

The Rural Science Education Program recruited 38 Fellows (3 % Native American, 3 % African American, 8 % Hispanic; 76 % Women) from life science related disciplines. [OSU Fellows](#) were recruited from Horticulture, Soil Science, Botany and Plant Pathology, Zoology, Fisheries and Wildlife, Molecular and Cellular Biology, and Animal Science. The OSU Fellows worked in teams of one graduate and one undergraduate Fellow, and each team worked with elementary, middle and/ or high school students twice a week. A team worked with the same students twice a week or with two groups of students each once a week. Academic Year undergraduates assisted the teams, developed curricula and organized lesson plans for the webpage.

The OSU Fellows were provided 5 weeks of summer training which was followed by a 3 day Workshop during which teachers were involved in providing instruction. During the first two weeks when schools started in fall, the Fellows made observations in the classrooms. Subsequently they spent 15 hours each week in developing and implementing inquiry-based lessons in collaboration with the teachers to enhance the existing curricula throughout the year. Year 3 Fellows adapted, refined and expanded many of the lessons and units developed by Year 1 and Year 2 Fellows in addition to adding their own lessons to the wealth of curriculum developed in the program.

Lessons implemented by OSU Fellows covered a range in topics including: the nature of science, bacteria, [fungi](#), mold, photosynthesis, respiration, germination, [salmon development](#), cell organelles, mitosis, meiosis, [soil](#), water cycle, water quality, camouflage, floral and faunal diversity, [insect behavior](#), [biotechnology](#), etc. Several lessons were multidisciplinary such as comparison of DNA extracted from diverse trees on school grounds, plant-animal-human relationships, etc. K-12 students also gained experience in writing procedures and reports. In addition, OSU Fellows engaged K-12 students in discussions on topics of social relevance such as non-point source pollution and GMOs. In Central Linn, 7th graders students were engaged in a unique activity of writing a grant for \$ 100 awarded by the program for purchase of science-related materials.

OSU Fellows developed several [community projects](#) to bring science into the K-12 students' homes and helps develop more support for science education in the small rural communities we partner with through the program.

Professional Development:

OSU Fellows participated in on and off campus outreach programs. Increasing numbers of OSU Fellows made formal [presentations](#) on the program to a diversity of audiences in Year 3 (Fig. 1). Initially this requirement was focused on department seminars, but the many Fellows chose to participate in larger meetings on campus or in professional society meetings. Additionally, OSU Fellows involved their advisors in the classrooms. This enabled them bridge their lab experiences with their NSF fellowship experiences. Each graduate Fellow was also involved in preparation of a manuscript.

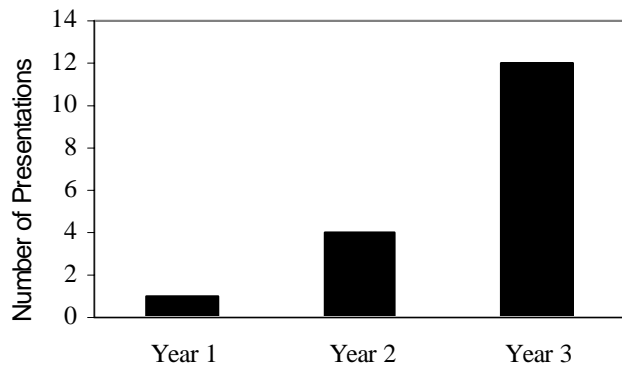


Fig. 1. Presentations by OSU Fellows during courses, seminars, and professional society meetings.

A survey of OSU Fellows recruited over the 3 years was conducted in Year 3. OSU Fellows indicated improved communication skills, and experience gained in breaking down science content for communication with non scientists (Fig. 2), enhanced understanding of their own research, and enhanced knowledge and access to faculty expertise across disciplines through interactions with team members and faculty mentors. They indicated that, after being involved in the program, they actively sought opportunities for involvement in community outreach activities.

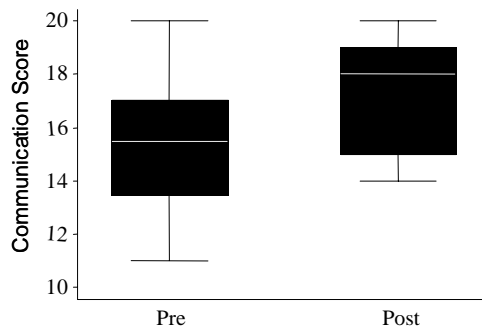


Fig 2. Year 2 OSU Fellows communication at start (Pre) and at the end (Post) of Fellowship from self reporting survey on comfort level speaking to groups, and explaining science to the public.

The alumni survey conducted in 2005, that was administered to Year 1 and Year 2 Fellows, showed that of the respondents (N=19) 88% have continued to be involved in outreach activities including visits to local schools, hosting students in their labs on campus, a trip to Africa to provide vision care, etc. Every Year 1 and Year 2 graduate Fellow except one who was conducting research in the Galapagos donated their time to participate in the summer training for the next cohort. OSU Fellows participated in outdoor school, department outreach events and other programs.

Fellows described their improved communication skills in terms of their ability to break down complex scientific concepts and their confidence in speaking in front of audiences.

“I felt that the interaction with the other fellows and collaboration of knowledge was a very valuable aspect of the program. Also the experience of breaking down my knowledge to where I was able to teach others a scientific concept was a very valuable learning tool for me. It helped me grasp certain scientific concepts more and improved my interpersonal & communication skills” - Alumnus Fellow.

One Fellow even attributed her ability to calmly get through her oral comprehensive exams to the confidence she built speaking in front of seventh graders twice a week for an academic year. A year 3 Fellow indicated that the experiences gained in the program benefited him greatly while he wrote his thesis and in his thesis defense presentation.

K-12 students commented on OSU Fellows communication skills. A middle school student said, “(Fellows) used words you could understand and if you didn’t they said it in a different way.”

The program provided opportunities for the professional development of the OSU Fellows. These included presentations about the program at professional meetings collaborative work, time management and opportunities to develop program independently. OSU Fellows commented on skills gained in managing multiple projects and approaching collaborators.

Alumni Fellows described the impacts of developing time management and collaborative skills in statements such as:

“Juggling an academic program plus the demands of the NSF Program gave the confidence that I can handle almost anything a career could throw at me”.

“The development of relationships with professors and researchers at OSU that I would not have been able to make were it not for the NSF fellowship. I HAD to reach out to them and it paid off”.

Impacts on Careers of OSU Fellows:

OSU Fellows have requested us to highlight the skills listed above in reference letters. They have used these skills as they have taken on leadership positions beyond the fellowship. For example, an Alumnus Fellow is currently supervising the outreach activities at a 250 acre horse ranch, while another is the lead TA that is in charge of redeveloping an undergraduate microbiology lab curriculum at another university.

One Alumnus Fellow indicated that she secured a job in an ophthalmology research lab due to the experience gained in the program in working independently. Another Fellow was selected for OSU biotechnology outreach internship as a result of experience gained in the program in balancing research and outreach, discussing policy issues with K-6 students, and scientific communication to the public.

One Alumnus Fellow commented:

“The (GK-12) experience has given me a unique way to look at different situations. Having the GK-12 experience has also been a plus on my resume. I recently received a position at my university working with a clinical study & children in part because I had the GK-12 experience”.

Perhaps one of the greatest impacts has been that OSU Fellows have increased their knowledge and skills within their own research areas. This includes both better understanding of underlying science concepts and research design, and solidifying their knowledge of their own specialties through teaching it. OSU Fellows describe the impact that the program had on their own research with statements such as:

“It was an excellent review of some basic science principles that I don’t use in my own day-to-day research! There is nothing like teaching a topic to cement it in your own mind”

“It has improved my ability to communicate what science means to others. It also helped me realize that you do not need fancy equipment to do scientific research. This has come in handy being in a remote Island where access to equipment is limited. I have learned to scrounge up parts to make usable and reliable scientific equipment for research”.

The program helped OSU Fellows see themselves not just as students but as scientists too. One OSU Fellow commented: “Instead of just being a student, I am a scientist making an impact on the community”. This relationship was crucial in encouraging the OSU Fellows to be involved in additional outreach during the program and after their fellowship ended.

Additional unique impacts include:

- Fellow was able to secure resources for PhD research in the Galapagos after developing skills in obtaining resources for science instruction in rural schools in the program.
- Communication skills developed in the program benefited Fellows in passing prelim oral exam, and in thesis writing.
- Fellow was selected for OSU biotechnology outreach internship as a result of experience gained in the program in balancing research and outreach, discussing policy issues with K-6 students, and scientific communication to the public.

Outreach

OSU Fellow performed outreach in three areas: typical out of classroom event, teacher professional development, and community events. This requirement forced the Fellows to move beyond their comfort range and explore the variety of outreach experiences that will be available to them as research scientists. Outreach activities that OSU Fellows were involved with include:

- Science Fairs: OSU Fellows organized science fairs in Seven Oak Middle School and Cascades Elementary School.
- Family Math and Science Night: Fellows organized and implemented inquiry activities in Family Math and Science Nights organized by the SMILE program and the Science and Math Education Department at OSU.
- OSU Fellows volunteered at Outdoor School organized in Seven Oak Middle School and Central Linn High School.
- 4-H Wildlife Stewards Program: OSU Fellows at Clover Ridge Elementary School partnered with the Wildlife Stewards program and facilitated class projects that were presented at the Summit hosted by the school on Earth Day. Several projects received awards or special recognition.