

Warren M. Christensen, Ph.D.
North Dakota State University, Department of Physics
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EDUCATION

- 2007 Ph.D., Department of Physics and Astronomy, Iowa State University, Ames, IA
 “Student understanding of calorimetry, entropy and the second law of thermodynamics”
 Thesis advisors: Dr. David Meltzer and Craig Ogilvie
- 2001 B.S., Physics, Magna Cum Laude, University of Central Missouri, Warrensburg, MO

RESEARCH INTERESTS

Physics Education Research, student use of mathematics in physics, Discipline-based Education research, research-based curriculum development and dissemination, flipped classroom instructional impact, reformed physics courses with a focus on biomedical equipment

PROFESSIONAL EXPERIENCE

- 2023-present Professor, North Dakota State University, Fargo, ND
- 2016-present Associate Professor, North Dakota State University, Fargo, ND
- 2009-2016 Assistant Professor, North Dakota State University, Fargo, ND
- 2007-2009 Post-doctoral Research Associate, University of Maine, Orono, ME
 Supervisor: Dr. Susan McKay, John Thompson, and Michael Wittmann
- 2004-2007 Graduate Research Assistant, Iowa State University, Ames, IA
- 2002-2007 Graduate Teaching Assistant, Iowa State University, Ames, IA
- 2000-2001 Lab Teaching Assistant for Physics for non-majors, University of Central Missouri, Warrensburg, MO

TEACHING EXPERIENCE

North Dakota State University

- 2020-22 Course developer and Instructor for Quantum Mechanics II (2 times)
- 2019-22 Course developer and Instructor for Quantum Mechanics I (3 times)
- 2013-15 Introductory Calculus-based Electricity and Magnetism Recitation (2 times)
- 2013-20 Co-developer of the multi-departmental Foundations of Science Course (with Jeff Boyer and others) (6 times)
- 2012-14 Course developer and Instructor for Intro to Electromagnetic Theory (2 times)
- 2011-21 Course Creator and Instructor for Research Methods in STEM Education (5 times)
- 2010-22 Coordinator of STEM Education Research Seminar (6 times)
- 2009-22 Course developer and Instructor for University Physics I: First semester Calculus-based Physics (10 times)

Christensen Curriculum Vitae

University of Maine, Orono, ME

- 2008-2009 Co-instructor for Research-based Curriculum design course taken by interns at Jackson Laboratory in Bar Harbor, ME
- 2007-2008 Facilitator for Seminar on Research Methodology for Science and Mathematics Education Research

Iowa State University, Ames, IA

- 2002-2007 Recitation & Laboratory Teaching Assistant throughout the introductory physics sequences
- 2006 Teaching Assistant and Grader for Sophomore-level Modern Physics I & II
- 2004-2006 Ph.D. Qualifying Exam Preparation Course Co-Creator and Co-Instructor
- 2004-2005 Teaching Assistant and Grader for Junior-level Thermal Physics course
- 2003 Tutoring for Women In Science and Engineering program

GRANTS

“REU Site: Collaborations in Discipline-Based Education Research (CiDER): An Interdisciplinary Research Experience in Undergraduate STEM Education,” NSF DUE #2243101, Award Total: \$404,840; Role: co-PI; Submitted: 08/25/2022, Current Status: Pending.

“Collaborative Research: Beyond procedures: a research-based approach to teaching mathematical methods in physics,” NSF PHY #1912152, Award Total: \$171,528; Role: PI; 09/01/2019-08/31/23, Current Status: Funded.

“REU Site: Growing up STEM: An Interdisciplinary Research Experience in Undergraduate STEM Education,” NSF DUE #1852045, Award Total: \$476,899; Role: Co-PI; 06/01/2019-05/31/23, Current Status: Funded.

“REU Site: Interdisciplinary Research in Undergraduate STEM Education,” NSF DRL #1560142, Award Total: \$475,838; Role: Co-PI; Submitted: 08/26/2015, Current Status: Funded.

“Continuing the Conversation in DBER: The Transforming Research in Undergraduate STEM Education (TRUSE) Conference,” NSF DUE #1551038, Award Total: \$37,342; Role: PI; Submitted: 07/06/2015, Current Status: Funded.

“Collaborative Research: Multimedia modules for physics instruction in a flipped classroom course for pre-health and life science majors,” NSF DUE #1431434, Award Total: \$42,769; Role: PI; Submitted: 02/03/2014, Current Status: Funded.

“Collaborative Research: Research on the teaching and learning at the physics-mathematics interface,” NSF PHY #1406035, Award Total \$57,184; Role: Subaward PI; Submitted: 11/15/2013, Current Status: Funded.

“REU Site: Interdisciplinary Research in Undergraduate STEM Education,” NSF DRL #1156974, Award Total: \$328,456; Role: PI, with Jennifer Momsen (co-PI; NDSU); 10/01/12-09/30/16.

“Collaborative Research: A Conference to Promote the Integration of Research on Undergraduate Mathematics, Physics, and Chemistry Education,” NSF DUE #0941191, Award Total \$132,670; Role:

Co-PI, with Chris Rasmussen, (PI, San Diego State University) and John Thompson (co-PI, University of Maine); 05/19/2009.

“Collaborative Research: Research and Curriculum Development in Thermal Physics,” NSF Grant DUE-0817282; Role: co-PI, with J.R. Thompson (PI; University of Maine), and D.E. Meltzer (co-PI; Arizona St. U. Polytechnic); Collaborative Proposal by M.E. Loverude (PI; California St. U – Fullerton); 09/01/08–08/31/11.

HONORS AND AWARDS

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| 2016 | College of Science and Mathematics Ambassadors' Excellence Award, yearly award given to one faculty of the College of Science and Mathematics by the Student Ambassadors of the college, NDSU |
| 2010 | Scholar in Residence Award Winner, from the Physics Education Research Topical Group within the American Association of Physics Teachers, NDSU |
| 2005-2006 | Robert G. Patrick Award Winner, for Outstanding Teaching Assistant of Year, ISU |
| 2000-2001 | Department of Theater and Dance, Best Actor Award, UCM |
| 2000-2001 | College of Arts & Sciences Student of the Year Nominee, UCM |

PEER-REVIEWED PUBLICATIONS

Dalton, Chaelee, Farlow, Brian D., Christensen, Warren M. “Multivariable Calculus Textbook Representation of Non-Cartesian Coordinates: A Misalignment Between Multivariable Calculus Textbook Content and Upper-Division Physics Application.” *European Journal of Physics*. In review.

Slominski, Tara, Christensen, Warren M., Buncher, John B., and Momsen, Jennifer. “The role of context and framing on student reasoning about fluid dynamics.” *CBE-Life Sciences Education*. In review.

Luecke, Danny, Carlow, Sunshine, Mattes, Josh, Christensen, Warren, and Mackey, Holley. “Circulating Conversations Methodology: Co-Connecting Knowledge to Develop Research Questions at Sitting Bull College.” *Philosophy of Mathematics Education Journal* **39** (2022).

Wawro, Megan, Watson, Kevin, and Christensen, Warren. "Students' metarepresentational competence with matrix notation and Dirac notation in quantum mechanics." *Physical Review Physics Education Research* **16** 2 (2020).

Slominski, Tara, Fugleberg, Andrew, Christensen, Warren M., Buncher, John B., and Momsen, Jennifer L. "Using Framing as a Lens to Understand Context Effects on Expert Reasoning." *CBE—Life Sciences Education* **19** 3 (2020).

Farlow, Brian, Vega, Marlene, Loverude, Michael E., and Christensen, Warren M. "Mapping activation of resources among upper division physics students in non-Cartesian coordinate systems: A case study." *Physical Review Physics Education Research* **15** 2 (2019).

Lee, LaDoris, Connelly, Manju, Henderson, Charles, Dancy, Melissa, Christensen, Warren M., “A Comparison of Student Evaluations of Instruction vs. Students' Conceptual Learning Gains,” *Am. J. Phys.* **86** (7) 531-535 (2018).

Christensen, Warren, Coakley, Aeowynn, Brainard, Jordan, Austin, Kimberly, Mylott, Elliot, & Widenhorn, Ralf. "Development of a Rubric for Improved Understanding of IPLS Curricula." Paper presented at Physics Education Research Conference 2018, Washington, DC, August 1-2, 2018.

Vega, Marlene, Christensen, Warren, Farlow, Brian, Passante, Gina and M. Loverude. "Student understanding of unit vectors and coordinate systems beyond cartesian coordinates in upper division physics courses." Paper presented at the Physics Education Research Conference 2016, Sacramento, CA, July 20-21, 2016.

Myllott, Elliot, Kutschera, Ellynn, Dunlap, Justin C., Christensen, Warren M., Widenhorn, Ralf, "Using biomedically relevant multimedia content in an introductory physics course for life science and pre-health students," *Journal of Sci. Ed. And Tech.* **25** 2 (2015).

Smith, Trevor I., Christensen, Warren M., Thompson, John R., Mountcastle, Don B., "Identifying student difficulties with entropy, heat engines, and the Carnot cycle," *Phys. Rev. Sp. Top: Phys. Ed. Res.* **11** 2 020116 (2015).

Lauer, Shanda, Momsen, Jennifer, Offerdahl, Erika, Kryjevskaja, Mila, Christensen, Warren, Montplaisir, Lisa, "Stereotyped: Investigating gender in introductory science courses," *CBE Life Sci Educ* **12** 1 (2013).

Christensen, Warren M., Johnson, James K., Van Ness, Grace R., Mylott, Elliot, Dunlap, Justin C., Anderson, Elizabeth A., Widenhorn, Ralf, "Developing and Assessing Curriculum on the Physics of Medical Instruments," *CBE Life Sci Educ* **12** 2 (2013).

Christensen, Warren M., "Moving worked problems to YouTube," *The Physics Teacher* **51** 8 (2013).

Christensen, Warren M., Thompson, John R., "Investigating graphical representations of slope and derivative without a physics context," *Phys. Rev. Sp. Top: Phys. Ed. Res.*, **8** 2 023101 (2012).

Christensen, Warren M., Meltzer, David E., Nguyen, Ngoc-Loan, "Student understanding of calorimetry in introductory calculus-based physics," *American Journal of Physics*, **79** (11) 1168-1176 (2011).

Thompson, John R., Christensen, Warren M., Wittmann, Michael C., "Preparing future teachers to anticipate student difficulties in physics in a graduate-level course in physics, pedagogy, and education research," *Physical Review Special Topics: Physics Education Research* **7**, 010108 (2011).

Reprinted in Teacher Education in Physics: Research, Curriculum, and Practice, D.E. Meltzer and P.S. Shaffer, Eds., 91-102 (American Physical Society, 2011).

Christensen, Warren M., Meltzer, David E., Ogilvie, Craig A., "Student ideas regarding entropy and the second law of thermodynamics in an introductory physics course," *American Journal of Physics*, **77** (10) 907-917 (2009).

Smith, Trevor I., Christensen, Warren M., Thompson, John R., “Student difficulties with concepts related to entropy, heat engines and the Carnot cycle,” 2009 Physics Education Research Conference, Ann Arbor, MI, July 29-30, 2009.

OTHER PUBLICATIONS

Christensen, Warren M., Thompson, John R., “Investigating student understanding of physics concepts and the underlying calculus concepts in Thermodynamics,” Proceedings of the 13th annual conference for Research in Undergraduate Mathematics Education (2010).

Christensen, Warren M., Engelhardt, Larry A., “Tapping Physics Education Research for a graduate-level curriculum: A novel approach for a Ph.D. qualifying exam preparation course,” in the *Forum on Education of The American Physical Society Spring 2006 Newsletter* (2006).

INVITED PRESENTATIONS

Keeping up with Cartesian: Use of Non-Cartesian Coordinate Systems in Calculus III, Invited talk at the 2019 Research on Undergraduate Mathematics Education Conference – Math Physics Working Group, Oklahoma City, OK, February 28, 2019.

Student Reasoning about Eigenvectors and Eigenvalues from a Resources Perspective, Invited talk at Minnesota State University at Moorhead, Moorhead, MN, January 18, 2019.

Investigating mathematics in the upper-division physics: Examples of Linear Algebra and Non-Cartesian Coordinate Systems, Invited talk at Kansas State University, March 21st, 2016.

Student Evaluations of Instruction and Their Relations to Students’ Conceptual Learning Gains, Invited Panel at the 2015 Summer Meeting of the American Association of Physics Teachers, College Park, MD, July 27th, 2015.

How do Student Evaluations of Instruction Relate to Students’ Conceptual Learning Gains? Invited talk at Michigan State University, Nov 12th, 2014.

Student Framing Impacts Math/Physics Thinking in the Context of Matrix Multiplication, Invited talk at the 2014 Summer Meeting of the American Association of Physics Teachers, Minneapolis, MN, July 28th, 2014.

Investigating math/physics frame shifts in the context of matrix multiplication, Invited talk at Chicago State University, April 17th, 2014.

Student reasoning about matrix multiplication: a window for investigating math/physics frame shifts, Invited talk at University of Maine, March 21st, 2014.

Investigating math/physics frame shifts in the context of matrix multiplication, Invited talk at University of Maryland – College Park, MD, Feb. 24th, 2014.

Investigating students’ understanding of matrix multiplication through a Resources and Framing Framework, Invited Talk at Rochester Institute of Technology, Rochester, NY, November 21, 2013.

Students' ideas about matrix multiplication, an analysis using the framework of Resources and Framing, Invited talk at Minnesota State University – Moorhead, October 18, 2013.

Students' understanding of matrix multiplication: An analysis using the Resources and Framing framework, Invited talk at San Jose St University, August 7, 2013.

Panel: Multi-Disciplinary Based Education Research Groups, invited panelist at 2012 Summer Meeting of the American Association of Physics Teachers, August 1, 2012.

Tackling Teaching: Understanding Commonalities among Chemistry, Mathematics, and Physics Classroom Practices, Invited talk at the 2012 Transforming Research in Undergraduate STEM Education, St. Paul, MN, June 5th, 2012.

On the Effective Use of Clicker, and other Voting Systems, seminar at North Dakota State University, Pedagogical Luncheon, Fargo, ND, February, 1, 2012

Physics Education Research: Developing a Science of the Learning and Teaching of Physics, seminar at Francis Marion University, Francis Marion Science Colloquium, Florence, SC, November 20, 2008.

Investigations into Student Understanding of Entropy and the Second Law of Thermodynamics, seminar at The Ohio State University, Physics Education Research Group, Columbus, OH, May 19, 2008.

Student Conceptions of Entropy in an Introductory Physics Course, seminar at the University of Maine, Center for Science and Mathematics Education Research, Orono, ME, April 12, 2007.

Research on Student Learning and the Development of Effective Curriculum, seminar at West Chester University, Department of Physics, West Chester, PA, February 8, 2007.

Physics Education Research: The Why and the How, seminar at St. Mary's University, Department of Physics, Winona, MN, January 26, 2007.

Student Understanding of Entropy and the Second Law of Thermodynamics, seminar at the University of Washington, Department of Physics, Seattle, WA, January 27, 2006.

CONTRIBUTED PRESENTATIONS

Wawro, Megan, Christensen, Warren M., Watson, Kevin, *Student Reasoning about Eigenvectors and Eigenvalues from a Resources Perspective*, Juried Talk at the 2019 Physics Education Research Conference, Provo, UT, July 25, 2019.

Farlow, Brian D., Vega, Marlene, Bradley, Alden, Dalton, Chaelee, Kalra, Ruby, Brainard, Jordan, Loverude, Michael, *Square Peg Thinking, Round Hole Problems*, Juried Talk at the 2019 Physics Education Research Conference, Provo, UT, July 25, 2019.

Farlow, Brian D., Dalton, Chaelee, Brainard, Jordan, Christensen, Warren M., *Identifying Student Ideas on Coordinate Systems from Calculus III Course*, Contributed Poster at the 2019 Summer Meeting of the American Association of Physics Teachers, Provo, UT, July 23, 2019.

Farlow, Brian D., Dalton, Chaelee, Kalra, Ruby, Christensen, Warren M., *Expectations for Vectors in Curvilinear Coordinates in Upper-Division Physics*, Contributed Poster at the 2019 Summer Meeting of the American Association of Physics Teachers, Provo, UT, July 22, 2019.

Wawro, Megan, Watson, Kevin, Christensen, Warren M., *Student Reasoning about Eigenvectors and Eigenvalues from a Resources Perspective*, Contributed Poster at the 2019 Conference for Research in Undergraduate Mathematics Education, Oklahoma City, OK, March 2, 2019.

Watson, Kevin, Christensen, Warren M., Wawro, Megan, *How Students' Understanding of Normalization Changes After Taking Quantum Mechanics*, Contributed Poster at the 2018 Physics Education Research Conference, Washington D.C., August 1, 2018.

Christensen, Warren, Coakley, Aeowynn, Brainard, Jordan, Austin, Kimberly, Mylott, Elliot, Widenhorn, Ralf, *Development of a Rubric for Improved Understanding of IPLS Curricula*, Contributed Poster at the 2018 Physics Education Research Conference, Washington D.C., August 1, 2018.

Farlow, Brian D., Dalton, Chaelee, Christensen, Warren M., *Vectors in Math and Physics Courses: An Instructional Gap*, Contributed Poster at the 2018 Summer Meeting of the American Association of Physics Teachers, Washington D.C., July 30, 2018.

Christensen, Warren M., Watson, Kevin, Wawro, Megan, *Student Reasoning about Eigenvectors and Eigenvalues from a Resources Perspective*, Contributed Talk at the 2018 Summer Meeting of the American Association of Physics Teachers, Washington D.C., July 30, 2018.

Dalton, Chaelee, Farlow, Brian D., Christensen, Warren M., *Got Anything non-Cartesian?: An Analysis of Multivariable Calculus Textbooks*, Contributed Talk at the 2018 Summer Meeting of the American Association of Physics Teachers, Washington D.C., July 30, 2018.

Farlow, Brian D., Vega, Marlene, Bradley, Alden, Loverude, Michael, Christensen, Warren M., *Exploring Student Reasoning Behind "Pattern-Matched" Position Vectors*, Contributed Talk at the 2018 Summer Meeting of the American Association of Physics Teachers, Washington D.C., July 30, 2018.

Dalton, Chaelee, Farlow, Brian, Christensen, Warren M., *Multivariable Calculus Textbook Analysis Highlights a Lack of Representation for Non-Cartesian Coordinate Systems*, Contributed Poster at the 2018 Conference for Research in Undergraduate Mathematics Education, San Diego, CA, February 23, 2018.

Christensen, Warren M., Farlow, Brian, Vega, Marlene, Loverude, Michael, *Student Resources for Unit and Position Vectors in Cartesian and Non-Cartesian Coordinate Systems*, Contributed Poster at the 2018 Conference for Research in Undergraduate Mathematics Education, San Diego, CA, February 23, 2018.

Watson, Kevin, Wawro, Megan, Christensen, Warren M., *Quantum Physics Students' Reasoning about Eigenvectors and Eigenvalues*, Contributed Poster at the 2018 Conference for Research in Undergraduate Mathematics Education, San Diego, CA, February 23, 2018.

Widenhorn, Ralf, Mylott, Elliot, Christensen, Warren, *Assessment of a Biomedically Relevant Introductory Physics Course*, Contributed Poster at the 2018 Winter Meeting of the American Association of Physics Teachers, San Diego, CA, January 7, 2018.

Myllott, Elliot E., Christensen, Warren M., Widenhorn, Ralf, *Impact of IPLS Course Materials on Attitudes of Pre-health Students Toward Physics Instruction*, Contributed Poster at the 2017

Summer Meeting of the American Association of Physics Teachers, Cincinnati, OH, July 26, 2017.

Mylott, Elliot E., Kepple, Caitlin, Christensen, Warren M., Widenhorn, Ralf, *Attitudes of Pre-health Students Toward Reformed IPLS Course Materials*, Contributed Poster at the 2017 Summer Meeting of the American Association of Physics Teachers, Cincinnati, OH, July 25, 2017.

Vega, Marlene, Loverude, Michael, Farlow, Brian, Christensen, Warren M., *Student Unit Vector Resources in Polar Coordinates*, Contributed Poster at the 2017 Summer Meeting of the American Association of Physics Teachers, Cincinnati, OH, July 24, 2017.

Farlow, Brian, Christensen, Warren M., Loverude, Michael, Vega, Marlene, *Addressing Student Ideas About Coordinate Systems in the Upper Division*, Contributed Poster and Talk at the 2017 Summer Meeting of the American Association of Physics Teachers, Cincinnati, OH, July 24-25, 2017.

Christensen, Warren M., Farlow, Brian, Vega, Marlene, Loverude, Michael, *Upper-division Physics Student Thinking Regarding Non-Cartesian Coordinate Systems*, Contributed Poster at the 2017 Transforming Research in Undergraduate STEM Education, St. Paul, MN, July 6, 2017.

Wawro, Megan, Watson, Kevin, Christensen, Warren M., *Meta-Representational Competence with Linear Algebra in Quantum Mechanics*, Preliminary Talk at the 2017 Conference for Research in Undergraduate Mathematics Education, San Diego, CA, February 25, 2017.

Christensen, Warren M., Farlow, Brian, Vega, Marlene, Loverude, Michael, *Upper-division Physics Student Thinking Regarding Non-Cartesian Coordinate Systems*, Contributed Poster at the 2017 Conference for Research in Undergraduate Mathematics Education, San Diego, CA, February 24, 2017.

Farlow, Brian, Loverude, Michael, Vega, Marlene, Christensen, Warren M., *Student Ideas About Coordinate Systems in the Upper Division*, Contributed Poster and Talk at the 2016 Summer Meeting of the American Association of Physics Teachers, Sacramento, CA, July 18, 2016.

Farlow, Brian, Vega, Marlene, Loverude, Michael, Christensen, Warren M., *Student Thinking Regarding Coordinate Systems in the Upper Division*, Contributed Poster at the 2016 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 11, 2016.

Vega, Marlene, Loverude, Michael, Passante, Gina, Christensen, Warren M., *Student Understanding of Non-Cartesian Coordinate Systems in Upper-Division Physics*, Contributed Talk at the 2016 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 12, 2016.

Farlow, Brian, Vega, Marlene, Loverude, Michael, Christensen, Warren M., *Student Thinking Regarding Coordinate Systems in the Upper Division*, Contributed Poster and Talk at the 2016 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 11-12, 2016.

Christensen, Warren M., Momsen, Jennifer L., *A Cohort Model for a Discipline-based Education Research REU Program*, Contributed Poster at the 2016 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 11, 2016.

Christensen, Warren M., Urich, Matthew, Widenhorn, Ralf, *Assessing a Flipped, Biomedically Focused Curriculum for IPLS*, Contributed Talk at the 2016 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 10, 2016.

Christensen, Warren M., Remily, Levi, Urich, Matthew, Widenhorn, Ralf, *Using Biomedical Curriculum in Introductory Physics for the Life Sciences*, Contributed Poster at the 2015 Summer Meeting of the American Association of Physics Teachers, College Park, MD, July 28th, 2015.

Christensen, Warren M., Lee, LaDoris, Henderson, Charles, Dancy, Melissa, *How do student evaluations of instruction relate to students' conceptual learning gains?* Contributed Talk at the 2015 Winter Meeting of the American Association of Physics Teachers, San Diego, CA, January 5, 2015.

Christensen, Warren M., Momsen, Jennifer L., *Outcomes of an REU Cohort Model in Discipline-based Education Research*, Contributed Poster at the 2015 Winter Meeting of the American Association of Physics Teachers, San Diego, CA, January 4, 2015.

Christensen, Warren M., *Using a Framing and Resources Framework For Analyzing Student Thinking about Matrix Multiplication*, Contributed Poster at the 2014 Conference for Research in Undergraduate Mathematics Education, Denver, CO, February 27, 2014.

Anderson, Elizabeth, Johnson, James K., Van Ness, Grace, Widenhorn, Ralf, Christensen, Warren M., *Assessing the Developing Curriculum of an Upper-level Physics in Biomedicine Course*, Contributed Talk at the 2013 Summer Meeting of the American Association of Physics Teachers, Portland, OR, July 17, 2013.

Anderson, Elizabeth, Johnson, James K., Van Ness, Grace, Widenhorn, Ralf, Christensen, Warren M., *Assessing Curriculum of a Physics in Biomedicine Course*, Contributed Poster at the 2013 Summer Meeting of the American Association of Physics Teachers, Portland, OR, July 17, 2013.

Johnson, James K., Christensen, Warren M., Widenhorn, Ralf, Van Ness, Grace, Anderson, Elizabeth, *Attitudinal Assessment of Curriculum on the Physics of Medical Instruments*, Contributed Talk at the 2013 Summer Meeting of the American Association of Physics Teachers, Portland, OR, July 16, 2013.

Christensen, Warren M., *Investigating Student Understanding of Eigentheory in Quantum Mechanics*, Contributed Talk at the 2013 Conference for Research in Undergraduate Mathematics Education, Denver, CO, February 22, 2013.

Christensen, Warren M., Johnson, James K., Van Ness, Grace R., Mylott, Elliot, and Widenhorn, Ralf, *Initial Assessment of a Curriculum on the Physics of Biomedicine*, Contributed Talk at the 2013 Winter Meeting of the American Association of Physics Teachers, New Orleans, LA, January 7, 2013

Christensen, Warren M., *Investigating students understanding of Eigentheory in Quantum Mechanics*, Contributed Poster at the 2012 Transforming Research in Undergraduate STEM Education, St. Paul, MN, June 6, 2012.

Pazicni, Samuel, Marrongelle, Karen, Christensen, Warren, *Tackling Teaching: Understanding Commonalities among Chemistry, Mathematics, and Physics Classroom Practices*, at the 2012

Conference for Research in Undergraduate Mathematics Education, Portland, OR, February 24, 2012.

Christensen, Warren M., *Research-based course design in a large lecture course without recitations*, at the 2012 Winter Meeting of the American Association of Physics Teachers, Ontario, CA, February 6, 2012.

Christensen, Warren M., Scherr, Rachel E., Close, Hunter G., McKagan, Sarah B., *Negotiating Novel Forms of Energy: "Phase Energy"*, poster at the 2011 Physics Education Research Conference, Omaha, NE, August 3, 2011.

Christensen, Warren M., Scherr, Rachel E., Close, Hunter G., McKagan, Sarah B., Close, Eleanor W., *'Productive Disciplinary Engagement' in the Context of Energy*, at the 2011 Summer Meeting of the American Association of Physics Teachers, Omaha, NE, August 2, 2011.

Christensen, Warren M., Scherr, Rachel E., Close, Hunter G., McKagan, Sarah B. *What meanings of "Forms of Energy" are implicit in the negotiation of novel forms?* poster at the 2011 Foundations and Frontiers of Physics Education Research Conference, Bar Harbor, ME, June 15, 2011.

Christensen, Warren M., *Moving Worked Physics Examples from the Classroom to YouTube*, at the 2011 Winter Meeting of the American Association of Physics Teachers, Jacksonville, FL, January 11, 2011.

Thompson, John R., Christensen, Warren M., Rasmussen, Chris L., Towns, Marcy H., *TRUSE Conference: Integrating Undergraduate Physics, Chemistry and Mathematics Education Research*, poster at the 2011 Winter Meeting of the American Association of Physics Teachers, Jacksonville, FL, January 11, 2011.

Christensen, Warren M., *Adapting Effective Small Group Activities*, at the 2010 Summer Meeting of the American Association of Physics Teachers, Portland, WA, July 20, 2010.

Christensen, Warren M., Thompson, John R., *Student understanding of slope and derivative after multivariable calculus*, at the Conference on Transforming Research in Undergraduate STEM Education, Orono, ME, June 15, 2010

Thompson, John R., Christensen, Warren M., Mountcastle, Donald B., *Investigating Student Understanding of Physics Concepts and the Underlying Calculus Concepts in Thermodynamics*, at the 2010 March Meeting of the American Physical Society, Portland, OR, March 16, 2010.

Christensen, Warren M., Thompson, John R., *Student understanding of calculus within physics and mathematics classrooms*, at the 2010 March Meeting of the American Physical Society, Portland, OR, March 16, 2010.

Thompson, John R. and Christensen, Warren M., *Investigating Student Understanding of Physics Concepts and the Underlying Calculus Concepts in Thermodynamics*, at the Conference on Research in Undergraduate Mathematics Education, Raleigh, NC, February 26, 2010

Kryjevskaja, Mila, Christensen, Warren M., *Adapting Research-based Instructional Materials To Meet Institutional Constraints*, at the 2010 Joint American Physical Society April

Meeting/American Association of Physics Teachers Winter Meeting, Washington D.C., February, 15, 2010.

Christensen, Warren M., Kryjevskaja, Mila *Adaptation of Tutorial-style Instruction for Interactive Lectures: Entropy “Two-blocks” Tutorial*, at the 2010 Joint American Physical Society April Meeting/American Association of Physics Teachers Winter Meeting, Washington D.C., February, 15, 2010.

Smith, Trevor I., Christensen, Warren M., Thompson, John R., Mountcastle, Donald B., *Addressing student difficulties considering entropy and heat engines*, poster at the 2009 Physics Education Research Conference, Ann Arbor, MI, July 30, 2009.

Christensen, Warren M., Smith, Trevor I., Thompson, John R., *Curriculum Adaptation in Upper-Level Thermodynamics: Entropy and the Second Law*, at the 2009 Summer Meeting of the American Association of Physics Teachers, Ann Arbor, MI, July 28, 2009.

Christensen, Warren M., Thompson, John R., *Student thinking regarding derivative and slope concepts in multivariable calculus*, at the 2009 March Meeting of the American Physical Society, Pittsburgh, PA, March 19, 2009.

Christensen, Warren M., Thompson, John R., Wittmann, Michael C., *Graduate student ideas about common student thinking concerning force and motion*, poster at the 2009 Conference on the Preparation of Physics and Physical Science Teachers, Pittsburgh, PA, March 13, 2009.

Christensen, Warren M., Thompson, John R., *Assessing the concepts of integration and differentiation in multivariable calculus*, poster at the 2008 Physics Education Research Conference, Edmonton, Alberta, Canada, July 23, 2008.

Christensen, Warren M., Thompson, John R., *Student difficulties concerning derivative and slope concepts in multivariable calculus*, at the 2008 Summer Meeting of the American Association of Physics Teachers, Edmonton, Alberta, Canada, July 22, 2008.

Christensen, Warren M., Thompson, John R., Wittmann, Michael C., *Assessing the evolution of content knowledge and pedagogical content knowledge in a graduate course in physics, pedagogy, and education research*, poster at the 2008 Conference on the Preparation of Physics and Physical Science Teachers, Austin, TX, February 29, 2008.

Christensen, Warren M. and Meltzer, David E., *“Is Entropy Conserved?” Student Understanding of Entropy in Introductory Physics*, at the 2007 American Astronomical Society/American Association of Physics Teachers Joint Meeting, Seattle, WA, January 9, 2007.

Meltzer, David E., and Christensen, Warren M., *Pedagogical Landscape in Upper-Level Thermal Physics*, at the 2007 American Astronomical Society/American Association of Physics Teachers Joint Meeting, Seattle, WA, January 9, 2007.

Christensen, Warren M. and Engelhardt, Larry, *Peer-Led Instruction for a Qualifying Exam Preparatory Course or: How I Learned to Stop Worrying and Love the PhD Qualifying Exam*, at the 2006 Physics Education Research Conference, Syracuse, NY, July 26, 2006.

Student Thinking Regarding Entropy and the Second Law of Thermodynamics, at the 2006 Summer Meeting of the American Association of Physics Teachers, Syracuse, NY, July 24, 2006.

Christensen, Warren M. and Engelhardt, Larry, *Peer-Led Instruction for a Qualifying Exam Preparatory Course or: How I Learned to Stop Worrying and Love the PhD Qualifying Exam*, at the 2006 American Physical Society April meeting, Dallas, TX, April 24, 2006.

Christensen, Warren M., and Meltzer, David E., *What's Entropy? Student Understanding of Thermodynamics in an Introductory Physics Course*, at the 2006 Winter Meeting of the American Association of Physics Teachers, Anchorage, AK, January 24, 2006

Meltzer, David E., Christensen, Warren M., and Thompson, John R., *Uneven Development of Students' Reasoning Regarding Concepts in Thermal Physics*, at the 2006 Winter Meeting of the American Association of Physics Teachers, Anchorage, AK, January 23, 2006.

Christensen, Warren M., Meltzer, David E., and Stroman, Thomas A., *Students' Ideas about the State-Function Property of Entropy*, at the conference on Foundations and Frontiers in Physics Education Research, Bar Harbor, ME, August 16, 2005.

Christensen, Warren M., and Meltzer, David E., *Students' Reasoning Regarding Entropy and the Second Law of Thermodynamics*, at the 2005 Summer Meeting of the American Association of Physics Teachers, Salt Lake City, UT, August 8, 2005.

Meltzer, David E., and Christensen, Warren M., *Students' Reasoning Regarding Entropy and the Second Law of Thermodynamics in an Upper-Level Thermal Physics Course*, at the 2005 American Physical Society March Meeting, Los Angeles, California, March 23, 2005.

Christensen, Warren M., and Meltzer, David E., *Student Understanding of Entropy and the Second Law of Thermodynamics in an Introductory Physics Course*, at the 2005 American Physical Society March Meeting, Los Angeles, CA, March 23, 2005.

Christensen, Warren M., and Meltzer, David E., *Students' Ideas about Entropy and the Second Law of Thermodynamics*, at the 2005 Winter Meeting of the American Association of Physics Teachers, Albuquerque, NM, January 11, 2005.

Meltzer, David E., and Christensen, Warren M., *Development of Student Reasoning in an Upper-Level Thermal Physics Course*, at the 2005 Winter Meeting of the American Association of Physics Teachers, Albuquerque, NM, January 11, 2005

Christensen, Warren M., Nguyen, Ngoc-Loan P., and Meltzer, David E., *Student Difficulties with Graphical Representation of Vector Products: Crossing and Dotting Beyond t 's and i 's*, poster at the 2004 Physics Education Research Conference, Sacramento, CA, August 4-5, 2004.

Christensen, Warren M., Nguyen, Ngoc-Loan P., and Meltzer, David E., *Semi-Intuitive Thinking and Reasoning Inconsistencies in Calorimetry*, at the 2004 Summer Meeting of the American Association of Physics Teachers, Sacramento, CA, August 3, 2004.

Christensen, Warren M., Nguyen, Ngoc-Loan P., and Meltzer, David E., *Intuitive and Rule-based Reasoning in the Context of Calorimetry*, at the 2004 Winter Meeting of the American Association of Physics Teachers, Miami Beach, FL, January 26, 2004

Nguyen, Ngoc-Loan P., Christensen, Warren M., and Meltzer, David E., *Students' Use of Rule-based Reasoning in the Context of Calorimetry and Thermal Phenomena*, poster at the 2003 Physics Education Research Conference, Madison, WI, August 6-7, 2003.

MENTORING

Christensen Curriculum Vitae

Graduate Students:

Brian Farlow, Ph.D., Department of Physics, North Dakota State University (Graduated Fall 2019)

Danny Luecke, Department of Mathematics, North Dakota State University

Undergraduate Researchers:

Marne Johnson, Brandon Johnson, Matthew Urich, Levi Remily, Daron Dykes, Jordan Brainard, Joseph Bonin, Samantha Gisi, Michael Noah, Matthew Hansen

Graduate Committee service:

Brianna Santangelo, Department of Physics, North Dakota State University

Safana Ismael, Department of Physics, North Dakota State University

Lauren Singelman, Department of Electrical and Computer Engineering, North Dakota State University

Nekeisha Johnson, Department of Physics, North Dakota State University

Rachel Salter, Department of Biological Sciences, North Dakota State University

Alistair McInerny, Department of Physics, North Dakota State University

Tara Slominski, Department of Biological Sciences, North Dakota State University

Shanda Lauer, Department of Psychology, North Dakota State University

Cody Gette, Department of Physics, North Dakota State University

Trent Anderson, Department of Chemistry and Biochemistry, North Dakota State University

Jon Dees, Department of Biological Sciences, North Dakota State University

Sarah Freeman, Department of Chemistry and Biochemistry, North Dakota State University

Jaime Wirth, School of Education, North Dakota State University

Kory Boehmer, School of Education, North Dakota State University

Trevor I. Smith, Department of Physics and Astronomy, University of Maine

COMMUNITY OUTREACH

2016 Liquid Nitrogen Demonstration for elementary students at Washington (20+)

2013 Liquid Nitrogen Demonstration for elementary students at Washington (20+)

2013 NDSU College of Science and Mathematics – Science Café Lecturer

2011 Science Fun Night – Longfellow Elementary, Fargo, ND

2011 Science Fun Day – Horizons Middle School, Moorhead, MN

2010 Science Fun Night – Longfellow Elementary, Fargo, ND

DEPARTMENTAL AND UNIVERSITY SERVICE

2022-2023 President Elect for the Faculty Senate

Summer 2022 Workshop using Clickers and Voting Cards in Interactive Classrooms for the OTL Teaching and Learning Conference with Dr. Tara Slominski (Biological Sciences)

Summer 2022 Workshop on Integrating FlipGrid for OTL Teaching and Learning Conference with Dr. Katie Wissman (Psychology)

2021-2023 Faculty Representative on the University President's Cabinet

Christensen Curriculum Vitae

2021-2022	College of Science and Mathematics Representative on the Faculty Senate Executive Committee
2021-2022	Faculty Senator from the College of Science and Mathematics
2021-2022	Creator and Member of FS Working Group on Mode of Instruction
2021-2022	Member of the Faculty Senate Ad Hoc Committee on Grading System Change
Fall 2021	Chair of Search Committee for Lecturer Position in Physics
2021-2022	Chair of Departmental Committee on Awards and Honors
2021-2022	Chair of Departmental Committee on Assessment
Summer 2021	Member of the College of Science and Mathematics Strategic Task Force
Spring 2021	Faculty Senator from the College of Science and Mathematics (substitute)
2019-2022	Member of Ad Hoc Learning Assistants Program Committee
2018-2020	Member of the College of Science and Mathematics PTE Committee
2016-present	Facilitated Search Committee Training on Inherent and Unconscious Bias (10 times)
2015-2017	College of Science and Mathematics Representative on the Faculty Senate Executive Committee
2015-2017	Faculty Senator from the College of Science and Mathematics
2015	Chair of Search Committee for Professor of Practice in Physics
2015	Conducted an Internal Department Evaluation about satisfaction among Physics Majors
2014-2015	Search Committee Member for Professor of Practice in Physics
2015	Co-organized a Regional Learning Assistants Workshop at NDSU
2015-2018	Workshop with Assistant Professor Chelsea Pace “The Classroom Is A Stage! Engaging Students Using All of Their Senses,” at the Graduate Learning Conference for College Teaching (3 times)
2014	New Faculty Mentoring Workshop for Advance FORWARD
2013-present	Served as a FORWARD Advocate
2013-2021	Chair of Physics Department Undergraduate Recruitment and Outreach
2012-2015	Faculty in Residence in the Mathew Living Learning Center
2011-2021	Faculty Advisor to the Society of Physics Students
2010-2018	LIVE REAL Mentor for the Department of Physics
2009-present	Steering Committee for the Interdisciplinary STEM Education Ph.D. program
2011-2013	Attended National Learning Assistants Workshop in Boulder, CO on three occasions to create and build capacity for the Learning Assistants Program at NDSU.
2009-2012	Physics Department Assessment Committee Member
2011	Summative Assessment Workshop for the Teaching and Learning Conference
2011	Formative Assessment Workshop for the College of Science and Mathematics
2010	Search Committee for new position in Engineering Education
2010	Summative Assessment Workshop for the Teaching and Learning Conference

NATIONAL/INTERNATIONAL SCIENTIFIC SERVICE

2017	Organized the 3rd Transforming Research in Undergraduate STEM Education Conference, taking place in St. Paul, MN. (Grant funded activity)
2007-present	Reviewer for <i>American Journal of Physics</i> , <i>Physical Review Special Topics: Physics Education Research</i> , <i>The Physics Teacher</i> and <i>The Proceedings of the Physics Education Research Conference</i>

Christensen Curriculum Vitae

2013-2016	Recruited to be a Learning Assistants Workshop Regional Team Leader to assist in developing and extending the Learning Assistants Alliance.
2012-2013	Served as Chair of the Committee on Research in Physics Education within the American Association of Physics Teachers
2012-2013	Served as Member Ex Officio to the Physics Education Research Leadership Organizing Council, the governing body for the Physics Education Research Topical Group within AAPT
2012	Organized a Workshop on Grant Writing in Physics Education Research at the Summer Meeting of the AAPT
2012	Organized the 2 nd Transforming Research in Undergraduate STEM Education Conference, taking place in St. Paul, MN. (Grant funded activity)
2011-2012	Served as Vice-Chair of the Committee on Research in Physics Education within the American Association of Physics Teachers
2010-2013	Served as an At-Large member on the Committee on Research in Physics Education within the American Association of Physics Teachers
2010	Volunteer for the Paper Sort for the National Summer Meeting of the American Association of Physics Teachers

MEMBERSHIPS

American Physical Society, American Association of Physics Teachers and Physics Education Research Topical Group

PROFESSIONAL DEVELOPMENT

2019	LGBTQ+ SafeZone Training 1, 2 & 3
2014	Raising Calculus to the Surface Workshop, Winona, MN
2014	FORWARD Search Committee Training
2011-2015	FORWARD Ally Coffee Meetings
2011	FORWARD Ally Training
2011	LGBTQ+ SafeZone Training
2009-2011	College of Science and Mathematics first and second year faculty seminars, North Dakota State University
2009-2018	Attended numerous Pedagogical Luncheons, North Dakota State University
2006	Preparing Future Faculty seminar series, Iowa State University