

# Ryan S. Nixon, PhD

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## CURRENT POSITION

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

## EDUCATION

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**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

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### *Peer-Reviewed Papers*

#### *Published*

- 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., 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*.
- Nixon, R. S., & Campbell, B. K. (in review). Concept models as a planning tool for practicing science teachers. *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. *Journal of Research in Science Teaching*.
- Maguet, M., Morrison, T., Wilcox, B., and Nixon, R. S. (in review) Identifying elements of voice in first-grade science writing. *Literacy Research and Instruction*.
- 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*

- Morrison, T., Maguet, M., Wilcox, B., and Nixon, R. S. (2019, November, submitted) 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, submitted). *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, accepted). *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, accepted). *"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., Klavacek, 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*

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. (submitted)

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)

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**

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***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**

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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*

Reviewer *Teaching and Teacher Education* 2017-present  
Ad hoc reviewer *International Journal of Science Education* 2017-present  
Ad hoc reviewer *Chemistry Education Research and Practice* 2017-present  
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  
Undergraduate recruitment council 2017-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**

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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