Encouraging Undergraduate Outreach

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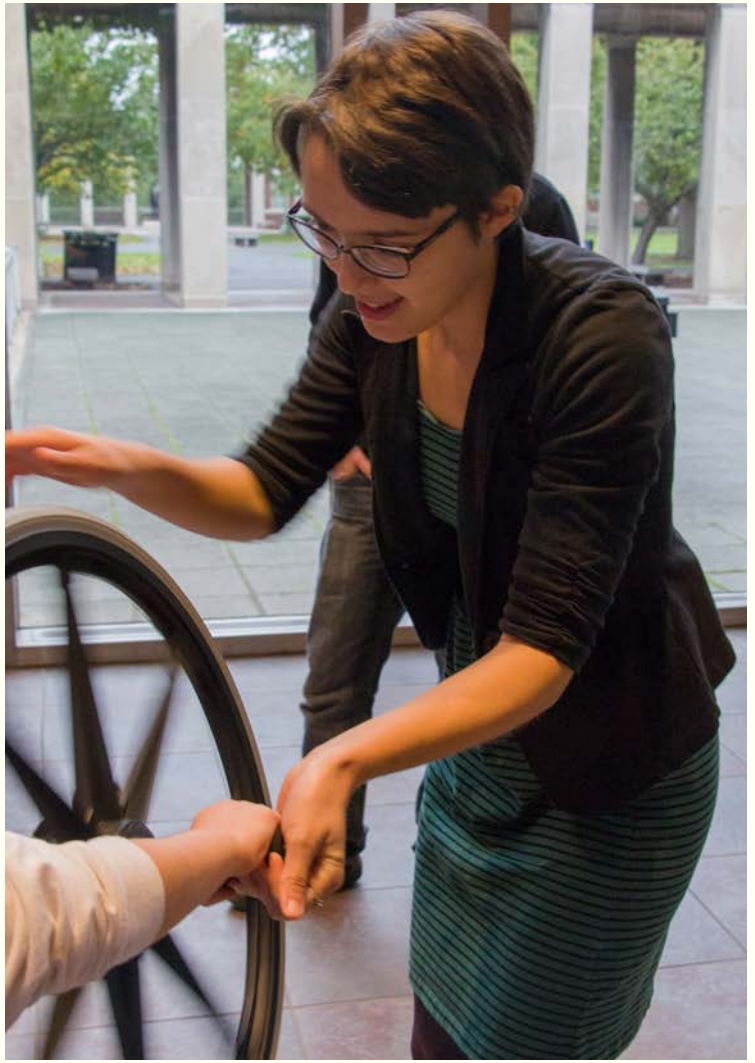
Why do Outreach?

- Increases the likelihood of pursuing STEM later in life
- Inquiry more effective than conventional teaching
- Not all teachers are able to teach in a way that encourages exploration
- Collaboration between campus and community
- Informed public

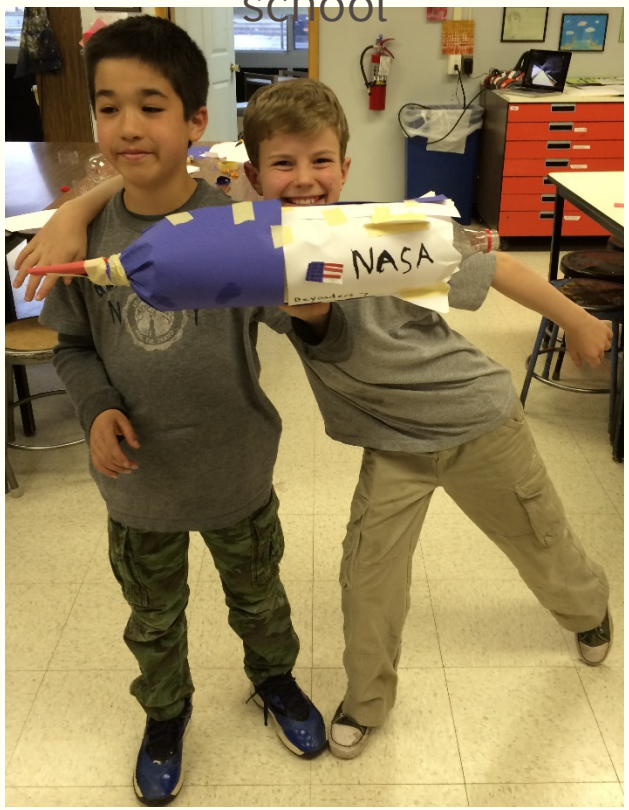


The SPS Mission

"The SPS exists to help students help students transform themselves into contributing members of the professional community. Course work develops only one range of skills. Other skills needed to flourish professionally include effective communication and personal interactions, leadership experience, establishing a personal network of contacts, presenting scholarly work in professional meetings and journals, and outreach services to the campus and local communities."

Example: Outreach at the University of Rochester

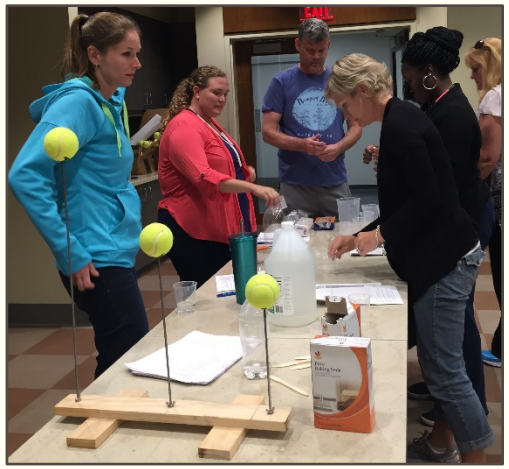
Making bottle rockets at a local elementary school

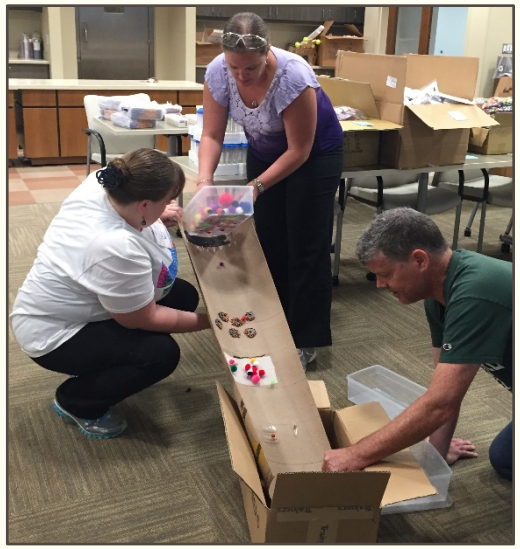


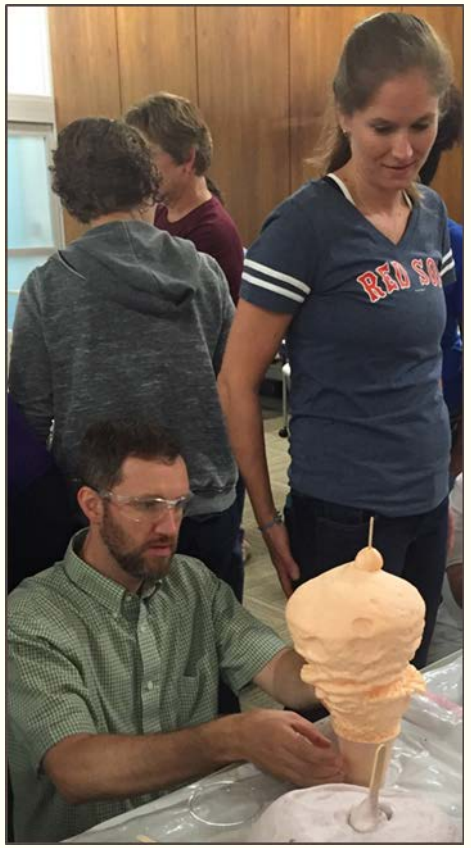
Two boys learn about center of mass at Spooky Science Day

Father and daughter look through a solar filter during Family Science Day

NIST Summer Institute for Middle School Teachers







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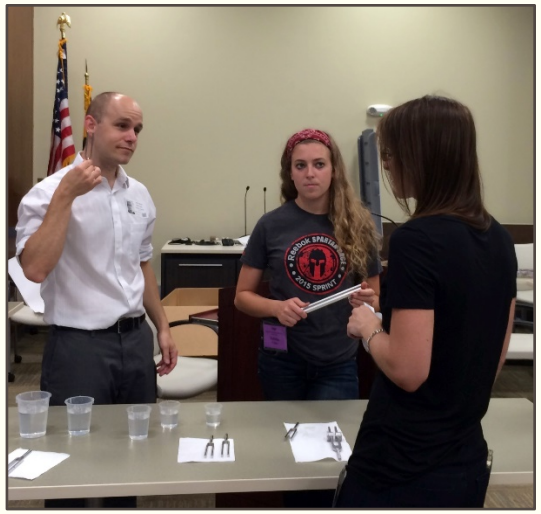

The Physics Carnival

Benefits	Obstacles

▪ Teachers bring activities to their classrooms
▪ Largely, demonstrations were well-received
  ▪ Rutherford gold foil
  ▪ Solo cup phone
▪ Interactive and engaging
▪ Visualizations of difficult-to-explain concepts
▪ Excitement
	▪ Equipment
	▪ Acoustics was poorly understood
	▪ Concerns with materials being used as weapons
	▪ Class Relevance
	▪ Attention span

Running a Successful Event

- Come prepared
- Have additional information available
- Encourage inquiry
- Variety
- Be excited

SPS Involvement

- Science Outreach Catalyst Kits (SOCKs): Developed annually by interns for SPS Chapters and Physics students
  - Variance in format and quality
  - Not vetted by teachers
  - 25 distributed annually
- Prizes awarded for chapter and individual outreach
  - *Marsh W. White, Blake Lilly, Future Faces of Physics*
  - High award rate

Future of the SOCK Manual

- Activity/demonstration manual for use in undergraduate outreach
- 1-2 exploratory activities per standard per grade level
- Similar to current SOCK, but more comprehensive
- Supplemental to classroom teaching
- Sold by SPS National to chapters

Next Generation Science Standards

- Collaboration among scientists and teachers
- Adopted by 16 states within 3 years
- Focused on exploration and critical thinking
- Core concepts taught with a combination of laboratories and lectures
- In-depth approach to scientific topics, concentration on current events
- Adopted by individual teachers even if state hasn't yet

Implementing the NGSS

The Problems	How SPS Chapters Can Help
Not enough classroom time to do labs and hands-on activities	After-school programs with undergraduate volunteers
Not enough funding to purchase NGSS kits	Inexpensive, repeatable activities without specialized equipment
Students are uncomfortable with not knowing the answer to everything	Bring in undergraduate researchers to discuss the true nature of science and all its uncertainties

Conclusions and Thanks

- Ongoing project for future interns
- Potential new revenue source
- Importance of outreach

- Brad Conrad
- Bo Hammer
- Courtney Lemon
- SPS and AIP