

Who is she?

Counselor Deanna Troi from Star Trek



Benefits to research team?

- o Opportunity to engage next generation
- o Improve ability to communicate research effectively
- o More (lower cost) labor to collect/process data
- o Different perspective on research question
- o Time/effort saved on trying to learn whole new field (education theory)
- o Time/effort saved on trying to locate/reach audience



Benefits to teacher?

- o “teaching science instead of teaching about science”
- o Increase content knowledge
- o Increase understanding of scientific process
- o Network
- o Increase motivation and excitement in teaching

(Dresner & Worley, 2006)



Benefits to students/public?

- o Positive change in classroom environment (*Dresner & Worley, 2006*)
- o More likely to receive correct/realistic info.
- o Access to info.
- o Exposure to role models (*Silverstein et al, 2009*) and science careers (*Siegel et al, 2005*)
- o Improved test scores (*Silverstein et al, 2009*)



What does the research say?

Students who participated in original scientific research while in high school are significantly more likely to both enter and maintain a career in science compared to students whose first experience didn't occur until university. (2009) *Lesley F. Roberts and Richard J. Wassersug Does Doing Scientific Research in High School Correlate with Students Staying in Science? A Half-Century Retrospective Study.*

In years three and four after program entry participating in Columbia University's Summer Research Program, teachers' students passed Regents science exams at a rate that was 10.1% higher than that of nonparticipating teachers' students. Other program benefits include decreased teacher attrition from classroom teaching and school cost savings of U.S. \$1.14 per \$1 invested in the program. (2009) *Samuel C. Silverstein et al - Teachers' Participation in Research Programs Improves Their Students' Achievement in Science*

A dynamic learning community, authentic inquiry, a deeper understanding of the nature of science, and learning about scientific careers are all benefits of scientist- teacher partnerships. (2005) *Marcelle A. Siegel, Susanna Mlynarczyk-Evans, Tamara J. Brenner, and Katherine M. Nielsen - A Natural Selection – Partnering teachers and scientists in the classroom laboratory creates a dynamic learning community*

Things to consider

- o Educator as meaningful partner in team
 - o Doing research
 - o Taking lead developing curriculum
 - o Inclusion as co-writers in grant proposals
- o Time commitment (*short or long term?*)
- o Timeline of inclusion (*from start?*)



Things to consider

- o Educator compensation
 - o Stipend
 - o Graduate credit
- o \$\$\$ for materials/equipment for student activities



Things to consider

- Sharing outreach model/methods beyond program
 - Website / long term free access to materials
 - \$\$\$ for educators to attend educator conferences to share your research and E & O activities



Planning to include educators

- Timeline
- Team expert for NSF Broader impacts

Goals of NSF Broader Impacts Criterion:

- (1) Increased economic competitiveness of the U.S.
- (2) Development of a globally competitive STEM workforce.
- (3) **Increased participation of women and underrepresented minorities in STEM.**
- (4) Increased partnerships between academia and industry.
- (5) **Improved pre-K-12 STEM education and teacher development.**
- (6) **Improved undergraduate STEM education.**
- (7) **Increased public scientific literacy.**
- (8) Increased national security.



What does the research say?

Partnerships across the divide between K-12 schools and institutions of higher education are essential in increasing the coherency of science education in the American educational system from the first days of kindergarten through the undergraduate years. - (2003) *Kimberly D. Tanner, Liesl Chatman, and Deborah Allen - Approaches to Biology Teaching and Learning: Science Teaching and Learning Across the School University Divide Cultivating Conversations through Scientist Teacher Partnerships*

A collaborating scientist - a rewarding addition to any high school program - can help students collect and analyze data that either replicates or parallels the work of the partnering scientist. This type of partnership is beneficial for both the students and scientists. (2006) *Cheryl Abbott and Marc Swanson - A Rewarding Partnership - Critical components of a successful collaborative scientist-student project*

All students need to be offered experiences of this nature [real/authentic science] - (2003) *Jrene Rahm, Heather C. Miller, Laurel Hartley, John C. Moore - The Value of an Emergent Notion of Authenticity: Examples from Two Student / Teacher – Scientist Partnership Programs*