Andrew F. Heckler  
Department of Physics, Ohio State University  
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Professional preparation
Ohio State University  Cosmology/Astrophysics  Post-doc 1996-99  
Fermi National Accelerator Lab  Cosmology/Astrophysics  Post-doc 1994-96  
University of Washington  Physics  Ph.D., 1994  
Peace Corps, Gabon, Africa  H.S. Science Teacher  1986-88  
Ohio State University  Physics  B.S., 1986

Appointments
Assistant Dean, College of Mathematical and Physical Sciences, Ohio State Univ. 1998-2005.  
Assistant Professor, Department of Physics, Ohio State University. 2005-2011.  
Associate Professor, Department of Physics, Ohio State University. 2011-2017.  
Professor, Department of Physics, Ohio State University. 2017-present.

Grant Funding
Current:
“Math Practice for Physics: Building Math Fluency in an Introductory Undergraduate Physics Context”,  
PI: A. Heckler, Co-PIs: B. Burrola Gabilondo, D. Meltzer. NSF IUSE award 10/2019-9/2022, $473,281.  

“NRT-IGE: Enhancing Learning and Retention in Graduate Physics”, PI: A. Heckler, Co-PI: C. Porter, J. Pelz, A. Kalish, C. Hirata. NSF NRT-IGE award 9/2017-8/2020, $496,571.  

Previous:
“Center for Emergent Materials”, P.I.: C. Hammel. Funded by NSF MRSEC program. I am director of the Education and Human Resources Development, including a research program to improve learning in Materials-related topics. The portion for EHRD is approx. $1.8M.  11/1/2014-8/31/2020, $17,900,000.  

“Investigating and Improving Synthesis Problem Solving Skills in Introductory Physics Via Analogical Reasoning”, PI: L. Ding, Co-PI: A. Heckler, R. Catrambone. NSF REESE award, 10/2013-9/2017, $943,013  

“Essentials Skills Practice for Introductory Physics Students”, PI: A. Heckler. OSU Office of Distance Education and eLearning Departmental Impact Grant, 1/1/2015-12/31/2016, $22,500.  

“GeoGames - online map games for teaching and learning through a real-world spatial perspective”, PI: O. Ahlqvist, Co-PI, A. Heckler, R. Ramnath. NSF Cyberlearning award, 10/2013-9/2015, $459,154.  

“Materials Science as content integrator in the Physical Science Classroom”, PI: G. Daehn, Co-PI: A. Heckler, I am a developer and facilitator of this teacher prof. dev. program. Ohio Dept of Education, 6/2013-6-2016, $397,854.  

“Scientific Misconceptions: From Cognitive Underpinnings to Educational Treatment”  
PI: A. Heckler; Co-PI: V. Sloutsky. Funded by the Institute of Education Sciences, U.S. Department of Education. 9/1/2005-8/31/2010, $933,397.  

“Modeling instruction for Physical Science in Ohio”, PI: A. Heckler; Co-PI: K. Harper. Funded by Ohio Board of Regents Grant for Improving Teacher Quality. (2004-2006) $114,790. Renewal: PI: K. Harper; Co PI: A. Heckler (2006-2009), $363,756.
Service
1) Chair line (vice, elect, chair, past) (elected position) Topical Group on Physics Education Research of the American Physical Society, 2018-2021.
2) Member, Education Policy Committee, appointed by American Physical Society’s Committee on Education, 2018-2021.
3) Research Fellow, Ohio State University Institute for Teaching and Learning, 2017-present.
4) Member (elected position), Executive Committee of the American Physical Society’s Forum on Education, 2015-2018.
5) Institute of Education Sciences (IES) proposal review panel member, 2008-2011, 2017-2018.
6) Chair, Board member OH-PKAL (Ohio Project Kaleidoscope regional network), 2015-2018.
7) College Board Advanced Placement Physics C Development Committee Member 2012-2017.
8) Editorial Board Member, Physics Review Special Topics: Physics Education Research. 2012-2015.
9) Chair, AAPT Research in Physics Education Committee. 2010-2011.
10) Natural Sciences Panel member, Ohio Board of Regents articulation and transfer program, 2005-present
11) Board Member, Communities in Schools of Central Ohio, 2005-2014.

Awards
1) Fellow of the American Physical Society, 2021
2) University Distinguished Teaching Award, Ohio State University, 2018
3) Outstanding Referee Award, American Physical Society, 2016
4) Outstanding Teaching Award, Physics Department, Ohio State University, 2016

Publications in Peer-reviewed Journals

**Education and Cognition Research**
1) Kryjevskaia, M., Heron, P.R.L., & Heckler, A.F. (2021). Intuitive or rational? Students and experts need to be both, *Physics Today* 74, 28-34.
2) Nieberding, M., & Heckler, A. F. (2021). Patterns in assignment submission times: Procrastination, gender, grades, and grade components. *Physical Review Physics Education Research*, 17(1), 013106.
3) Kim, Y., Yu, S. L., Koenka, A. C., Lee, H. W., & Heckler, A. F. (2021). Can self-efficacy and task values buffer perceived costs? Exploring introductory- and upper-level physics courses. *The Journal of Experimental Education*. Advance online publication.
4) Porter, C. D, & Heckler, A.F. (2020). Effectiveness of guided group work in graduate level quantum mechanics. *Physical Review Physics Education Research*, 16(2), 020127.
5) Simmons, A.B. & Heckler A.F. (2020). Grades, grade component weighting, and demographic disparities in introductory physics. *Physical Review Physics Education Research*, 16(2), 020125.
6) Porter, C. D, & Heckler, A.F. (2019). Graduate student misunderstandings of wave functions in an asymmetric well. *Physical Review Physics Education Research*, 15(1), 010139.
7) Heckler, A.F., & Bogdan, A.M. (2018). Reasoning with alternative explanations in physics: The cognitive accessibility rule. *Physical Review Physics Education Research*, 14(1), 010120.
8) Amos, N., & Heckler, A.F. (2018). Mediating relationship of differential products in understanding integration in introductory physics. *Physical Review Physics Education Research*, 14(1), 010105.
9) Young, N.T., & Heckler, A.F. (2018). Observed hierarchy of student proficiency with period, frequency, and angular frequency. *Physical Review Physics Education Research*, 14(1), 010104.
10) Ibrahim, B., Ding, L., Heckler, A.F., White, D.R., Badeau, R. (2017). How students process equations in solving quantitative synthesis problems? Role of mathematical complexity in students' mathematical performance. *Physical Review Physics Education Research*, 13(1), 020120.
11) Badeau, R., White, D.R., Ibrahim, B., Ding, L., Heckler, A.F. (2017). What works with worked examples: Extending self-explanation and analogical comparison to synthesis problems. *Physical Review Physics Education Research*, 13(2), 020112.
12) Ibrahim, B., Ding, L., Heckler, A.F., White, D.R., Badeau, R. (2017). Students’ conceptual performance on synthesis physics problems with varying mathematical complexity. *Physical Review Physics Education Research, 13*(1), 010133.

13) Mikula, B. D., & Heckler, A. F. (2017). Framework and implementation for improving physics essential skills via computer-based practice: Vector math. *Physical Review Physics Education Research, 13*(1), 010122.

14) Heckler, A.F., & Mikula, B. D. (2016) Factors Affecting Learning of Vector Math from Computer-Based Practice: Feedback Complexity and Prior Knowledge. *Physical Review Physics Education Research, 12*, 010134.

15) Heckler, A. F., & Scaife, T. M. (2016) Patterns of Response Times and Response Choices to Science Questions: The Influence of Relative Processing Time. *Cognitive Science, 39*, 496-537.

16) Heckler, A. F., & Scaife, T. M. (2015). Adding and subtracting vectors: The problem with the arrow representation. *Physical Review Special Topics—Physics Education Research, 11*, 010101.

17) Kaminski, J. A., Sloutsky, V. M., & Heckler, A. F. (2013). The cost of concreteness: The effect of nonessential information on analogical transfer. *Journal of Experimental Psychology: Applied*, 19 (1), 14-29.

18) Rosenblatt, R., Heckler, A. F., & Flores, K. (2013). A tutorial design process applied to an introductory materials engineering course. *Advances in Engineering Education, 3*(3-02), 1-38.

19) Rosenblatt, R., & Heckler, A. F. (2011). Systematic study of student understanding of the relationships between the directions of force, velocity, and acceleration in one dimension. *Physical Review Special Topics—Physics Education Research, 7*, 020112.

20) Scaife, T. M., & Heckler, A. F. (2011). Interference between electric and magnetic concepts in introductory physics, *Physical Review Special Topics—Physics Education Research, 7*, 010104.

21) Heckler, A. F., & E. C. Sayre (2010). What happens between pre- and post-tests: multiple measurements of student understanding during an introductory physics course, *American Journal of Physics, 78*, 768-777.

22) Scaife, T. M., & Heckler, A. F. (2010). Student understanding of the direction of the magnetic force on a charged particle, *American Journal of Physics, 78*, 869-876.

23) Heckler, A. F. (2010). Some consequences of prompting novice students to construct force diagrams, *International Journal of Science Education, 32*, 1829-1851.

24) Sayre, E. C., & Heckler, A. F. (2009). Peaks and decays of student knowledge in an introductory E&M course. *Physical Review Special Topics—Physics Education Research, 5*, 013101.

25) Kaminski, J. A., Sloutsky, V. M., & Heckler, A. F. (2009). Transfer of Mathematical Knowledge: The Portability of Generic Instantiations, *Child Development Perspectives, 3*, 151-155.

26) Kaminski, J. A., Sloutsky, V. M., & Heckler, A. F. (2009). Concrete Instantiations of Mathematics: A Double-Edged Sword, *Journal for Research in Mathematics Education, 40*, 90-93.

27) Kaminski, J. A., Sloutsky, V. M., & Heckler, A. F. (2008). The Advantage of Learning Abstract Examples in Learning Math *Science, 320*, 454-455.

28) Sloutsky, V. M., Kaminski, J. A., & Heckler, A. F. (2005). The advantage of simple symbols for learning and transfer, *Psychonomic Bulletin & Review 12* (3), 508-513.

**Astrophysics and Cosmology**

1) R. Lopez, S. Dodelson, A. F. Heckler, and M.S. Turner, Precision detection of the cosmic neutrino background, *Physical Review Letters* 82, 3952 (1999)

2) A. F. Heckler, Formation of a Hawking-radiation photosphere around microscopic black holes *Physical Review D55*, 480 (1997)

3) A. F. Heckler, Calculation of the emergent spectrum and observation of primordial black holes *Physical Review Letters, 78*, 3430 (1997)

4) M. Gleiser, A. F. Heckler, and E.W. Kolb, Modeling thermal fluctuations: Phase mixing and percolation, *Physics Letters B, 405*, 121 (1997)
5) M. Gleiser and A. F. Heckler, Non-perturbative effects on nucleation, *Physical Review Letters* 76, 180 (1996).
6) A. F. Heckler and E.W. Kolb, Searching for stellar mass black holes in the solar neighborhood, *Astrophysical Journal Letters* 472, L85 (1996).
7) A. F. Heckler, The effects of electro-weak phase transition dynamics on baryogenesis and primordial nucleosynthesis, *Physical Review* D51, 405 (1995).
8) A. F. Heckler, Astrophysical applications of quantum corrections to the equation of state of a plasma, *Physical Review* D49, 611 (1994).
9) A. F. Heckler and C.J. Hogan, Neutrino heat conduction and inhomogeneities in the early universe, *Physical Review* D47, 4256 (1993).

**Book Chapters**

1) Halasek, K., Heckler, A.F., Rhodes-DiSalvo, M. (2020). Transforming the Teaching of Thousands: Promoting Evidence-based Practices at Scale. In *Transforming Institutions: Accelerating Systemic Change in Higher Education*. White, K., Beach, A., Finkelstein, N., Henderson, C., Simkins, S., Slakey, L., Stains, M., Weaver, G., & Whitehead, L. (Eds.). Pressbooks.

2) Heckler, A. F. (2011). The Ubiquitous Patterns of Incorrect Answers to Science Questions: The Role of Automatic, Bottom-Up Processes. In J. P. Mestre and B. H. Ross (Eds.): *Psychology of Learning and Motivation: Cognition In Education*, Vol 55 (pp. 227-268), Oxford: Academic Press.

**Publications in Peer-Reviewed Conference Proceedings**

1) Rosenblatt, R. and Heckler, A. F. (2017). The Development Process for a New Materials Science Conceptual Evaluation, *2017 IEEE Frontiers in Education Conference (FIE)*, Indianapolis, IN, 2017, pp. 1-9, doi: 10.1109/FIE.2017.8190456.
2) Porter, C. D., Bogdan, A. M., and Heckler, A. F. (2017), Prelecture Questions and Conceptual Testing in Undergraduate Condensed Matter Courses, 2017 PERC Proceedings [Cincinnati, OH, July 26-27, 2017], edited by L. Ding, A. Traxler, and Y. Cao, doi:10.1119/perc.2017.pr.075.
3) Koenka, A. C., Yu, S. L., Kim, Y., Lafranconi, H., & Heckler, A. F. (2017, April). What predicts success in undergraduate physics? The importance of belonging and the complexity of cost. Paper presented at the Annual Meeting of the American Educational Research Association. San Antonio, Texas.
4) Porter, C. D., Bogdan, A. M., and Heckler, A. F. (2016), Student understanding of potential, wavefunctions and the Jacobian in hydrogen in graduate-level quantum mechanics, *2016 PERC Proceedings* [Sacramento, CA, July 20-21, 2016], edited by D. L. Jones, L. Ding, and A. Traxler, doi:10.1119/perc.2016.pr.056.
5) Ibrahim, B., Ding, L., White, D. R., Badeau, R., and Heckler, A. F. (2016), Synthesis problems: role of mathematical complexity in students' problem solving strategies, *2016 PERC Proceedings* [Sacramento, CA, July 20-21, 2016], edited by D. L. Jones, L. Ding, and A. Traxler, doi:10.1119/perc.2016.pr.037.
6) Amos, N.R. and Heckler, A. F. (2015), Student Understanding of Differentials in Introductory Physics, *2015 PERC Proceedings* [College Park, MD, July 30-31, 2015], edited by A. D. Churukian, D. L. Jones and L. Ding.
7) Badeau, R., White, D. R., Ibrahim, B., Heckler, A. F. and Ding, L. (2015), Applying Analogical Reasoning to Introductory-level synthesis problems, *2015 PERC Proceedings* [College Park, MD, July 30-31, 2015], edited by A. D. Churukian, D. L. Jones and L. Ding.
8) White, D. R., Badeau, R., Heckler, A. F. and Ding, L. (2014), Bottlenecks In Solving Synthesis Problems, *2014 PERC Proceedings* [Minneapolis, MS, July 30-31, 2014], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.
9) Badeau, R. and Heckler, A. F. (2014), Design and Evaluation of a Natural Language Tutor for Force and Motion, *2014 PERC Proceedings* [Minneapolis, MS, July 30-31, 2014], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.
10) Amos, N.R. and Heckler, A. F. (2014), Spatial Reasoning Ability And The Construction Of Integrals In Physics, 2014 PERC Proceedings [Minneapolis, MS, July 30-31, 2014], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.

11) Bogdan, A. M. and Heckler, A. F. (2013), Effects of Belief Bias on Student Reasoning from Data Tables, 2013 PERC Proceedings [Portland, OR, July 17-18, 2013], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.

12) Mikula, B. D. and Heckler, A. F. (2013), Student Difficulties with Trigonometric Vector Components Persist in Multiple Student Populations, 2013 PERC Proceedings [Portland, OR, July 17-18, 2013], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.

13) White, D. R. and Heckler, A. F. (2013). Effects of Training Examples on Student Understanding of Force and Motion, 2013 PERC Proceedings [Portland, OR, July 17-18, 2013], edited by P. V. Engelhardt, A. D. Churukian, and D. L. Jones.

14) Heckler, A. F., Mikula, B., & Rosenblatt, R. (2013). Student accuracy in reading logarithmic plots: the problem and how to fix it. 2013 IEEE Frontiers in Education Conference Proceedings, 1066-1071.

15) Mikula, B. D., & Heckler, A. F. (2013). The effectiveness of brief, spaced practice on student difficulties with basic and essential engineering skills. 2013 IEEE Frontiers in Education Conference Proceedings, 1059-1065.

16) Scaife, T. M., & Heckler, A. F. (2012). The Dependence of Instructional Outcomes on Individual Differences: An Example from DC Circuits. Proceedings of 2012 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

17) Heckler, A. F., & Rosenblatt, R. (2011). Student Difficulties with Basic Concepts in Introductory Materials Science Engineering. 41st ASEE/IEEE Frontiers in Education Conference Proceedings, S2H-1-6.

18) Rosenblatt, R., Heckler, A. F., & Flores, K. (2011). Group-Work Tutorials for an Introductory Materials Engineering Course. 41st ASEE/IEEE Frontiers in Education Conference Proceedings, S2H-7-12.

19) Heckler, A. F., Scaife, T. M., & Sayre, E. C. (2010). Response Times and Misconception-like Responses to Science Questions. In S. OhiIson & R. Catrambone (Eds.), Proceedings of the 32nd Annual Conference of the Cognitive Science Society (pp. 139-144). Austin, TX: Cognitive Science Society.

20) Heckler, A. F. (2010). Concrete vs. Abstract Problem Formats: A Disadvantage of Prior Knowledge. Learning in the Disciplines: Proceedings of the 9th International Conference of the Learning Sciences (ICLS 2010), Vol. 1, 365-371. International Society of the Learning Sciences: Chicago, IL.

21) Heckler, A. F., & Rosenblatt, R. (2010). Student Understanding of atomic bonds and their relation to mechanical properties of metals in an introductory materials science engineering course. Proceedings of the Annual Conference of the American Society of Engineering Education, Louisville, KY.

22) Rosenblatt, R., & Heckler, A. F. (2010). Student Understanding of the mechanical properties of metals in an introductory materials science engineering course. Proceedings of the Annual Conference of the American Society of Engineering Education, Louisville, KY.

23) Ding, L., Reay, N. W., Heckler, A. F., & Bao, L. (2010). Sustained Effects of Solving Conceptually Scaffolded Synthesis Problems, 133-136, Proceedings of 2010 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

24) Rosenblatt, R., E.C. Sayre, & Heckler, A. F. (2009). Modeling students’ conceptual understanding of force, velocity and acceleration. Proceedings of 2009 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

25) Heckler, A. F., Kaminski, J. A., & Sloutsky, V. M. (2008). Learning Associations That Run Counter to Biases in Learning: Overcoming Overshadowing and Learned Inattention. Proceedings of the XXX Annual Conference of the Cognitive Science Society, 511-516. Austin, TX: Cognitive Science Society.
26) Kaminski, J. A., Heckler, A. F., & Sloutsky, V. M. (2008). Blocking effects on dimensions: How attentional focus on values can spill over to the dimension level. Proceedings of the XXX Annual Conference of the Cognitive Science Society, 1075-1080. Austin, TX: Cognitive Science Society.

27) E.C. Sayre, & Heckler, A. F. (2008). Evolution of student knowledge in a traditional introductory physics classroom. Proceedings of 2008 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

28) Rosenblatt, R., E.C. Sayre, & Heckler, A. F. (2008). Toward a comprehensive picture of student understanding of force, velocity and acceleration. Proceedings of 2008 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

29) Scaife, T. M., & Heckler, A. F. (2007). The Effect of Field Representation on Student Responses to Magnetic Field Questions. Proceedings of 2007 Physics Education Research Conference. Melville, New York: AIP Conference Proceedings.

30) Kaminski, J. A., Sloutsky, V. M. & Heckler, A. F., (2007). The Effects of Learning Multiple Instantiations on Transfer. Proceedings of the XXIX Annual Conference of the Cognitive Science Society, 1581-1585. Mahwah, NJ: Erlbaum.

31) Heckler, A. F., Kaminski, J. A., & Sloutsky, V. M. (2006). Differential Cue Salience, Blocking and Learned Inattention. Proceedings of the XXVIII Annual Conference of the Cognitive Science Society, 1167-1172. Mahwah, NJ: Erlbaum.

32) Kaminski, J. A., Sloutsky, V. M. & Heckler, A. F., (2006). Effects of Concreteness on Representation: An Explanation for Differential Transfer. Proceedings of the XXVIII Annual Conference of the Cognitive Science Society, 1167-1172. Mahwah, NJ: Erlbaum.

33) Kaminski, J. A., Sloutsky, V. M. & Heckler, A. F., (2006). Do Children Need Concrete Instantiations to Learn an Abstract Concept? Proceedings of the XXVIII Annual Conference of the Cognitive Science Society, 1167-1172. Mahwah, NJ: Erlbaum.

34) Kaminski, J. A., Sloutsky, V. M. & Heckler, A. F., (2005). Relevant concreteness and its effects on learning and transfer. Proceedings of the XXVII Annual Conference of the Cognitive Science Society, 1167-1172. Mahwah, NJ: Erlbaum.

35) Sloutsky, V. M., Kaminski, J. A., and Heckler, A. F. (2004) Transfer of learning between isomorphic artificial domains: Advantage for the abstract. Proceedings of the XXVI Annual Conference of the Cognitive Science Society, 1167-1172. Mahwah, NJ: Erlbaum.

Invited and Peer-reviewed Presentations (Education and Cognition Research)
1) “Two elephants in the room: traditional testing and curving”, PER seminar, University of Illinois Urbana Champaign, May 2021.

2) “Fairness, Equity, and Values in Grades and Grading”, Invited Keynote AAPT Western PA Annual meeting (Virtual), April 2021.

3) “Fairness, Equity, and Values in Grades and Grading”, Physics Department Colloquium, Ohio State University, January 2021.

4) “Dual process model of reasoning: Navigating a Terrain” Invited Session, Winter Conference of the American Association of Physics Teachers. January 2021.

5) “Consistency and Fairness in Introductory Physics Course Grades” Invited Session, Winter Conference of the American Association of Physics Teachers. January 2021.

6) “What do grades tell us about students, instructors, and programs?” PER Seminar, University of Washington Bothell, December 2020

7) “Consistency and Fairness in Introductory Physics Course Grades” PER Seminar, University of Colorado Boulder, November 2020

8) “What do grades tell us about students, instructors, and programs?” Invited Session, Summer Conference of the American Association of Physics Teachers, July 2020.

9) “Highlights from studies on student learning, reasoning, and understanding in Physics”, Physics Department Colloquium, Ohio University, September 2019.
10) “Building up to complexity: Synthesizing multiple concepts to solve problems”, Invited Session, Annual Physics Education Research Conference, Provo UT, July 2019.
11) “Why is scientific reasoning so hard, and what can we do about it?” Invited Session, American Physical Society April Meeting, Denver, CO. April 2019.
12) “What basic skills should introductory physics students have?”, Invited Session, Winter Conference of the American Association of Physics Teachers, Houston, TX. January 2019.
13) “Improving Fluency in STEM Essential Skills through Brief, Spaced Practice”, AAC&U 2018 Transforming STEM Higher Education Conference, Atlanta GA. November 2018.
14) “Why is scientific reasoning so hard, and what can we do about it?” Conference at the Interface of Discipline-Based Education Research in STEM and Psychological Science, Washington University, St. Louis, MO. September 2018.
15) “Is practicing Essential Skills Essential?”, Invited Session, Winter Conference of the American Association of Physics Teachers, San Diego, CA. January 2018.
16) “Why is scientific reasoning so hard, and what can we do about it?” Physics Department Colloquium, University of Washington, November 2017.
17) “Improving STEM Essential Skills through Brief, Spaced Practice”, Lilly Conference, Miami University, November 2017.
18) “The cognitive contours that influence science reasoning, and how to navigate them”, PER Seminar, Purdue University, September 2017.
19) “Dear Common Sense: Can we talk? I am trying to learning science”, Invited Conference talk, Research in Science Education Annual Conference, University of Maine, June 2016.
20) “A great method for creating questions for class, homeworks, and tests: Dissecting science concepts into dimensions.” Invited Workshop, Research in Science Education Annual Conference, University of Maine, June 2016.
21) “Improving learning in an Introductory Materials Science Engineering Course”, Invited Conference Talk, Materials Week, Ohio State University, May, 2016.
22) “Improving STEM instruction: Examples of how Discipline-Based Education Research can help” Invited Keynote for Workshop: Developing and Sharing Best Practices: From Concept to Classroom, American Society for Biochemistry and Molecular Biology. Otterbein University, February 2016.
23) “Measuring physics understanding on times scales from milliseconds to months”, Invited Conference Talk, APS Mid-Atlantic Section Meeting, Morgantown, WV, October 2015.
24) “Are spatial diagrams best for STEM tasks involving spatial reasoning?” Invited Conference talk, Integrating Cognitive Science with Innovative Teaching in STEM Disciplines: Spatial Learning in STEM, Northwestern University. September, 2015.
25) “The contours that influence physics reasoning”, Invited Session, Summer Conference of the American Association of Physics Teachers, Baltimore, MD. July 2015.
26) “Measuring physics understanding on times scales from milliseconds to months”, PER Seminar, Michigan State University, April 2015.
27) “Improving skills through brief, spaced practice”, The 6th North American Materials Education Symposium, 2015 Columbus, OH, March 2015.
28) “The contours that influence reasoning”, PER Seminar, Stanford University, February 2015.
29) “The contours that influence reasoning”, Invited Session, Winter Conference of the American Association of Physics Teachers, San Diego, CA. January 2015.
30) “Measuring physics understanding on times scales from milliseconds to months”, PER Seminar, Purdue University, April 2014.
31) “Which is better: fast and “thoughtless”, or slow and reasoned?”, PER Seminar, Illinois State University, April 2014.
32) “The study of student responses to questions: assumptions and inferences” Invited Session, Winter Conference of the American Association of Physics Teachers, New Orleans, LA. January 2013.
33) “Which is better: fast and “thoughtless”, or slow and reasoned?”, Research in Science Education Annual Conference, invited talk, University of Maine, June 2012.
34) “A method for constructing good questions for use in class, homework and tests: the dissection of a scientific concept into its relevant and irrelevant dimensions” Research in Science Education Bi-Annual Conference, Invited workshop, June 2012.
35) “Measuring Physics Learning on Times Scales from Milliseconds to Months”, Physics Department Colloquium, Ohio State University, November 2011.
36) “The dynamics of learning and performance: student performance from milliseconds to months”, Didactics Group Seminar, ETH Zurich, Switzerland July 2011.
37) “What causes the patterns in students’ incorrect answers to physics questions?” Invited session, American Physical Society Conference, Garden Grove, CA. April 2011.
38) Response Times and Misconception-like Responses to Science Questions”. Paper presented at 32nd Annual Conference of the Cognitive Science Society, Portland, OR, August 2010.
39) “Concrete vs. Abstract Problem Formats: A Disadvantage of Prior Knowledge.” International Society of the Learning Sciences, International Conference, Chicago, IL, June 2010.
40) “What causes the patterns in students’ incorrect answers to physics questions?” Physics Department Colloquium, University of Maine, April 2010.
41) “Implicit Learning and Learning Scientific Concepts”, Invited Session, Winter Conference of the American Association of Physics Teachers, Washington DC. February 2010.
42) “Concrete vs. Abstract: is a little knowledge a bad thing?”, Physics Department Colloquium, Indiana University-Purdue University Indianapolis, Oct 2009.
43) “What happens to student performance between the pre and post-test?” Invited Session, Summer Conference of the American Association of Physics Teachers, Ann Arbor, MI. July 2009.
44) “Understanding fundamental causes of student difficulties: Towards a first-principles design of instruction”, Plenary Session, Frontiers and Foundations of Physics Education Research Biennial Conference, Bar Harbor, Maine, June 2009.
45) “Concrete vs. Abstract: is a little knowledge a bad thing?” National Association of Research in Science Teaching, 2009 National Conference, Garden Grove, CA, April 2009
46) Learning Associations That Run Counter to Biases in Learning: Overcoming Overshadowing and Learned Inattention. Paper presented at 30th Annual Conference of the Cognitive Science Society, Washington D.C., July 2008.
47) “Learning biases: Overcoming scientific misconceptions”, Human Factors Interest Group seminar, University of Manchester, U.K. July 19, 2008.
48) “Overcoming Scientific Misconceptions”, Kansas State University Physics Education Research Seminar. March 4, 2008.
49) “Current Research Projects”, University of Washington Physics Education Research Seminar. Feb 5, 2008.
50) “Concrete vs. Abstract: Is a little knowledge a bad thing?” Invited Session, Physics Education Research Conference, Greensboro, NC, August 2007.
51) “Measuring understanding: dependence of student answering on the question task.” Invited Session, Summer Conference of the American Association of Physics Teachers, Greensboro, NC. August 2007.
52) “Concrete vs. Abstract: Is a little knowledge a bad thing?”, University of Illinois Champagne-Urbana Physics Education Research Seminar. April, 2007.
53) “Abstract or Concrete: Which is better for learning and transfer?”, American Physical Society Conference, Invited session on Physics Education Research, Jacksonville, FL. April 2007.
54) “How diagrams Help and Hinder Problem Solving”, American Educational Research Association, 2007 National Conference, April 2007.
55) “Abstract or Concrete, which is better for learning or transfer?” Invited Session, Summer Conference of the American Association of Physics Teachers, Syracuse, NY. August 2006.
56) “The Role of Diagrams in Solving Problems”, National Association of Research in Science Teaching, 2006 National Conference, San Francisco, CA, April 2006.
57) “Abstract or Concrete, which is better for learning or transfer?” University of Maryland Physics Education Research Seminar. April, 2006.
58) 14)“Cognition and the Learning of Physics”, Rutgers University Physics Education Research Seminar. May 2005.
59) “Finding a Measure of Student Learning: the Normalized Gain and Other Measures”, Ohio State University Physics Education Research Seminar. April 2005.