Current recommendations in science education highlight the notion that students must experience science in ways that echo the experiences of scientists in order to develop proficiencies in that discipline (NGSS Lead States, 2013; NRC, 2012). In this way, K-12 teachers must move beyond simply focusing on content to providing students with opportunities to think, feel, act, and behave as scientists do as the work to construct understandings about the natural world through disciplinary engagement. These features of disciplinary engagement include the cultural aspects of science—the knowledge, practices, habits of mind, and affect that scientists must attend to in order to work within a scientific community of practice (See Figure 1) (Lave & Wenger, 1991; Pickering, 1995).

If K-12 students are to experience aspects of the culture of science in the classroom, then it stands to reason that science teachers should have a clear understanding of what science, as a cultural endeavor, entails. Yet most science teachers have had limited exposure to or experiences with the scientific community, and therefore may not have full knowledge or understanding of the culture of science and this is particularly true for many elementary teachers (Trygstad et al., 2013). One possible way to provide such understanding for K-12 teachers is through Research Experiences for Teachers (RET) professional development programs, programs in which teachers are situated within a scientific community of practice for a time to work shoulder-to-shoulder with research scientists. In addition to supporting teachers’ understanding of and participation in science, a central goal of RET programs is to influence change in teachers’ classroom practices for teaching science, a central goal of RET programs is to influence change in teachers’ classroom teaching practice.

INTRODUCTION

Why Focus on Elementary Teachers?

High quality science education during the elementary years provides students with opportunities to develop critical processing and problem-solving skills, disciplinary practices, and habits of mind inherent to the scientific community. Before concepts in science learning may become too daunting or complex (Czerniak & Mentzer, 2013). Yet, despite its importance, science teaching is often minimized in elementary school. One possible reason for this is that K-5 teachers are often unprepared to teach science in meaningful ways due to inadequate science teaching preparation, underdeveloped science content knowledge, and a lack of personal experience with scientific research (Aflalo, 2014).

RET programs are fertile contexts to support K-5 teachers in becoming more confident and comfortable with science and the work of scientists by immersing them in hands-on research while working elbow-to-elbow with experts. The hope, then, is that such exposure will translate to their classroom teaching practice.

METHODS

Research Questions

- What aspects of the culture of science and the community of science are elementary teachers experiencing in a Research Experience for Teachers program?
- How do elementary teachers come to understand and take up these aspects in their RET experiences?
- In what ways might these experiences within the community and culture of science influence elementary teachers’ classroom practices for teaching science?

Study Participants

Ava
- Majored in Elementary Education
- Elementary K-6 Certified (FL)
- 16-20 years teaching experience
- Teaches at a Title 1 School

Carrie
- Majored in Special Education
- ESE/ElemPreK/P/Phek-D Cert. (FL)
- 6-10 years teaching experience
- Teaches at a Title 1 School

Lynette
- Majored in Special Education
- ESE/ElemPreK/P/Phek-D Cert. (FL)
- 6-10 years teaching experience
- Teaches at a Title 1 School

Miranda
- Majored in Elementary Education
- Elementary/ECE Certified (NC)
- 11-15 years teaching experience
- Teaches at a Title 1 School

Next Steps

Some preliminary reflections from the elementary teacher RET participants suggest that they each left the MagLab feeling more confident and enthusiastic about teaching science in the coming school year. In addition to analyzing the current data for aspects of teachers’ experiences with the culture and community of science, next steps include conducting follow-up observations and interviews within the elementary participants’ classroom contexts in order to gain a better understanding of the ways in which the RET program might influence their teaching practice.

REFERENCES


ACKNOWLEDGEMENTS

Thank you to Jose Sanchez, Roxanne Hughes, and the Center for Integrating Research and Learning (CIRL) staff for their continued support and for allowing me to work closely with the RET program over the last several years.
Thank you to the RET mentor scientists at the National High Magnetic Field Laboratory, particularly Bob Goddard, Jianyi Jiang, and Yang Wang, for allowing me to observe their work and interactions with the 2017 RET participants.
Thank you to Sherry Southerland and my dissertation committee members at Florida State University for their guidance and commitment to my success throughout this project.
This work was performed at the National High Magnetic Field Laboratory and is supported by National Science Foundation DMR-1157490.