



**Trying it on:**

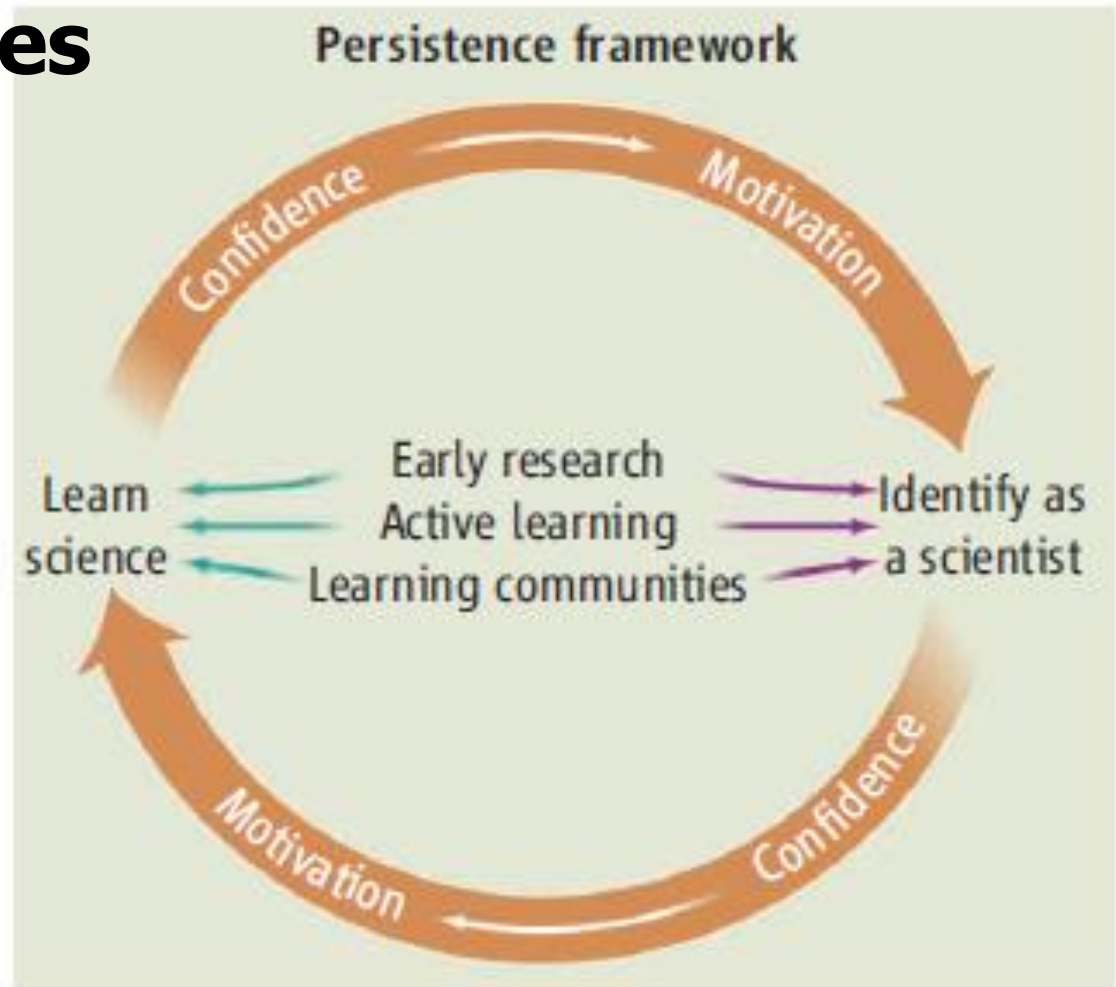
# **Research along the K-13 pathway**

Sue Ann Heatherly



# Guiding Principles

From: Graham, Mark J., et al. "Increasing persistence of college students in STEM." *Science* 341.6153 (2013): 1455-1456.



**The Persistence Framework.** Confidence is belief in one's own ability; motivation is intention to take action in pursuit of goals; learning is acquiring knowledge and skills; and professional identification is feeling like a scientist.



# Core Activity: Immersive Research Experiences



# The Programs

Supporting Success along STEM pathway; Promoting a Diverse STEM Workforce

- **Undergrad and Grad. Internships**
- **Two-week Immersion: HS>UG transition**
- **Hybrid Pulsar Search Collaboratory HS+UG**
- **Two-week Immersion: : Middle>HS transition**
- **Radio Astronomer for a day (Gr 5-16)**





# To achieve outcomes, good research experience should:

- Not be Google-able
- Original to participants
- Challenging
- Teams approach
- Doable with instrumentation at hand
- Reportable and must be reported



# For your consideration

*While for professional scientists, engineers and mathematicians, the term research means conducting a systematic exploration of a question to discover new knowledge, for students the word has a broader definition. We define student research as an extended open-ended investigation of a question or problem where students develop or refine questions, approaches, and results that are **original to them**. While research is a broad and diverse enterprise, student research employs the same general tools and techniques, social interactions, and attitudes practiced by scientists, engineers, and mathematicians in their work.*



# Original to “them” 2 week immersion



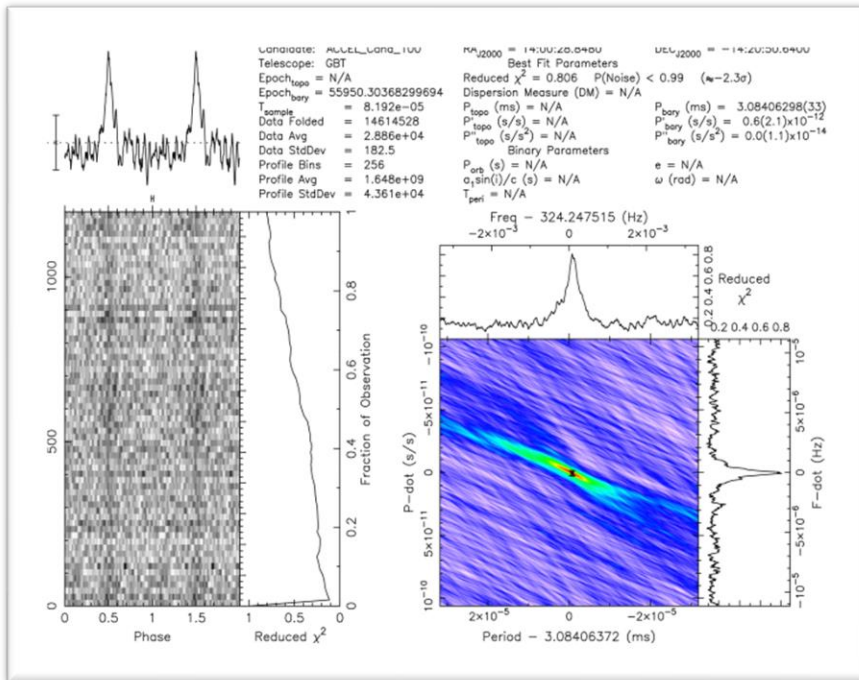
- Open-ended research problem given as starting point
- Students govern process, collect their own data
- Report at conclusion via colloquium style presentation
- Produce poster



# Analyzing archived data Pulsar Science Collaboratory

NSF #0737641, #1516269

[pulsars.nanograv.org](http://pulsars.nanograv.org)



- Working with GBT data to discover new pulsars
- Advanced projects
- National
- Hybrid Experience
- 3000 HS, UG students



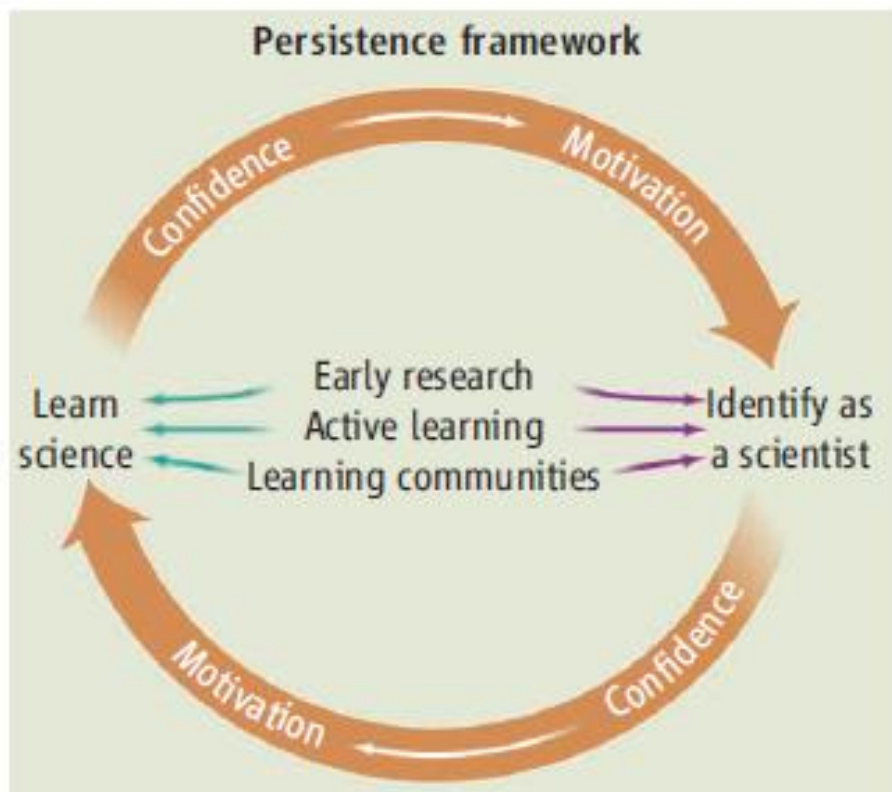


# Instrumentation Projects

## NSF #1649323, 1834586



# Does it work?



[K-12 eval example](#)  
[INCLUDES student survey](#)

## K-12

- ✓ Science Identity
- ✓ Career Interest
- ✓ Confidence

## Pre-UG

- ✓ STEM Identity
- ✓ STEM Efficacy
- ✓ Skills
- ✓ **Persistence**



# GREEN BANK OBSERVATORY

[greenbankobservatory.org](http://greenbankobservatory.org)

*The Green Bank Observatory is a facility of the National Science Foundation  
operated under cooperative agreement by Associated Universities, Inc.*

