

**MaTTS** MARINE TECHNOLOGY FOR  
TEACHERS AND STUDENTS



# Multi-modal Professional Development in Ocean Sciences

Ivar G. Babb  
University of Connecticut  
[ivar.babb@uconn.edu](mailto:ivar.babb@uconn.edu)



THE  
UNIVERSITY  
OF RHODE ISLAND  
GRADUATE SCHOOL  
OF OCEANOGRAPHY



# Outline

- Brief Project Overview
- Professional Development Strategies
- What worked
- What didn't

# MaTTS Project Goals

- **Enhance teachers' content knowledge and skills** in marine and communication technologies
- Engage teachers and students **through immersive, hands-on marine technology and science activities**
- Develop a regional cadre of marine technology and science high school teacher and student leaders
- Link teachers and students **with marine scientists and engineers** through **live research expeditions**
- **Expose students to career pathways** in marine technology related to the 21st century workforce

# Project Activities

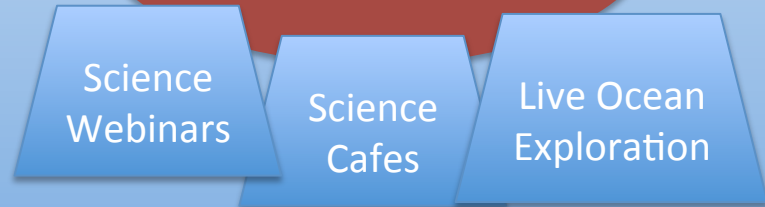
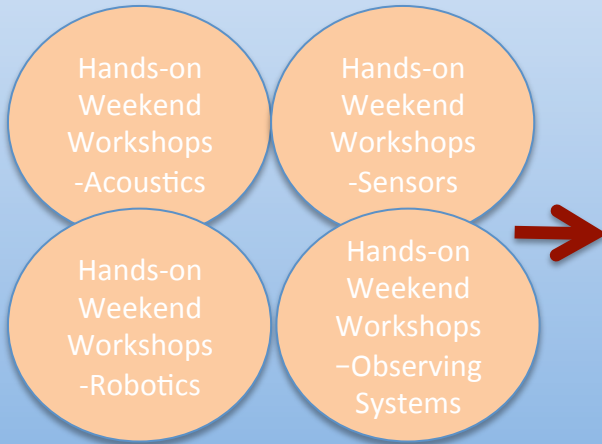
- **Teacher professional development** with ocean scientists and engineers at both the University of Rhode Island and University of Connecticut
- **Weekend teacher professional development workshops** to enhance teacher self-efficacy with ocean science and technologies
- **Summer Institute** for teachers and students with building and deployment of oceanographic instruments, field exercises, and career building activities
- **Virtual classroom contact** with ocean scientists and oceanographic expeditions
- After school **Science Cafes and Webinars** for teachers and students led by ocean scientists and engineers
- **High School Student Leader Presentations** at local middle schools
- **Culminating event** to showcase student activities and gained knowledge

# PD Continuum

Teacher Gains:  
*Content Efficacy*

Teacher Gains:  
*Content Efficacy Leadership*

Teacher Gains:  
*Content Efficacy*



Student Gains:  
*Content Efficacy Leadership Career Awareness*

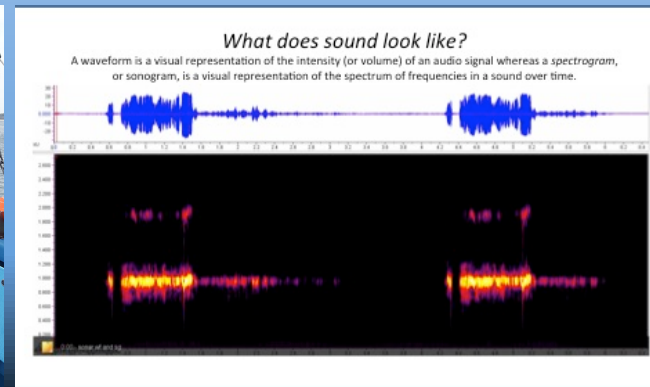
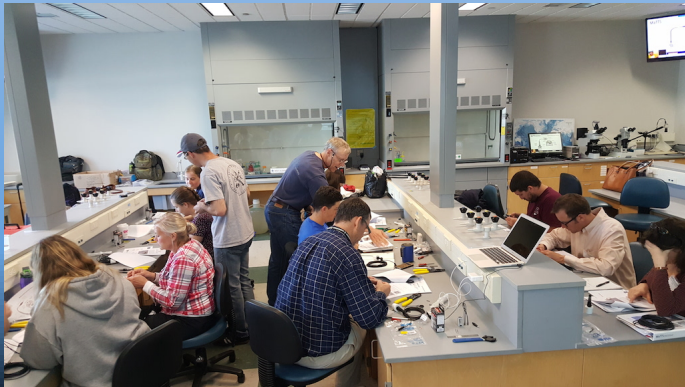
Student Gains:  
*Content Efficacy Leadership*

# Teacher Weekend Workshops

## Developing a Community of Practice in Ocean Science & Engineering

- Science orientation
- Hands-on technology building
- Testing and data collection
- Reflection and discussion of classroom applications

- Acoustics and Sound in the Sea
- Building a low-cost hydrophone
- Open source software orientation and use to collect and visualize sound data
- Exploring online sound data and discussion of potential classroom applications



# Teacher & Student Summer Institute

- Summer Institute reprised the ocean science & technology themes of the spring workshops
- Science presentations
- Hands-on technology building
- Relevant outside activities – ROV races
- Meet a scientist/engineer
- Watch standing and interacting w/ scientists at the Inner Space Center





Ship-to-Shore Telepresence

Telepresence for  
Exploration



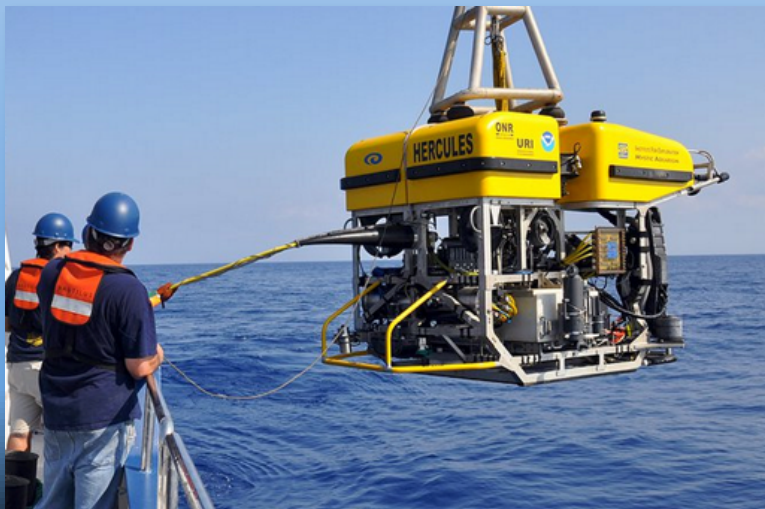


## Research and Exploration Vessels & ROVs

NOAA Ship *Okeanos Explorer* & D2 ROV

*E/V Nautilus* & *Hercules* ROV

Other Vessels in U.S. Research Fleet





brightline

EXPLORE

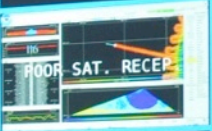
11:05:54 EDT

THE UNIVERSITY OF RHODE ISLAND



PREVIOUSLY RECORDED

POOR SAT. RECEPTION



Live feeds from the NOAA Ship Okeanos on the U.S. East Coast

# Mixed-method Evaluation

- Four survey instruments selected to assess:
  - Content – no appropriate instrument existed, so MaTTS team created one that focused on the unique ocean science & technology of the program
  - The Student Leadership Practices Inventory [SLPI] was selected to measure changes in leadership
  - The Science Teachers' Beliefs About Science [STBAS] instrument was selected to measure attitudes and beliefs
  - The STEM Semantics instrument measures career interest using a validated sequence of semantic terms to describe dispositions about STEM.
- Interviews and Focus Groups for both Teachers and Students

# Results of Teacher Surveys

- Teachers were measured pre-post over the entire 18-month project.
- Teachers gained 13% in the ocean stem content (75 to 88% correct) especially on technology related topics such as ROVs, hydrophones, passive samplers
- Not surprising due to the unique nature of the MaTTS ocean STEM content



# Results of Teacher Surveys

- Teachers gained in 67% of items in the beliefs about science survey, with 30% more than .25
- Teachers gained in 70% of the items in the leadership practices survey, with 52% over the .25 threshold
- This suggests that the teachers improved their leadership skills over the entire project

# Summary of Innovations in PD

- Weekend Workshops – provided unique ocean STEM content, hands-on skill development, teacher efficacy
- IT-enabled Science Cafes & Webinars that complemented the hands-on PD provided positive interventions over the longer-term
- This suggests that the PD continuum was effective, particularly in improving teachers knowledge and leadership skills

**Questions?**

# MaTTS School District Partner Agreement

- Each school district entered into an agreement with MaTTS to establish the ground rules and expectations, which facilitated the participation of teachers and students in the project activities, including:
  - assist with the recruitment of teacher and student candidates
  - provide release time for teacher teams - one hour of mentoring time bi-weekly (not to replace existing planning time)
  - provide one day of release time at the end of the academic year for teacher leaders, mentees, and student leaders to attend the Culminating Event
  - provide release time for high school students to spend one day with a class of middle school students to prepare them for and host a live broadcast from the Inner Space Center of a current ocean expedition



# MaTTS Project Team

## University of Rhode Island

Gail Scowcroft, Associate Director Inner Space Center

Dwight Coleman, Director ISC

Andrea Gingras, Manager, Education Programs, ISC

Chris Knowlton, Assistant Director, ISC

Holly Moran, Marine Research Associate, ISC

Romy Pizziconi, Communications Coordinator, ISC

Derek Sutcliffe, Systems Engineer, ISC

## University of Connecticut

Ivar Babb, Director, Northeast Underwater Research, Technology & Education Center

Matt Jewell, Engineer, NURTEC

Kevin Joy, Technical Director, NURTEC

John Hamilton, Underwater Vehicle Technician, NURTEC

## Eidos Education

Liesl Hotaling, Principal and Ocean Engineer

## Project Oceanology

Lauren Rader, Field Instructor

## Education Design, INC

David Reider, External Evaluator

