KAPLAN

"Learning engineering":
The Art of Using Learning Science at Scale to Lift Performance
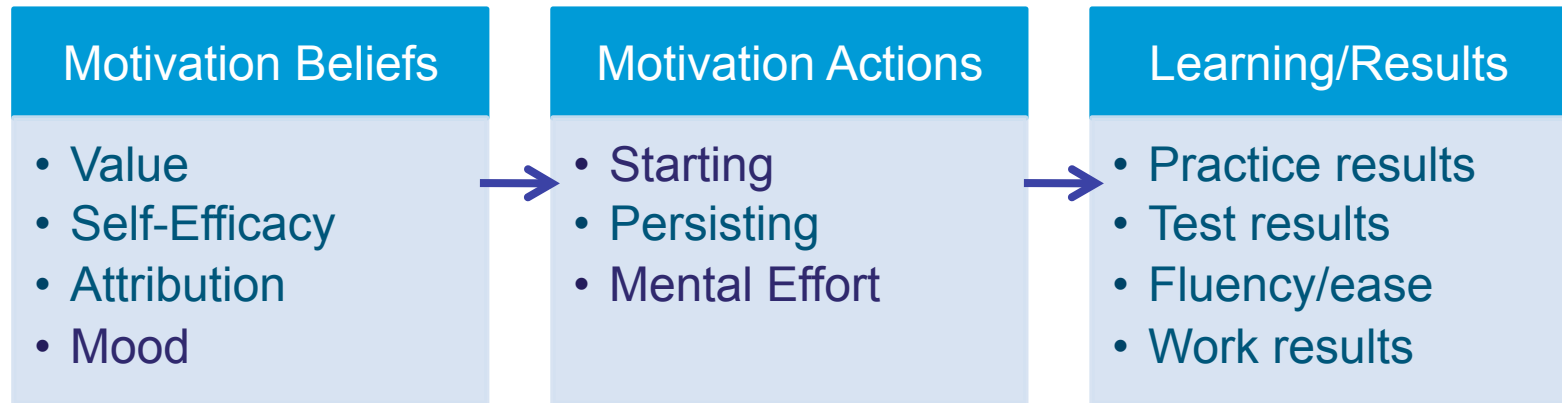
October 2015

We know a lot about how expertise works
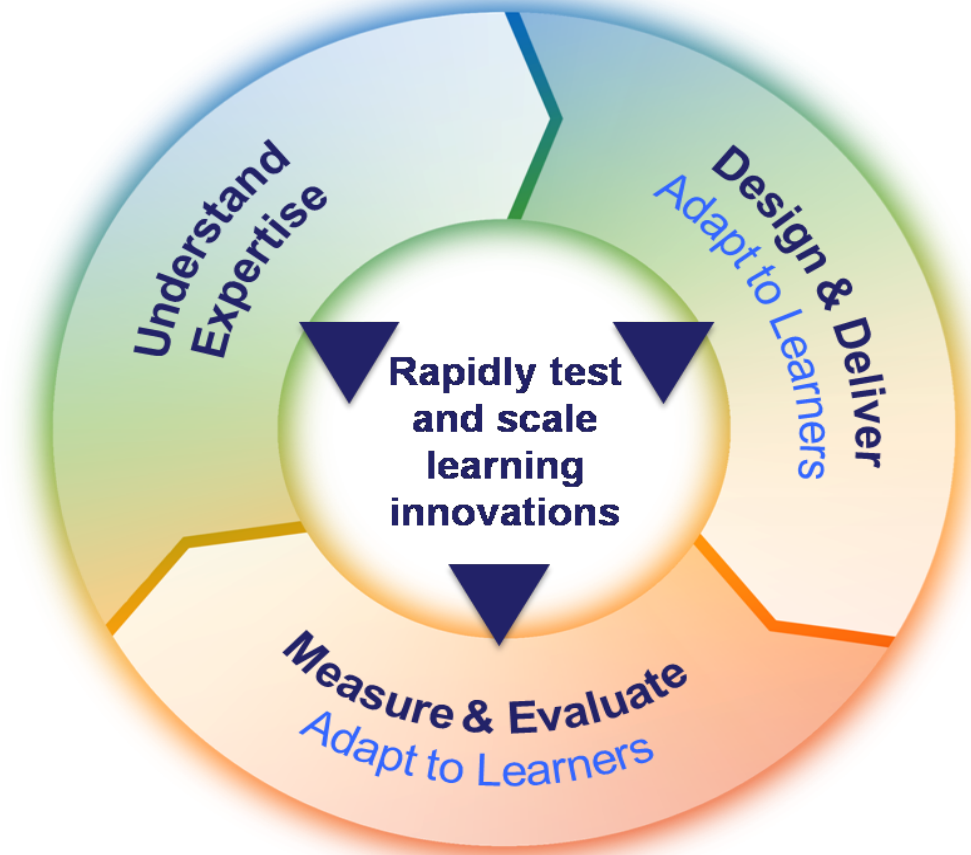
Working Memory and Long-Term Memory

Audio ——

Visual ——

KAPLAN

We also know more about motivation. . .

| Motivation Beliefs	Motivation Actions	Learning/Results
• Value • Self-Efficacy • Attribution • Mood	• Starting • Persisting • Mental Effort	• Practice results • Test results • Fluency/ease • Work results

KAPLAN

This allows for a "learning engineering" approach
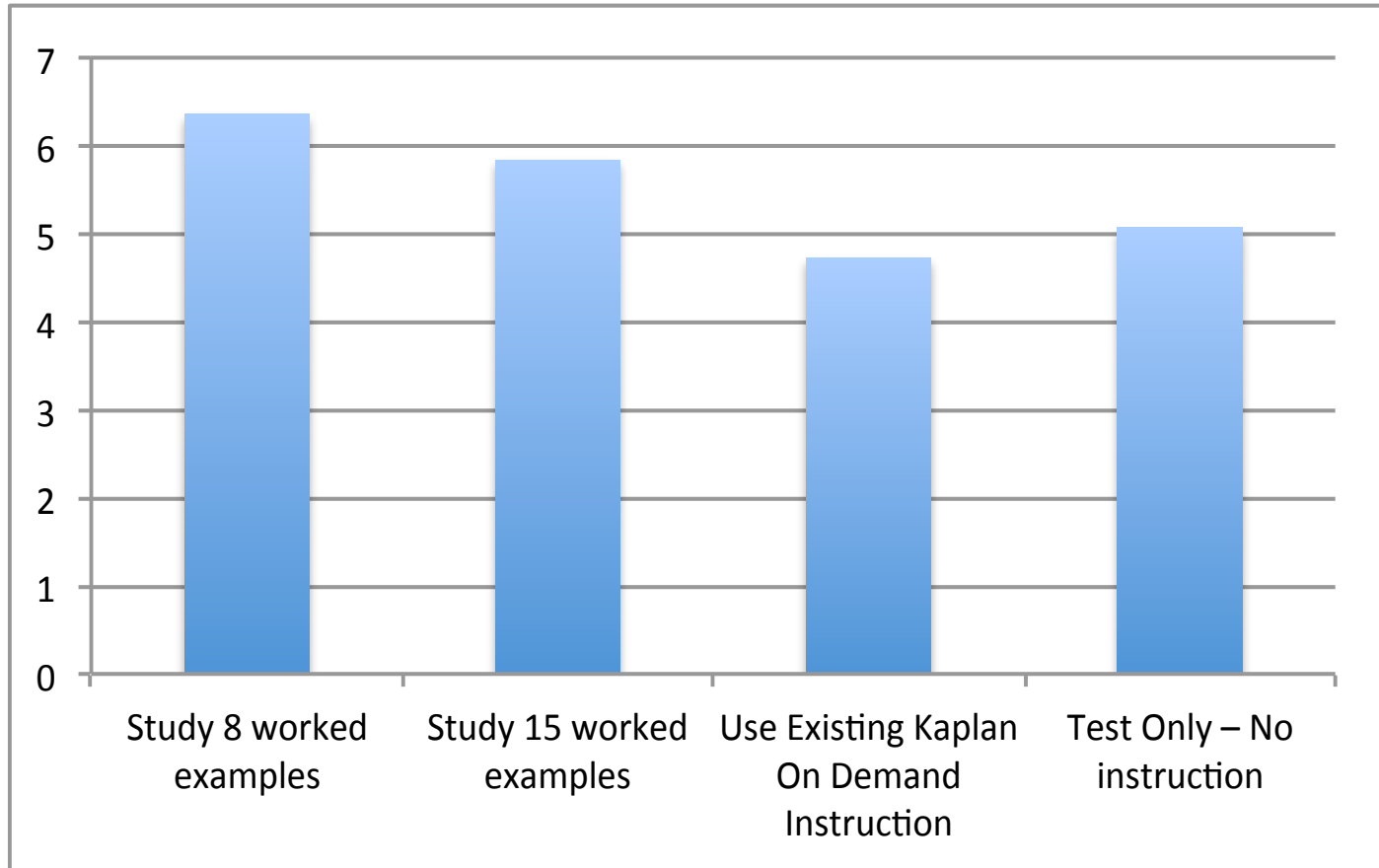
KAPLAN

Have to be careful – what we think is "good" may not be

- Comparison of course teacher view vs. independent teachers' markings
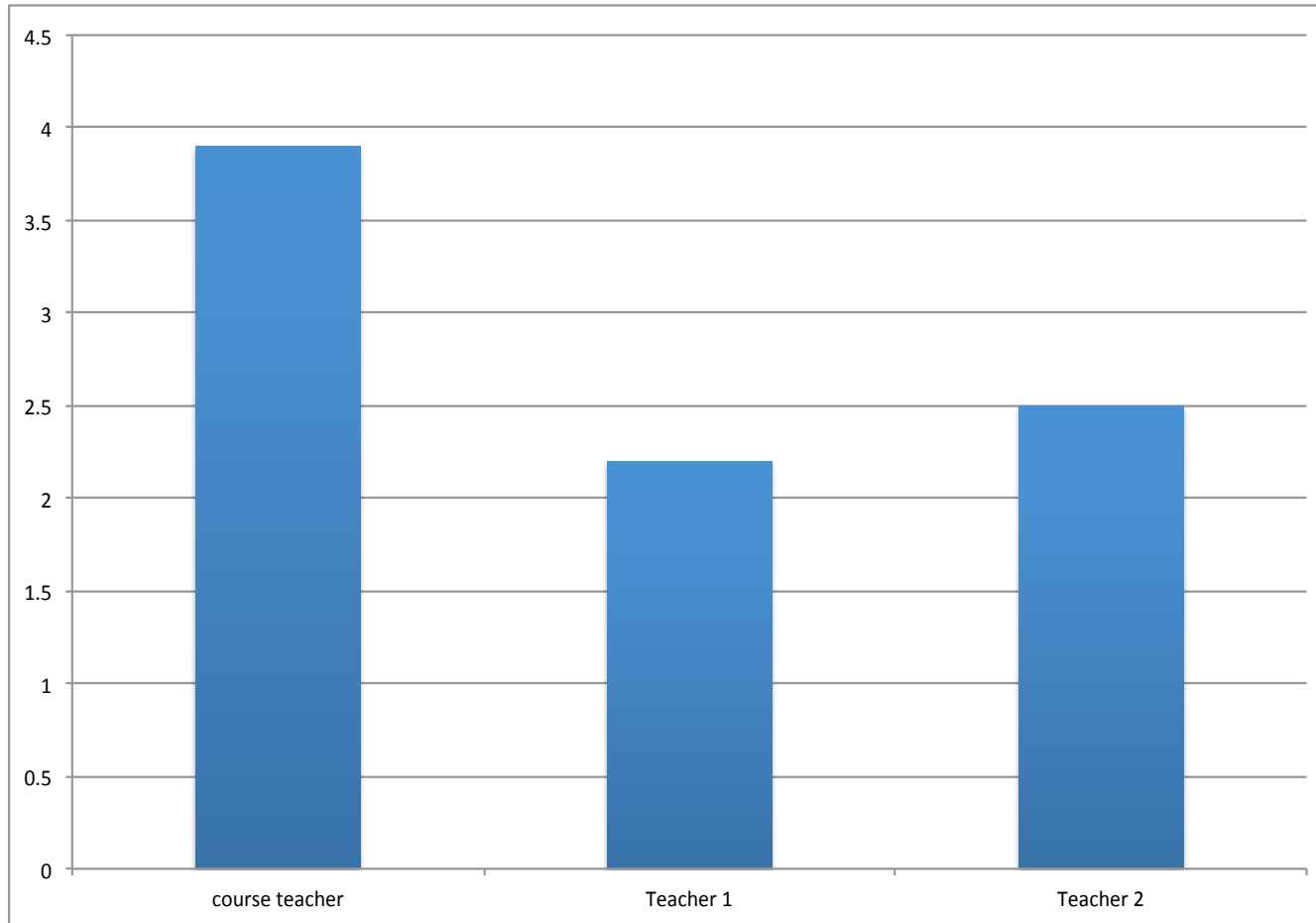
Based on 10 randomly selected papers from a writing course

KAPLAN

The evidence also shows our intuitions aren't the best guides
LSAT Logical Reasoning example

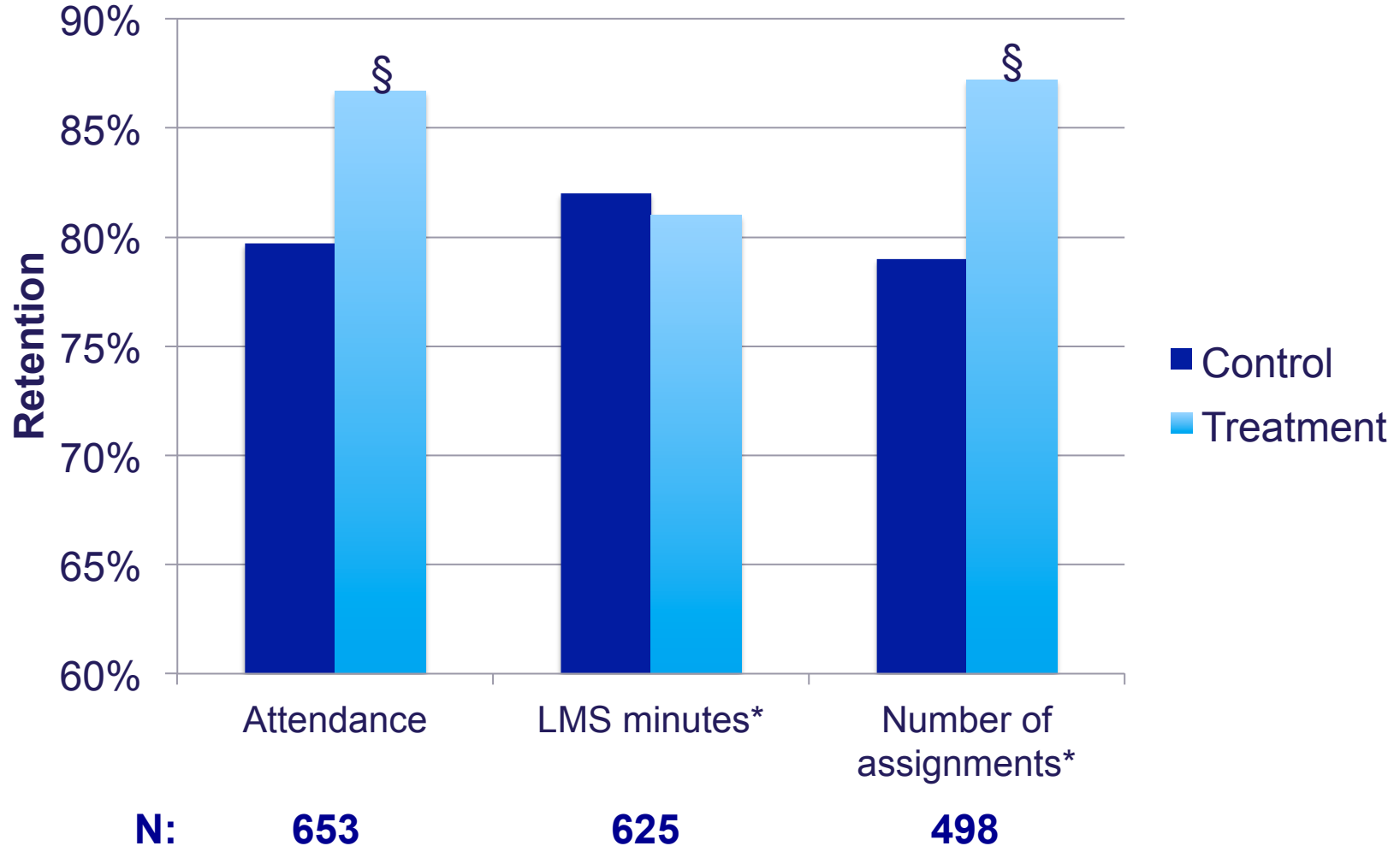| N	153*	148*	107	84
Time (mins)	8.15	12.8	99.32	NA

* Significant difference from "No Instruction"

KAPLAN

Faculty supports do help students – but need to check

Impact of faculty dashboards on first year college social studies course

* Improved learning outcomes

KAPLAN

There is much evidence about how to improve learning

Principle	Description	Effect size (s.d. units)
Multimedia	Use relevant graphics and text to communicate content	1.5
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	1.3
Modality	Include audio narration where possible to explain graphic presentation	1.0
Redundancy	Do not present words as both on-screen text and narration when graphics are present	.7
Personalization	Script audio in a conversational style using first and second person	1.3
Segmenting	Break content down into small topic chunks that can be accessed at the learner's preferred rate	1.0
Pre-training	Teach important concepts and facts prior to procedures or processes	1.3
Etc.	Worked examples, self-explanation questions, varied-context examples and comparisons, etc.	??

KAPLAN

Source: E-learning and the Science of Instruction, Clark and Mayer, 3rd ed., 2011

All this changes how courses should be developed

Existing courses

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

Redesigned courses

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

Adjusted student success rates with 95% confidence limits

(Vertical axis) Adjusted student success rate: 20%, 30%, 40%, 50%, 60%, 70%

Control: 39%
Pilot: 50%
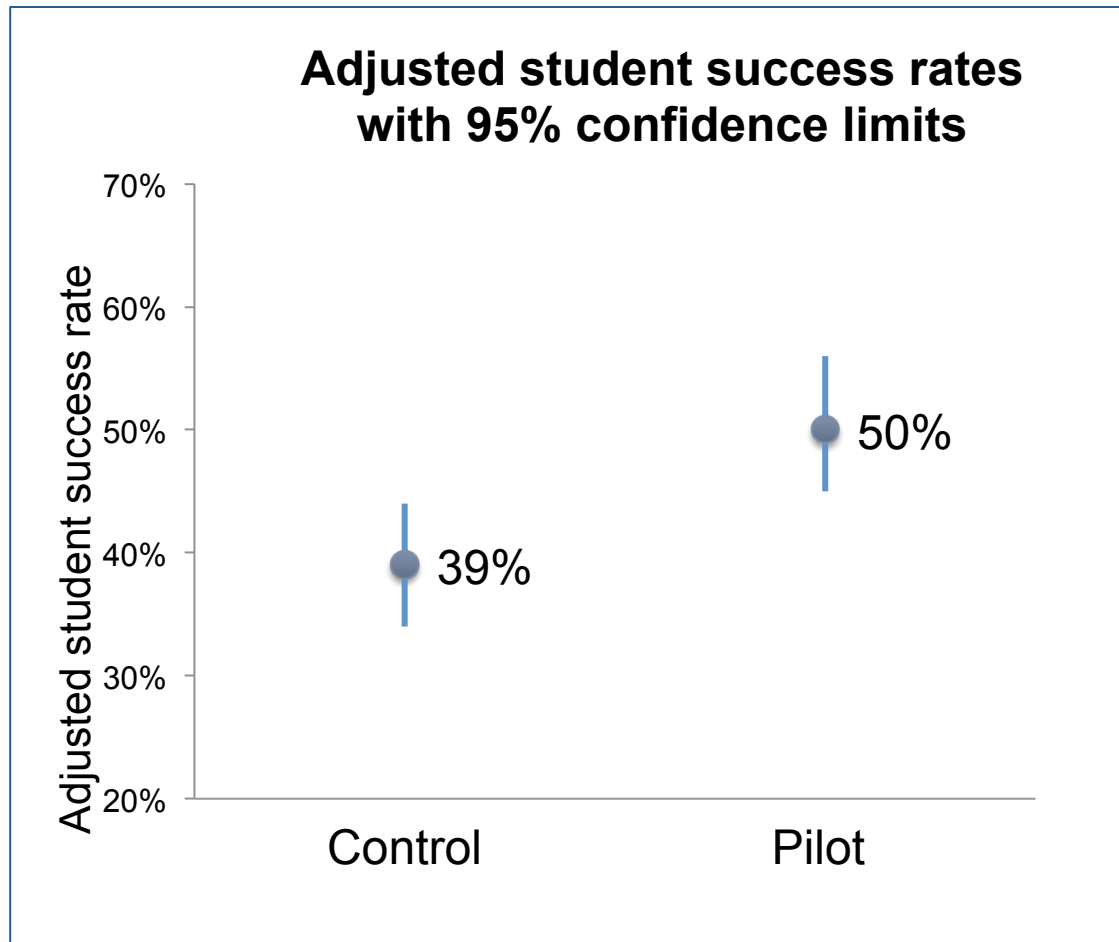
- **11%** higher success rate

- **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.

KAPLAN

Evidence matters if you're after good "learning engineering"
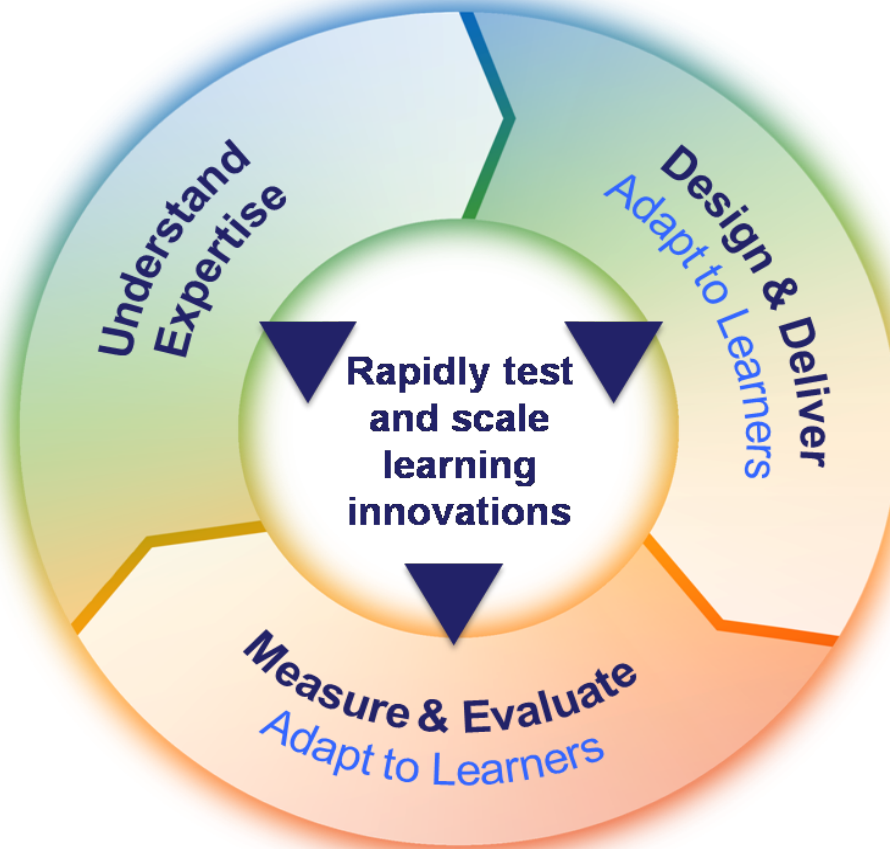
KAPLAN

Where to find out more?

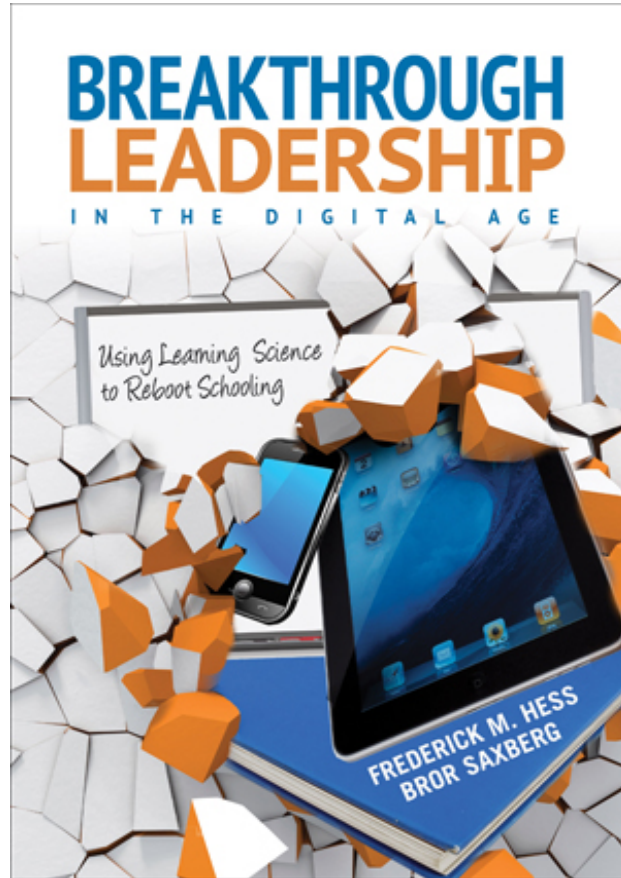- Location of course on using (and downloading) the checklist:

  http://goo.gl/f1RCAu

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

  http://www.kaplan.com/brorsblog

- Contact me:

  bror.saxberg@kaplan.com

KAPLAN

April 20, 2015
Why We Need Learning Engineers
Chronicle of Higher Education

KAPLAN