



“Learning engineering”: The Art of Using Learning Science at Scale to Lift Performance

October 2015

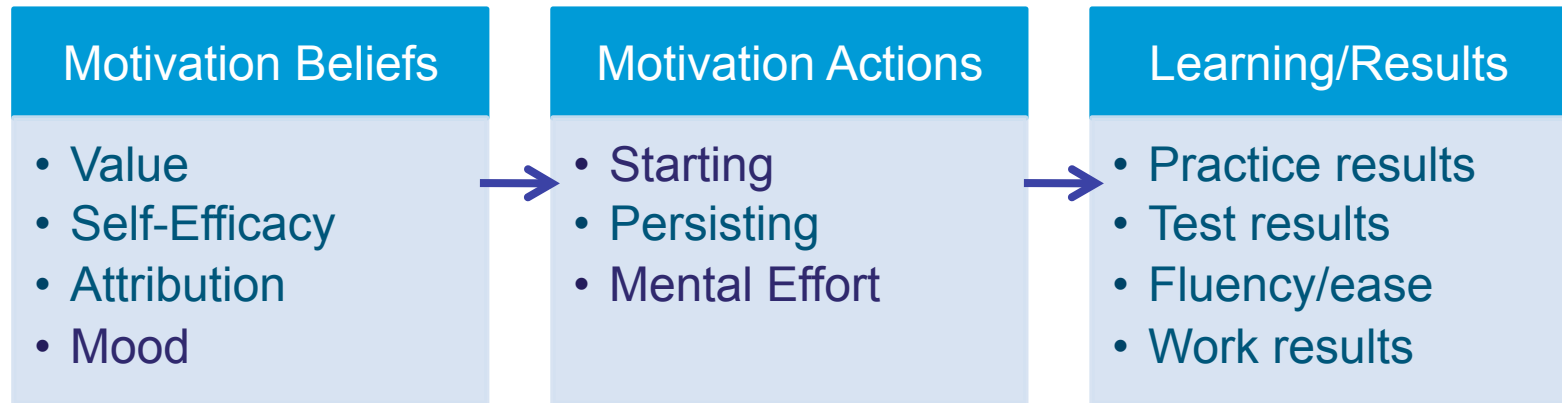
We know a lot about how expertise works

Working Memory and Long-Term Memory

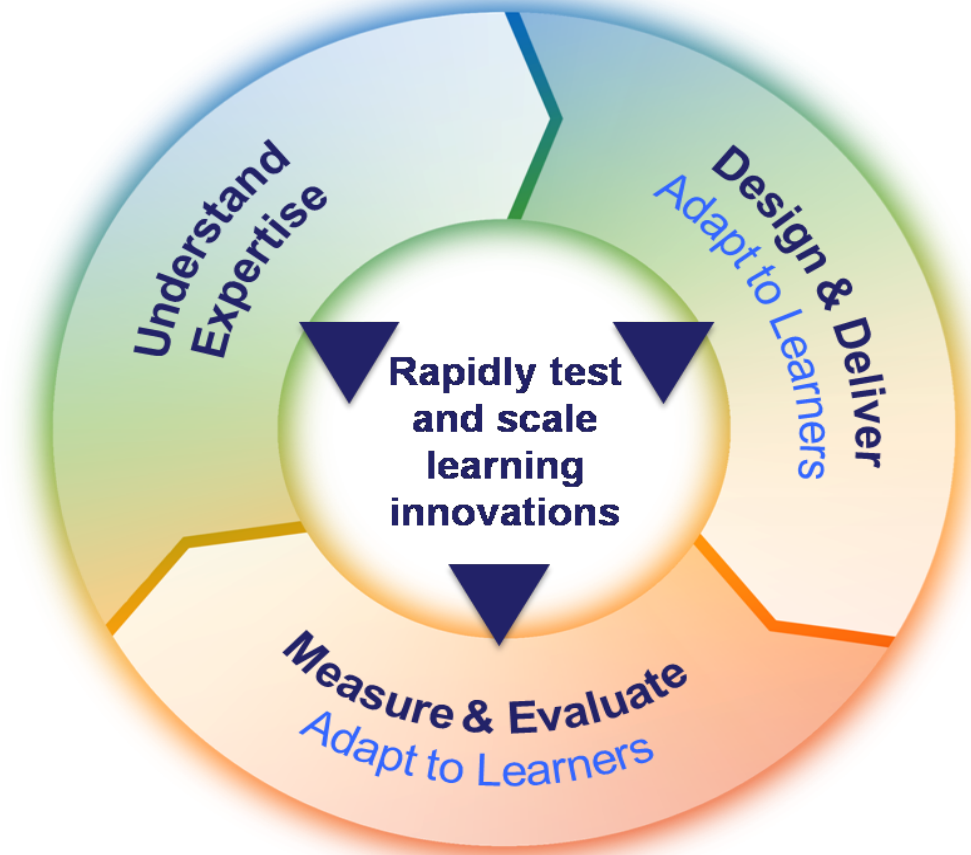
Audio —

Visual —

We also know more about motivation. . .

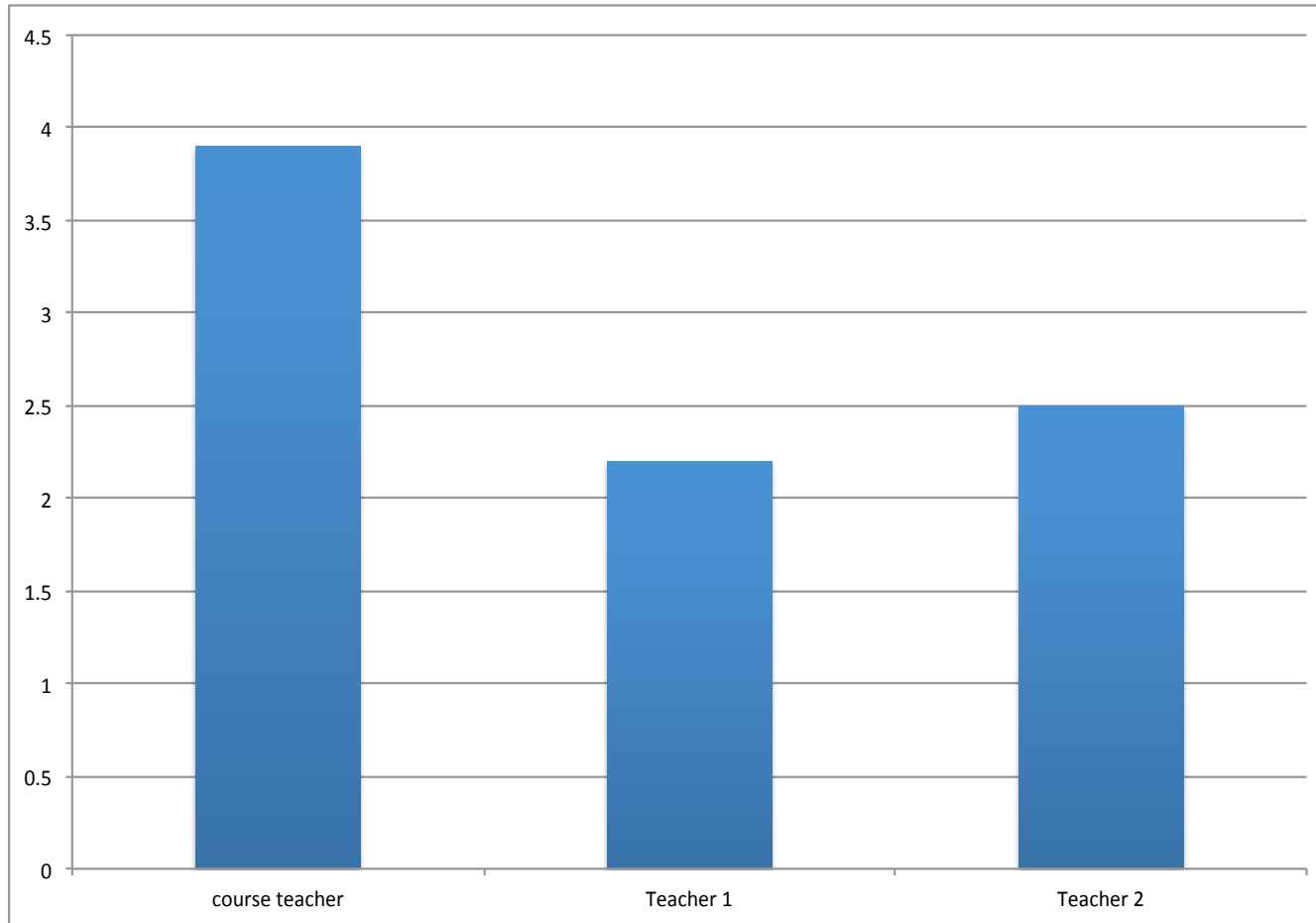


This allows for a “learning engineering” approach



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

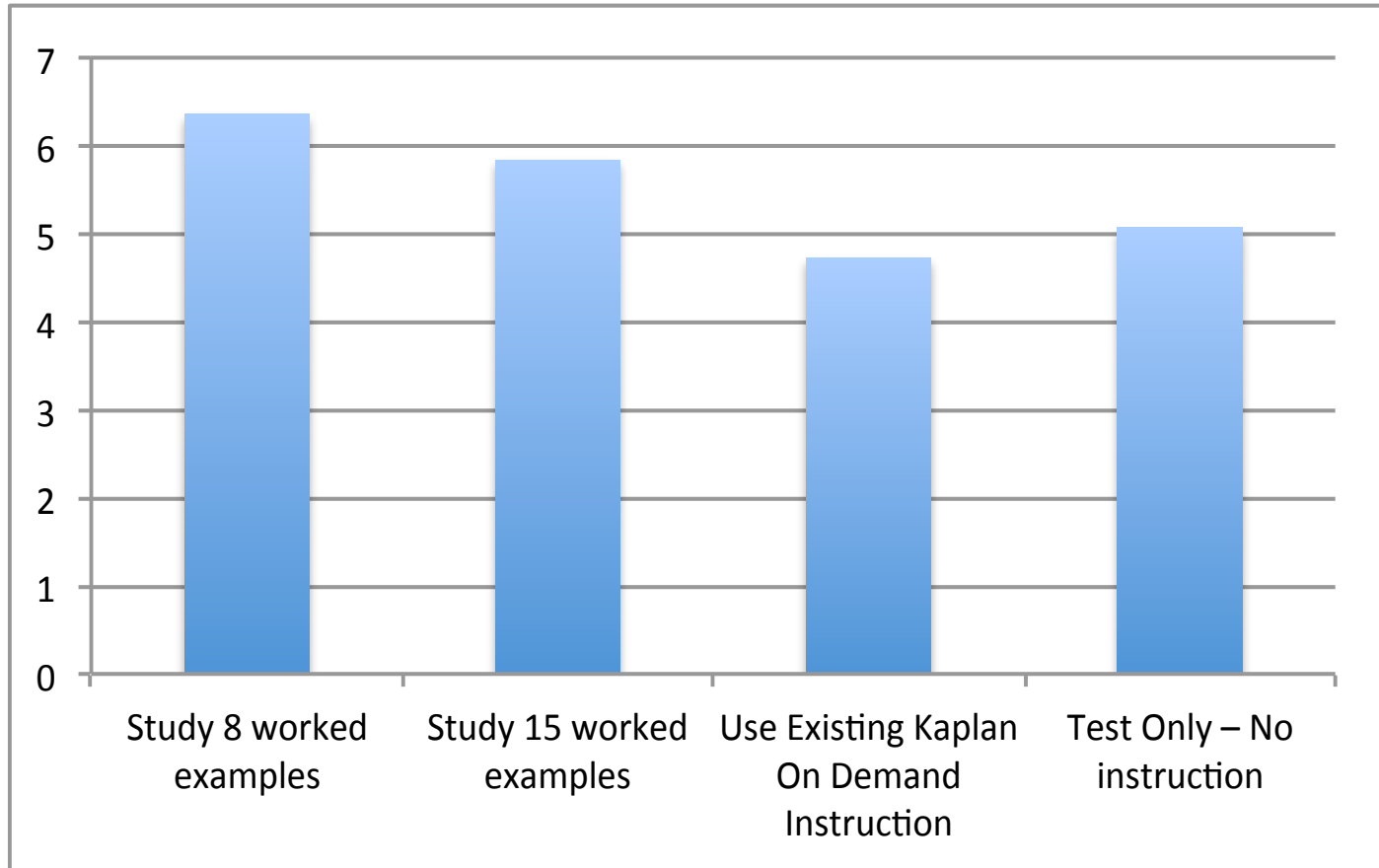
- Comparison of course teacher view vs. independent teachers' markings



Based on 10 randomly selected papers from a writing course

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

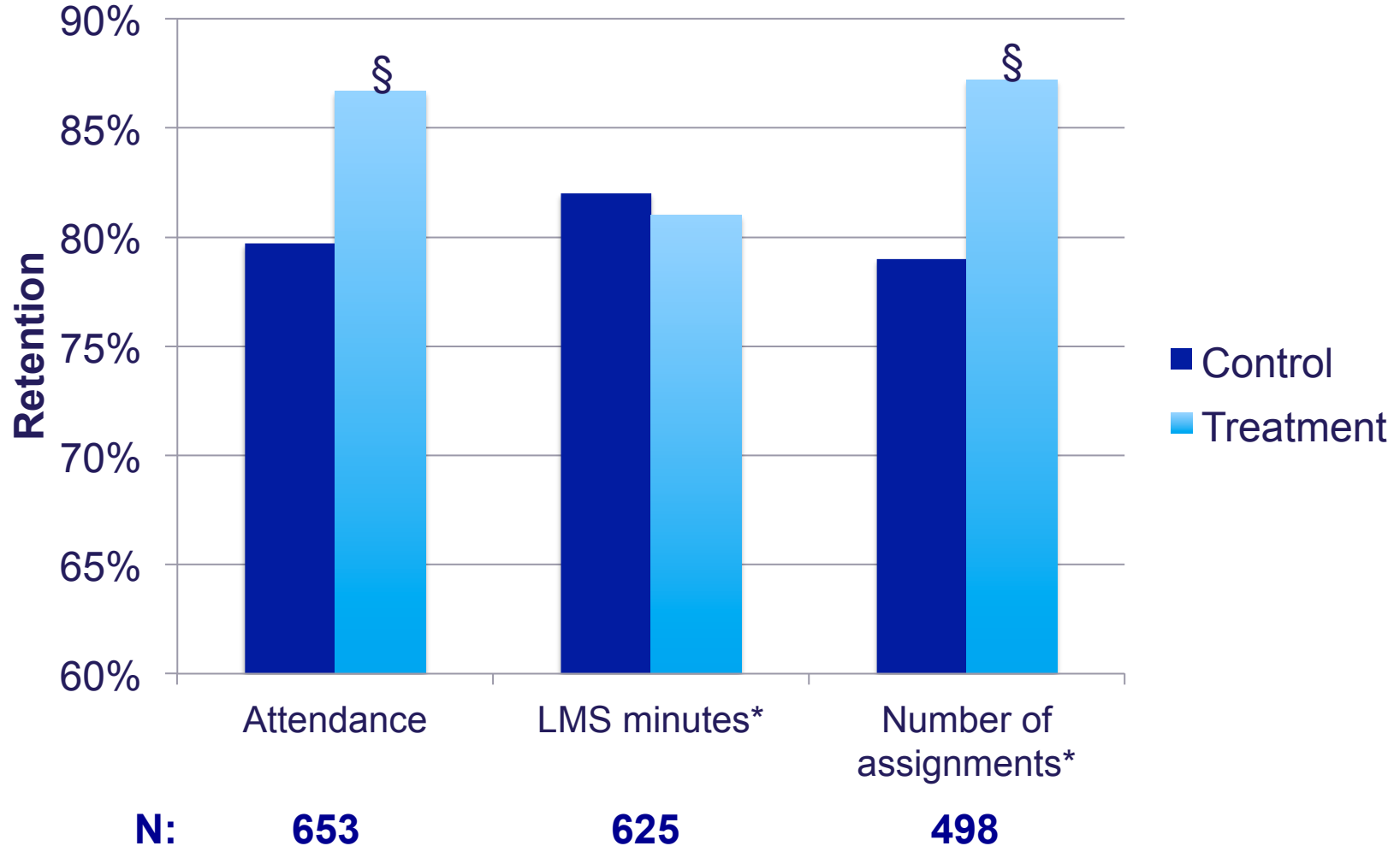
99.32

NA

* Significant difference from "No Instruction"

Faculty supports do help students – but need to check

Impact of faculty dashboards on first year college social studies course



* Improved learning outcomes

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.	??

All this changes how courses should be developed

Existing courses

SC115: Principles of Nutrition
Prof: Brenda Sugrue, Eric Ellefsen, Leston Drake, Stuart Garry, Christopher Lapine
Kaplan Tech Support 866-522-7747
Option 0

Course Admin Gradebook Email Live Doc Sharing Dropbox Journal Weblography Help

Unit 4: Fats - Macronutrients II

Home Unit Outcomes To-Do List Extra! Extra! Academic Tools Home Page

Total Fat 19g
Saturated Fat 5g
Trans Fat 5g

Unit 4 Overview
Fats (Macronutrients II)
When you think of "fat" you may automatically think of the negatives associated with the word. Fats in foods, however, are not all bad. This unit discusses the roles of fats in foods, as well as how they are digested and used in the body. We will look at healthy and unhealthy fats like trans fats and

Reading Discussion Seminar Assignment

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

SC115: Principles of Nutrition -- KLI Prototype
Instructor: Jeannine Reilly
Kaplan Tech Support 866-522-7747

Course Admin Gradebook Email Live Doc Sharing Dropbox Journal Weblography Help

Unit 5: Proteins - Macronutrients III

Set 1 - 2

Prepare Practice Perform

Item 1 2

As part of Health Week, you are advising college students on their typical daily diet of protein. Each student has logged their diet for the previous day in a software program, and they hand you a report stating the amount of nutrients for the day.

Blake weighs 158 lbs and he consumed 48 grams of protein yesterday. Determine how his protein consumption compares with the recommendations.

Did Blake's protein consumption meet the recommendations?

☐ Yes
☐ No

Choose a reason for your Answer

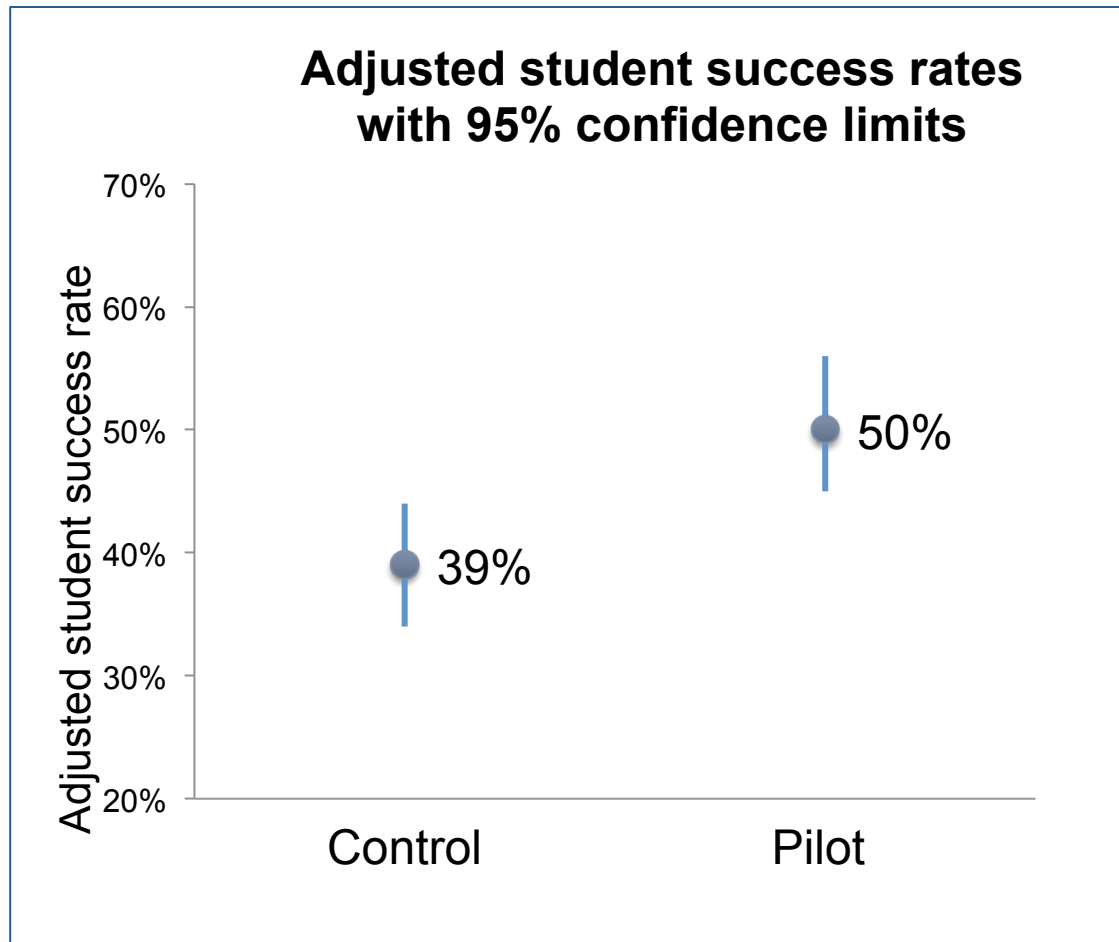
Submit

Blake weighs 158 lbs and he consumed 48 grams of protein yesterday

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

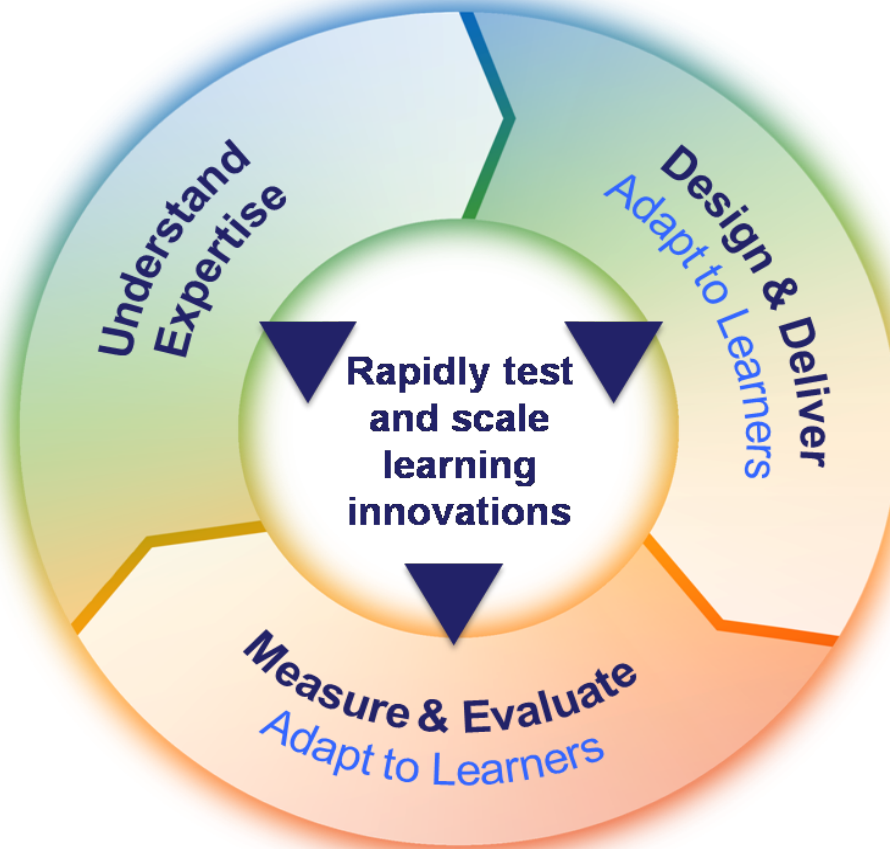
Result: much greater student success



- 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.

Evidence matters if you're after good “learning engineering”



Where to find out more?

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

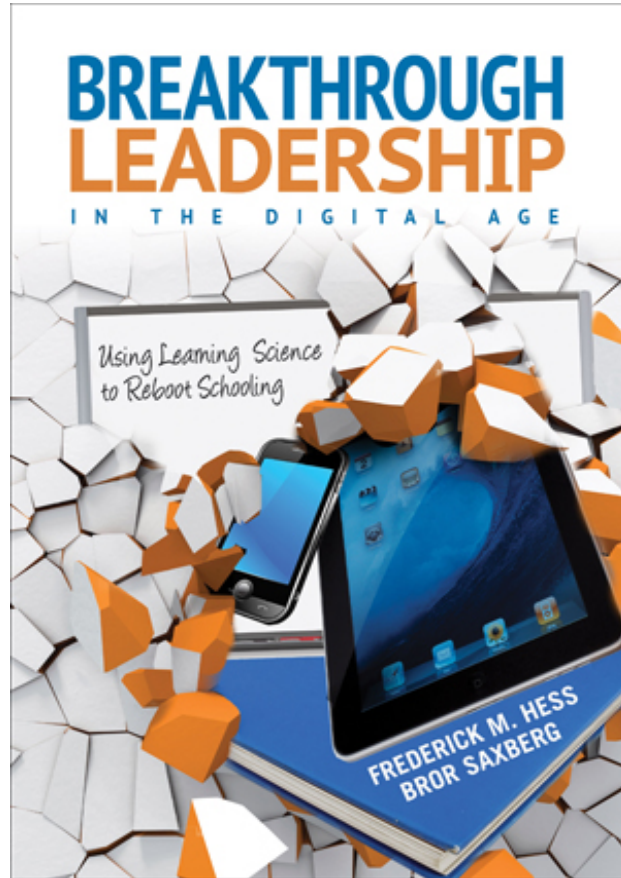
<http://goo.gl/f1RCAu>

- Bror's Blog for more on “learning engineering”:

<http://www.kaplan.com/brorsblog>

- Contact me:

bror.saxberg@kaplan.com



April 20, 2015

Why We Need Learning Engineers

Chronicle of Higher Education

