

STC: HyERS

Scientist-Teacher Connection: Hypothesis-guided Experimental Research by Students

Program

The goal of the HyERS program is to get local K-12 students actively doing hypothesis-driven experimental research. Too often, students see science as only a body of knowledge, rather than an activity—certainly not an activity they are capable of doing themselves. Many scientists have tried outreach projects working directly with students, but such attempts require a large time outlay by faculty and still reach only a limited number of students. Through the HyERS program, we exponentially increase our impact by collaborating with teachers—sharing the issues and tools from a narrow slice of our research, for them to use in developing experimental programs with their classes.

The HyERS program has three phases:

1. **Teacher workshop:** A week-long course, focusing on a single research question of current interest to ODU faculty. We cover background information and bench-top experimental techniques to address the question, and engage teachers in creating research-based lesson-plans. Teachers acquire the tools to have students perform inquiry-based scientific research.
2. **Interactive website:** Resource for teachers and students, containing: workshop materials, teacher-designed lessons, an “Ask a Scientist” feature (building lasting interaction between scientists and teachers), and discussion forum where teachers network and support one another.
3. **Student symposium:** Annual symposium at ODU to showcase student-designed research projects. Students present research their findings and interact with ODU researchers; teachers reinforce ties with other HyERS participants and the ODU research community.



Pilot success: Ohio State 2005

In 2004, I wrote a proposal to the NSF as a supplement to our Environmental Molecular Sciences Institute (EMSI) grant, to develop the workshop portion of HyERS. As a result, we received \$97,715 to develop a series of workshops based around EMSI research topics. Having established a collaboration with the OSU Department of Education, I contacted the Columbus Public Schools professional development office, who agreed to cover the cost (~\$15,000) of permitting their teachers to take our courses without charge.

The following summer, we offered four EMSI workshops as graduate-level education courses. Our project was externally evaluated by Institutional Research Consultants, Inc., with very positive feedback. Some teacher comments:

- “This was the best series of classes I’ve ever taken! I couldn’t have asked for anything better.”
- “The major thing is that I talk about the role of a scientist and the scientific method. I explain to my students that science is not linear but rather very cyclical. A scientist can be anybody. I am giving them a different picture about science.”
- “I enjoyed being taught by practicing scientists instead of people from the school district.”
- “There is an awful lot of pedagogy out there, but this class honed in on scientific content. That was beneficial... This class was a two-way one—content and pedagogy.”



Broader impact

- We have developed a simple protocol for assembling workshops, that other faculty can use to create a workshop module and join the HyERS community—so HyERS can expand to be department or college-wide.
- Each HyERS teacher works with an average of 100 to 200 students per year, so the HyERS program has the potential to reach many students with minimal work by faculty, giving us high “bang-for-buck.”
- The student seminar is an excellent recruitment opportunity for ODU.
- Granting agencies and potential donors respond positively to a solid educational outreach program coupled to solid scientific research.
- Close ties between Education and Sciences broadens the training of university students in both colleges.