

Integrating Community Outreach into an Undergraduate Forest Resources Communications Course



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Introduction

High quality **communication skills** are critical for natural resources graduates entering the work force, and some undergraduate curricula are being adjusted to support emphasis on society-ready students (Sample et al. 2015; Bullard et al. 2014). Despite being a metric of positive outcomes touted by undergraduate research programs, **outcomes of formal communication** to peer and lay audiences receive little attention in undergraduate research literature. The **PINEMAP Undergraduate Research Fellowship** is a unique forest resources program providing undergraduates the opportunity to participate in authentic research at collaborating institutions for 12 weeks during the summer followed by a 16 week fall online independent study course, *Effective Communication Skills* (Figure 1). Since 2012, **38 students have completed the program** over four cohorts and reached a wide variety of secondary school students.

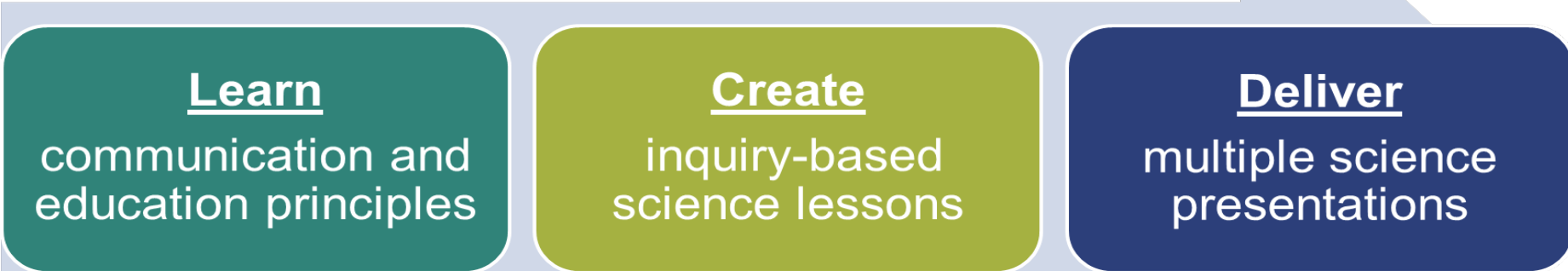


Figure 1. Diagram showing the process students go through to develop and deliver presentations that function as PINEMAP education and outreach.

Outreach Lessons

Perhaps the most important course component occurs when **students provide outreach for PINEMAP** by presenting to 10 public secondary school classes. Students' lessons include **activities that reinforce the message** related to forest resources, climate change, and PINEMAP research. For example, one presentation utilized a terrarium and infrared gas analyzer to show the process of photosynthesis decreasing atmospheric CO₂ and respiration increasing atmospheric CO₂ (Figure 2). After multiple practice sessions, students coordinate visits with school teachers near their home university (Table 1). Host teachers evaluate students' lessons and provide qualitative feedback.



Figure 2. A 2012 PINEMAP Fellow uses a closed terrarium to demonstrate how plants change quantities of atmospheric CO₂.

Table 1. PINEMAP Fellowship outreach metrics for 2012-2015.

	2012	2013	2014	2015	Total	Unique
Fellowships completed	5	12	10	11	38	-
Presentations delivered	53	107	81	94	335	-
Schools visited	14	25	24	31	94	84
Teachers visited	29	40	32	36	137	115
Students reached	1,060	2,629	1,518	2,108	7,315	-

"If all college students were as prepared, articulate, and polished as [this student] was on his presentation topic, there would be a greater demand for these types of opportunities."
 - 2015 host teacher

Research Communications

The second half of the distance class ties students' summer research together with presentation skills as students develop scientific abstracts, posters, and narrated slide presentations (Figure 3). A peer review activity for posters began in 2013. These are skills useful in communicating research in future undergraduate and graduate studies. Students submit good quality drafts, receive feedback for revisions, and submit final versions for grades.

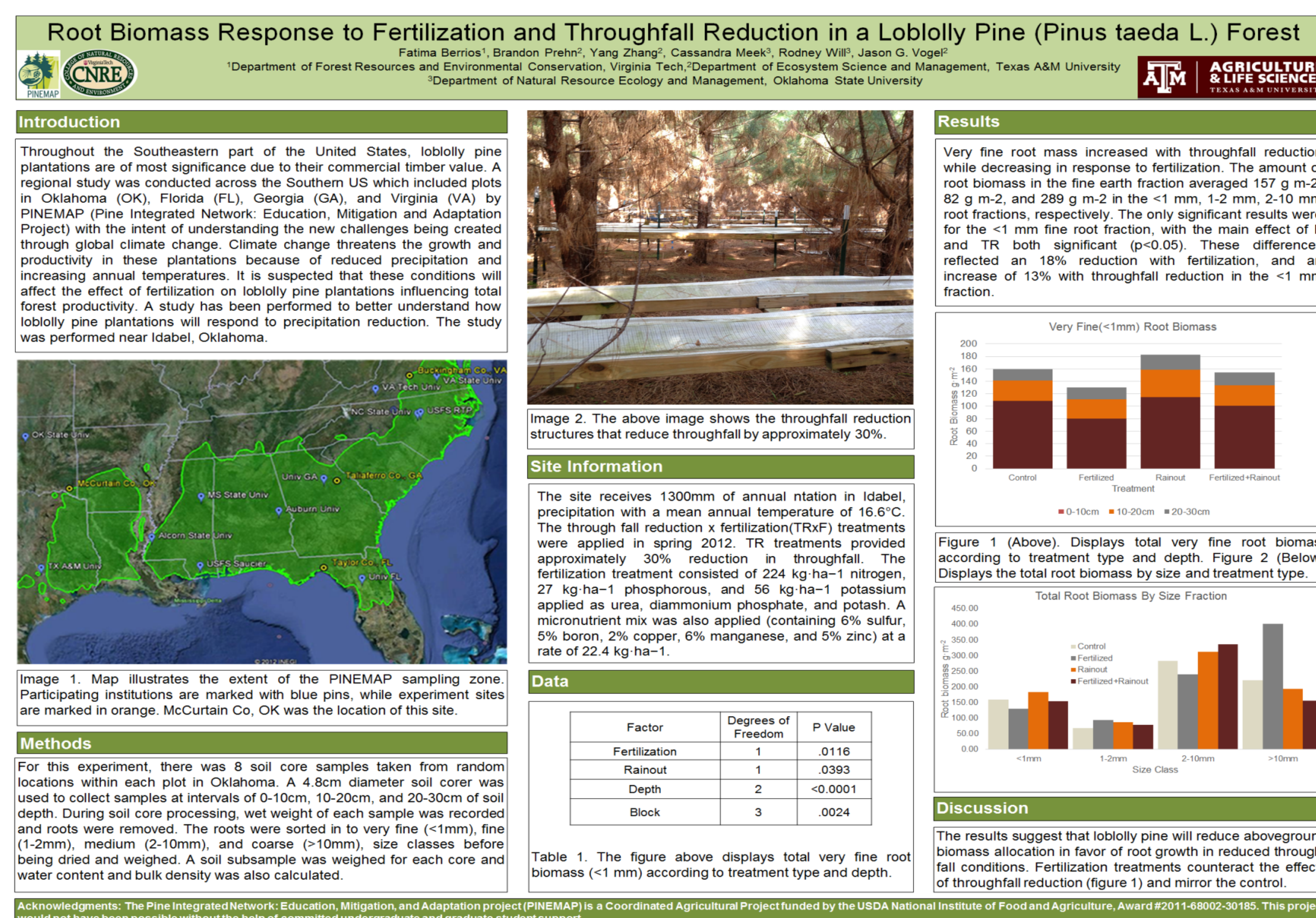


Figure 3. Research poster created by a student researcher in the PINEMAP Undergraduate Fellowship Program during 2015.

Public Speaking Anxiety Scores

- 22 students completed the Personal Report on Public Speaking Anxiety survey (McCroskey 1970) before and after the course (Figure 4).
- Speaking apprehension decreased** by 16 points on average ($p < .0001$).

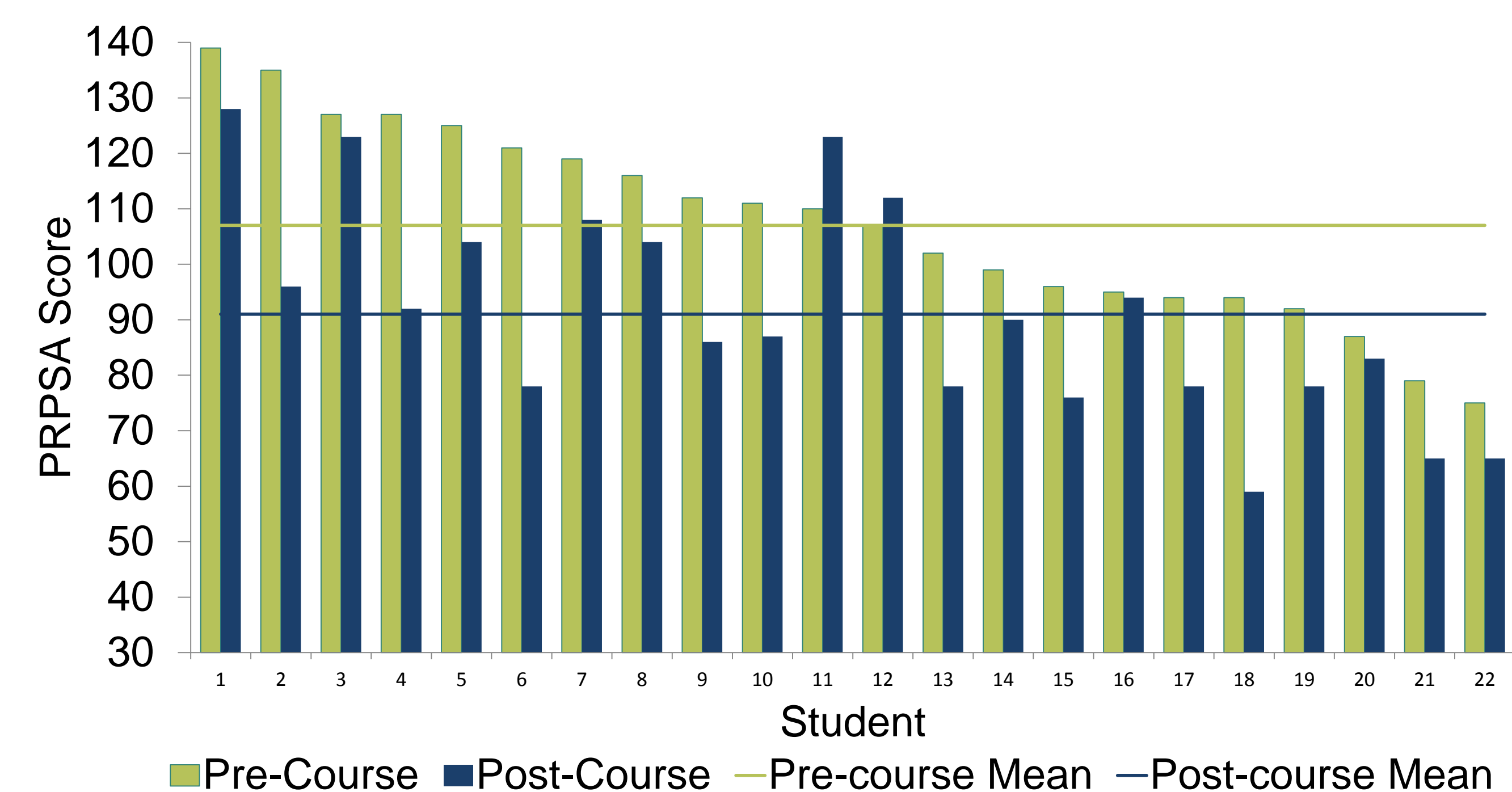


Figure 4. Pre-course and post-course speaking anxiety scores show an average 16 point decrease for students fall 2012- spring 2016.

Course Evaluations

- Twenty-five students completed the end of course evaluation (Figure 5).
- This survey used Likert-type items on a 5 point rating where "Strongly Agree" = 5 and "Strongly Disagree" = 1.
- Respondents indicated skill improvement in **creative thinking, oral communication, and written communication**.
- Responses also suggest that **research communication assignments are helpful** to students preparing for graduate school and future employment.
- Feedback on possible improvements was taken into consideration during a **revision of the syllabus and assignment grade weighting**.

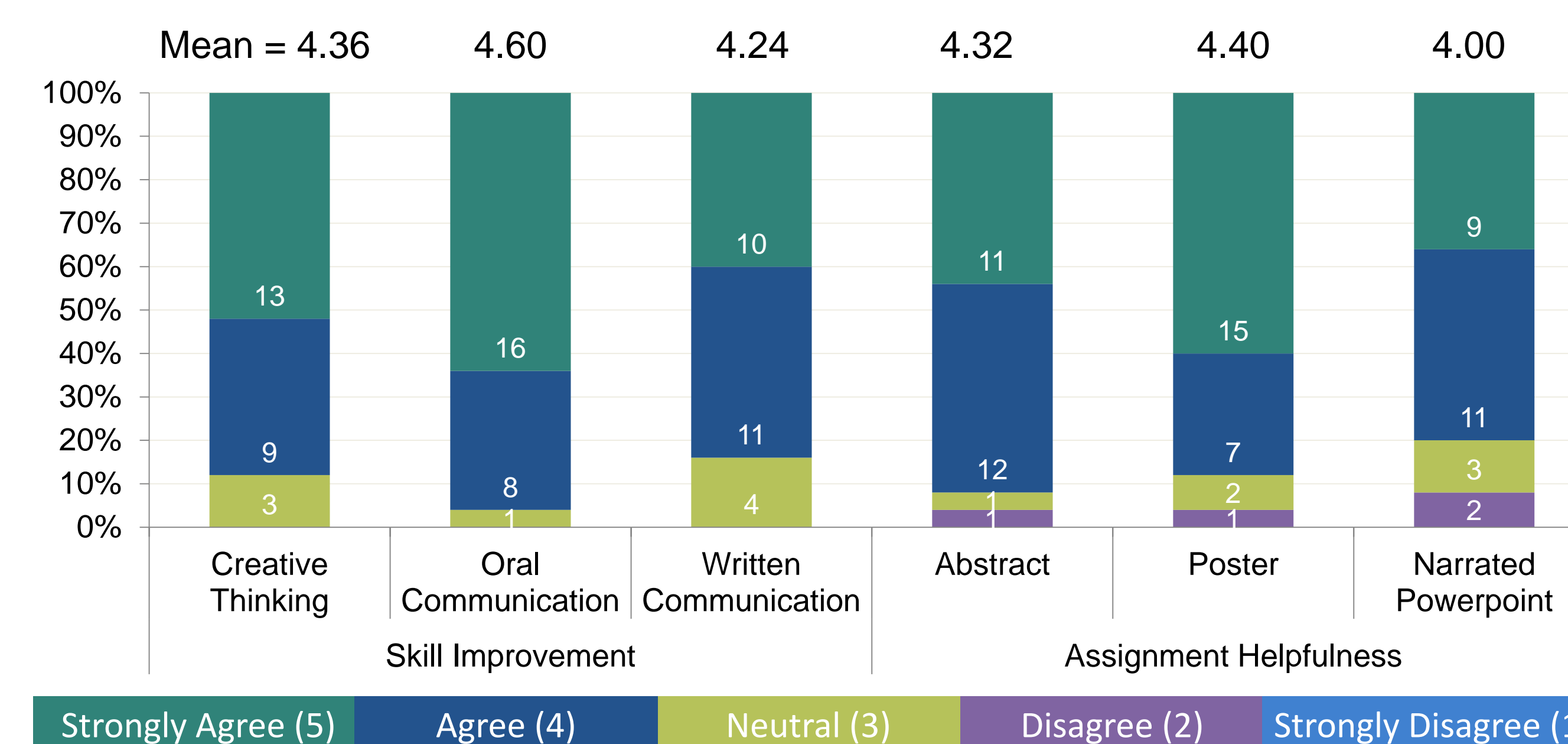


Figure 5. End of course evaluations ($n = 25$) for 2012-2015 suggest that students improved creative thinking, oral communication, and written communication skills and that the research communication assignments were helpful.

"I really appreciated learning about how to do these and getting practice before grad school. They never make undergraduates do things such as practice writing professional abstracts and posters, so I was thankful for this experience."
 - 2013 student

"Doing the poster and powerpoint really helped me learn more about the concepts and ideas of the study I was part of. I am walking away with a much greater understanding to it all."
 - 2014 student

"Public presentations to schools was a great experience and has improved my abilities and confidence in organizing and presenting a project."
 -2014 student

"All of these assignments were very helpful to develop my scientific writing. I feel more prepared for my higher level classes from this work."
 -2015 student

Conclusions

- Undergraduates interacted with many secondary school students from diverse ages and geographic areas by giving natural resources lessons.
- Secondary school educator feedback indicates they appreciate the opportunity for undergraduate researchers to visit their classrooms to teach students about natural resources.
- Including this form of community engagement in the course curriculum contributed to undergraduates' perceived gains in creative thinking, oral communication and written communication.
- We believe integrating community outreach contributes to undergraduates' preparedness for interacting with peers and society.

