
# A Transformation to Learning Engineering

**Bror Saxberg**
**CLO**
**Kaplan, Inc.**

March 2017

# Kaplan spans domains and geography

### Kaplan University Group

- Kaplan University
- Kaplan Legal Education
- Kaplan Professional Education
- KU Nursing

### Kaplan Test Prep

- KTP Grad
- KTP Pre-College
- KTP Med
- KTP Nursing
- KTP Bar Review
- Dev Boot Camp
- KTP International

### Kaplan International Colleges

- Kaplan Int'l Colleges
- Global Pathways
- Dublin Business School

### Kaplan Asia Pacific

- Kaplan Higher Ed – Asia
- Kaplan Professional – Asia
- Kaplan Higher Ed – Australia
- Kaplan Professional – Australia
- In Country Pathways – China
- BEO - HO

### Kaplan United Kingdom

- Kaplan Higher Ed – Europe
- Kaplan Professional – Europe

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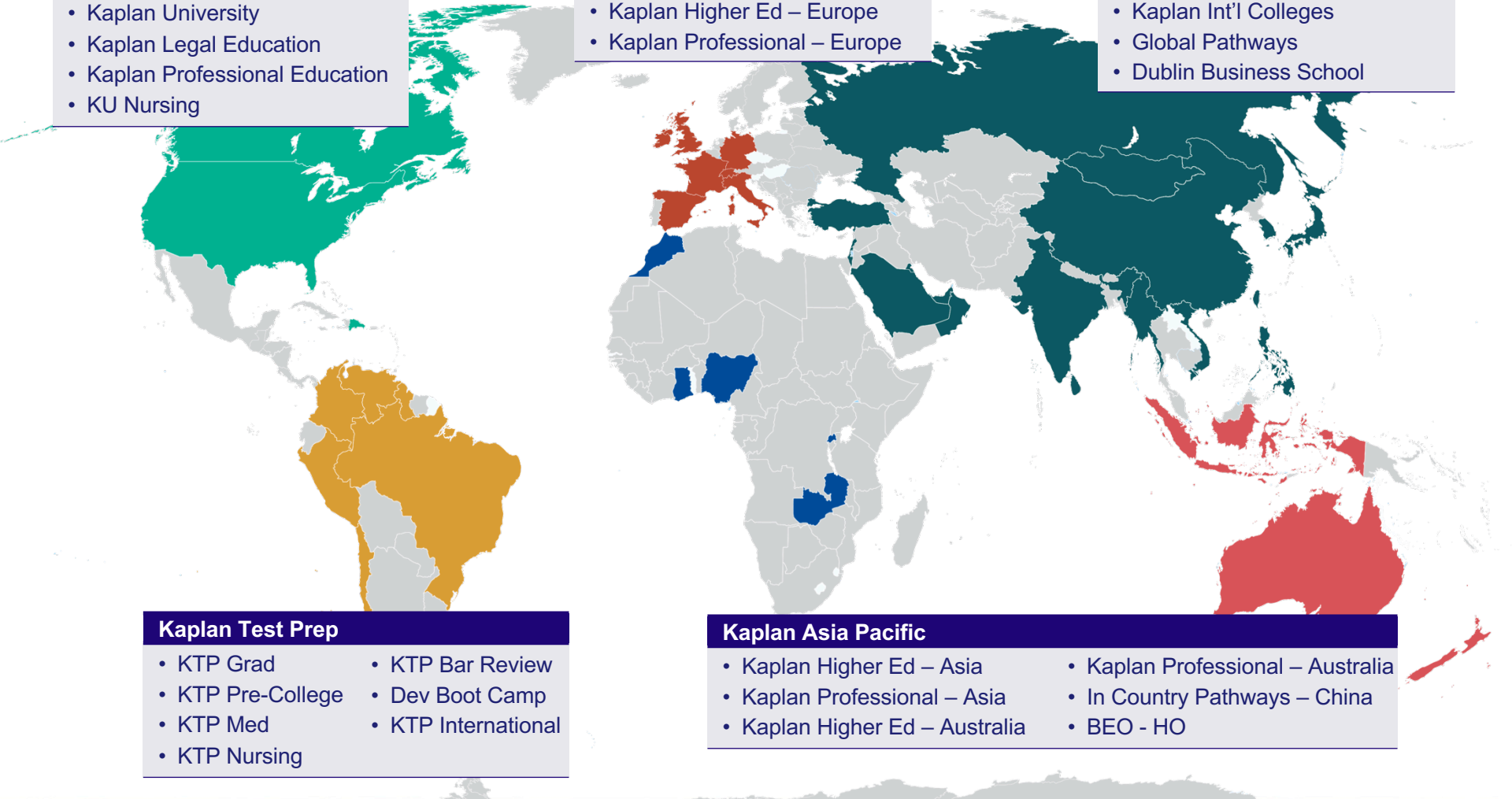

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# Lots of ed-tech innovation worldwide



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# What do we see in this ed-tech “space”?

Area9 central offices, Copenhagen

- That’s my office!
- Who’s cleaning those beams?
- What ideas come out of here?
- What’s my allocation for this?
- Who would pay for *this*?
- So cool - when do we move?

# Indeed, technology can help

- Can make learning solutions more affordable, reliable, available, customizable, data-rich
- Adds new learning capabilities (simulations, video, adaptive)
- Provides possibility of systematic improvement – faster pilots, richer data

# However, on-line isn't always on-point

- Technology will scale good *and bad* learning
- Learners aren't always motivated by it
- Peer to peer work has mixed success
- Complex skills need expert human coaching
- Blending all this together is not "settled law"

# So, how to think about this?

- Start from how learning actually works
- Use technology to implement and enhance *good* solutions
- Use evidence to make progress

## Learning Engineering

# A change process to get to “learning engineering”


- Show the science
- Show a process
- Make examples

- Refine process
- Train IDs
- Market exposure

- Wider use
- Community
- Set GM goals

- Initial tools/rubric
- Evidence review
- Detailed measures



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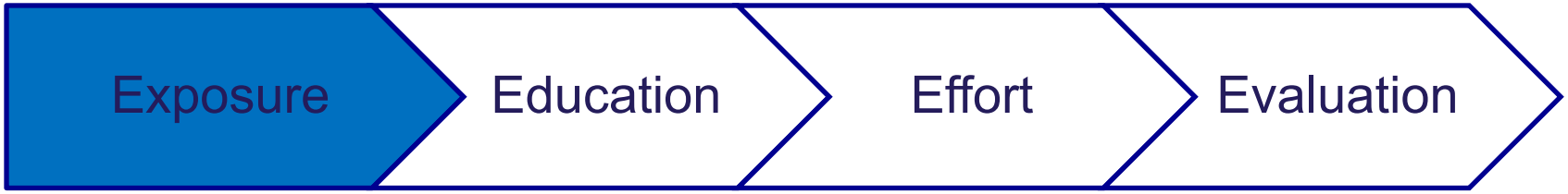
# Exposure first



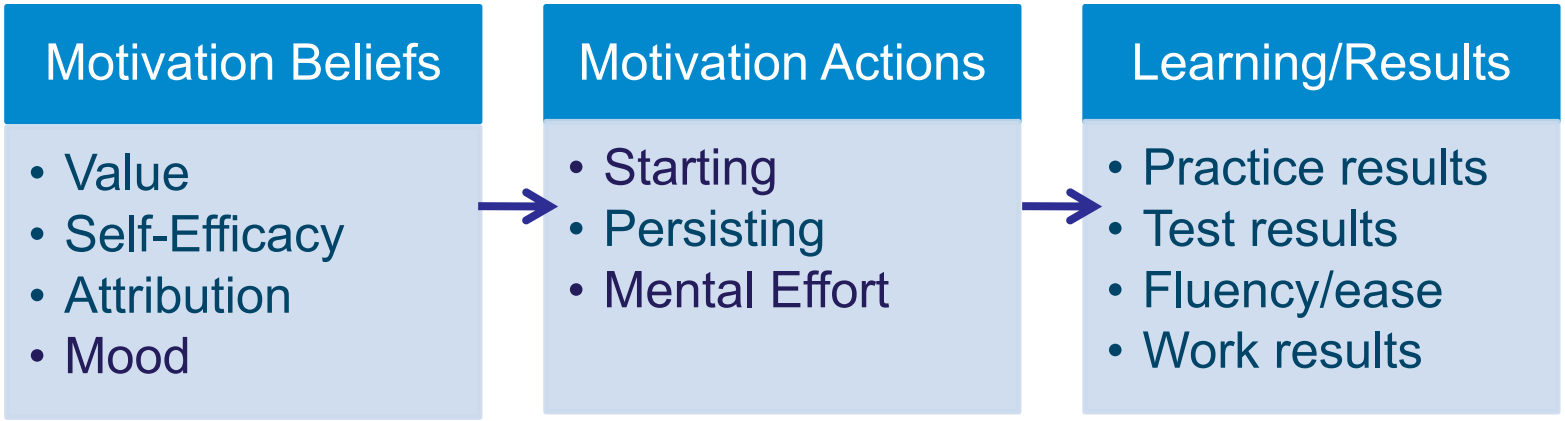

- Show the science
- Show a process
- Make examples

# We know a lot about how expertise works

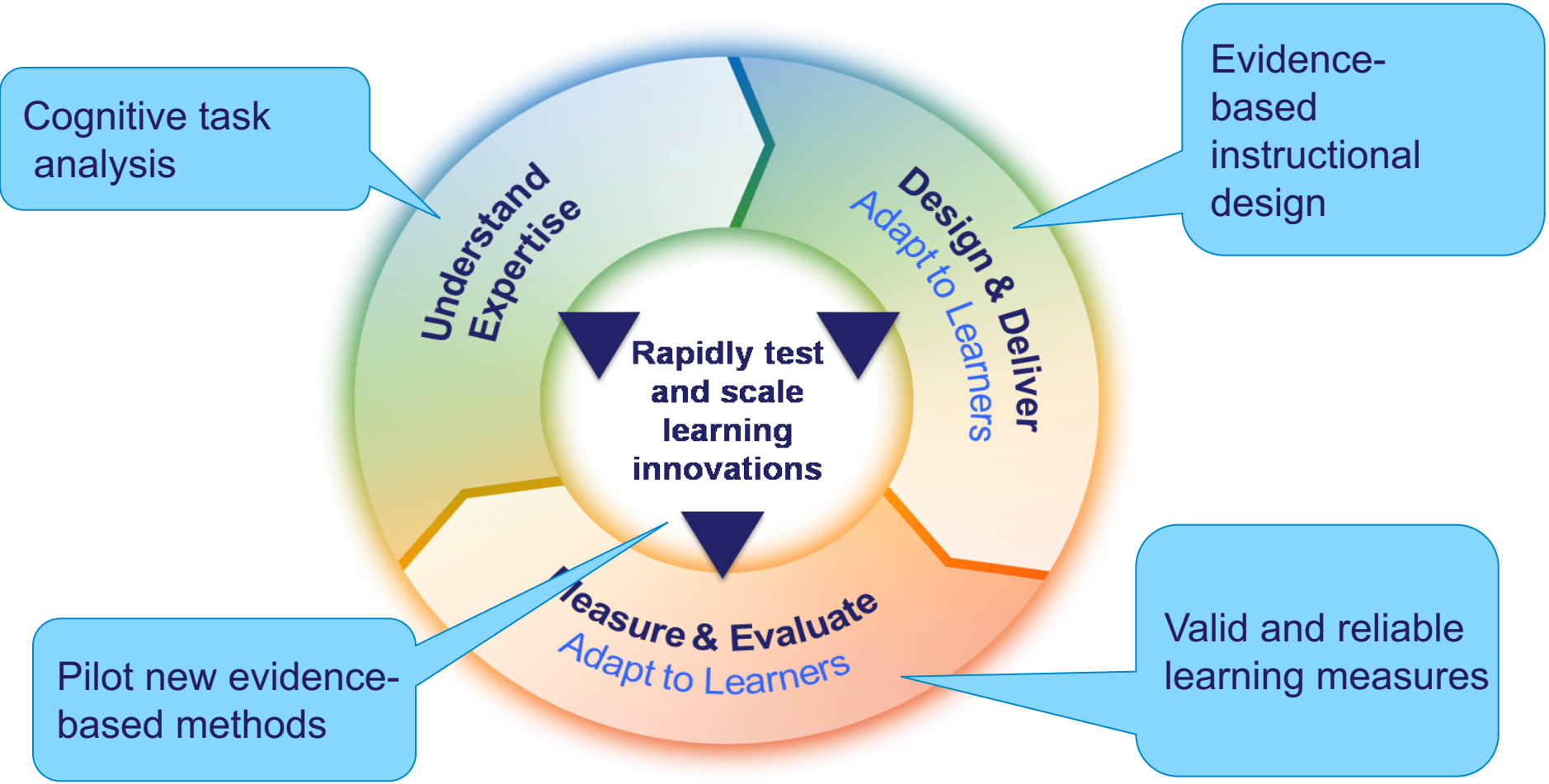
Audio & Visuals aid memory

| Working Memory | Long-Term Memory |
|---|---|
| Short retention | Long retention |
| Audio + video = benefits | Auto-connect to WM |
| Verbal/conscious | Non-verbal/Non-conscious |
| 3-5 things at once | Highly parallel |
| Slow processing | Rapid processing |
| Error-prone | Error-free (with proper training) |
| Highly flexible | Rigid – decisions and tasks must “fit” |
| Can generate new insights/knowledge | |

# We also know quite a lot about motivation



# This allows for a “learning engineering” process



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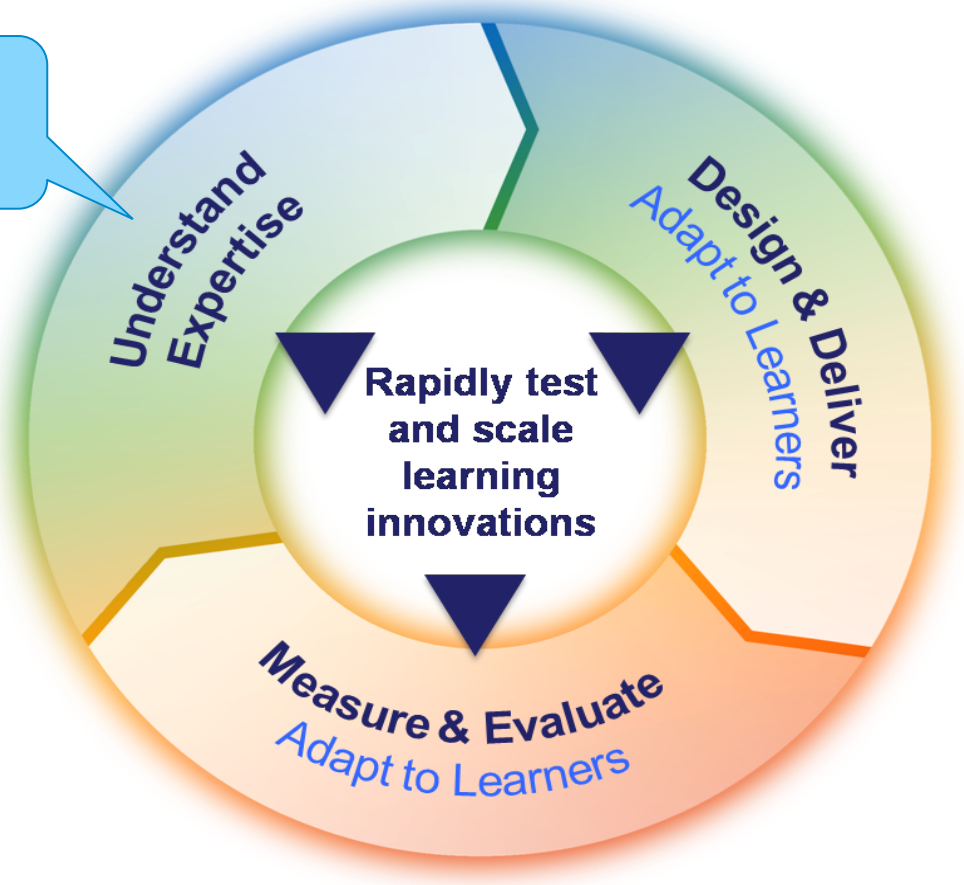
# This allows for a “learning engineering” process

Cognitive task analysis



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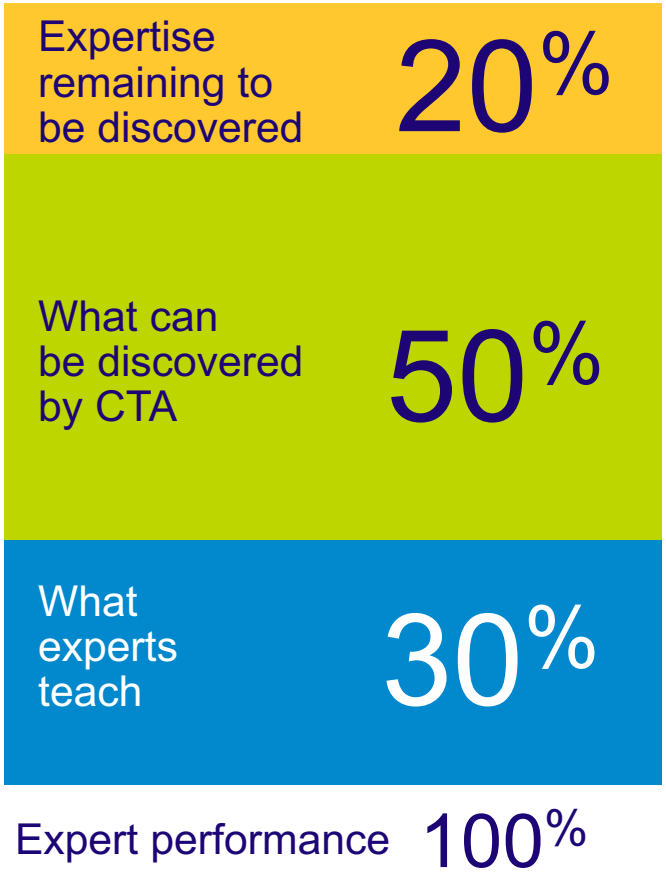
# It requires work to unpack more of expertise: Cognitive Task Analysis (CTA)

CTA unlocks **50%** more of the knowledge required to be an expert in a field




CTA is based on structured interviews with top experts identified with *data*, not opinion.

Interviews identify key decisions and tasks and then the steps behind these.

These interviews are refined to a “gold standard” and used to drive instruction.



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# CTA identifies more expertise than the technical:

## Ex.: Only 4 of 13 critical paralegal tasks typically taught

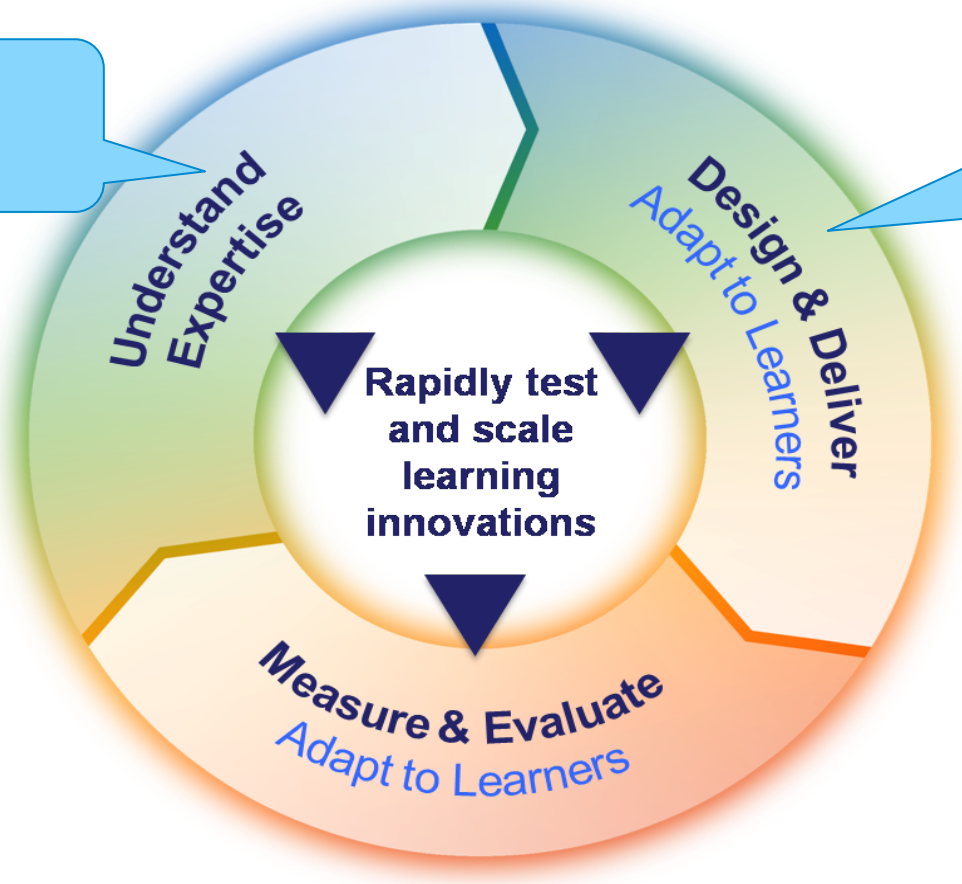
| CTA Expert Identified Activities | Modules in Paralegal Curriculum |
|---|---|
| Intake interview | Unit 1: Justin King Case<br>Unit 2: Pre-Complaint Investigation |
| *Identify conflicts* | ***NOT TAUGHT*** |
| *Determine & comply pre-litigation notices or demands* | ***NOT TAUGHT*** |
| Draft & file a complaint | Unit 3: Drafting the Complaint<br>Unit 4: Pre-Answer Investigation<br>Unit 5: Pre-Complaint Investigation |
| *Motion/Pleadings* | ***NOT TAUGHT*** |
| Discovery | Unit 6: Discovery I<br>Unit 7: Discovery II |
| Pre-trial | Unit 8: Pre-trial Motions & Settlements<br>Unit 9: Getting Ready for Trial |
| *Trial* | ***NOT TAUGHT*** |
| *Post-trial* | ***NOT TAUGHT*** |
| *Settlement* | ***NOT TAUGHT*** |
| *Appellate filings & hearings* | ***NOT TAUGHT*** |
| *Technology Tools: e-Discovery* | ***NOT TAUGHT*** |
| *Technology Tools: Litigation Tools* | ***NOT TAUGHT*** |

# CTA improves on conventional course coverage: Ex.: Only 4 of 13 critical paralegal tasks typically taught

| CTA expert identified activities | Modules in Paralegal Curriculum |
|---|---|
| Intake interview | Unit 1: Justin King Case<br>Unit 2: Pre-Complaint Investigation |
| Identify conflicts | **Not taught** |
| Determine and comply pre-litigation notices or demands | **Not taught** |
| Draft and file a complaint | Unit 3: Drafting the Complaint<br>Unit 4: Pre-Answer Investigation<br>Unit 5: Draft the Answer |
| Motion/Pleadings | **Not taught** |
| Discovery | Unit 6: Discovery I<br>Unit 7: Discovery II |
| Pre-trial | Unit 8: Pretrial Motions and Settlements<br>Unit 9: Getting Ready for Trial |
| Trial | **Not taught** |
| Post trial | **Not taught** |
| Settlement | **Not taught** |
| Appellate filings and hearings | **Not taught** |
| Technology Tools: e-Discovery | **Not taught** |
| Technology tools: Litigation Tools | **Not taught** |

# Evidence-based ID also matters

Cognitive Task Analysis




Evidence-Based Instructional Design



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# Design starts from how expertise gets acquired

| Stage | Implications for Instructional Design |
|---|---|
| Declarative | Clear **information** displays, e.g., job aids, examples, reference material |
| Procedural | Build varied **Practice tasks,** and **rich feedback/coaching** |
| Automated | **Repeated frequent practice** to build speed and accuracy |

# There's specific guidance to make screens/lessons work better

| Principle | Description | Effect size (s.d. units) |
|---|---|---|
| Multimedia | Use relevant graphics and text to communicate content | 1.4 |
| Contiguity | Integrate the text nearby the graphics on the screen – avoid covering or separating integrated information | 1.1 |
| Coherence | Avoid irrelevant graphics, stories, videos, media, and lengthy text | 0.9 |
| Modality | Include audio narration where possible to explain graphic presentation | 0.8 |
| Redundancy | Do not present words as both on-screen text and narration when graphics are present | 0.9 |
| Personalization | Script audio in a conversational style using first and second person | 0.8 |
| Segmenting | Break content down into small topic chunks that can be accessed at the learner's preferred rate | 0.8 |
| Pre-training | Teach important concepts and facts prior to procedures or processes | 0.8 |
| Etc. | Worked examples, self-explanation questions, varied-context examples and comparisons, etc. | ?? |



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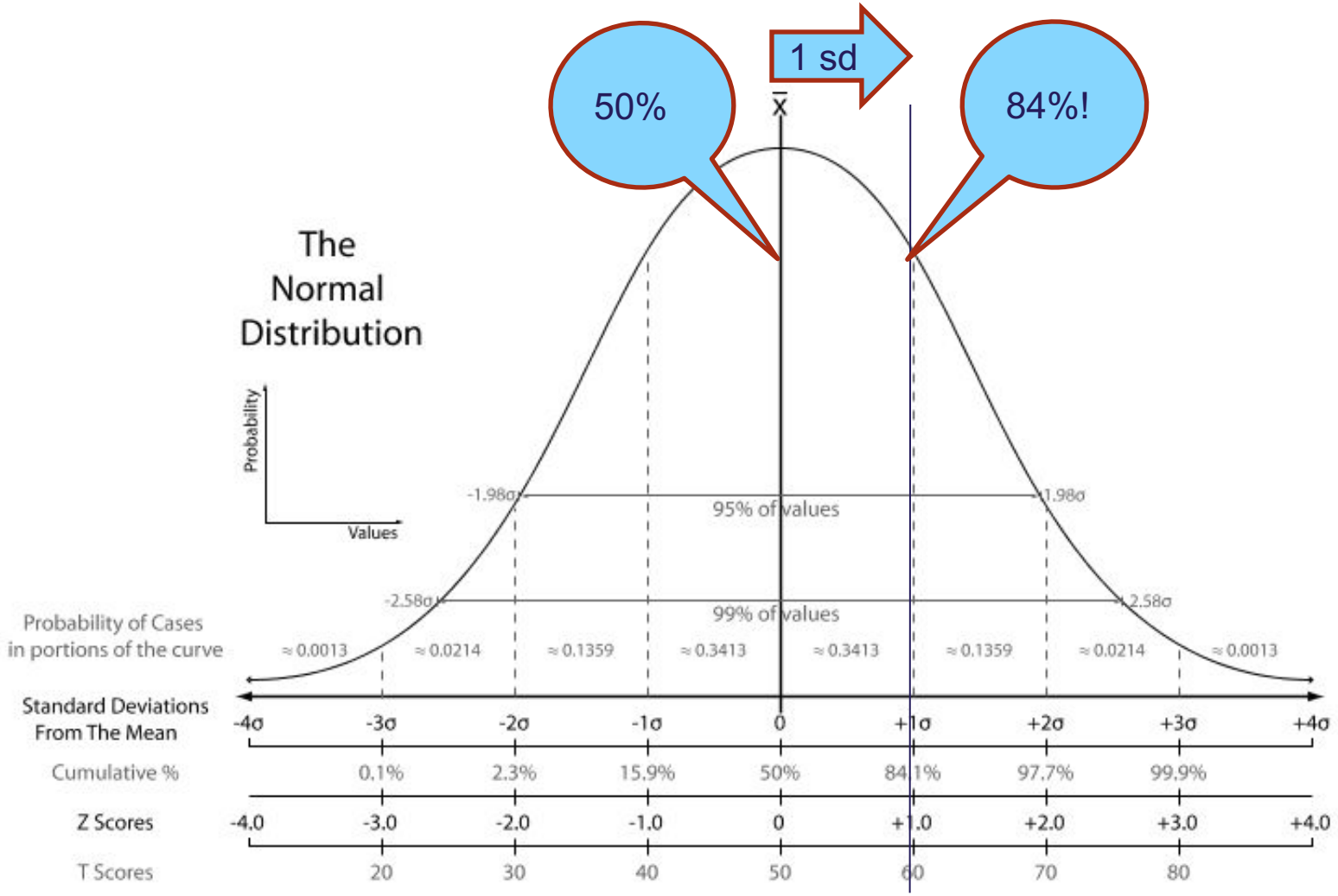
**Source: E-learning and the Science of Instruction, Clark and Mayer, 4th ed., 2016**

# The impact is not small!



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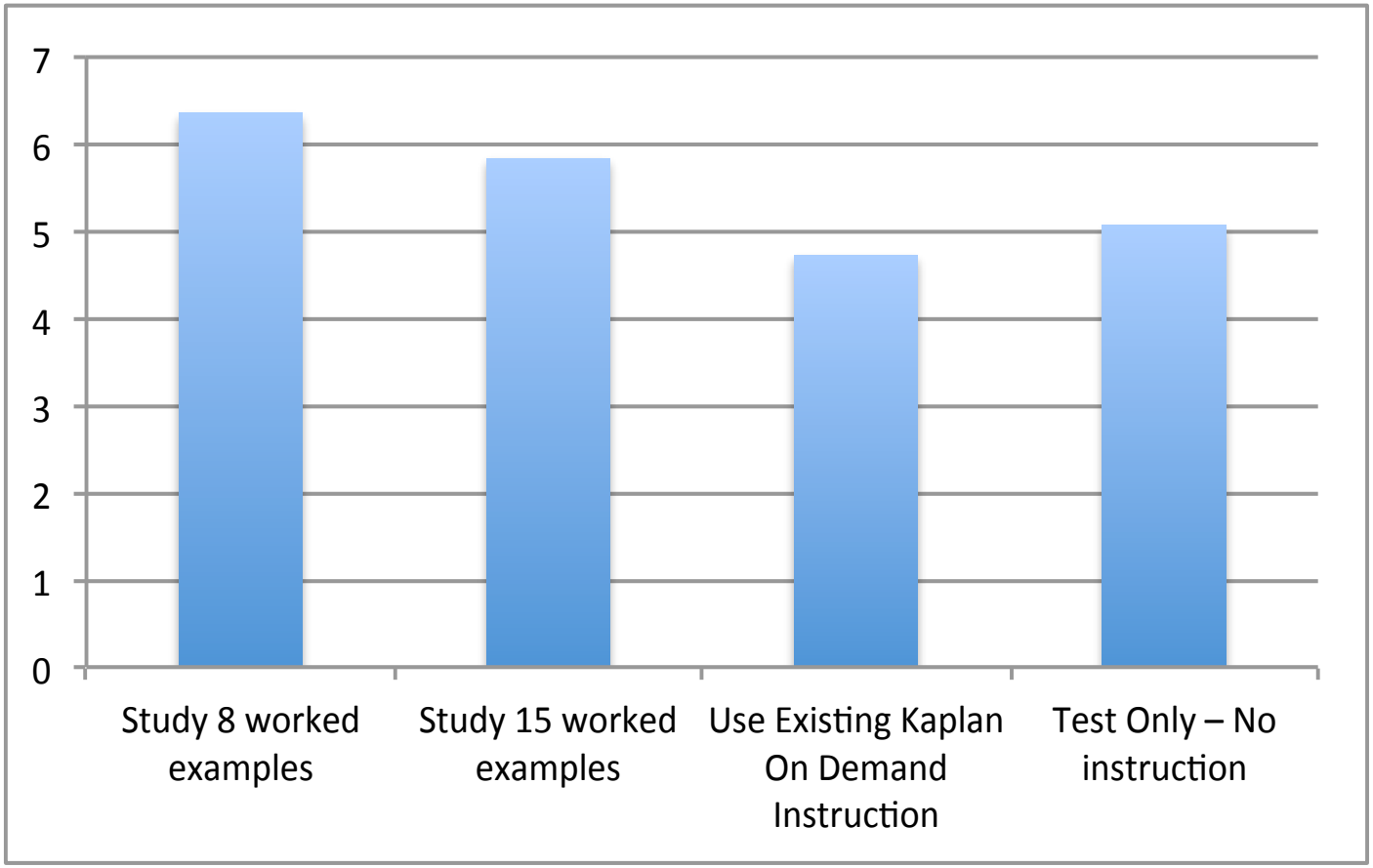
# Evidence shows our intuitions aren't the best guides: LSAT Logical Reasoning example






| | | | | |
|---|---|---|---|---|
| **N** | **153*** | **148*** | **107** | **84** |
| **Time (mins)** | **8.2** | **12.8** | **99.3** | **NA** |

* Significant difference from "No Instruction"



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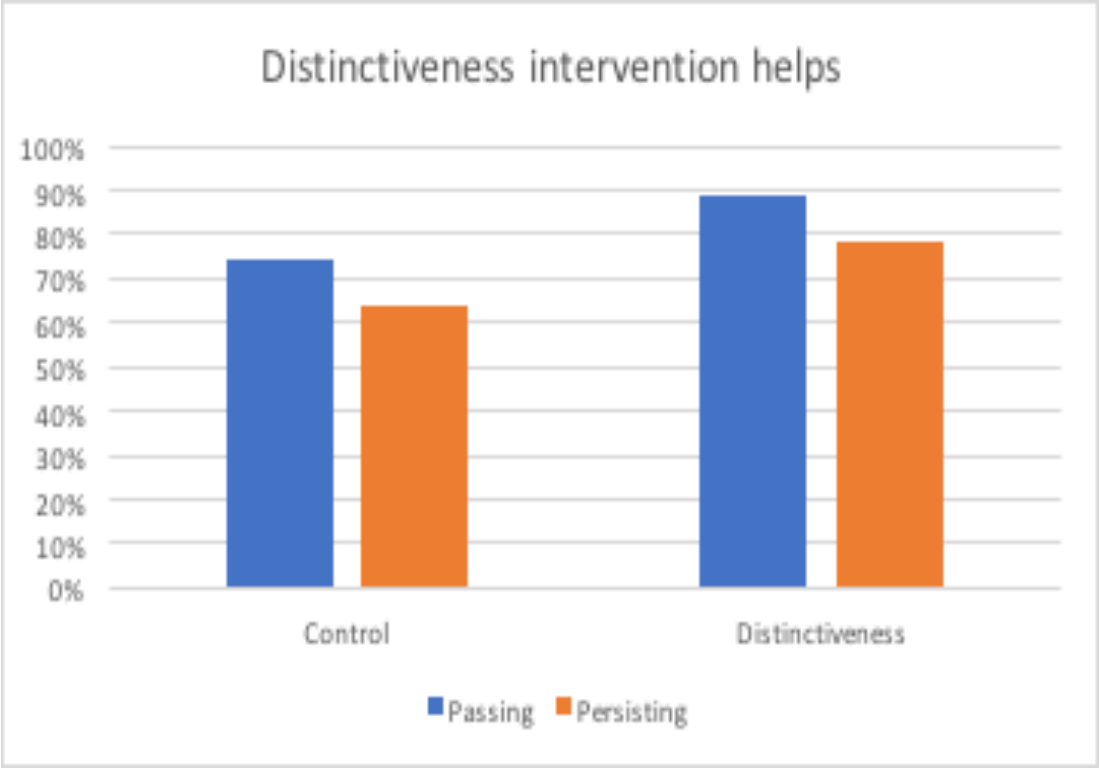
# Motivation/meaning interventions work too

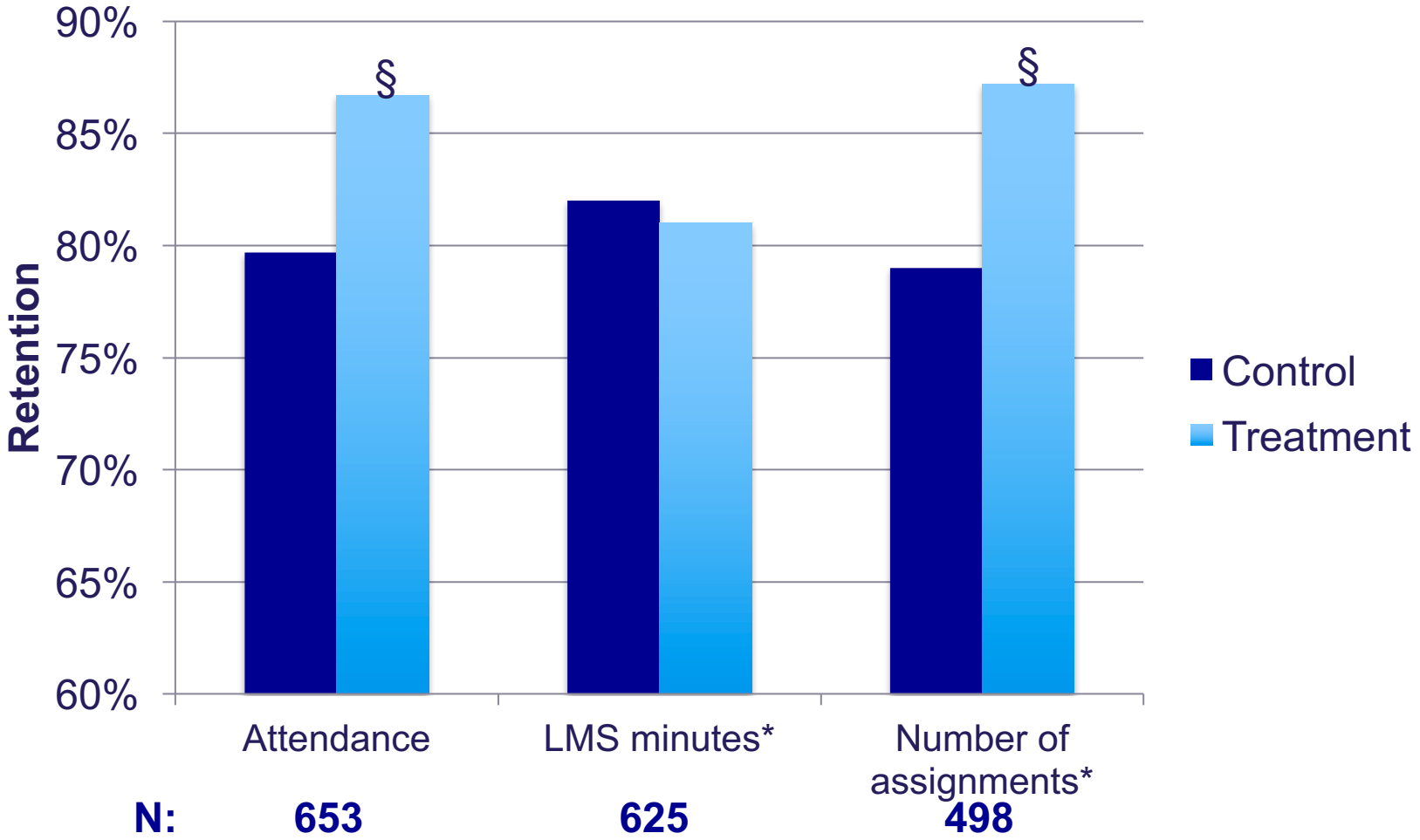



N = 446 N = 302

- Students in both conditions had initial research-backed surveys on their “uniqueness” needs
- Intervention students were asked to write to open-ended prompts on “what it means to be distinct” and “the generation of strategies for meeting their distinctiveness needs in the context of their courses.”
- These students were also asked later to share “strategies for asserting their distinctiveness through scholastic achievement”
- Passing, grades, and persisting to next course all showed significant improvements with the intervention

# *Need* to check:

Impact of faculty dashboards on first year college social studies course




| N: | 653 | 625 | 498 |
|---|---|---|---|

* Improved learning outcomes

§ Improved retention



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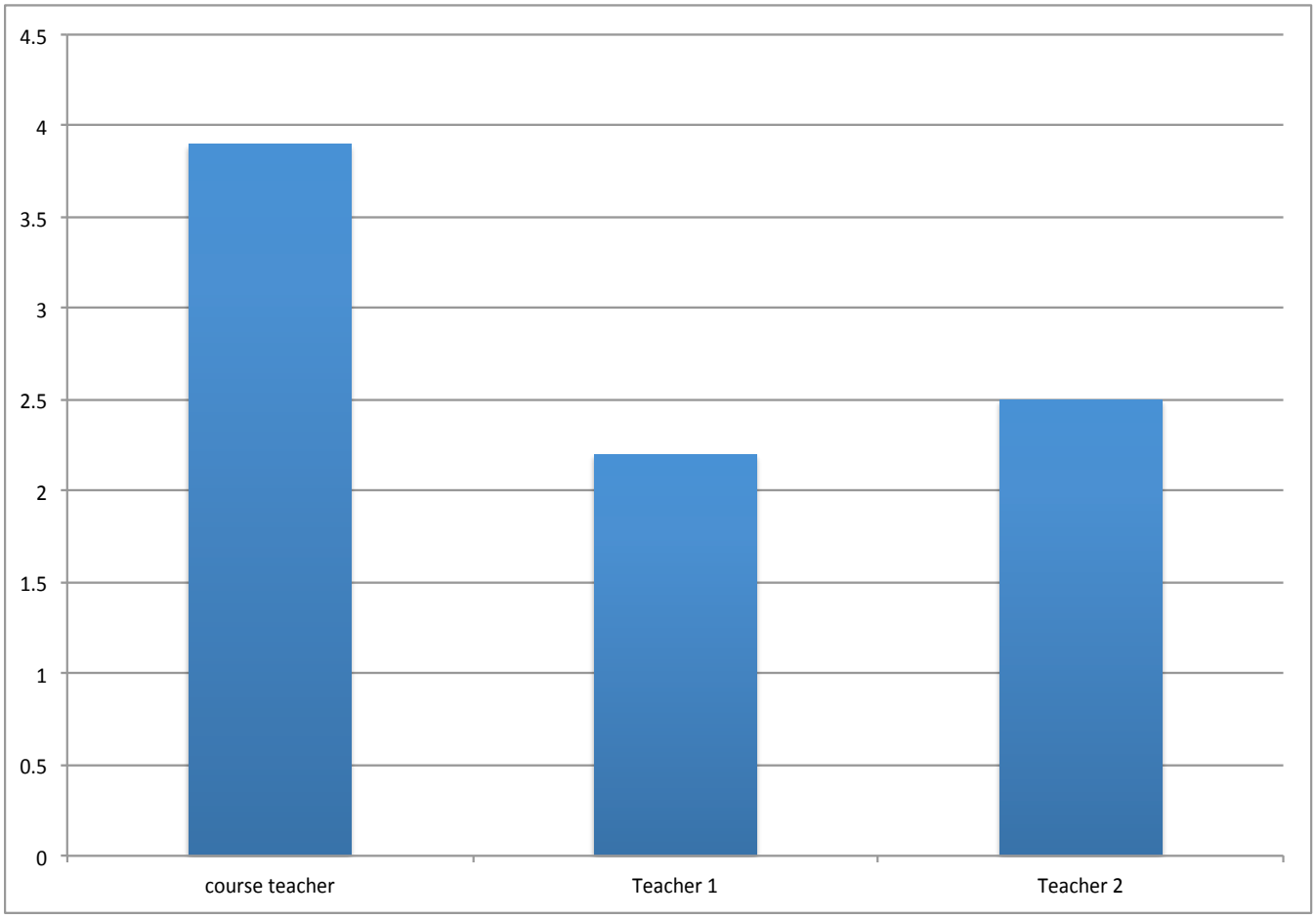
# Have to be careful – what we think is “good” may not be

- Comparison of course teacher view vs. independent teachers’ markings




**Based on 10 randomly selected papers from a writing course**



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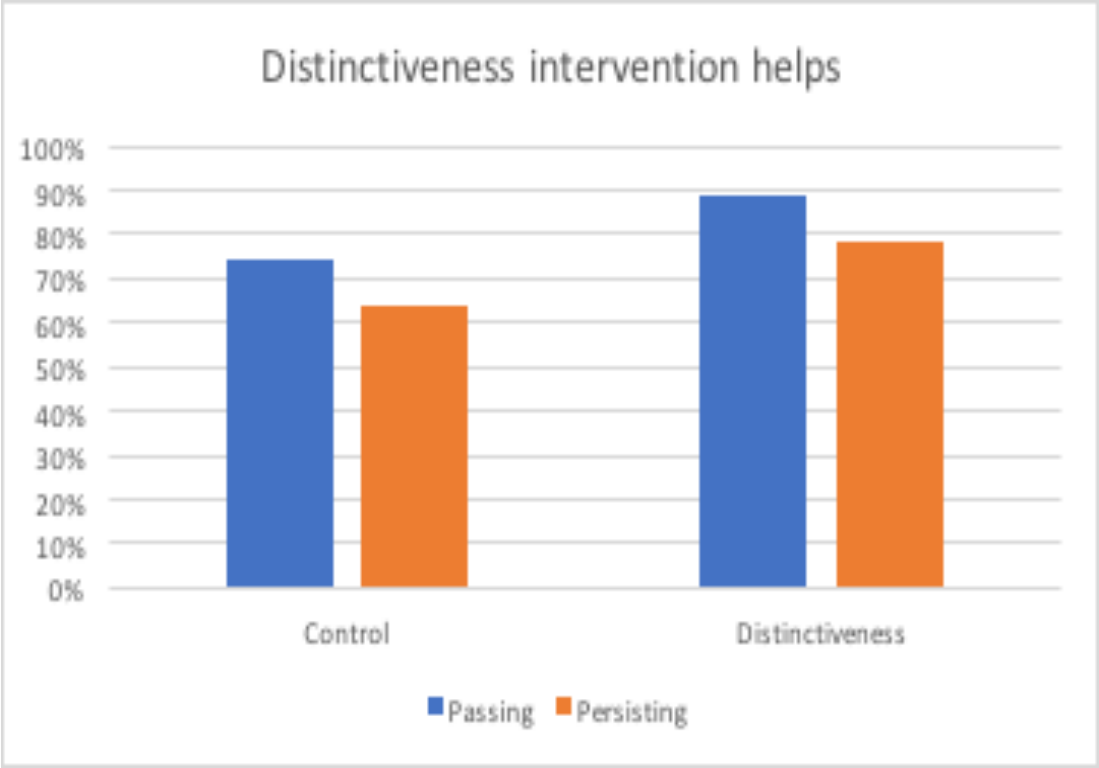


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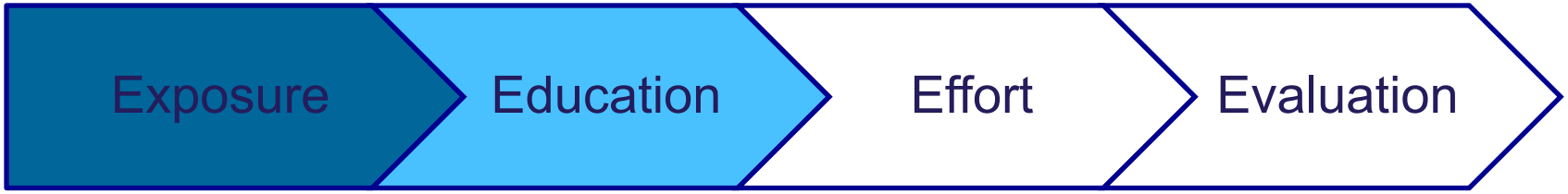
# Education of key personnel is next




- Show the science
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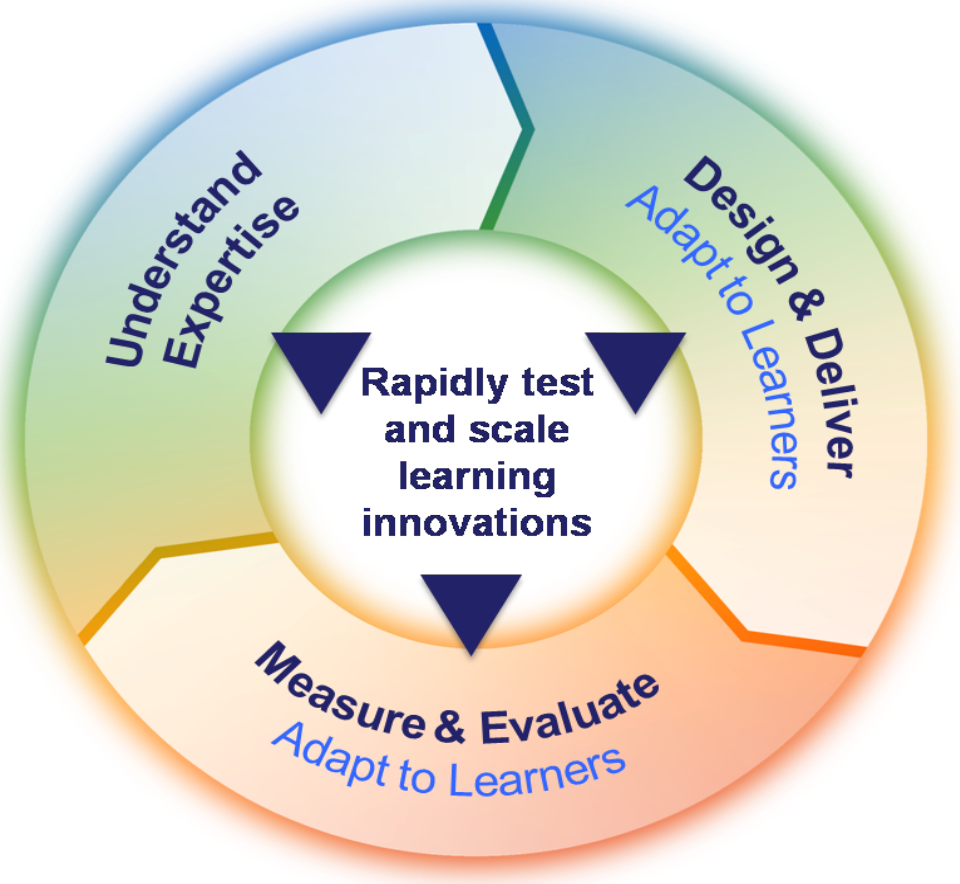
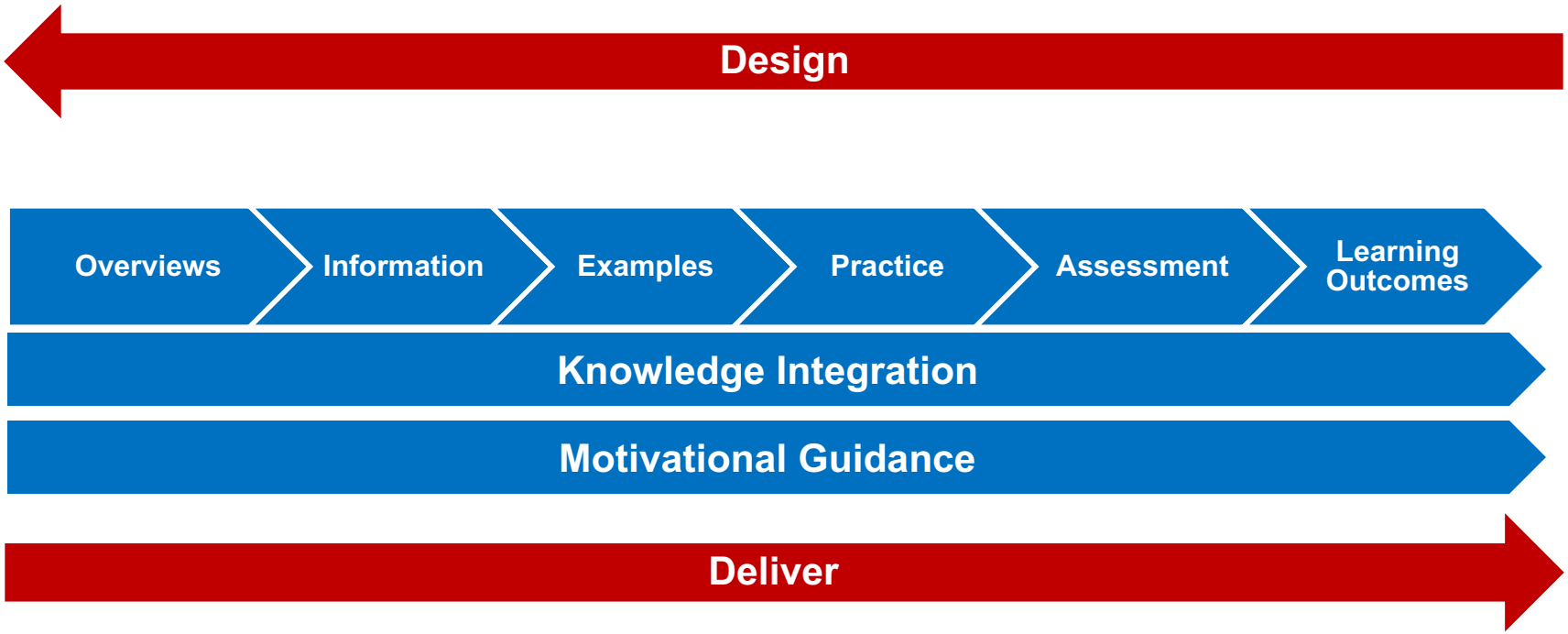
# Need to train for different components of Learning Engineering



# Learning science pushes us to backwards design



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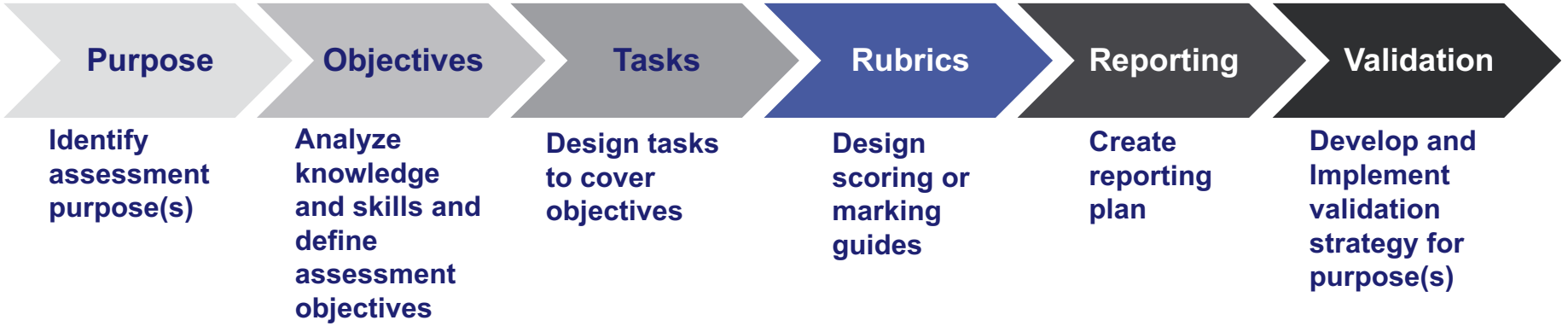
# Research gives us clearer guides to help with hard outcomes

| Knowledge Component | | Practice/Assessment |
|---|---|---|
| Procedure | | Decide when to use; perform the steps |
| Supportive Knowledge | Fact | Recall fact in task context; spaced repetition |
| | Concept | Classify, identify or generate examples and non-examples |
| | Process | Identify causes of faults in a process; predict events in a process |
| | Principle | Decide if principle applies; predict an effect; apply principle to solve a problem, explain a phenomenon or make a decision |

# Building valid and reliable assessments “the Kaplan Way”



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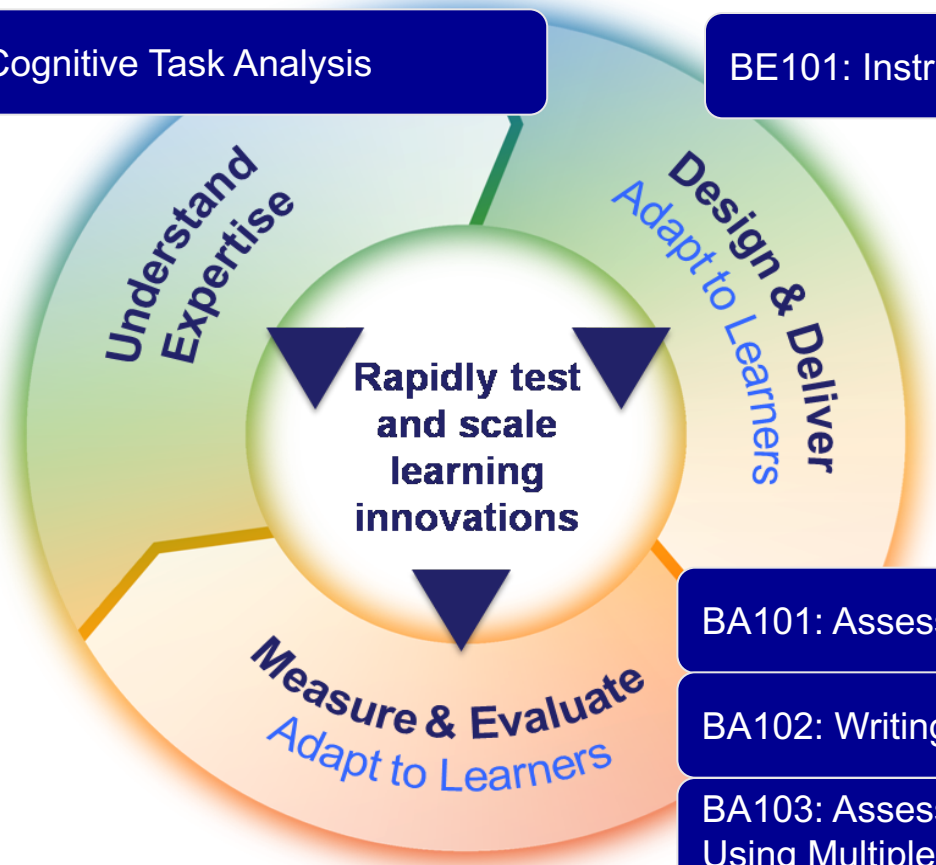
# Training for developers is key




BE201: Cognitive Task Analysis

BE101: Instructional Design

BA101: Assessment Blueprint Development

BA102: Writing Effective Multiple Choice Items (BETA)

BA103: Assessing Complex Knowledge and Skills Using Multiple Choice Questions (BETA)

Building Valid Short Answer and Performance Tasks

Assessment Validation

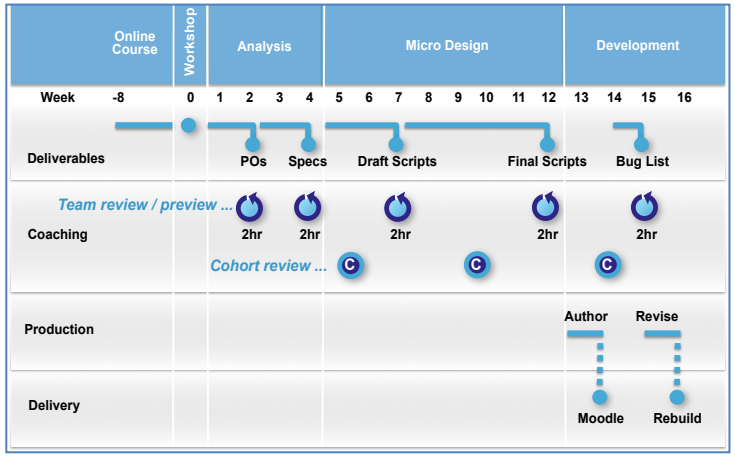
**Launched**

**In development**

**In the queue for 2017**

# It's real work to alter how a large number of IDs build. . .





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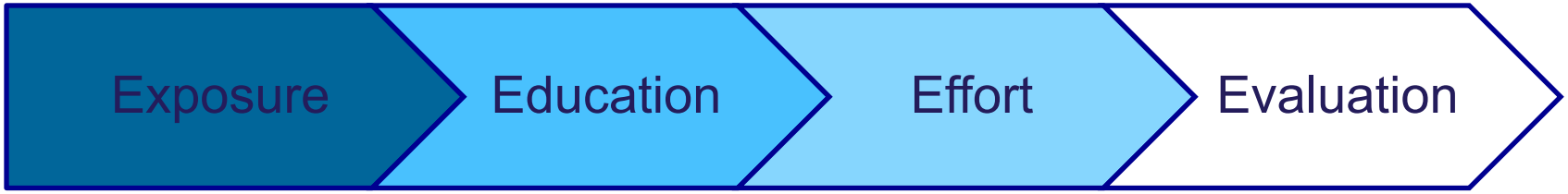
# Serious effort to expand across organization




- Show the science
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- Refine process
- Train IDs
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- Wider use
- Community
- Set GM goals

# We knew there was (is) much potential to improve*




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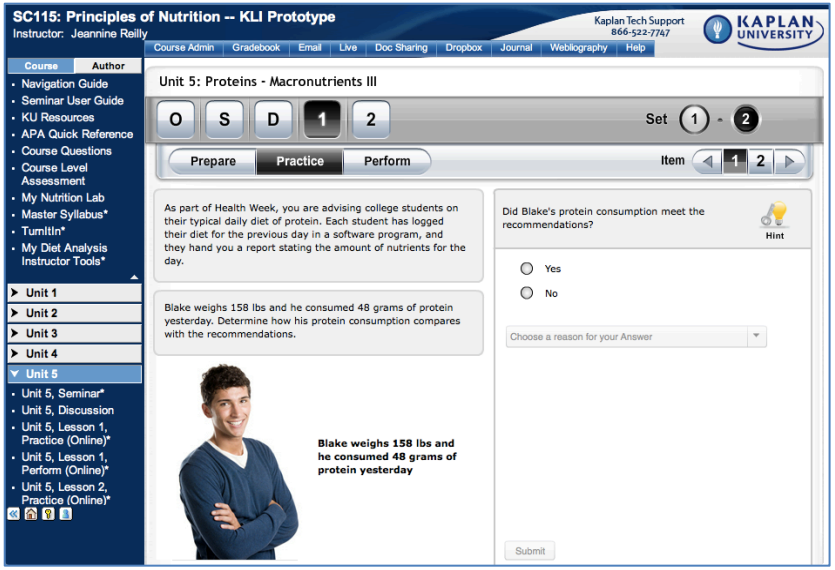
*Example: Ratings from Kaplan Way for Learning checklist, applied to 9 Kaplan products

# More use of learning science principles does help

## Existing courses


## Redesigned courses



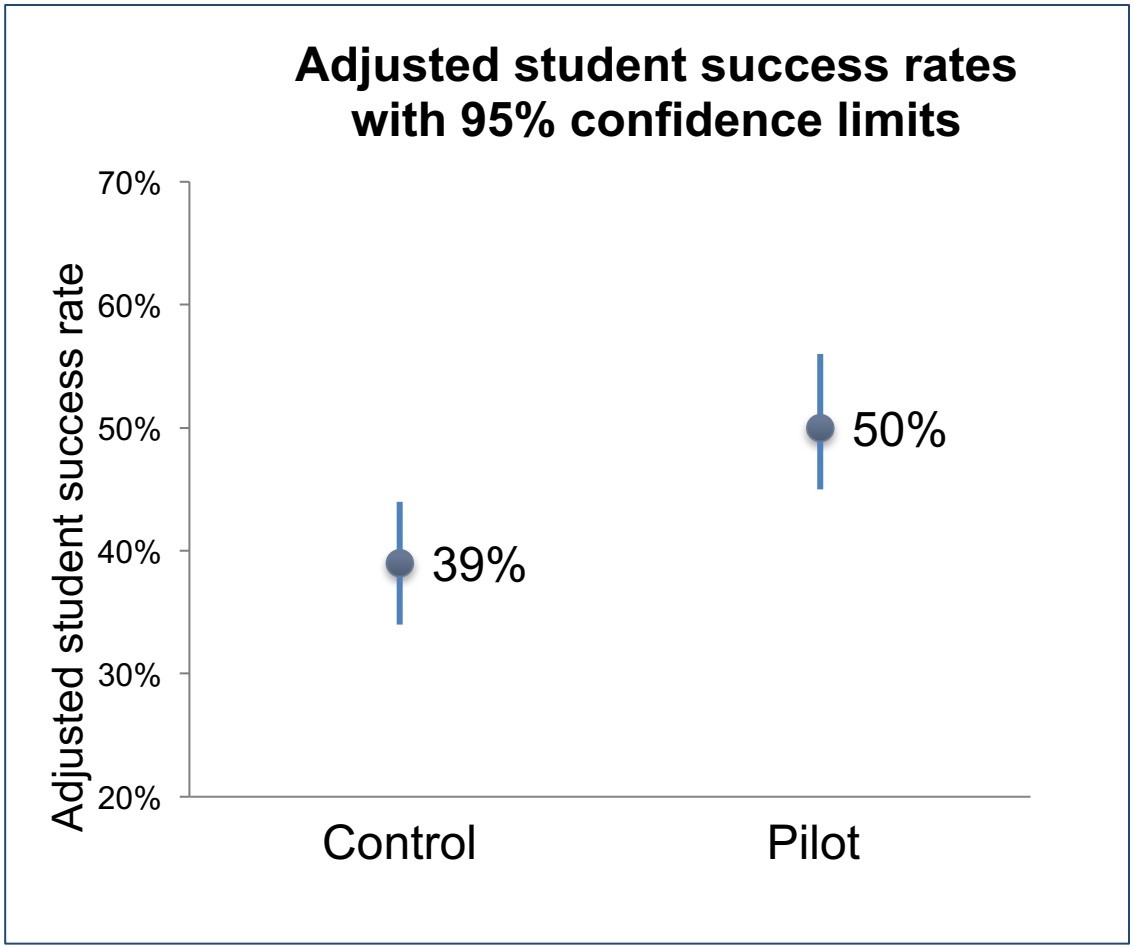

### Read, Write, Discuss

- Outcomes and content not precisely aligned
- Limited demonstrations, worked examples, and practice
- General assessment rubrics
- High reliance on discussion boards

### Prepare, Practice, Perform

- Outcomes and content aligned
- One lesson per objective
- Demonstrations and worked examples
- Practice, feedback before assessment
- Detailed scoring guides
- Less discussion/more practice
- Standard instructor materials
- Monitoring and support for motivation

# Result: much greater student success




- **11%** higher success rate
- **28%** increase
- Students in redesigned courses were **1.6** times more likely to be successful

*Wald Chi-Square: 10.42, df=1, n=895, Sig<.001.*



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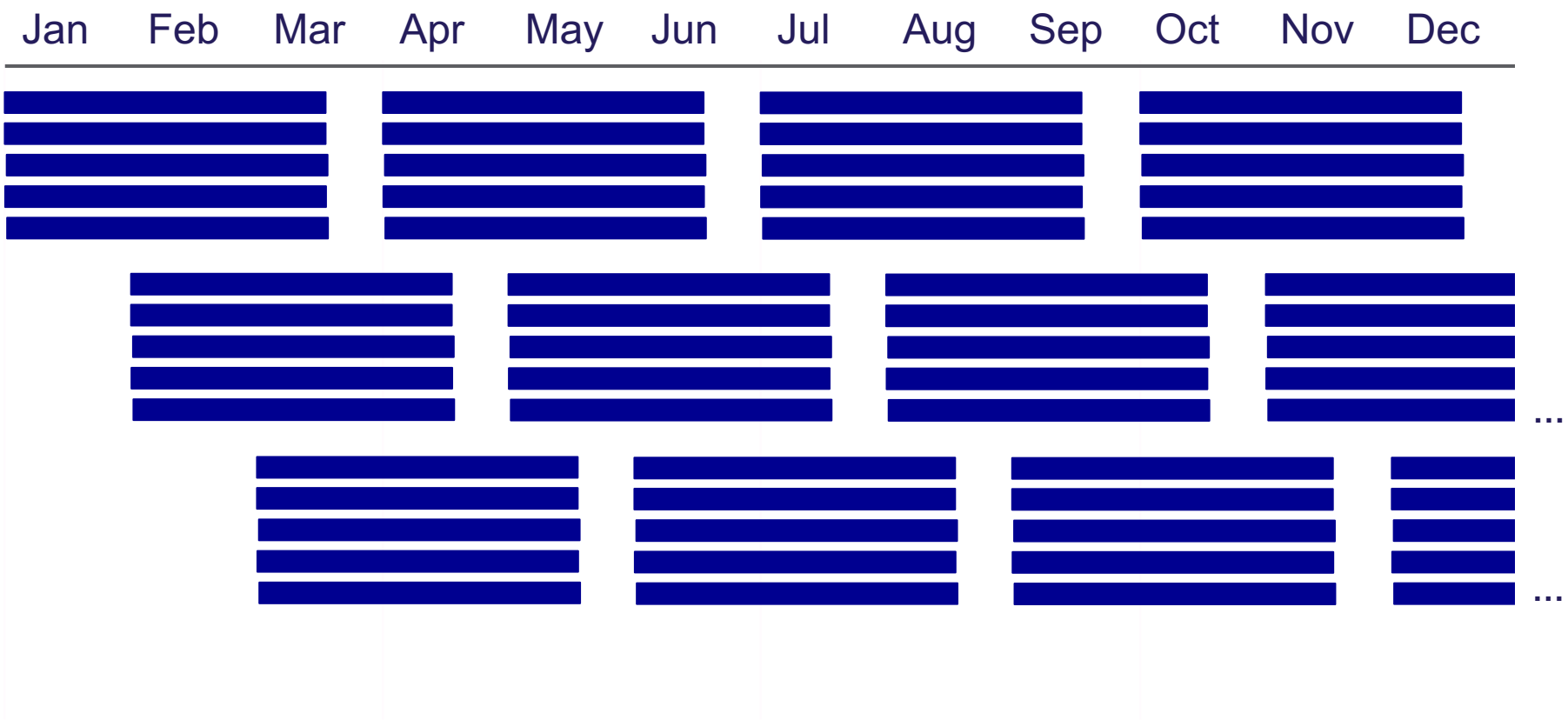
# With scale, we can run many tests

**ILLUSTRATIVE**




For illustration purposes: Based on CM 107 (College Composition)
Each band represents 8 sections, each with 25 students (a total of 200 students)



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# With scale, we have the option to continue to improve further

| Adaptive | Assessment & CLA | Learning Strategies | Media Principles | Motivation & Self Efficacy | Social Norming | Worked Examples | Others | Open Courses |
|---|---|---|---|---|---|---|---|---|
| SmartBook | CLA Re-Scoring | Self-Explanation | Advanced Organizers | Judgments of Learning | Badging | Early | Section Size | Challenge Exams |
| MyLab | Assessment | Self Summary | Coherence | Motivational Priming | Iconographs | Later | Orientation | |
| | | Self Test | Continuity | Self Efficacy | | | Faculty Dashboard | |
| | | | Modality | | | | | |
| | | | Multimedia | | | | | |
| | | | Redundancy | | | | | |



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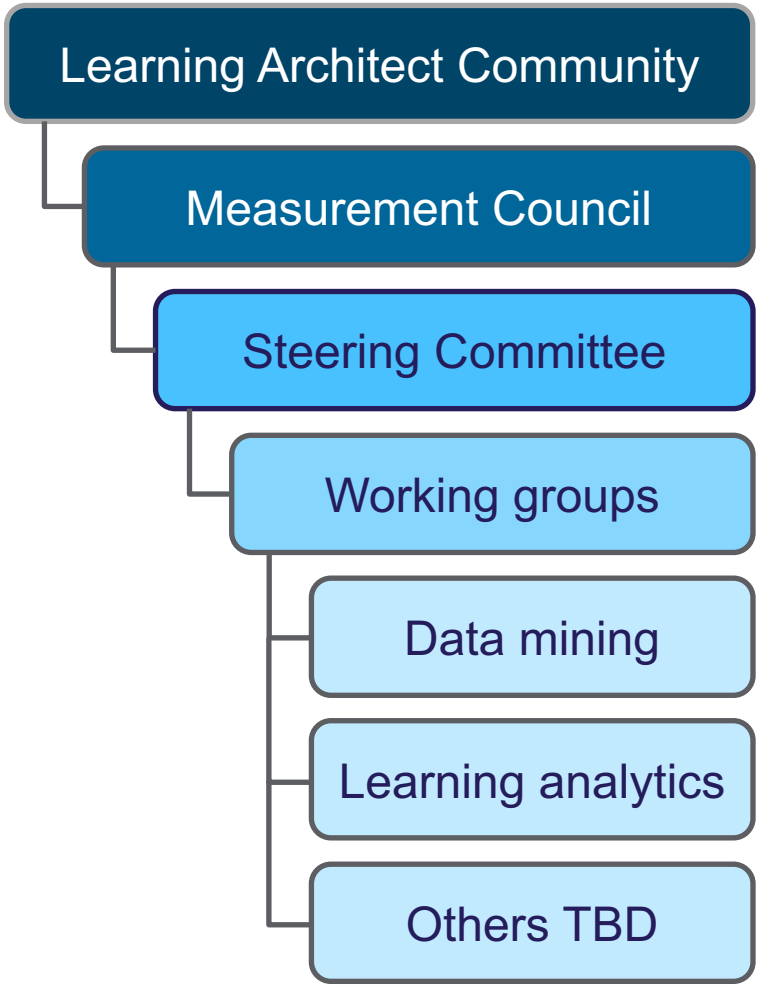
# Established a Learning Architect Community: E.g., to look in detail at learning measurement issues




**Anyone connected with learning at Kaplan**

**Anyone interested in learning measurement at Kaplan**

**Key leaders who drive learning measurement within their business units**

**Small groups focused on specific measurement issues and challenges**



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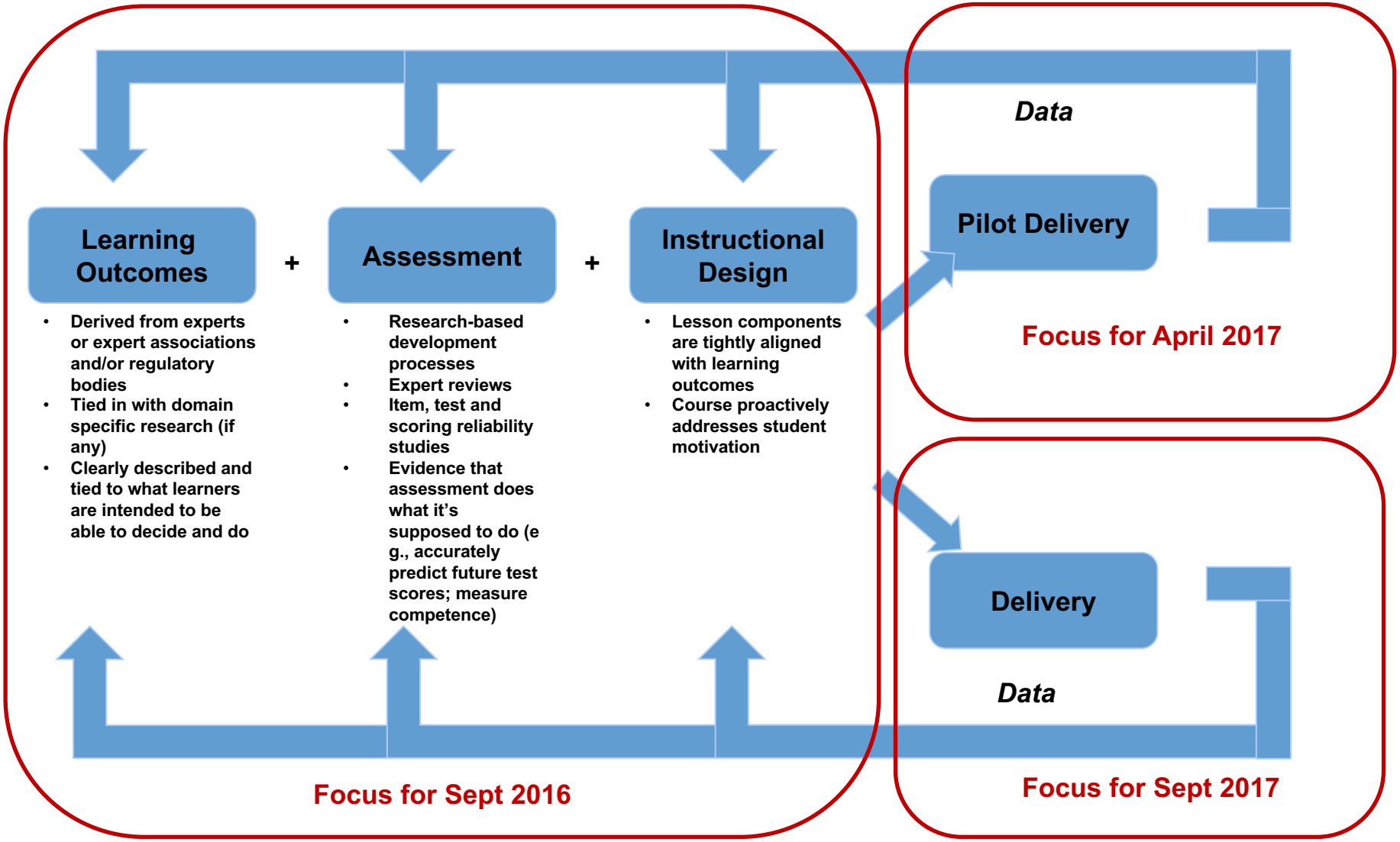
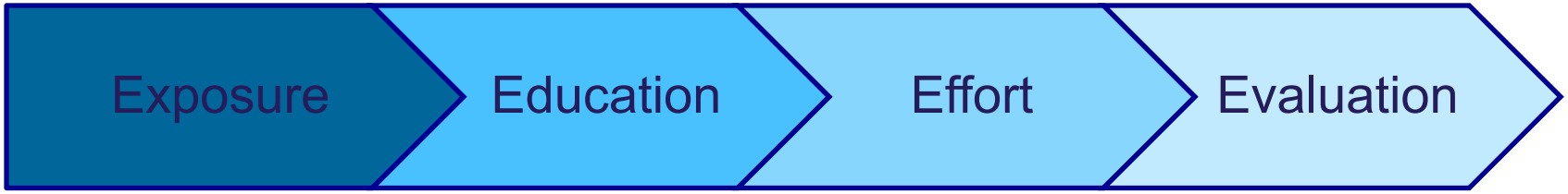
# Established a General Manager review process to focus on learning tradeoffs and essential ingredients for quality



# Over time, need to continue evaluation




- Show the science
- Show a process
- Make examples

- Refine process
- Train IDs
- Market exposure

- Wider use
- Community
- Set GM goals

- Initial tools/rubric
- Evidence review
- Detailed measures

# We put in place a “Kaplan Way” checklist:

| Category | Rating | Rank |
|---|---|---|
| 1. Objectives | | |
| 2. Assessment | | |
| 3. Practice | | |
| 4. Examples | | |
| 5. Information | | |
| 6. Multimedia | | |
| 7. Overviews | | |
| 8. Integration | | |
| 9. Motivation | | |
| 10. Organization | | |
| 11. Usability | | |
| 12. Personalization | | |
| TOTAL SCORE (1 - 12) | | |

# It is specific about lesson design. . .

| **Objectives** |
| --- |
| • Learning objectives are **stated.** |
| • Learning objectives are stated as **performance** objectives. |
| • Learning objectives are **aligned.** |
| **Assessment** |
| • Assessment **matches** objectives. |
| • Assessment measures acquisition of **knowledge components**. |
| • Detailed **scoring guides** are provided for constructed responses. |
| **Practice** |
| • Practice **matches** assessment. |
| • Practice develops **knowledge components**. |
| • **Feedback** corrects errors and misconceptions. |

# And a lot more!

| Integration |
| --- |
| • **Presentations** make connections among knowledge components. |
| • **Questions** during presentation and practice promote **self-explanation.** |
| • Prompts for **discussions** promote **explanation** of knowledge components. |
| **Motivation** |
| • Content difficulty is addressed to regulate **confidence.** |
| • Performance is attributed to **effort**. |
| • The tone is **positive.** |
| **Organization** |
| • Content is organized **by objective**. |
| • Knowledge components are covered in **prerequisite order**. |
| • Content alternates between **presentation and practice**. |

# This means systematic attention from teams

## Product Quality Report: Product Overview

**<Course Number>:**

<Narrative descript
including format (o
based, blended, etc
prerequisites, gene
goals, and other fe

## Product Quality Report: Ratings Summary

| Category |
|---|
| 1. Objectives |
| 2. Assessment |
| 3. Practice |
| 4. Examples |
| 5. Information |
| 6. Multimedia |
| 7. Overviews |
| 8. Integration |
| 9. Motivation |
| 10. Organization |
| 11. Usability |
| 12. Personalization |
| TOTAL SCORE ( |

## Product Quality Report: Comments Summary

| Category | |
|---|---|
| 1. Objectives | |
| 2. Assessment | |
| 3. Practice | |
| 4. Examples | |
| 5. Information | |
| 6. Multimedia | |
| 7. Overviews | |
| 8. Integration | |
| 9. Motivation | |
| 10. Organization | |
| 11. Usability | |
| 12. Personalization | |
| OVERALL | |

## Product Quality Report: Appendix

**CATEGORY:** <e.g., Overviews>

**STRENGTH (or OPPORTUNITY):** <short description here>

<Add one screen capture per slide to illustrate strengths or opportunities of the product>

4



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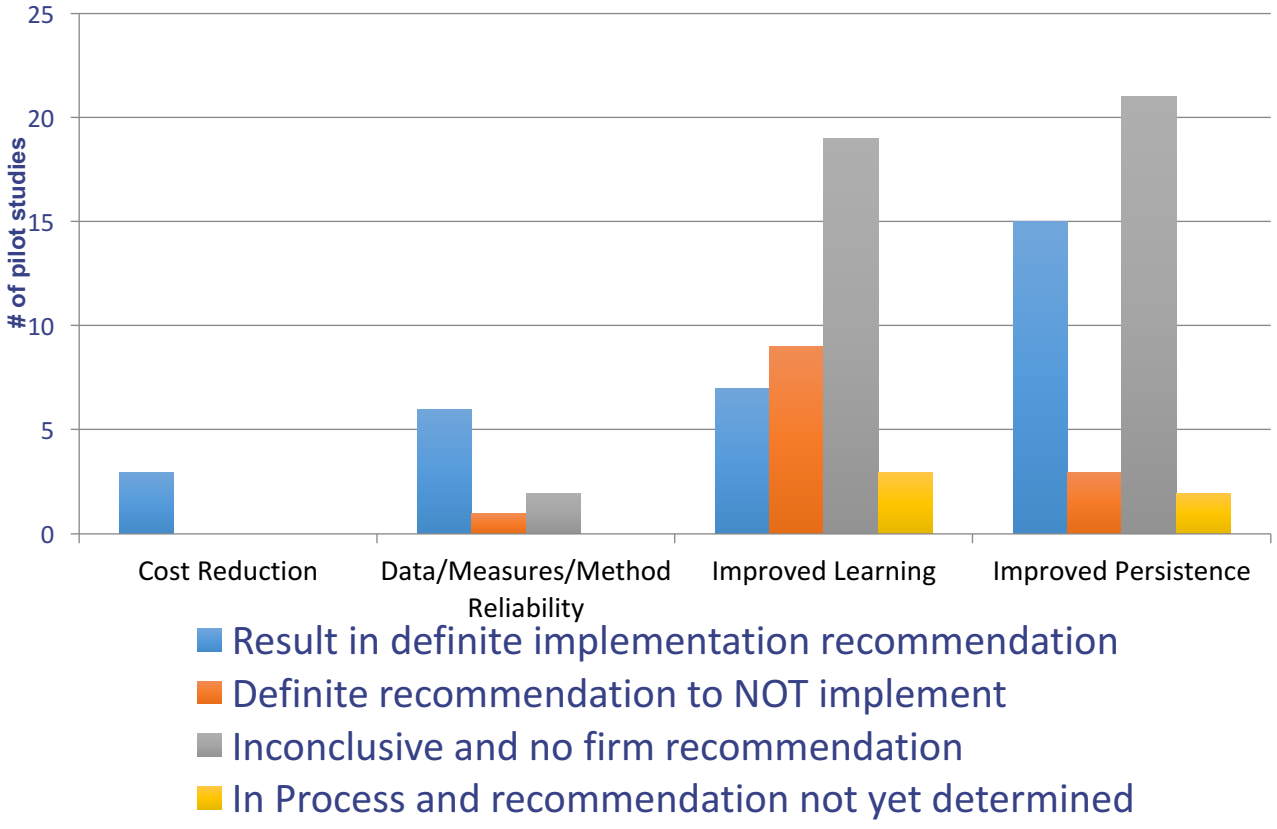
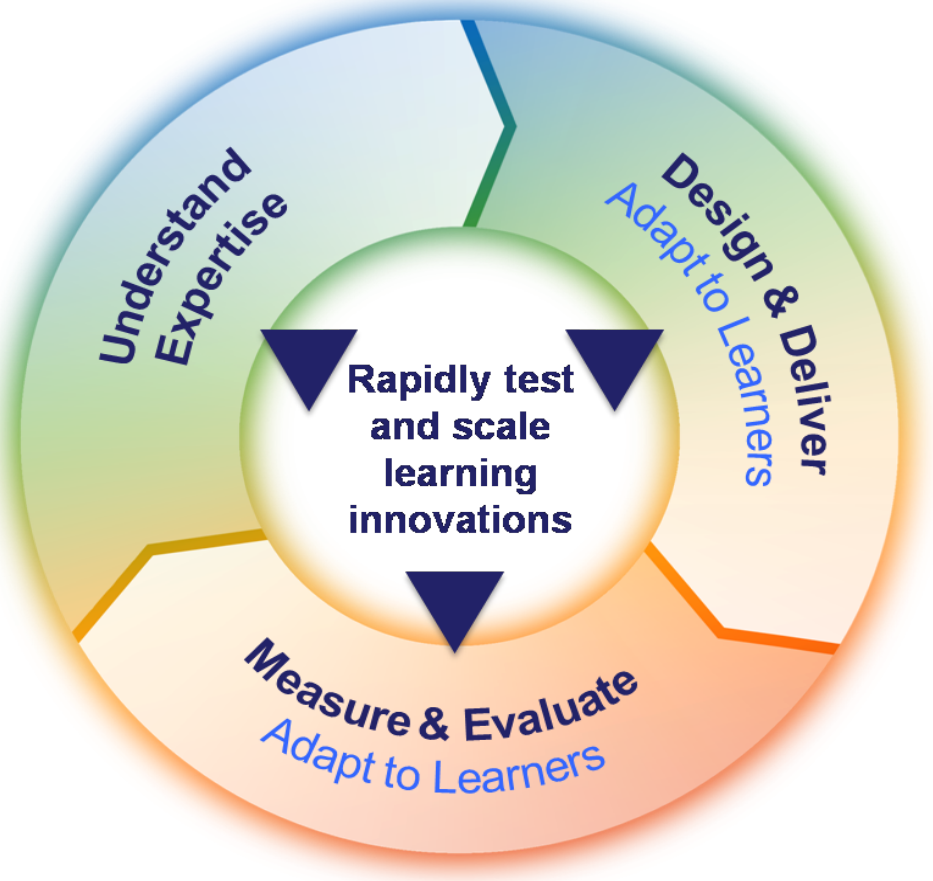
# At scale, we can look at the overall outcome of many pilots

## Kaplan University Research Pipeline Focus and Progress (11/2015)




- Four key focus areas; Dozens of randomized control trials over past two years.
- Several early studies proved inconclusive – led to more structured pilot design process.
- Yielding several “go / “no go” decisions based on evidence of improved outcomes.

# *All* this matters if you're after good "learning engineering"



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# Where to find out more?

- Location of course on using (and downloading) a learning science checklist:

  http://goo.gl/f1RCAu

- Bror's Blog for more on "learning engineering":

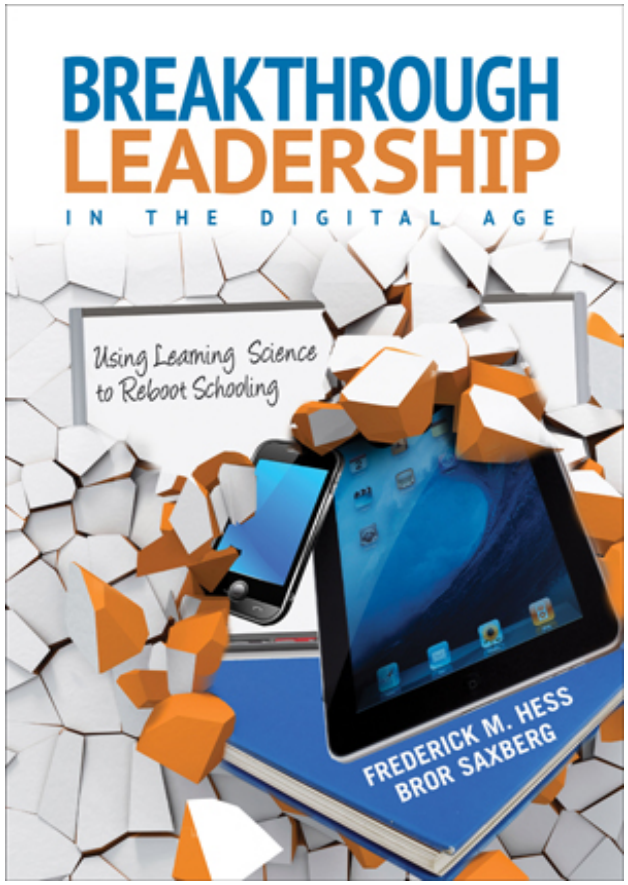
  http://www.kaplan.com/brorsblog

- Recent Ithaka article on applying learning engineering at KU:

  https://goo.gl/lIhRZM

- Contact me:

  bror.saxberg@kaplan.com

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## Why We Need Learning Engineers

Chronicle of Higher Education



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