Community – School Partnership: Bringing Together NGSS and Citizen Science in Elementary Classrooms Across New Hampshire

Lara Gengarelly[1], Sameer Honwad[2], Megan Glenn[1], Erik Froburg[1], Malin Clyde[1], Haley Andreozzi[1]

[1]University of New Hampshire, [2]SUNY Buffalo

Introduction / Rationale

Currently K-12 science instruction is changing in the United States. As described in the *Framework* (National Research Council [NRC] 2012) and outlined in the *Next Generation Science Standards* (NGSS Lead States 2013), the new national K-12 science education recommendations emphasize active learning that engages students in the science practices while learning disciplinary content. Furthermore, a fundamental principle of the *NGSS* is that K-12 students engage in science learning that is relevant to their everyday lives, hence demanding real-world, problem-based learning (NRC, 2012). Research indicates that ongoing support and PD helps teachers transform their instruction to reflect the vision of NGSS (Houseal et al., 2014; Miller et al., 2015).
Schoolyard SITES is a UNH research study that investigates a new PD model for elementary school teachers. The program partners teachers with Cooperative Extension science volunteers (ESVs) to create a community-based professional development partnership that improves educators' use of locally-relevant, citizen science projects in the classroom. The model builds on the premise that both groups have expertise that can be shared and collaboratively developed.

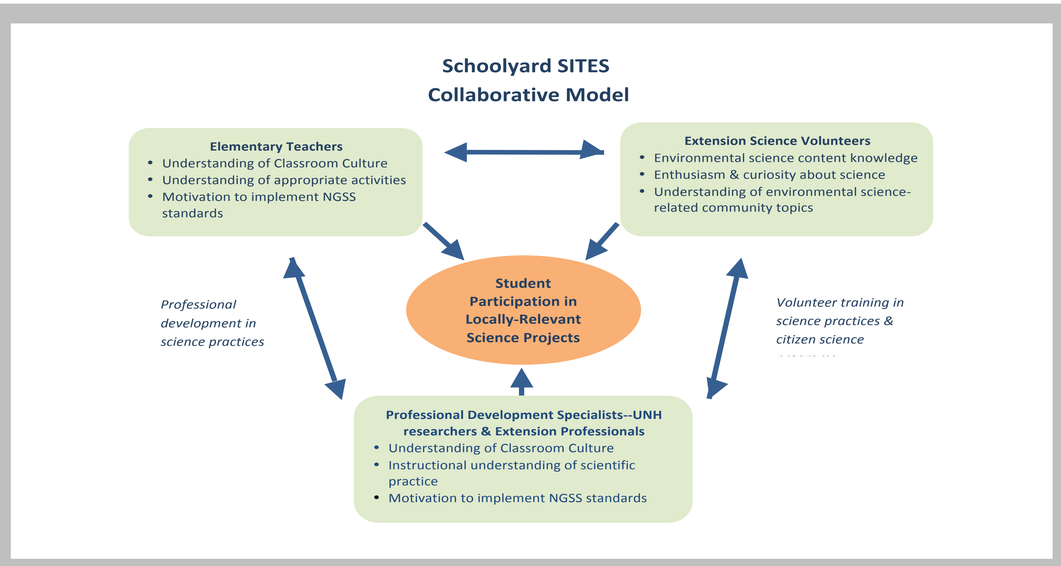
Research

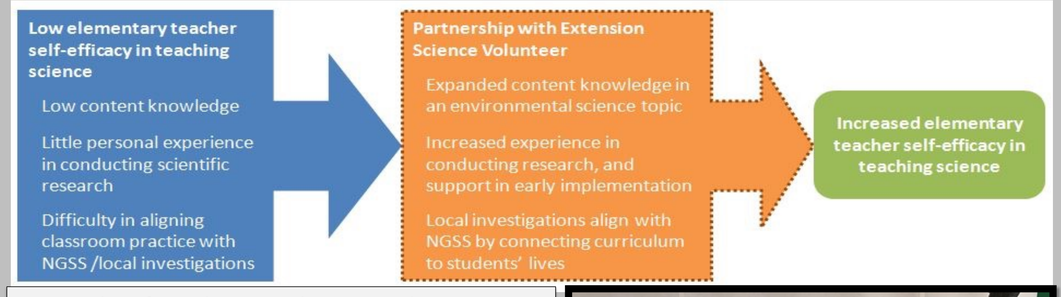
Primary Research Question:

What aspects of an Extension science volunteer-teacher collaboration improve elementary teachers' self-efficacy in teaching science, science content knowledge, and their ability to integrate NGSS science practices through locally-relevant citizen science projects?

- What is the process of collaboration between ESVs and teachers?
- What are the changes that are observed in elementary school teachers' self-efficacy teaching science and ability to integrate NGSS science practices through locally-relevant citizen science project?
- What is the shift that is observed in teacher content knowledge and how does the shift in teacher content knowledge relate to the changes in teacher self-efficacy?

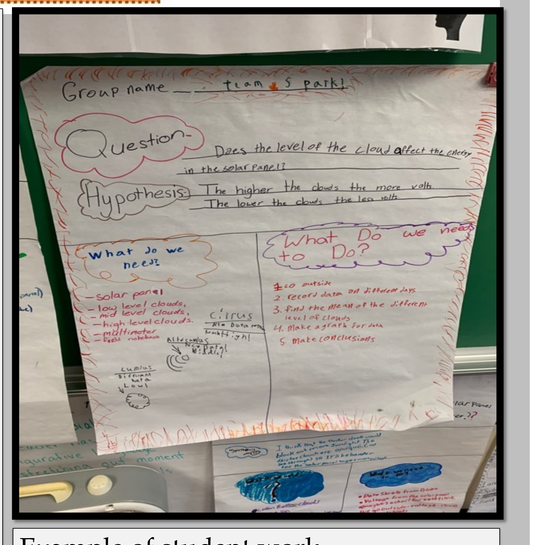
School-Community Partnership Model





Example of co-designed Curriculum
Energy and Atmosphere designed by 4th grade teachers and Extension science volunteer partner
NGSS PE: 4-PS3-2 Observations to provide evidence that energy can be transferred from place to place
SEPs:
• Asking Questions
• Planning and Carrying out Investigations
• Analyzing and Interpreting Data
• Engaging in Argument from Evidence

Student Generated Scientific Questions:
Does the level of the cloud affect the energy in the solar panel?
Does cloud opacity affect how much energy can be absorbed by a solar panel?
Citizen Science Connection: GLOBE Atmosphere –cloud protocol



Example of student work.
Overarching question for the project:
Do clouds affect how much energy can be absorbed by a solar panel?

Methods

Collaboration: In order to observe and analyze collaboration between the ESVs and teachers we used the method proposed by Stokols et al. (2003a, 2003b).

1. We designed and administered a pre/post survey that focused on understanding the collaborative process between the teacher and volunteer.
2. We also designed and conducted semi-structured interviews that were complimentary to the surveys.

Self Efficacy: For the purposes of researching teacher self-efficacy we used the *science teaching efficacy and belief instrument* (STEBI) (Riggs & Enochs 1990; Stohlman, Moore, & Roehrig, 2012). The pre-post survey had approximately 25 – 30 items, and each item prompted a response from the teachers on whether they *strongly agree, agree,* are *uncertain, disagree* or *strongly disagree* with the item statement.

NGSS: Along with surveys and interviews we also collected the curriculum unit plans that the teachers and ESV partners designed collaboratively.

Findings, Discussion and Conclusion

Collaboration: All of the teachers (n = 12) and volunteers (n=7) reported that they have seen a new pathway to building teacher-community partnerships.

Self Efficacy: On average, teachers felt more able to successfully teach elementary science after participating in the Schoolyard SITES program The average self-efficacy score increased from 50.8 to 54.8 (Fig. 1).

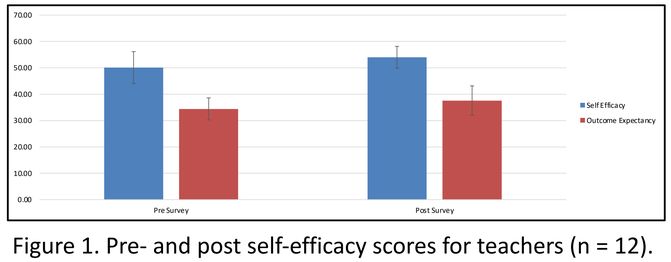


Figure 1. Pre- and post self-efficacy scores for teachers (n = 12).

NGSS: We have observed an overall increase in NGSS practices in the classroom. The top science practices reported were students' carrying out investigations, asking scientific questions, analyzing and interpreting data, and designing and using models.

Leitzel Center | Extension

University at Buffalo
The State University of New York

Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Grant Number:
DRK 12 # 1721133

References (QR Code):