Multi-modal Professional Development in Ocean Sciences

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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
- Hands-on Weekend Workshops - Acoustics
- Hands-on Weekend Workshops - Sensors
- Hands-on Weekend Workshops - Robotics
- Hands-on Weekend Workshops - Observing Systems

Teacher Gains: Content Efficacy Leadership
- Week-long, Hands-on & Virtual Summer Institute

Student Gains: Content Efficacy Leadership Career Awareness

Teacher Gains: Content Efficacy
- IT-Enabled Activities
  - Science Webinars
  - Science Cafes
  - Live Ocean Exploration

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
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

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