Measuring the impact of STEM learning in afterschool

Afterschool Alliance

The webinar will begin shortly.

Housekeeping Notes

Experiencing Delays?
Try closing out the other programs running on your computer.

Audio difficulties? Keep this number handy!
Dial: 1-877-860-3058
Code: 1135574

Have a question or comment?
Use the group chat to interact with presenters and other participants.

Afterschool Alliance

Today's Speakers

Bronwyn Bevan
Senior Research Scientist
University of Washington

Kevin Crowley
Professor of Learning Sciences & Policy, Univ. of Pittsburgh

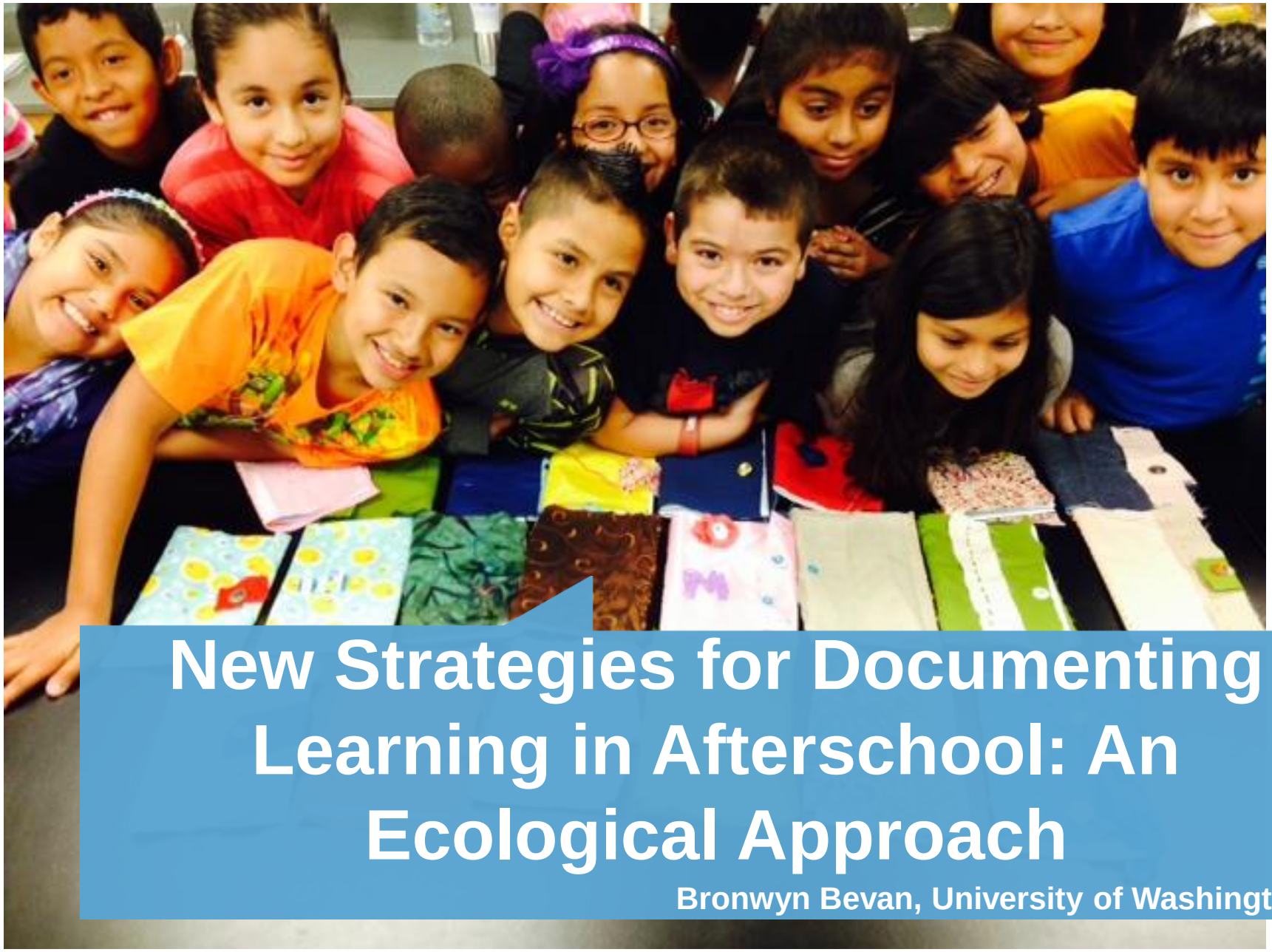
Robert Tai
Associate Professor of Education, Univ. of Virginia

Vera Michalchik
Director of Evaluation and Research, Stanford University

Afterschool Alliance

Webinar Overview

1. Introduction (Bronwyn)
2. Activated learning (Kevin)
3. Connected learning (Vera)
4. Longitudinal views (Robert)
5. Panel Questions
6. Audience Q&A

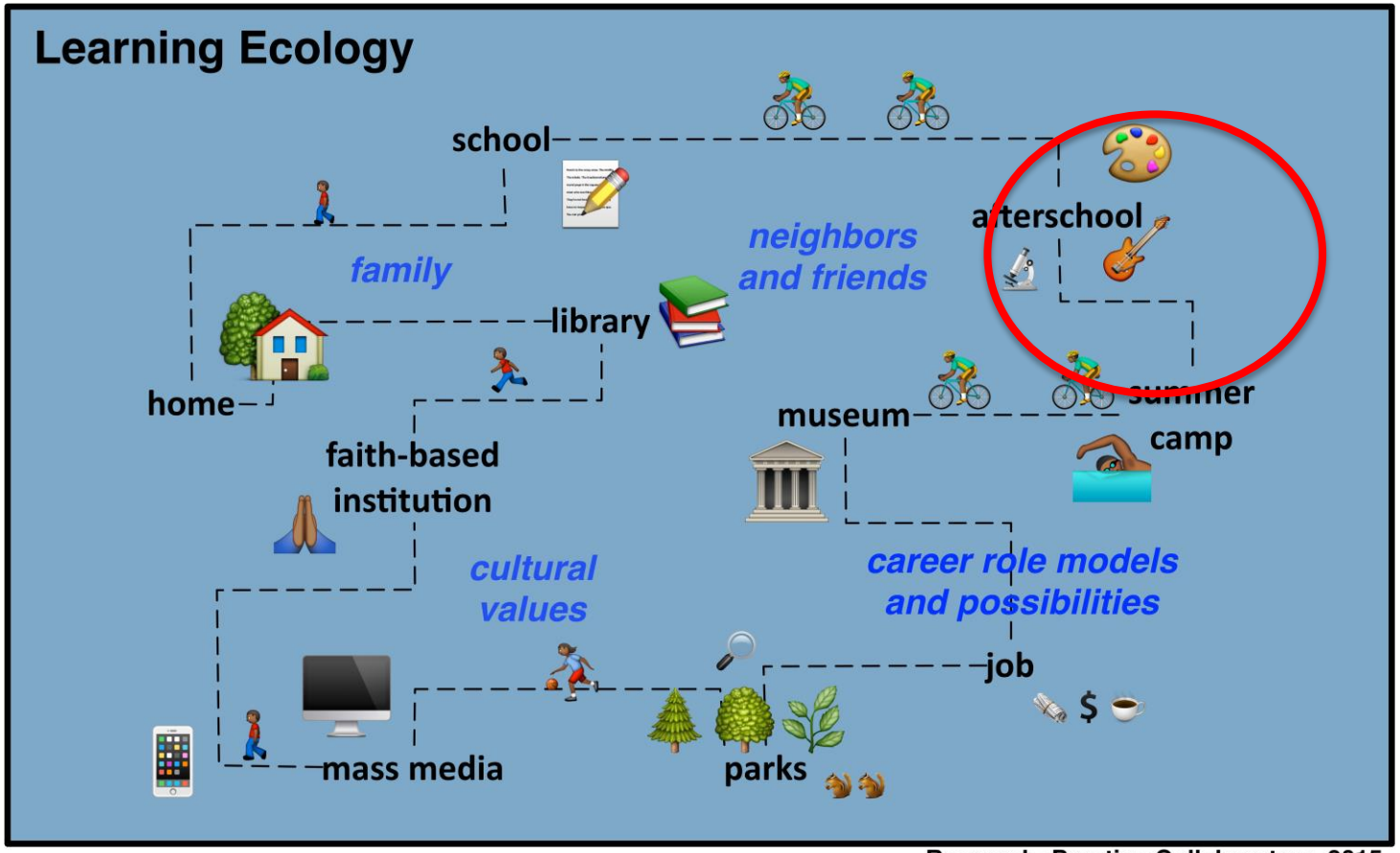


New Strategies for Documenting Learning in Afterschool: An Ecological Approach

Bronwyn Bevan, University of Washington

Learning: An Ecological Approach

+ A process that happens over time and across setting



Learning: An Ecological Approach

- A process that happens over time and across setting

- A process that involves identity development
  - "I want to do this"
  - "I can do this"
  - "This matters to me, my future, my community"

- A process mediated by cultural resources
  - Language
  - Norms for social interaction
    (e.g, group versus individual; verbal versus non-verbal, etc.)
  - Societal values and labels that communicate what is important; who is good at what, etc.

Measuring Impacts of STEM Afterschool

+ MOST COMMON: Learning is an **outcome**
  + Interest, attitudes, and motivations to do STEM
  + STEM career awareness

  + Surveys measuring short term pre/post changes

+ NEW APPROACHES: Learning is a **process**
  + Documenting over time
  + Making connections across settings

  + Situates the afterschool experience as an important contributor to longer-term processes

NEW ***Measuring Impacts*** NEW of STEM Afterschool

+ ACTIVATED LEARNING (Kevin Crowley, U Pittsburgh)
+ CONNECTED LEARNING (Vera Michalchik, Stanford U)
+ LONGITUDINAL VIEWS (Robert Tai, U Virginia)

Research+Practice Collaboratory

+ Develop R+P Tools and Tools for R+P

+ Create R+P Conversations and Exchanges

+ Build and Study Research-Practice Partnerships (RPPs)

researchandpractice.org

SCIENCE LEARNING

ACTIVATION LAB

Our Partners

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

UNIVERSITY OF PITTSBURGH
LRDC Learning Research & Development Center

SRI International

Funders

GORDON AND BETTY MOORE FOUNDATION

the Sprout fund

THE GRABLE FOUNDATION
dedicated to improving the lives of children

NSF

SCIENCE LEARNING ACTIVATION LAB

Science Learning Activation

What positions youth
for success in science/STEM?

How can we ***activate*** children's interest and curious minds in ways that ignite persistent engagement in science learning and inquiry?

SCIENCE LEARNING ACTIVATION LAB

Tracking what changes…

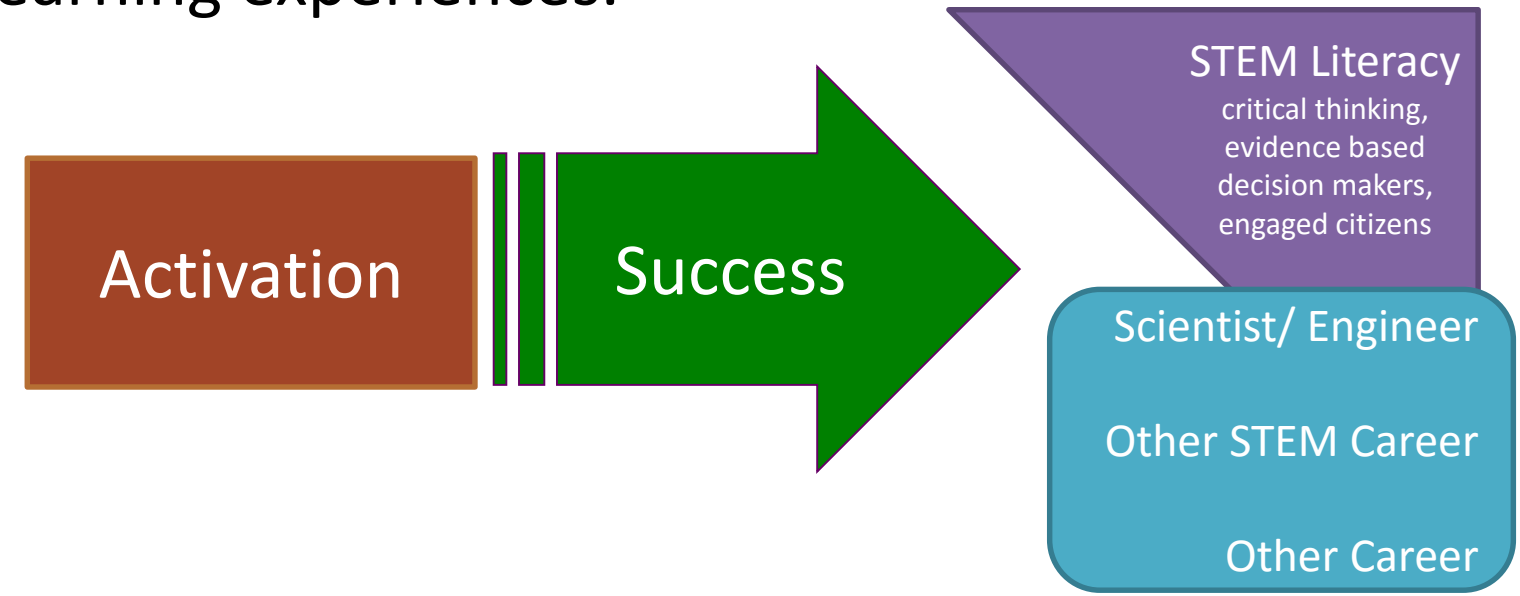
within and
across STEM
learning settings

SCIENCE LEARNING ACTIVATION LAB

Tracking what predicts…

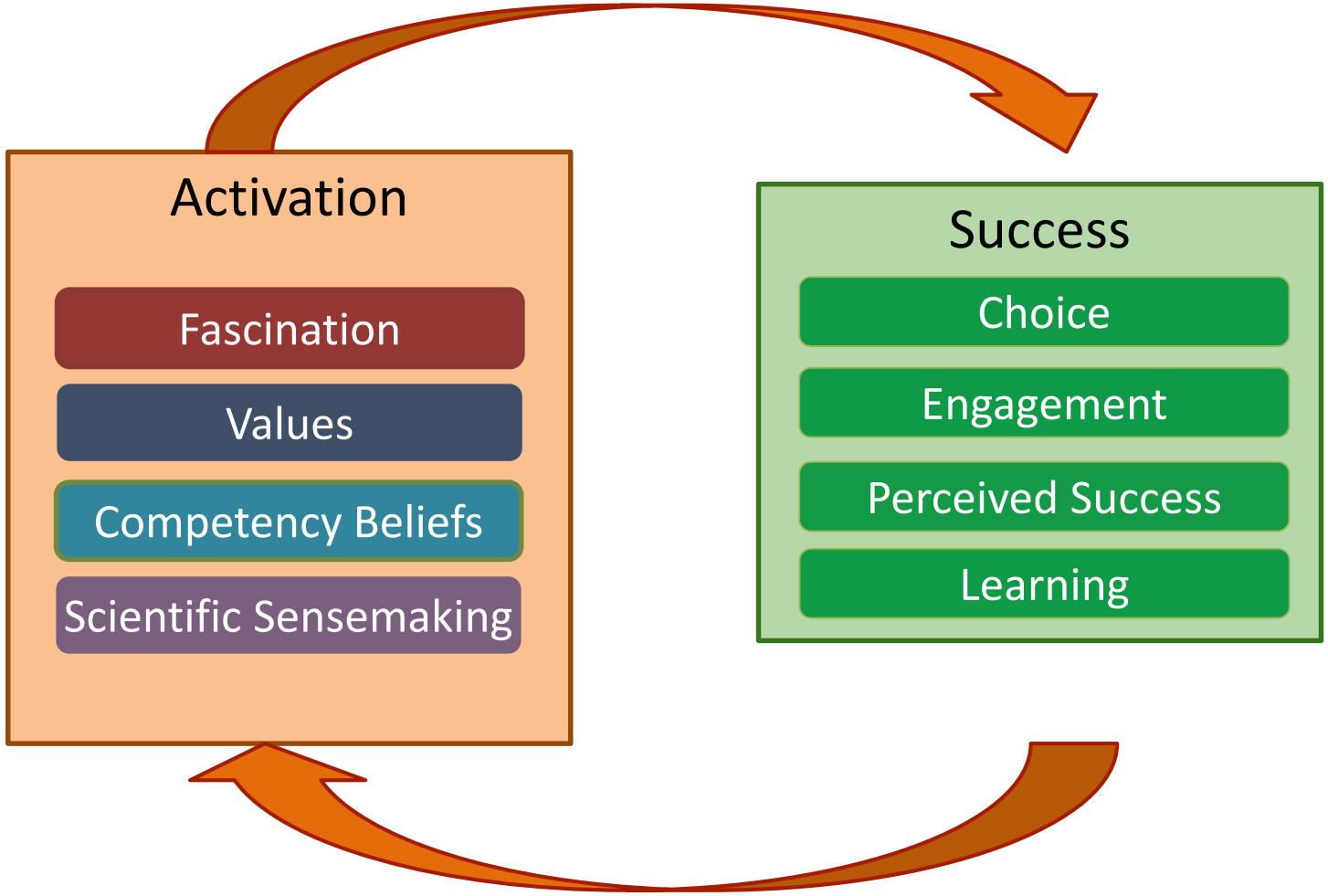
Science (STEM) learning activation =

A composition of *dispositions, skills, and knowledge* that enables success in proximal science (STEM) learning experiences.



SCIENCE LEARNING ACTIVATION LAB

What is Activation? The positive feedback loop between activation and success



SCIENCE LEARNING ACTIVATION LAB

Science Activation Dimensions

- **Fascination with natural and physical phenomena.** *A person's emotional and cognitive attachment with science topics and tasks.*
- **Values science.** *The degree to which a person values science, including the knowledge learned in science, the ways of reasoning used in science, and the role that science plays in families and communities.*
- **Competency Beliefs.** *The extent to which a person believes that s/he is good at science.*
- **Scientific Sensemaking.** *The degree to which a person engages with science learning as a sensemaking activity. Sub-dimensions include: questions, experiment, evidence, explanation, and nature of science.*

SCIENCE LEARNING ACTIVATION LAB

Success Dimensions

- **Choice.** *Choosing to participate in the next science learning opportunity (e.g. camp, museum visit, watching a science program).*
- **Engagement.** *Includes affective, behavioral, and cognitive components (e.g. excited about materials, doing the science activities at hand, and thinking about science ideas).*
- **Perceived Success.** *Feeling successful in completing science learning tasks in absolute and relative terms.*
- **Learning.** *Achieving the learning goals for a particular science experience.*

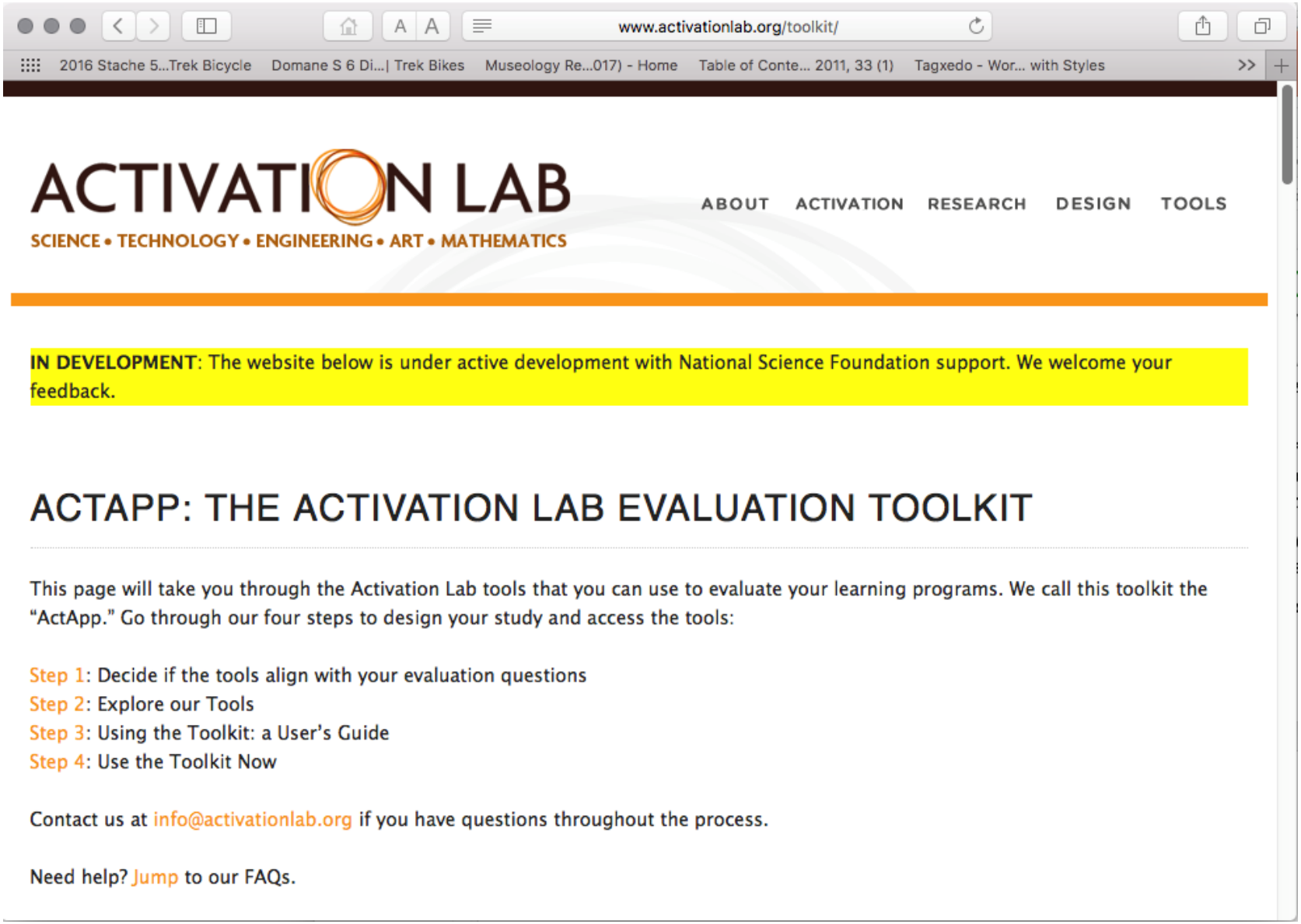
SCIENCE LEARNING ACTIVATION LAB

What the research says…

- **Activation is real.** Literature reviews, life-history interviews with people who've succeeded in science, and deep qualitative work with youth.
- **Activation is measurable.** *Multiple-choice surveys administered on iPads or paper, customizable to program, strong psychometrics, rigorous validity testing.*
- **Activation predicts success.** *Longitudinal studies suggest that the feedback loop works. It doesn't just work a single way.*
- **Activation is useful.** *Design partnerships in Pittsburgh, California and beyond provide common language, measurable outcomes, and big picture thinking.*

SCIENCE LEARNING ACTIVATION LAB

Activation is available…



Capturing Connected Learning

When and Where It Happens

Vera Michalchik
(on behalf of CLRN survey team—Bill Penuel, lead)

CONNECTED Learning

EQUITABLE, SOCIAL, AND PARTICIPATORY

Connected learning is a model of learning that holds out the possibility of reimagining the experience of education in the information age. It draws on the power of today's technology to fuse young people's interests, friendships, and academic achievement through experiences laced with hands-on production, shared purpose, and open networks.

PRODUCTION CENTERED

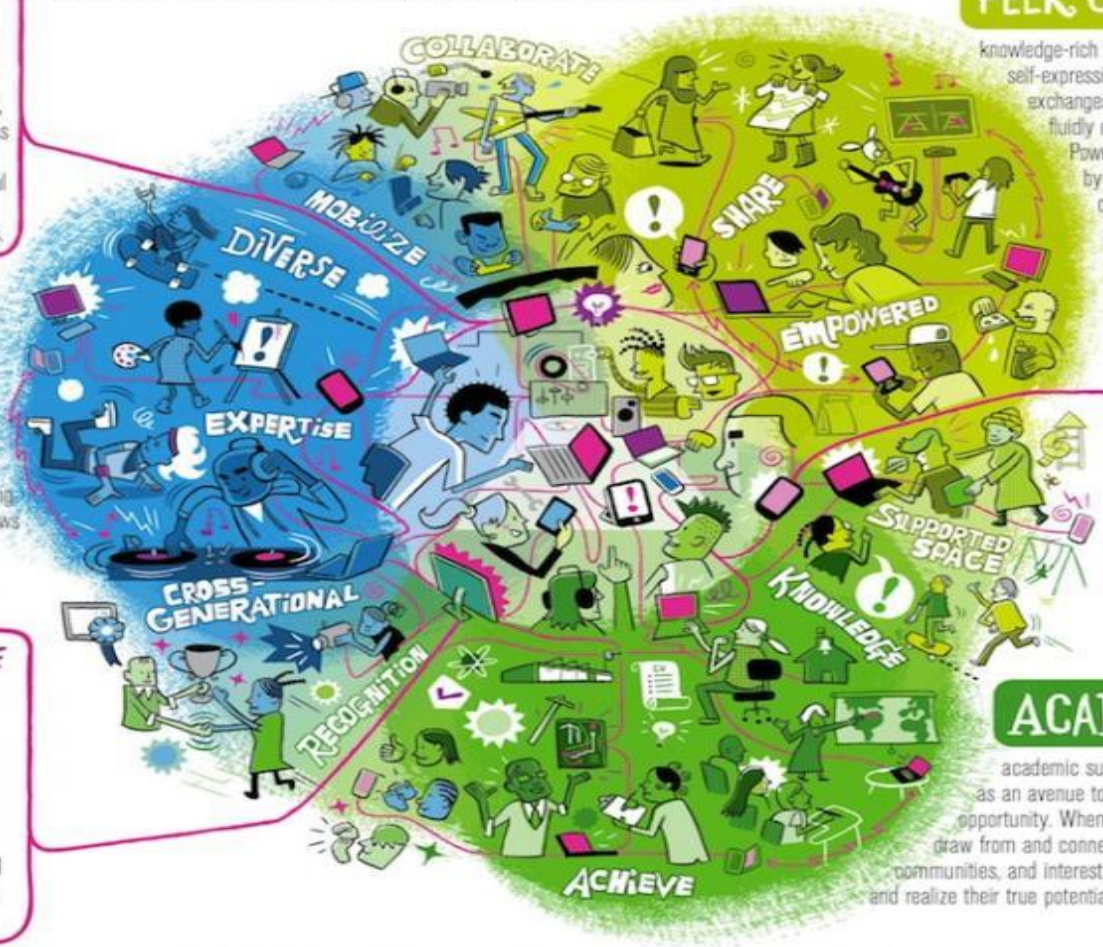
Connected learning prizes the learning that comes from **actively producing, creating, experimenting, and designing**, because it promotes skills and dispositions for lifelong learning, and for making meaningful contributions to today's rapidly changing work and social conditions.

INTERESTS

Interests foster the drive to gain knowledge and expertise. Research has repeatedly shown that when the topic is personally interesting and relevant, learners achieve much higher-order learning outcomes. Connected learning views interests and passions that are developed in a social context as essential elements.

SHARED PURPOSE

Today's social media and web-based communities provide unprecedented opportunities for caring adults, teachers, parents, learners, and their peers to share interests and contribute to a common purpose. The potential of **cross-generational learning and connection** unfolds when centered on common goals.



PEER CULTURE

Connected learning thrives in a socially meaningful and knowledge-rich ecology of ongoing participation, self-expression, and recognition. In their everyday exchanges with peers and friends, young people fluidly contribute, share and give feedback. Powered with possibilities made available by today's social media, this peer culture can produce learning that's engaging and powerful.

OPENLY NETWORKED

Connected learning environments **link learning in school, home, and community**, because learners achieve best when their learning is reinforced and supported in multiple settings. Online platforms can make learning resources abundant, accessible, and visible across all learner settings.

ACADEMIC

Connected learning recognizes the importance of academic success for intellectual growth and as an avenue towards economic and political opportunity. When academic studies and institutions draw from and connect to young people's peer culture, communities, and interest-driven pursuits, learners flourish and realize their true potential.

ACTIVE **RELEVANT** REAL-WORLD EFFECTIVE **HANDS-ON**
NETWORKED **INNOVATIVE** PERSONAL TRANSFORMATIVE

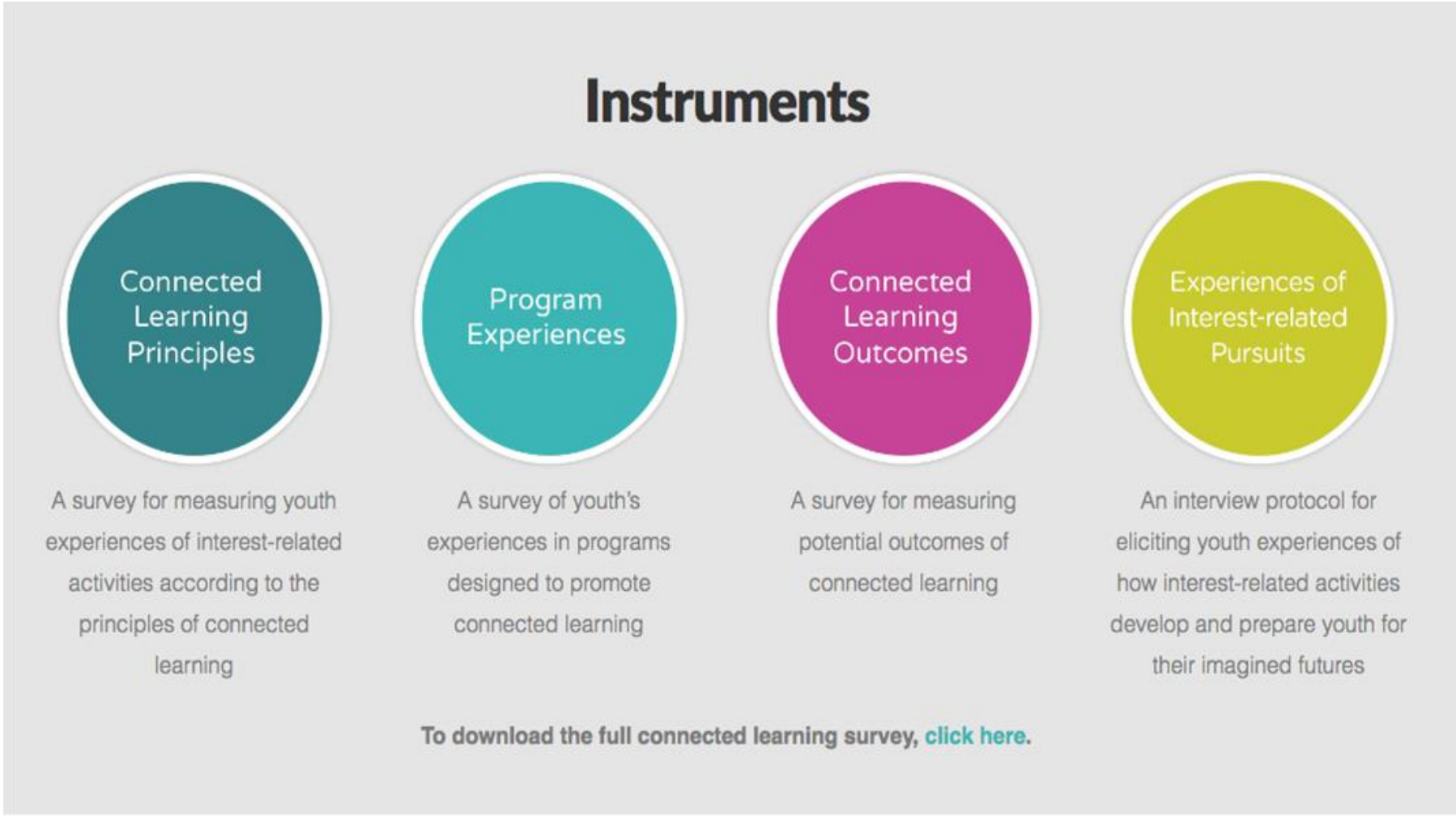
CONNECTED LEARNING PRINCIPLES

Pursuit is experiences as...

Interest Powered	Centered on youths' interests— development of related knowledge and skill
Peer Supported	Encouraged by peers— who work together and give feedback
Production Centered	Making, production, or performance— for a real audience
Shared Purpose	Adults participate alongside youth— youth have a say in the goals and structure
Openly Networked	Well-resourced— tools and guidance in using tools

The Instruments

http://researchtools.dmlhub.net/



CONNECTED LEARNING PRINCIPLES

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Survey of Principles of Connected Learning

1. Think of an activity that:
   - You enjoy doing
   - You do with other people
   - You get better at doing, the more you engage in the activity

Can you think of an activity like this?

☐ Yes
☐ No

I2. *If yes:* What is that activity?

I3. *If no:* What is the activity you spend the most time doing while here?

I4. How long have you been doing this activity?

_____ years _____ months

Targeted at youths' experiences in relation to programs

It feels like family when I come here.

I belong here.

I can take risks when I am at this program.

CONNECTED LEARNING OUTCOMES

Civic Engagement

Connections to others

Support for building connections (brokering)

Career orientation

Personal fulfillment and satisfaction

EXPERIENCES OF INTEREST-RELATED PURSUITS

Interview designed to elicit youth's experiences of how interest-related activities develop and prepare youth for their imagined futures.

THANK YOU!!

CLRN resources for program evaluations include:

A website with instruments:
http://researchtools.dmlhub.net/

A self-paced online course:
http://dmlcommons.net/2016-course/

ROBERT H. TAI, ED. D.
UNIVERSITY OF VIRGINIA

Measuring the Impact of STEM Learning in Afterschool: A Longitudinal View

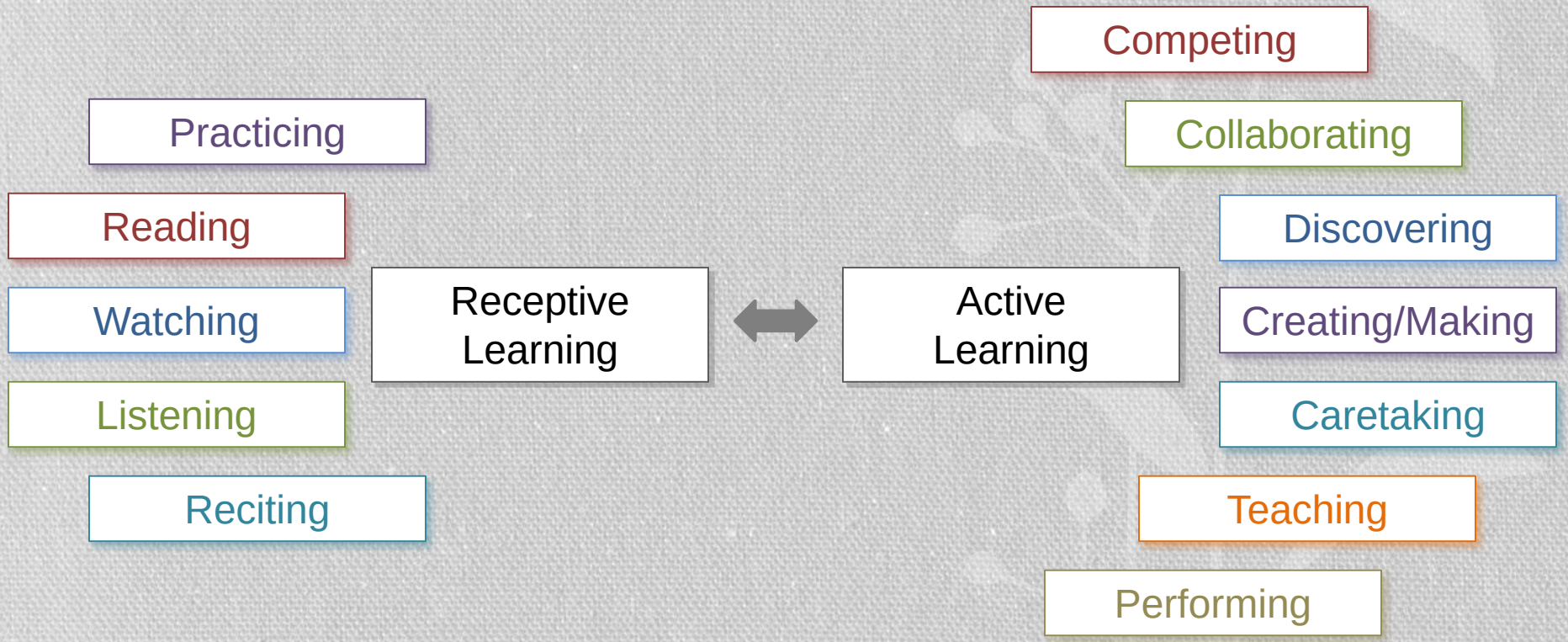
Afterschool Webinar

Afterschool Alliance

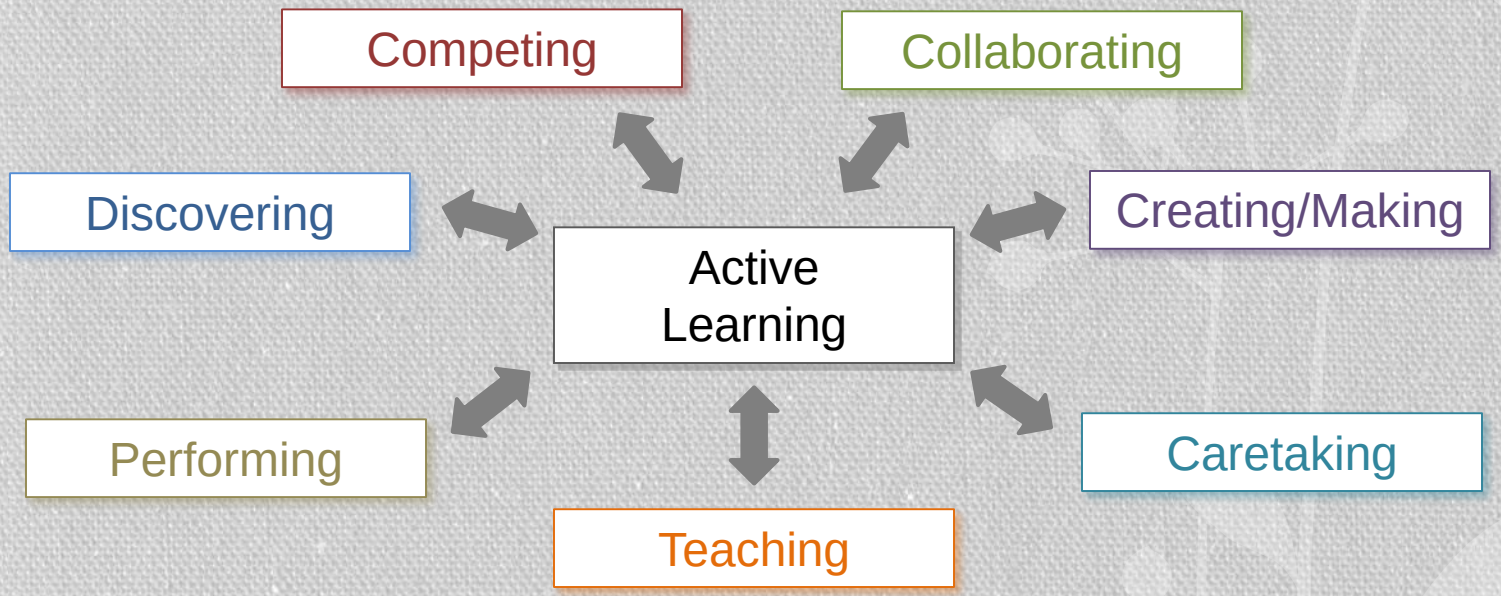
November 2, 2016

University of Virginia
Curry School of Education

Active Learning versus Receptive Learning



Afterschool STEM Targets Active Learning



***Framework for Observing and Categorizing Instructional Strategies* (FOCIS)**

Active Learning Preference Survey

We want to know how you feel about different activities. (*Please* UNDERLINE *the number of your choice for the activities below.*)

When I find out that an activity involves …	I feel … ☹ 😐 ☺
★ Being in a group	1 2 3 4 5
★ Being in a competition	1 2 3 4 5
Making or building things	1 2 3 4 5
Discovering and learning new things	1 2 3 4 5
Presenting in front of lots of people	1 2 3 4 5
Taking care of animals	1 2 3 4 5
Helping people learn things	1 2 3 4 5

We want to know what you think about each of the statements below. If you strongly agree, then choose 5. If you strongly disagree, then choose 1.

(*Please* UNDERLINE *the number of your choice for the activities below.*) 👎 👍
★ Working with others is more fun than working alone — 1 2 3 4 5
★ I like being part of a team — 1 2 3 4 5
★ I learn better when I am working with others — 1 2 3 4 5
★ I get excited when I hear there will be a competition — 1 2 3 4 5
★ I enjoy competing against other people — 1 2 3 4 5
★ I like to focus on my own goals, rather than competing with others — 1 2 3 4 5
I like figuring out how things work — 1 2 3 4 5
I like taking things apart to see what is inside — 1 2 3 4 5
I like trying different ways to figure things out — 1 2 3 4 5

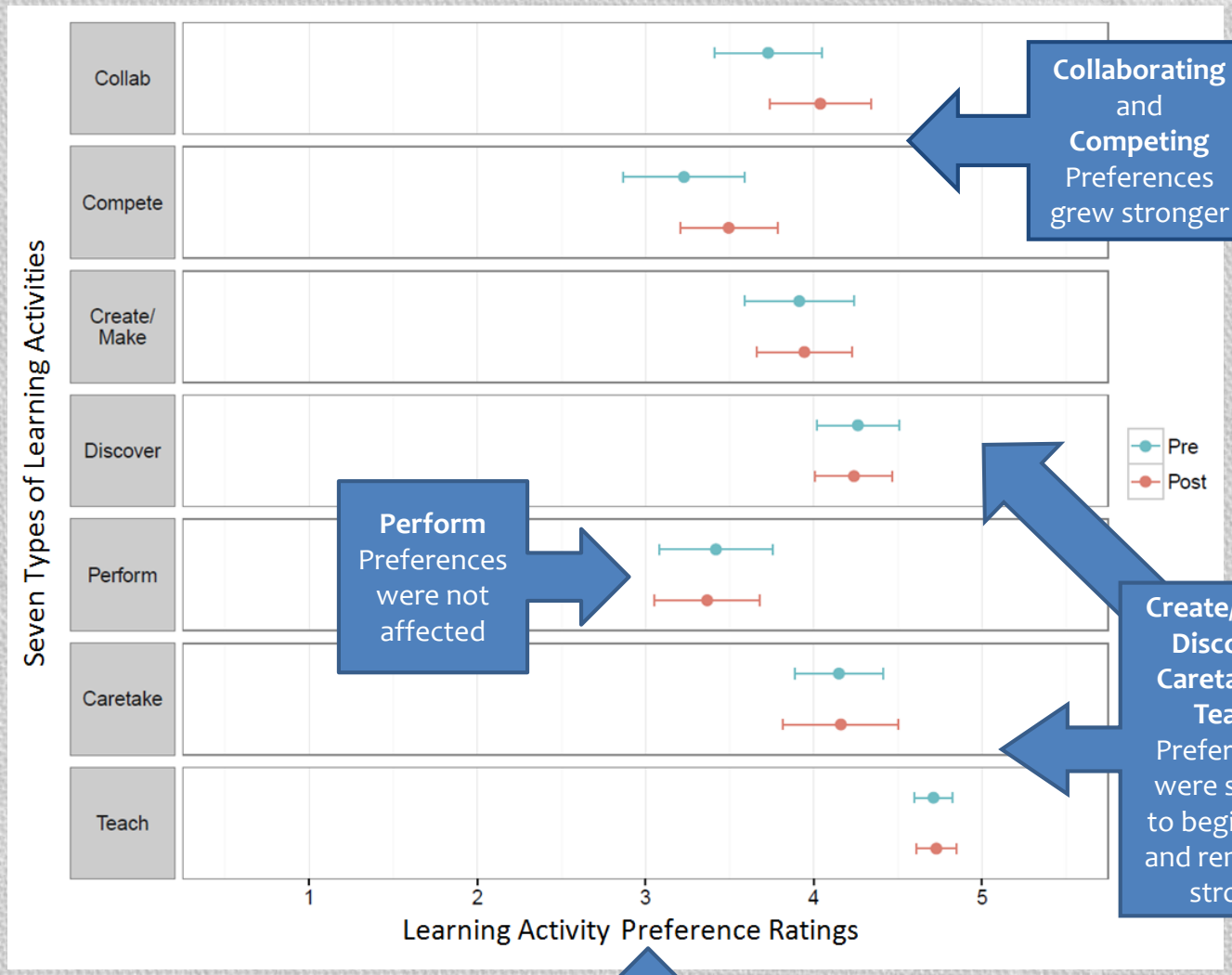
	👎 👍
I like solving problems	1 2 3 4 5
Helping others to learn things is fun	1 2 3 4 5
I like teaching things to others	1 2 3 4 5
Having a pet is big responsibility, but something I like to do	1 2 3 4 5
I like to take care of things like plants and aquariums	1 2 3 4 5
I feel good when people depend on me	1 2 3 4 5
Performing in front of people is fun	1 2 3 4 5
I like telling people about my work	1 2 3 4 5
I like presenting my work to my class	1 2 3 4 5
I like doing projects where I make things	1 2 3 4 5
Whenever I can, I make the things I need	1 2 3 4 5
I like building things	1 2 3 4 5

To calculate the Collaboration preference score, the ★ question responses are averaged.

To calculate the Competition preferences score, the ★ question responses are averaged.

Etc. for each of the other five active learning types

Example of a Pre- and Post-Program Outcome Comparison, n=39



All Learning Activity Preferences had positive ratings both before and after the program.

FOCIS Program Evaluation Instrument

- Currently being used by the Boy Scouts of America in the development of their new STEM Scouts Program.
- Evaluation Program planned for DonorsChoose.Org supported by the Overdeck Foundation.
- FOCIS has been used as a longitudinal instrument to track changes in students learning activity preferences in a two-year study. (n=8000+)

We gratefully acknowledge the support of these organizations

All views expressed are those of the researchers and do not represent the views of the National Science Foundation, the Robert N. Noyce Foundation, or the S. D. Bechtel, Jr. Foundation

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I gratefully acknowledge their contributions

Thank you

Robert H. Tai, Ed.D.
rht6h@virginia.edu

Panel Questions

Audience Q & A

Thank you for attending!

Bronwyn Bevan
bronwynb@uw.edu

Vera Michalchik
vera.michalchik@stanford.edu

Robert Tai
rht6h@virginia.edu

Kevin Crowley
crowleyk@pitt.edu

Anita Krishnamurthi
akrishnamurthi@afterschoolalliance.org

Afterschool Snack Blog

/afterschoolalliancedc

@afterschool4all

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