



Center for Excellence and Innovation in Teaching and Learning
University of New Hampshire

*The [Student] Cognition Toolbox: How You Can Help
Students Boost Academic Performance, and How Students
Can Help Themselves*

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Talk about Teaching
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Workshop Agenda

- How do your students currently study?
- Choosing a Cognitively-based study strategy
- Student Cognition Toolbox
- Workshop activities

HOW DO STUDENTS STUDY?

What the research says

The SBI

How Students Study

Miyatsu, Nguyen, & McDaniel (2018). Five popular study strategies, *Perspectives on Psychological Science*, 13, 390–407

Re-reading

• 78%

Highlighting
and
Underlining

• 53%

Note-taking

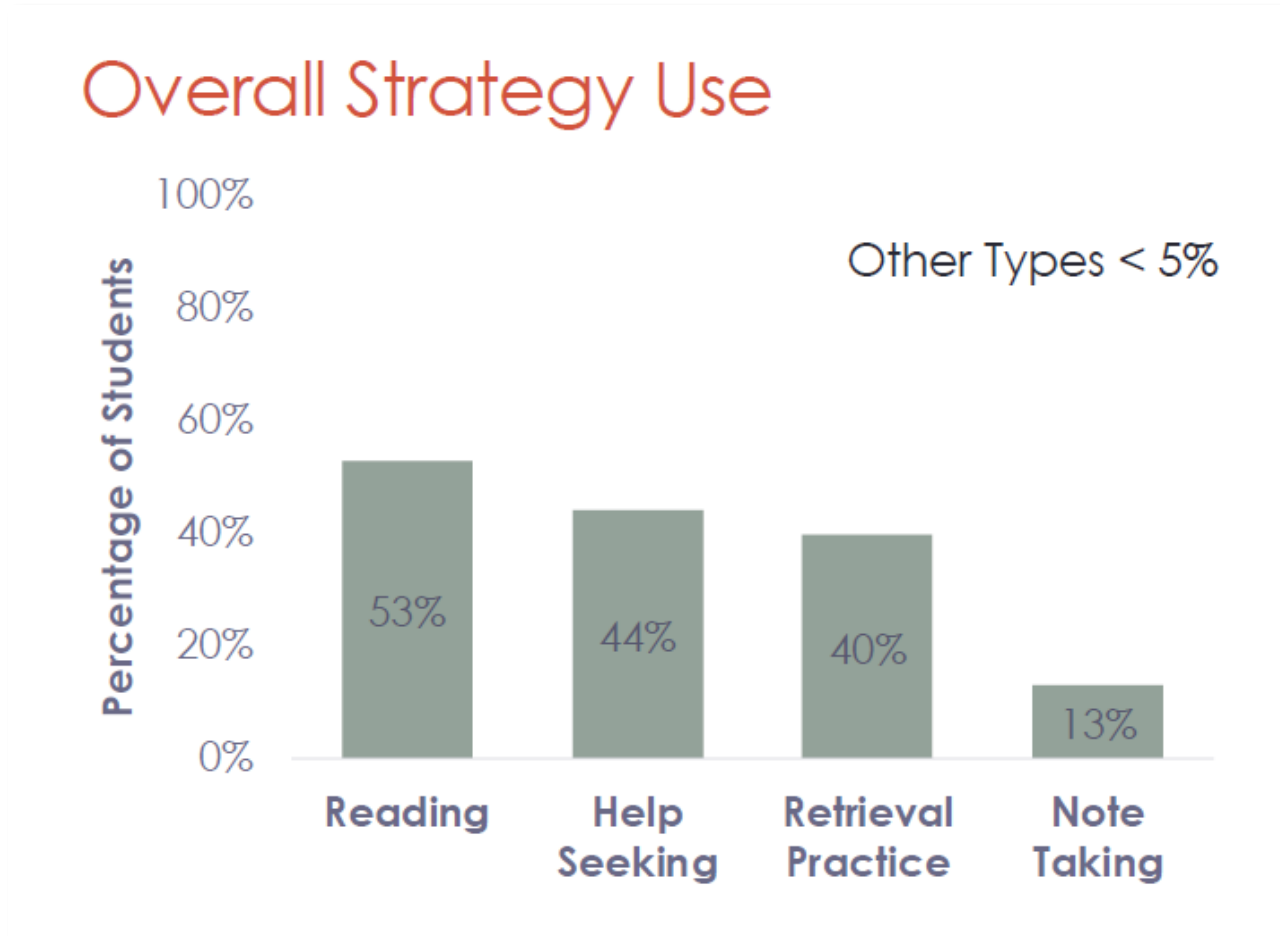
• 30%

Using Flash
Cards

• 53%

Understanding Normative Educational Practices Can Inform Innovation in STEM Learning

Butler (2018)



THE STUDY BEHAVIOR INVENTORY

Deep

I space out my study sessions in the time leading up to the exam

I relate what I am reading for the course to classroom sessions

I test myself on course materials without referring to my course materials or notes, etc.

I plan effectively for study time between classes

I summarize in my own words information I learn from my study

I explain concepts to a classmate/friend

I create outlines, charts, diagrams, or tables, etc., to organize and help me see patterns in course information

Shallow

I ask a classmate/friend to help me understand course material

I focus most of my studying to the time just prior to an exam

I ask my professor or TA to help me understand course materials

I read the required course materials more than once

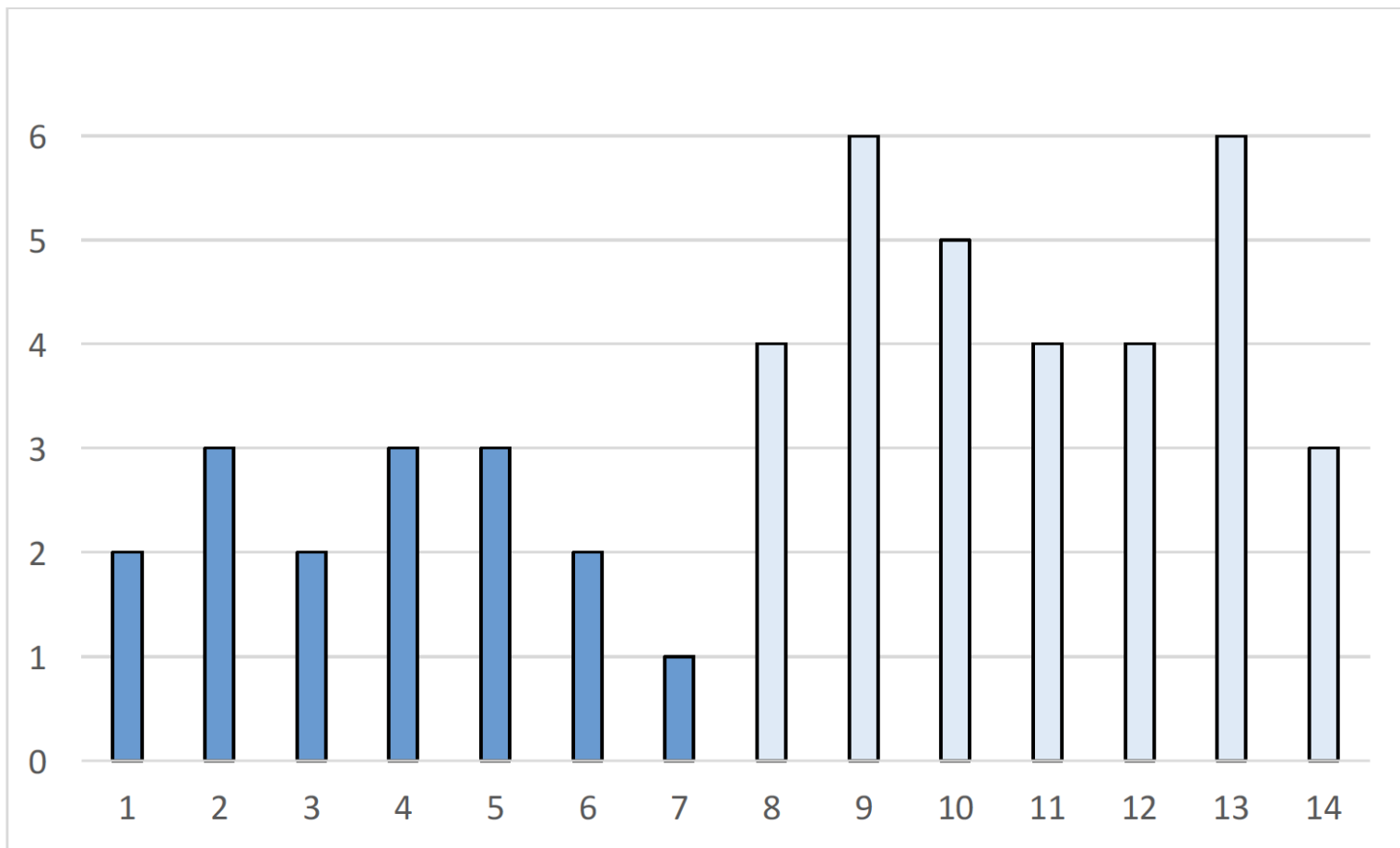
I highlight and/or underline the most important information in my reading

I take care to organize my lecture notes

I try to learn the more difficult material first, when time is limited prior to an exam

Very true
of me

Not at all
true of
me

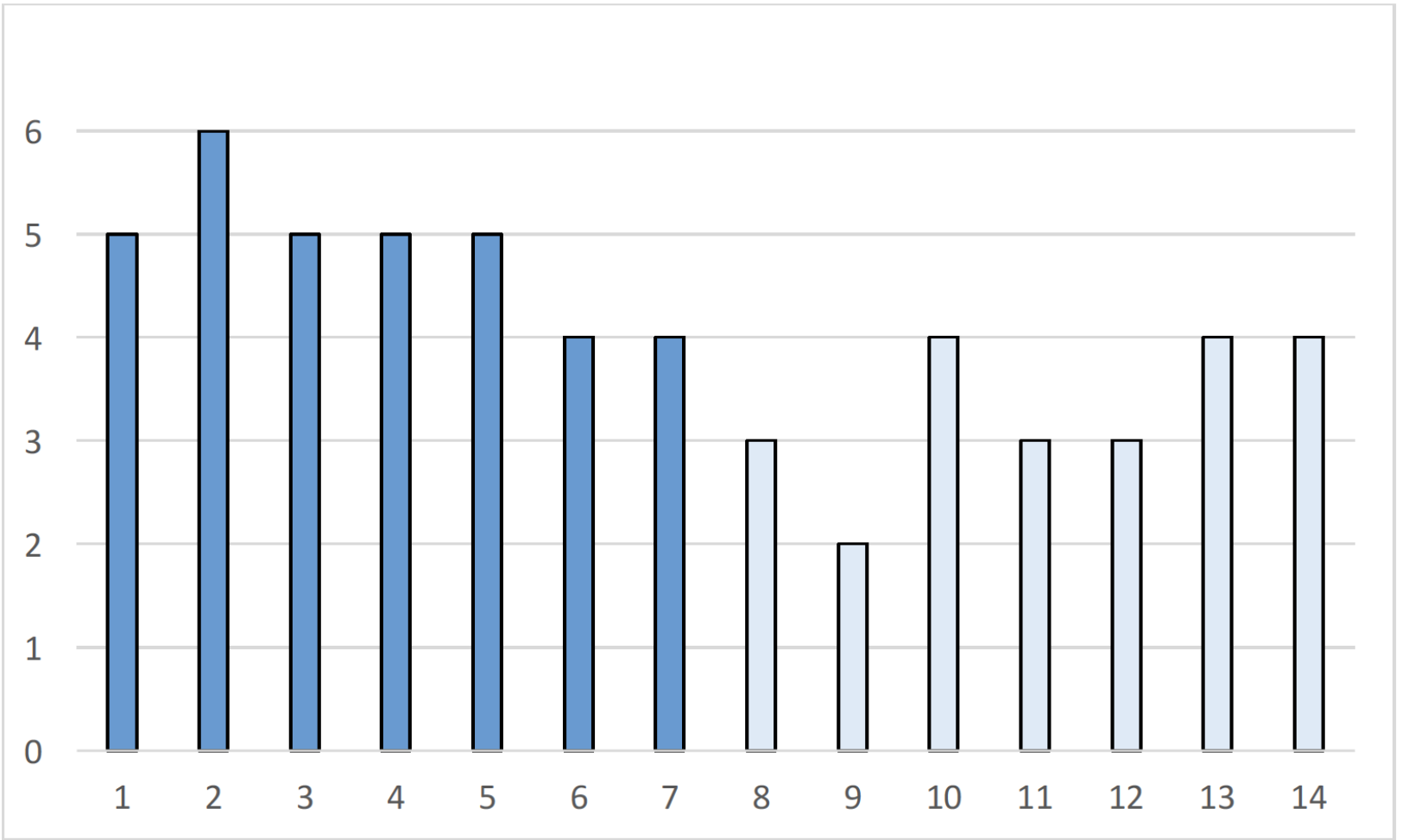


Deep

Shallow

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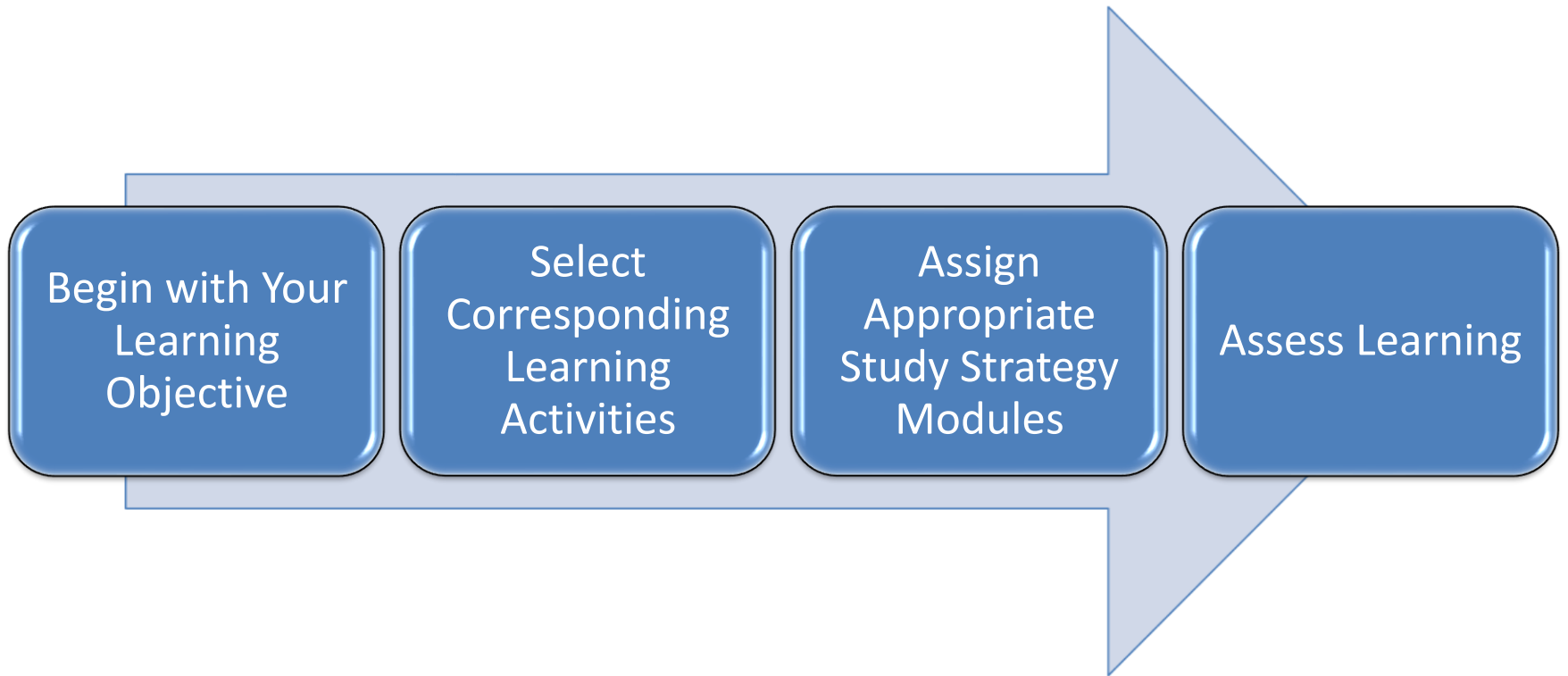
Not at all
true of
me



Deep

Shallow

CHOOSING A COGNITIVELY- BASED STUDY STRATEGY



How do we “activate” and
enhance student learning?

It depends . . .

It Depends?

What kind of knowledge does your student need to attain?

- Facts?
- Concepts?
- Principles?

What kind of learning processes is required for your student's learning objective?

- Learn facts and associations?
- Learning rules, classifications, and categories?
- Learn principles, sense making, and deep comprehension?

What kind of study strategy will you recommend and use to promote learning your objectives?

- Quizzing?
- Self-explanation?
- Elaborative interrogation?

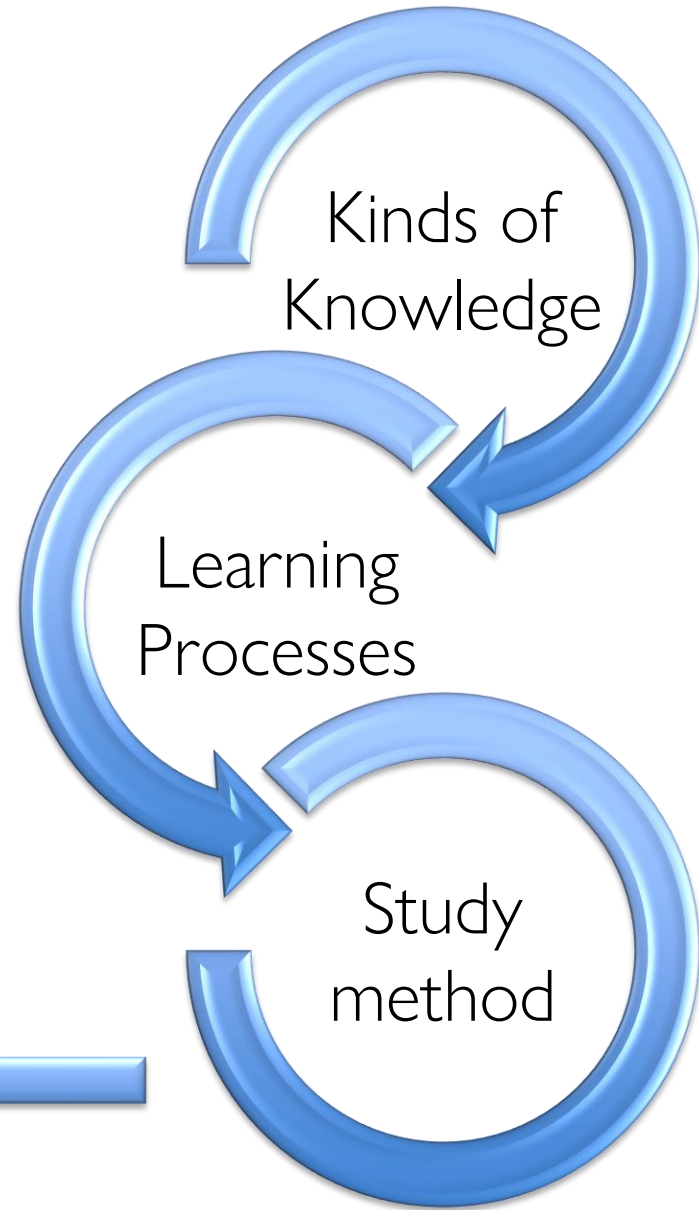
The Study Strategy Selection Grid Based on the Knowledge-Learning Instruction (KLI) Framework

Kenneth R. Koedinger
Carnegie Mellon University
Albert T. Corbett
Carnegie Mellon University
Charles Perfetti
University of Pittsburgh
2011

When Your Learning Goals are to:	Relevant and Useful Study Strategies Include:	This Technique Should Help You to:	Keep in Mind:
<p>Learn Facts & Associations, such as:</p> <ul style="list-style-type: none"> - Vocabulary - Definitions - Events/Dates 	<ul style="list-style-type: none"> - Practice Quizzing - Spaced Practice - Feedback 	<ul style="list-style-type: none"> - Memorize, by forming strong memory connections that allow you to quickly and consistently recall information - Information should come to mind with ease 	<ul style="list-style-type: none"> - Combining study strategies can be very effective (e.g., spacing out practice quizzes paired with feedback) - Strategies for more complex material might be less useful at this level
<p>Learn Rules, Classifications, & Categories, such as:</p> <ul style="list-style-type: none"> - Math problems - Math formulas - Chemistry rules - Artistic styles 	<ul style="list-style-type: none"> - Self-Explanation - Worked Examples - Interleaved Practice - Elaborative Interrogation - Feedback 	<ul style="list-style-type: none"> - Classify and categorize material - Know when or when not to apply a rule or set of rules - Continue to refine rules through experience and examples 	<ul style="list-style-type: none"> - Combining study strategies can be very effective (e.g., interleaving the use of worked examples paired with feedback) - Strategies for more complex material might be less useful at this level
<p>Learn Principles, Sense Making, & Deep Comprehension, such as:</p> <ul style="list-style-type: none"> - Physics principles - Chemistry models - Integrated term papers - Political policies 	<ul style="list-style-type: none"> - Self-Explanation - Elaborative Interrogation - Collaboration with Others 	<ul style="list-style-type: none"> - Integrate and reason about class material - Provide rationales and explanations for concepts and ideas and how they relate to each other 	<ul style="list-style-type: none"> - Learn less complex information first before jumping to this level of knowledge, that is, you need to first know facts before you can explain complex principles

Matching what students need to learn and the kind of learning activities matters

Assessments

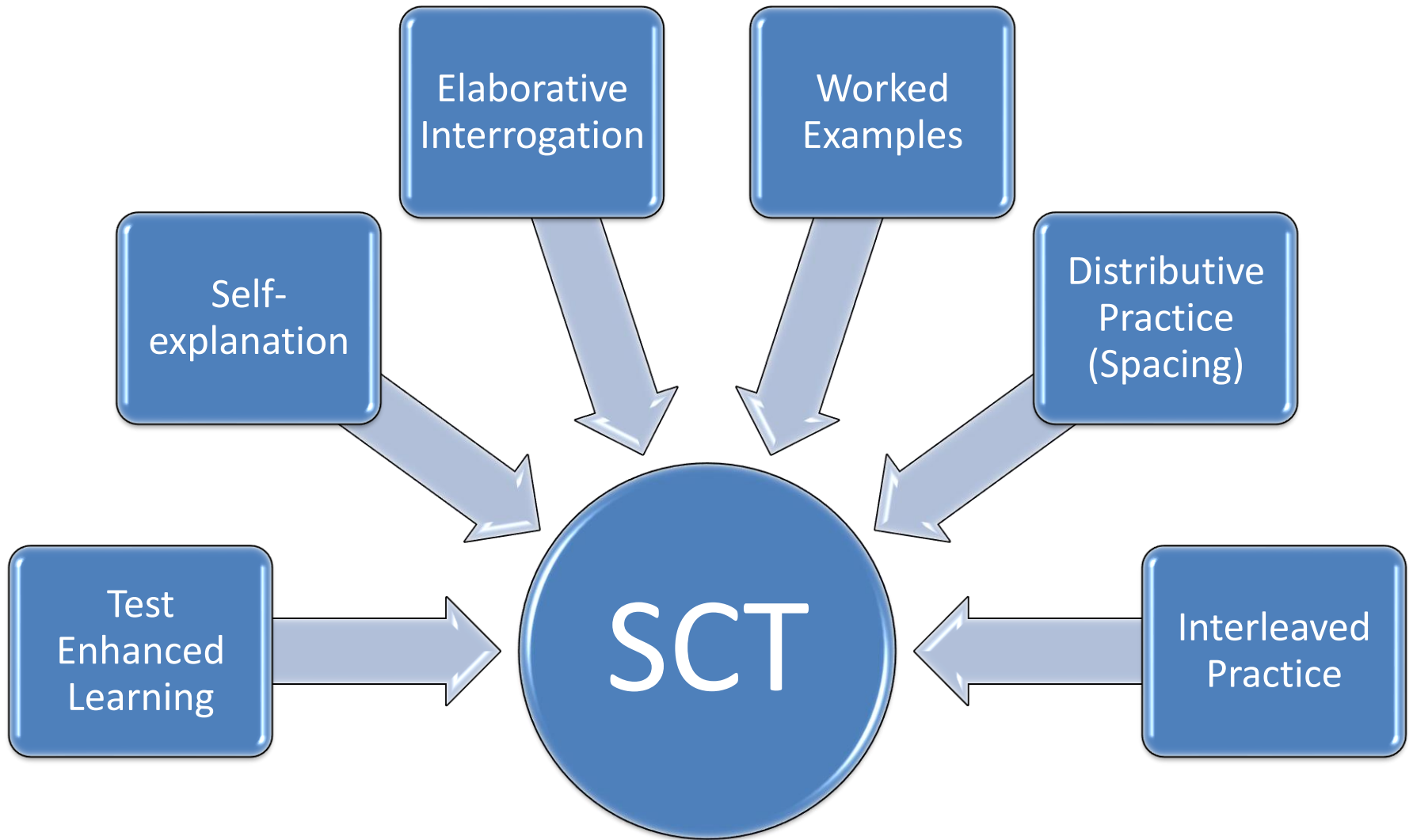


General Module Template

- Study Behavior Inventory
- Part 1: Engagement in learning activity
 - Exposure of material to learn
 - Utilization of learning strategy during reading
 - Assessment of learning
- Part 2: The Study Skills Lesson
 - Exposure to presentation on the study strategy
 - Practice using strategy in a variety of contexts
 - Assessment on how well they learned the study strategy

STUDENT COGNITION TOOLBOX

STUDY STRATEGIES



Fall 2019

- ~600 students from a variety of courses
 - Biology
 - Chemistry
 - Psychology
 - Statistics
 - PLTL Leaders
- Course credit
- Assessment plans
 - general student feedback
 - module effectiveness
 - course learning

Initial Findings

- Student comments

The Student Cognition Toolbox

Carnegie Mellon University



Open Learning Initiative

Transforming higher education through the science of learning.

THE SCT

A TEACHER'S PERSPECTIVE
