

Ryan S. Nixon, PhD

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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

Navy, S. L., Nixon, R. S., Luft, J. A., & Jurkiewicz, M. A. (in press). Accessed or latent resources? Exploring new secondary science teachers' networks of resources. *Journal of Research in Science Teaching*.

Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2019). Elementary teachers' science subject matter knowledge across the teacher career cycle. *Journal of Research in Science Teaching*, 56(6), 707-731. doi: <https://doi.org/10.1002/tea.21524>

Nixon, R. S., Toerien, R., & Luft, J. A. (2019). Knowing more than their students: Characterizing secondary science teachers' subject matter knowledge. *School Science and Mathematics*, 119, 150-160. doi: <https://doi.org/10.1111/ssm.12323>

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*
- Nixon, R. S., & Campbell, B. K. (in review). Concept models as a planning tool for practicing science teachers. *International Journal of Science Education*.
- Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (in review). "I've got some work to do": Elementary teachers learning science through teaching experience. *Science Education*.
- Young, T. A., & Nixon, R. S. (in review). Avoiding supporting science misconceptions through fiction books. *The Reading Teacher*.

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

Smith, L. K., Nixon, R. S., & Hall-Kenyon, K. M. (2020, April, accepted). *Elementary teachers' conceptions of successful science and literacy integration*. Paper presented at the NARST Annual International Conference, Portland, OR.

Nixon, R. S., & Campbell, B. K. (2020, January, accepted). *Analysis of concept models: A tool for supporting teachers' in working through science concepts*. Paper presented at the conference for the Association for Science Teacher Education, San Antonio, TX.

Morrison, T., Maguet, M., Wilcox, B., and Nixon, R. S. (2019, November) *Identifying elements of voice in first-grade science writing*. Paper presented at the annual meeting of the Association of Literacy Educators and Researchers, Corpus Christi, TX.

Navy, S. L., Nixon, R. S., Luft, J. A., & Jurkewicz, M. A. (2019, April). *Activation and interaction of a network of resources by new teachers*. Paper presented at the American Educational Research Association, Toronto, Canada.

Mendenhall, M. P., Smith, L. K., & Nixon, R. S. (2019, March). *Developing scientific literacy: Grades 6-8 teachers' knowledge and beliefs*. Paper presented at the NARST Annual International Conference, Baltimore, MD.

Nixon, R. S., Smith, L. K., & Sudweeks, R. R. (2019, March). *"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). *Concept models as a planning tool for practicing science teachers*. Paper presented at the conference for the Association for Science Teacher Education, Savannah, GA.

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

Nixon, R. S. & Abbott, B. W. (2019). *Elementary teachers' informal learning of science content with innovative water cycle materials*. National Science Foundation Education and Human Resources Directorate Core Research Program (ECR). \$490,600. (submitted)

Nixon, R. S. (2019). *CAREER: Learning science subject matter knowledge through teaching experience*. National Science Foundation Faculty Early Career Development Program (CAREER). \$562,966. (declined)

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

Abbott, B. W., Ames, D., Glenn, K. S., Nixon, R. S., Hopkins, B. G., Gill, R., Carling, G. (2019). *We are teaching the water cycle wrong: Fixing misconceptions of water in the Anthropocene*. Brigham Young University Interdisciplinary Research Origination Awards, \$119,500. (declined)

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. (2019, April). *Graduate student forum at an annual conference of NARST*. Baltimore, MD.

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, April). *Graduate student forum at an annual conference of NARST*. Atlanta, GA.

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. (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 PreK-3 Instructor, Brigham Young University, Provo, UT since 2019
Taught prospective elementary teachers methods of teaching science to students in grades preK-3.

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

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.

Teaching Grants

Nixon, R. S. (2019). *Teacher candidates participation in the National Science Teaching Association conference*. Brigham Young University McKay School of Education Experiential Learning Grant, \$3,640. (funded)

Nixon, R. S. (2018). *Teacher candidates participation in the Utah Science Teachers Association conference*. Brigham Young University McKay School of Education Experiential Learning Grant, \$6,000. (funded)

K-12 TEACHING EXPERIENCE

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- 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

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- 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

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- Professional Organizations*
- NARST Program Committee, strand coordinator 2019-2021
 National Science Foundation grant reviewer 2019
 Graduate student forum speaker at NARST Annual Conference 2018, 2019
Science Education reviewer 2019-present
Teaching and Teacher Education reviewer 2017-present
International Journal of Science Education reviewer 2017-present
Chemistry Education Research and Practice reviewer 2017-present
 Reviewer for ASTE Annual Conference 2014-2019
 Reviewer for NARST Annual Conference 2013-2019
- State*
- Utah SEEd standards core guide team member 2019
 Utah elementary science endorsement team member 2018-2019

Utah 5th grade science standards writing team member 2018-2019

McKay School of Education

Convocation, name reader of graduates 2019
Undergraduate recruitment council 2017-present
Early childhood and elementary partnership advisory council 2016-present

Department of Teacher Education

Graduate recruitment committee 2019-present
Study group co-leader, with Sarah Clark 2019-2020
Study group member, directed by Robert Bullough 2019
TED Student Council chair 2018-present
Faculty load council member 2017-2018
Elementary science coordinator 2016-present
Curriculum committee member 2016-2019
Elementary mathematics education search committee member 2016-2019
Graduate admissions committee member ad hoc member 2016

PROFESSIONAL ORGANIZATIONS

Utah Science Teachers Association 2017-present
Georgia Science Teachers Association 2015-2020
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) 2012-2018
National Association for Research in Science Teaching (NARST) 2011-present
Northern Rocky Mountain Educational Research Association (NRMERA) 2011-2016
National Science Teachers Association (NSTA) 2007-2019
American Association of Physics Teachers (AAPT) 2006-2011