LEARNING MINDSETS IN PRACTICE

David Dockterman, Ed.D., HGSE, @dockterman

THE PLAN – 4 EXERCISES

➤ Feedback for persistent learning

➤ Evidence Centered Design

➤ Mapping learning behaviors

➤ Nudging desire behavior

FEEDBACK FOR TENACIOUS LEARNING

Low Effort

High Success

High Effort

High Success

Low Effort

Low Success

High Effort

Low Success

INSPIRED BY ANESTHESIOLOGISTS

American Society of Anesthesiologists®

Simulation Education Network Summit

EVENTS

ANESTHESIOLOGY® annual meeting

Anesthesia Quality Meeting(AQM)

Certificate in Business Administration

Executive Physician Leadership Program

INSIGHTS + INNOVATIONS

SIMULATION EDUCATION NETWORK SUMMIT 2018
APRIL 20–21 | SCHAUMBURG, IL

Keynote Speaker - David Dockterman, Ed.D.

David Dockterman is a Lecturer on Education at the Harvard Graduate School of Education focusing on the translation of research into innovative and effective practice. His courses on evidence-driven innovation and adaptive learning draw students from around the world. In 1982, while getting his doctorate at Harvard, Dr. Dockterman helped found Tom Snyder Productions, an early pioneer in educational technology. At Tom Snyder, Scholastic, and HMH, he designed dozens of award-winning, research-based educational software programs. In addition, Dr. Dockterman works with school districts and other learning organizations to infuse the underlying research from behavioral psychology and cognitive science to foster productive struggle and growth mindset among students, teachers, and institutional leaders. In all his work, he helps educators recognize multiple dimensions of learner variability and create learning environments that can respond flexibly to a range of learner needs and goals. He is a Fellow of the International Society for Design and Development in Education, an Editorial Board Member for the journal *Science of Learning*, a Senior Fellow for the International Center for Leadership in Education, and a judge for the Global Learning XPRIZE.

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CASE #1

> • The resident preps and drapes a patient for central line insertion. Ultrasound is used to visualize the right internal jugular vein and the carotid artery. Using an 18 gauge needle, bright red blood is aspirated.

CASE #2

- A 600-lb patient is scheduled for cystoscopy with laser lithotripsy of a ureteral stone. The attending anesthesiologist suggests a GA , ETT, and ramping the patient prior to induction. The resident replies, "In my practice, I don't need to ramp my patients."

SCENARIO TABLE TALK

You notice these two students who have not submitted the most recent assignment.

➤ What would you do?

➤ What information would guide you to act differently and how?

Student Na...	Sec...	DELIVERABLE ... Out of 0	DELIVERABLE 2... Out of 0	DELIVERABLE... Out of 0	DELIVERABL... Out of 0	DELIVERABLE, b... Out of 0
Student		📄	📄	📄	📄	✓
Student		-	✓	-	📄	-
Student		📄	✓	✓	📄	✓
Student		-	📄	✓	📄	✓
Student		📄	📄	-	✓	✓
Student		📄	📄	✓	📄	✓
Student		📄	📄	✓	📄	-
Student		🖉	-	✓	-	✓

You notice members of a student project team working independently rather than collaboratively.

➤ What would you do at that moment?

➤ What information would guide you to act differently and how?

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SCENARIO TABLE TALK

You (or your assistants) notice a student making an error during a lab/problem set/ data analysis/coding task.

➤ What would you do at this point?

➤ What information would guide you to act differently and how?

Describe a scenario relevant to you. Consider knowledge & skill issues, ability to regulate learning, and affect.

➤ Take a few minutes to discuss with those around you.
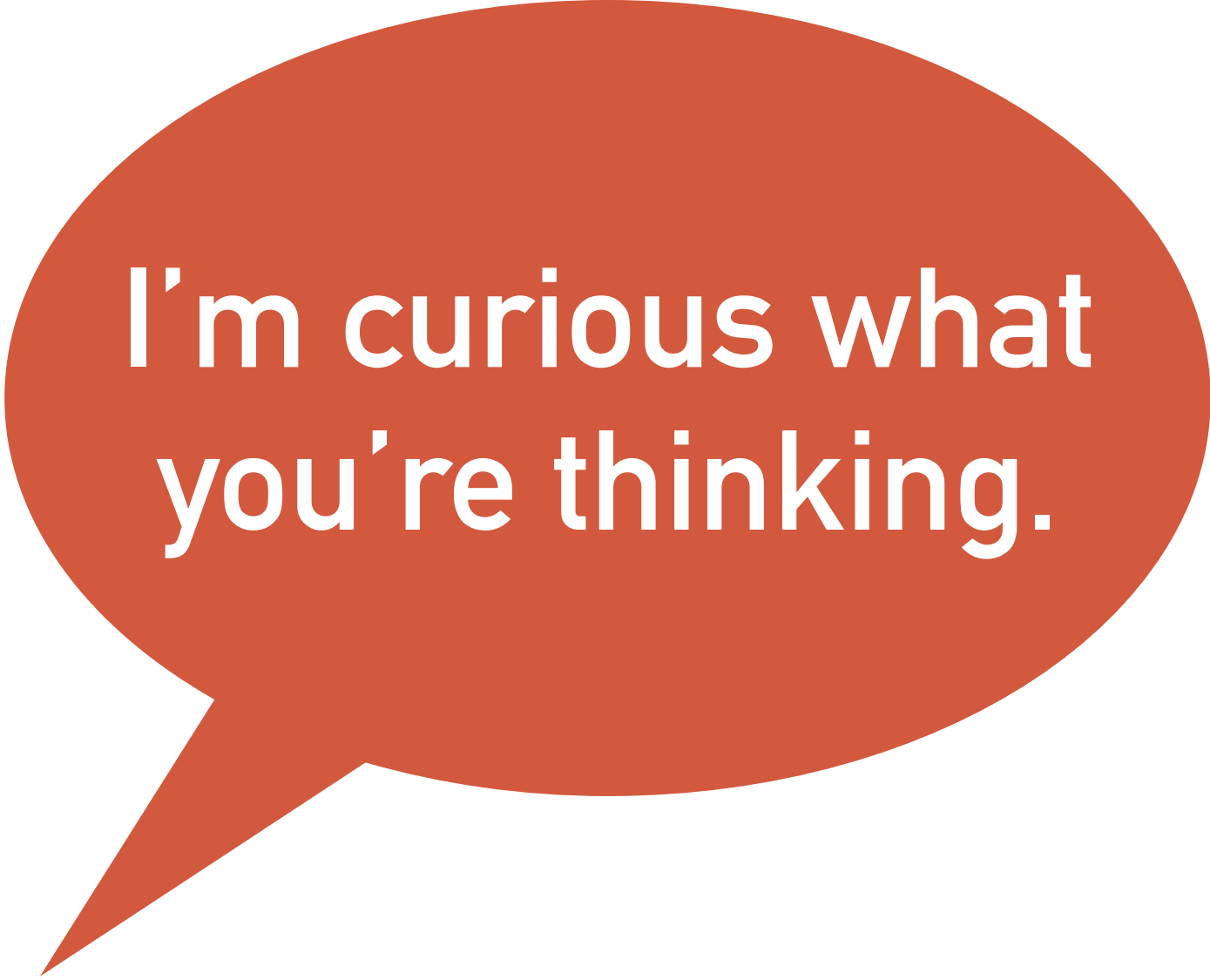
➤ Be prepared to share.

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CONSIDER LANGUAGE

➤ Framing a task

Let's start with something easy.

This might take a few tries.

That's not how I would do it.

CONSIDER LANGUAGE

➤ Framing a task

➤ During a task

I'm curious what you're thinking.

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CONSIDER LANGUAGE

➤ Framing a task

➤ During a task

➤ After a task

You are brilliant!

Good use of resources. What can you learn from it?

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HOW DO YOU KNOW WHO NEEDS WHAT...WHEN...HOW?

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WHO GETS A HUG? WHO GETS A KICK IN THE PANTS?

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EDUCATION, INITIATIVES, AND INFORMATION RESOURCES

One Size Does Not Fit All: Aptitude *x* Treatment Interaction (ATI) as a Conceptual Framework for Complementary and Alternative Medicine Outcome Research. Part 1—What Is ATI Research?

OPHER CASPI, M.D., Ph.D., and IRIS R. BELL, M.D., Ph.D.

ABSTRACT

When multiple treatment choices are available, the question is not just "which treatment is the best?" but more importantly "best or better for whom, when, and why?" Aptitude (or attribute) by treatment interaction (ATI) is a research paradigm that attempts to examine exactly that—how outcome depends on the match or mismatch between patients' specific characteristics and the treatment they receive. The purpose of this two-part paper is to introduce ATI methods as a conceptual framework into complementary and alternative medicine/integrative medicine (CAM/IM) outcome research. Part 1 presents key concepts in ATI research. Part 2 will present ATI research designs and discusses their applications to the examination of the relationships between individuals and therapies, and the illumination of the mechanisms that make therapies differentially effective. Based on this examination, we conclude that ATI research offers invaluable insights into the multifaceted package of care typically delivered in contemporary medicine and therefore should be included in the portfolio of all CAM/IM outcome research.

INTRODUCTION

Increasingly, medical treatments are administered as part of multifaceted packages of care that contain a variety of therapeutic components. However, such an approach to patient care may inadvertently present some unique challenges. First, from the patients' cognitive standpoint, research suggests that medical care that involves multiple alternative therapeutic options may result in paradoxical paralysis (Redelmeier and Shafir, 1995). Second, from a practical standpoint, it is unclear whether complex packages of care, compared to more limited approaches, result in better outcomes (National Center for Complementary and Alternative Medicine, 2000). Last, from a health policy standpoint, it is questionable whether this multifaceted approach to patient care is effective, efficient, and economically justifiable at a time of "growing complexity of health care, which today is char-

acterized by more to know, more to do, more to manage, more to watch, and more people involved than ever before" (Institute of Medicine, 2001).

However, offering complex multifaceted packages of care is challenging in at least one other way. It results in more difficulty in making causal inferences regarding the relationship between intervention(s) and outcome(s). This is because, depending on the situation, it is possible that some components of the package of care may augment each other, others may be redundant of each other, and still others may cancel out each other's effects (Shoam and Rohrbaugh, 1995). Add to this the fact that human beings are uniquely complex and the result is a difficult puzzle to solve. Therefore, outcome research that fails to account for this complexity systematically may inadvertently reach a misleading conclusion. For example, null findings from comparative outcome studies may obscure systematic individual differ-

Program in Integrative Medicine, University of Arizona, Tucson, AZ.

LEARNERS VARY IN

WHAT they know and can do

- General knowledge and vocabulary
- Domain knowledge
- Procedural skills
- Technical and research skills
- Domain analysis

HOW they manage their learning

- Attention
- Empathy
- Focus
- Challenge-seeking
- Help-seeking
- Productive Perseverance
- Strategic learning

WHY they engage in learning

- I believe it's worth doing.
- I believe I can learn what I need.
- I believe my group supports me.

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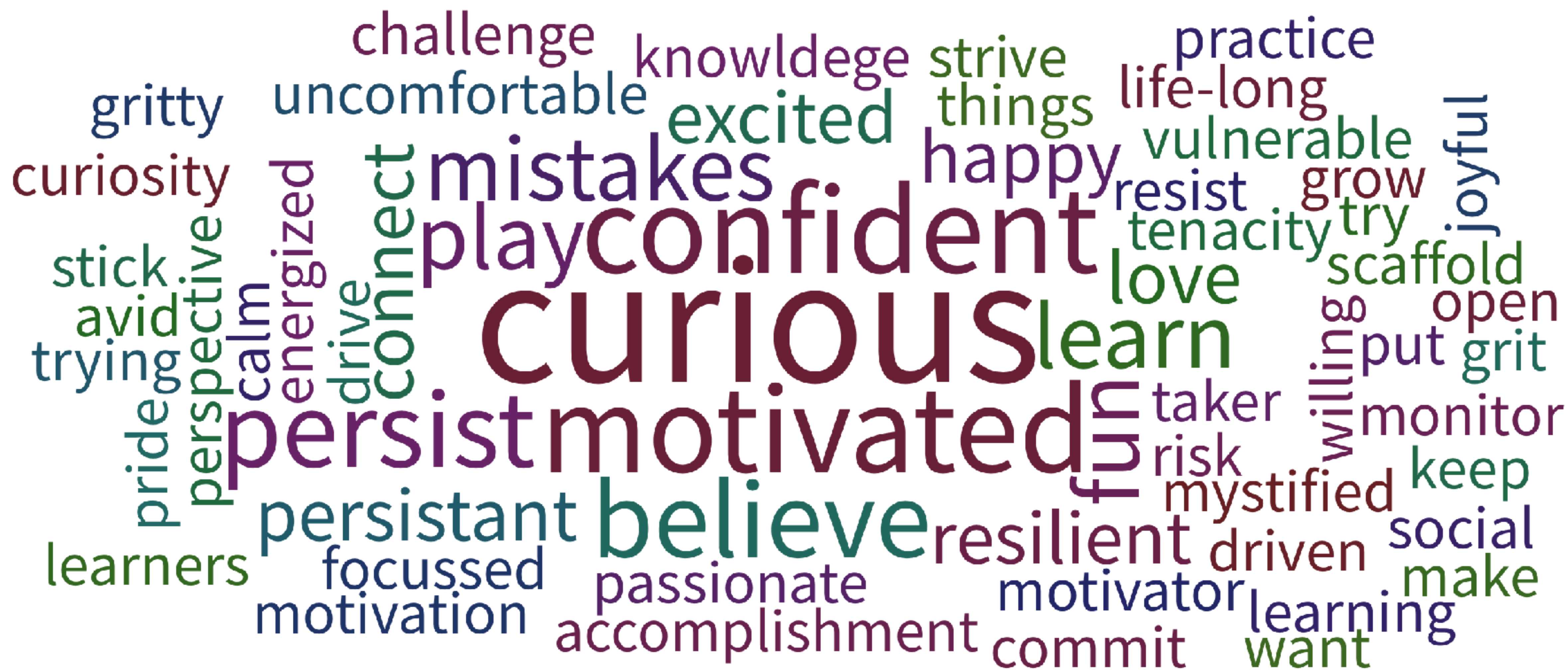
DOMAIN KNOWLEDGE & SKILLS

Defined and mapped

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THE OTHER STUFF

Can't identify needs you can't see

YOUR TRAITS OF TENACIOUS LEARNERS

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WHO DOESN'T WANT CURIOSITY?

Is Curiosity as Good at Predicting Children's Reading, Math Success as Self-Control? Study Says Yes

By **Sarah D. Sparks** on May 1, 2018 3:06 PM

https://www.nature.com/articles/s41390-018-0039-3

Ever since the landmark **"marshmallow test"** highlighted the importance of early self-control in later achievement, educators have worked to find ways to build self-regulation among young children. But a new study in the journal Pediatric Research suggests **boosting children's natural curiosity may be equally crucial to their long-term learning**.

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BUT WHAT IS IT?

Supplemental Table S1: Loading Coefficients and Confirmatory Factor Analysis of Curiosity and Effortful Control factors

Factor	Cronbach's Alpha	Questionnaire items included	Loading coefficient for each item
Curiosity	$\alpha = 0.73$	Likes to try new things	0.66
(5 variables)		Shows eagerness to learn new things	0.61
		Shows imagination in work and play	0.61
		Easily adjusts to a new situation	0.55
		Appropriately uses a variety of words to describe feelings	0.51
Effortful Control	$\alpha = 0.67$	Pays attention well	0.71
(2 variables)		Keeps working until finished with whatever he is asked to do	0.71

ELABORATE SOME CONSTRUCTS WITH PADLET
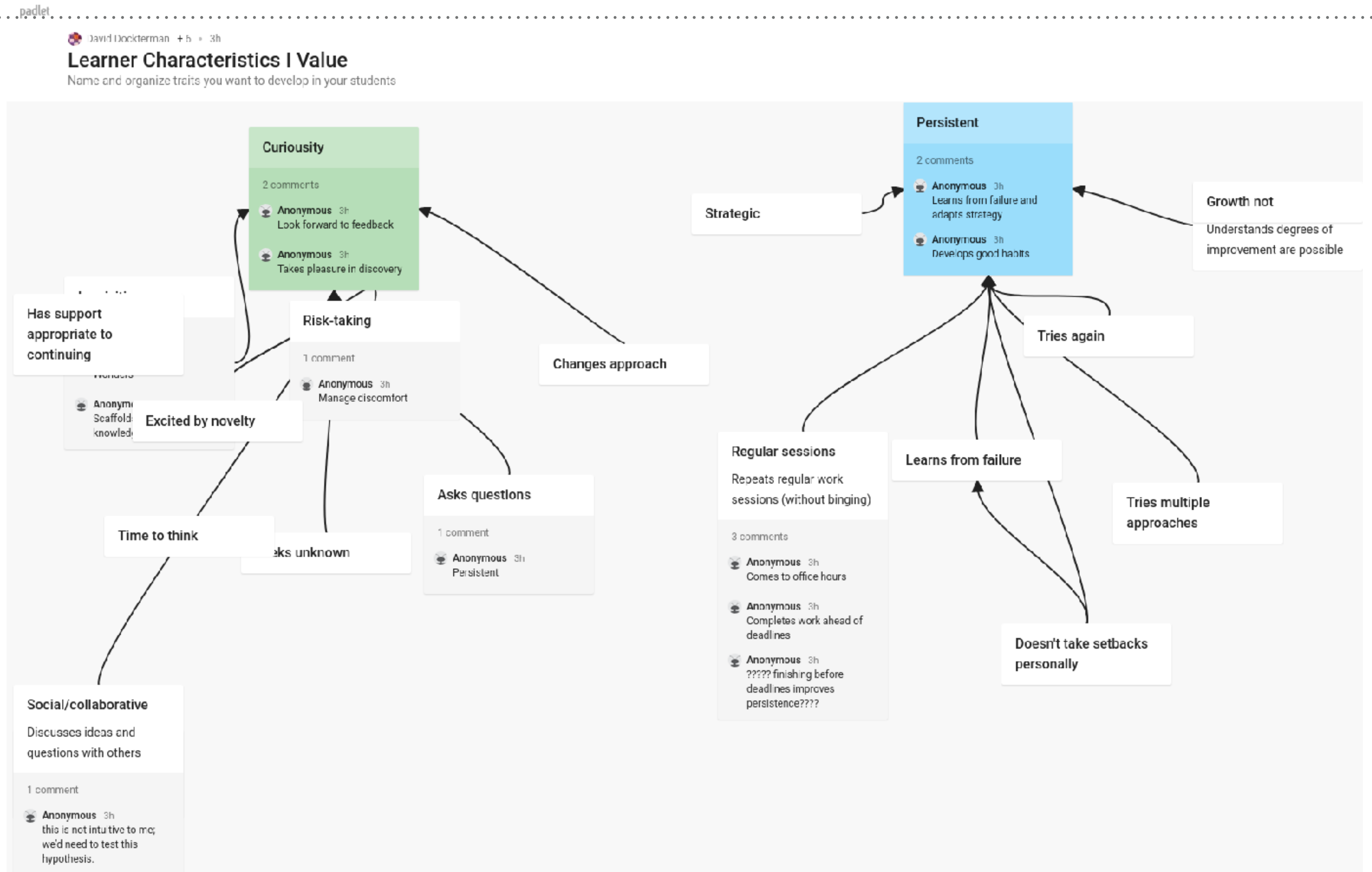
FASTEST INTRO TO EVIDENCE CENTERED DESIGN EVER…

➤ If you want to observe behaviors, you have to expose them.

➤ Identify the target behavior/trait (teamwork, humility, openness, perseverance, giving & receiving feedback, resilience after failure…)

➤ Describe what would count as evidence, from strong to weak, of the behavior/trait.

➤ Design tasks to illuminate that evidence, recognizing it may be exhibited differently for different learners.

➤ Validate

➤ Revise   *http://circlcenter.org/evidence-centered-design/*

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A WORKED EXAMPLE OF ECD

➤ Noticing carelessness

Carelessness in Online Learning Environments:

An Evidence-Centered Design Perspective

By: Maria Ofelia Z. San Pedro

January 2017

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http://improvement-analytics.org/a4l-network/a4l-white-papers/

Student Model	
Focal Construct	• Carelessness – An error made on a task that the student already knows how to do (Clements, 1982) or impulsive and/or hurried actions (Maydeu-Olivares & D'Zurilla, 1995).
	• In the context of an online learning environment, carelessness is evaluated similarly to the contextual probability of slipping on a problem or problem step (using a carelessness model), with slip being a construct or a parameter from BKT that has been manipulated (Baker, Corbett, & Aleven, 2008) to infer carelessness (San Pedro et al., 2011).
	• A model of carelessness is developed by obtaining ground-truth labels of slip/carelessness using future information to create a machine-learned model that can predict careless errors without using future data by estimating the probability or degree of a careless error (Baker, Corbett & Aleven, 2008; San Pedro et al., 2011).
Additional knowledge, skills, and abilities	• Student's prior knowledge
	• Student's current and past performance
	• Student's academic emotions (i.e., affect) and engagement
	• Student's motivation and goal orientation
	• Student's self-regulation strategies (i.e., metacognition)

Task Model	
Characteristic Features of the Task	• Task environment elicits answers to problem items that support evidence of whether a student knows or does not know how to answer (e.g., hint request, error, scaffolding)
	• Learning artifact/activity within environment can be identified as correct or incorrect; focal construct is evident on incorrect answers
	• Learning artifact/activity within environment is identified with a skill
	• Opportunity to answer a problem item with an identified skill that has been previously encountered at least twice
Variable Features of the Task	• Additional problem items that require the same skill
	• Preliminary skill-building exercises and/or supplementary exercises
	• Task difficulty
	• Look and feel of user interface
	• Presentation of problem items (e.g., wording, repetition)
	• Presentation of feedback or hints (e.g., correctness, vagueness)
	• Metacognitive feedback
	• Manipulation of features in environment that will elicit boredom, confusion, or gaming the system
Potential Task Products	• Correct and incorrect attempts at answering a problem
	• Number and type of unique problems or action items student attempts and the skill attached to those problems/items
	• Number of attempts student made for each unique problem or action item
	• Requesting help (e.g., hint, scaffolding)
	• Time taken for actions made

A WORKED EXAMPLE OF ECD

....

➤ Noticing carelessness

➤ What are the characteristics of a learner being careless?

➤ What factors can influence whether a learner is careless or careful?

➤ What are the characteristics of a task where you might see carelessness?

http://improvement-analytics.org/a4l-network/a4l-white-papers/

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A WORKED EXAMPLE OF ECD

....

➤ Noticing carelessness

➤ What are the characteristics of a learner being careless?

➤ What factors can influence whether a learner is careless or careful?

➤ What are the characteristics of a task where you might see carelessness?

➤ What evidence of carelessness might you collect in these kind of tasks?

➤ How would you evaluate that evidence (from very careful to very careless?)?

Evidence Model	
Potential Observations	**Potential observations below are written with respect to boredom but can be reversed to understand potential predictors of *engagement (flow)*.** • Incorrect attempt at a problem or action item followed by correct attempts at same problem or action item • Student has a high probability of knowing the skill identified with problem or action item on answering it incorrectly • Rapid actions made by student (e.g., errors, help requests) • Significant confusion or boredom displayed (whether through observation or detection) when students commit errors (San Pedro et al., 2014) • High overall performance by student on same-skill action items • Repeated attempts at problem or action items • High learning goal orientation, high academic efficacy, high performance-approach and performance-avoid goals (determined through questionnaires) (Hershkovitz et al., 2013)
Potential Frameworks	• Interaction-based models of carelessness (with features solely from logs, features inclusive of non-log features; with features solely outside logs) • Error pattern analysis • Analysis of moment-by-moment learning • Metacognitive intervention for student errors, rapid responses or at the end of system usage • Extending scope of contextual slip estimation (i.e., more than two succeeding actions to estimate slip labels)

http://improvement-analytics.org/a4l-network/a4l-white-papers/

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TRY DEFINING A <u>CONSTRUCT IN</u> CONTEXT?

Overview

Summary	Briefly describe the construct, learning environment, and data used.
	Provide seminal citations or papers on the noncognitive construct, environment, and/or data.
Rationale	*Describe the overall importance of the construct being measured.*
	For what purpose(s) will claims or inferences related to the construct be used?

Student Model

Focal construct or behavior	*Name the primary construct addressed by this design pattern.*
Additional knowledge, skills, and abilities	*Identify sources of construct irrelevant variance or confounds (i.e., other knowledge, skills, or abilities) that may affect how students manifest a construct, data quality, or measurement.*

Task Model

Characteristic features of the task	*Aspects of the task or task environment that are required to evoke evidence about the focal construct.*
Variable features of task	*Aspects of the task or task environment that can vary, or can be intentionally varied, to affect how students enact the focal construct.*
Potential task products	*That which students say, do, or make that produces or contains evidence of the focal construct.*

Evidence Model

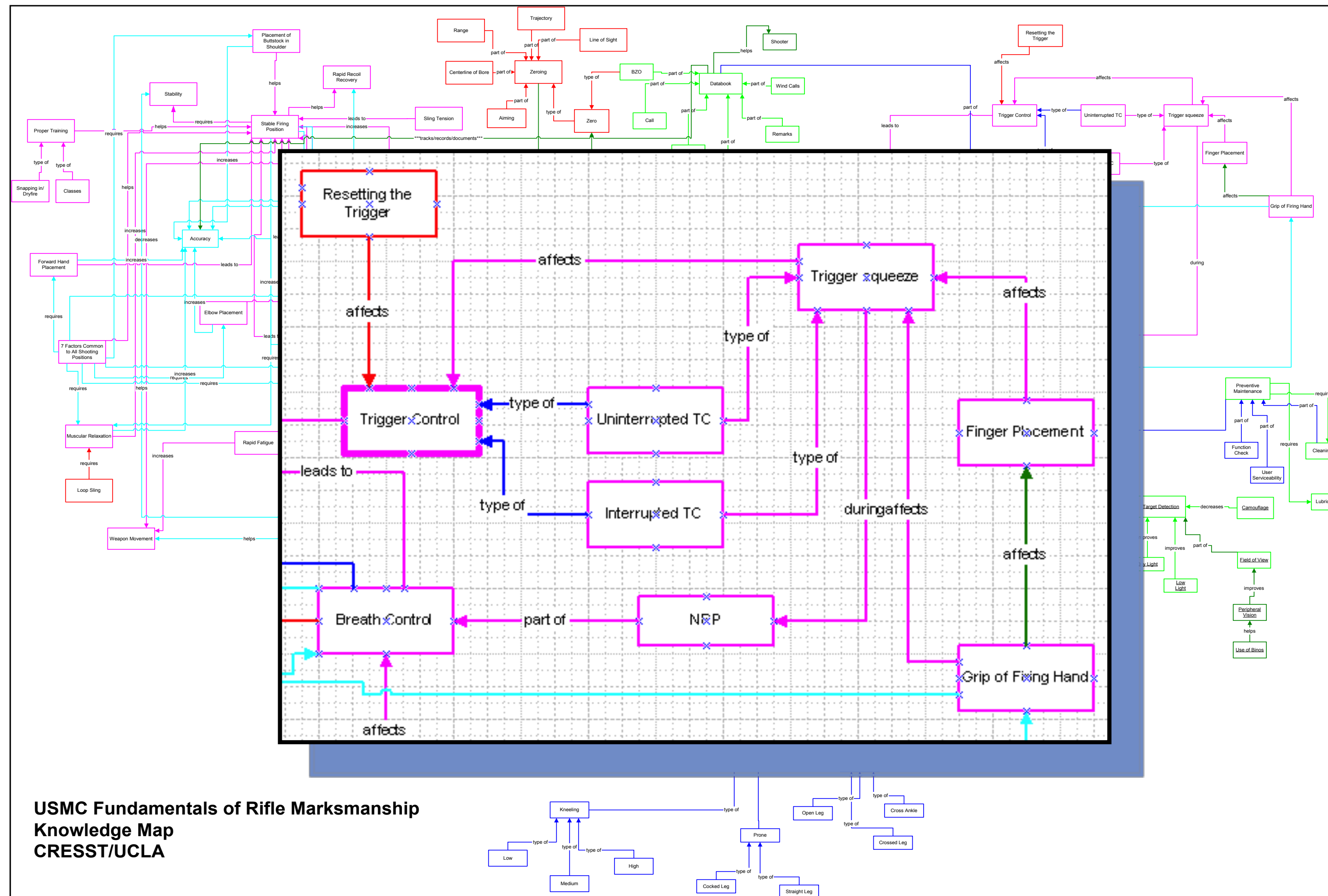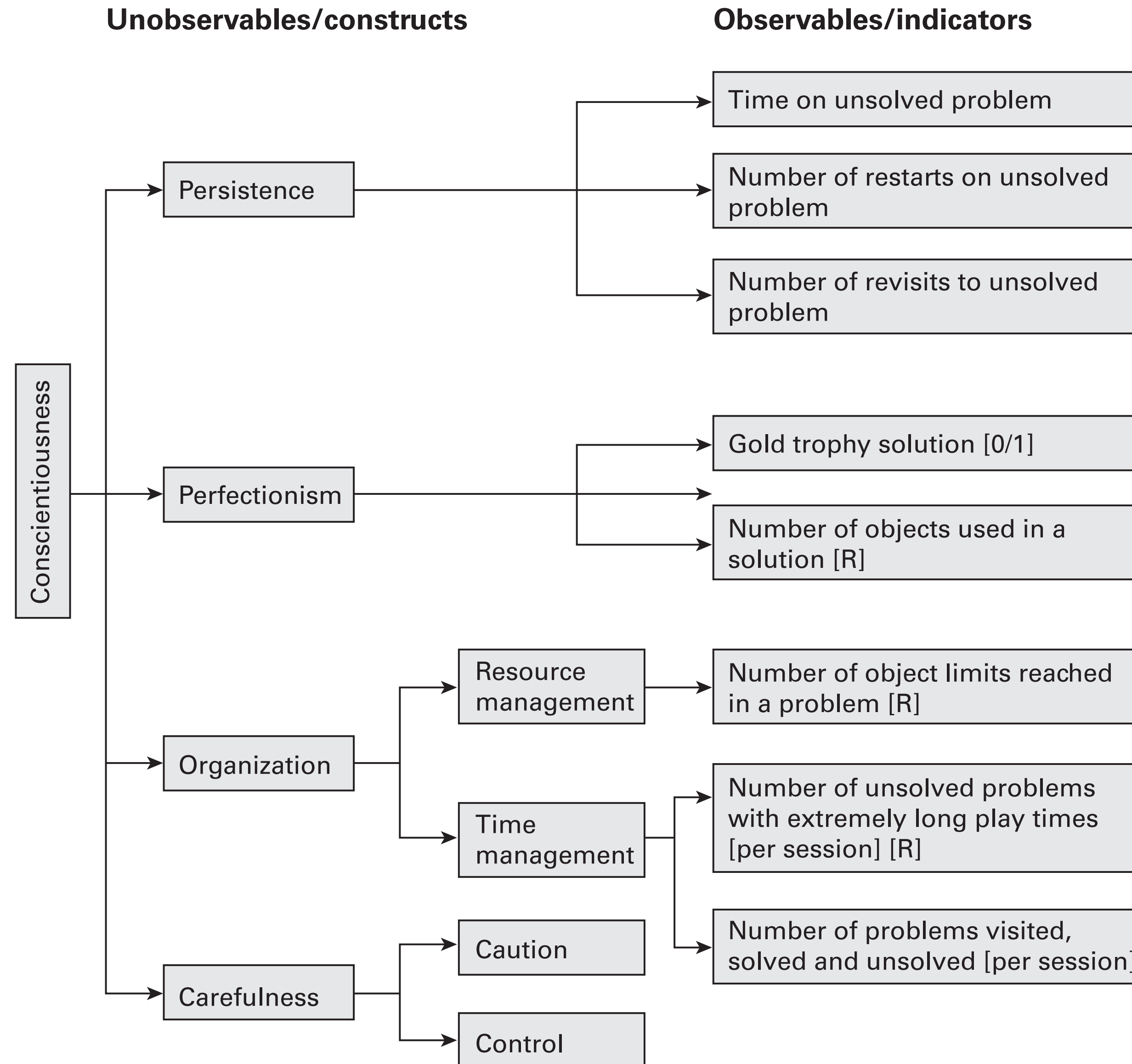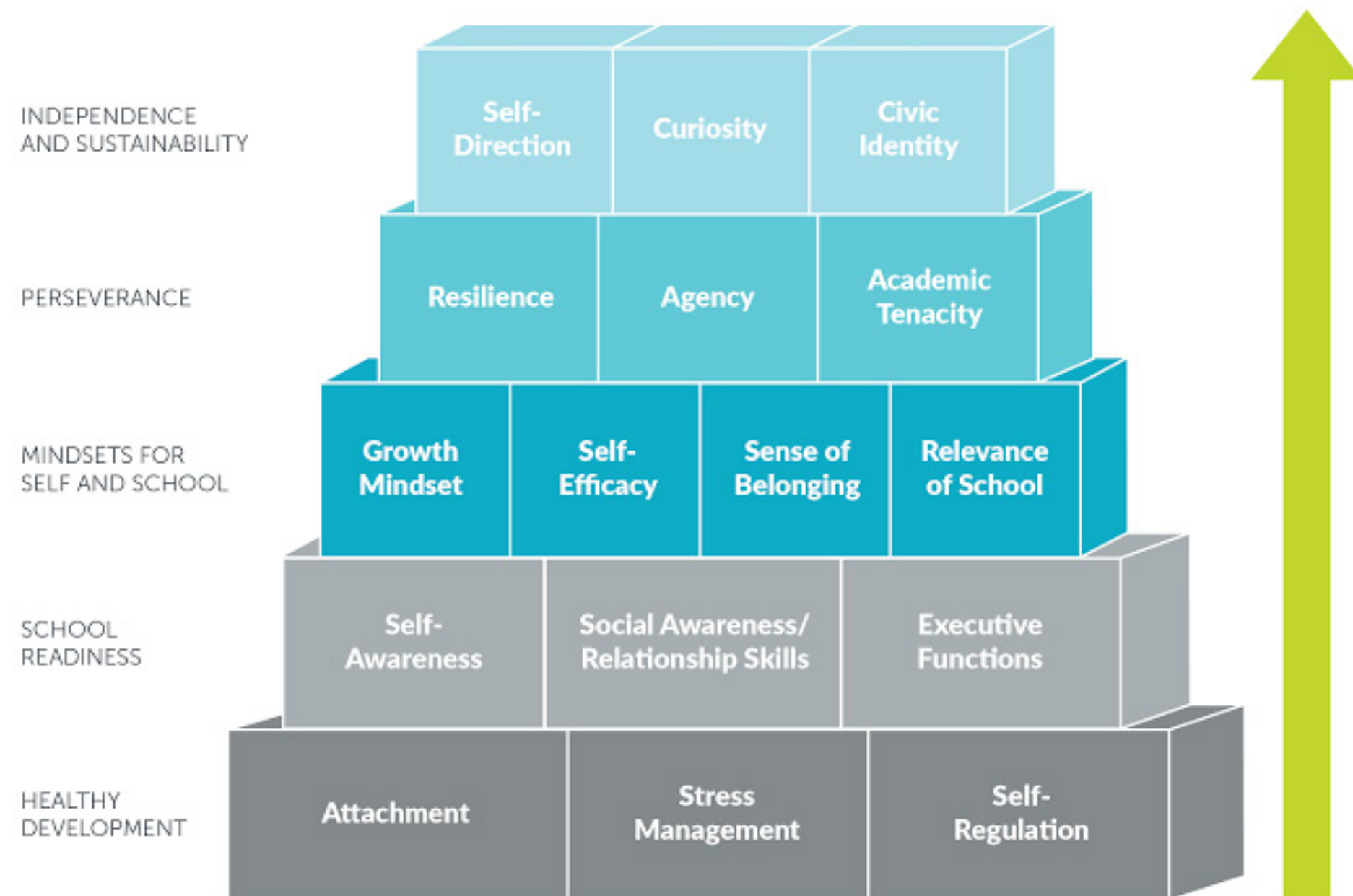| Potential observations	*Qualities of the potential task products (e.g., excessive, limited, or correct) that can be used to make inferences about focal construct.*
Potential frameworks	*Potential frameworks (e.g., rubrics, algorithms, or rules) used to interpret, judge, or contextualize potential observations.*

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CONSTRUCTS CAN LEAD TO MAPS/ONTOLOGIES

Figure 5. Example ontology representation showing the big ideas in rifle marksmanship, with an exploded view.

https://cresst.org/wp-content/uploads/cresst_resource13.pdf

MAP GUIDES WHAT TO WORK ON

Unobservables/constructs

Observables/indicators

Conscientiousness

- Persistence
  - Time on unsolved problem
  - Number of restarts on unsolved problem
  - Number of revisits to unsolved problem
- Perfectionism
  - Gold trophy solution [0/1]
  - Number of objects used in a solution [R]
- Organization
  - Resource management
    - Number of object limits reached in a problem [R]
  - Time management
    - Number of unsolved problems with extremely long play times [per session] [R]
    - Number of problems visited, solved and unsolved [per session]
- Carefulness
  - Caution
  - Control

HIGHLIGHTS WHAT TO NOTICE; WHAT TO WORK ON

BUILDING BLOCKS FOR LEARNING: A FRAMEWORK FOR COMPREHENSIVE STUDENT DEVELOPMENT

INDEPENDENCE AND SUSTAINABILITY
- Self-Direction
- Curiosity
- Civic Identity

PERSEVERANCE
- Resilience
- Agency
- Academic Tenacity

MINDSETS FOR SELF AND SCHOOL
- Growth Mindset
- Self-Efficacy
- Sense of Belonging
- Relevance of School

SCHOOL READINESS
- Self-Awareness
- Social Awareness/ Relationship Skills
- Executive Functions

HEALTHY DEVELOPMENT
- Attachment
- Stress Management
- Self-Regulation

Stafford-Brizard, K. B. (2016). Turnaround for Children.

Domain: Textual Analysis (Close Reading)								
Dimension: Development								
High-Level Description: Explaining the connection between events, ideas or concepts in a text using specific details.								
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
No evidence of describing how individual actions, events, ideas/concepts, or steps in a procedure are connected to a sequence of events.	Describes characters in a story and explains how their actions contribute to the sequence of events. OR Describes the relationship between a series of events, ideas/ concepts, or steps in a procedure using language that pertains to time sequence or cause/effect.	Uses specific details in a text to... Describe in depth a character, setting, or event in a story. OR Explain events, ideas/concepts, or steps in a procedure in informational text, including what happened and why.	Uses specific details in a text to explain the relationship or interactions between two or more... Characters, settings, or events in a story. OR Events, ideas/ concepts, or steps in a procedure in informational text.	Explains how events, individuals, and/or ideas/ concepts interact within a text and contribute to the development of the storyline or theme/ central idea. Analyzes how the text makes connections and distinctions between or among key events, individuals, and/or ideas/ concepts.	Analyzes clearly and accurately the development of a complex event, individual (e.g., someone with conflicting motivations) and/or idea/ concept within a text. Analysis includes how the complex event, individual, and/ or idea/concept is introduced, explained, and developed, and how it connects, is distinguished from, and interacts with other elements in the text.	Analyzes clearly and accurately how a series of events or ideas/concepts unfolds in a text, including when and how they are introduced and developed, the connections between/ among them, and how they contribute to the development of the storyline or theme/central idea of the text.	Analyzes clearly and accurately how a complex series of events or ideas/concepts unfolds in a text, including when and how they are introduced and developed, the connections between/ among them, and how they contribute to the development of the storyline or theme/central idea of the text.	Analyzes clearly and accurately the development (e.g., introduction, unfolding, connections, interactions) of a complex event, individual, and/or idea/ concept or a series of complex events and/or ideas/concepts within a text. Analysis includes an evaluation of the effectiveness of the development.

https://blog.summitlearning.org/2017/08/science-of-summit-framework-research/

MAKE A MAP, ONTOLOGY, RUBRIC. . .
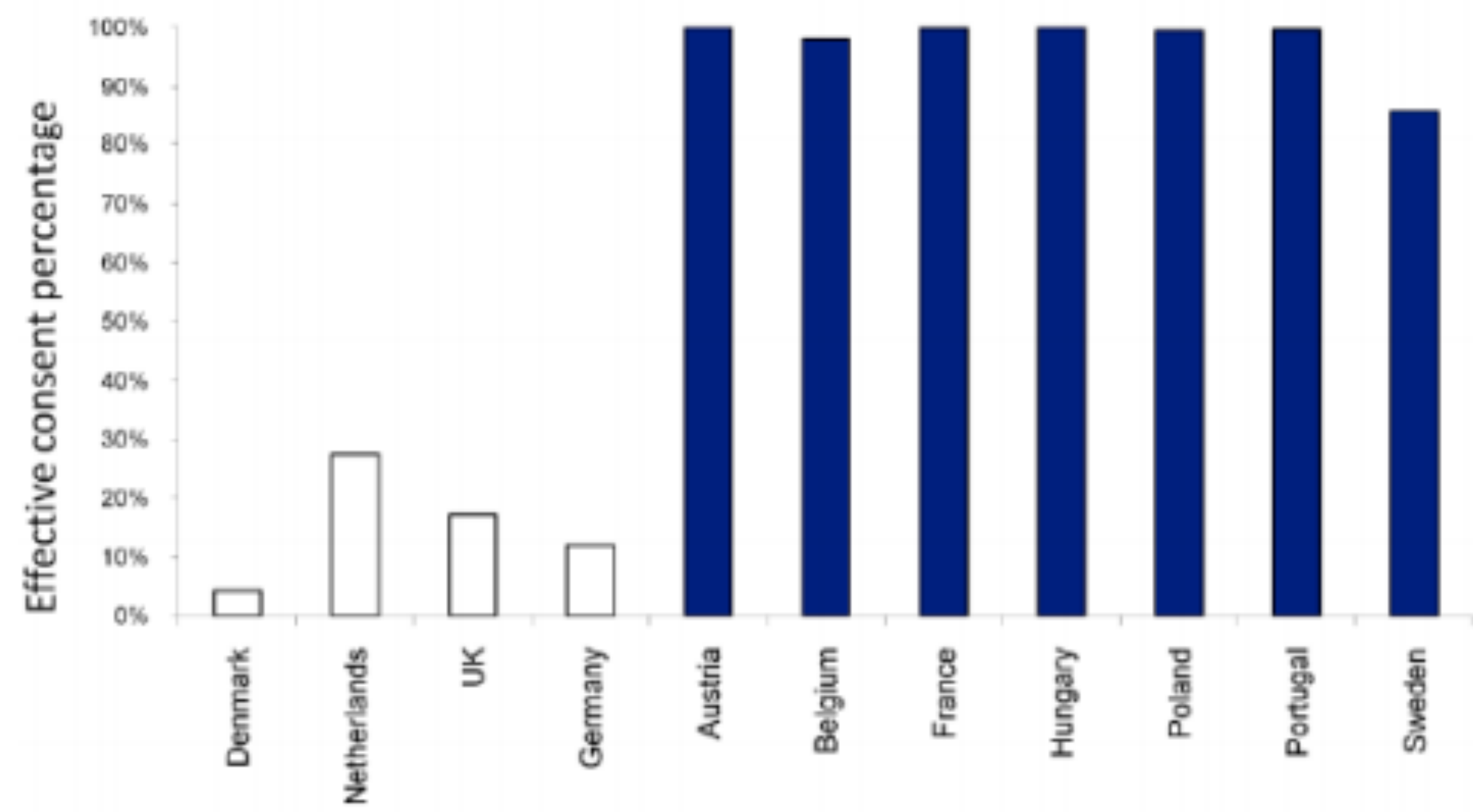
WHAT ARE NUDGES?

➤ Defaults (organ donation and 401k)

Self-reported miles declared

26.1k

23.6k

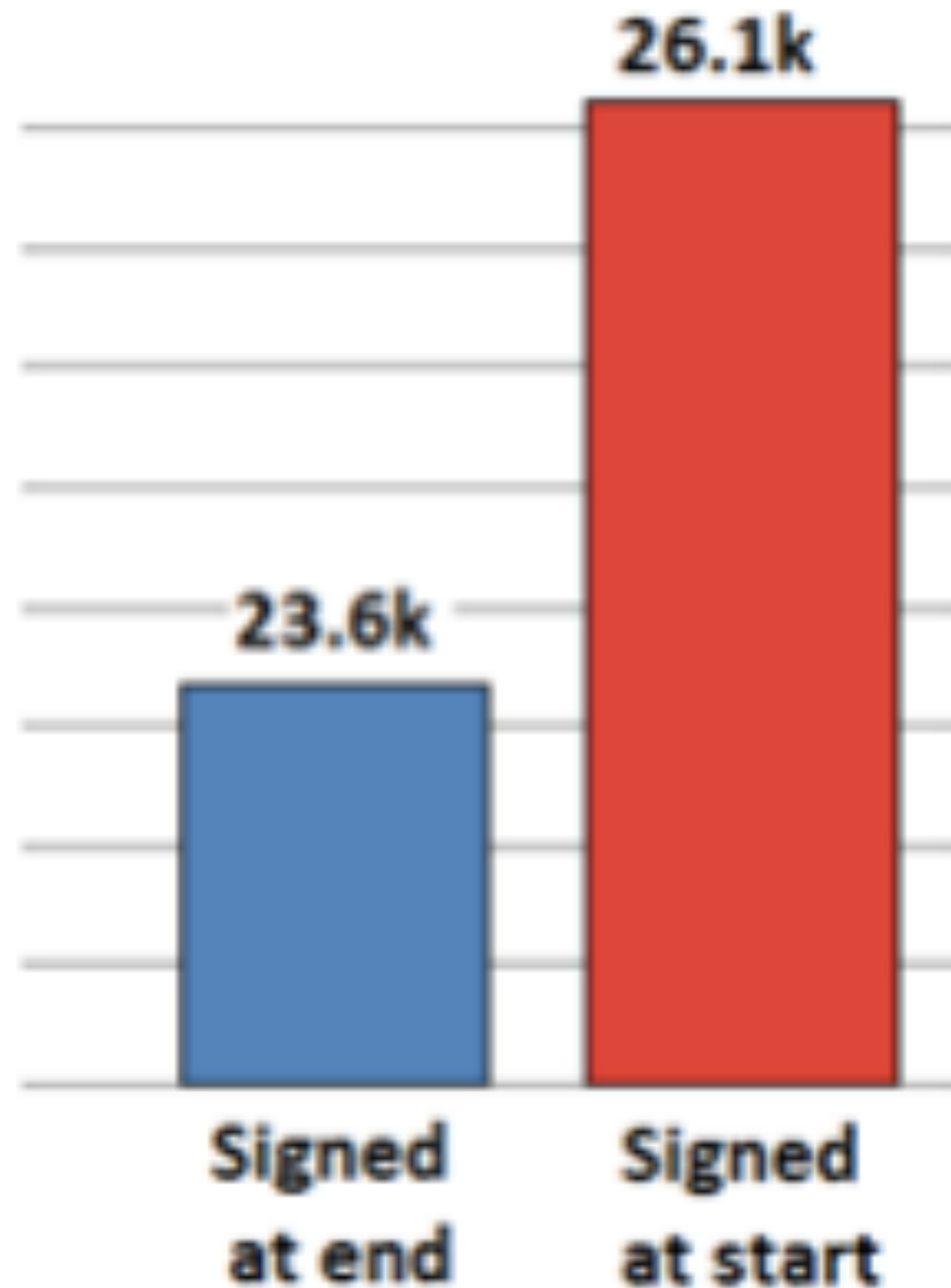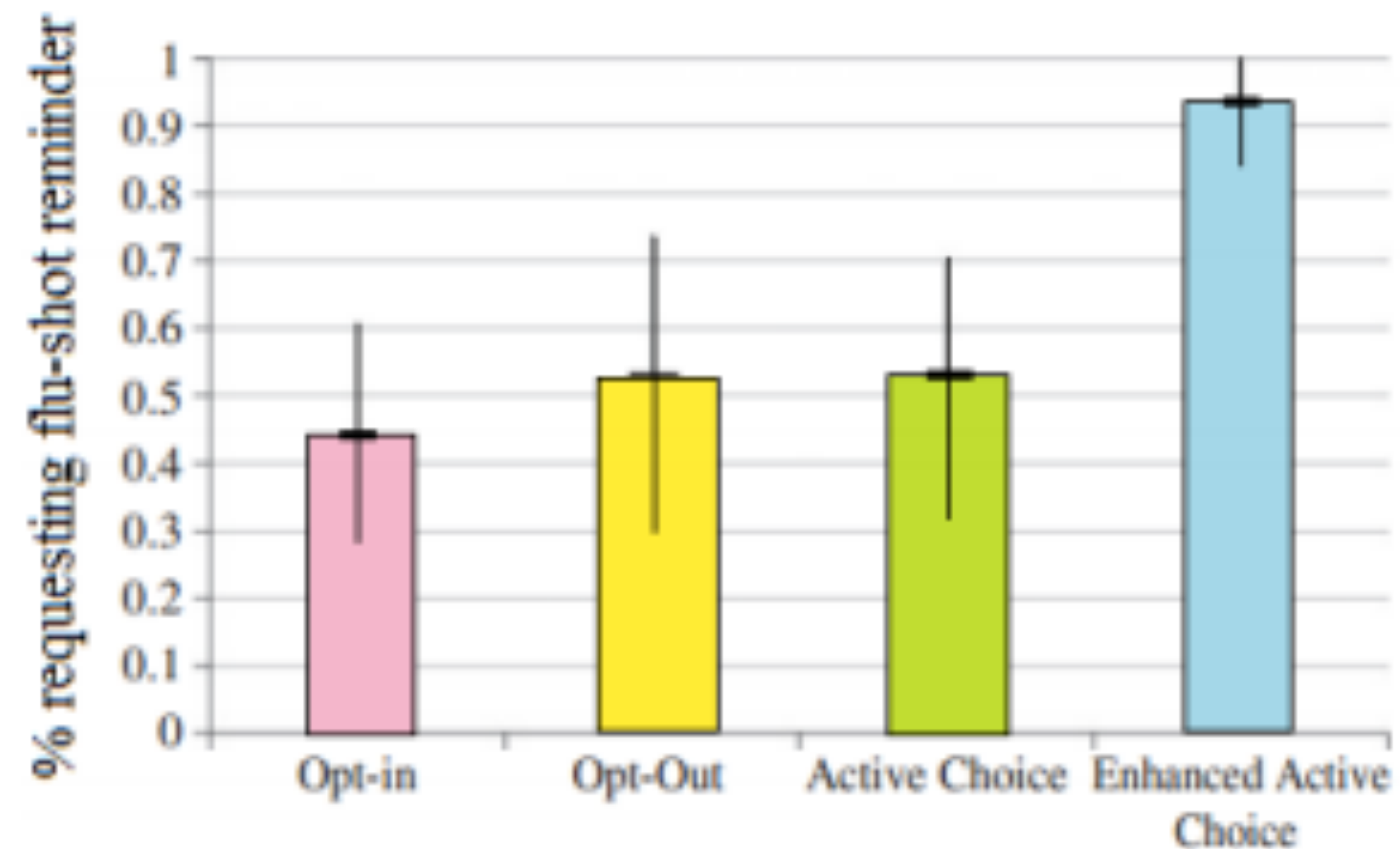Signed at end   Signed at start

WHAT ARE NUDGES?

➤ Defaults (organ donation and 401k)

➤ Identity Prime (miles declared)

WHAT ARE NUDGES?

➤ Defaults (organ donation and 401k)

➤ Identity Prime (miles declared)

➤ Directed locus of control (flu shots)

WHAT ARE NUDGES?

➤ Defaults (organ donation and 401k)

➤ Identity Prime (miles declared)

➤ Directed locus of control (flu shots)

➤ Norming (healthy cafeteria eating)

Table II. Impact of a smarter lunchroom makeover on the selection and consumption of fruits and vegetables

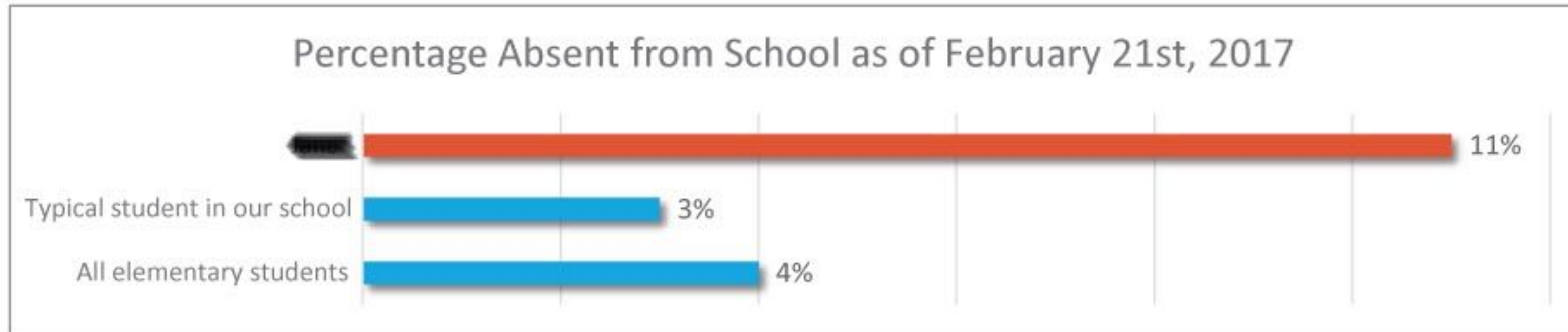|	Students who took a serving, %			Students who consumed at least one-half a serving, %			Students who consumed an entire serving, %		
	Before makeover	After makeover	Change	Before makeover	After makeover	Change	Before makeover	After makeover	Change
Fruit	47.3	53.7	13.4 (.012)	40.4	47.7	17.9 (.004)	31.6	36.6	15.8 (.006)
Vegetable	35.8	44.0	23.0 (<.001)	33.7	42.0	24.5 (<.001)	18.7	20.5	9.8 (.022)
Starchy vegetable	14.7	13.6	−7.7 (.088)	10.0	9.7	−2.5 (.325)	6.0	6.1	1.4 (.387)

'Nudge' letter example

Once every quarter, Tacoma Public Schools mails parents a copy of their children's total absences compared with other students. This is one example of a "nudge" letter that school officials hope will improve attendance.

Dear Parent/Guardian of Jane:

In Tacoma Public Schools we strive to improve the attendance of our students. Each minute of the school day provides opportunities for learning, and it's noticeable when students miss time.

Jane has missed 13 days — or 11% of school this year, more than the typical student at our school or in the district for the same grade.

Percentage Absent from School as of February 21st, 2017

Jane — 11%

Typical student in our school — 3%

All elementary students — 4%

We are worried that if Jane continues to miss school days, it will be difficult to stay on track in the classroom.

'Nudge' letter example

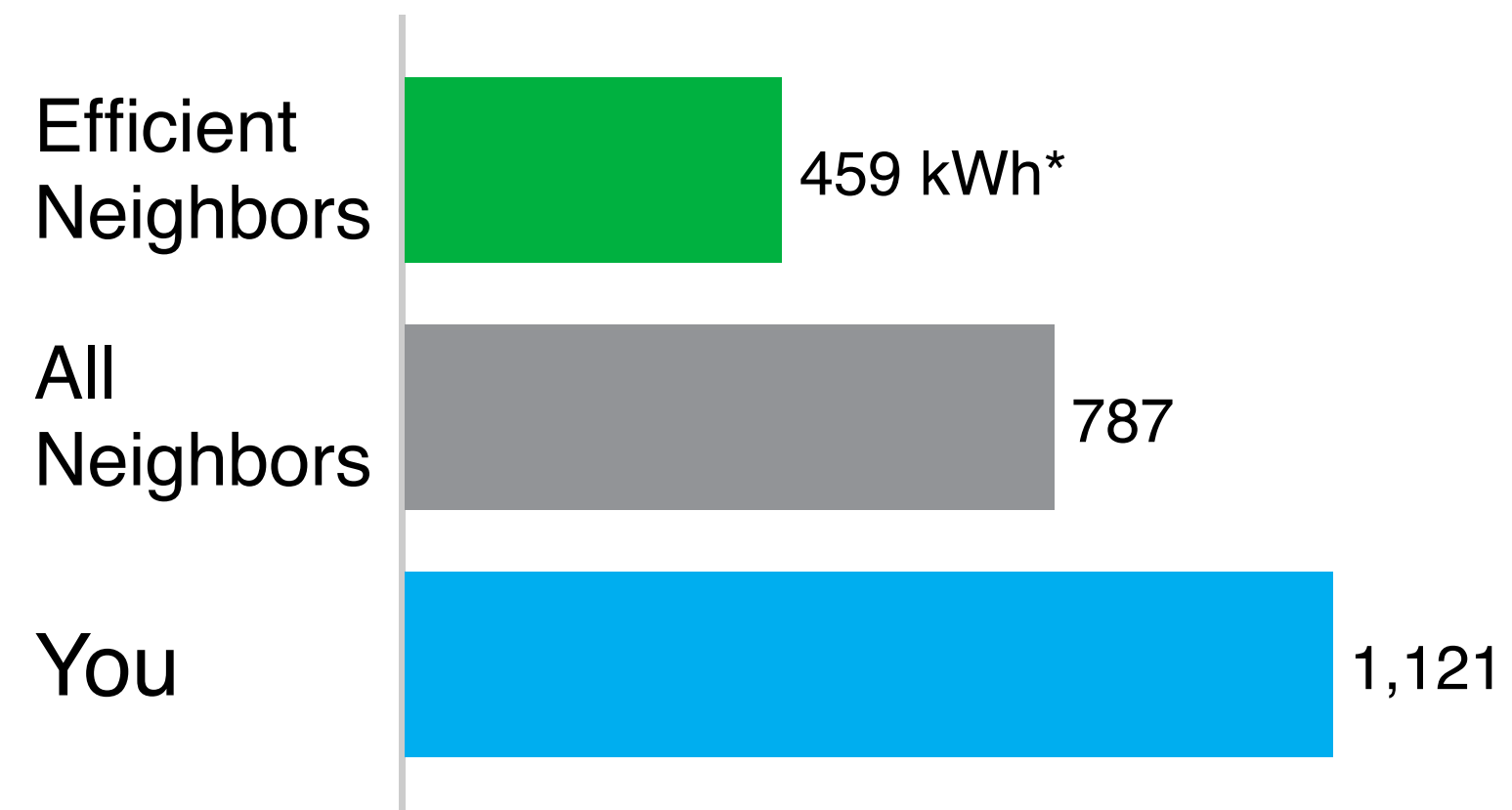**EVERS⬤URCE**

You used more electricity than your neighbors.

Efficient Neighbors	459 kWh*
All Neighbors	787
You	1,121

You used more than average

* kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt hour.
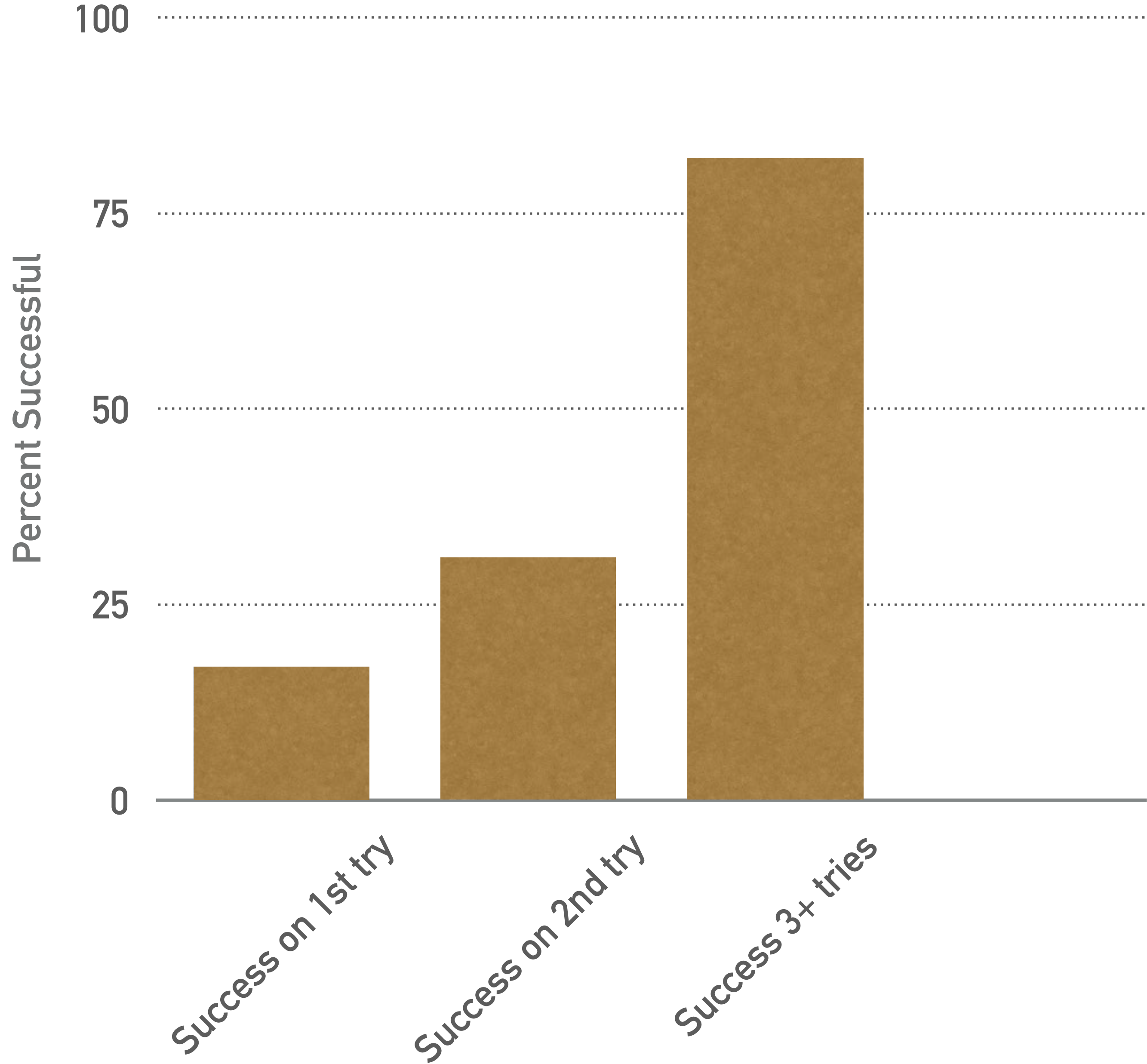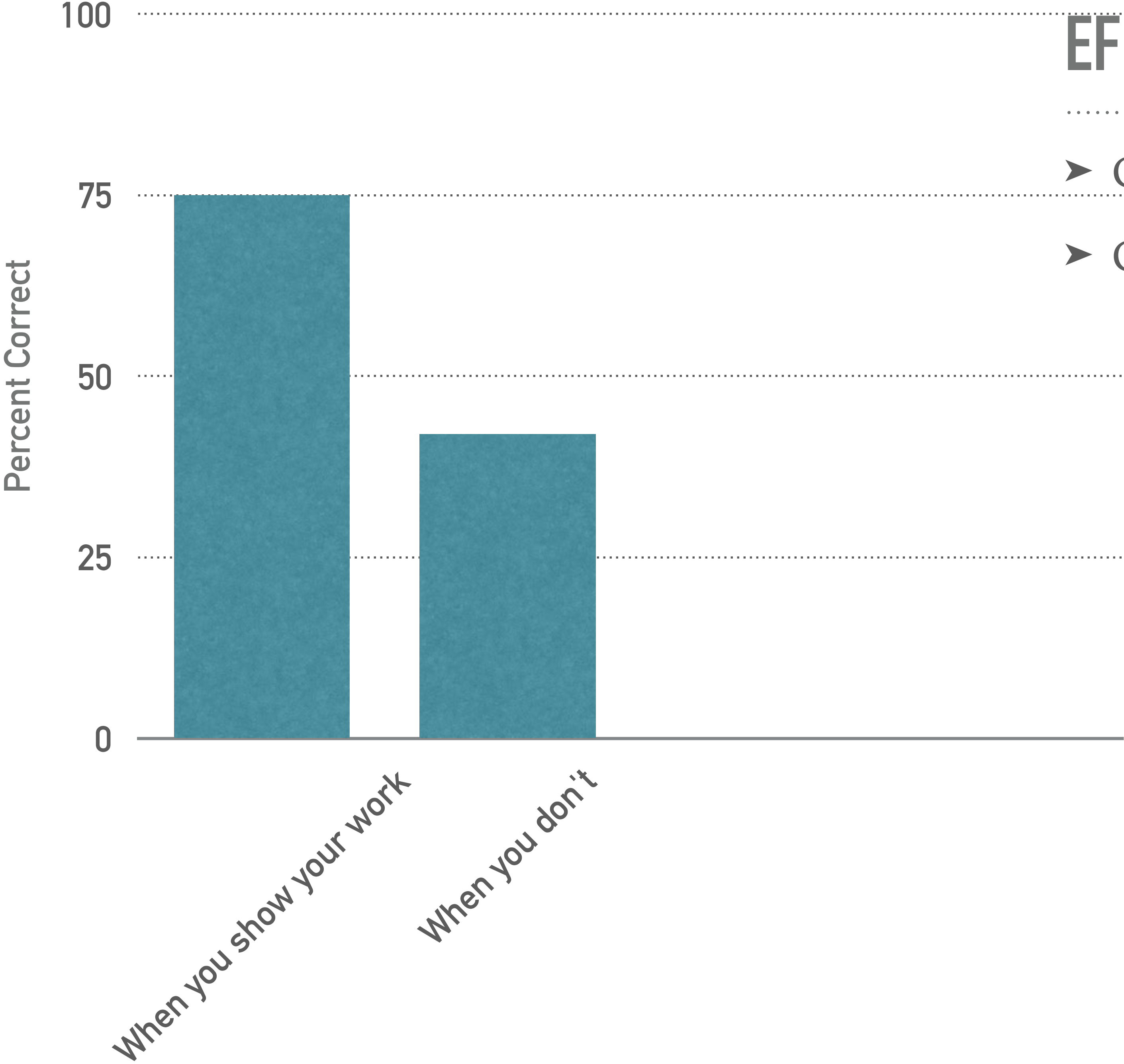
WANT TO SKETCH A NUDGE?

➤ You have a construct.

➤ You have defined characteristics of that construct.

➤ You have identified observable evidence of the construct.

➤ So how might you use collected observations (data) to encourage desired behavior?

FABULOUS DISASTER

Celebrate learning from failure

PARTING THOUGHTS

➤ Be intentional about who needs what learning.

➤ Match your language to the need in service of continued learning.

➤ Map out a path for exposing needs and monitoring growth.

➤ Notice what you want to support.

➤ Use data to encourage productive learning and effective learners.

THANK YOU. QUESTIONS?

david_dockterman@gse.harvard.edu

twitter: @dockterman