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10:58:31 AM

This month:



Volume 21 | Issue 2 | Page 72

[Reprints](#) | [Issue Contents](#)

[View Article Extras](#)

By Steven Farber

CAREERS

Making Outreach Work

How a take-your-child-to-work day helped launch a \$200,000 education initiative.

February 2007

[Table of Contents](#)

[Editorial](#)

[Columns](#)

[Features](#)

[Editorial Advisory Board](#)



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SHARON GEKOSKI-KIMMEL / Philadelphia Inquirer

In 2000, I came to Philadelphia's Kimmel Cancer Center at Thomas Jefferson University (TJU) to start a research laboratory and a zebrafish core facility. Like many places, TJU

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had a "Take Your Child To Work" day. The department that organized this university-wide effort had the idea of sending the kids to the new, state-of-the-art zebrafish facility on campus. They thought it was the closest available aquarium. Shortly thereafter, I began leading a number of group tours through the facility, giving faculty and students direct, hands-on experience with zebrafish.

[getting started in outreach](#)

High school students, TJU minority groups, and inner city summer science programs all made their way through our cramped, noisy, humid space to see several thousands of our research subjects. The tour would culminate with a view through the microscope at the larval beating heart. I later learned, mostly through letters from the departments sponsoring these tours, that the visit to my laboratory was often the highlight of the day. I also learned, as is often the case in a large institution, that if you do something well you usually get asked to do it again. As I became more involved, however, I realized that I could not sustain this kind of effort alone. This was, in part, my motivation for starting Project BioEYES.

Bringing fish, dispelling myths

In November of 2001, responding to a request from my son and then his teacher, I lugged the fish, microscope, and other gadgets to my own children's elementary school. Here I had my first experience bringing a live science experiment to the classroom. Despite the challenges that face a new assistant professor and against the advice of some of my mentors, I became committed to developing a more formal outreach program.

Teaching 4th grade, 7th grade, and high school kids required special skills that I lacked: Try lining up a full class of 4th graders behind a microscope and you'll see what I mean. But by mid-2002, I had developed a proposal to various TJU deans and department chairs requesting seed money (\$66,000) for my education initiative. It's a proposal I'm happy to share.

News of my success with TJU tours reached the dean of the Medical School, Thomas Nasca. When I approached him, I was pleasantly surprised to find he was excited to provide the funds to hire a science educator with nonprofit program-development experience. Jamie Shuda (formerly Schaefer) took the challenge in late 2002 and developed a curriculum that connected my wild zebrafish ideas to both state and federal academic standards. Better yet, she knew how to run a class.

Project BioEYES is the product of our collaboration. In it, students perform a weeklong zebrafish genetic experiment using live zebrafish in their own classroom. On day 1, students mate striped (wild-type) and albino zebrafish, collect the eggs, and record their hypothesis regarding the pigmentation pattern of the offspring. The next day embryos are collected, and using a high-quality

stereomicroscope, students observe the young zebrafish as they grow from single-cell zygotes to free-swimming larvae. By the end of the week, students can observe the beating heart of the larvae they raised and observe pigment granules. The project educates the children in genetics and life sciences by incorporating live experiments as the primary teaching tool, at no cost to participating schools.

We still allow students and community members to tour our zebrafish labs and have extended tours to Drosophila labs, in collaboration with Jim Jaynes, a faculty member at TJU. The program also offers high school internships and a summer scholarship program. This experience helps young people gain an appreciation for scientific research, stimulates some to pursue careers in science, and even dispels common stereotypes about scientists (that we are socially awkward, wild-haired, white men holding bubbling tubes).

In less than a year the program was reaching over 700 students. We had started a fundraising blitz with the help of the Jefferson Foundation. Project BioEYES targets schools with large populations of poor and minority children, as these groups are historically underrepresented in science. Our partnership in 2002 with the School District of Philadelphia was essential for our sustainability. It provided paid teacher-trainings throughout the school district in return for our guarantee that we would reach 2,000 Philadelphia students per year. With this active partnership, we are reaching a diverse student population (83.6% non-Caucasian). After only one year we were seen as a value-added service within our target community, as evidenced by numerous letters from teachers and students.

Currently, the demand for our program in Philadelphia has exceeded the amount of weeks in a school year. We have reached over 6,900 students and 380 teachers to date. We have an estimated annual operating budget of \$185,000 and have succeeded in securing a significant portion of our annual Philadelphia budget from Thomas Jefferson University (20%), and from funders such as GlaxoSmithKline, The Brooke J. Lenfest Foundation, the Pennsylvania State Department of Education, Pennsylvania Governor Edward Rendell's Office, the Christopher Ludwick Foundation, and the Teleflex Foundation, among several others.

We have worked hard at maintaining these relationships by focusing much of our effort on accountability and evaluating the effectiveness of our services. We use both quantitative and qualitative assessments, analyzed by the TJU Department of Health Policy, to measure content knowledge gained as well as attitudes toward science. Each student is asked to complete a questionnaire before and after participating in our classroom unit. The assessments indicated considerable gains in knowledge as a result of participating in the program: The majority (73%) of students say they would like to do an experiment like this again.

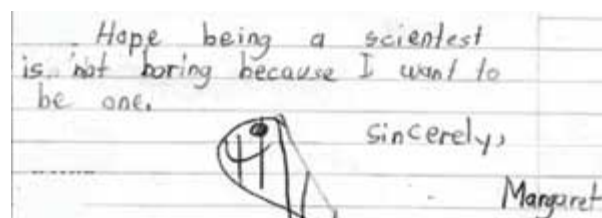
The teachers are also asked to complete a survey following the weeklong experiment, and their results have been positive as well. For example, when asked about the strongest benefit to participating in the program, a Philadelphia

high school teacher replied, "The students see how science is used outside the classroom. Sometimes students believe education is restricted to the classroom, because they have not been exposed to careers and the role of science in research." Project BioEYES has also held teacher focus groups and has presented our program to lead science teachers and administrators within the School District of Philadelphia.

Why I'll talk anyone's ear off

As the program grows we continue to face new challenges. In 2004, I accepted a position at the Carnegie Institution of Washington Embryology Department as a staff scientist and as an adjunct faculty

member in the Johns Hopkins Biology Department (see "[Peering into Carnegie](#)"). By 2005, we had moved my lab and the fish into a new building on the Johns Hopkins Homewood campus. Despite this, I have retained an adjunct faculty position at TJU to continue my role in Project BioEYES. The TJU core zebrafish facility remains active under the guidance of Shiu-Ying Ho, a new assistant professor in the biochemistry and molecular biology department.



Portion of a letter written by a BioEYES participant.

When I arrived at Carnegie, I began making plans to merge Project BioEYES with the science outreach program created by the former president of the Carnegie Institution and a leading geneticist and molecular biologist, Maxine Singer. The two education programs that Singer created - First Light and the Carnegie Academy for Science Education (CASE) - have been transforming classroom teaching in public elementary schools across the District of Columbia since 1989. Together with Singer, I approached the administration with a plan that would blend aspects of CASE/First Light and Project BioEYES and offer the expanded curriculum to schools in Philadelphia, Baltimore, and Washington DC. Last summer, Carnegie president Richard Meserve agreed to provide approximately \$43,000 in startup funds to launch this expansion, but success will ultimately depend on our ability to find local foundations to support our efforts.

Reflecting on my experience during one of the toughest academic fiscal climates in years, I have found that academic institutions will come on board when a plan is developed to rapidly bring in local funders. Given the pressing need for quality supplemental science education, we have been successful in securing outside funding. As in Philadelphia, we started at the grass-roots level in Baltimore. We secured the support of teachers who were willing and excited to host the unit in their class and administrators who enthusiastically gave their approval. We have been pitching the program to anyone who will listen (you might not want to sit next to me on your next flight).

We involve faculty and students, and we never turn down the opportunity to host a tour. As a result, we are able to educate underserved youth. Most importantly, Jamie and I are able to blend our education and science knowledge into a tangible and innovative program that is appealing to not only the school district, but also to university administrators and potential funders.

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