Mobile Laboratory Coalition

MLC CONFERENCE

ACCELERATING SCIENCE EDUCATION

JUNE 25-28 2019 ATLANTA, GA

CONFERENCE SUPPORT

Funding for this year's conference was provided in part by the Science Education Partnership Award (SEPA) program at the National Institute of General Medical Sciences (NIGMS) at the NIH under Award Number R13 GM129195. The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Service; nor does mention of trade names, commercial practice, or organizations imply endorsement by the U.S. Government.

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

Additional conference support provided by:

Bio-Bus
GEORGIA STATE UNIVERSITY

Georgia State University
A MAJOR PUBLIC RESEARCH UNIVERSITY IN ATLANTA

FARBER SPECIALTY VEHICLES
Custom Coach™

HITACHI
Inspire the Next

West NETWORKS

Seattle Children's
HOSPITAL · RESEARCH · FOUNDATION

TRIUNE
SPECIALTY TRAILERS

NEW ENGLAND BioLabs Inc.

minipcr bio™

2019 MOBILE LABORATORY COALITION CONFERENCE

The 2019 Mobile Laboratory Coalition's 14th annual conference was held on June 25-28 in Atlanta, Georgia. There were 71 conference participants representing 46 programs and companies from across the U.S., as well as one international program.

Hosted by The Bio-Bus Program, Seattle Children's Research Institute, Farber Specialty Vehicles, and Triune Specialty Trailers, the conference took up residence on the campus of Georgia State University.

Workshop topics encompassed a wide variety of topics including:

- Curriculum demonstrations
- Collaborations and partnerships
- Resources for interactive teaching
- Grant writing
- Reimagining an old mobile lab
- Science stations
- Engaging diverse audiences
- Community research and program design
- Evaluation
- Building a mobile lab

The conference also hosted a lively poster session with 16 presentations and mobile lab tours on campus at Georgia State University. Networking opportunities were the highest rated aspects of the conference on the post-conference survey.

Thank you all for your attendance and participation. Without so many quality contributions from our members, we would not have such a worthwhile conference each year. It was great to connect with you in Atlanta, and I look forward to seeing you next year.

Sincerely,

Michelle Ventura Ezeoke, Ph.D.

2019 MLC Conference Organizing Committee:

Michelle Ventura Ezeoke, Ph.D., Georgia State University
Don DeRosa, Ed.D., Boston University
Patrick Flanagan, M.Sc., Ocean Learning Lab and Immersive Experience (OLLIE)
David Garbe, Ph.D., PA Society for Biomedical Research (PSBR)
Amanda Jones, Ph.D., Seattle Children's Research Institute
Sherry Painter, Ph.D., LeMoyne-Owen College
Sarah J. Weisberg, M.Sc., BioBus, Inc.
Joe Wilkerson, Learning Undefeated

TABLE OF CONTENTS

Report prepared by:

Courtney Hagans, Program Coordinator | *courtney.hagans@seattlechildrens.org*
Rebecca Carter, M.S., Senior Curriculum Specialist | *rebecca.carter@seattlechildrens.org*
Amanda Jones, Ph.D., Senior Director, Science Education Department | *amanda.jones@seattlechildrens.org*

Graphic Design By:
Xpress Printing Services, LLC.

WEDNESDAY, JUNE 26

7:30-8:30am Registration, coffee & networking

8:30-8:45am *Welcome and Introductions*

Dr. Barbara Baumstark
Georgia State University

Dr. Michelle Ventura Ezeoke
Behalf of Mobile Laboratory Coalition
The Bio-Bus Program

8:45-9:00am Program Introductions – Round 1

9:00-10:30am

Keynote Session: Dr. Meisa Salaita

Dr. Meisa Salaita, Atlanta Science Festival Co-Founder and Co-Executive Director

10:30-10:45am Break

10:45-11:35am Concurrent Workshop Sessions

Session 1: STEM Education with the Mobile Fab Lab

Jonathan Doctorick, Technical and Education Manager, Mobile Fab Lab

Session 2: Collaborations and Partnerships – Building a Network for Success

Lori Harvey, Manager of STEM Educational Outreach and CSR Programs, Hitachi High Technologies America, Inc.

11:35-1:00pm Lunch

1:00-1:15pm Program Introductions – Round 2

1:15-2:15pm

Plenary Session: The Findings Group, LLC: Evaluation 101

Dr. Tom McKlin, Director, The Findings Group, LLC

2:20-3:10pm Concurrent Workshop Sessions

Session 3: From Community Research to Program Design: Listening, Learning, and Creating with Community Every Step of the Way

Maritza Hernandez-Bravo, Denver Museum of Nature and Science
Lindsey Housel, Denver Museum of Nature and Science

Session 4: Te(a)ch for Mobile Labs: Resources for Interactive Teaching on Mobile Labs

Dr. Carla Romney, Director of Research, Boston University School of Medicine CityLab
Dr. Don DeRosa, Director, Boston University School of Medicine CityLab and MobileLab

3:10-3:25pm Break

3:25-4:15pm Concurrent Workshop Sessions

Session 5: The Tall Short Physics Bus: Smaller and Better Than Ever!

Dr. Bruce Bayly, Associate Professor of Mathematics, University of Arizona
Erik Herman, Founder of The Physics Bus

Session 6: Writing My Next Grant!

Dr. Patricia Irizarry, Director of Outreach and Assistant Professor, Rutgers University
Dr. Don DeRosa, Director of Boston University School of Medicine CityLab and MobileLab
Dr. Carla Romney, Director of Research at Boston University School of Medicine CityLab

6:00-9:00pm Networking Dinner at the Painted Pin

THURSDAY, JUNE 27

7:30-8:30am Registration, coffee & networking

8:30-9:30am

Keynote Session: Jason Martin

Jason Martin, Executive Director, STE(A)M Truck

9:30-9:45am Program Introductions – Round 3

9:45-10:00am Break

10:00-10:50am Concurrent Workshop Sessions

Session 7: Osceola's STEM Mobile Lab: Every Student, Future Ready

Melanie Stefanowicz, Executive Director, Secondary & Post-Secondary Career and Technical Education, The School District of Osceola County, Florida
Magen Palo, Resource Teacher, The School District of Osceola County, Florida
Rachelle Sole, Resource Teacher, The School District of Osceola County, Florida

Session 8: Expanding College and Career Options with a Mobile Lab

Dr. Michelle Ventura Ezeoke, The Bio-Bus Program
Dr. Patricia Irizarry, Director of Outreach and Assistant Professor, Rutgers University

11:00-11:50am

Plenary Session: Empowering Generations Through Science Collaborations

Dr. Patrick Enderle, Assistant Professor at Georgia State University College of Education
Gretchen Gose, K-8 Science Educator, Unidos Dual Language School
Brenda Rivera, K-8 Science Educator, Unidos Dual Language School
Sakenna Washington, K-8 Science Educator, Charter School (APS)

12:00-2:45pm Lunch and Mobile Lab Viewing

Mobile Labs Included: Georgia State University's Bio-Bus Program, Osceola Mobile STEM Lab, Kennesaw State University's iTeach MakerBus, BioBus, Inc., Ocean Lab

3:00-3:50pm Concurrent Workshop Sessions

Session 9: Second Wind: Reimagining an Old Mobile Lab

Dr. Carla Romney, Director of Research at Boston University School of Medicine CityLab
Dr. Don DeRosa, Director of Boston University School of Medicine CityLab and MobileLab

Session 10: LIFE Mobile Laboratory Integrated in Learning Packages

Dr. Bjarke Takashi Rojle Christensen, Project Officer, Novo Nordisk Foundation
Morten Trolle, Project Officer, Novo Nordisk Foundation
Aff Hjarno, Project Officer, Novo Nordisk Foundation

4:00-4:30pm Poster Set-Up

4:30-6:30pm Poster Session & Networking Reception

FRIDAY, JUNE 28

7:30-8:30am Registration, coffee & networking

8:30-9:45am **Plenary Session: Mobile Lab Coalition Communication and Website Committees**

Dr. David Garbe, Outreach Educator, Pennsylvania Society for Biomedical Research (PSBR)

9:45-9:55am Program Introductions – Round 4

10:00-10:50am Concurrent Workshop Sessions

Session 11: Beginning Grant Writing

Patrick Flanagan, Director, Ocean Learning Lab and Immersive Experiences (OLLIE)
Lori Shimoda, Director, I Am a Scientist STEM Outreach Program, Chaminade University
Sarah Weisberg, Chief Scientist and Executive Vice President, BioBus

Session 12: Building a Mobile Lab: The Ups and Downs of Creating a Mobile Science Program and Motile Mobile Labs

Dr. David Garbe, Outreach Educator, Pennsylvania Society for Biomedical Research (PSBR)
Li Murphy, Director of Facilities, BioBus

10:50-11:00am Break

11:00-11:50am Concurrent Workshop Sessions

Session 13: Methods to Engage Science Learning Through a Cultural Lens

Lori Shimoda, Director, I Am a Scientist STEM Outreach Program, Chaminade University

Session 14: Wheeling Science Education: Presenting BioBus's Science Stations

Sarah Weisberg, Chief Scientist and Executive Vice President, BioBus

12:00pm Adjourn

Keynote: Dr. Meisa Salaita

Wednesday, June 26, 9:00 – 10:30am

Presenter:	**Dr. Meisa Salaita,** *Atlanta Science Festival Co-Founder and Co-Executive Director*
Reporters:	**Jonathan Doctorick,** *Fab Lab Carnegie Science Center* **David Garbe,** *PA Society for Biomedical Research*

Session Description

This keynote session focused on Dr. Meisa Salaita's experiences developing the Atlanta Science Festival.

About Dr. Meisa Salaita

- Ph.D. – Co-founder and Co-executive Director, Atlanta Science Festival
- Producer of The Story Collider
- At Fernbank Planetarium, hosted an astronaut and students that could talk to the International Space Station during a 3-minute window
- Started as a teacher and then moved on to the Atlanta Science Festival to perform science outreach
- Background in formal science – Chemistry
    - Began career teaching at a private school in San Francisco.
    - Created their chemistry program
    - Discovered that she enjoyed creating new programs
    - Moved to Atlanta

Atlanta Science Festival (ASF)

- Non-profit science communication
- Mission: bring people from the community together centered on science topics
- Has grown substantially since its inception
- In addition to the Festival, they have a program that matches scientists with classroom teachers
- Allows Dr. Salaita to "get to" individuals who have curiosity in science for various reasons
- The demographics for the Festival match the demographics of Atlanta at large
- ASF Information
    - 60k attendees
    - 99 partners
    - 128 events
    - 38 sponsors
    - 338 volunteers
    - 85 venues
    - 108 classroom visits
    - 234 media hits
    - Events spread across Atlanta metro area
    - Female attendees: 63%

Beyond ASF

- Has turned into a year-round science event
- Science Communication Fellowship
- Year-round science events include a 5k Race Through Space (realistically space out the planets along the way)
- Science Passport Activity to experience the science activities already in the area
- Georgia Chief Science Officers offers program for students to learn how to be the next science and thought leaders
- The festival is still striving to broaden access to science
    - Need to tailor your content and subject matter to the demographics you're serving
    - College night instead of "cafe" talk by scientist
    - What does a scientist look like? http://ed.final.gov/projects/scientists

The Story Collider

- How people interact with science:
    - Personal
    - Social
    - Professional
- Broadening Access
    - Main point: Science and science careers do not have to be for the "other"
- Science communication
    - Competence and warmth – people seek people they can trust
    - Scientists often seen as competent, but not necessarily warm
    - We get people to trust us through stories; they help us make sense of the world around us

Questions and Answers

- How do you collect demographic data?
    - External evaluators
    - Also check to see if universities have in-house evaluators
    - Post cards, on the ground teams, extrapolate data from respondents
- When did ASF become a non-profit?
    - Seeded by Emery, but they did not want ownership
    - Spun off by itself
- What is ASF's relationship with the sponsors?
    - Does not necessarily like that universities have to be on the list of sponsors
        - This can often be seen as "exclusive"
    - However, companies like Google and Delta make ASF seem more accessible
- Have you turned down sponsors?
    - If approached, no
    - She has not approached certain sponsors that she does not believe align with her mission
- Scientists and warmth – Check out the work of Susan Fish and Cindy Dupree.

Participants

Rick Armstrong, Faber Specialty Vehicles
Julienne Bailey, Utah STEM Bus
Susan Bannwart, LaPorte Co. Public Library
Barbara Baumstark, Georgia State University
Bruce Bayly, University of Arizona, The Physics Factory
Corey Coombs, Seattle Children's Research Institute
Kimberly Cox-York, Colorado State University
Don Derosa, Boston University Mobile Lab
Marina Delgado, BioBus, Inc.
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Fab Lab Carnegie Science Center
Rich Elsasser, Education Service Center Region 13
Donavin Farber, Farber Specialty Vehicles
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsher Health System
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Davidson Fleurantin, BioBus
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
Ian Fried, BioBus, Inc.
David Garbe, Pennsylvania Society for Biomedical Research
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lori Harvey, Hitachi High Technologies
Thomas Haynes, Puyallup School District
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Lindsey Housel, Denver Museum of Nature & Science
Patricia Irizarry, Rutgers University
John Jaramillo, EWD Saddleback College
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Harry Kurtz, Triune Specialty Trailers
Geoff Lawrence, National Space Science & Technology Institute/ Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Kristy McDowell, Baby Scientist Inc.
Dani Meyers, Colorado Academy
Joshua Mitchell, Education Service Center Region 13
Danielle Molden, BioBus, Inc.
Li Murphy, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Magen Palo, Osceola County School District
Rosemary Puckett, BioBus, Inc.
William Roden, Seattle Children's Research Institute
Carla Romney, Boston University Mobile Lab
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Shiloh Slomsky, SEEDS
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM lab
Maija Thiel, Puyallup School District
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab
Sarah Weisberg, BioBus, Inc.
Joseph Wilkerson, Learning Undefeated

Keynote: Can We Eliminate Inequities with Wheels?

Thursday, June 27, 8:30 – 9:30am

Presenter: **Jason Martin,** *Executive Director, STE(A)M Truck*
Reporters: **Patrick Flanagan**, *Ocean Learning Lab and Immersive Experiences*
Madison Dodds, *Salk Institute*

Session Description

The STE(A)M Truck is a maker space with a growing fleet that serves over 4000 elementary and middle school students each year. The mission of the program is to give students a hands-on learning experience, a chance to "get their hands dirty", and to empower teachers.

About Jason Martin

- Grew up in Jersey City in an urban environment
  - Learned street smarts
- Moved to the country and spent childhood on the farm
  - School wasn't good; went to a different high-performing high school
- Didn't do well in high school
  - Got an apprenticeship as a mason
- Was hired at Teach for America
  - Started BUG Club GOES – **B**rain **U**p**G**rade Club **G**et **O**ut and **E**xperience **S**tuff

Zip Code Effect on School

- Zip codes effect and shape future opportunities
- Jason was able to go to a high-performing school outside the rural district; increased his opportunities
- Different zip codes can influence if you will successfully graduate college
  - Leaves large pockets of underserved areas that have lasting impacts on population

- Believes public schools are poorly set up to tap into the community network
- STE(A)M truck is able to close opportunity gaps and eliminate inequities by transforming teaching and learning through and experimental maker approach

About STE(A)M Truck

- Began with a 1988 delivery truck
- Had a past life helping adults sign up for unemployment benefits
- Launched with one truck, now they have six vehicles
- How to create apprenticeship experience that empowers youth to solve real-world problems
    - Put all experts and tools for learning and experience on truck
    - Bring programs to schools; teach kids to use everything from: band saws, chop saws, 3D printers, CNC machines
        - Begins in pre-k age group
        - Taps into their natural curiosity
- STE(A)M Truck focuses on three core proficiency factors
    - School culture
        - Working together with students, teachers, admin, and staff to build a sense of community
    - Teacher effectiveness
        - Shows teachers what students are capable of
    - Interventions for struggling students
        - Many students struggling show improvement with pre and post visit testing
- Program has three parts to it
    - Engagements (1, 3, and 5-day events per grade) (1st year)
    - Capacity building for teacher-leaders (2nd year)
    - Sustaining support and engagement with school teachers and administrators (3+ years)
- STE(A)M focuses on
    - Giving kids opportunities to get their hands dirty and do things
    - Empowering teachers to do the same
    - Working to be culturally inclusive and sensitive to communities they serve
    - Intentional about who is hired and projects that are chosen
- Core program is 20 days long
    - Same site, same kids
- Current projects and success stories
    - Building a compost heap for local community
    - Two girls, with a team of engineers, developed a camera for a girl without arms who wants to be a filmmaker
        - The leader of this project was considered a mediocre student by her teachers
        - How much potential can be unlocked if they thrive in other ways?
- 1:5 teacher: student ration
    - Students work closely with artist/ engineer for 20 hours
    - Increases likelihood that memory will stick
- Schoolboard presentations are important
    - Schoolwide share day at end of 20-day period
- Invite principal and the school board

Questions and Answers

- How are you funded?
  - Half of budget earned revenue from schools
  - Half is foundation and corporate grants
- How do you know you're effecting change in school culture?
  - Began with charter schools open to innovation and experimentation
  - Those schools began to see changes
  - If right teachers are on board, they become advocates of the program
- What is your pitch to teachers to take 20 whole days to the program?
  - Our program aligns with scope and sequence standards
  - Speak with teachers weeks before program begins
  - Teachers are receptive to our programs; principals are more difficult to get on board
- How are you empowering teachers afterward?
  - Helping schools develop innovation labs (design and build, picking and using tools)
  - Ongoing support and shared curriculum
  - Community guilds to support teachers after program
- How did you focus on gender and race expectations as factors?
  - Intentional about recognizing bias in policies, teachers, principals, and who we hire
- Cost and staff of 20-day-program?
  - 5 person staff each day
  - $850/half day and $1700/full day

Participants

Julienne Bailey, Utah STEM Bus
Susan Bannwart, LaPorte Co. Public Library
Bruce Baycy, The Physics Factory
Bjorke Christensen, LIFE, Novo Nordisk Foundation
Corey Coombs, Seattle Children's Research Institute
Don DeRosa, Boston University Mobile Lab
Marina Delgado, BioBus, Inc
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Mobile Fab Lab
Madison Dodds, Salk Institute
Michelle Ezeoke, Georgia State University
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsher Health System
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
Ian Fried, BioBus, Inc.
Ryan Gililland, Triune Specialty Trailers
Gretchen Gose, Unidos Dual Language School
Kaila Green, Northcutt Elementary
Lori Harvey, Hitachi High Technologies
Thomas Haynes, Puyallup School District
Erik Herman, Physics Factory
Patricia Irizarry, Rutgers University
John Jaramillo, EWD Saddleback College
Kyle Kilpatrick, Oakland Schools

Participants

Phil Kimmel, Oakland Schools
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Joshua Mitchell, Education Service Center Region 13
Danielle Molden, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Rosemary Puckett, BioBus, Inc.
Brenda Rivera Lee, Unidos Dual Language School
William Roden, Seattle Children's Research Institute
Carla Romney, Boston University Mobile Lab
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Shiloh Slomsky, SEEDS
Maija Thiel, Puyallup School District
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab
Sakenna Washington, National Alliance for Public Charter Schools
Joseph Wilkerson, Learning Undefeated

Plenary: The Findings Group, LLC: Evaluation 101

Wednesday, June 26, 1:15 – 2:15pm

Presenter: **Dr. Tom McKlin,** *Director, The Findings Group, LLC*
Reporters: **Li Murphy**, BioBus, Inc.
Lori Shimoda, Chaminade University, I am a Scientist

Session Description

Purpose of evaluation is to make your ideas and/or work better. One can utilize logic model template (resources, activities, outputs, outcomes, and long term) to track progress.

Example

- Lessons to be learned from the Vasa, a Swedish warship built in the 1600's to be the greatest warship
  - Sank after being launched due to numerous errors in the design and construction
  - Construction was rushed
  - Head designer died during construction
  - Design was changed multiple times

Agenda

1. Why
2. Modeling
3. Derive evaluation
4. Outcome
5. Method
6. Reporting

Why

- To prevent catastrophe
- Make sure program is doing what we want to do
- Who to influence?
  - Teachers, students, parents

Modeling

- Logic model template
- Resources

Resources: Who will do the work (name names)? What physical resources will be used?	Activities: What the project will do.	Outputs: What will happen as a result of those activities?	Outcomes: What happens as a result of the combined outputs?	Long term impact: How the world will be different as a result of the combined outcomes.

Evaluation

- implementation- did you do what you planned
- program outputs
- outcomes
- long term

Evaluation	The Vasa disaster
Planning: modeling, evaluation, method	Competing goals of the project
Data Collection & Analysis	Determined the Vasa was unstable
Reporting	Lack of communication

Outcome

- How will activities produce the long-term impact that you expect to have?
- Do you believe the relationship between all the pieces (resources-activity-outputs-outcomes-long term impact)?
    - Input – understand mechanism – output
- Impact Evaluation: assess changes that lead to outcome
- Theory of Change: assess mechanism which change occurs

Method

- Be mindful of the very young and how adults may influence their behavior "administrator effect", and their wanting to please
- Assessment
- Interview
- Observation
- Artifact analysis
- Neighborhood walks

Report

- Understand the mechanisms that affect impact

Participants

Julienne Bailey, Utah STEM Bus
Susan Bannwart, LaPorte Co. Public Library
Barbara Baumstark, Georgia State University
Bruce Bayly, The Physics Factory
Bjorke Christensen, LIFE, Novo Nordisk Foundation
Marina Delgado, BioBus, Inc.
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Mobile Fab Lab
Rich Elsasser, Education Service Center Region 13
Michelle Ezeoke, Georgia State University
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsher Health System
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
Ian Fried, BioBus, Inc.
David Garbe, Pennsylvania Society for Biomedical Research
Thomas Haynes, Puyallup School District
Erik Herman, Physics Factory
Harry Kurtz, Triune Specialty Trailers
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Maptson, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desura Matthews, Learning Undefeated
Kristy McDowell, Baby Scientist Inc.
Dani Meyers, Colorado Academy
Danielle Molden, BioBus, Inc.
Li Murphy, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Magen Palo, Osceola County School District
Rosemary Puckett, BioBus, Inc.
Robert Sallee, National Space Science & Technology Institute
Heather Skaza Acosta, Conservancy of Southwest Florida
Lori Shimoda, Chaminade University, I am a Scientist
Rachelle Sole, STEM Mobile Lab

Martiza Hernandez-Bravo, Denver Museum of Nature & Science
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lindsey Housel, Denver Museum of Nature & Science
Kyle Kilpatrick, Oakland Schools
Phil Kimmel, Oakland Schools
Melanie Stefanowicz, Osceola Mobile STEM Lab
Maija Thiel, Puyallup School District
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab
Sarah Weisberg, BioBus, Inc.
Joseph Wilkerson, Learning Undefeated

Plenary: Empowering Generations Through Science Collaborations

Thursday, June 27, 11:00 – 11:50am

Presenters:	**Dr. Patrick Enderle,** *Georgia State University*
	Gretchen Gose, *Unidos Dual Language School*
	Brenda Lee Rivera, *Unidos Dual Language School*
	Sakenna Washington, *National Alliance for Public Charter Schools*
Reporters:	**Patricia Irizarry,** *Rutgers University*
	Heather Skaza Acosta, *Conservatory of Southwest Florida*

Session Description

A collaborative discussion of the way that we can reach out to underserved communities to support their needs in education including, but not limited to, STEM education.

Collaboration Successes

During these workshops, the audience was divided into two groups to create a list of challenges and successes they had have making collaborations. During group discussion each panelist commented on their own experiences for those challenges or successes and their experience after participating in the Bio Bus teacher training program.

- Successes
  - Examples of program that are new or have been running successfully
  - Identifying partners
  - Communication with science educators
- Challenges
  - Focus on industry career programs
  - Trying to reach communities outside of Atlanta (or your area)
  - How to keep students engaged once they become engaged
- What can the mobile lab community contribute?
  - Ability to reach out to the communities. We need to come to them
  - Access
  - Impact
  - Address the current need for teaching things in different ways
- Importance of STEM education in diverse communities
  - Positive impact on students when they see scientists that look like them
  - Mobile Lab supports student empowerment through exposure
  - Teach in a unique way to touch and inspire students and teachers to teach and learn in unique way
  - STEM for all; not for some

- Not all students are headed for STEM careers, but all need to be STEM literate
- Partnering with community groups will connect you to real issues within the community
  - Non-science and non-education groups
- Demonstrate to students that they matter

Participants

Julienne Bailey, Utah STEM Bus
Bruce Bayly, The Physics Factory
Thomas Bussey, Fulton County Schools
Bjarke Christensen, LIFE, Novo Nordisk Foundation
Kimberly Cox-York, Colorado State University
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Mobile Fab Lab
Madison Dodds, Salk Institute
Michelle Ezeoke, Georgia State University
Courtney Fenlon, University of Illinois
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
David Garbe, Pennsylvania Society for Biomedical Research
Ryan Gililland, Triune Specialty Trailers
Kaila Green, Northcutt Elementary
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lori Harvey, Hitachi High Technologies
Thomas Haynes, Puyallup School District
Erik Herman, Physics Factory
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Lindsey Housel, Denver Museum of Nature & Science
Patricia Irizarry, Rutgers University
John Jaramillo, EWD Saddleback College
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Kristy McDowell, Baby Scientist Inc.
Dani Meyers, Colorado Academy
Joshua Mitchell, Education Service Center Region 13
Barielba Nenbee, BioBus, Inc.
Rosemary Puckett, BioBus, Inc.
William Roden, Seattle Children's Research Institute
Robert Sallee, National Space Science & Technology Institute
Bazla Shahzad, Dekalb County Schools
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Maija Thiel, Puyallup School District
Aliya Tousana, Fulton County Schools
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab
Joseph Wilkerson, Learning Undefeated

Plenary: Mobile Lab Coalition Communication and Website Committees

Friday, June 28, 8:30 – 9:45am

Presenter: **Dr. David Garbe,** *Pennsylvania Society for Biomedical Research*
Reporters: **Rosemary Puckett,** *BioBus, Inc.*
Marina Delgado, *BioBus, Inc.*

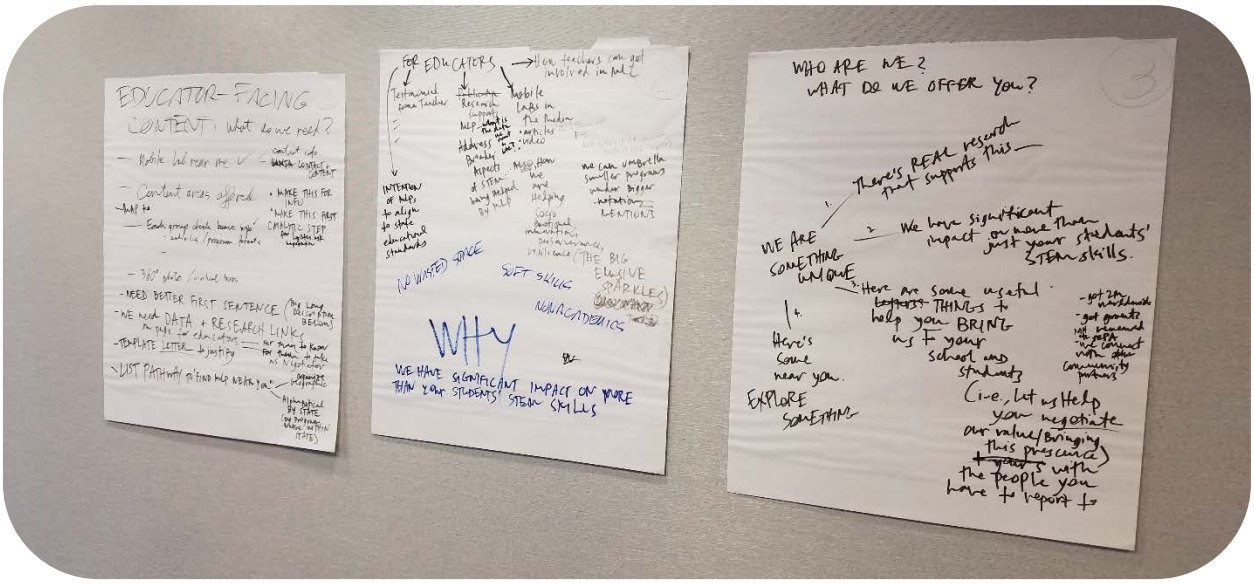
Session Description

The Mobile Lab Coalition presents their website and asks for critical feedback on: grant content, member benefits, program advantages and disadvantages, member portal, and educator content.

Feedback

- Program advantages and disadvantages
  - Add images for those just entering MLC world for first time under "program types"
    - Drive program choice by outcome

    - Add virtual tours of some mobile labs
- "For Educator" Page
    - Adding teacher testimonials
    - Make website an easy transition from "who are we" to "how do we get to you"
    - Broaden out from STEM
        - Research that provides evidence of Mobile Lab's impact outside of STEM
- Miscellaneous
    - Share MLC logo to all members and link them
    - Use #mobilelabcoalition to increase visibility
    - Ask board for text and scaffolding of content from members
        - Accumulate, then add
- Members Portal
    - Detailed conference reports
- Nitpicking things about links, format, etc.
    - "Mobile Labs 101" is in two places on dropdown menu



Participants

Julienne Bailey, Utah STEM Bus
Corey Coombs, Seattle Children's Research Institute
Marina Delgado, BioBus, Inc.
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Mobile Fab Lab
Madison Dodds, Salk Institute
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Davidson Fleurantin, BioBus
Ian Fried, BioBus, Inc.
David Garbe, Pennsylvania Society for Biomedical Research
Thomas Haynes, Puyallup School District
Erik Herman, Physics Factory
Lindsey Housel, Denver Museum of Nature & Science
Patricia Irizarry, Rutgers University
Verdy Jocelyn, Georgia State University
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Dani Meyers, Colorado Academy
Danielle Molden, BioBus, Inc.
Li Murphy, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Edward Nguyen, Bio-Bus
Sherry Painter, LeMoyne-Owen College
Rosemary Puckett, BioBus, Inc.
Daniel Pulido, Bio-Bus
William Roden, Seattle Children's Research Institute
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Maija Thiel, Puyallup School District
Sarah Weisberg, BioBus, Inc.
Kaleb Whitfield, Bio-Bus
Joseph Wilkerson, Learning Undefeated

Workshop Session 1: STEM Education with the Mobile Fab Lab

Wednesday, June 26, 10:45 – 11:35am

Presenter: **Jonathan Doctorick,** *Founder, Mobile Fab Lab*
Reporters: **Bruce Bayly,** *The Physics Factory*
Carla Romney, *Boston University Mobile Lab*

Session Description

Jonathan Doctorick, Mobile Fab Lab founder, told the story so far of the Mobile Fab Lab at Carnegie Science Center. Carnegie Science Center used Fab Lab to enhance STEM education for all ages (elementary to adult). Program builds "technical literacy" and critical thinking skills.

About Carnegie Science Center (CSC)

- Hands-on science and technology museum in Pittsburgh, PA
- Pittsburgh has strong technology infrastructure including Google and Uber
- CSC receives millions of visitors per year of varying ages; their influence extends throughout the entirety of Pennsylvania

About Jonathan Doctorick

- Began using "Mr. Wizard" style science outreach presentations
- Began Fab Lab at the Carnegie Science Center 4 years ago

About the Fab Lab

- Interconnected network of 1200 Fab Labs around the world
- Fab Labs are based on STEM learning environment developed at MIT
- Lab is free and open to the public
    - Users pay for materials they use; nothing else
- Central Concept
    - Computer-aided design and fabrication are part of modern technical literacy
    - Specific tech skills are not taught because technology changes too frequently
    - Participants develop a general learning style; creativity encouraged
    - Students experiment in the scientific method and engineering design process
    - "Safe to Fail" is a reoccurring theme; there's a masterful mistakes wall on which kids are proud to post their failures
- Teacher professional develop is part of CSC Fab Lab Program
    - Schools no longer have only computers; high-tech rooms are now makerspaces
    - Teachers must learn tie in technology into their curriculum and lessons
    - Teaching teachers and allowing teachers to become learners alongside their students is critical
- Skills acquired in the STEM are transferrable to history, writing, art, and life
- Students have designed pyramids, laser cut sonnets, and 3D-printed a bust of Shakespeare

Mobile Fab Lab: Reasons for Going Mobile

- First Mobile Fab Lab housed in 50-foot trailer by pickup truck
    - Challenges included: navigating small streets, hills, and snow
    - Drivers needed extensive training
    - Operational costs were high
    - Setup and takedown were time-consuming
    - Full-time staff needed
    - Visits had to be multi-day

    - Many problems were solved by going to van-based mini-lab
- Total packages of van wrap, hardware, software, curriculum, and training now offered by CSC for $175,000
- Logistics are simpler when students are at their own schools, gives them more time to work in lab
- Accessibility is easier to arrange for vision-impaired, wheelchair-bound, and any other special-needs students
- Schools don't have to worry about bus transportation
- Cost is $1000/day for Mobile Fab Lab to visit a school; grant support is available to offset cost to schools
- Three types of visits Mobile Fab Lab conducts
    - Project Workshops – Flexible with numbers and times (limit of 60 students/day)
    - Engineering Challenge – Accommodates 90-100 students/day. Teamwork is encouraged. Allows more efficient use of resources
    - Capstone Project – 1 class to occupy lab for whole lab. Set up lab for 1 week in school
- In the lab students and teachers use Inkscape and SketchUp for design

Questions and Answers

- Where do you get your talent, i.e. workers?
    - SSC Human Resources are great recruiters
    - Bring in college graduates with majors in Theater, English, Anthropology, Science, and Education.
    - Being a good storyteller is the most valuable ability
- What about social equity?
    - Special efforts to increase diversity
    - Reach out to rural schools as well as urban, Title 1, underserved groups
- How can low-income schools afford Mobile Fab Lab?
    - Connect schools with grant funding opportunities and provide boilerplate, etc

Participants

Julienne Bailey, Utah STEM Bus
Susan Bannwart, LaPorte Co. Public Library
Barbara Baumstark, Georgia State University
Bruce Bayly, The Physics Factory
Bjarke Christensen, LIFE, Novo Nordisk Foundation
Corey Coombs, Seattle Children's Research Institute
Don Derosa, Boston University Mobile Lab
Kristin Diamantides, Learning Undefeated
Rich Elsasser, Education Service Center Region 13
Courtney Fenlon, University of Illinois
Thomas Haynes, Puyallup School District
John Jaramillo, EWD Saddleback College
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Harry Kurtz, Triune Specialty Trailers
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Lisa Martin, Puyallup School District
Kristy McDowell, Baby Scientist Inc.
Dani Meyers, Colorado Academy
Magen Palo, Osceola County School District
Shiloh Slomsky, SEEDS
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM lab
Maija Thiel, Puyallup School District
Sarah Weisberg, BioBus, Inc.
Joseph Wilkerson, Learning Undefeated

Workshop Session 2: Collaborations and Partnerships – Building a Network for Success

Wednesday, June 26, 10:45 – 11:35am

Presenter: **Lori Harvey,** *Hitachi High Technologies*
Reporters: **Dona Mapston,** *Salk Mobile Lab*
Kimberly Cox-York, Colorado State University
Patricia Irizarry, *Rutgers University*

Session Description

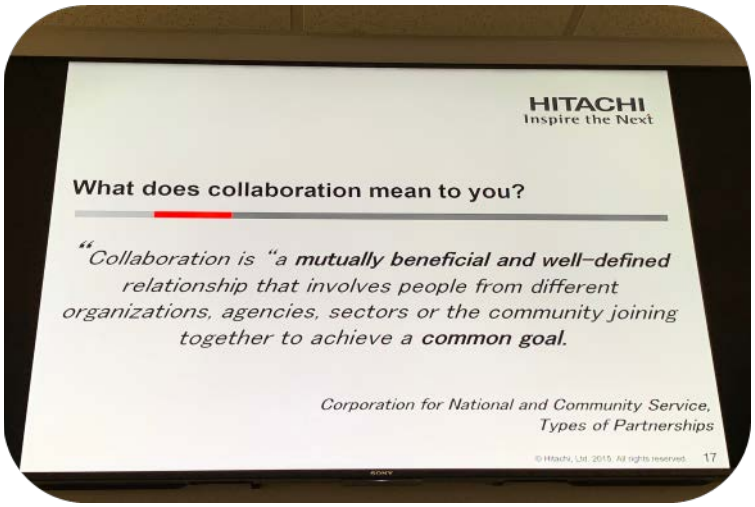
This session was a showcase of how to establish and build partnerships and collaborations for creating sustainable efforts in communities.

The Hitachi Program

- Founded out of company CSR goals (Community Social Responsibility) focused on STEM education outreach and SDG (Social Development Goals) to: 1) increase diversity and (2) provide STEM education for all
- Multiple locations. Collaborators include universities and private companies in different kinds of industries
- Program loans SEM (scanning electron microscope) to communities
    - Free
    - Time scales vary – a couple of weeks to several months plus
    - Provide support for logistics as well as curriculum: InspireSTEMeducation.us

Tips and Hints

- Collaboration networks are key
    - Each link leads to others
    - Works best when the collaborations between partners are
        - Mutually beneficial
        - Well defined relationships between different people and organizations
        - Based on common goals
- Your elevator pitch should focus on your goals
- Stages of collaboration
    - Connection
    - Cooperation
    - Coordination
    - Collaboration – only occurs when goals align
- How to find companies to collaborate with:
    - City, county, and state workforce business and investment boards (these are key!)
        - These focus on workforce development and usually have youth development imperatives
    - Study up on company goals (company website) to see where alignments happen
        - If goals not on website – check with HR



    - Ask companies about their WDP (workforce development plan)
- Why collaborate?
    - Shared concern
    - Pool power
    - Add diversity
    - Overcome gridlock
    - Increased ability to handle complex issues
- Roadmap to develop relationships
    - Prepare
    - Plan
    - Develop
    - Renew
- Assessing relationships
    - Make sure these are part of conversations on both sides
    - Connection with purpose and people
    - Clarity of purpose
    - Congruency of mission, strategies, values
    - Creation of value
    - Communication among partners
    - Continued learning
    - Commitment to the partnership
- Recommended Reading
    - The Ducker Foundation Workbook
    - Meeting Collaboration Challenge
    - Non-Profit Management, 2002
- How to connect to partners in your area?
    - STEM X based in Ohio, 22 state members including Academia, business and industry and government
- Meeting the Collaboration Challenge
    - Useful workbook

Participants

Kimberly Cox-York, Colorado State University
Marina Delgado, BioBus, Inc.
Rebecca Fisher, Ochsher Health System
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Fancy Flores, Learning Undefeated
Ian Fried, BioBus, Inc.
David Garbe, Pennsylvania Society for Biomedical Research
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lindsey Housel, Denver Museum of Nature & Science
Patricia Irizarry, Rutgers University
Dona Mapston, Salk Mobile Lab
Joshua Mitchell, Education Service Center Region 13
Danielle Molden, BioBus, Inc.
Li Murphy, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Rosemary Puckett, BioBus, Inc.
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab

Workshop Session 3: From Audience Insights to Program Design: Listening, Learning, and Creating with Community Every Step of the Way

Wednesday, June 26, 2:20 – 3:10pm

Presenters: **Lindsey Housel,** *Denver Museum of Nature & Science*
Maritza Hernandez-Bravo, *Denver Museum of Nature & Science*
Reporters: **Li Murphy,** *BioBus, Inc.*
Kimberly Cox-York, *Colorado State University*

Session Description

An in-depth dive to a three-year process of strategic IN reach and OUT reach towards mobile vehicles built by and for communities in both concept and roll-out.

No Walls Initiative – Listening/Needs Assessment

- Audiences really wanted the museum to come to them
- Targeted people who hadn't visited the museum in at least 3 years
- Found:
  - People are deeply engaged with nature, but not identifying it as science
  - Already engaging, so the museum wants to leverage the way people are already engaging
  - Asked broad questions not about the museum, but about values e.g. social interactions (family time camping), star gazing etc.
  - Used the words the community was using
- Feasibility phase – more listening
  - Found they needed two vehicles to meet specific needs – schools v. communities.
    - RV – Mobile Time Machine – Schools
    - Trailer – Curiosity Cruiser – pop-up trailer for community

How

- Human-centered design – iterative process of empathy and testing
- Appreciative inquiry, asset-based approach
- Ask positive questions: What is working, not what's missing
- In combination, this worked well

Evaluation – Mixed Methods

- Co-created with the community
  - Open, two-way communication
  - 3 focus groups for broader ideas
  - 3 Surveys – 2 for the vehicle (RV) and 1 for naming the overall experience
- Focus groups
  - Group dynamics encouraged inspiration, facilitated clarification (can ask better questions), helped build relationships
  - Challenge – audience is large and diverse & the state is large
  - Needed to assess who to talk to, how to diversify, and who would be the point person

Logistics

- Do them in the community (rather than at the museum)
- Provide food
- Schedule them on different days/times to help accommodate people
- Leveraged community connectors
- Personal/ professional connections outside the museum
- Social media
- Teachers
- Used for building relationships
- Always had at least one museum staff present
- Maintained ongoing communication

Lessons Learned

- Recruiting focus group participants – needed more time to increase diversity
- Should have had scheduled check-ins for updates – to keep community informed of progress
- Be aware of your own bias
- Team needs a 'can do' attitude
- Leverage existing events & prototypes

Methods for Focus Groups

- Used graphics boards – standardized as much as possible to limit bias
- Summarized transcripts with key findings
- Executed in rounds
    - Vehicle style
    - Experiences – themed but flexible
    - Themes
    - Prototypes – what does/doesn't work
        - Tested specific things: logistics, audience, content
        - Low tech
        - Variety of venues
        - Variety of formats

Participants

Corey Coombs, Seattle Children's Research Institute
Kimberly Cox-York, Colorado State University
Marina Delgado, BioBus, Inc.
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Fancy Flores, Learning Undefeated
Ian Fried, BioBus, Inc.
David Garbe, Pennsylvania Society for Biomedical Research
Ryan Gililland, Triune Specialty Trailers
Philip Kimmel, Oakland Schools
Harry Kurtz, Triune Specialty Trailers
Li Murphy, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Rosemary Puckett, BioBus, Inc.
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Morten Trolle, LIFE, Novo Nordisk Foundation
Sarah Weisberg, BioBus, Inc.

Workshop Session 4: Te(a)ch for Mobile Lab: Resources for Interactive Teaching on Mobile Labs

Wednesday, June 26, 2:20 – 3:10pm

Presenters: **Dr. Carla Romney,** *Boston University Mobile Lab*
Dr. Don DeRosa, *Boston University Mobile Lab*

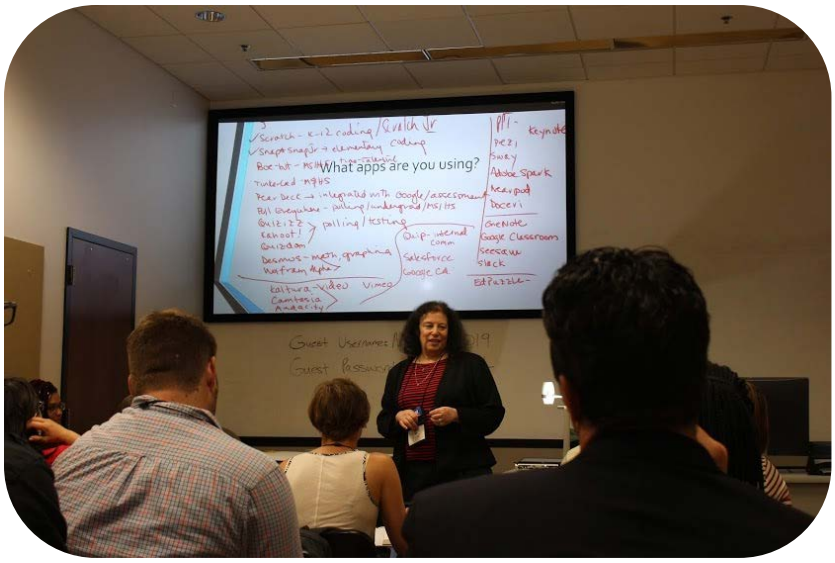
Reporters: **Jonathan Doctorick,** *Mobile Fab Lab*
Don DeRosa, *Boston University Mobile Lab*

Session Description

This is primarily a discussion session during which participants shared apps they use, the pros and cons of the apps, and their experience with the apps that inform the participants. Successes and failures were welcomed.

Coding

- Scratch
  - Use with K-12 students
  - Drag and drop coding
  - It is very useful
  - Scratch Junior is recommended as well
- Snap
  - Elementary audience
  - Used for coding
  - Snap Junior available
- Boe-Bot:
  - Mostly used with middle school and high school students in an after-school program
  - More time intensive
- Tinker Cad - Middle school



Presentation

- Pear Deck – integrates with PowerPoint and Google
- Prezi
- Sway
- Keynote
- Adobe Spark
- Nearpod- integrates PowerPoint
- Doceri
  - Can run an array of computers from an iPad or phone.
  - Useable on both Mac and PC
  - Can cross boundaries

Polling/quizzing

- Quizizz
- Kahoot!
- Quizdom
- Poll Everywhere

- Piazza

Math

- Desmos – math graphing
- Wolfram alpha

Collaboration

- One Note & Google Classroom
  - Nice interface that allows students to do pre and post work as bookends for the mobile program experience
- Canvas
  - Requires a subscription
  - Higher Education appropriate
- Moodle
- Seesaw
  - Recommended for high school
  - Permits sharing and editing of documents
- Slack
  - Can share and upload most documents
    - Uses a text messaging or chat type of interface
- Recommended for adult students
- Must be invited to join
- Can share videos, text, etc.

Video

- Edpuzzle - Editing youtube videos
- Kaltura - Creating video content
- Camtasia
- Audacity
- Vimeo

Database management

- Salesforce
  - Manages databases, subscription
  - One participant cautioned about problems on the user end because the training needed is intensive
  - Recommends one person be in charge
- Airtable
  - Useful when several people are using a spreadsheet
- CRM
- Quip - Internal communications
- Google Calendar - To share appointments

Other

- Padlet - Easy for students to use
- Mouse.org - For K-12
- Design - 3D printing

Simulations

- PHET
- Howard Hughes Institute
- Science in the classroom
- Labster
- Google Expeditions
- Oculus sword
- Tiltbrush

More

- Science journal – physics, bio, chem applications
- Piazza – polling
- Mailchimp – bulk mailing

Problems/Bad Experiences

- Open ended polling – students post inappropriate responses
- Sharing – students delete another students' work
- How are you finding Wi-Fi access as you travel?
- How many people are bringing their own hotspot?
    - 3 or 4 people answered yes
- Rural areas may not have cell phone reception or Wi-Fi
- West Technologies can help pull in stronger signals where reception is weak.

Participants

Julienne Bailey, Utah STEM Bus
Susan Bannwart, LaPorte Co. Public Library
Barbara Baumstark, Bio-Bus
Bjarke Christensen, LIFE, Novo Nordisk Foundation
Don Derosa, Boston University Mobile Lab
Kristin Diamantides, Learning Undefeated
Jonathan Doctorick, Mobile Fab Lab
Rich Elsasser, Education Service Center Region 13
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsner Health System
Thomas Haynes, Puyallup School District
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Patricia Irizarry, Rutgers University
Kyle Kilpatrick, Oakland Schools
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Kristy McDowell, Baby Scientist Inc.
Dani Meyers, Colorado Academy
Joshua Mitchell, Education Service Center Region 13
Magen Palo, Osceola County School District
Heather Skaza Acosta, Conservatory of Southwest Florida
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM
Maija Thiel, Puyallup School District
Bruce Waller, Inspiration Lab
Joseph Wilkerson, Learning Undefeated

Workshop Session 5: The Tall Short Physics Bus: Smaller and Better Than Ever!

Wednesday, June 26, 3:25 – 4:15pm

Presenters:	**Dr. Bruce Bayly,** *The Physics Factory*
	Erik Herman, *The Physics Factory*
Reporters:	**Lindsey Housel,** *Denver Museum of Nature & Science*
	Tommy Haynes, *Puyallup School District*

Session Description

This session discussed the dual autobiography of Bruce Bayly and Erik Herman and the multiple reincarnations of the physics bus.

History of Tall Short Physics Bus

- Bruce and Erik started making physics exhibits with kids
- Began as a school bus powered by vegetable oil
- First bus was in use from Fall 2003-Summer 2006
- Second bus in use from Spring 2007-2010
- Math Bus roadshow began in 2014. Has science demos and math concept exhibits
- Traveled to Poland and Beijing to showcase

New Exhibit-Based Physics Bus

- Crowdsource funding raised 6K of small donations, donor matched to 12K, Cornell grad donated a party bus, a funder stepped forward with new bus
- William S "Bill" Bickel Memorial Physics Bus
    - His widow donated 10K
- Updated Equipment
    - 7.3 liter power stroke diesel engine
    - Interior space is 14x8x6 ft
    - Exterior space is 10x10 ft with folding canopy
    - Wheelchair lift
    - Counter space
    - University of Arizona painted exterior including images of famous scientists and donors.
- Physics concepts on bus
    - Forces/ motion
    - Airflow/ pressure
    - Sound/ vibration
    - Electricity/ magnetism
- Exhibits
    - Recycled household material
    - Physics experiments on board

Participants

Julienne Bailey, Utah STEM Bus
Kimberly Cox-York, Colorado State University
Kristin Diamantides, Learning Undefeated
Fancy Flores, Learning Undefeated
Ian Fried, BioBus, Inc.
Thomas Haynes, Puyallup School District
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lindsey Housel, Denver Museum of Nature & Science
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Lisa Martin, Puyallup School District
Dani Meyers, Colorado Academy
Danielle Molden, BioBus, Inc.
Maija Thiel, Puyallup School District
Joseph Wilkerson, Learning Undefeated

Workshop Session 6: Writing My Next Grant!

Wednesday, June 26, 3:25 – 4:15pm

Presenters:	**Dr. Patricia Irizarry,** *Rutgers University*
	Dr. Carla Romney, *Boston University Mobile Lab*
	Dr. Don DeRosa, *Boston University Mobile Lab*
Reporters:	**Lori Shimoda,** *Chaminade University, I am a Scientist*
	David Garbe, *Pennsylvania Society for Biomedical Research*

Session Description

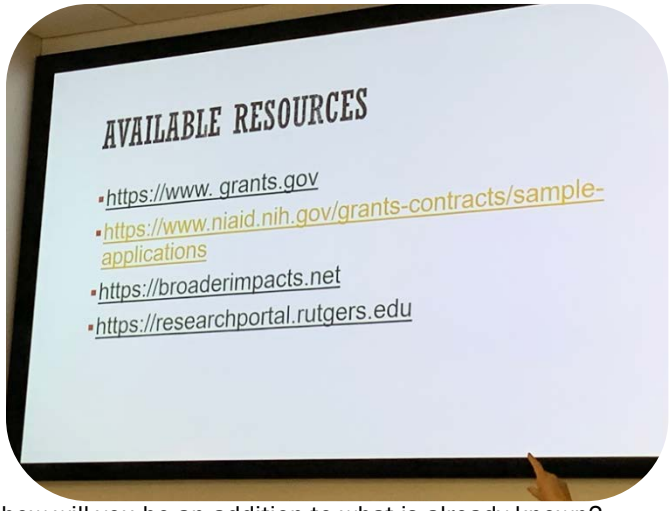
This session discussed new and learned tips for writing a grant.

Timeline of the Rutgers Science Explorer

- 1999-2003: NSF GK-12 Track1 - Building a Learning Community
- 2003-2008: NSF GK-12 Track2 - Build a Mobile Science Lab
- 2009-2013: Institutionalization Phase - transition to grad assistant model
- 2014-2015: Restructuring phase
- 2016-2017: Engage broader audience with STEAM Focus and Broader Impacts (multiple NSF grants)
    - Collaborate with multiple PI's applying for NSF grant; or those that have had a NSF grant rejected
- 2018-2019: Now focus on science communication science

Be Strategic When Writing Grants

- Work with faculty that might be able to include the program in broader impacts or communicating science
- Along the way, you will most likely need to reinvent yourself and your program to keep the grants fresh and exciting
- Develop relationships with partners that allow you to critique and build off of each other to make the grants even better
- Delve into the science education literature to learn and know how people "learn" so you can include this in your evaluation and grant language
    - What research has been done previously
    - For government grants, you must investigate something that has not been studied before (similar to science grant)
    - Federal agencies are interested in "research"; what has not been done before
    - You must know what has been done previously because people looking at your grant will have this background
    - How can your program contribute; how will you be an addition to what is already known?



- When starting out, you should be able to define and state your research question
    - How are you going to test it?
    - What are the challenges?
    - Who are you collaborating with?
    - What is your timeline and action items?
- Make sure you understand the program Request for Proposals before applying to these federal grants
    - Federal grants do not fund programs, they fund research

    - Expect that your first grant submission will be rejected
- The entire process will take 1.5-2 years; so, start early! Expect to put in hundreds of hours of work to get one of the federal (SEPA) grants
- Don't be wounded by the failures; keep trying and trying
- Ask the program officers if there is an opportunity to sit on the grant review panels

Participants

Don Derosa, Boston University Mobile Lab
Marina Delgado, BioBus, Inc.
Jonathan Doctorick, Mobile Fab Lab
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsher Health System
Emily Freeland, Learning Undefeated
David Garbe, Pennsylvania Society for Biomedical Research
Lori Harvey, Hitachi High Technologies
Harry Kurtz, Triune Specialty Trailers
Dona Mapston, Salk Mobile Lab
Desurae Matthews, Learning Undefeated
Joshua Mitchell, Education Service Center Region 13
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Magen Palo, Osceola County School District
Carla Romney, Boston University Mobile Lab
Robert Sallee, National Space Science & Technology Institute
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM lab
Bruce Waller, Inspiration Lab

Workshop Session 7: Osceola's STEM Mobile Lab: Every Student, Future Ready

Thursday, June 27, 10:00 – 10:50am

Presenters:	**Melanie Stefanowicz,** *Osceola Mobile STEM Lab*
	Magen Palo, *Osceola County School District*
	Rachelle Sole, *STEM Mobile Lab*
Reporters:	**Dona Mapston,** *Salk Mobile Lab*
	Kristy McDowell, *Baby Scientist Inc.*

Session Description

Osceola STEM lab has redefined itself several times to figure best practices to support with challenging transient population that is unprepared for the job growth and job sectors that are predicted. Current lab goal is to create excitement in young students, so they select rigorous coursework in higher grades.

About the Osceola STEM Lab

- Osceola School District – Every school is a PLTW (Project Lead the Way) school
- Motto is: "Every Child, Every Chance, Everyday!"
- There are many interpretations of STEM; had to find common definition for common curriculum needs
- Community extremely diverse with many students being transient and living in hotels
- STEM Mobile Lab
    - First created in 2015 as title 1 funded RV
    - Curriculum was 5th grade
    - Focused on hurricane experience
- Current group took over lab in 2018
    - Changed curriculum to forensics
    - Added tablets, smart table, Botley robots

    - Created robotic unit for community event
- New focus on elementary excitement.
    - Goal is to have students select PLTW electives in higher grades to get industry jobs to pay for college
- To keep up with industry sectors, lab will be creating new modules
- Each program designed with career pathway in mind
- Lots of Hispanic and migrant families; want to be aware of this and prepare students for careers even if they do not attend college

Participants

Susan Bannwart, LaPorte Co. Public Library
Bruce Bayly, The Physics Factory
Thomas Bussey, Fulton County Schools
Marina Delgado, BioBus, Inc.
Jonathan Doctorick, Mobile Fab Lab
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
Ian Fried, BioBus, Inc.
Gretchen Gose, Unidos Dual Language School
Kaila Green, Northcutt Elementary
Thomas Haynes, Puyallup School District
Erik Herman, Physics Factory
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Lindsey Housel, Denver Museum of Nature & Science
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Kristy McDowell, Baby Scientist Inc.
Danielle Molden, BioBus, Inc.
Rosemary Puckett, BioBus, Inc.
Bazla Shahzad, Dekalb County Schools
Heather Skaza Acosta, Conservatory of Southwest Florida
Maija Thiel, Puyallup School District
Aliya Tousana, Fulton County Schools
Morten Trolle, LIFE, Novo Nordisk Foundation
Bruce Waller, Inspiration Lab
Sakenna Washington, National Alliance for Public Charter Schools
Joseph Wilkerson, Learning Undefeated

Workshop Session 8: Expanding College and Career Options with a Mobile Lab

Thursday, June 27, 10:00 – 10:50am

Presenter:	**Dr. Patricia Irizarry,** *Rutgers University*
	Dr. Michelle Ventura Ezeoke, *Georgia State University*
Reporters:	**Madison Dodds,** *Salk Institute*
	Kristin Diamantides, *Learning Undefeated*

Session Description

Mobile lab programs can be used to involve and develop volunteer and graduate students. Students can learn alternative careers and gain important soft skills which will aid them in many industries.

Expanding College and Career Options

- Goal for participants in the Rutgers Science Explorer Program
    - Science communication training

    - Professional experience
    - Mentoring
    - Tour guide certification
    - STEM Outreach as an alternative career
- Outreach programs
    - Start with grassroots efforts
    - Foster collaborations between volunteers, institutions, and educators
    - Start small. Consider volunteers and partnering with other institutions
    - Make sure program is visible to target audience to build interest and sustain programs
- Grad student benefits
    - Unique experience to harness skills that aren't taught in tradition programs
    - Gives students chance to share their passion for science
    - Soft skills learned will help diversify instructional strategy to use when they go on to teach
    - 20 credit program/certificate for high school and college students

Participants

Julienne Bailey, Utah STEM Bus
Bjarke Christensen, LIFE, Novo Nordisk Foundation
Corey Coombs, Seattle Children's Research Industry
Kimberly Cox-York, Colorado State University
Kristin Diamantides, Learning Undefeated
Madison Dodds, Salk Institute
Courtney Fenlon, University of Illinois
David Garbe, Pennsylvania Society for Biomedical Research
Steve Hoemberg, Minnesota State Transportation Center of Excellence
Lori Harvey, Hitachi High Technologies
John Jaramillo, EWD Saddleback College
Dani Meyers, Colorado Academy
Joshua Mitchell, Education Service Center Region 13
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
William Roden, Seattle Children's Research Institute
Lori Shimoda, Chaminade University, I am a Scientist
Shiloh Slomsky, SEEDS

Workshop Session 9: Second Wind: Reimagining an Old Mobile Lab

Thursday, June 27, 3:00 – 3:50pm

Presenters:	**Dr. Don DeRosa,** *Boston University Mobile Lab*
	Dr. Carla Romney, *Boston University Mobile Lab*
Reporter:	**Sarah Weisberg,** *BioBus, Inc.*

Session Description

A discussion-based session on the pros and cons of running a mobile lab with an aged or aging vehicle.

Current Mobile Labs

- Rutgers University 2005
    - Bluebird bus that fits 20 students
    - 1 teacher, 2 grad students
- UTAH STEM Access
    - Refurbished UTA bus
    - Late 80s/early 90s
    - Refurbished recently

- Salk, 2008 van
  - Former was a natural gas vehicle that could not be retrofit
  - Tanks were about to expire; needed to buy a new one
- MESO, 1976 GMC motorhome
  - Ripped out everything
  - Cut roof
  - Put telescope on inside
  - 3rd engine and 2nd transmission
  - Why? In retrospect, thinks they were running hot and thermostat was off
- Transportation Center of Excellence
  - Tech-oriented industries are supporting → $250,000 rig
  - 40-50ft trailer
  - Need combination endorsement and Class A license
  - Not super-old
  - Thinking of doing trailer 2.0 over the summer
- Physics Bus
  - Have had 7 vehicles since 2004
    - All school busses
    - All over 15 years old
  - Themes
    - DIY, scrappy, bus itself
    - Some busses have broken down and been scrapped, some creating now (as we speak)
- BioBus I and II
  - 1974 transit bus & 2016 trailer pulled by Ford F250
  - Bus broke down many times, led us to think about decoupling lab from drive train

Mobile Labs - Things to Know

- 12-15 year lifespan
  - Typically, will not last more than 20 years
- If using a base such as a school bus, make sure to review its entire history of repairs
  - Set aside money for upgrades and repairs
  - Critical to develop good relationships with mechanics
  - Specialized mechanics are more expensive
- It can be a struggle to find someone to drive
  - Requires a CDL license
    - Starting 2020 to get CDL you must be a part of a class/ program that is official
- Learn the difference between regular, extraordinary, and catastrophic maintenance
  - Set week or two a year for preventative maintenance
  - Can send fluids in for analysis to learn about lifespan of your vehicle

What to Do if Bus is Out for Long Time?

- Have kids come to you
- Approach manufacturer to see if you can borrow/purchase something that has been returned
- Work with museum or park for permanent installation

Participants

Julienne Bailey, Utah STEM Bus
Bruce Bayly, The Physics Factory
Kimberly Cox-York, Colorado State University
Ian Fried, BioBus, Inc.
Erik Herman, Physics Factory
Steve Hoemberg, Minnesota State Transportation
Patricia Irizarry, Rutgers University
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Dona Mapston, Salk Mobile Lab
Sarah Weisberg, BioBus, Inc.

Workshop Session 10: LIFE Mobile Laboratory Integrated in Learning Packages

Thursday, June 27, 3:00 – 3:50pm

Presenters:	**Bjarke Takashi Rojle Christensen,** *LIFE, Novo Nordisk Foundation*
	Morten Trolle, *LIFE, Novo Nordisk Foundation*
Reporters:	**Susan Banwant,** *LaPorte Co. Public Library*
	Patrick Flanagan, *Ocean Learning Lab and Immersive Experiences*

Session Description

LIFE works to support science education in Denmark.

About LIFE

- Acronym LIFE stands for Learning, Ideas, Fascination, Experiments
- Facility located in Copenhagen
- New program funded last year
    - Still prototyping
    - Program funded by Novo Nordisk Foundation
    - 5% of total budget allocated to assessment
- Building 10 mobile labs to reach all over the country
    - Awarded a $250M grant for 10 years for 10 trucks, one learning center, and 30 learning packages
    - Denmark has 1.39M students. 10 trucks can serve 10% of student population ever year

- No standardized government curriculum
    - Test at end of curriculum
    - Teachers design their own evaluation
        - Based on competencies rather than content
- Problems they've encountered
    - Limited capacity for use
        - Remedied this by utilizing a coordinator to schedule with schools
    - Risk of being an expensive stand-alone experience
        - Addressed this by building pre-visit and post-visit interactive activities
            - Material boxes
            - Digital platform
            - LIFE learning center

- Mobile Laboratories
- Critical criteria for curriculum
  - Authentic problems
  - Bring in research institutions and industry partners
  - Inquiry-based learning
  - Support "Common Objectives" (similar to U.S. Common Core)
- Currently have 4 learning packages for specific grade levels
- First Mobile Lab
  - Five working spaces with flexible tables
  - Modular removable table in the middle
  - Hood for specimen prep
  - Separate teacher space not for students
  - Touchscreen on the wall
  - 5 student computers with HDMI

About Novo Nordisk Foundation

- Holding firm that owns Novo Nordisk and Novozymes company
- 4% of money earned must be given back to society through grants for research, diabetes treatment, innovation, education and outreach, humanitarian, and social causes
- All programs affiliated with NNF are free to schools

Participants

Susan Bannwart, LaPorte Co. Public Library
Jen Colvin, Learning Undefeated
Kristin Diamantides, Learning Undefeated
Madison Dodds, Salk Institute
Courtney Fenlon, University of Illinois
Rebecca Fisher, Ochsher Health System
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Fancy Flores, Learning Undefeated
Emily Freeland, Learning Undefeated
Gretchen Gose, Unidos Dual Language School
Thomas Haynes, Puyallup School District
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Lindsey Housel, Denver Museum of Nature & Science
Kyle Kilpatrick, Oakland Schools
Philip Kimmel, Oakland Schools
Lisa Martin, Puyallup School District
Desurae Matthews, Learning Undefeated
Joshua Mitchell, Education Service Center Region 13
Magen Palo, Osceola County School District
Billy Roden, Seattle Children's Research Institute
Lori Shimoda, Chaminade University, I am a Scientist
Heather Skaza Acosta, Conservatory of Southwest Florida
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM lab
Maija Thiel, Puyallup School District
Bruce Waller, Inspiration Lab
Joseph Wilkerson, Learning Undefeated

Workshop Session 11: Beginning Grant Writing

Friday, June 28, 10:00 – 10:50am

Presenters:	**Patrick Flanagan,** *Ocean Learning Lab and Immersive Experiences*
	Lori Shimoda, *Chaminade University, I am a Scientist*
Reporters:	**Marina Delgado,** *BioBus, Inc.*
	Patricia Irizarry, *Rutgers University*

Session Description

This session discussed a start to grant writing for beginners.

Grant Writing and Exercise Overview

- Main tips
  - Align your goals with the funding agency when writing your statement
  - Budget should connect with proposed activity
  - Leave no space for questions or confusion
  - Be careful, be strategic and really think about supplies and things you might need along the way
    - What are you measuring?
    - Do you need IRB?
    - What is the sustainability plan?
  - Establish what you expect to come out of it. Clear and measurable outcomes
  - Set realistic goals; make sure you can meet them to be able to get funding in the next cycle
  - Look on bank websites for foundations and accounts that they manage. They usually have links for these foundations' opportunities Mark yourself to their need
- Pitch competition
  - 5 mins to win $10,000
  - Audience was divided in 4 groups
  - Worked on the development of a 5 mins pitch
    - Presented a potential project for funding
  - The projects presented were
    - Women in Science STEM Summer Camp to engage in Earth Sciences
    - Using a Mobile Lab to teach all students in a district about Physics and Planetary Sciences
    - Introduction to Robotics for students near rural areas in the Mexican Border
    - Training high school students for technical careers on board of a Mobile Lab

Participants

Bruce Bayly, The Physics Factory
Madison Dodds, Salk Institute
Fancy Flores, Learning Undefeated
Patricia Irizarry, Rutgers University
Desurae Matthews, Learning Undefeated
Barielba Nenbee, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Magen Palo, Osceola County School District
Robert Sallee, National Space Science & Technology Institute
Rachelle Sole, STEM Mobile Lab
Melanie Stefanowicz, Osceola Mobile STEM Lab

Workshop Session 12: Building a Mobile Lab: The Ups and Downs of Creating a Mobile Science Program and Motile Mobile Labs

Friday, June 28, 10:00 – 10:50am

Presenters:	**Dr. David Garbe,** *Pennsylvania Society for Biomedical Research* **Li Murphy,** *BioBus, Inc.*
Reporters:	**Sarah Weisberg,** *BioBus, Inc.* **Ian Fried,** *BioBus, Inc.*

Session Description

This session discussed making a sustainable mobile lab and mobile science program.

About Dr. David Garbe

- Scientist by training
- Outreach educator at PSBR (Pennsylvania Society for Biomedical Research)
- Became informal educator less than 3 years ago
  - Unable to secure permanent position with academia
  - Shifted to advocacy for students

- Met Sarah Weisberg in March 2017; attended first MLCC in 2017 and became a member
- MLC Board of Directors

David Garbe Mobile Lab Insights

- Know your resources
- Have a goal but be flexible
    - What materials do you need?
    - What does your community need?
- No paralysis by analysis
    - Get third party to assist in creation

About Li Murphy

- Attended MLCC in 2012
- Hired at BioBus—first and only job

Li Murphy Insights

- Sustainability
    - Think of how to generate continued buy-in
        - Continued use is needed to maintain and improve mobile labs
    - If things are too modular, you lose design thinking ability
    - Build employees in the same way you build the lab
        - Increases long-term sustainability
- Give space for failure
    - Design flaws like coolant leaking into walls, electrical burns, etc. can occur

Participants

Julienne Bailey, Utah STEM Bus
Bjarke Christensen, LIFE, Novo Nordisk Foundation
Kristin Diamantides, Learning Undefeated
Courtney Fenlon, University of Illinois
Emily Freeland, Learning Undefeated
Ian Fried, BioBus, Inc.
Thomas Haynes, Puyallup School District
Maritza Hernandez-Bravo, Denver Museum of Nature & Science
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Kristy McDowell, Baby Scientist Inc.
Maija Thiel, Puyallup School District
Sarah Weisberg, BioBus, Inc.
Joseph Wilkerson, Learning Undefeated

Workshop Session 13: Methods to Engage Science Learning Through a Cultural Lens

Friday, June 28, 11:00 – 11:50am

Presenter: **Lori Shimoda,** *Chaminade University, I am a Scientist*
Reporters: **Patrick Flanagan,** *Ocean Learning Lab and Immersive Experiences*
Marina Delgado, *BioBus, Inc.*

Session Description

Taking full advantage of using science as an opportunity to encourage and re-engage students to give them a sense of belonging.

About Hawaii

- In Hawaii, a sense of place is important
    - Where are you from?

    - Who is your family?
- Hawaii is a majority-minority community
- Many Pacific Islander communities have a collective mindset whereas the Western world has an individualistic mindset
    - Connected to family and community
    - Think in terms of "we"
    - "I" is avoided
- Very attached to their culture

About "I Am a Scientist"

- All classes taught at Chaminade University in Honolulu
- Culturally-sensitive practices are important
    - Cava drinking is a cultural tradition for coming together.
        - Students are studying the genetics of the cava plants that they are sourcing
        - Taro root is part of a traditional origin story. Some students are hesitant to use western methods to dissect and analyze the taro root.
    - Small pools full of native species that are at risk for being paved over by developers
        - Use native shrimp to discuss conservation, sustainable harvest, aguaculture, and stewardship of natural resources
    - Traditional sailing/canoeing navigation
- Oftentimes the family needs to be taught as well as the student
    - Embracing science can be seen as a rejection of family and culture
- Students learn that ancient art and culture has be derived from STEM which gives them a sense of belonging and identity

Participants

Julienne Bailey, Utah STEM Bus
Bruce Bayly, The Physics Factory
Marina Delgado, BioBus, Inc.
Madison Dodds, Salk Institute
Patrick Flanagan, Ocean Learning Lab and Immersive Experiences
Ian Fried, BioBus, Inc
Patricia Irizarry, Rutgers University
Geoff Lawrence, National Space Science & Technology Institute, Mobile Earth & Space Observatory
Danielle Molden, BioBus, Inc.
Barielba Nenbee, BioBus, Inc.
Rosemary Puckett, BioBus, Inc.
William Roden, Seattle Children's Research Institute
Robert Sallee, National Space Science & Technology Institute
Maija Thiel, Puyallup School District

Workshop Session 14: Wheeling Science Education: Presenting BioBuses' Science Stations

Friday, June 28; 11:00 – 11:50am

Presenter: **Sarah Weisberg,** *BioBus, Inc.*
Reporters: **Thomas Haynes,** *Puyallup School District*
Kristy McDowell, *Baby Scientist Inc.*

Session Description

This session discussed analyzing and critiquing your mobile lab programs to see how you can evolve and grow.

Evolution of individual programs from BioBus

- Two ways your program will evolve
  - Creating summer science camps
  - Developing and creating more community partnerships
- What are the pros and cons of each program?
  - Con – Money
  - Pro – Gratification
- What are the key resources needed for evolution?
  - People
  - Money
  - Communication
- Interject flexibility; impact will be broadened
- How can you make small changes?
  - Mindset
  - Mobility
- Radical Ideas/Shifts
  - Scale/Reach
  - Divorce parent company
  - Fellowship/networking model
- Modular equipment allows for accessibility but still has big impact

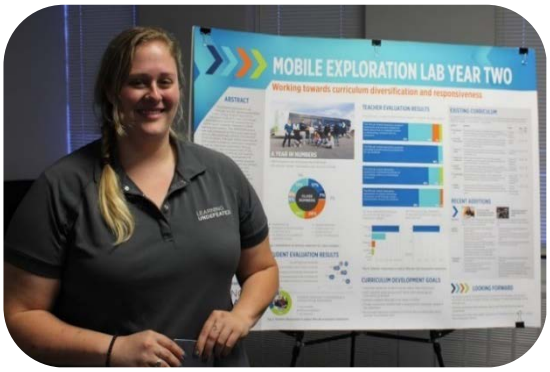
Participants

Bjarke Christensen, LIFE, Novo Nordisk Foundation
Courtney Fenlon, University of Illinois
David Garbe, Pennsylvania Society for Biomedical Research
Steve Haueberg, Minnesota State Transportation
Thomas Haynes, Puyallup School District
Dona Mapston, Salk Mobile Lab
Lisa Martin, Puyallup School District
Kristy McDowell, Baby Scientist Inc.
Li Murphy, BioBus, Inc.
Sherry Painter, LeMoyne-Owen College
Heather Skaza Acosta, Conservatory of Southwest Florida

POSTER SESSION THURSDAY, JULY 27

Poster Number	Project Name/Poster Title	Institution	Presenter(s)
1	STEM Ecosystems - The Power of Partnerships	Salk Institute	Dona Mapston
2	Science Education at Seattle Children's Research Institute: 10 Years Later	Seattle Children's Research Institute	William H. Roden, Corey Coombs, Rebecca A. Carter, Dr. Alexander Chang, Courtney Hagans, and Dr. Amanda L. Jones
3	Salk Mobile Science Lab - Biotechnology Programs for Middle School	Salk Institute for Biological Studies Education Outreach	Madison Dodds and Dona Mapston
4	The Rutgers Science Explorer - MLC Exchange Program	Colorado State University	Dr. Kimberly Cox-York
5	In Situ Hybridization: Using Mobile Labs to Recruit and Retain Students for Community Science Programming	BioBus, Inc	Marina Delgado, James Townsend, and Sarah Weisberg
6	Inspiring One Mind at a Time	BabyScientist	Dr. Kristy McDowell and Carly McDowell
7	Rutgers Science Explorer: The Campus Tour Experience!	Rutgers University	Dr. Patricia Irizarry and Emmanuel Serrano
8	Mobile Learning Labs in Texas Middle Schools: Bringing STEM Career Exploration Opportunities to Rural Counties in the Texas Gulf Coast Region	Learning Undefeated	Fancy Flores, Desurae Matthews, Joseph Wilkerson, Emily Freeland, Kristin Diamantides, Janee Pelletier, Brian Gaines, and Jen Colvin
9	Adolescent STEM Mentees as STEM Mentors: Near-peer Mentoring in Informal Science Education Internships	Bio-Bus, Inc	Tessa Hirschfeld-Stoler
10	Using Neuroscience as a Bridge Between Physics, Biology and Chemistry	Learning Undefeated	Kristin Diamantides
11	Coding with Finch Robots Using Scratch, Snap! Jr., and Snap!	Institute for Advanced Learning and Research	Bruce Waller
12	How Not to Play Whack-a-Mole with Your Mobile Laboratory	BioBus, Inc	Ian Fried and Ben Miller
13	Mobile eXploration Lab Year Two: Working Towards Curriculum Diversification and Responsiveness	Learning Undefeated	Emily Freeland, Kristin Diamantides, Joseph Wilkerson, and Jennifer Colvin
14	P51 Glow Labs to Investigate DNA Structure, Enzyme Activity, and Synthetic Biology on the Go	miniPCR	Dr. Ally Huang
15	DNA Runs in the Family	The Bio-Bus Program	Dr. Michelle Ventura Ezeoke, Dr. Barbara Baumstark, Edroyal Womack, and Gretchen Gose

Poster #13

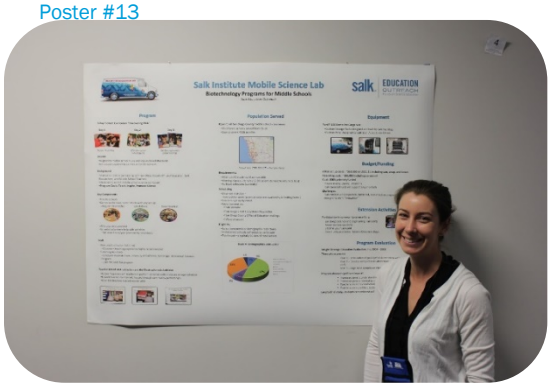


Poster #6

Poster #7

Poster #2

Poster #13



Poster #10

CONFERENCE ATTENDEES

Rick Armstrong
Sales
Farber Specialty Vehicles
rarmstrong@farberspecialty.com

Julienne Bailey
STEM Bus Coordinator
Utah STEM Action Center
juliennebailey@utah.gov

Susan Bannwart
Community Engagement Manager
La Porte County Public Library
sbannwart@laportelibrary.org

Dr. Bruce Bayly
Associate Professor of Mathematics
University of Arizona
bjb@math.arizona.edu

Thomas J. Bussey
5th Grade Teacher
Fulton County Schools
tjbussey1@gmail.com

Dr. Bjarke Takashi Røjle Christensen
Project Officer
LIFE, Novo Nordisk Foundation
btc@novo.dk

Corey Coombs
Senior Scientist
Seattle Children's Research Institute
corey.coombs@seattlechildrens.org

Dr. Kimberly Cox-York
Assistant Professor
Colorado State University
kimberly.cox-york@colostate.edu

Kristin Diamantides
Education Outreach Coordinator
Learning Undefeated
kdiamantides@gmail.com

Marina Delgado
Support Scientist
BioBus, Inc.
marina@biobus.org

Dr. Don DeRosa
Director
Boston University School of Medicine
CityLab and MobileLab
donder@bu.edu

Jonathan Doctorick
Technical and Education Manager
Fab Lab Carnegie Science Center
doctorickj@carnegiesciencecenter.org

Madison Dodds
Community Programs Specialist
Salk Institute
mcote@salk.edu

Dr. Rich Elsasser
Executive Director
Region 13 Education Service Center
rich.elsasser@esc13.txed.net

Donavin Farber
Sales
Farber Specialty Vehicles
dfarber@farberspecialty.com

Dr. Courtney Fenlon
Senior Outreach Activities Manager
University of Illinois
cfenlon@illinois.edu

Dr. Rebecca Fisher
Program Manager, Education Outreach
Ochsner Health System
rebecca.fisher@ochsner.org

Patrick Flanagan
Director
Ocean Learning Lab and Immersive Experiences
patrick@oceanlab.org

Fancy Flores
Education Program Manager
Learning Undefeated
fancy@learningundefeated.org

Emily Freeland
Education Program Manager
Learning Undefeated
emily@learningundefeated.org

Dr. David Garbe
Director of Outreach and Education
PA Society for Biomedical Research (PSBR)
david@psbr.org

Ryan Gililland
Business Development
Triune Specialty Trailers/Brewco
rgililland@brewco.com

Gretchen Gose
Educator
Unidos Dual Language School
gretchen.gose@clayton.k12.ga.us

Kaila Green
EIP Teacher
Northcutt Elementary School
misslav2012@gmail.com

Lori Harvey
Manager, STEM Educational Outreach and CSR Programs
Hitachi High Technologies Americas, Inc
Lori.Harvey@Hitachi-HTA.com

Thomas Haynes
Teacher
Puyallup School District
mehrerta@puyallup.k12.wa.us

Erik Herman
Director
The Physics Factory
erik@physicsfactory.org

Maritza Hernandez-Bravo
Denver Museum of Nature & Science
maritza.hernandez-bravo@dmns.org

Steve Hoemberg
Director of Outreach
Dakota County Tech College, TCOE
steven.hoemberg@dctc.edu

Lindsey Housel
Experience Developer
Denver Museum of Nature & Science
lindsey.housel@dmns.org

Dr. Ally Huang
Scientist
miniPCR
ally@mit.edu

Dr. Patricia Irizarry
Assistant Teaching Professor and Program Director
Rutgers Science Explorer
pairiba@sas.rutgers.edu

John Jaramillo
Dean, Economic and Workforce Development and Business Sciences
Saddleback College
jjaramillo@saddleback.edu

Kyle Kilpatrick
STEM Consultant
Oakland Schools
kyle.kilpatrick@oakland.k12.mi.us

Philip Kimmel
STEM Consultant
Oakland Schools
philip.kimmel@oakland.k12.mi.us

Millie Klein
Deputy Executive Director
Region 13 Education Service Center
millie.klein@esc13.txed.net

Harry Kurtz
President
Triune Specialty Trailers
harryk@triunemfg.com

Geoff Lawrence
Scientist Educator
NSSTI/MESO
gflawrence@gmail.com

Dona Mapston
Director, Education Outreach
Salk Institute
mapston@salk.edu

Leigh Martin
KSU iTeach MakerBus
leigh@ksuiteach.org

Lisa Martin
Science Teacher
Puyallup School District
mehrerta@puyallup.k12.wa.us

Desurae Matthews
Education Outreach Coordinator
Learning Undefeated
desurae@learningundefeated.org

Dr. Kristy McDowell
Founder
BabyScientist
dr.klmcdowell@babyscientist.org

Dani Meyers
Science Teacher
Colorado Academy
danibill5@gmail.com

Li Murphy
Director of Facilities
BioBus, Inc.
li@biobus.org

Barielba Nenbee
Graduate Student
GSU, Bio-Bus Program
bnenbee2@student.gsu.edu

Dr. Sherry Painter
Assoc. Prof. of Chemistry
LeMoyne-Owen College
sherry_painter@loc.edu

Magen Palo
CTE Resource Specialist
The School District of Osceola County, FL
magen.palo@osceolaschools.net

Sally Partridge
Associate Director
Region 13 Education Service Center
sally.partridge@esc13.txed.net

Rosemary Puckett
Community Scientist
BioBus, Inc
rosemary@biobus.org

Brenda Lee Rivera
Educator
Unidos Dual Language School
brenda.rivera@clayton.k12.ga.us

William Roden
Senior Scientist
Seattle Children's Research Institute
william.roden@seattlechildrens.org

Dr. Carla Romney
Director of Research
Boston University
romney@bu.edu

Robert Sallee
Chairman, Board of Directors
NSSTI-MESO
robert.sallee@nssti.org

Bazla Shahzad
3rd Grade Teacher
Dekalb County Schools
bazla786@gmail.com

Allison Sharai
Director, Education & Community Affairs
Ochsner Health System
asharai@ochsner.org

Lori Shimoda
Research Associate
Chaminade University of Honolulu
iamascientist.stem@gmail.com

Dr. Heather Skaza-Acosta
Director of Education
Conservancy of Southwest Florida
heathers@conservancy.org

Shiloh Slomsky
SEEDS Coordinator
LTBB of Odawa Indians
purchasing@ltbbodawa-nsn.gov

Rachelle Sole
CTE Resource Specialist
The School District of Osceola County, FL
rachelle.sole@osceolaschools.net

Melanie Stefanowicz
Executive Director
The School District of Osceola County, FL
melanie.stefanowicz@osceolaschools.net

Dr. Maija Thiel
Director, CTE
Puyallup School District
mehrerta@puyallup.k12.wa.us

Aliya Tousana
STEM Teacher
Fulton County Schools
l2sana42@gmail.com

Morten Trolle
Project Officer
LIFE, Novo Nordisk Foundation
mtr@novo.dk

Dr. Michelle Ventura Ezeoke
Program Manager
The Bio-Bus Program, Georgia State University
mventura1@gsu.edu

Bruce Waller
STEM Program Coordinator
Institute for Advanced Learning and Research
bruce.waller@ialr.org

Sakenna Washington
Science Educator
Charter School (APS)
docadeba91@gmail.com

Sarah Weisberg
Chief Scientist
BioBus, Inc
sarah@biobus.org

Peter West
SDWAN Engineer
West Networks
peter@westnetworks.com

Joseph Wilkerson
Education Director
Learning Undefeated
joe@learningundefeated.org

Luke Ziegler
Engagement Manager
KSU iTeach MakerBus
luke@ksuiteach.org

TRAVEL STIPEND AWARDEES

Funding for this year's travel stipends was provided by the Science Education Partnership Award (SEPA) program at the National Institute of General Medical Sciences (NIGMS) at the NIH under Award Number R13 GM129195

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

Bruce Bayly, Ph.D.
Mathematics Dept., University of Arizona

Corey Coombs
Seattle Children's Research Institute

Kimberly Cox-York, Ph.D.
Colorado State University

Marina Delgado
BioBus, Inc.

Don DeRosa, Ed.D.
CityLab

Jonathan Doctorick, M.S.
Fab Lab Carnegie Science Center

Madison Dodds
Salk Institute for Biological Studies

Rich Elsasser, Ed.D.
Education Service Center Region 13

Patrick Flanagan, M.S.
Ocean Learning Lab and Immersive Experiences

David Garbe, Ph.D.
The Pennsylvania Society for Biomedical Research (PSBR)

Lindsay Housel
Denver Museum of Nature & Science

Patricia Irizarry, Ph.D.
Rutgers Science Explorer

Dona Mapston
Salk Institute for Biological Studies

Kristy McDowell, Ph.D.
BabyScientist

Li Murphy, M.S.
BioBus, Inc.

William Roden
Seattle Children's Research Institute

Carla Romney, M.B.A, D.Sc.
Boston University

Lori Shimoda
Chaminade University of Honolulu: I Am a Scientist

Sarah Weisberg, M.S.
BioBus, Inc.

MLC

Mobile Laboratory Coalition