ATE Evaluation Practice: Lessons from the Field

Preconference workshop at the ATE PI Conference

October 22, 2014

EvaluATE
Evaluation Resource Center for advanced technological education

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EvaluATE Mission

To promote the goals of the ATE program by

- partnering with ATE projects and centers to strengthen the program's evaluation knowledge base
- expanding the use of exemplary evaluation practices
- supporting the continuous improvement of technician education throughout the nation

EvaluATE

Evaluation Resource Center for advanced technological education

THE EC EVALUATION CENTER

WESTERN MICHIGAN UNIVERSITY

www.evalu-ate.org

EvaluATE Team

Lori Wingate

Arlen Gullickson

Jason Burkhardt

Emma Perk

Corey Smith

Patricia Negrevski

Presenters

Lori Wingate
EvaluATE, Western Michigan University

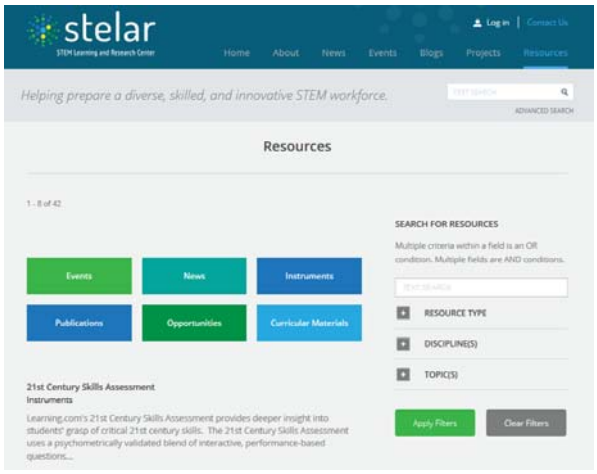
Candiya Mann
Social and Economic Sciences Research Center, Washington State University

Bruce Nash
DNA Learning Center, Cold Spring Harbor Laboratory

Amy Nisselle
DNA Learning Center, Cold Spring Harbor Laboratory

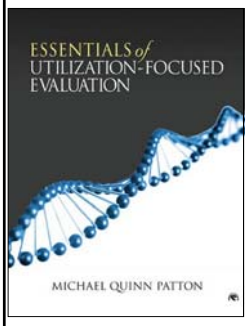
Sources for info on evaluation

STEM Learning and Research Center: stelar.org

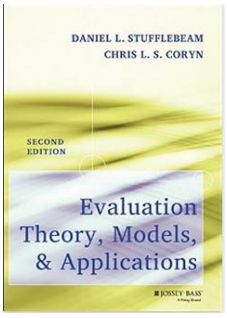


Sources for info on evaluation

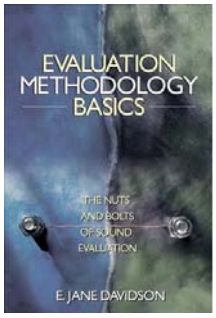
Favorite Books



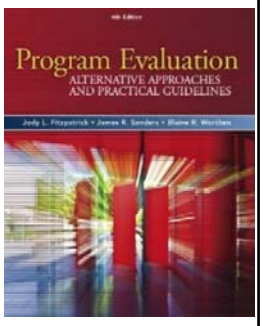
Patton



Stufflebeam & Coryn



Davidson



Fitzpatrick, Sanders, & Worthen

Sources for info on evaluation

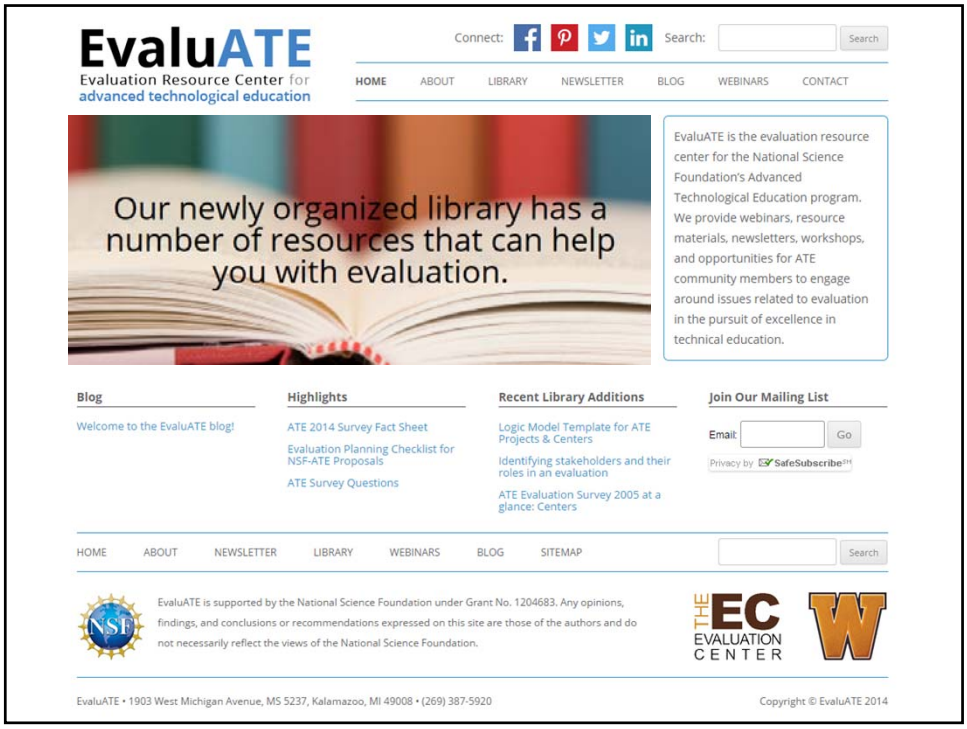
American Evaluation Association: eval.org

Sources for info on evaluation

AEA365.org

EvaluATE Activities

- 4-6 webinars per year
- Quarterly newsletter
- Annual survey of ATE grantees
- Annual workshop at ATE PI conference
- Website



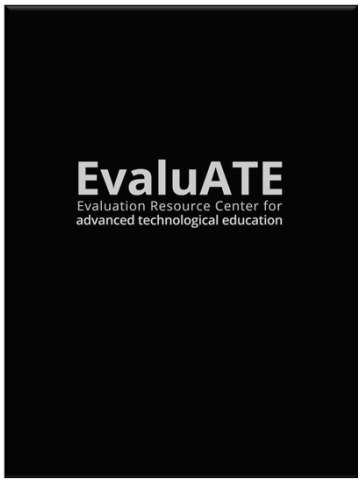
Workshop Materials

Folders

Slides

Activity materials

Feedback survey



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Agenda

1:00	Welcome, introductions, and ice breaker
1:20	Lesson from the Field 1: Managing multi-site data collection (Candiya)
1:40	Q&A
1:50	Lesson from the Field 2: Following up with professional development participants (Amy & Bruce)
2:05	Q&A
2:15	Break
2:30	Idea Exchange: ATE evaluation challenges and solutions
2:50	Activity 1: Multisite data collection (Lori)
3:15	Activity 2: Planning follow-up (Lori)
3:40	Closing comments/Q&A, feedback survey
4:00	Adjourn

Managing Multi-Site Data Collection

CANDIYA MANN
SENIOR RESEARCH MANAGER
SOCIAL & ECONOMIC SCIENCES RESEARCH CENTER
WASHINGTON STATE UNIVERSITY

MATE Center: ROV Competitions

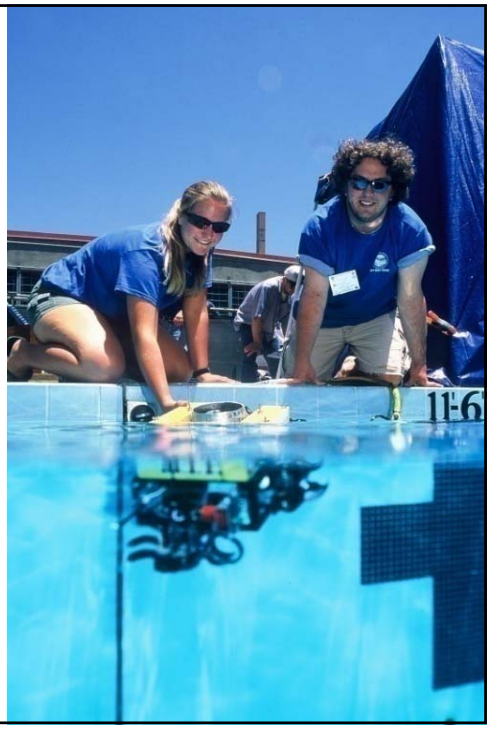
Goals

Use ROV competition as an engaging platform to…

- Develop STEM skills
- Stimulate interest in marine technical careers
- Facilitate interactions between students, faculty, and industry professionals

Competition Components

POOL MISSION

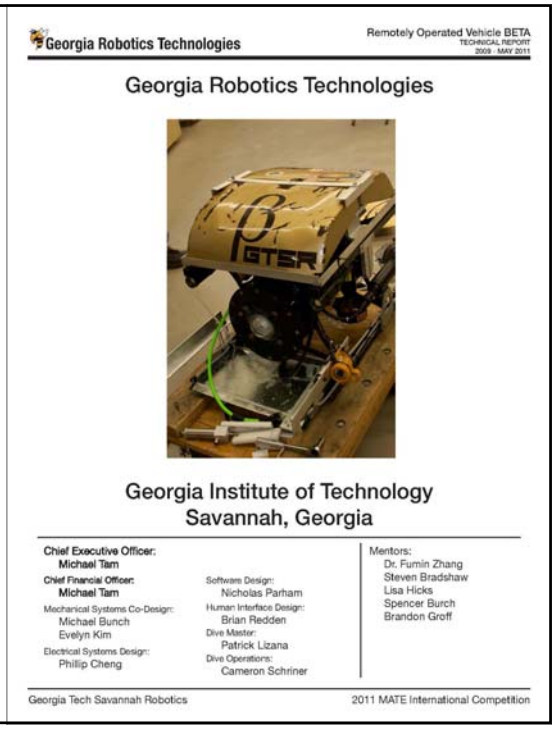


Competition Components

ENGINEERING PRESENTATION

Competition Components

TECHNICAL REPORT & COMPANY SPEC SHEET



Georgia Robotics Technologies

Remotely Operated Vehicle BETA
TECHNICAL REPORT
2009 - MAY 2011

Georgia Robotics Technologies

Georgia Institute of Technology
Savannah, Georgia

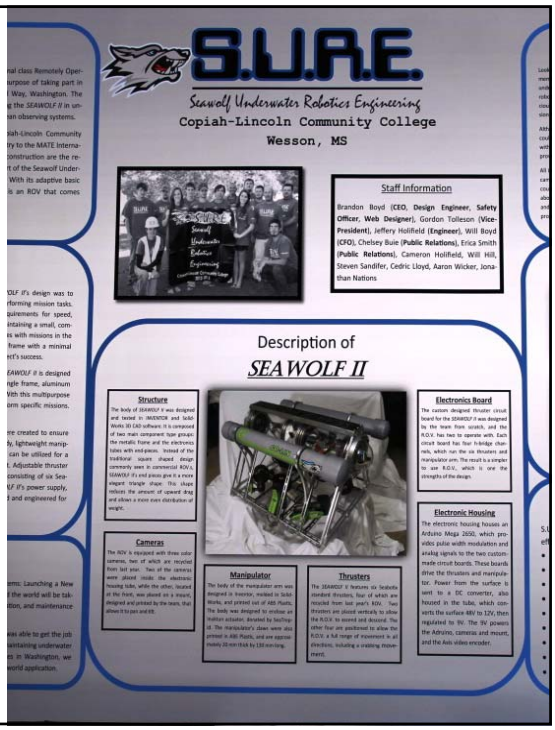
Chief Executive Officer: Michael Tam
Chief Financial Officer: Michael Tam
Mechanical Systems Co-Design: Michael Bunch, Evelyn Kim
Electrical Systems Design: Phillip Cheng
Software Design: Nicholas Parham
Human Interface Design: Brian Redden
Dive Master: Patrick Lizana
Dive Operations: Cameron Schriner

Mentors:
Dr. Fumin Zhang
Steven Bradshaw
Lisa Hicks
Spencer Burch
Brandon Groff

Georgia Tech Savannah Robotics
2011 MATE International Competition

Competition Components

POSTER & MEDIA OUTREACH



S.U.R.E.
Seawolf Underwater Robotics Engineering
Copiah-Lincoln Community College
Wesson, MS

Staff Information

Brandon Boyd (CEO, Design Engineer, Safety Officer, Web Designer), Gordon Tolleson (Vice-President), Jeffery Hollifield (Engineer), Will Boyd (CFO), Chebey Buie (Public Relations), Erica Smith (Public Relations), Cameron Hollifield, Will Hill, Steven Sandifer, Cedric Lloyd, Aaron Wicker, Jonathan Nations

Description of
SEA WOLF II

Structure
Cameras
Manipulator
Thrusters
Electronics Board
Electronic Housing

Some numbers for you…

Some numbers for you…

23 regionals lead to 1 culminating competition

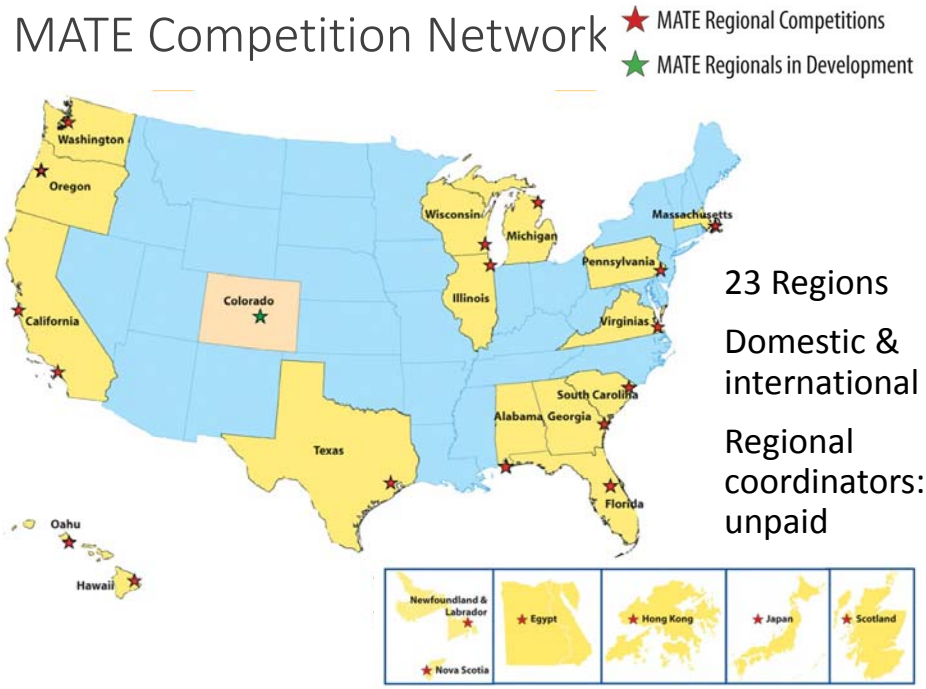
4 competition classes

Grades 4 – 16

In 2014…

- 580 teams
- ~2,300 students
- ~600 teachers
- ~1,000 industry

MATE Competition Network



23 Regions

Domestic & international

Regional coordinators: unpaid

Complementary Activities

Summer Institutes

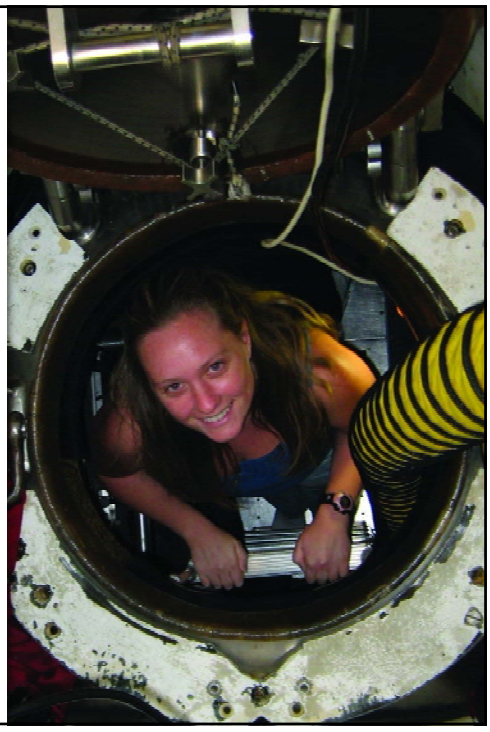
Regional workshops

800-page textbook

Curriculum + videos

ROV kits

At-sea internships



Selected Evaluation Questions

Selected Evaluation Questions

How does the ROV program affect…

Students'

- Awareness of STEM careers?
- Intention to pursue STEM career?
- Interest in studying STEM?
- STEM knowledge and skills?
- 21st Century skills?

Teachers' confidence facilitating STEM learning experiences?

Parents' support of their children's interest in STEM careers?

Selected Evaluation Questions

Activity	Tools
Workshops	Pre-post surveys & knowledge tests
Summer Institutes	Post-survey & 9-month follow-up
Competitions	Post-surveys, interviews, observations, coordinator reports

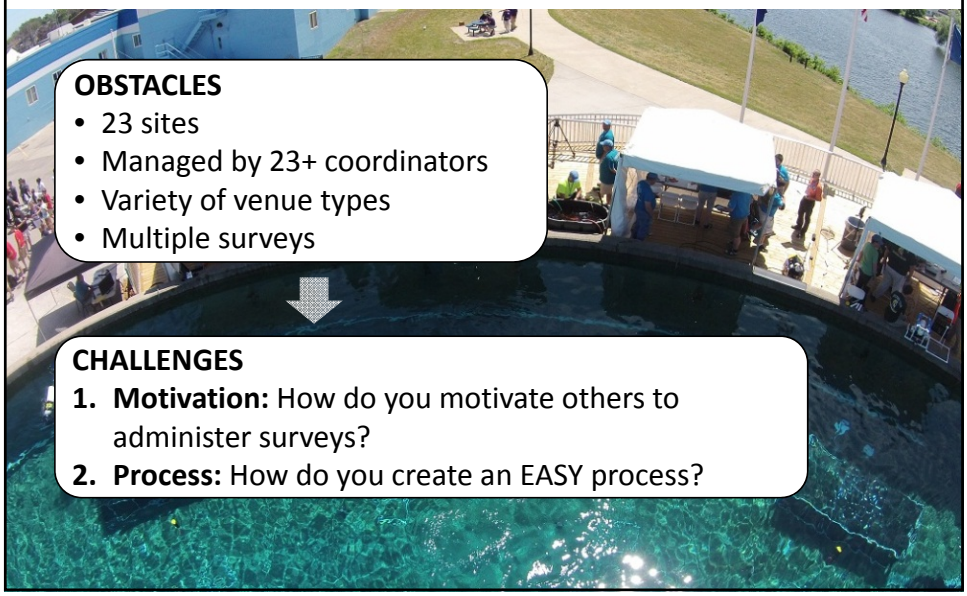
In development…

Pilot study: longitudinal follow-up with econometric models

Post-Competition Surveys

Survey	Languages	Must Administer?
Students	English/Spanish	Required
Teachers	English	Required
Parents	English/Spanish	Optional
Judges	English	Optional

Data Collection Challenges

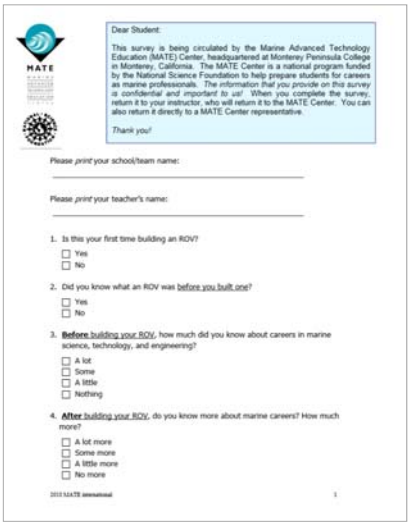


OBSTACLES
- 23 sites
- Managed by 23+ coordinators
- Variety of venue types
- Multiple surveys

CHALLENGES
1. **Motivation:** How do you motivate others to administer surveys?
2. **Process:** How do you create an EASY process?

Year 1 (What not to do)

	2010
Type	Paper & Survey Monkey
Coordinated?	Coordinators
Printed?	Coordinators
Returned?	Coordinators
Data entered?	MATE
Coverage	10 sites



Dear Student:

This survey is being circulated by the Marine Advanced Technology Education (MATE) Center, headquartered at Monterey Peninsula College in Monterey, California. The MATE Center is a national program funded by the National Science Foundation to help prepare students for careers as marine professionals. *The information that you provide on this survey is confidential and important to us!* When you complete the survey, return it to your instructor, who will return it to the MATE Center. You can also return it directly to a MATE Center representative.

Thank you!

Please *print* your school/team name: _____

Please *print* your teacher's name: _____

1. Is this your first time building an ROV?
   - ☐ Yes
   - ☐ No
2. Did you know what an ROV was before you built one?
   - ☐ Yes
   - ☐ No
3. **Before** building your ROV, how much did you know about careers in marine science, technology, and engineering?
   - ☐ A lot
   - ☐ Some
   - ☐ A little
   - ☐ Nothing
4. **After** building your ROV, do you know more about marine careers? How much more?
   - ☐ A lot more
   - ☐ Some more
   - ☐ A little more
   - ☐ No more

Year 1 Lessons Learned

Downsides

- Spotty coverage
- Burden on coordinators
- Multiple datasets
- Slow data entry

Upsides

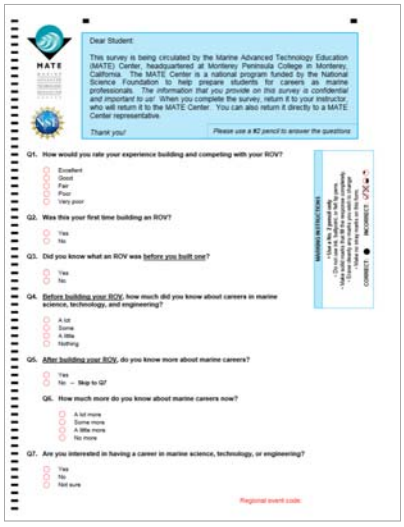
- Inexpensive

Next steps…

- How to make data collection easy for the coordinators?

Year 2 Approach

	2010	2011
Type	Paper & Survey Monkey	Scannable
Coordinated?	Coordinators	MATE
Printed?	Coordinators	MATE (campus)
Returned?	Coordinators	MATE sends box & UPS label
Data entered?	MATE	Scanned
Coverage	10 sites	17



Year 2 Lessons Learned

Upsides

- Better coverage
- Single, clean dataset
- Fast data entry

Downsides

- More $$: printing & mailing
- One-time cost: scannable form set-up
- Time-consuming to coordinate

Next Steps… How to simplify survey distribution?

Year 3 Approach

	2010	2011	2012
Type	Paper & Survey Monkey	Scannable	Scannable
Coordinated?	Coordinators	MATE	MATE
Printed?	Coordinators	MATE (campus)	Local Kinko's
Returned?	Coordinators	MATE sends box & UPS label	Kinko's: box MATE: FedEx label
Data entered?	MATE	Scanned	Scanned
Coverage	10 sites	17	21

Kinko's Process

1. Coordinators identified a local Kinko's
2. MATE emailed files and printing instructions to Kinko's
3. MATE mailed pre-printed FedEx labels to coordinators
4. Kinko's printed surveys and provided an empty FedEx box
5. Coordinators picked up the surveys, administered them, and returned the completed surveys via FedEx

Year 3 Lessons Learned

Upsides

- Eliminated shipping time/cost to coordinators

Downsides

- Increased printing costs
- Possible miscommunication with Kinko's
- Time consuming to manage communication

Next Steps… How to simplify the coordination?

Year 4 Approach

	2010	2011	2012	2013
Type	Paper & Survey Monkey	Scannable	Scannable	Scannable
Coordinated?	Coordinators	MATE	MATE	Excel form: BaseCamp
Printed?	Coordinators	MATE (campus)	Local Kinko's	Evaluator
Returned?	Coordinators	MATE sends box & UPS label	Kinko's: box MATE: FedEx label	Evaluator sends box & UPS label
Data entered?	MATE	Scanned	Scanned	Scanned
Coverage	10 sites	17	21	21

Year 4 Lessons Learned

Upsides
- Better quality control
- Less expensive than Kinko's or campus
- Less administrative burden on MATE staff

Downsides
- Still some coordination time required

Next Steps…
- How to simplify coordination?
- How to eliminate shipping to international sites?

Year 5 Approach

	2010	2011	2012	2013	2014
Type	Paper & Survey Monkey	Scannable	Scannable	Scannable	Scannable & Online option
Coordinated?	Coordinators	MATE	MATE	Excel form: BaseCamp	EmailMeForm (www.EmailMeForm.com)
Printed?	Coordinators	MATE (campus)	Local Kinko's	Evaluator	Evaluator
Returned?	Coordinators	MATE sends box & UPS label	Kinko's: box MATE: FedEx label	Evaluator sends box & UPS label	Evaluator sends box & UPS label
Data entered?	MATE	Scanned	Scanned	Scanned	Scanned & online in same dataset
Coverage	10 sites	17	21	21	16

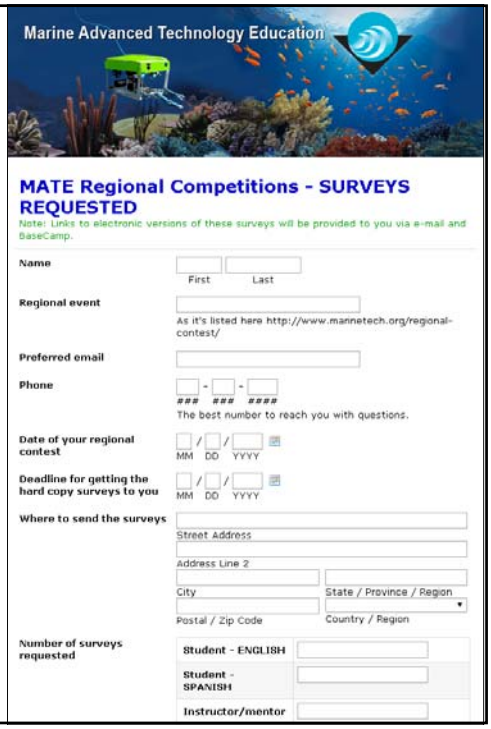
Year 5 Lessons Learned

Upsides

- Simplified coordination
- Eliminated international shipping

Downsides

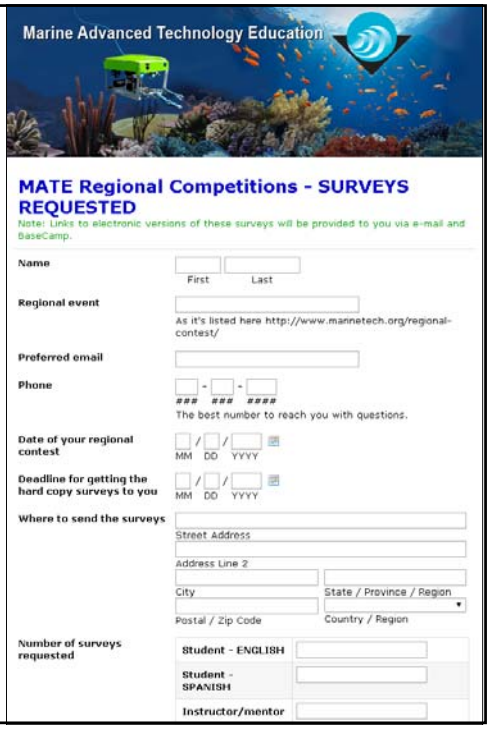
- Difficult for int'l sites without computers



Year 5 Lessons Learned

Next steps…

- How to balance cost and accessibility for international without computers onsite?
- Time for another partner meeting



Motivation

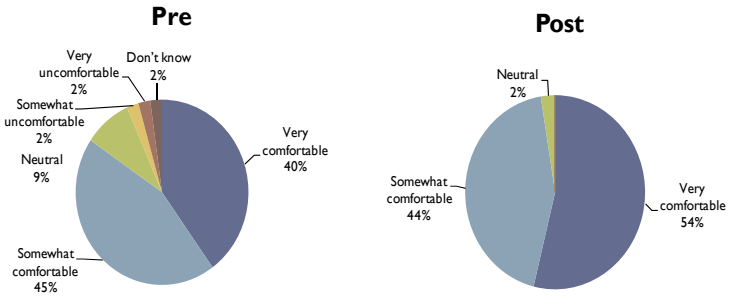
Goal: Make coordinators co-owners in evaluation

Partners' meeting: presented…

1. Evaluation plan
2. Overall results
3. "The Evaluation and You"

Did the teachers gain confidence facilitating STEM learning experiences through the workshops?

"How comfortable are you facilitating STEM learning experiences for students?"



"I feel so much more comfortable coaching because of the support from MATE."

"The Evaluation and You"

Shared all survey forms

Trained how/when to implement each

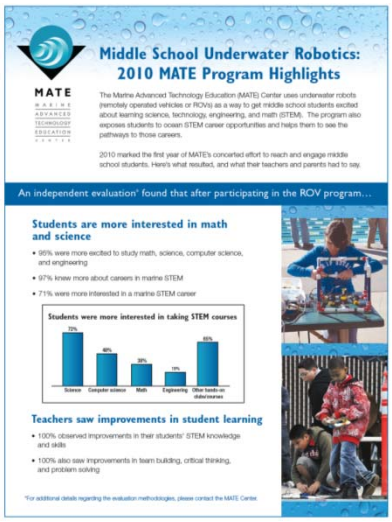
Data Collection Tools (All tools will be revised for Year Two.)	Timing, Tips and Other Notes
Teacher/Mentor Workshops: **Pre-Surveys & Post-Surveys**	• ***At your teacher/mentor workshops:*** Administer the pre-survey first thing, before any instruction. Administer the post-survey at the end of the training. • These are intended to be used at the introductory workshop. If they are used at subsequent workshops, please separate those surveys and let me know so I can analyze those separately.
Competition Surveys: **Student Survey** **Teacher/Mentor Survey** **Parent/Family Survey**	• ***There are 3 separate competition surveys:*** 1) students, 2) faculty/mentors, and 3) parents/family. • ***Location:*** The surveys need to be administered AT THE COMPETITION or other culminating ITEST event please. • ***Print/Web:*** Student and faculty surveys are available in printable versions or via the web. If you choose to administer via the web, computers with internet access need to be available at the competition. • ***Incentives:*** Some regions use incentives to motivate people to complete the surveys, such as t-shirts or food. The use of survey incentives is entirely up to you, but please let me know if you do use them, as I'd like to mention it in the report. • ***Parents who mentor teams:*** In this case, they are welcome to complete both the parent survey and the

"The Evaluation and You"

Provided their region's results

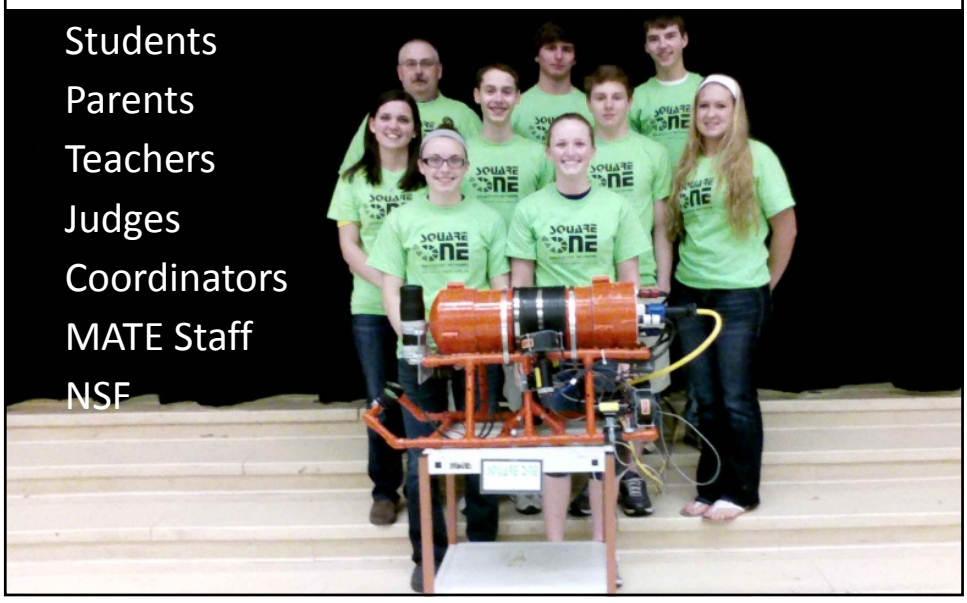
Discussed how to use results…

- Improve competition
- Recruit students, teachers, administrators, sponsors
- Use in PR, grant applications
- Create "highlights" sheets for events & conferences



Acknowledgements

Students
Parents
Teachers
Judges
Coordinators
MATE Staff
NSF



Developing Leaders in Biosciences:

Evaluating an ATE Biotechnology Education Program

Bruce Nash, Assistant Director for Science
Amy Nisselle, Multimedia & Evaluation Manager

CSH Cold Spring Harbor Laboratory
DNA Learning Center

Genomic Approaches in Biosciences

Aim

Strengthen biotech instruction by training educators to implement experiments integrating four major technologies of the genome era

1. PCR
2. DNA sequencing
3. RNA interference
4. Bioinformatics

CSH Cold Spring Harbor Laboratory
DNA Learning Center

Genomic Approaches in Biosciences

Collaboration
- DNA Learning Center
- Bio-Link careers resources
- 12 community colleges

Week-long summer educator workshops
- Original grant: 2011-13
- Extension: 2013-15 ("train the trainer")

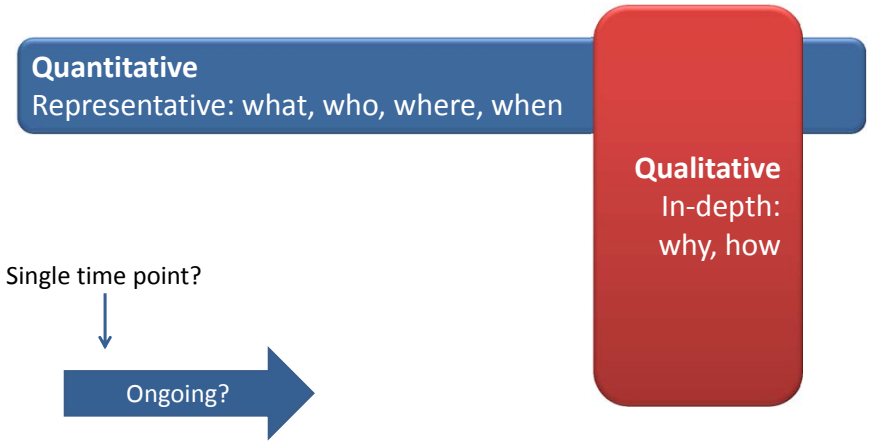
Curriculum
- Theoretical, laboratory, and computer technology materials
- Practical advice on classroom management
- Career exploration

CSH Cold Spring Harbor Laboratory
DNA Learning Center

Evaluation Objectives

1. What are the **teacher impacts** of the program on:
   a) confidence to teach program curricula?
   b) Implementation/ classroom behavior?
2. What are the **student impacts** of the program in terms of:
   a) experiences of student-centered research and learning?
   b) preparation for careers in biotechnology?
3. What are the **barriers and facilitators** to program implementation (teacher, student, institution, other)?

Evaluation Methods



Cold Spring Harbor Laboratory DNA Learning Center

Mixed Methods

Combines aspects of both quantitative and qualitative

Provides breadth and depth of understanding (but requires more time and varied skills)

Often two-step process

1. Focus groups with stakeholders (e.g., teachers) to identify key issues
2. Survey of key issues sent to wider sample

1. Surveys to broad population to highlight key issues
2. Focus groups / classroom observations to investigate key issues in more depth

Cold Spring Harbor Laboratory DNA Learning Center

Methods Matrix for Teacher Impact

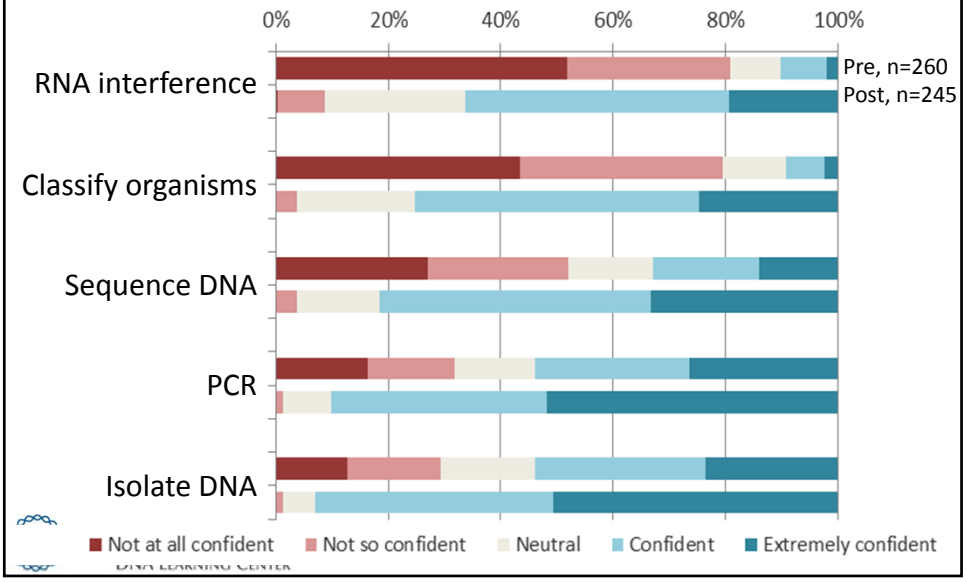
Time

Data collection tool	*Evaluation Objective*	
	Teacher confidence	Implementation/ Teacher behavior
Pre-workshop survey	✓	
Post-workshop survey	✓	
Follow-up survey (12 mo)	✓	✓
Long-term case study (18 mo)		
Classroom observation	✓	✓
Teacher interview	✓	✓
Student focus group		✓

Cold Spring Harbor Laboratory
DNA Learning Center

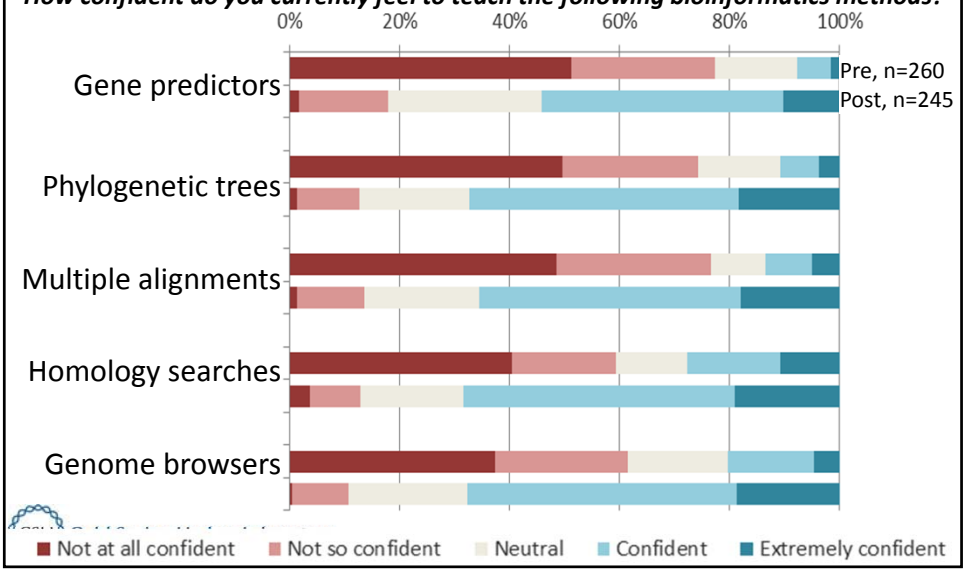
Change in Confidence: Labs

"How confident do you currently feel to teach the following lab methods?"



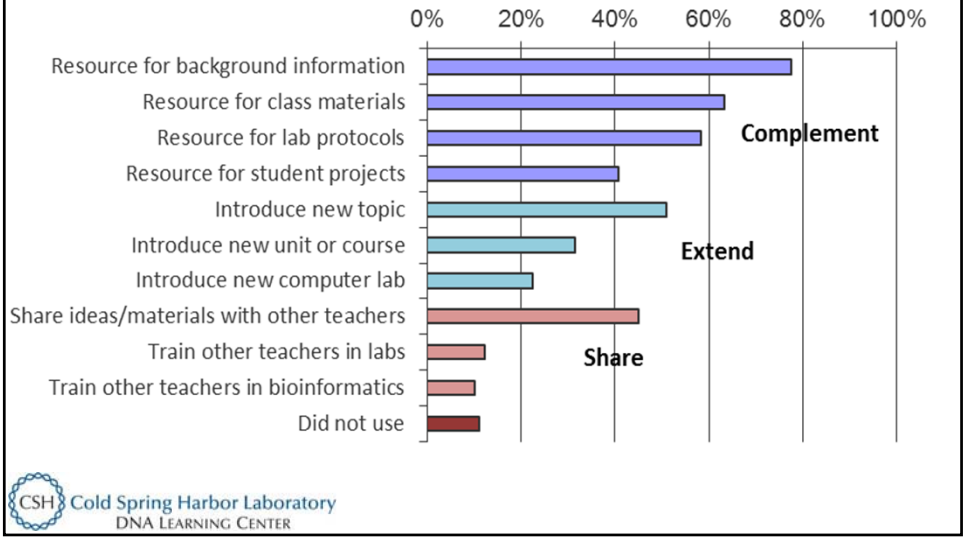
Change in Confidence: Bioinformatics

"How confident do you currently feel to teach the following bioinformatics methods?"



Implementation

"To date, how have you actually used the workshop materials or DNA Subway?" (n=98)



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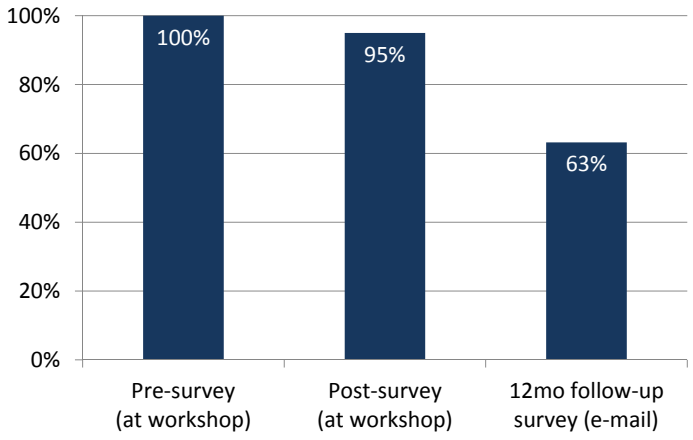
Qualitative Data

"Students have 2 weeks that incorporate isolating their taste bud receptor as part of a larger lab report and investigation of genetic variation within a population… It incorporates both the biotechnology along with literature research, classical Mendelian inheritance of single traits and Hardy-Weinberg predictions."
Teacher, 12mo f-up survey

"Biotech is the only [class] where we've learnt stuff that we can apply when we get a job… where I feel a little more confident in that, 'Oh, I can do this in a lab.'"
Student, long-term case study focus group

Cold Spring Harbor Laboratory
DNA Learning Center

Challenge: Survey Response Rates



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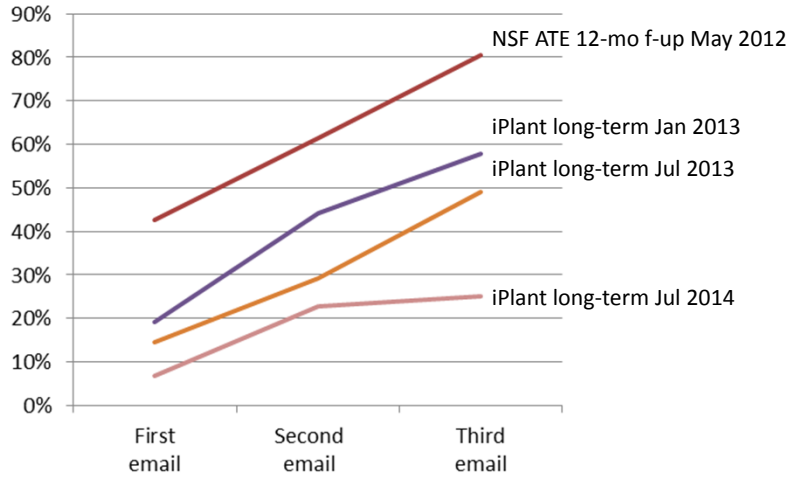
Solution: Dillman Method – 3 Strikes

	First email	Second email	Third email
Timing	t=0	+2 weeks	+2–3 weeks
Who	DNALC admin	DNALC admin	DNALC admin
Thanks	-	Thanks/response rate	Thanks/response rate
What	NSF ATE workshop evaluation survey	Evaluation survey	Survey
Where	Survey URL	Survey URL	Survey URL
Why	To improve workshops and DNALC programs	To improve workshops	-
When	If you do it by… you'll get/win…	Still time to do it by… and get/win…	Last chance to do it
Next	Reminder in 2 weeks	Reminder	-

Dillman, D., Smyth J., & Christian, L. (2014). *Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. (4th Ed.) John Wiley & Sons.

Dillman Method: DNALC Survey Responses



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Using Evaluation Data

To refine current program

- Curricula (more time for bioinformatics, highlight careers)
- Logistics (participant selection)
- Follow-up (tutorials, online lesson plans, collaborations)
- Extend evaluation program (SURE data re independent student research experiences)

To fund new/expanded programs

- Use these data in all grant proposals (teacher training, workshops, student research, use of materials, *etc*.)
- Expanded existing NSF ATE program in response to demand (analyse data from "train the trainer" model *cf* original program)

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DNA Learning Center

Acknowledgements

NSF ATE funding
Advisory board members
Workshop/study participants
Community college collaborators
DNALC staff

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DNA Learning Center

Further Information & Resources

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Curricula materials

Data collection tools

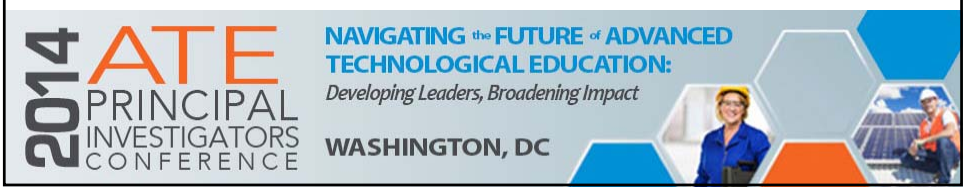
- Surveys
- Interview / focus group questions
- Templates for observation field notes

Evaluation theory references

Cold Spring Harbor Laboratory
DNA Learning Center

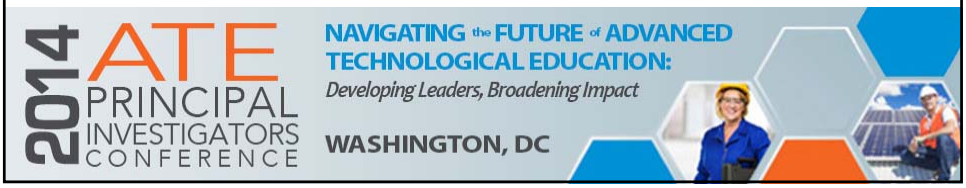
More on Evaluation at the Conference

THURSDAY	7:45 a.m.	Breakfast Roundtable 7: How to Track, Evaluate, and Promulgate Center Online Educational Resources
	10:30 a.m.	ATE Research and Evaluation: Responsibilities and Opportunities
FRIDAY	7:45 a.m.	Breakfast Roundtable 16: Research and Evaluation by ATE Projects and Centers



More on Evaluation at the Conference

Visit the EvaluATE team at Booth #3 during showcase sessions



Thank you!

EvaluATE
Evaluation Resource Center for advanced technological education