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Education

University of Minnesota – Twin Cities (UMn)

2009 (expected), Ph.D. in Physics, subfield: Physics Education Research
Dissertation: *Development and Validation of an Assessment Instrument for Student Problem Solving*
Adviser: Dr. Kenneth Heller

2006, M.S. in Physics, subfield: High Energy Physics
Project: *Development of a Fiber Continuity and Light Calibration Device for NOvA*
Adviser: Dr. Dan Cronin-Hennessy

North Dakota State University (NDSU)

2004, B.S. in Physics and Physics Education, minors in Math and Math Education
North Dakota Teaching Certification: Physics

Research Experience

University of Minnesota-Twin Cities

2004-present: Physics Education Research and Development Group with Dr. Ken Heller

2005-present: *Development and validation of an assessment instrument for student problem solving*. Developed a scoring rubric to assess students' written solutions to physics problems, created and tested training materials for the rubric, and analyzed written and interview data of students' problem solving to obtain evidence for the reliability and validity of the instrument (in progress).

2008-2009: *Gender differences in both Force Concept Inventory and introductory physics performance*. Analyzed relationships between the FCI physics concept exam, a math diagnostic exam, and performance in introductory physics courses for males and females using SPSS (Statistical Package for the Social Sciences).

Spring 2006: *Development of a fiber continuity and light calibration device for NOvA*. Experimental High Energy Physics research in a laboratory under the guidance of Dr. Dan Cronin-Hennessy. Designed and tested a device to assess light transmission quality of wavelength-shifting scintillator fibers for a particle detector in the proposed electron neutrino appearance experiment NOvA.

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Research Experience cont'd:

Stanford Linear Accelerator Center, Menlo Park, California

Summer 2003: *Department of Energy Science Undergraduate Laboratory Internship*. Co-wrote a software tool CRAnE (Cosmic Ray Analysis Environment) in Java to plot incoming cosmic ray rates as they are detected by a compact Cosmic Ray Telescope, and assembled and tested the telescopes with teachers in the QuarkNet program.

Fermi National Accelerator Laboratory, Batavia, Illinois

Summer 2002: *Department of Energy Pre-Service Teacher Program*. Co-developed a web-based education module on systems analysis to satisfy the Real Time Embedded Systems (RTES) outreach component of the proposed high energy experiment BTeV; attended the QuarkNet program leadership training workshop for high school teachers.

Teaching Experience and Curriculum Development

University of Minnesota-Twin Cities

2005-2007: *Mentor Teaching Assistant (TA)*. Co-led a weekly seminar for new physics TAs throughout the academic year which highlighted both theoretical and practical issues of teaching physics, observed TAs to provide them with individual feedback on their teaching performances, and acted as a liaison between TAs and faculty instructors.

Fall 2005, 2006: *Co-Instructor, Physics Teaching Assistant Orientation*. Organized materials for and helped conduct the 8-day orientation for 40+ new physics TAs, to prepare them to teach laboratories and discussions sessions with UMn cooperative group problem solving methods.

2004-2005: *Teaching Assistant, Physics for Pre-medicine & Biology Students I & II*. Instructor for laboratory and discussion sessions using cooperative group problem solving methods; graded written work including exams and laboratory reports.

Summer 2006: *Laboratory Manual Development Coordinator*. Supervised seven graduate students in the revision of introductory physics laboratory manuals and instructor guides; facilitated meetings and edited and proofed documents prior to publishing.

North Dakota State University

Spring 2004: *Student Teaching at Fargo South High School*. Co-taught two honors physics and three advanced placement physics classes with Steve Kennedy for 16 weeks at Fargo South High School in Fargo, North Dakota.

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Teaching Experience and Curriculum Development cont'd:

2001-2003: *Undergraduate Fellow in the NSF GK-12 program GraSUS (Graduate-Student-University-School)*. Wrote curriculum for a unit on graph theory in a pre-calculus class at Moorhead High School, set up Personal Response Systems (PRS) and LON-CAPA online homework in science classrooms at Fargo South High School, and wrote a conceptual physics question bank for use with PRS clickers.

2003-2004: *Undergraduate Teaching Assistant, College Physics I & II*. (Algebra-based course). Laboratory instructor and grader of homework and exams.

2000-2001: *Problem Based Learning course peer instructor in University Physics I*. (Calculus-based course for scientists & engineers). Coached student groups on PBL projects during class time and assisted instructor Dr. Douglas Kurtze.

Publications

Docktor, J., & Heller, K. (2008). Gender differences in both Force Concept Inventory and introductory physics performance. In C. Henderson, M. Sabella, & Leon Hsu (Eds.), *AIP Conference Proceedings Vol. 1064: 2008 Physics Education Research Conference* (pp. 15-18). Melville, NY: American Institute of Physics.

Presentations, Posters, and Workshops

Abstracts and electronic copies of most items listed below can be obtained online at:
<http://groups.physics.umn.edu/physed/People/Docktor/index.html>

(upcoming) "Robust Assessment Instrument for Student Problem Solving," J. Docktor and K. Heller, presentation, NARST, Garden Grove, CA, April 2009.

(upcoming) "Developing a Useful Instrument to Assess Student Problem Solving," J. Docktor, contributed talk, AAPT/AAAS Winter Meeting, Chicago, IL, February 2009.

(upcoming) "Applying a Simple Rubric to Assess Student Problem Solving," J. Docktor, poster, AAPT/AAAS Winter Meeting, Chicago, IL, February 2009.

(upcoming) "Gender Differences in High School Preparation for University Introductory Physics," J. Docktor and K. Heller, poster, AAPT/AAAS Winter Meeting, Chicago, IL, February 2009.

"Developing a Useful Instrument to Assess Student Problem Solving," J. Docktor, presentation at the Minnesota Association of Physics Teachers Meeting, St. Peter, MN, October 2008.

"Developing a Useful Instrument to Assess Student Problem Solving," J. Docktor, presentation at the Wisconsin Association of Physics Teachers Meeting, Chippewa Falls, WI, October 2008.

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Presentations, Posters, and Workshops cont'd:

“Gender Differences in Both Force Concept Inventory and Introductory Physics Performance,” J. Docktor and K. Heller, invited poster session, Physics Education Research Conference, Edmonton, Alberta, Canada, July 2008.

“Robust Assessment Instrument for Student Problem Solving,” J. Docktor, contributed talk and poster, AAPT Summer Meeting, Edmonton, Alberta, Canada, July 2008.

“Cognitive Research and the Practical Classroom: Bridging the Gap,” L. Hsu and J. Docktor, workshop, Minnesota Area Association of Physics Teachers Fall Meeting, St. Cloud, Minnesota, October 2007.

“New TA Orientation: Resources, Policies, and Classroom Climate,” B. Beers and J. Docktor, workshop, University of Minnesota Center for Teaching and Learning Orientation for New Teaching Assistants, Minneapolis, Minnesota, August 2007.

“Robust Assessment Instrument for Student Problem Solving,” J. Docktor, poster, Canada-America-Mexico (CAM) physics graduate student conference, Montreal, Quebec, Canada, August 2007.

“Robust Assessment Instrument for Student Problem Solving,” J. Docktor, contributed talk and poster, AAPT Summer Meeting, Greensboro, NC, July 2007.

“Flexible Software for Computer-Based Problem Solving Labs,” B. Nellermoe and J. Docktor, invited talk, AAPT Summer Meeting, Greensboro, NC, July 2007.

“A report on the conference ‘Why the Difference? A Teachers Conference on Best Practices to Engage Girls and Students of Color in Science, Technology, Engineering, and Math’,” J. Docktor, presentation at the monthly luncheon of the Institute of Technology Program for Women, University of Minnesota, September 2006.

Workshops & Certification Courses Attended

July 2008: *Learning Physics While Practicing Science* by Eugenia Etkina and Alan Van Heuvelen. AAPT Workshop on the Physics Active Learning Guide and Investigative Science Learning Environment (ISLE) curricula.

July 2008: *Using Research-based Curricula and Tools to Revitalize Your Introductory Course* by David Sokoloff, Ronald Thornton, and Priscilla Laws. AAPT Workshop on RealTime Physics Labs and Interactive Lecture Demonstration (ILD) curricula.

Spring 2008: *UMn TA Web Certification Course*. Training in learning technologies and web design using Dreamweaver, Adobe Photoshop, Adobe Presenter, WebVista, and Moodle.

Professional Service

2005-present: *Website Administrator, UMn Physics Education Research Group*

2006-2007: *President of the UMn Women in Physics & Astronomy student organization and physics representative for the Institute of Technology Program for Women.* Coordinated networking and outreach events for women graduate students and secured funding.

Summer 2006, 2007: *Assistant Coordinator for the UMn Physics Research Experiences for Undergraduates (REU) program.* Assisted with group seminars and field trips.

Professional Organizations

American Association of Physics Teachers (AAPT)

Minnesota Area Association of Physics Teachers (MAAPT)

Wisconsin Association of Physics Teachers (WAPT)

References

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