

# Welcome!

In the chat, please add your name,  
organization, role and what you hope to  
get out of this webinar

# Objectives for Today's Webinar

1. Audience members will become more familiar with program implementation concepts.
2. Audience members will understand the importance and benefits of systematically measuring program implementation.
3. Audience members will Increase awareness of implementation data sources and measurement approaches.

# Orientation to the Adobe Connect Platform

# Today's Webinar

- Webinar will last approximately 75 minutes and is being recorded.
- Recording will be available soon on the CADRE website.
- We will ask you to fill out a feedback survey following the webinar.

# Today's Webinar

- Listen-only mode.
- Use Q and A/Chat Pod to submit content and technical questions at any time.
- Q and A session at end of presentation.

# Today's Webinar

- To see this presentation most clearly, you may want to use the “Full Screen” button in the upper right of the presentation pod.
- In order to submit a question, you will need to click the “Full Screen” button again to resume normal view.

# Background on This Webinar Series

- Funded by the National Science Foundation.
- Will offer one webinar per quarter for a total of seven webinars in 2019 and 2020.
- Goal is to increase rigor of research methods within the DRK-12 program.
- Hosted by American Institutes for Research with a variety of internal and external experts.

# Meet the Presenter



## Chris Hulleman

Director and Associate  
Professor

Motivate Lab

University of Virginia

[chris.hulleman@virginia.edu](mailto:chris.hulleman@virginia.edu)





**Motivate Lab**

# **Webinar 2: Developing a Program Implementation Measurement Framework**

**Dr. Chris Hulleman  
10/10/2019**

# Agenda

1. Review of Webinar 1: What is fidelity?
2. How do you measure fidelity?
3. Alignment of logic models to measures.
4. Measuring core components.
5. Challenges of measuring implementation in practice.

*Review of Webinar 1*

# **WHAT IS FIDELITY?**

# What Is Intervention Fidelity?

The extent to which the program has been implemented as expected

(Dane & Schneider, 1998)

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Fidelity to what?

Fidelity to the Intervention model.

# Five-Step Model of Fidelity Assessment

1. Define the Intervention Logic Models.
2. Identify Fidelity Measures.
3. Conduct Psychometric Analyses of Fidelity Indices.
4. Conduct Within-Group and Between-Group Fidelity Analyses.
5. Link Fidelity to Outcomes.

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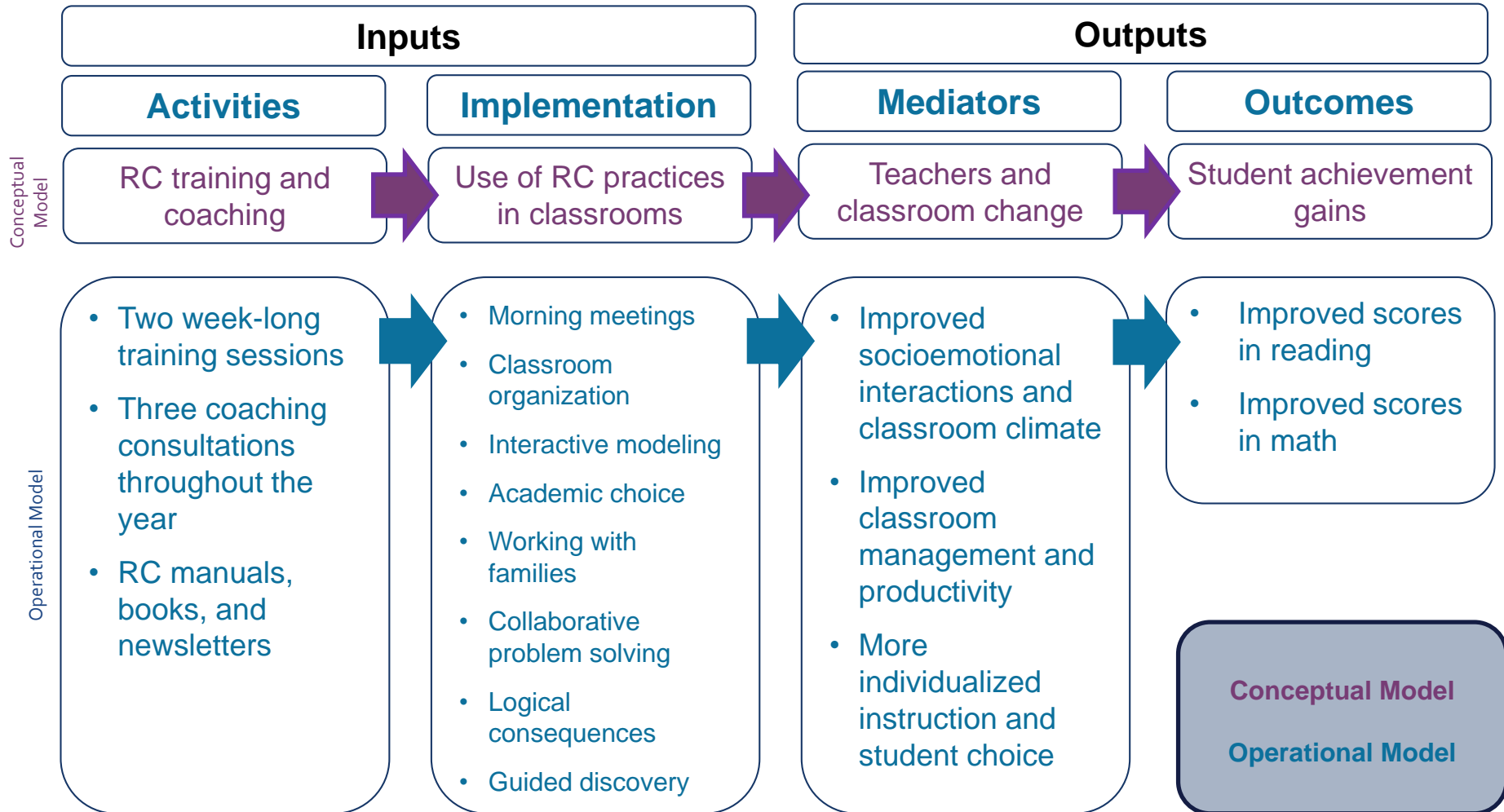
# Five-Step Model of Fidelity Assessment

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For more information on the Five-Step Model, see handout titled:  
***Five-Step Model of Fidelity Assessment***

# Step 1: Defining the Logic Model

## *The Responsive Classroom*



*Step 2:*

# **ALIGNMENT OF LOGIC MODELS TO MEASURES**

# Why Focus on Core Components?

- Core components help us focus on:
  - **Theoretical/conceptual model** of change and the **processes** of the intervention.
  - What's **desirable** versus acceptable?
  - **Fidelity** versus best practices (but not fidelity).

# Why Focus on Core Components?

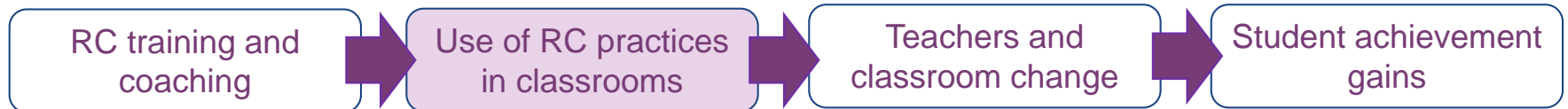
- Core components help us focus on:
  - **Theoretical/conceptual model** of change and the **processes** of the intervention.
  - What's **desirable** versus acceptable?
  - **Fidelity** versus best practices (but not fidelity).

## So that, at the end of the day, we can say:

- **WHO** was most successful at implementing.
- **WHAT** they did that made them more successful.
- **WHERE** (in which classrooms) they were most successful.
- **HOW** to generalize these effects across classrooms.

# Moving From Logic Model Components to Measurement

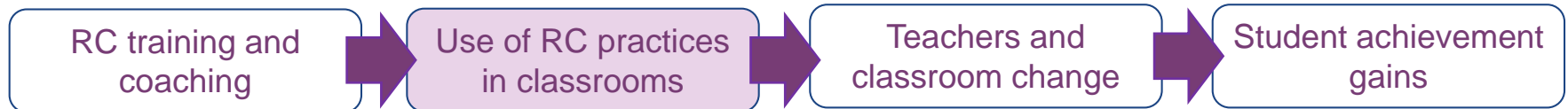
Conceptual Model



Component	Sub-components	Facets	# of indicators
RC Practices	Morning Meeting	General	5
		Greeting	3
		Sharing	4
		Group activity	6
		Morning message	7
	Classroom Organization	Arrangement	1
		Materials	2
		Displays	1
	Interactive Modeling	Teacher demonstration	2
		Student observations	2
		Student practice	3
	Academic Choice	Plan	4
		Work	4
Reflect		3	

# Moving From Logic Model Components to Measurement

Conceptual Model



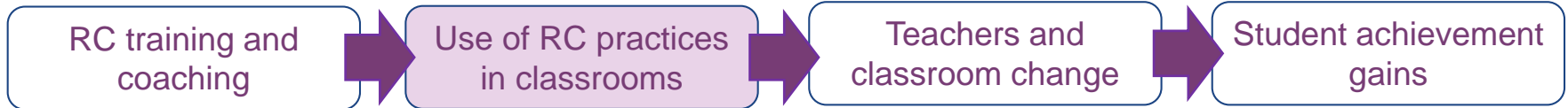
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Items focused on exposure and adherence

Classroom observations and teacher self-reports

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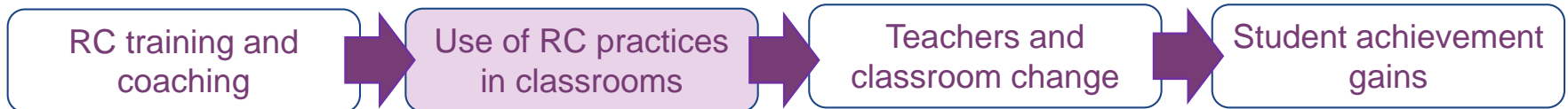
Classroom observations and teacher self-reports

**Morning Meeting** over-represented



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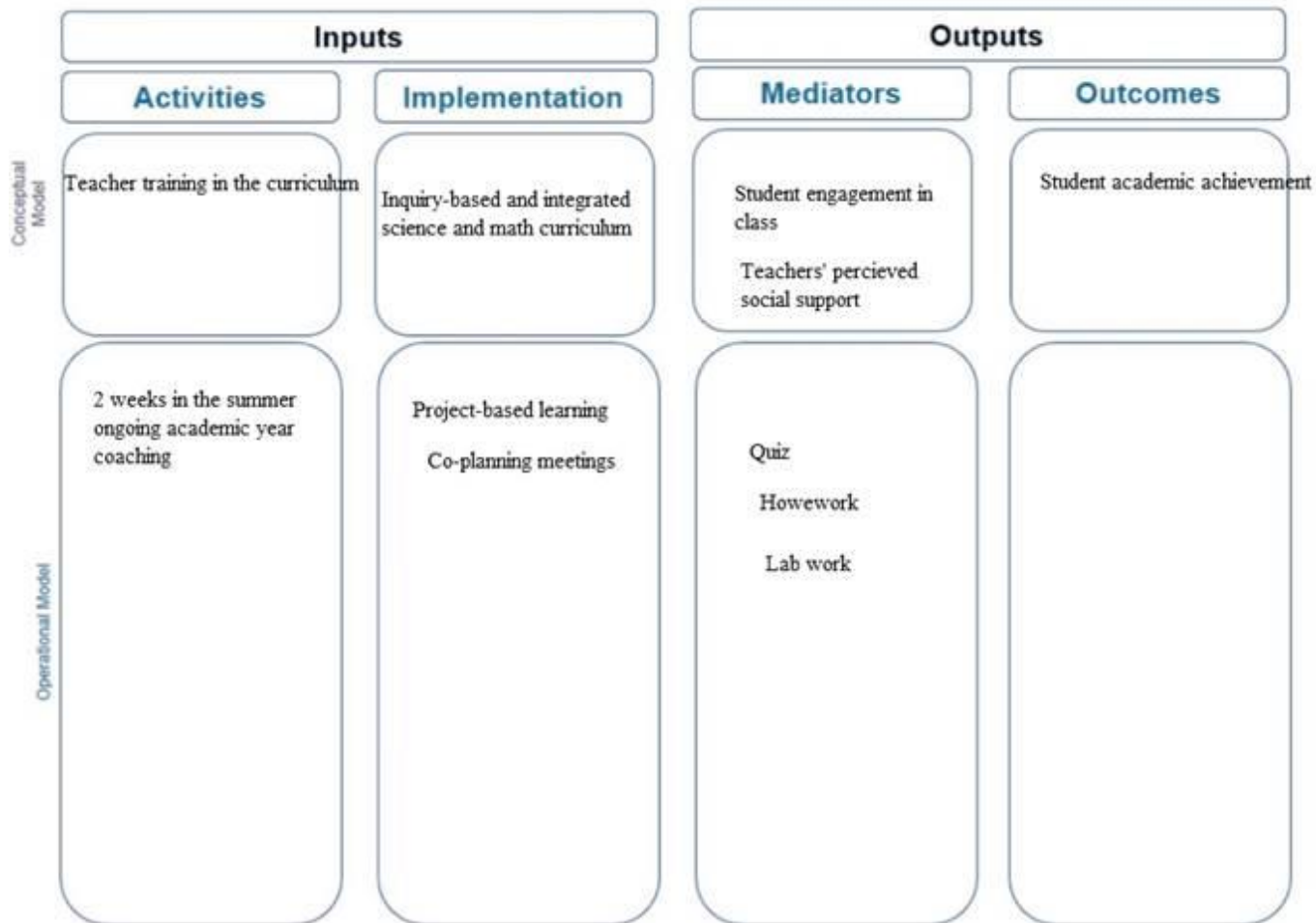
**Classroom Organization** under-represented

# Question and Answer Session

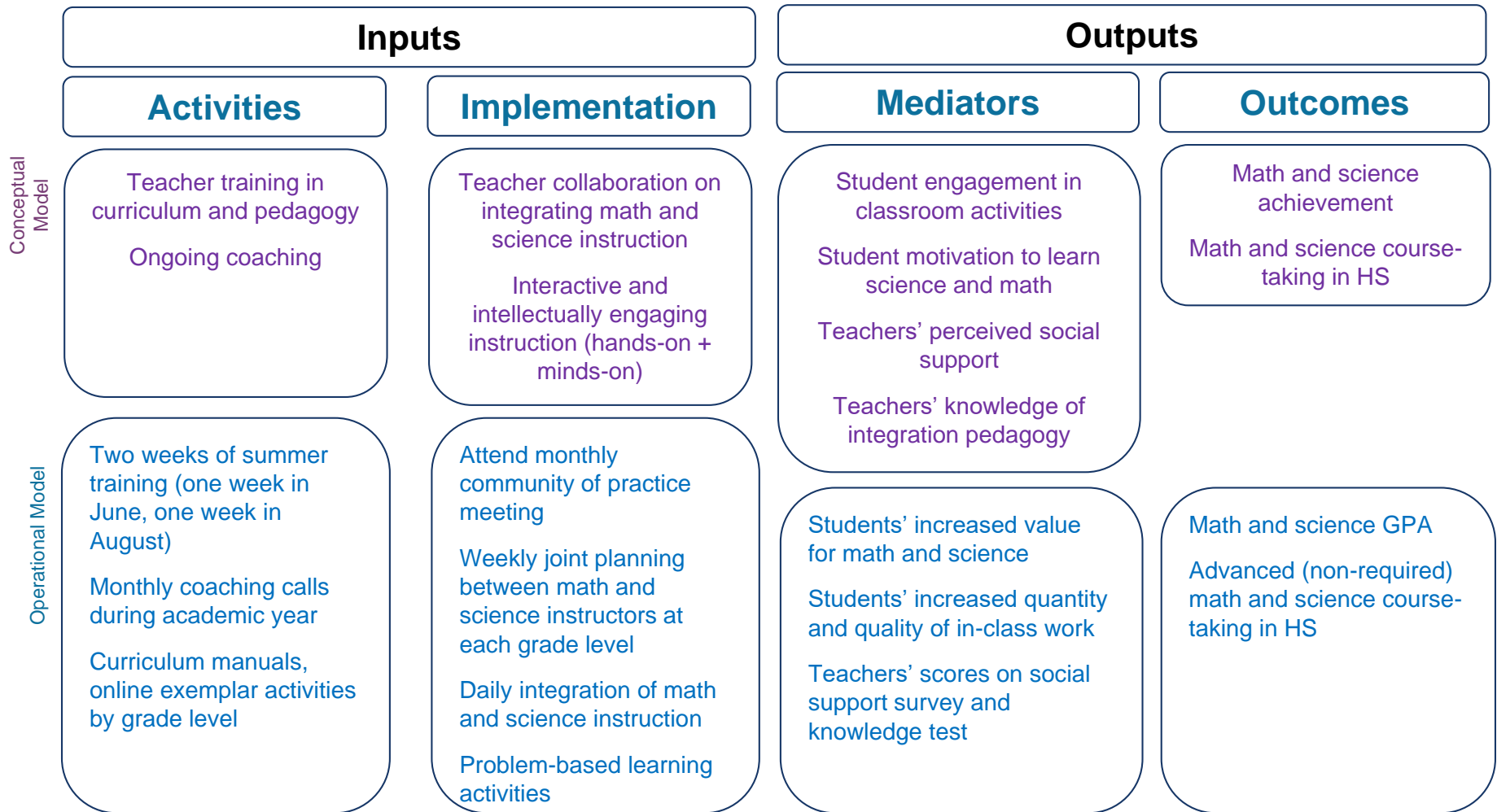
# Aligning Measures With Core Components

*The Motivation in STEM (M-STEM) program focuses on training teachers to implement an interactive, inquiry-based, and integrated science and math curriculum to enhance student motivation and learning in middle and high school STEM courses. The primary outcomes of the program include STEM GPA and advanced STEM course-taking in high school. Training includes two weeks in the summer plus ongoing coaching during the school year and emphasizes teacher collaboration in integrating science and math learning.*

# Aligning Measures With Core Components



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# Identifying Fidelity Measures by Explicating High- Versus Low-Quality Implementation

***Core Component:** How would an effective, enthusiastic M-STEM teacher collaborate with other teachers to integrate math and science instruction?*

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Sub-component	Exemplary	Average	Untrained
Planning meetings with grade-level math and science teachers			
Community of practice meetings			
Coaching calls			

# Identifying Fidelity Measures by Explicating High- Versus Low-Quality Implementation

**Core Component:** *How would an effective, enthusiastic M-STEM teacher collaborate with other teachers to integrate math and science instruction?*

Sub-component	Exemplary	Average	Untrained
Planning meetings with grade-level math and science teachers	Weekly		
Community of practice meetings	Monthly		
Coaching calls	Monthly, use of video		



# Identifying Fidelity Measures by Explicating High- Versus Low-Quality Implementation

**Core Component:** *How would an effective, enthusiastic M-STEM teacher collaborate with other teachers to integrate math and science instruction?*

Sub-component	Exemplary	Average	Untrained
Planning meetings with grade-level math and science teachers	Weekly	Monthly	
Community of practice meetings	Monthly	Monthly	
Coaching calls	Monthly, use of video	Monthly, no video	

# Identifying Fidelity Measures by Explicating High- Versus Low-Quality Implementation

**Core Component:** *How would an effective, enthusiastic M-STEM teacher collaborate with other teachers to integrate math and science instruction?*

Sub-component	Exemplary	Average	Untrained
Planning meetings with grade-level math and science teachers	Weekly	Monthly	None or yearly
Community of practice meetings	Monthly	Monthly	None
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# MEASURING CORE COMPONENTS

# Identify Fidelity Measures

The conceptual and operational logic models allow the researcher to plan a thorough fidelity assessment of each component.

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**Fidelity indices** should be identified for each core component:

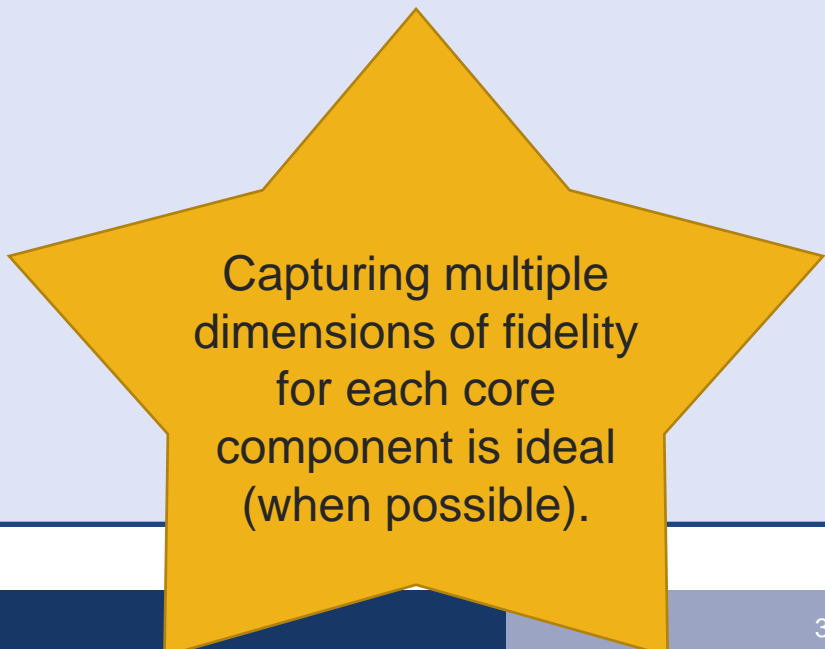
- Observations
- Logs
- Interviews
- Surveys

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The conceptual and operational logic models allow the researcher to plan a thorough fidelity assessment of each component.

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- Logs
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- Surveys



Capturing multiple dimensions of fidelity for each core component is ideal (when possible).

# Dimensions of Intervention Fidelity

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Quantity

Quality

# Activity

# Identifying Fidelity Measures by Explicating High- Versus Low-Quality Implementation

**Core Component:** *How would an effective, enthusiastic M-STEM teacher collaborate with other teachers to integrate math and science instruction?*

Sub-component	Exposure	Adherence	Quality	Responsive-ness
Planning meetings with grade-level math and science teachers				
Community of practice meetings				
Coaching calls				

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# The ABCs of Item and Scale Construction

## A

**Aim** for one-to-one correspondence of indicators to component of interest

## B

**Balance** items across components

## C

**Coverage** and quality are more important than the quantity of items

# Balance Items Across Components

How many items are needed for each scale?

Literacy Content	#items	$\alpha$
Oral language	20	0.95
Language, comprehension, and response to text	7	0.70
Book and print awareness	2	0.80
Phonemic awareness	3	0.68
Letter and word recognition	7	0.76
Writing	6	0.67
Literacy Processes:		
Thematic studies	4	0.62
Structured literacy circles	2	0.62

# Balance Items Across Components

How many items are needed for each scale?

- Trade-off between balance and reliability
- Reliability influenced by number of items
- Reliability cut-off?
  - $\alpha < 0.70-0.80$ ?

Literacy Content	#items	$\alpha$
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# Balance Items Across Components

Two scales each have two items, but very different levels of reliability

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# Balance Items Across Components

How many items are needed for each scale?

**Oral Language**—Randomly selected items and recalculated alpha:

- 10 items:  $\alpha = 0.92$
- 8 items:  $\alpha = 0.90$
- 6 items:  $\alpha = 0.88$
- 5 items:  $\alpha = 0.82$
- 4 items:  $\alpha = 0.73$

Literacy Content	#items	$\alpha$
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# Poll

# Examples of Fidelity Measures

- Self-report surveys
- Interviews
- Student/administrator logs
- Observations
- Examination of permanent products



# Dimensions of Intervention Fidelity

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Quantity

Quality

# Measure Fidelity in Both Treatment and Control Conditions

- Focus on core components.
- Also consider best practices that may influence the hypothesized processes and outcomes.
- Enables creation of treatment-control contrast (Hulleman & Cordray, 2009).

# Question and Answer Session

# **CHALLENGES OF MEASURING IMPLEMENTATION IN PRACTICE**

# Meet the Discussant



**Sara  
Rimm-Kaufman**

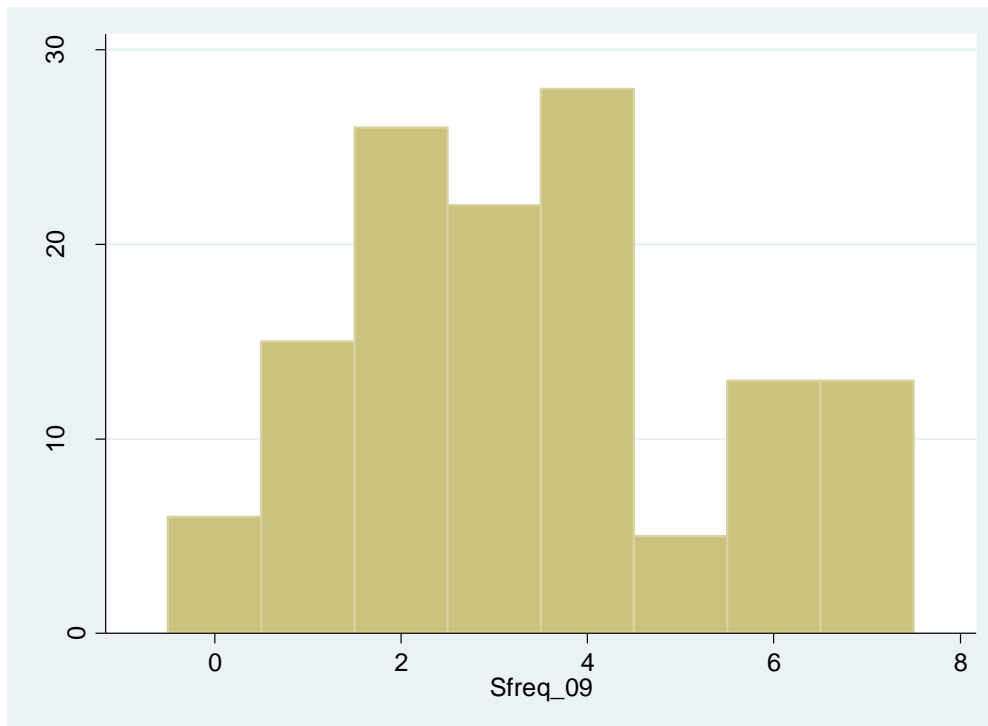
University of Virginia

[serk@virginia.edu](mailto:serk@virginia.edu)

# Step 5: Binary Complier Index

## Academic Choice (three items)

I provide opportunities for students to choose how to do work, what kind of work to do, or both.



0 almost never

1 1x/month

2 2–4x/month

3 1x/week

4 2–3 times/week

5 4x/week

6 1x/day

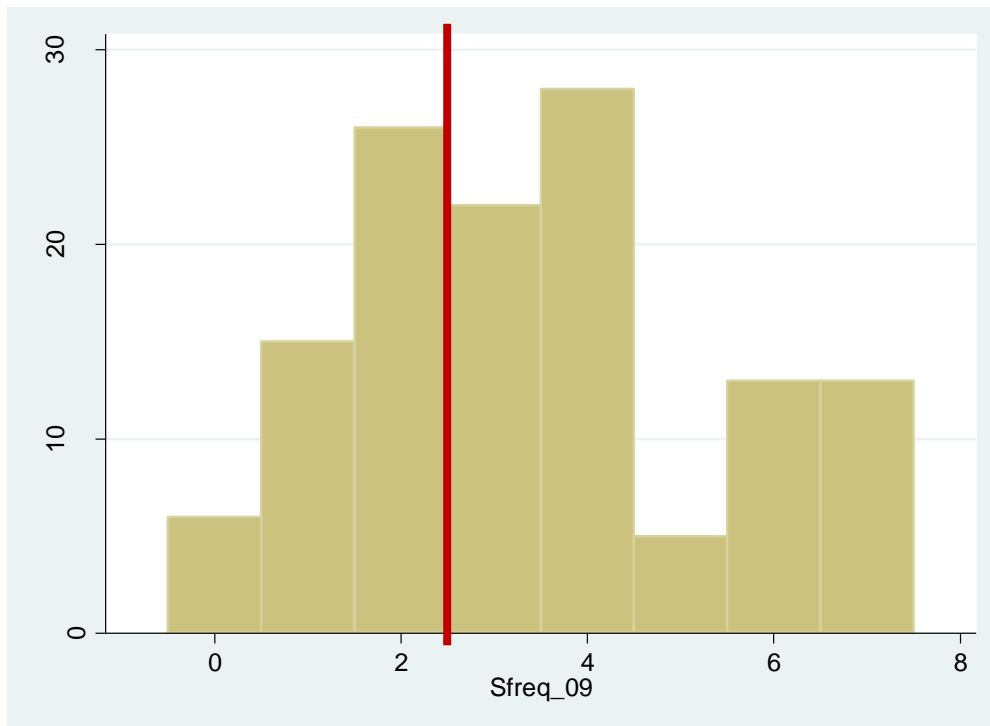
7 more than 1x/day

# Step 5: Binary Complier Index

## Academic Choice (three items)

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**Teacher must be at 3 or above on all three items to be a Complier.**



0 almost never

1 1x/month

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5 4x/week

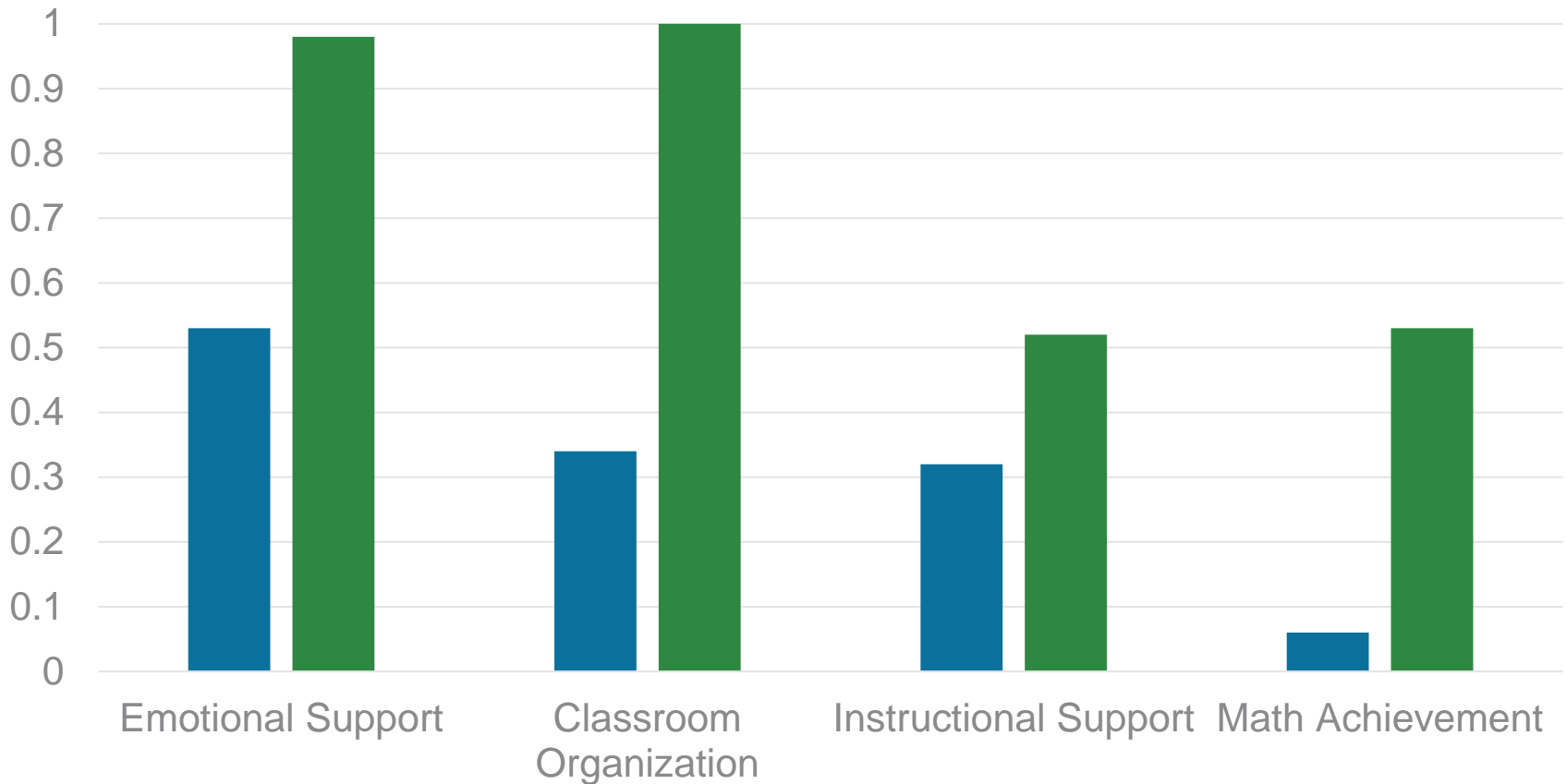
6 1x/day

7 more than 1x/day

# Step 5: Binary Complier Index

Compliers Versus Noncompliers (within the Intervention group)

■ Morning Meeting   ■ Academic Choice





# Question and Answer Session

# Closing

Resources available

Next steps

# Resources

- Three Fidelity of Implementation Frameworks
- Fidelity Resources and References
- Five-Step Model of Fidelity Assessment
- Logic Model Activity

**Thank you for joining us!**

Chris Hulleman  
chris.hulleman@virginia.edu

# The Relevance Intervention

## Utility Value

1. Select a topic that is currently being covered in class.
2. Write a one-paragraph essay that applies the topic to your life or to the life of someone you know.

## Control

1. Select a topic that is currently being covered in class.
2. Write a one-paragraph summary of what you are learning.

# Step 1: Specifying Logic Models

Logic models are graphic displays that describe planned action and expected results.

(Knowlton & Phillips, 2009)

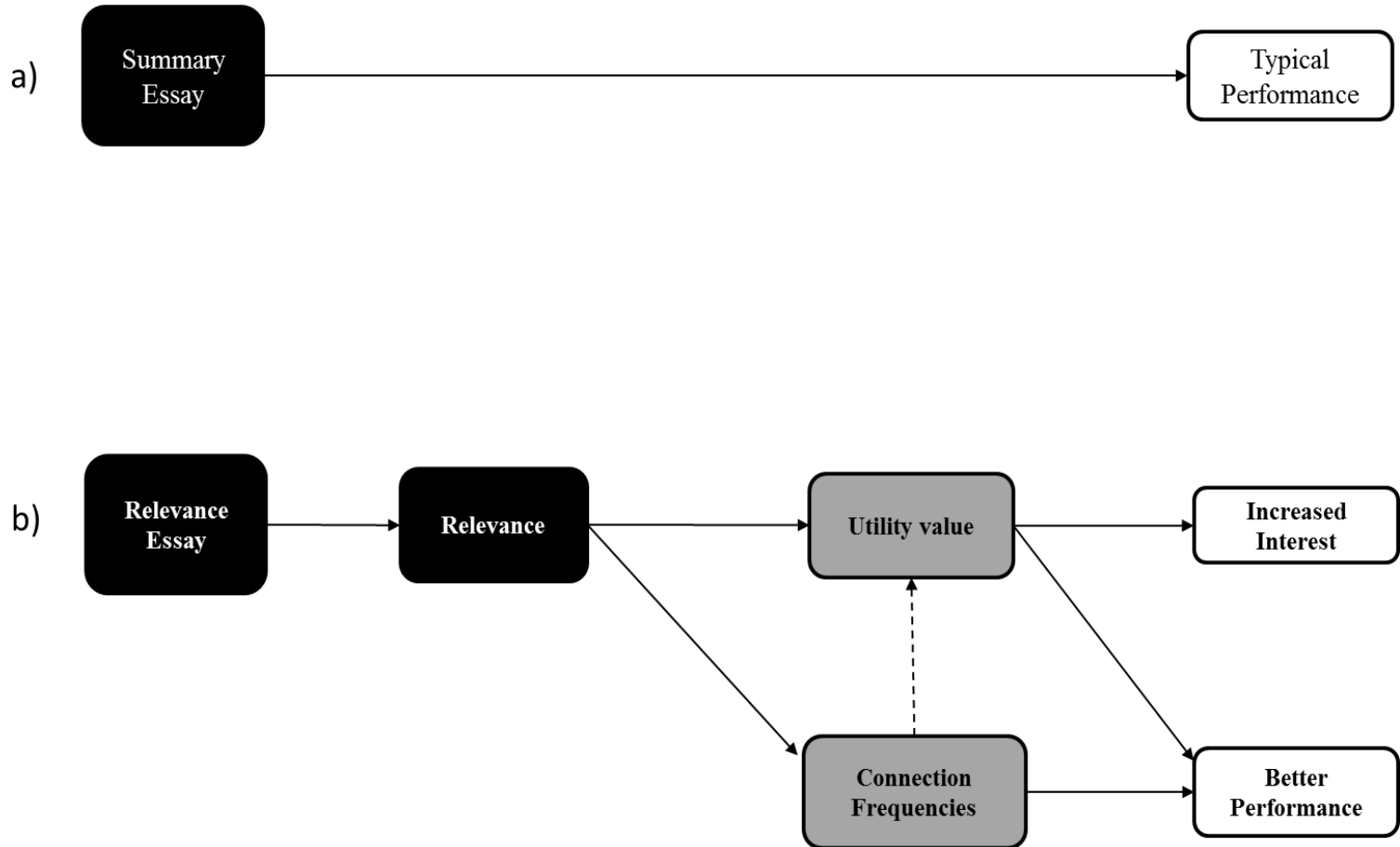
## Conceptual Logic Models

- General representation of how you believe change will occur.
- Outlines major constructs.

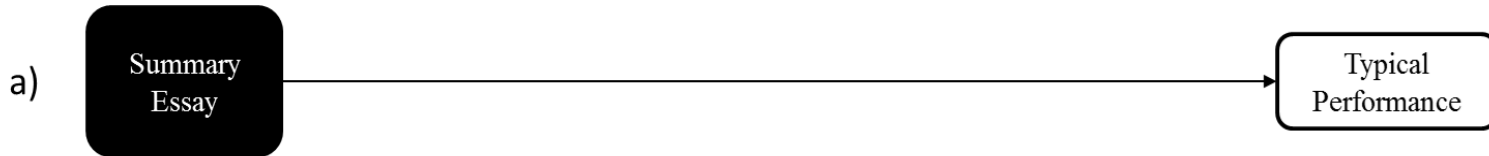
## Operational Logic Models

- Specific representation of change.
- Details resources, planned activities, their outputs, and intended outcomes over time.

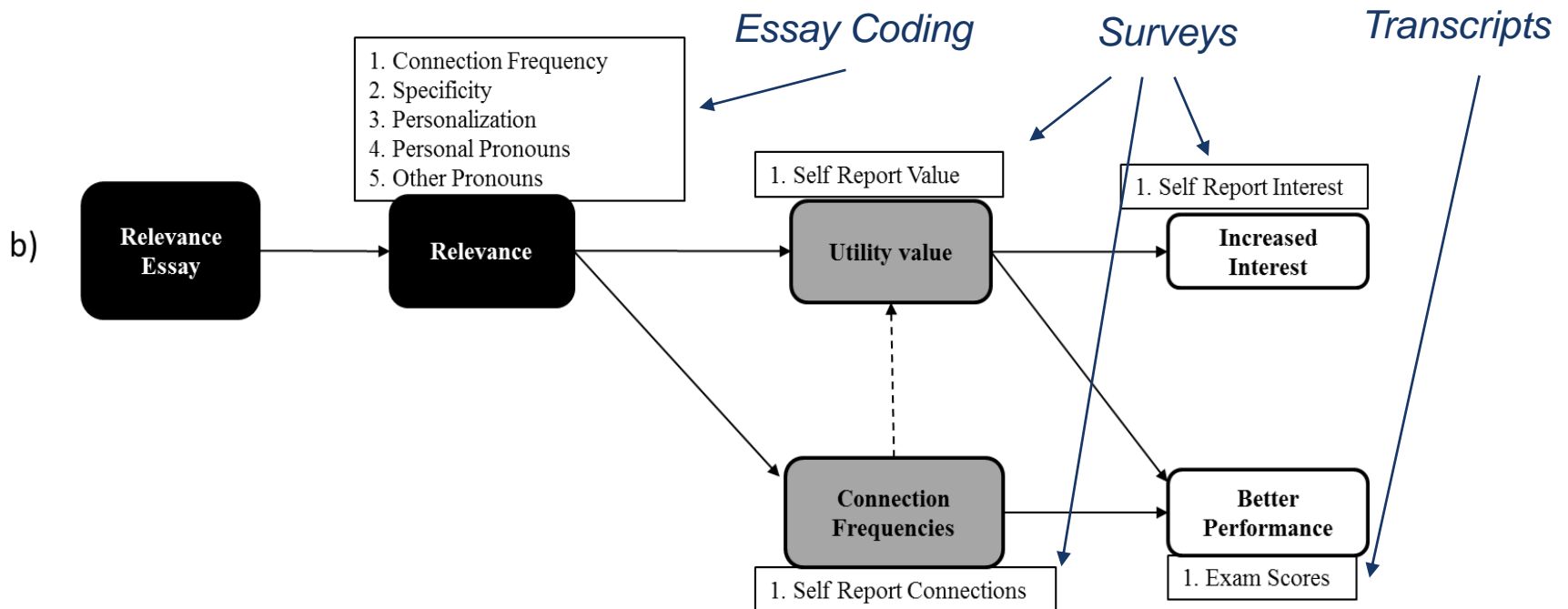
# Step 1: The Relevance Intervention Logic Models



# Step 1: The Relevance Intervention Logic Models



## Step 2: Identify Fidelity Measures





# Step 3: Conduct Psychometric Analyses

## Reliability

If we measured the same level of fidelity multiple times, would we get the same index scores?

- Are observers consistent with each other? Over time?
- Is enhanced with multiple methods of measurement.

## Validity

The extent to which the fidelity index reflects actual fidelity.

- Reliability is necessary, but not sufficient, for validity.
- Is our measure representative of reality?

# Step 4: Within- and Between-Group Fidelity Analyses

## Within-group analyses

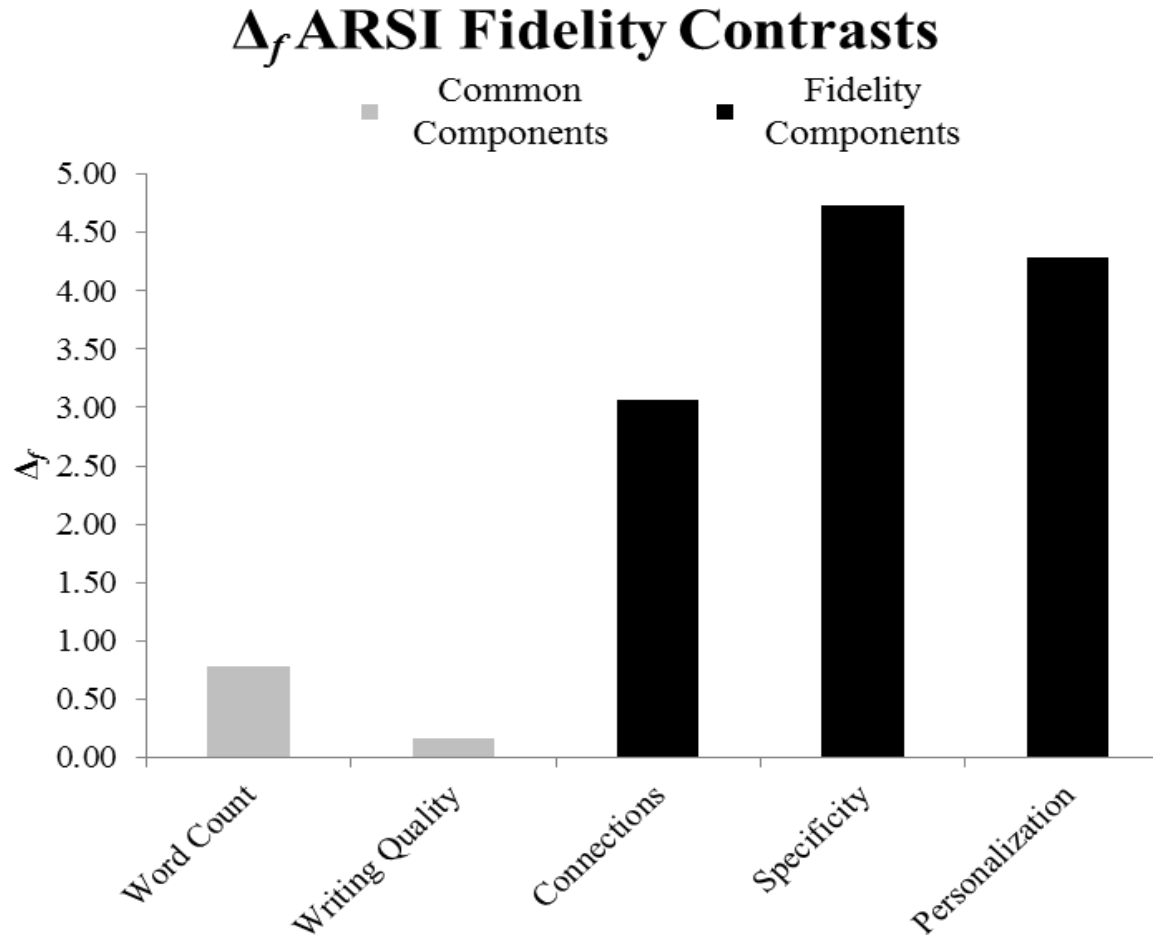
Within the Tx group, relationships between fidelity measures, mediating variables, and outcomes can provide richer information about an intervention than impact analyses.

## Between-group analyses

- Measure fidelity in both Tx and C conditions.
- Can calculate **achieved relative strength (ARS;** Hulleman & Cordray, 2009).

$$ARS\ Index = \frac{t^{Tx} - t^C}{S_T}$$

# Step 4: Between-Group Analyses



# Step 5: Link Fidelity to Outcomes

