraduates & LDT MA students)
Stanford Graduate Life Community Advisor & Head Community Advisor
CMU Resident Advisor
Sexual Assault Advisor
Safezone Trained LGBTQ Ally

Committee Membership

Student representative: Stanford GSE Behavioral Neuroscience Faculty Search Committee
Student representative: CMU Global Education Working Group
CMU Science and Humanities Scholars Student Advisory Council
CMU Modern Languages Student Advisory Council

Additional Experience with K-12 Students

Senior Class Program Director, Minds Matter of Philadelphia
Child Life Volunteer, Children's Hospital of Pittsburgh
English as a Second Language and French Classroom Tutor, Allderdice High School
Assistant Teacher, 4 year-old class, CMU Children's School (Psychology Dept. Lab School)
Summer Camp Counselor, 7-9 year-olds, Chatham College Music & Arts Day Camp

Membership in Professional Societies

American Association of Physics Teachers
American Educational Research Association
Cognitive Development Society
International Society of the Learning Sciences

Psychology of Math Education (PME) – North America Chapter
Phi Beta Kappa Society
Psi Chi Psychology Honor Society