



Science Learning Activation: Positioning Youth for Success

ITEST PI Summit: June 15-16, 2017

Overview

Learning Activation

The Instruments

How you can use them

Similar instruments

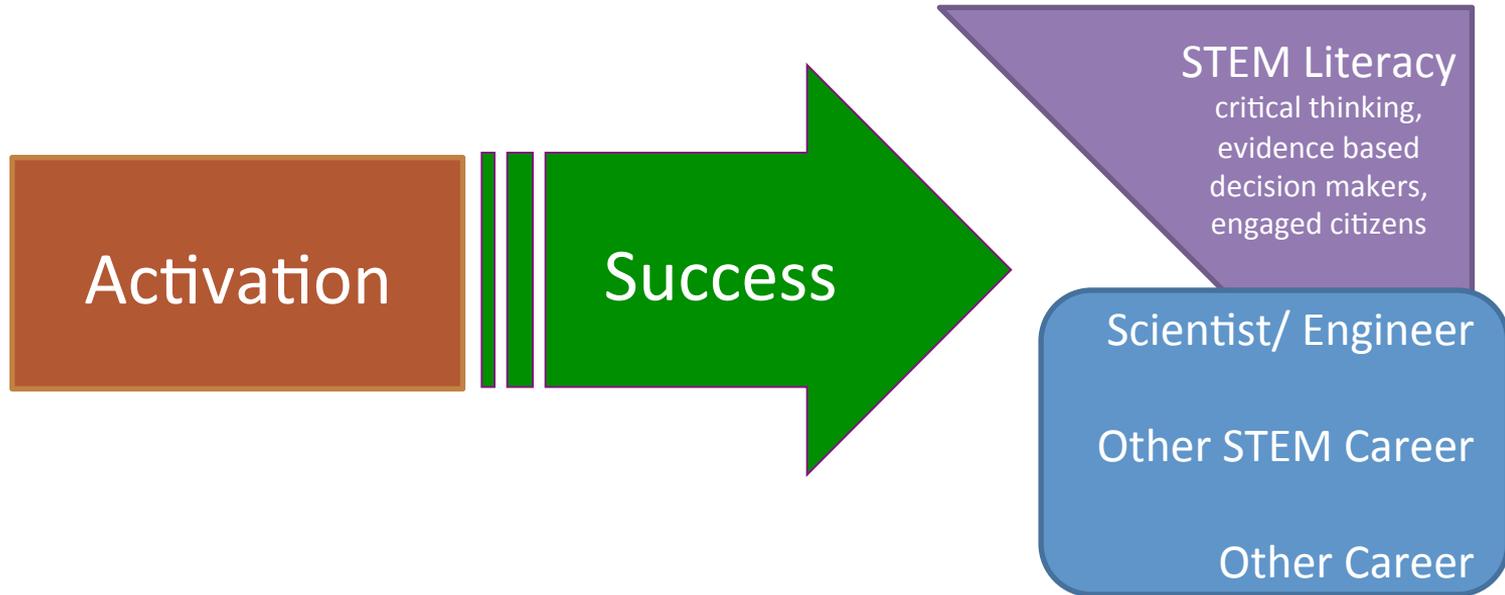
Guiding Question

What positions youth
for success in science?

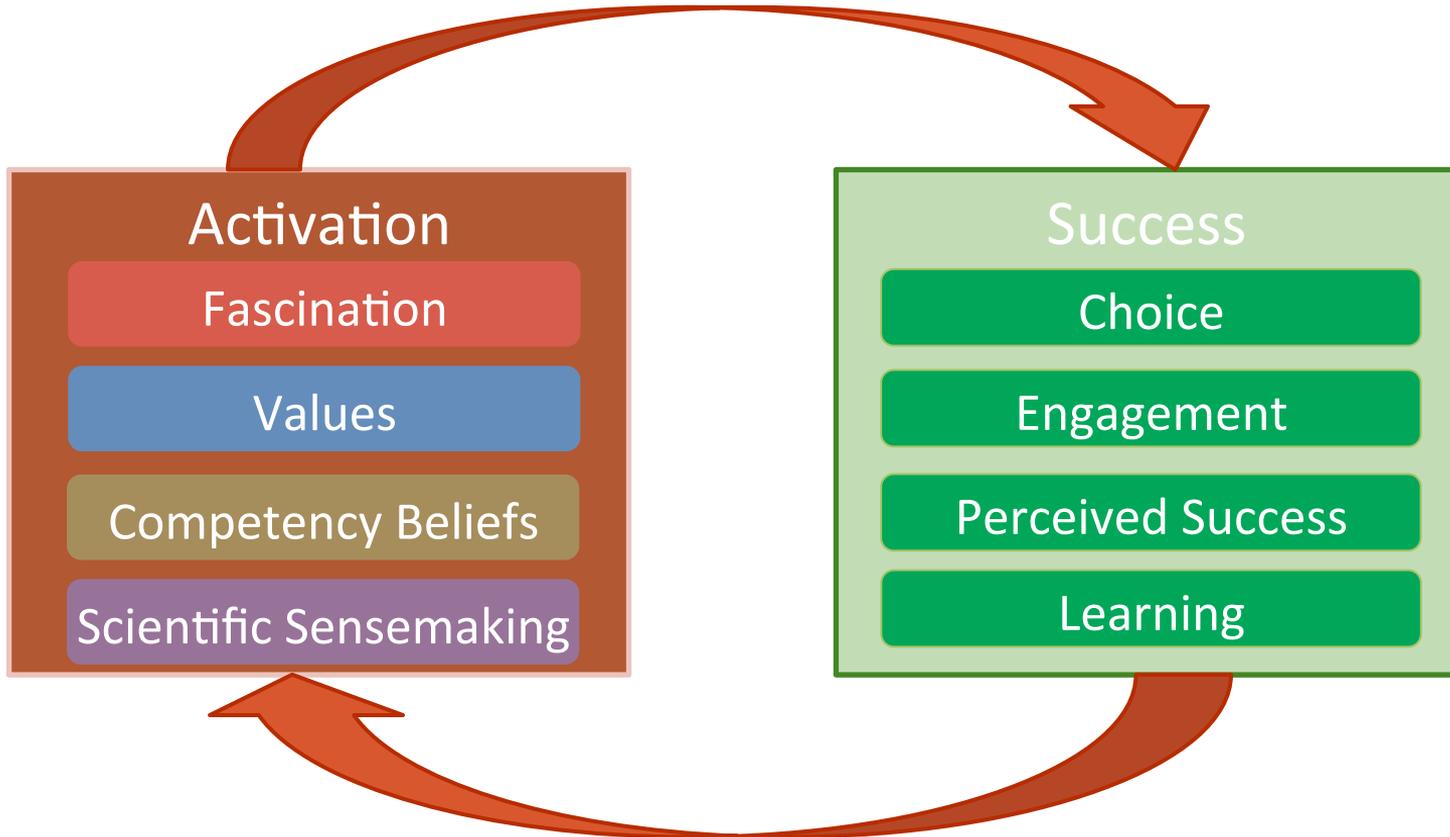
Theory of Activation

Science learning activation =

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



Theory of Activation



Science Activation Dimensions

Fascination

A person's emotional and cognitive attachment with science topics and tasks.

Values

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 of engagement with science-related content as an activity of constructing explanations across representations, using methods generally aligned with the practices of science (questions, experiment, evidence, explanation, and nature of science).

Fascination

Fascination with natural and physical phenomena refers to an individual's emotional and cognitive attachment with science topics and tasks.

1. Curiosity/Wonderment

- In general, I find science: (very interest, interesting, boring, very boring)

2. Positive affect

- In general, when I work on science, I think its cool

3. Obsession

- In general, when I work on science, I love it
- After a really interesting science activity is over, I can't stop thinking about it

(Harty & Beally, 1984; Gardner, 1987; Loewenstein, 1994; Litman & Spielberg, 2003; Hidi & Renninger, 2006; Kind et al., 2007; Reid, 2006; Osborne et al., 2003; Gardner 1975; Baram-Tsabari & Yarden, 2005; Dawson & Bennett, 1981; Germann, 1988; Dawson, 2001; Girod, 2001; Ames, 1992)

Values

Values science refers to the degree to which learners value science, including the knowledge learned in science, the ways of reasoning used in science, and the role that science plays in families and communities.

1. Everyday value

- Do you think science is useful in your life?
- I talk about science or science ideas with people or someone in my family outside of school

2. Career value

- Do you think you could become a scientist someday?
- I think learning science is useful for what I want to do as a job.

(Eccles & Wigfield, 2002; Azevedo, 2011; Lemke, 2001; Driver, 1996; Lederman, 1992; Lederman, Ab-El-Khahlick, Bell, & Schwartz, 2002)

Competency Beliefs

Competency beliefs in science refers to the extent to which a person believes that she is good at science.

1. Functions

2. Tasks

3. Settings

- I can do the science activities I get in class.
- I can answer all the questions on a science test in class.
- I can figure out how to finish a science experiment at home.
- If I went to a science camp for kids my age, I could understand what was going on.
- I can find and understand what I am looking for on any website for kids my age that has science information on it.

(Bandura, 1986; Schunk, et al., 2008; Lau & Roeser, 2002; Lawson, Banks, & Logvin, 2007; Linnenbrink & Pintrich, 2003; Durik et al., 2006)

Scientific Sensemaking

Scientific sensemaking is engagement with science-related content as an activity of constructing explanations across representations, using methods generally aligned with the practices of science . Sub-dimensions include:

- **Questions:** Identifies investigable problems and generates appropriate questions
- **Experiment:** Designs experiments appropriate to a research question
- **Evidence:** Extracts evidence; interprets and analyzes data accurately and with intention
- **Explanation:** Understands the relationship between claims, evidence, and reasoning; Constructs mechanistic explanations of phenomena.
- **Nature of Science:** Understands how science as a discipline works; knows that science is both a body of knowledge and a process.

(Coutinho & Albergaira-Alemda, 2014; Chin & Osbourne, 2008; Chen & Klahr, 1999; Apedoe & Ford, 2010; Erduran & Jimenez-Aleixandre, 2007; Lehrer, Schauble, & Petrosino, 2001; Klahr & Dunbar, 1988; Kuhn & Crowell, 2011; Lederman et al. 2002; Khishfe & Lederman, 2006)

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).

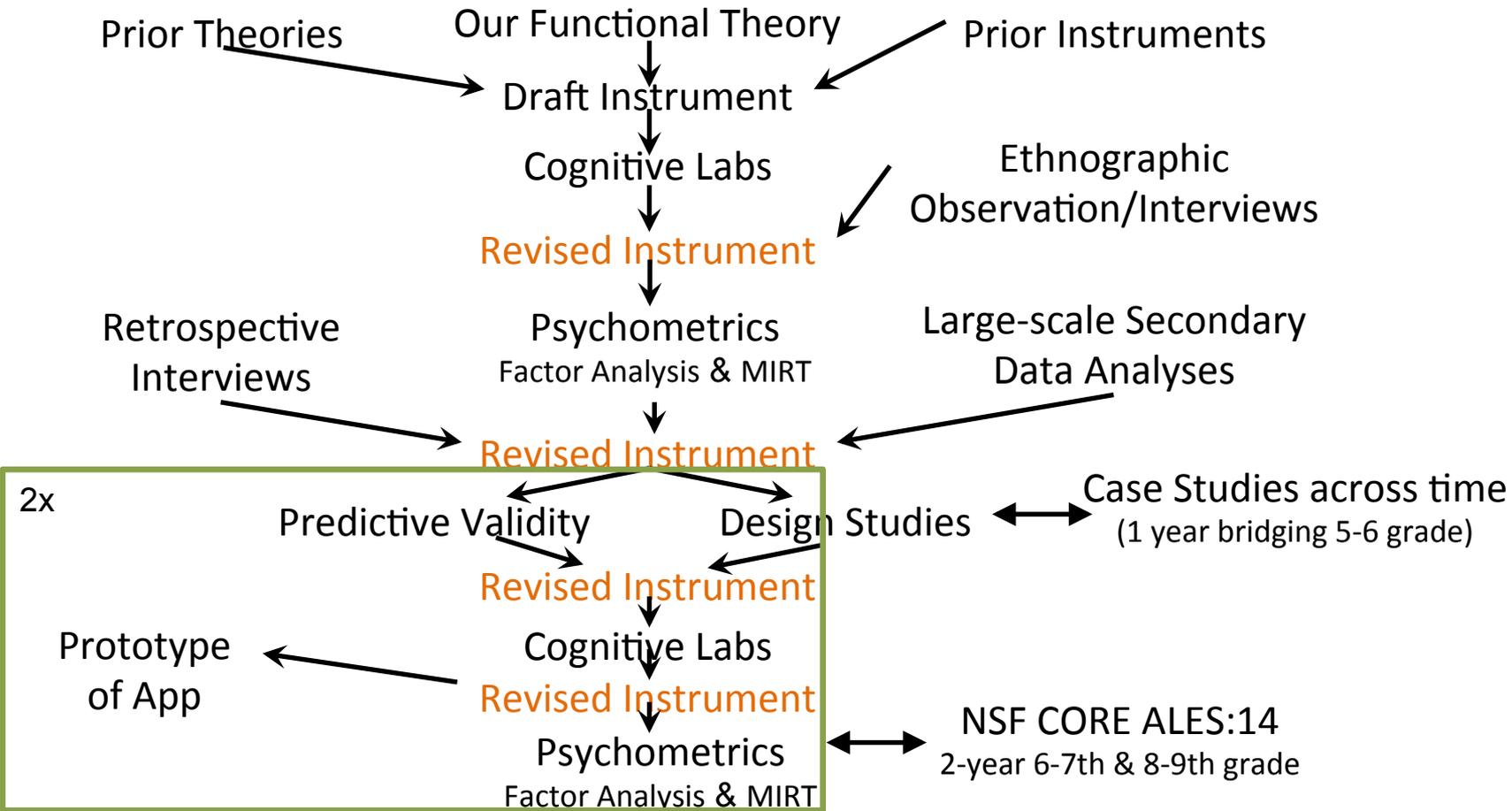
Perceived Success

Feeling successful in completing science learning tasks in absolute and relative terms.

Learning

Achieving the learning goals for a particular science experience.

Development Process 3.4



Fascination

8 items, $\alpha=0.90$

Fascination with natural and physical phenomena refers to an individual's emotional and cognitive attachment with science topics and tasks.

1. Curiosity/Wonderment

- In general, I find science: (very interest, interesting, boring, very boring)

2. Positive affect

- In general, when I work on science, I think its cool

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		X		
		X		
		X		
3		X		
		XX F06.3		
		X F04.3		
		XX		
		XXX F08.3		
2		XXX F02.3		
		XXX F07.3		
		XXX		
		XXXXX F05.3		
		XXXXX F03.3		
1		XXXXX		
		XXXXXXXX F01.3	F06.2	
		XXXXXXXXXX		
		XXXXXXXXXX F08.2		
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		XXXXXXXXXX F04.2	F07.2	
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		XXXXXXXX		
		XXXXXXXX F01.2		
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-1		XXXXXXXX		
		XXXXXXXX F05.2		
		XXXX		
		XXX		
		XXXX F01.1	F03.2	F06.1
-2		XX F02.2		
		XX F08.1		
		XX F07.1		
		X		
		X F04.1		
-3		X		
		X		
		X F05.1		
		F03.1		
		F02.1		
-4				

Values

8 items, $\alpha=0.87$

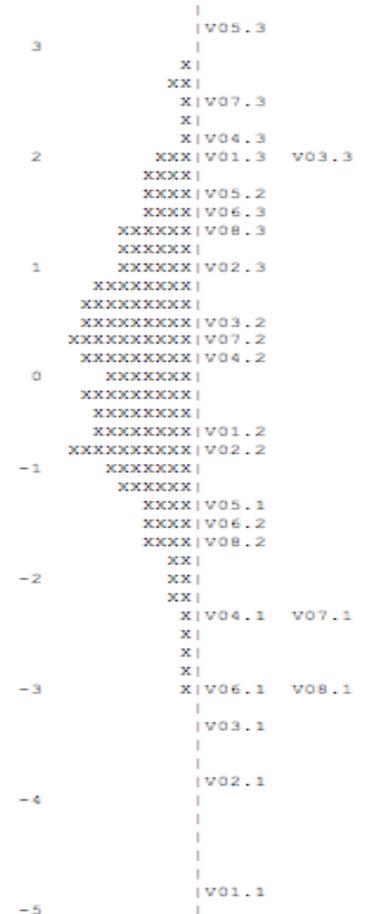
Values science refers to the degree to which learners value science, including the knowledge learned in science, the ways of reasoning used in science, and the role that science plays in families and communities.

1. Everyday value

- Do you think science is useful in your life?
- I think science is more important than anything else.

2. Career value

- Do you think you could become a scientist someday?
- I think learning science is useful for what I want to do as a job.

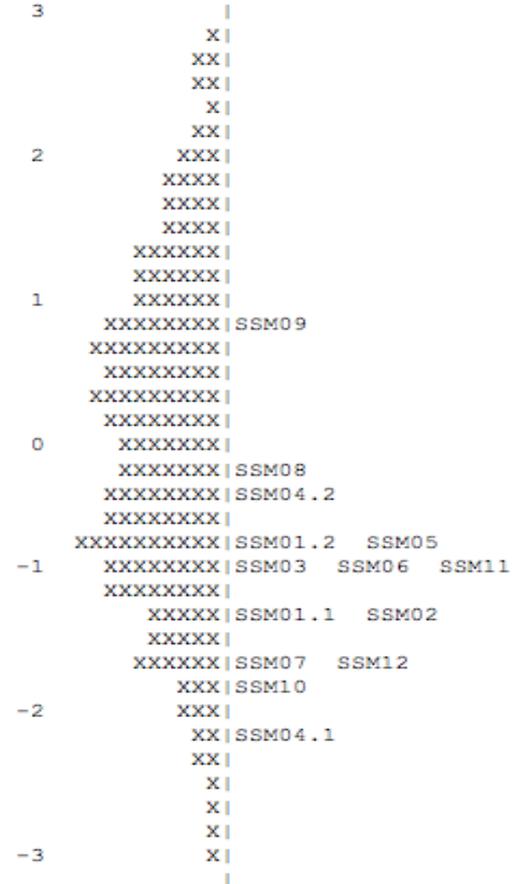


Scientific Sensemaking

12 Items, $\alpha=0.89$

The degree to which the individual engages with science **learning** as a sensemaking activity. Including:

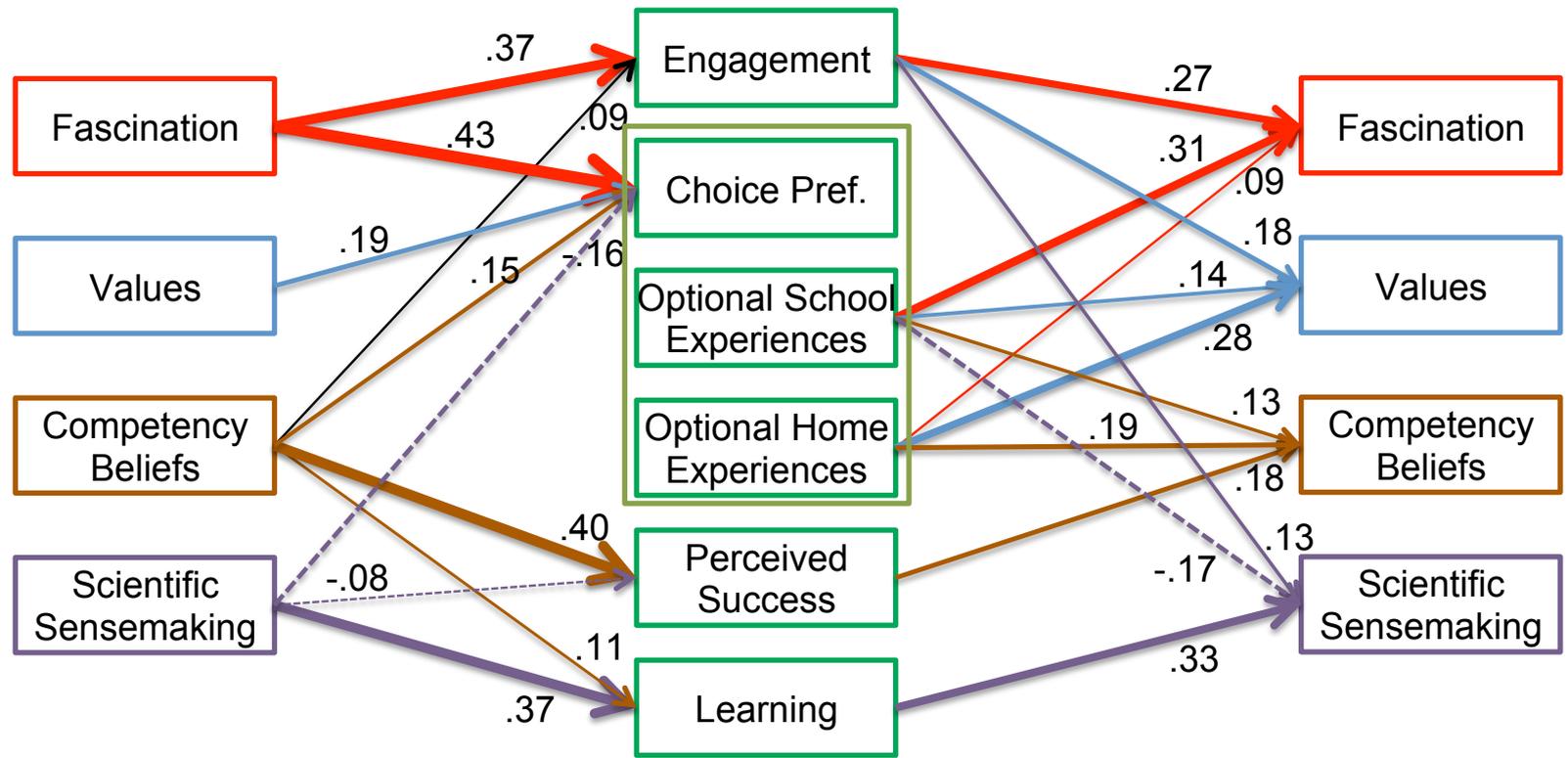
- **Questions:** Identifies investigable problems and generates appropriate questions from them
- **Experiment:** Designs experiments appropriate to a research question with relevant control of variables
- **Evidence:** Extracts relevant evidence; interprets and analyzes data accurately and with intention
- **Explanation:** Understands the relationship between claims, evidence, and reasoning; Constructs mechanistic explanations of phenomena.
- **Nature of Science:** Understands how science as a discipline works; knows that science is both a body of knowledge and a process.



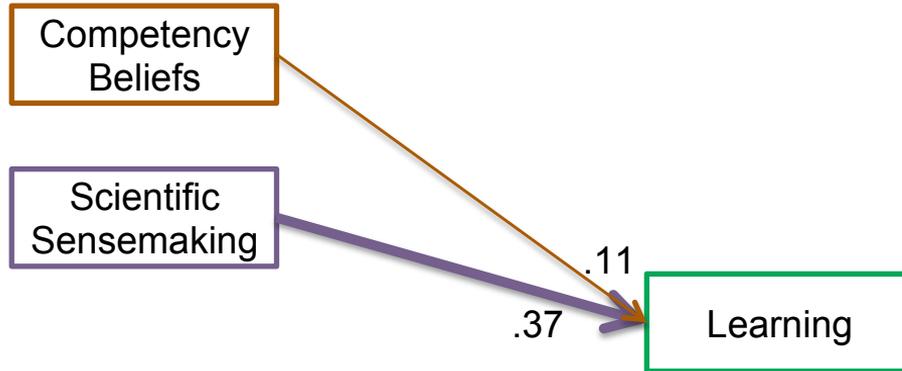
NSF CORE: Malleable Factors (ALES14)

Data collection	6 th + 8 th grade 4 hands-on / 4 textbook schools			7 th + 9 th grade	
Fidelity / Activity Logs		Mid 4 times	End 4 times	Mid 4 times	
Activation	Begin	Mid	End	Begin	Mid
Family Background	Begin				
Prior/Recent Experiences	Begin	Mid		Begin	Mid
*Content knowledge	Pre	Post		Pre	Post
Engagement	4 times	4 times		4 times	
Choice Preferences	Begin		End	Begin	
State tests		8 th only			
Career Interest	Begin		End	Begin	
<i>Perceived success</i>	4 times	4 times		4 times	

Interactive Cycle



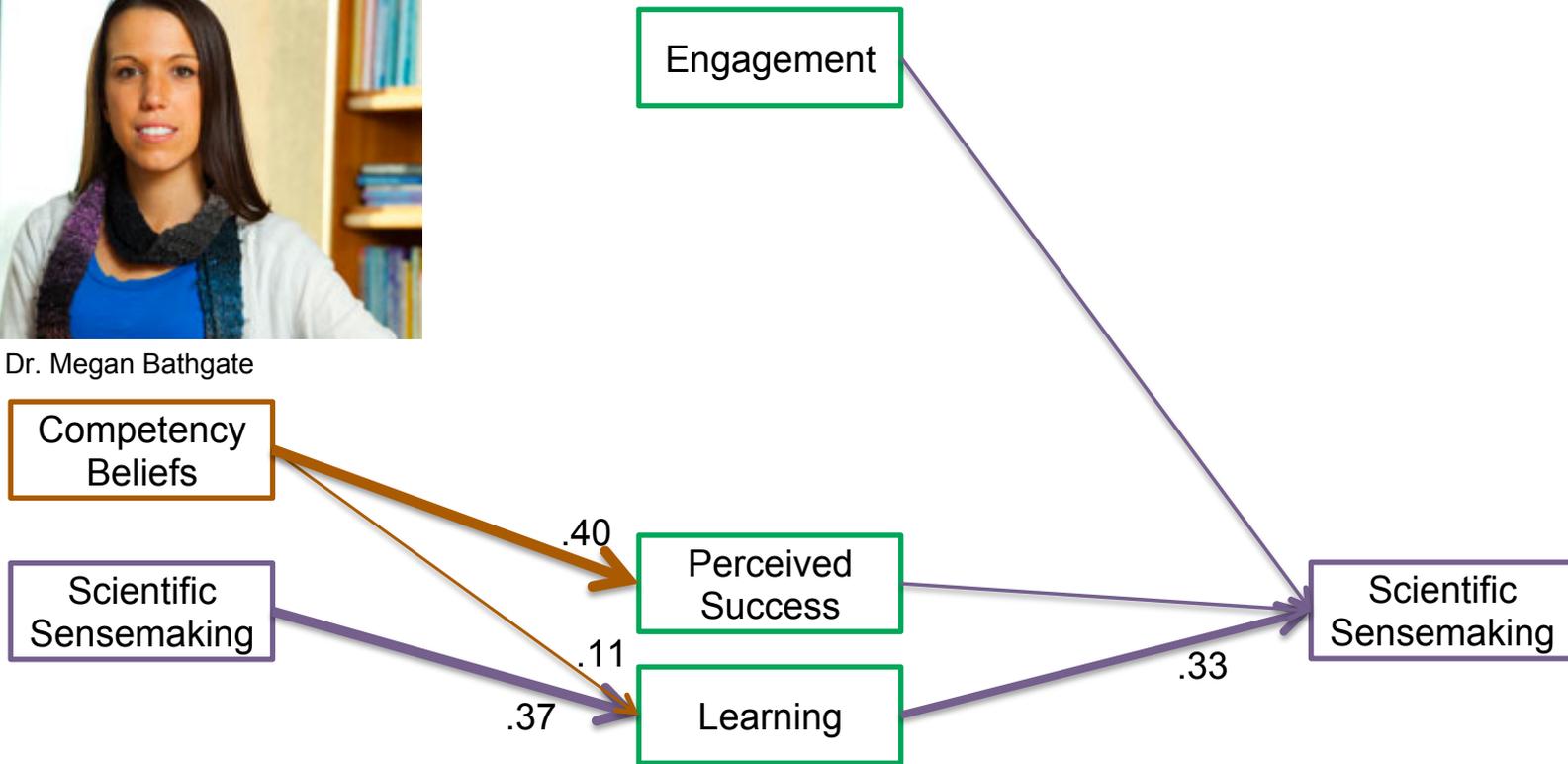
Use Cases



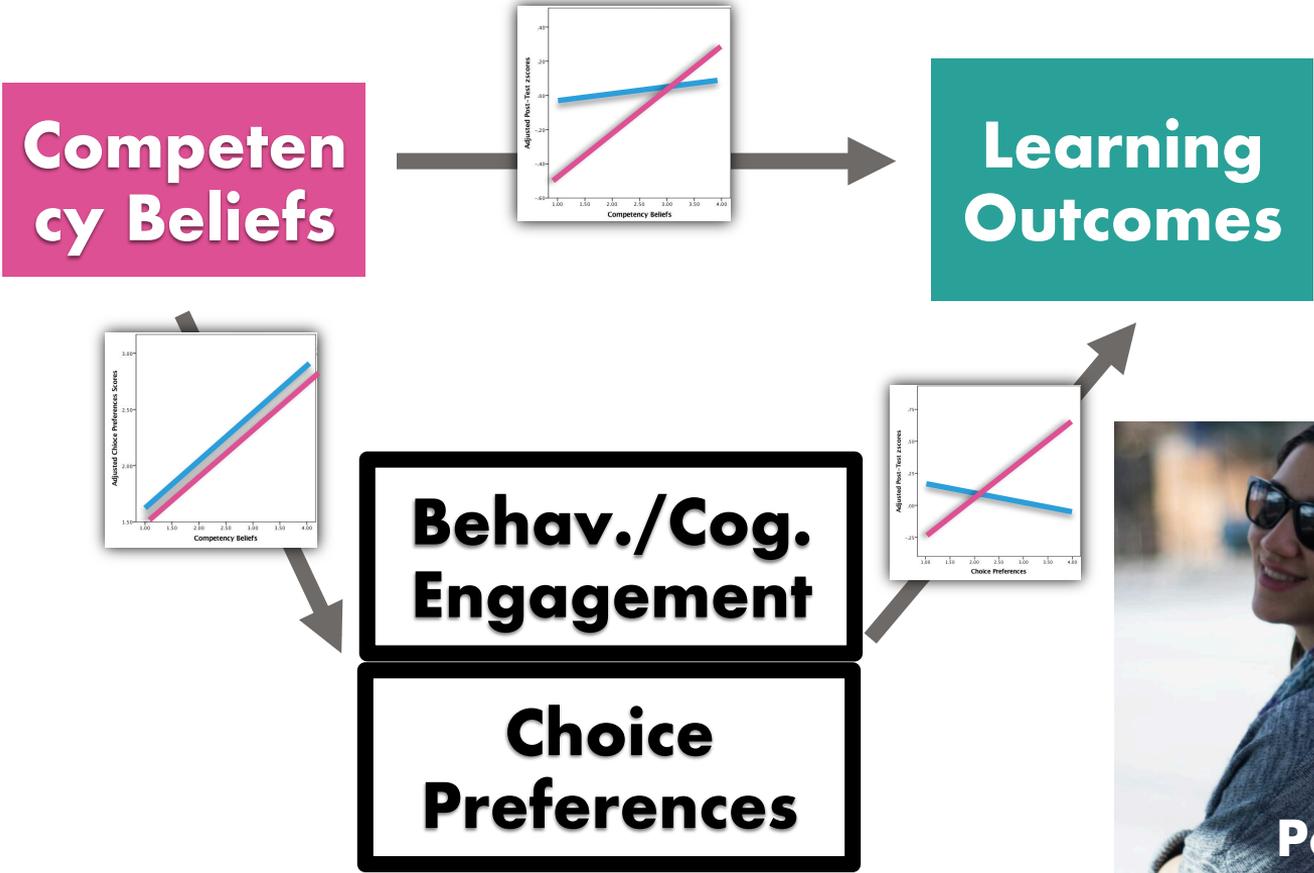
Sensemaking to Learning



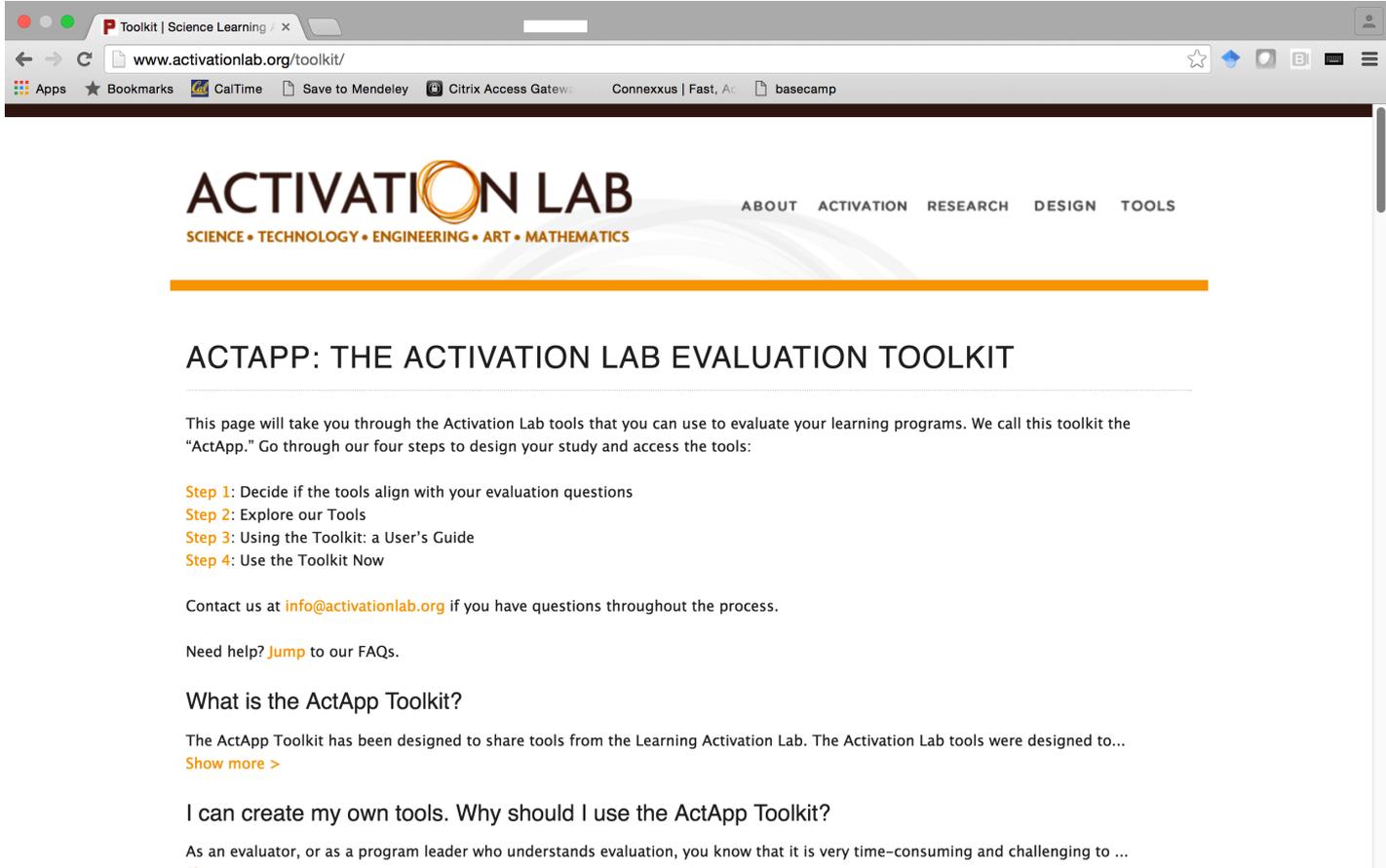
Dr. Megan Bathgate



Competency Beliefs to Learning



ActApp: Toolkit



The screenshot shows a web browser window with the URL www.activationlab.org/toolkit/. The browser's address bar and tabs are visible. The page content includes the Activation Lab logo, a navigation menu with links for ABOUT, ACTIVATION, RESEARCH, DESIGN, and TOOLS, and a main heading for the ActApp Toolkit. Below the heading, there is an introductory paragraph, a list of four steps, contact information, and several sections with truncated text.

ACTIVATION LAB
SCIENCE • TECHNOLOGY • ENGINEERING • ART • MATHEMATICS

ABOUT ACTIVATION RESEARCH DESIGN TOOLS

ACTAPP: THE ACTIVATION LAB EVALUATION TOOLKIT

This page will take you through the Activation Lab tools that you can use to evaluate your learning programs. We call this toolkit the "ActApp." Go through our four steps to design your study and access the tools:

- Step 1: Decide if the tools align with your evaluation questions
- Step 2: Explore our Tools
- Step 3: Using the Toolkit: a User's Guide
- Step 4: Use the Toolkit Now

Contact us at info@activationlab.org if you have questions throughout the process.

Need help? [Jump](#) to our FAQs.

What is the ActApp Toolkit?

The ActApp Toolkit has been designed to share tools from the Learning Activation Lab. The Activation Lab tools were designed to...
[Show more >](#)

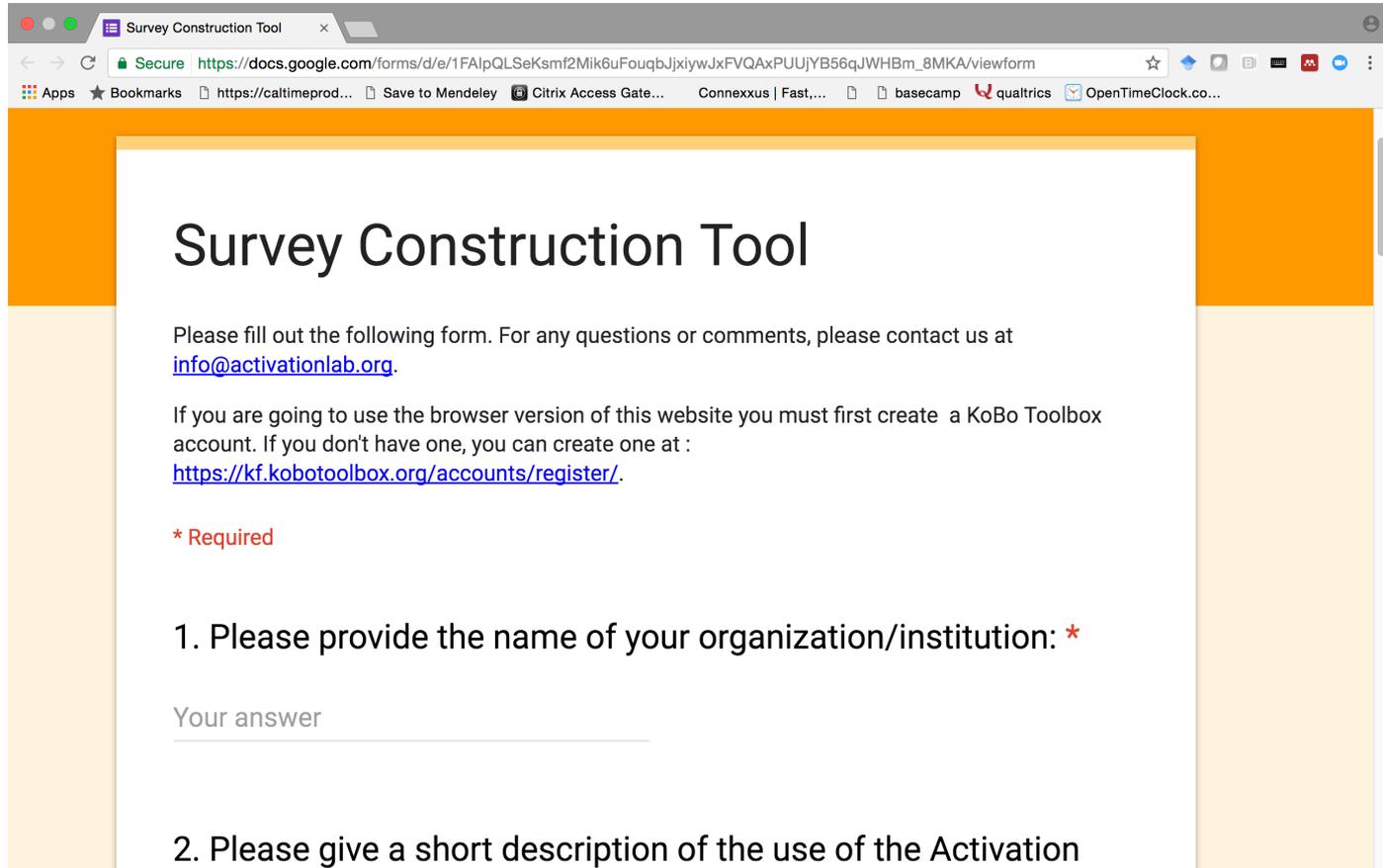
I can create my own tools. Why should I use the ActApp Toolkit?

As an evaluator, or as a program leader who understands evaluation, you know that it is very time-consuming and challenging to ...

Toolkit Structure

- Step 1:** Decide if the tools align with your evaluation questions
- Step 2:** Explore our tools
- Step 3:** Using the toolkit: A User's Guide
- Step 4:** Use toolkit now

Google Form



The image shows a browser window displaying a Google Form. The browser's address bar shows the URL: https://docs.google.com/forms/d/e/1FAIpQLSeKsmf2Mik6uFouqbjjxiywJxFVQAxPUUjYB56qJWHBm_8MKA/viewform. The form title is "Survey Construction Tool".

Please fill out the following form. For any questions or comments, please contact us at info@activationlab.org.

If you are going to use the browser version of this website you must first create a KoBo Toolbox account. If you don't have one, you can create one at : <https://kf.kobotoolbox.org/accounts/register/>.

*** Required**

1. Please provide the name of your organization/institution: *

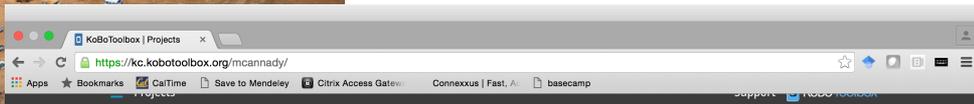
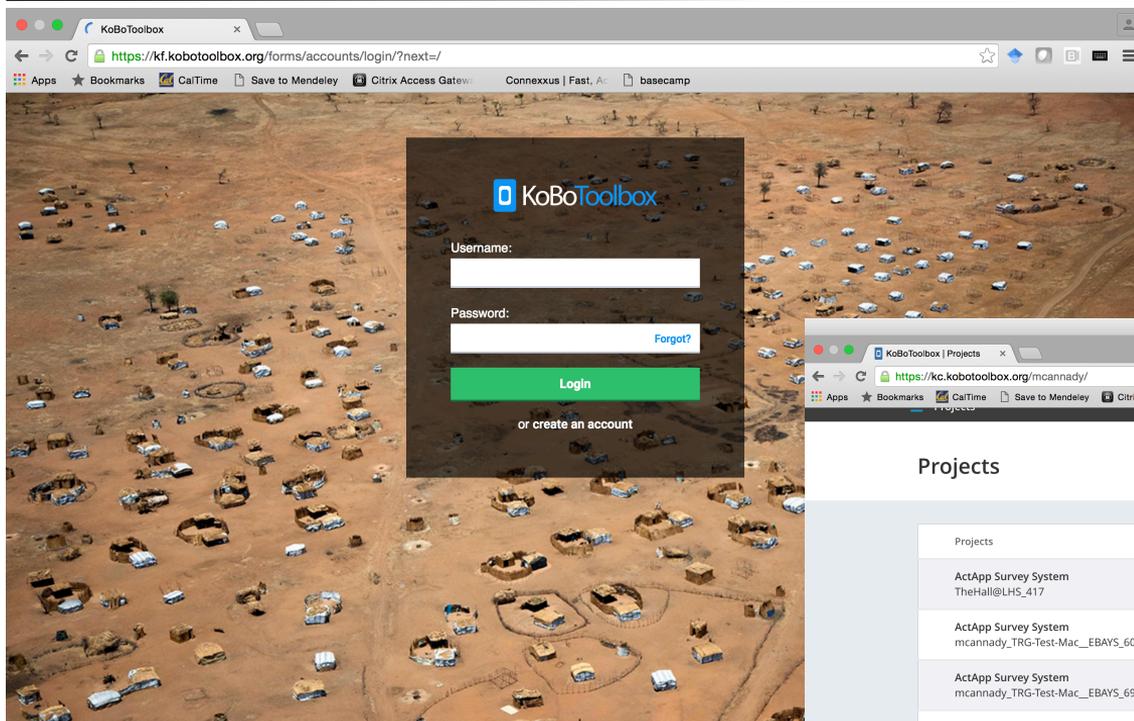
Your answer

2. Please give a short description of the use of the Activation

You've got email!

The screenshot shows a Gmail interface. At the top, the browser address bar displays a URL: <https://mail.google.com/mail/u/0/?ui=2&view=bt&ver=b8ppt0r8h4a3&q=kobotoolbox&qs=true&search=query&th=14f4cebdb574e3dc&qt=box.1.kobo.1.kobotoolbox.1.kobotoolboxes.1.t...>. Below the address bar, there are navigation buttons: 'move to inbox', a dropdown arrow, and 'more'. The email header shows the subject 'ActApp Confirmation' with a yellow envelope icon, and the location 'Inbox x'. On the right side of the header, there are icons for 'reply' and 'print'. The sender is identified as 'The Activation Lab <lucio.lopez@berkeley.edu>' with a date of '8/20/15' and a star icon. Below the sender information, it says 'to me' with a dropdown arrow. The main body of the email contains the following text: 'You have chosen to use the online survey option. Please keep this email for your records.' followed by a paragraph: 'Please use the following Survey URL to distribute the survey to survey-takers, <https://9quzq.enketo.kobotoolbox.org/webform> For survey scoring options, please view the technical reports available in the Activation Lab website. Please contact us at info@activationlab.org for information regarding scoring and evaluation services, or for general questions or comments.' The email concludes with '-The Activation Lab Team-'. The entire screenshot is framed by a light blue border on the left and right sides.

Kobo Toolbox

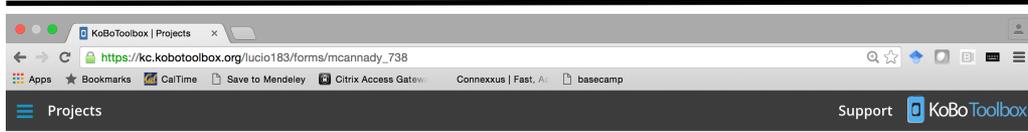


Projects

Projects	Active	Shared By	Date Created	Last Modified	Submissions
ActApp Survey System TheHall@LHS_417	✓	lucio183	Aug. 20, 2015	Aug. 20, 2015	3
ActApp Survey System mcannady_TRG-Test-Mac_EBAYS_605	✓	lucio183	Aug. 21, 2015	Aug. 21, 2015	1
ActApp Survey System mcannady_TRG-Test-Mac_EBAYS_694	✓	lucio183	Aug. 21, 2015	Jan. 06, 2016	2
ActApp Survey System mcannady_Theresearchgroupucberkeley_738	✓	lucio183	Aug. 20, 2015	Aug. 20, 2015	4

Advanced Users: [Upload your XLS form here directly](#)

Kobo Toolbox



ActApp Survey System

mcanndy_Theresearesearchgroupucberkeley_738

Submissions (4)

View data in table Analyze data Download data

Photos

View gallery Download all photos

Add Data

Enter data in browser How to collect data on mobile device?

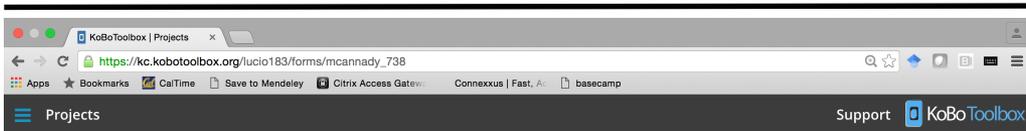
Form

mcannady_738  

Value	Frequency	Percentage
Every Day	2	50.0%

2. In general, when I work on science I

Kobo Toolbox



ActApp Survey System

mcannady_Theresearchgroupuberkeley_738

Submissions (4)

View data in table | Analyze data | Download data

Photos

View gallery | Download all photos

Add Data

Enter data in browser | How to collect data on mobile device?

Form

mcannady_738  

portsprogram_05102016

Data Review View

	E	F	M	N	O	P	Q
ination/F02	science_Fascination/F03	science_Fascination/F04	science_Values/V01	science_Values/V02	science_Values/V03	science_Values/V04	science_Vali
	Always	Interesting	This_year	Most_jobs	All_the_time	Never_2	A_few_Class
	Sometimes	Interesting	This_year	Most_jobs	Most_of_the_time	This_year	Most_of_my
	Sometimes	Interesting	Next_month	A_few_jobs	Most_of_the_time	This_year	A_few_Class
	Sometimes	Very_interesting	This_week	Most_jobs	Most_of_the_time	This_year	All_my_clas
	Sometimes	Interesting	This_week	Most_jobs	All_the_time	This_week	Most_of_my
	Sometimes	Interesting	This_week	Most_jobs	Sometimes	Next_month	Most_of_my
	Sometimes	Interesting	This_year	All_jobs	Sometimes	This_year	A_few_Class
	Sometimes	Interesting	This_year	Most_jobs	All_the_time	This_year	A_few_Class
	Sometimes	Interesting	This_year	A_few_jobs	Most_of_the_time	This_year	A_few_Class
	Sometimes	Interesting	This_year	Most_jobs	Sometimes	This_year	A_few_Class
	Sometimes	Interesting	This_year	Most_jobs	Sometimes	This_year	A_few_Class
	Sometimes	Boring	This_year	Most_jobs	Most_of_the_time	This_year	A_few_Class
	Always	Very_interesting	This_year	All_jobs	All_the_time	This_year	All_my_clas
	Always	Very_interesting	This_year	All_jobs	Most_of_the_time	This_year	A_few_Class
	Sometimes	Interesting	This_year	Most_jobs	All_the_time	This_year	Most_of_my
	Sometimes	Very_interesting	This_year	All_jobs	Most_of_the_time	This_week	Most_of_my
	Always	Very_interesting	This_week	All_jobs	All_the_time	This_week	All_my_clas
	Sometimes	Interesting	This_week	Most_jobs	Most_of_the_time	This_year	All_my_clas
19	Every_Day	Love_it	Sometimes	Interesting			
20	Every_Day	Love_it	Sometimes	Interesting			
21	Every_Day	Love_it	Always	Very_interesting	This_week	All_jobs	All_the_time
22	Once_a_week	Like_it	Sometimes	Very_interesting	This_week	A_few_jobs	All_the_time
23	Once_a_week	Don't_like_it	Sometimes	Interesting	This_year	Most_jobs	All_the_time
24	Every_Day	Like_it	Sometimes	Interesting	This_week	All_jobs	Most_of_the_time
25	Every_Day	Love_it	Always	Very_interesting	This_year	Most_jobs	All_the_time
26	Every_Day	Love_it	Always	Very_interesting	This_year	All_jobs	All_the_time
27	Once_a_month	Like_it	Sometimes	Interesting	This_week	Most_jobs	Most_of_the_time
28	Once_a_month	Like_it	Sometimes	Interesting	This_week	All_jobs	All_the_time
29	Once_a_month	Hate_it	Sometimes	Very_boring	This_week	Most_jobs	All_the_time
30	Every_Day	Like_it	Sometimes	Very_interesting	This_year	Most_jobs	Most_of_the_time
31	Every_Day	Like_it	Sometimes	Interesting	This_year	Most_jobs	Most_of_the_time
32	Every_Day	Like_it	Sometimes	Interesting	This_year	Most_jobs	Most_of_the_time

Ready | Count: 2508 | 130%

Users of Activation Tools

MakerEd	STEM Activation
FIRST Lego League	Emerging STEM Activation
Qualcomm: Qcamp & Thinkabit	STEM Activation
National Geographic BioBlitz	Science Fascination
Evalfest	Engagement
NYSci	STEM Activation
Residential Outdoor Science Education	Science Activation
Education Outside	Science Activation
Ports: Heal the Bay	Science Activation
Girl Scouts of America	Emerging STEM Activation

10,000+ respondents

Other Tools & Instruments

STELAR (<http://stelar.edc.org/resources>)

54 under youth motivation and interests in STEM

PEAR Institute

- The Common Instrument (CIS)
- Dimensions of Success (programmatic level)

Career Interest Questionnaire

- Tools for evaluating public participation in science research projects
- Other funding sources

Thanks!



Mac Cannady

mcannady@berkeley.edu

www.activationlab.org/toolkit

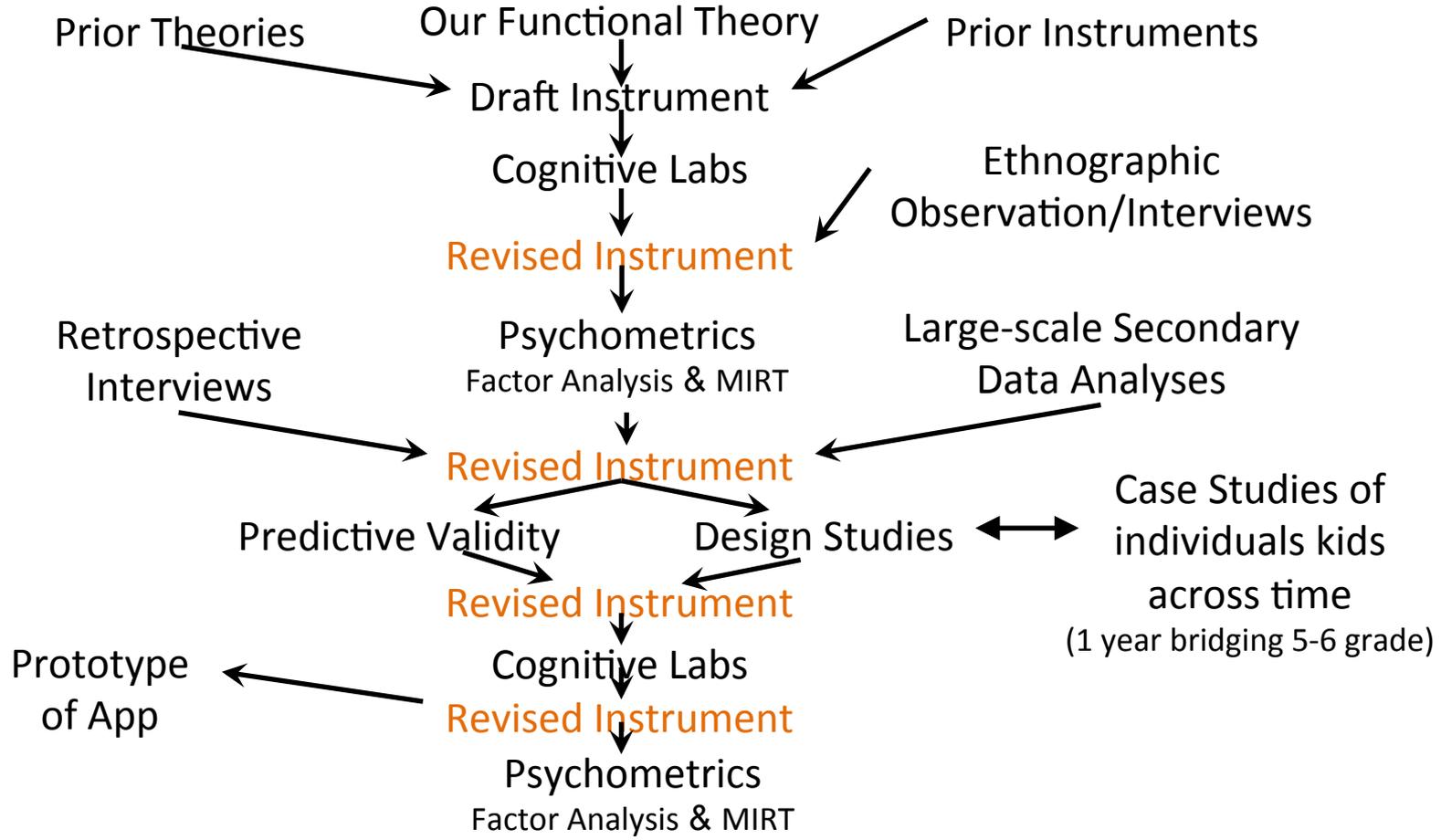
ebays



THE LAWRENCE
HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

 ARDUSAT

Development process 2.0



Challenges

The content problem:

- Science sensemaking is deep integration of content and practices of science
- But not interested in measuring content knowledge per se (unlike the NGSS)
- Students vary too much in prior content instruction

Effort problem

- Sensemaking requires effort: what is incentive for spending the effort?

Length problem

- Reasoning items significant learner time; long assessments are hard to use in research and a disaster in evaluation work

Longitudinal measurement problem

- Pre/post or longitudinal designs require new items; how made equivalent?

Our Strategy

Content problem

- Scenarios that leverage common rather than rare content knowledge (and scenarios embed/support access of content knowledge)

Effort problem

- Use charismatic megafauna: everybody likes dolphins (& monkeys, eagles, ...)

Length problem

- Sample subdimensions lightly (no need for reliable subscores)

Repeated testing problem

- Different scenarios pre/post or time 1, 2, 3, ...
- Equate difficulty of scenarios

Scenario opener

Grey Shanked Douc Monkeys are *critically endangered* and will be extinct in only a few years if something is not done to help them. We wonder whether the monkeys are affected by construction, trash, or different types of trees. We want to know which of these things is most harmful to the monkeys.

The amount of construction might matter, so we will study monkeys in two different forests with different amounts of construction.



Lots of construction



Little construction

Mechanism

A group of students are observing monkeys in a rainforest.

Diana and Elizabeth both think:

- Monkeys are affected most by the amount of construction.
- Many monkeys left the rainforest when there was construction.

Diana says: Monkeys cannot sleep when there is a lot of noise from the construction, so they leave.

Elizabeth says: Monkeys leave because there is construction, so when there is a lot of construction they leave.

Whose reasoning for why the monkeys leave the rainforest is more scientific?

0=Elizabeth because she repeats the important idea.

1=Diana because she explains how the construction causes a problem.

0=Elizabeth because she uses data collected from a study.

0=Diana because I would also leave if my environment was noisy.

Argument

David and Javier are talking about whether monkeys are affected by construction:

David says: It's not amount of trash because the rainforest is messy anyway. It's not the number of different types of trees because monkeys eat from all trees.

Javier says: I don't think monkeys like construction in the rainforest. I wouldn't want to live in a place with lots of construction.

Whose reasoning for why the monkeys leave the rainforest is more scientific?

0=Javier because he repeats the important ideas.

0=Javier because he explains how the trash causes a problem.

0=David because he uses data collected from a study.

1=David because he explains why it is not the other causes.

Questions, Evidence

Elijah wonders if the temperature outside makes a difference in how much monkeys play.

Which question is the best to ask to investigate this?

- A. Do monkeys play in hot weather?
- B. Which other animals live in the same part of the jungle as monkeys?
- C. Do monkeys like hot or warm weather?
- D. Do monkeys play more when the weather is hot or warm?

Maria is wondering which monkey eats the most. What is the best evidence she could get to answer her question?

- A. She could guess which monkey eats the most.
- B. She could choose a monkey and count the number of pieces of fruit he eats and compare it to the number of leaves he eats.
- C. She could ask her friends which monkey looks like it eats the most.
- D. She could count the number of things all of the monkeys eat.

Seth says that monkeys are full after they eat 7 pounds of food.

Monkey	Amount of food given	Amount of food eaten
Monkey #1	3 pounds	3 pounds
Monkey #2	5 pounds	5 pounds
Monkey #3	7 pounds	7 pounds
Monkey #4	9 pounds	7 pounds

Which piece of evidence in the table above makes Seth think this is true?

- A. Monkey #4 got 9 pounds of food which is the most.
- B. Monkey #1 got the least amount of food and ate it all.
- C. Monkey #4 got 9 pounds and only ate 7 pounds of food.
- D. Monkey #3 got 7 pounds and ate 7 pounds of food.

Choice Preferences

10 items, $\alpha=0.84$

Choice: Choosing to participate in the next opportunity for science learning

Choice preferences: Preferring science options from alternatives

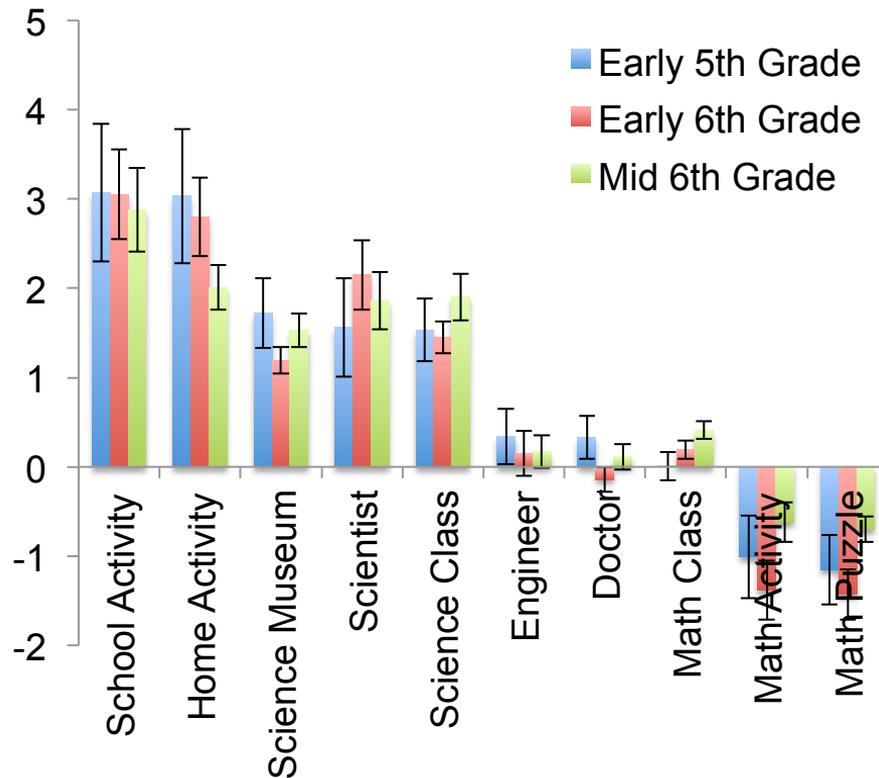
I would like to...

1. Formal

- Talk to a science teacher about good science books or websites.
- Do my homework or projects for science class with other students

2. Informal

- Watch TV programs about science topics.
- Attend a science camp next summer.
- Join a science club at school next year.



Engagement

8 items, $\alpha=0.85$

Engagement includes affective, behavioral, and cognitive components (e.g., excited about the materials, doing the science activities at hand, and thinking about science ideas).

1. Affective

- In general, I find science: (very interest, interesting, boring, very boring)

2. Behavioral

- In general, I find science: (very interest, interesting, boring, very boring)

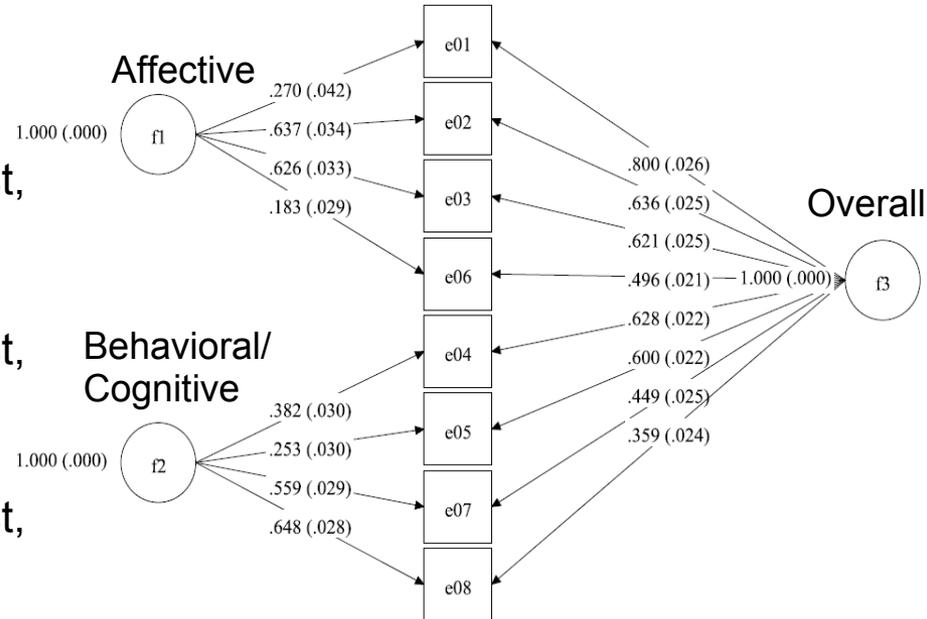
3. Cognitive

- In general, I find science: (very interest, interesting, boring, very boring)

Bi-Factor Model

Affective: $\alpha=0.84$

Behavioral/Cognitive: $\alpha=0.77$



Perceived Success

6 items, $\alpha=0.83$

Do students feel successful in completing science learning tasks in absolute and relative terms?

During this activity...

1. Absolute (Relative to Self)
 - It was easy for me.
 - I did a good job.
2. Comparison (Relative to Others)
 - I did better than the others.
 - I was more successful than everyone else.

Early psychometrics:

1. EFA: Separate from Engagement
2. Eng – PS only $r=.42$
3. Factor loadings all $> .64$
4. Forced two factor separates
Absolute vs. comparison

Some Results: Activation Lab, Enables Success Studies (ALES11, ALES14)

ALES11 Study

Context

- 10 schools implementing FOSS curriculum
- 38 6th grade classrooms
- broad range of classroom diversity (although all urban public)
- 4 months of instruction on weather & climate

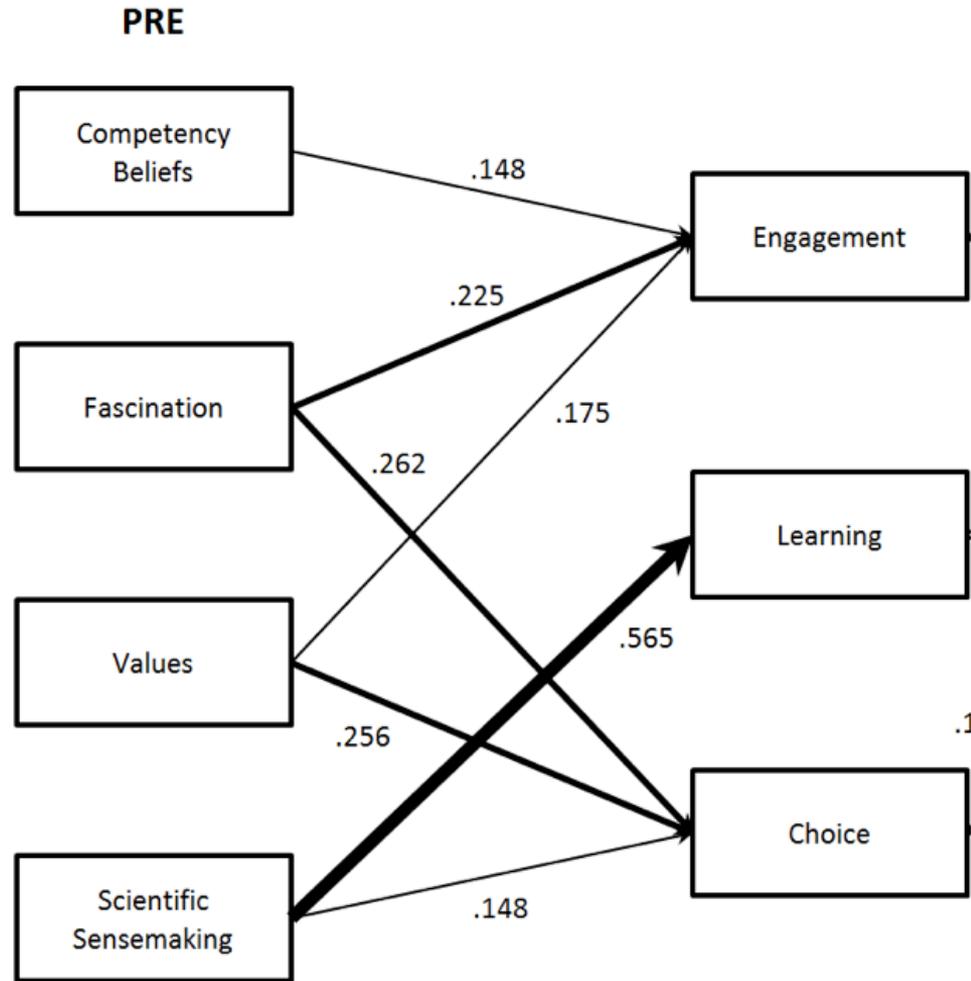
Measures

- pre-post content tests
- engagement measured during 4 activities
- choice preferences measured at beginning (and at end)

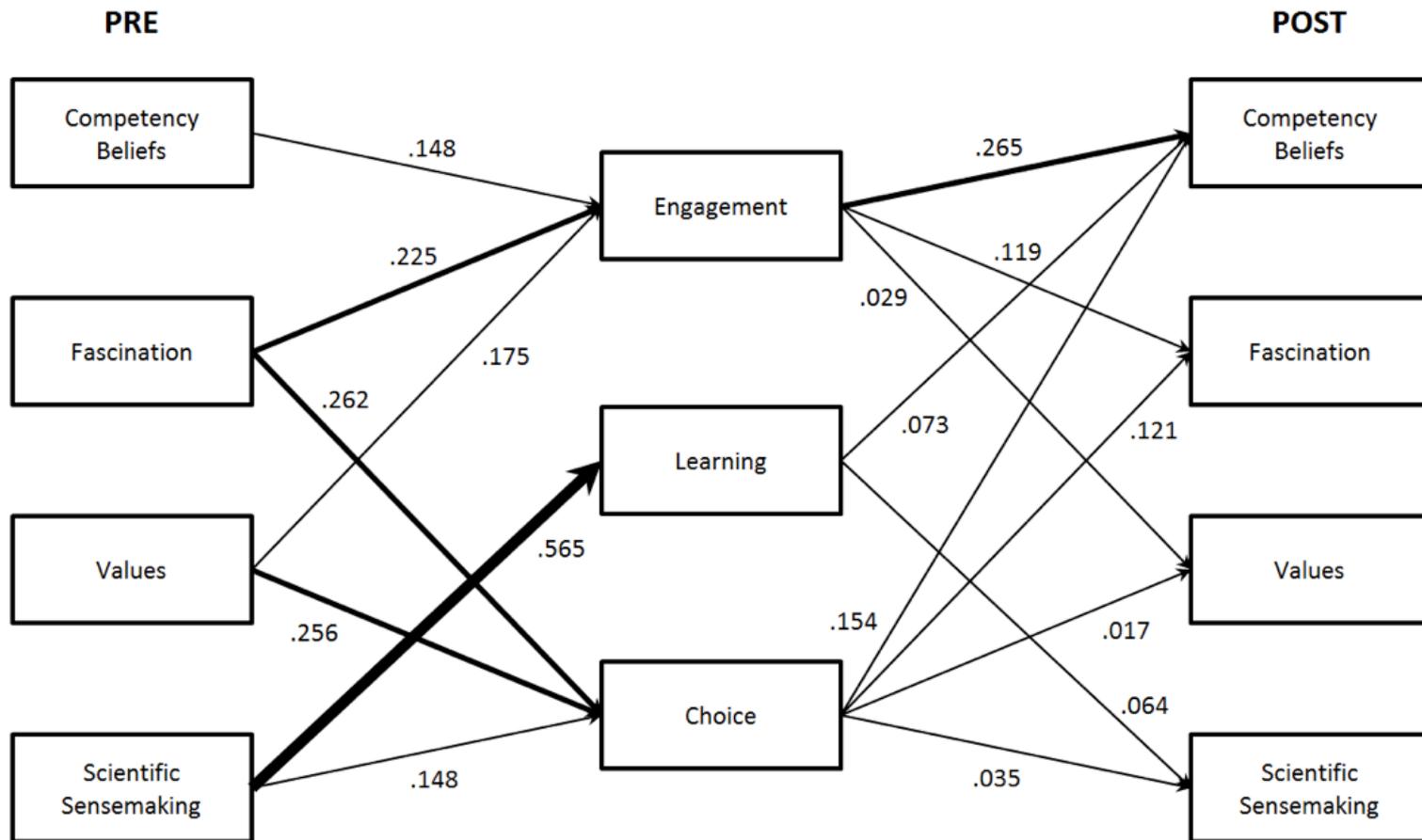
Predicting success

Predicting Learning without and with controlling for other factors

Pre Competency Beliefs	0.073 0.052
Pre Fascination	0.026 0.086
Pre Values	-0.011 -0.038
Pre Scientific Sensemaking	0.565*** 0.341***



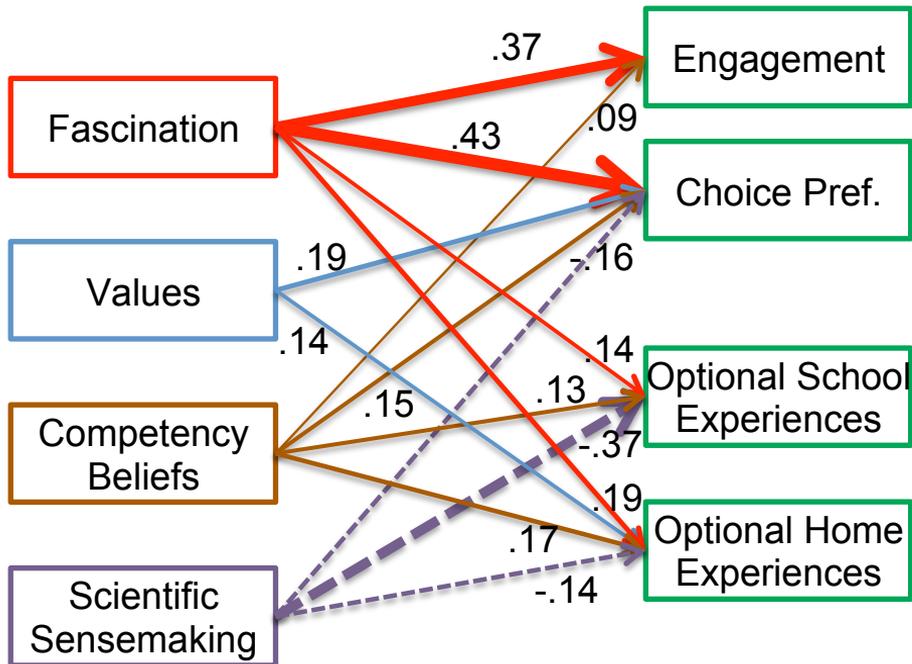
Change in Activation



Malleable Factors NSF grant (ALES14)

Data collection	6 th + 8 th grade 4 hands-on / 4 textbook schools			7 th + 9 th grade	
Fidelity / Activity Logs	4 times	4 times		4 times	
Activation	Begin	Mid	End	Begin	Mid
Family Background	Begin				
Prior/Recent Experiences	Begin	Mid		Begin	Mid
*Content knowledge	Pre	Post		Pre	Post
Engagement	4 times	4 times		4 times	
Choice Preferences	Begin		End	Begin	
State tests		8 th only			
Career Interest	Begin		End	Begin	
<i>Perceived success</i>	4 times	4 times		4 times	

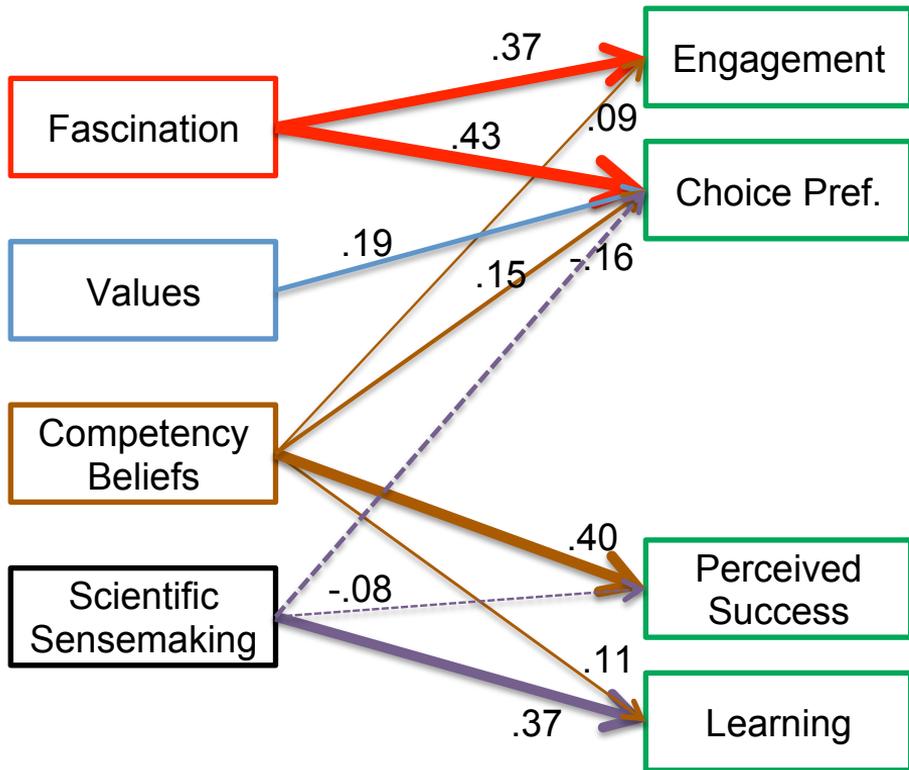
Activation Associated with Success



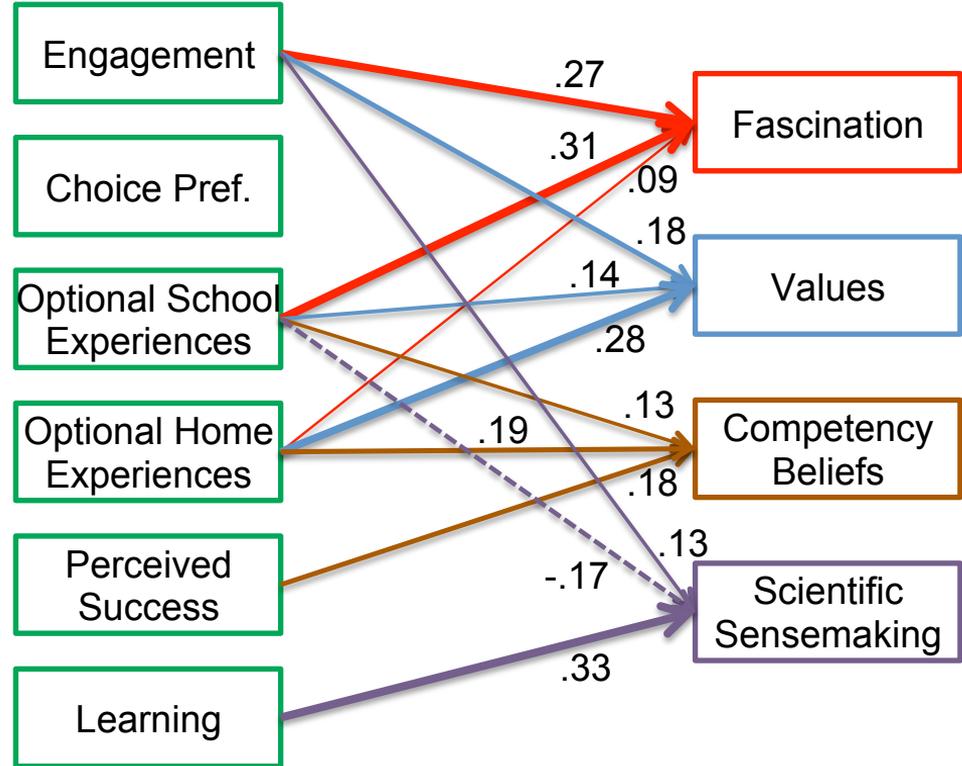
- Study group for science class
- Extra credit research project
- Part of science club

- Watch science TV
- Read science or scifi books
- Go to science websites
- Do science experiments at home

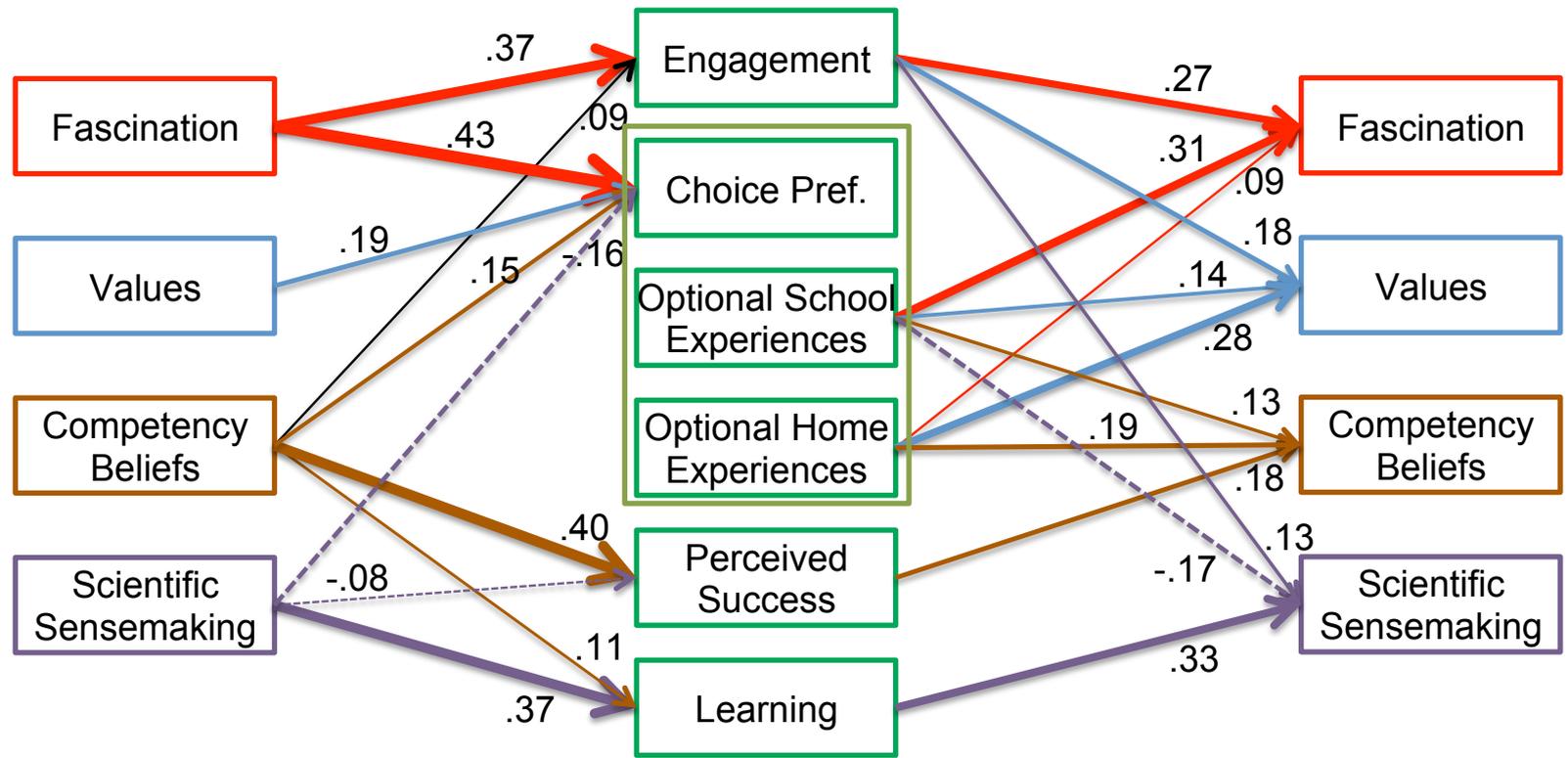
Activation Associated with Success



Success Associated with Activation Change



Interactive cycle



Other Users

Who has used these surveys?

- **MakerEd (STEM)**
- **First Lego League (Early Activation)**
- **Qualcomm's Qcamp (STEM)**
- **National Geographic BioBlitz (Fascination)**
- **EvalFest (Engagement)**
- **NYSci (STEM)**
- **UC Berkeley's girls engineering camp (STEM)**
- **TechHive (STEM)**
- **Education Outside (Science)**

~9,000 students

Current Project ActApp

PRIME NSF grant

The goal of this project is to transform the measures of science learning activation and related surveys and protocols that were previously developed for research purposes into evaluation instruments.

1. (other stuff)
2. Transpose the revised instruments to tablet platform and develop back-end algorithm to produce individualized scores.
3. Explore functioning of revised instrument in evaluation context.
4. Develop a toolkit that will help non-experts administer, analyze, disaggregate, and interpret results from the instrument.
5. Implement dissemination strategies.

Toolkit Structure

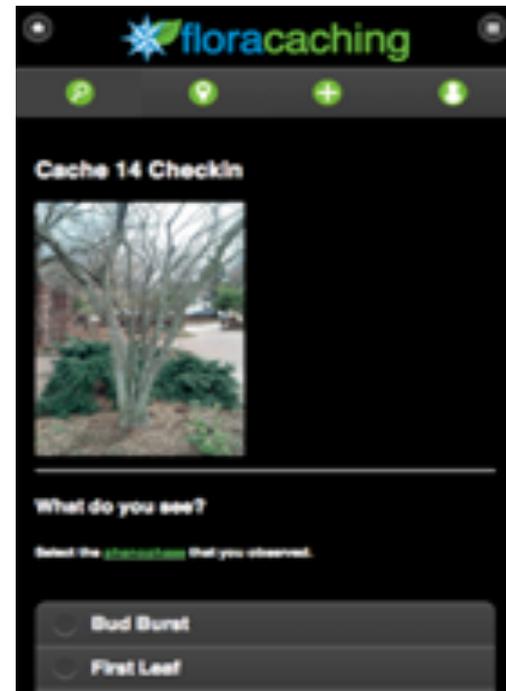
1. About the Tools
 - a. Instruments
 - b. Why you should use them
2. About Activation
 - a. Theory
 - b. Components
 - c. How dimensions align with commonly used terms (e.g., interest, efficacy)
3. Making sure this aligns with your program needs
 - a. Purpose/Research design
 - b. Context
 - c. Subjects/audience
 - d. Data collection methods
 - e. Resources available
4. Exploring instruments (based on categories above)
5. Scoring and scoring options
6. Analysis

ActApp

[ActApp Demo](#)

Alternative Measurement Approaches

Name of Project	Age Range of Participants	Domains of Learning	Key Technologies	Potential Activation Scales Relevant to Context
Alternate Reality Game	13-17	Astrobiology, Deep Time Sciences Scientific Inquiry Skills	Social Media Platforms Mobile Game Apps Story Platform	Fascination Sensemaking Competency Beliefs
ScienceKit and Science Everywhere	9-14	Scientific Inquiry Skills Technology (computer programming) Science Literacy (e.g., science fiction, science journalism, media, etc.)	Social Media App: ScienceKit	Fascination Sensemaking Competency Beliefs
BioTracker -- Floracaching	18 and Over	Plant Phenology Citizen Science in which participants contribute data to a national project	Gamified App: Floracaching	Fascination Values Competency Beliefs



Questions

- **Possible strategic areas of effort**
 1. How-to videos
 2. Use case success stories
 3. Improved usability of collection and reports
- **Sustainability plans**
 1. Pay service?
 2. Other funding sources
- **Dissemination strategies**
 1. Audience very specifically defined
 2. Where are they and how do you reach them
 3. Most effective ways to reach audience (webinar vs. live workshop)
- **What's next?**
 1. User studies (tools, toolkit)
 2. Evaluation of Activation in other domains (Art, STEAM) or other content (broad platform)