

Ryan S. Nixon, PhD

rynixon@byu.edu

CURRENT POSITION

Assistant Professor, Science Education 2015-current
Brigham Young University, Department of Teacher Education

EDUCATION

Doctor of Philosophy, Science Education 2015
University of Georgia, Athens, Georgia
Dissertation: *Knowing science like a teacher: An exploration of the content knowledge of new science teachers.*
Adviser: Julie A. Luft, PhD

Master of Arts, Teacher Education, Integrated STEM emphasis 2012
Brigham Young University, Provo, Utah
Thesis: *The effect of explicitly teaching multiple modes of representation in middle school science classrooms.*
Adviser: Leigh K. Smith, PhD

Bachelor of Science, Physics Teaching, Cum Laude 2009
Weber State University, Ogden, Utah
Level 2 Utah teaching certification: Physics, physical science, middle school science

SCHOLARSHIP

Peer-Reviewed Papers

Published

- Nixon, R. S., Toerien, R., & Luft, J. A. (in press). Knowing more than their students: Characterizing secondary science teachers' subject matter knowledge. *School Science and Mathematics.*
- Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (in press). Elementary teachers' science subject matter knowledge across the teacher career cycle. *Journal of Research in Science Teaching.* doi: <https://doi.org/10.1002/tea.21524>
- Nixon, R. S., Hill, K. M., & Luft, J. A. (2017). Secondary science teachers' subject matter knowledge development across the first five years. *Journal of Science Teacher Education, 28*(7), 574-589. doi: 10.1080/1046560X.2017.1388086
- Nixon, R. S., Luft, J. A., & Ross, R. J. (2017). Prevalence and predictors of out-of-field teaching in the first five years. *Journal of Research in Science Teaching, 54*(9), 1197-1218. doi: 10.1002/tea.21402
- Nixon, R. S., Campbell, B. K., & Luft, J. A. (2016). Effects of subject-area degree and classroom experience on new chemistry teachers' subject matter knowledge. *International Journal of Science Education, 38*(10), 1636-1654. doi: 10.1080/09500693.2016.1204482

Nixon, R. S., Godfrey, T. J., Mayhew, N. T., & Wiegert, C. C. (2016). Undergraduate student construction and interpretation of graphs in physics lab activities. *Physical Review Physics Education Research*, 12(1), 010104.

Luft, J. A., Dubois, S. L., Nixon, R. S., & Campbell, B. K. (2015). Supporting newly hired teachers of science: Attaining teacher professional standards. *Studies in Science Education*, 51(1), 1-48. doi: 10.1080/03057267.2014.980559

Nixon, R. S., Smith, L. K., & Wimmer, J. J. (2015). Teaching multiple modes of representation in middle school science classrooms: Impact on student learning and multimodal use. *School Science & Mathematics*, 115, 186-199. doi: 10.1111/ssm.12119

Luft, J. A., Nixon, R. S., Dubois, S. L., & Campbell, B. K. (2014). Supporting newly hired science teachers: Using research to inform practice. *The Science Teacher*, 81(6), 67-71.

Nixon, R. S., & Barth, K. N. (2014). A comparison of TIMSS items using cognitive domains. *School Science & Mathematics*, 114(2), 65-75. doi: 10.1111/ssm.12054

Nixon, R. S., & Johnston, A. (2009). Investigations into the hot chocolate effect. *Ergo*, 3, 63-69.

In Review

Luft, J. A., Fletcher, S. S., & Nixon, R. S. (accept with major revisions). Subject matter knowledge that is needed to teach science: Conceptualizing and exploring this construct. *Journal of Science Teacher Education*.

Navy, S. L., Nixon, R. S., Luft, J. A., & Jurkiewicz, M. A. (in review). Activation and interaction of a network of resources by new secondary science teachers. *Science Education*.

Book Chapters

Published

Nixon, R. S., & Luft, J. A. (2015). Teaching chemistry with a biology degree: Crosscutting concepts as boundary objects. In J. A. Luft & S. L. Dubois (Eds.), *Newly hired teachers of science: A better beginning* (pp. 75-85). Rotterdam, The Netherlands: Sense Publishers.

Luft, J. A., Dubois, S. L., Banilower, E. R., Campbell, B. K., Criswell, B. A., Donna, J. D., Firestone, J. B., Greisen, K., Henschel, M. M., Hill, K. M., McDonnough, J. T., Merk, H., Nixon, R. S., Richmond, G., Rushton, G. T., Stroupe, D., Webb, A. W., Windschitl, M., Wong, S. S. (2015). Connecting research to practice for better beginnings: Drawing upon what we know to enhance the teaching and learning of newly hired science teachers. In J. A. Luft & S. L. Dubois (Eds.), *Newly hired teachers of science: A better beginning* (pp. 197-203). Rotterdam, The Netherlands: Sense Publishers.

Conference Presentations

International Conferences

- Navy, S. L., Nixon, R. S., Luft, J. A., & Jurkewicz, M. A. (2019, April, submitted). *Activation and interaction of a network of resources by new teachers*. Paper presented at the American Educational Research Association, Toronto, Canada.
- Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2019, March, submitted). *“I’ve always been curious about science”*: Elementary teachers’ experiences outside of teaching. Paper presented at the NARST Annual International Conference, Baltimore, MD.
- Nixon, R. S., & Campbell, B. K. (2019, January, submitted). *Concept models as a planning tool for practicing science teachers*. Paper presented at the conference for the Association for Science Teacher Education, Savannah, GA.
- Mendenhall, M. P., Smith, L. K., & Nixon, R. S. (2019, March, accepted). *Developing scientific literacy: Grades 6-8 teachers’ knowledge and beliefs*. Paper presented at the NARST Annual International Conference, Baltimore, MD.
- Navy, S. L., Nixon, R. S., Luft, J. A., & Jurkewicz, M. A. (2018, March). *Availability and activation of contextual resources by new secondary science teachers*. Paper presented at the NARST Annual International Conference, Atlanta, GA.
- Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2018, March). *“I’ve got some work to do”*: Elementary teachers learning science through teaching experience. Paper presented at the NARST Annual International Conference, Atlanta, GA.
- Smith, L. K., Nixon, R. S., & Sudweeks, R. R. (2018, January). *Elementary teachers’ experience, subject matter knowledge, and knowledge of student misconceptions* Paper presented at the annual conference for the Association for Science Teacher Education, Baltimore, MD.
- Luft, J. A., & Nixon, R. S. (2017, April). *Exploring subject matter knowledge among science teachers: The potential of concept sketches*. Paper presented at the NARST Annual International Conference, San Antonio, TX.
- Smith, L. K., Nixon, R. S., Sudweeks, R. R., & Larsen, R. A. (2017, April). *Aspects of elementary teachers’ experience: Predictors of science subject matter knowledge?* Paper presented at the NARST Annual International Conference, San Antonio, TX.
- Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2017, January). *Prospective vs. novice teachers: Teaching experience and science subject matter knowledge*. Paper presented at the annual conference of the Association for Science Teacher Education, Des Moines, IA.
- Wiegert, C. C., Nixon, R. S., Godfrey, T. J., & Mayhew, N. T. (2016, July). Construction and interpretation of linear best-fit graphs in introductory labs. Paper presented at the American Association of Physics Teachers summer meeting, Sacramento, CA.

- Luft, J. A., Campbell, B. K., Nixon, R. S., Hill, K. M., & Dubois, S. L. (2016, April). *Beginning secondary science teachers' subject matter knowledge: Additional explorations and implications*. Paper presented at the annual conference for the American Educational Research Association, Washington, DC.
- Nixon, R. S., Hill, K. M., & Luft, J. A. (2016, April). *Content knowledge development when teaching out of field: The first five years*. Paper presented at the annual conference of NARST, Baltimore, MD.
- Nixon, R. S., Ross, R. J., & Luft, J. A. (2016, January). *Prevalence and predictors of out-of-field teaching in the first five years*. Paper presented at the annual conference for the Association for Science Teacher Education, Reno, NV.
- Campbell, B. K., Nixon, R. S. & Luft, J. A. (2015, March). *Context and constraints on noticing in classrooms of early career science teachers*. Paper presented at the annual conference of NARST, Chicago, IL.
- Dubois, S. L., Nixon, R. S., Toerien, R., & Jurkewicz, M. A. (2015, March). *Transcending national contexts: Cross-national and comparative science education research*. Related paper set presented at the annual conference of NARST, Chicago, IL.
- Nixon, R. S. Toerien, R., Luft, J.A., & Hewson, P.W. (2015, March). *Science knowledge for teaching of beginning teachers in South Africa and the US*. Paper presented at the annual conference of NARST, Chicago, IL.
- Luft, J. A., Dubois, S. L., Nixon, R. S., & Campbell, B. K. (2015, March). *Supporting new science teachers: What the research says about how to support new science teachers*. Paper presented at the NSTA National Conference, Chicago, IL.
- Crawford, B. A., Murray, J., Mazur, A., Capps, D. K., Ammons, J., Ross, R., & Nixon, R. S. (2015, January). *Tracking teachers' engaging their students in inquiry/science practices following authentic science professional development*. Paper presented at the conference for the Association for Science Teacher Education, Portland, OR.
- Luft, J. A., Hill, K., Nixon, R. S., Campbell, B. K., & Dubois, S. L. (2015, January). *The knowledge needed to teach science: Approaches, implications, and potential research*. Paper presented at the conference for the Association for Science Teacher Education, Portland, OR.
- Nixon, R. S. (2015, January). *Teaching chemistry with a biology degree: Crosscutting concepts as boundary objects*. Paper presented at the conference for the Association for Science Teacher Education, Portland, OR.

- Nixon, R. S., Campbell, B. K., & Luft, J. A. (2015, January). *Knowledge use when in- or out-of-field: Exploring beginning chemistry teacher content knowledge*. Paper presented at the conference for the Association for Science Teacher Education, Portland, OR.
- Jurkiewicz, M. A., Nixon, R. S., Toerien, R., & Brennan, A. R. (2014, January). *Beginning secondary science teachers' views of formative assessment*. Paper presented at the conference for the Association for Science Teacher Education, San Antonio, TX.
- Luft, J. A., Campbell, B. K., Dubois, S. L., Nixon, R. S., & Bang, E. (2014, January). *Newly qualified science teachers: What the research says*. Paper presented at the conference for the Association for Science Teacher Education, San Antonio, TX.
- Nixon, R. S., Dubois, S. L., Jurkiewicz, M. A., Toerien, R., Campbell, B. K., & Luft, J. A. (2014, January). *Science knowledge for teaching: Characterizations from early career teachers*. Paper presented at the conference for the Association for Science Teacher Education, San Antonio, TX.
- Hill, K. M., Luft, J. A., Weeks, C., Raven, S., & Nixon, R. S. (2013, September). *Content knowledge for teaching science: Capturing an elusive construct*. Paper presented at the conference for the European Science Education Research Association, Nicosia, Cyprus.
- Nixon, R. S. (2013, June). *Science knowledge for teaching: A beginning characterization of science teacher knowledge*. Poster at SAARMSTE Research School. Cape Peninsula University of Technology, Cape Town, South Africa.
- Luft, J. A., Weeks, C., Hill, K. M., Raven, S., & Nixon, R. S. (2013, April). *Science teacher knowledge: The impact of in- and out-of-field instruction*. Paper presented at the annual meeting for the American Association of Educational Research, San Francisco, CA.
- Luft, J. A., Hill, K. M., Weeks, C., Raven, S., & Nixon, R. S. (2013, April). *The knowledge needed for teaching science: A study of in and out-of-field teachers*. Paper presented at the annual conference of NARST, Rio Grande, Puerto Rico.
- Nixon, R. S., Barth, K. N., Young, J. S., & Wentworth, N. (2013, April). *A comparison of TIMSS items using cognitive domains*. Paper presented at the annual meeting for the American Association of Educational Research, San Francisco, CA.
- Nixon, R. S., & Smith, L. K. (2013, April). *Teaching multiple modes of representation in middle school science classrooms: Impact on student learning and multimodal use*. Paper presented at the annual conference of NARST, Rio Grande, PR.
- Local/Regional Conferences*
- Marks, S., Na, A., Rosdahl, V., Smith, L. K., Hall-Kenyon, K., & Nixon, R. S. (2018, October, submitted). *“Successful integration of science and literacy:” What it looks like in K-2 classrooms*. Paper presented at the annual conference of the Northern Rocky Mountain Educational Research Association, Salt Lake City, UT.

Campbell, B. K., & Nixon, R. S. (2015, February). *Exploring the development of new chemistry teacher content knowledge: The combined impact of degree and experience*. Paper presented at the UGA College of Education Faculty Research Conference, Athens, GA.

Campbell, B. K., & Nixon, R. S. (2015, February). *A layered way to think about science: Using multiple frameworks to represent science concepts*. Paper presented at the Georgia Science Teachers Association Annual Conference, Macon, GA.

Dubois, S. L., Nixon, R. S., Campbell, B. K., & Luft, J. A. (2014, February). *Research to strengthen and support induction science teachers: Building the capacity of science teachers*. Paper presented at the UGA College of Education Faculty Research Conference, Athens, GA.

Campbell, B. K., Luft, J. A., Nixon, R. S., & Dubois, S. L. (2014, February). *Applying a 5E framework to PhET simulations*. Paper presented at the Georgia Science Teachers Association Annual Conference, Macon, GA.

Nixon, R. S. (2013, February). *"It's easy, you can use pictures": A discussion on multimodal assessments*. Paper presented at the JoLLE Conference for Activist Literacies, Athens, GA.

Nixon, R. S., Barth, K. N., Young, J. S., & Wentworth, N. (2012, October). *A comparison of TIMSS scores using cognitive domains*. Paper presented at the annual conference of the Northern Rocky Mountain Educational Research Association, Park City, UT.

Nixon, R. S., Johnson, K., & Cantrell, P. (2011, October). *Comparing test blueprints in elementary and secondary science*. Paper presented at the annual conference of the Northern Rocky Mountain Educational Research Association, Jackson, WY.

Young, J. R., Despain, S., Klvacek, M., Miley, T., Nixon, R. S., Johnson, K., . . . Larsen, C. S. (2011, October). *Teachers as educational researchers: Taking up new ways of being*. Paper presented at the annual conference of the Northern Rocky Mountain Educational Research Association, Jackson, WY.

Grants

External

Pinnegar, S., Hall-Kenyon, K., Smith, L. K., Nixon, R. S., & Leary, H. (2018). *Increasing English Learners' (ELs) science based academic literacy through improving and sustaining the quality of their teachers*. U. S. Department of Education. \$6,062,883. (declined)

Nixon, R. S. (2017). *CAREER:Elementary teachers' development of science knowledge through teaching experience*. National Science Foundation Faculty Early Career Development Program (CAREER). \$812,562. (declined)

Internal

Smith, L. K., Hall-Kenyon, K., & Nixon, R. S. (2017). *Science literacy: Elementary teachers' knowledge and beliefs about what it means and how to teach it*. Brigham Young University McKay School of Education Research Grant, \$18,510. (funded)

Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2015). *Influence of teaching experience on elementary teachers' grade-level subject matter knowledge and documented science misconceptions*. Brigham Young University Mentoring Environments Grant, \$20,000. (declined)

Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2015). *Influence of teaching experience on elementary teachers' grade-level subject matter knowledge and documented science misconceptions*. Brigham Young University McKay School of Education Research Grant, \$22,900. (funded)

Invited Talks

Nixon, R. S., Ross, R. J., & Smith, L. K. (2019, February). *Patterns of re-novicing: Out-of-field teaching in elementary schools*. Paper presented at the Out-of-Field Teaching in Science Conference, St. Louis, MO.

Nixon, R. S. (2018, March). *Influence of teaching experience on elementary teachers grade-level subject matter knowledge and documented science misconceptions*. UGA Science Education Research Day, Athens, GA.

Nixon, R. S. (2018, March). *Graduate student forum at an annual conference of NARST*. Atlanta, GA.

Nixon, R. S. (2016). *A scenic overlook on the road to becoming a science teacher educator: Graphing in undergraduate physics labs*. Weber State University physics seminar. Ogden, UT.

Nixon, R. S. (2016, April). *Graduate student forum at an annual conference of NARST*. Baltimore, MD.

Research Interests: Teacher subject matter knowledge, out-of-field teaching, new science teachers

UNIVERSITY TEACHING EXPERIENCE

Teaching Science in Grades K-6 Instructor, Brigham Young University, Provo, Utah 2015
Taught prospective elementary teachers methods of teaching science to students in grades K-6.

Elementary Science Methods Teaching Assistant. University of Georgia, Athens, Georgia 2014
Assisted in teaching 25 students in an elementary science methods course that involved participation in a professional development school. Supervised by Julie Kittleson, PhD.

- Middle School Physical Science Instructor.*** University of Georgia, Athens, Georgia 2014
Co-taught physical science content course for 23 prospective middle school science teachers with another graduate student. Supervised by David Jackson, EdD.
- Introductory Physics Teaching Assistant.*** University of Georgia, Athens, Georgia 2014
Assisted with an introductory physics for engineers course held in a SCALE-UP classroom. Supervised by Craig Wiegert, PhD.
- Secondary Science Teaching Methods Intern.*** University of Georgia, Athens, Georgia 2013
Assisted with secondary science methods course by teaching, giving feedback on student work, and supervising field placements. Supervised by Julie Luft, PhD.
- Middle School Physical Science Intern.*** University of Georgia, Athens, Georgia 2013
Assisted and observed in physical science course for prospective middle school teachers. Supervised by David Jackson, EdD.
- Lab Aide.*** Weber State University Physics Department, Ogden, Utah 2008
Assisted students with science content and technical support for four introductory physics labs. Supervised by Michelle Arnold, PhD.

K-12 TEACHING EXPERIENCE

-
- Science Teacher.*** Dixon Middle School, Provo, Utah 2009-2012
Taught Eighth Grade Integrated Science to 130 students in classes consisting of 16-32 students from ethnically and socioeconomically diverse backgrounds for three years. Also taught Study of Flight, an elective course that integrated science, engineering, and social studies content related to flight.
- Outreach Team Student Director.*** OttReach/Science in the Parks, Ogden, Utah 2009
Under the direction of a Weber State University professor, organized and led an informal science education program in Ogden City parks. Supervised by Adam Johnston, PhD.
- Outreach Team Member.*** OttReach/Science in the Parks, Ogden, Utah 2008
Informally taught simple science concepts and encouraged curiosity in young children at low-income area parks. Supervised by Adam Johnston, PhD.

AWARDS AND SCHOLARSHIPS

-
- National Association for Research in Science Teaching *Research Worth Reading* finalist 2017
- Association for Science Teacher Education 2016 Conference Paper Award V: Implications for Research for Educational Practice 2017
- Outstanding Teaching Assistant Award 2015
- NARST Research School Scholarship for participation in South African research school 2013
- Distinguished Paper Award, NRMERA 2012 Conference 2012
- Praxis II Recognition of Excellence 2011
- Armed Forces Communications and Electronics Association STEM Teacher Scholarship and Teaching Tools Award 2010, 2011
- Outstanding Science Teaching Major Award 2009

SERVICE

Professional Organizations

Ad hoc reviewer <i>International Journal of Science Education</i>	2017
Ad hoc reviewer <i>Teaching and Teacher Education</i>	2017
Reviewer for ASTE Annual Conference	2014-2018
Reviewer for NARST Annual Conference	2013-2018

State

Utah elementary science endorsement team member	2018-present
Utah 5th grade science standards writing team member	2018-present

McKay School of Education

Early childhood and elementary partnership advisory council	2016-present
---	--------------

Department of Teacher Education

Student advisory council co-chair	2018-present
Faculty load council member	2017-2018
Elementary science coordinator	2016-present
Curriculum committee member	2016-present
Elementary mathematics education search committee member	2016-present
Graduate admissions committee member ad hoc member	2016

PROFESSIONAL ORGANIZATIONS

Utah Science Teachers Association	2017-present
Georgia Science Teachers Association	2015-present
Teaching Across Specialisations Collective	2014-present
Association for Science Teacher Education (ASTE)	2013-present
American Educational Research Association (AERA)	2012-present
School Science and Mathematics Association (SSMA)	2012-present
National Association for Research in Science Teaching (NARST)	2011-present
Northern Rocky Mountain Educational Research Association (NRMERA)	2011-2016
National Science Teachers Association (NSTA)	2007-2012
American Association of Physics Teachers (AAPT)	2006-2011