

Kara E. Gray, PhD
Assistant Professor of Physics
Seattle Pacific University
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EDUCATION

University of Colorado, Boulder

PhD. in Curriculum & Instruction – Science, 2013

Dissertation: Learning to Teach: The Experience of First Semester Physics LAs in the Colorado Learning Assistant Program

Committee: Valerie Otero (advisor), Lorrie Shepard, David Webb, Erin Furtak, Noah Finkelstein

Kansas State University

M.S. in Physics, 2004

Thesis: The Effect of Question Order on Student Responses

B.S. in Physics, 2003

Minor: Leadership Studies

ACADEMIC APPOINTMENTS

Interim Director of the Integrated Studies Program , Seattle Pacific University	Fall 2015 – present
Assistant Professor of Physics , Seattle Pacific University	Fall 2012 – present

TEACHING EXPERIENCE

Seattle Pacific University

Development of Concepts in Physical Science I • PHY 2567

Instructor - Fall 2015, Fall 2014, Fall 2013

Co-Instructor - Fall 2012

Development of Concepts in Physical Science II • PHY 2568

Instructor - Spring 2015, Winter 2015, Spring 2014, Winter 2014

Co-Instructor - Spring 2013

Introduction to the Nature of Science • PHY 1110

Instructor - Winter 2015, Fall 2014, Winter 2014, Spring 2013

Special Topics: Preparing to Teach • PHY 4950

Instructor - Spring 2015, Spring 2014

Preparing to Teach Physical Science • PHY 4510

Instructor - Winter 2014, Spring 2013, Winter 2013

Co-Instructor - Fall 2012

Senior Capstone Course for Natural Science Majors • PHY 4899

Lead Instructor – Fall 2013

Co-Instructor – Spring 2014, Winter 2014

Special Topics in Scientific Writing • PHY 4950

Co-Instructor – Spring 2013

University of Colorado, Boulder**STEP 1: Inquiry Approaches to Teaching • EDUC 2020**

Co-Instructor – Spring 2012

STEP 2: Math/Science Inquiry-Based Lesson Design • EDUC 2030

Co-Instructor – Spring 2012

Elementary Science Methods • EDUC 5215

Co-Instructor – Fall 2011

Math and Science Education (LA) Seminar • EDUC 4610

Co-Instructor – Spring 2011, Fall 2010, Spring 2009, Fall 2008

Teaching Assistant – Spring 2010, Fall 2009, Spring 2008

Physics 3: Modern Physics for Engineers • PHY 2130

Grader – Spring 2006

General Physics I (calculus-based) • PHY 1110

Teaching Assistant – Fall 2005

General Physics 2 (algebra-based) • PHY 2020

Teaching Assistant – Spring 2005

General Physics 2 (calculus-based) • PHY 1120

Teaching Assistant – Fall 2004

Kansas State University**Engineering Physics 1 • PHY 213**

Primary Instructor for Studio – Spring 2004, Fall 2003

RESEARCH EXPERIENCE

Seattle Pacific University**Co-principal investigator**, “Collaborative Research: Focus on Energy: Preparing Elementary Teachers to Meet the NGSS Challenge” (NSF DRL 1418211, \$518K), 2014-2018.**Senior personnel**, “Collaborative Research: Assessing, Validating, and Developing Content Knowledge for Teaching Energy” (NSF DRL 1222777, \$821K), 2012-2016.**Researcher**, “Energy Project Summer Research Institute” Summer 2010**University of Colorado, Boulder****Graduate research assistant**, “Learning Assistant Model for Teacher Education in Science and Technology” (NSF DRL 0554616, \$2.5M), 2006-2012.**Graduate research assistant**, Physics Education Research Group, Spring 2005-Spring 2006**Kansas State University****Graduate research assistant**, Physics Education Research Group, Summer 2003-Summer 2004

Undergraduate research assistant, Physics Education Research Group, Fall 2001-Spring 2013
Undergraduate research assistant, Condensed Matter Physics, Summer 2000
Undergraduate research assistant, Anatomy and Physiology, College of Veterinary Medicine, Spring 2000.

University of Maryland

Undergraduate research assistant, Physics Education Research Group, Summer 2002

Kansas University Medical Center

Undergraduate research assistant, Microbiology, Morrison Laboratory, Summer 1999 and Winter 1999

Intern, Basic Cancer Research, Wilkinson Laboratory, Summer 1998

PEER REVIEWED PUBLICATIONS

Otero, V. K., & Gray, K. E. (2008). Attitudinal Gains Across Multiple Universities Using the Physics and Everyday Thinking Curriculum. *Physical Review Special Topics - Physics Education Research*, 4(2), 020104.

Gray, K. E., Adams, W. K., Wieman, C. E., & Perkins, K. K. (2008). Students Know What Physicists Believe, But They Don't Agree: a Study Using the CLASS Survey. *Physical Review Special Topics - Physics Education Research*, 4(2), 020106.

Rebello, N. S., Zollman, D. A., Allbaugh, A. R., Engelhardt, P. V., Gray, K. E., Hrepic, Z., & Itza-Ortiz, S. F. (2005). Dynamic Transfer: A Perspective from Physics Education Research. In J. P. Mestre (Ed.), *Transfer of Learning from a Modern Multidisciplinary Perspective* (pp. 217–250). Charlotte: Information Age Publishing.

Engelhardt, P. V., Gray, K. E., & Rebello, N. S. (2004). How Many Students Does It Take Before We See The Light? *The Physics Teacher*, 42(4), 216–221.

Cho, J. H. ., Law, B. M., & Gray, K. E. (2002). Strong Critical Adsorption at the Liquid-Vapor Surface of a Nonpolar Mixture. *The Journal of Chemical Physics*, 116, 3058.

PEER REVIEWED CONFERENCE PROCEEDINGS

Gray, K. E., Webb, D. C., & Otero, V. K. (2012). Effects of the Learning Assistant Experience on In-Service Teachers' Practices. In N. S. Rebello, P. V. Engelhardt, & C. Singh (Eds.), *Physics Education Research Conference 2012* (pp. 199–202). Melville, NY: AIP Conference Proceedings 1413.

Gray, K. E., Webb, D. C., & Otero, V. K. (2010). Are Learning Assistants Better K-12 Science Teachers? In C. Singh, M. S. Sabella, & S. Rebello (Eds.), *Physics Education Research Conference 2010* (pp. 157–160). Melville, NY: AIP Conference Proceedings 1289.

- Gray, K. E., & Otero, V. K. (2009). Analysis of Former Learning Assistants' Views on Cooperative Learning. In C. Henderson, M. Sebella, & C. Singh (Eds.), *Physics Education Research Conference 2009* (pp. 149–152). Melville, NY: AIP Conference Proceedings 1179.
- Gray, K. E., & Otero, V. K. (2008). Analysis of Learning Assistants' Views of Teaching and Learning. In L. McCullough, L. Hsu, & P. Heron (Eds.), *Physics Education Research Conference 2008* (pp. 123–126). Melville, NY: AIP Conference Proceedings 1064.
- Otero, V. K., & Gray, K. E. (2007). Learning to Think Like Scientists with the PET Curriculum. In L. McCullough, L. Hsu, & P. Heron (Eds.), *Physics Education Research Conference 2007* (pp. 160–163). Melville, NY: AIP Conference Proceedings 951.
- Gray, K. E., & Rebello, N. S. (2005). Transfer Between Paired Problems In An Interview. In J. Marx, P. Heron, & S. Franklin (Eds.), *Physics Education Research Conference 2004* (pp. 157–160). Melville, NY: AIP Conference Proceedings 790.
- Gray, K. E., Hrepic, Z., Itza-Ortiz, S. F., Allbaugh, A. R., Engelhardt, P. V., Rebello, N. S., & Zollman, D. A. (2004). Implications of a Framework for Student Reasoning In an Interview. In J. Marx, P. Heron, & S. Franklin (Eds.), *Physics Education Research Conference 2003* (pp. 125–128). Melville, NY: AIP Conference Proceedings 720.
- Engelhardt, P. V., Gray, K. E., Hrepic, Z., Itza-Ortiz, S. F., Allbaugh, A. R., Rebello, N. S., & Zollman, D. A. (2004). A Framework for Student Reasoning In an Interview. In J. Marx, S. Franklin, & K. Cummings (Eds.), *Physics Education Research Conference 2003* (pp. 121–124). Melville, NY: AIP Conference Proceedings 720.
- Gray, K. E., Rebello, N. S., & Zollman, D. A. (2002). The Effect of Question Order on Student Responses to Multiple-Choice Questions. In S. V. Franklin, K. E. Cummings, & J. Marx (Eds.), *Physics Education Research Conference Proceedings*. Boise, ID.
- Gao, J. J., Xue, Q., Papasian, C. J., Gray, K. E., & Morrison, D. C. (2001). Mechanism by which Bacterial DNA and LPS Induce Synergistic Production of TNF-[alpha] in Mouse Macrophages. *Shock*, 15, 19–20.

INVITED PRESENTATIONS

- Robertson, A.D. & Gray, K.E. (2015, February). *Content Knowledge for Teaching: What Does it Look Like, and How Do We Measure It?* Invited talk presented at the Creative Conversations Talk Series, Seattle Pacific University, Seattle, WA.
- Gray, K.E. & DeWater, L.S. (2015, January). *Preparing Elementary Teachers in Science through a Multi-Year, Integrated Experience*. Invited talk presented at the American Association of Physics Teachers National Meeting, San Diego, CA.
- Gray, K.E. (2013, September). *Teaching to Learn: Analyzing the Experiences of First-time Physics Learning Assistants*. Invited talk presented at the Physics Education Seminar, Purdue University, West Lafayette, IN.

Gray, K.E. (2013, May). *Teaching to Learn: Analyzing the Experiences of First-time Physics Learning Assistants*. Invited talk presented at the Physics Education Seminar, University of Washington, Seattle, WA.

Gray, K.E. & Otero, V.K. (2012, February). *Evaluating the Colorado LA Program as a Teacher Preparation Program*. Invited talk presented at the American Association of Physics Teachers National Meeting, Ontario, CA.

CONTRIBUTED PRESENTATIONS

Gray, K.E. & Otero, V.E. (2011, August). *Effects of the Learning Assistant "Treatment" on In-Service Teachers' Practices*. Contributed talk presented at the American Association of Physics Teachers National Meeting, Omaha, NE.

Gray, K.E. & Otero, V.K. (2010, July). *Bridging the Gap Between Science Education and PER: Formative Assessment*. Contributed talk presented at the American Association of Physics Teachers National Meeting, Portland, OR.

Gray, K.E. & Otero, V.K. (2009, July). *Analysis of Former Learning Assistants' Views on Teaching and Learning*. Contributed talk presented at the American Association of Physics Teachers National Meeting, Ann Arbor, MI.

Gray, K.E. & Otero, V.K. (2009, May) *Enhancing Student Attitudes about Physics: A Multi-University Study*. Contributed talk presented at the American Physical Society Meeting, Denver, CO.

Otero, V.K., Webb, D., Talbot, R., Moin, L., Gray, K.E., & Finkelstein, N. (2009, April). *A Longitudinal Study of Pedagogical Content Knowledge: Content, Pedagogy, and Practice*. Contributed talk presented at the National Association of Research on Science Teaching Meeting, Garden Grove, CA.

Gray, K.E. & Otero, V.K. (2008, July) "Analysis of Learning Assistants' Views of Teaching and Learning." Contributed talk presented at the American Association of Physics Teachers National Meeting, Edmonton, Alberta.

Otero, V.K. & Gray, K.E. (2008, March). *Learning to Think Like Scientists with the PET Curriculum*. Contributed talk presented at the National Association of Research on Science Teaching Meeting, Baltimore, MD.

Gray, K.E. & Otero, V.K. (2007, July-August). *The Effect of the PET Curriculum on Physics Students' Attitudes*. Contributed talk presented at the Association American Physics Teachers National Meeting, Greensboro, NC.

Gray, K.E., Perkins, K.K., Adams, W.K. & Wieman, C.E. (2006, July). *Do Students Know What Physicists Think About Physics?* Contributed talk presented at the Association of American Physics Teachers National Meeting, Syracuse, NY.

Gray, K.E. & Rebello, N.S. (2004, July-August). *A Summary of the Effects of Question Order*. Contributed talk presented at the American Association of Physics Teachers National Meeting, Sacramento, CA.

Rebello, N.S., & Gray, K.E. (2004, July-August). *Modeling Cycle and Research-Based Pedagogy in an Electronics Course*. Contributed talk presented at the Association American Physics Teachers National Meeting, Sacramento, CA.

Rebello, N.S., Allbaugh, A., Engelhardt, P.V., Gray, K.E., Hrepic, Z., Itza-Ortiz, S., & Zollman, D.A. (2004, January) *A Perspective on Transfer of Learning*. Contributed talk presented at the Association American Physics Teachers National Meeting, Miami Beach, FL.

Gray, K.E., Engelhardt, P.V., & Rebello, N.S. (2003, August). *Investigating Students' Understanding of Light Bulbs and Complete Circuits*. Contributed talk presented at the Association American Physics Teachers National Meeting, Madison, WI.

Gray, K.E., Rebello, N.S., & Zollman, D.A. (2003, January). *The Effect of Question Order on Responses to Interview Questions*. Contributed talk presented at the Association American Physics Teachers National Meeting, Austin, TX.

Gray, K.E., Rebello, N.S., & Zollman, D.A. (2002, October). *The Effect of Question Order on Student Responses to Multiple-Choice Questions*. Contributed talk presented at the Arkansas, Oklahoma, and Kansas Association of Physics Teachers Regional Meeting, Ada, OK.

Gray, K.E., Rebello, N.S., & Zollman, D.A. (2002, August). *The Effect of Question Order on Student Responses to Multiple-Choice Questions*. Contributed talk presented at the Association American Physics Teachers National Meeting, Boise, ID.

CONTRIBUTED POSTERS

Gray, K.E. & Scherr, R.E. (2015, June). *Drawing Energy: Features of Energy Diagrams Created by K-12 Teachers*. Contributed poster presented at the Foundations and Frontiers in Physics Conference, Bar Harbor, ME.

Gray, K.E. (2014, October). *Creating a University-Wide LA Program at Seattle Pacific University*. Contributed poster presented at the National Learning Assistant Model Conference, Boulder, CO.

Gray, K.E. (2013, July). *LAs' Views of the Role of Student/Teacher Relationships on Learning*. Contributed poster presented at the Physics Education Research Conference, Portland, OR.

Gray, K.E. & Scherr, R.E. (2013, June). *How Can We Document Teachers' Pedagogical Decisions?* Contributed poster presented at the Foundations and Frontiers in Physics Conference, Bar Harbor, ME.

Gray, K.E. & Otero, V.K. (2012, October). *Teaching to Learn: Exploring the Experiences of First-time Learning Assistants*. Contributed poster presented at the National Learning Assistant Model Conference, Boulder, CO.

Gray, K.E. & Otero, V.K. (2012, August). *Teaching to Learn: Exploring the Experiences of First-time Learning Assistants*. Contributed poster presented at the Physics Education Research Conference, Philadelphia, PA.

- Gray, K. E., & Otero, V. K. (2011, August). *Effects of the Learning Assistant Experience on In-Service Teachers' Practices*. Contributed poster presented at the Physics Education Research Conference, Omaha, NE.
- Gray, K.E. (2011, June). Who is Learning in the CU LA Program? And What is Being Learned? Contributed poster presented at the Foundations and Frontiers in Physics Conference, Bar Harbor, ME.
- Gray, K. E., & Otero, V. K. (2010, July). *Are Learning Assistants Better Secondary Science Teachers?* Contributed poster presented at the Physics Education Research Conference, Portland, OR.
- Gray, K. E., & Otero, V. K. (2009, July). *Analysis of Former Learning Assistants' Views on Cooperative Learning*. Contributed poster presented at the Physics Education Research Conference, Ann Arbor, MI.
- Gray, K. E., & Otero, V. K. (2008, July). *Analysis of Learning Assistants' Views of Teaching and Learning*. Contributed poster presented at the Physics Education Research Conference, Edmonton, AB.
- Otero, V. K., & Gray, K. E. (2007, August). *Learning To Think Like Scientists with the PET Curriculum*. Contributed poster presented at the Physics Education Research Conference: Greensboro, North Carolina.
- Gray, K.E., Perkins, K.K., Adams, W.K., & Wieman, C.E. (2006, July) *Students' Opinions of Physicist's Beliefs about Physics versus Their Own*. Contributed poster presented at the American Association of Physics Teachers National Meeting, Syracuse, NY.
- Gray, K.E. & Rebello, N.S. (2004, August) *Transfer Between Paired Problems*. Contributed poster presented at the Physics Education Research Conference, Sacramento, CO.
- Allbaugh, A., Engelhardt, P.V., Gray, K.E., Hrepic, Z., Itza-Ortiz, S.F., Ortiz, L.G., Terrel A., Thacker, B.A., & Rebello, N.S. (2003, August) *The Dynamics of Student Reasoning During an Interview*. Targeted poster session presented at the Physics Education Research Conference, Madison, WI.
- Gray, K.E., Engelhardt, P.V., & Rebello, N.S. (2003, August) *Investigating Students' Understanding of Light Bulbs and Complete Circuits*. Contributed poster presented at the American Association of Physics Teachers National Meeting, Madison, WI.
- Rebello, N.S. & Gray, K.E. (2003, August) *Modeling Cycle Pedagogy in an Electronics Course: First Impressions*. Contributed poster presented at the American Association of Physics Teachers National Meeting, Madison, WI.
- Allbaugh, A., Engelhardt, P.V., Gray, K.E., Hrepic, Z., Itza-Ortiz, S.F., & Rebello, N.S. (2003, July) *Student Reasoning in an Interview: Framework and Implications*. Contributed poster presented at the Enrico Fermi International Summer School of Physics, Varenna, Italy.
- Gray, K.E., Rebello, N.S, & Zollman, D.A. (2002, October) *The Effect of Question Order on Student Responses to Multiple-Choice Questions*. Contributed poster presented at the Arkansas, Oklahoma, and Kansas Association of Physics Teachers Regional Meeting, Ada, OK.
- Gray, K.E., Rebello, N.S, & Zollman, D.A. (2002, August) *The Effect of Question Order on Student Responses to Multiple-Choice Questions*. Contributed poster presented at the Physics Education Research Conference, Boise, ID.

PROFESSIONAL WORKSHOPS

Learning Assistant Workshop. A workshop given by Dr. Kara Gray and the Seattle Pacific University Physics Department at the Physics Teacher Education Coalition Conference, Boulder, CO (February, 2015)

Resources for Leading the LA Prep Sessions. A session given for the International Learning Assistant Workshop, Boulder, CO (October, 2014)

Comparing LA Practices: Analysis of Video Data. A session given for the Colorado Learning Assistant Faculty Workshop, Boulder, CO (August, 2011)

Research Conducted on the Colorado LA Program. A session given for the National Learning Assistant Workshop, Boulder, CO (October, 2010)

Qualitative Research Methods. A workshop given by Dr. Valerie Otero and Kara Gray at the Physics Education Research Conference, Ann Arbor, MI (July, 2009)

AWARDS

PERLOC Travel Grant for Winter National AAPT Meeting, 2012

Elizabeth A. Wilson Scholarship, School of Education, University of Colorado, Boulder, 2011

NSF Graduate Research Fellowship Honorable Mention, 2004

Kathryn and Charles Bearman Scholarship in Physics, Kansas State University, 2003-2001

Nancy Landon Kassabaum Scholarship for Leadership, Kansas State University, 1999-2000

Kansas State Presidential Scholar, Kansas State University, 1999-2003

National Merit Scholar 1999-2003

UNIVERSITY SERVICE

Seattle Pacific University

Physics Club Advisor, Seattle Pacific University, Winter 2014 – present

Otto Miller Hall Rededication Committee, Seattle Pacific University, Summer 2014

Search Committee for Residence Life: Area Coordinator – New Residence Hall, Area Coordinator – Campus Housing and Apartments, & Residence Life Coordinator – Campus Housing and Apartments, Seattle Pacific University, Spring 2014

University of Colorado, Boulder

Search Committee for Assistant Professor in Curriculum & Instruction – Science Fall 2010- Spring 2011

Mentor to Noyce Fellow, 2011 - 2012

Organizer for Doctoral Seminar on Readings in Science Education, Fall 2011

Committee to Review Department Applications for participation in the Colorado Learning Assistant Program – Fall 2011

PEER REVIEW EXPERIENCE

American Journal of Physics: 2014 - present

Effective Practices in Preservice Physics Teacher Education - 2013

Journal of Research in Science Teaching: 2013 - present

Physical Review Special Topics – Physics Education Research: 2006 – present

Physical Education Research Conference Proceedings: 2003 – present

Proposals for the National Association of Research in Science Teaching National Conference: 2011

Proposals for the American Association of Education Research National Conference: 2011

PROFESSIONAL ASSOCIATIONS

American Association of Physics Teachers

American Physical Society