Building a Better Learning Engineer

Education Elements Personalized Learning Summit
May 2016

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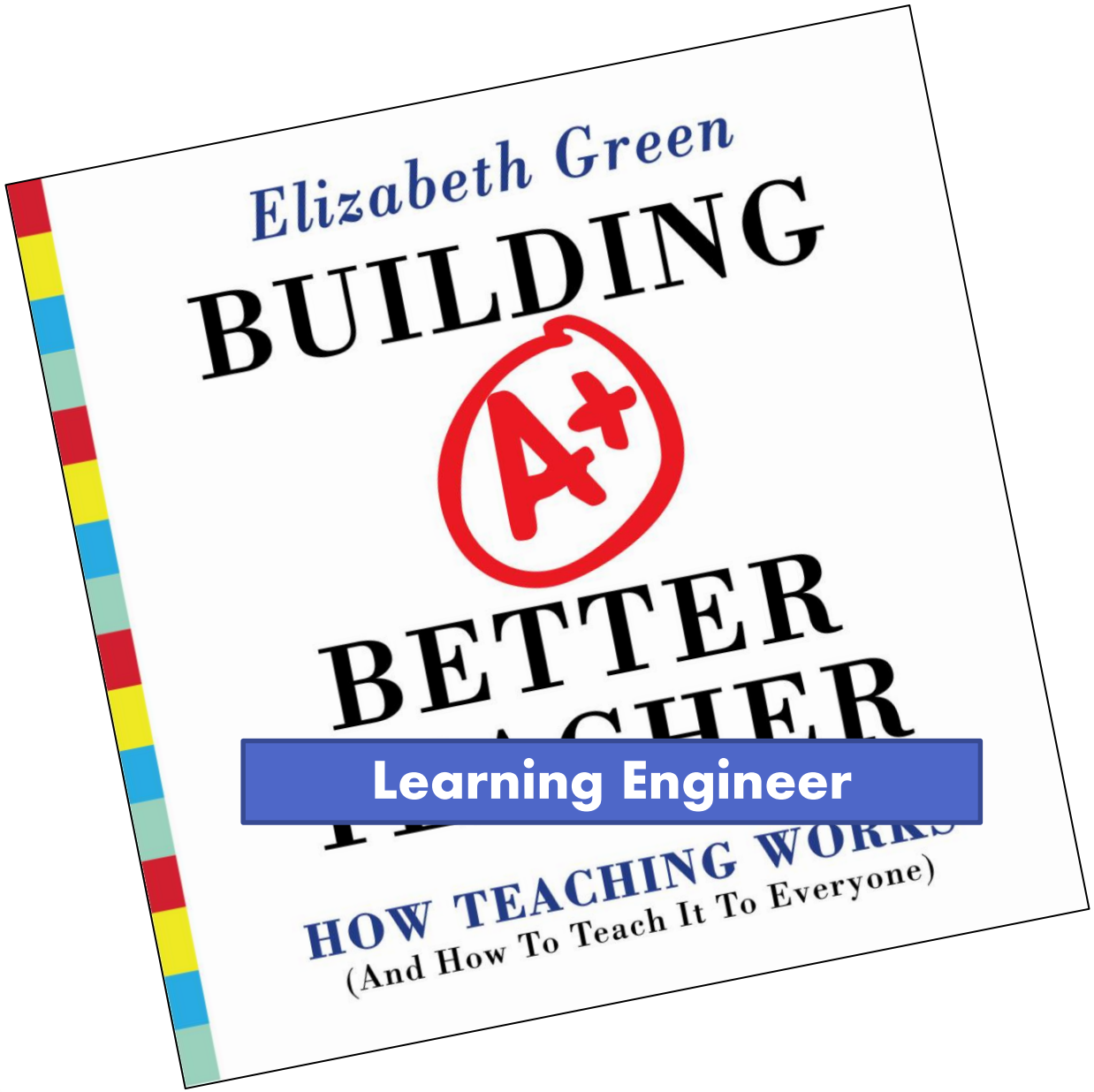
@deansforimpact



Learning Engineer

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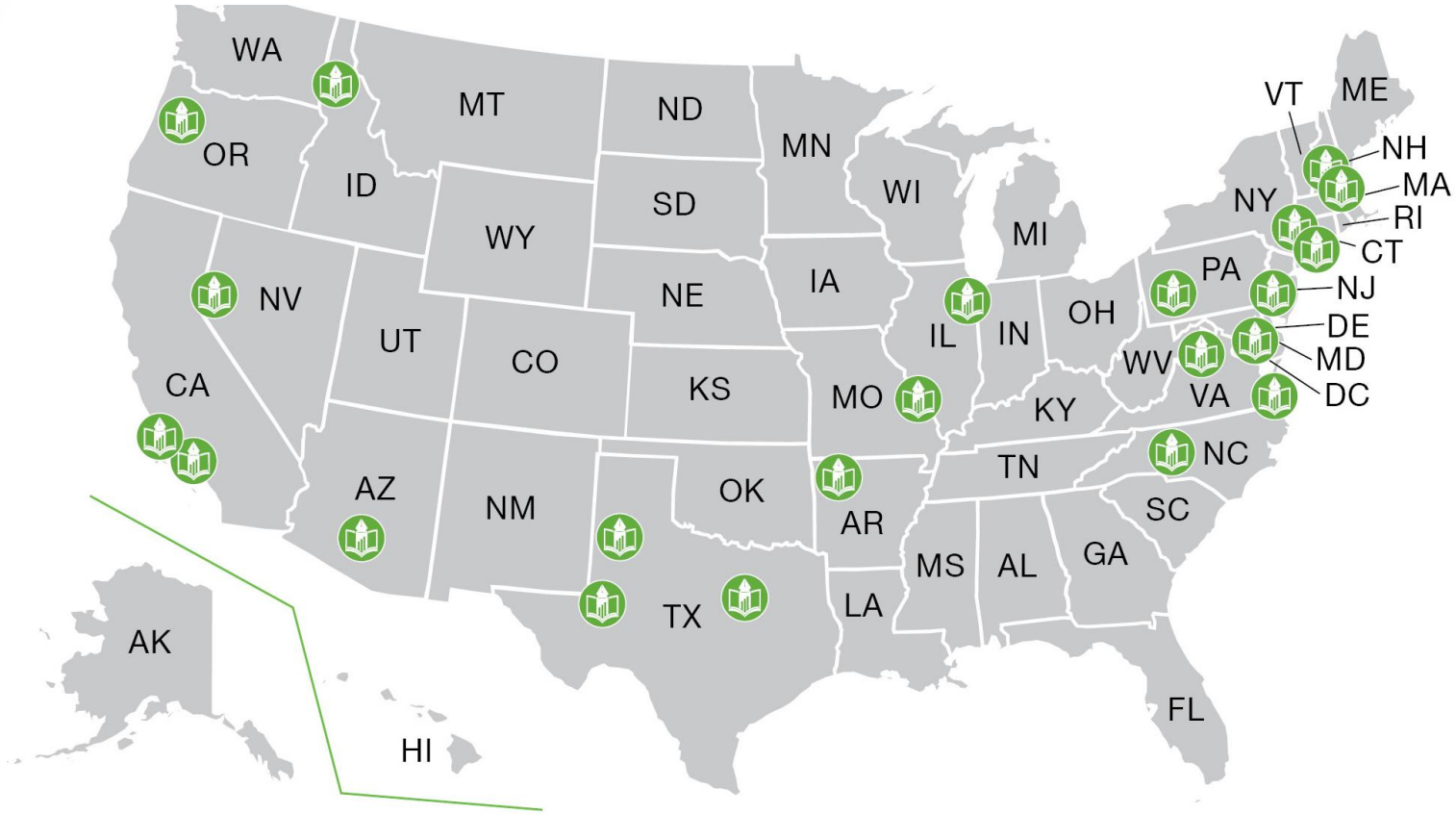
About Deans for Impact

Deans for Impact is a national nonprofit organization representing leaders in educator preparation who are committed to transforming educator preparation and elevating the teaching profession.

Member-led programs



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Guiding principles

Data-Informed

Outcomes Focused

Transparent & Accountable

Empirically Tested

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Session goals

1. Describe skills that teachers must possess to personalize learning effectively

2. Describe connection between learning science and personalized learning

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"It's just good, sound teaching practice.* It's nothing new."

*When it's done well.

Big asterisk.

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Session outline

- Introduction
- Individual brainstorm
- Small group activity: skill grouping
- Small group activity: skill sequencing
- Presentation: Learning Engineers
- Quiz
- Discussion
- Close

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Individual brainstorm

What skills must teachers have in order to personalize learning effectively?

Write one skill per Post-It note

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Small group discussion

- *Each member of the group shares*
- *Group similar skills together using post-it notes;* what do you notice?

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Small group discussion

- *Imagine that you were sitting down with a local teacher preparation program to sequence the development of skills that a new teacher must have in order to personalize learning effectively?*
  - *What skills should be developed pre-service?*
  - *During student teaching?*
  - *During the teacher's first year?*
  - *After the teacher's first year?*

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Why learning engineers?

Engineers…

- Identify real-world problems to be solved
- Design solutions by applying scientific knowledge
- Make those solutions feasible, within practical and financial constraints

Learning science *(or how students learn)*

Engineers view technology as a *tool*, not a solution

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Hess, Frederick, and Saxberg, Bror. "Schooling rebooted." *Education Next.* Spring 2014.

Why start with learning science?

- All educators, including new teachers, should know basic principles of cognitive science
- For teachers aiming to personalize learning, **a fundamental understanding of how students learn can help teachers decide *how and when to use technology* as a tool to further learning**

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How well do *you* know cognitive science?

- Cognitive science indicates that frequent quizzing ("retrieval practice") is an effective strategy to improve learning. Let's test that hypothesis.
- Using the browser on your smartphone or computer, please go to **www.govote.at** and enter code **76 30 39.**

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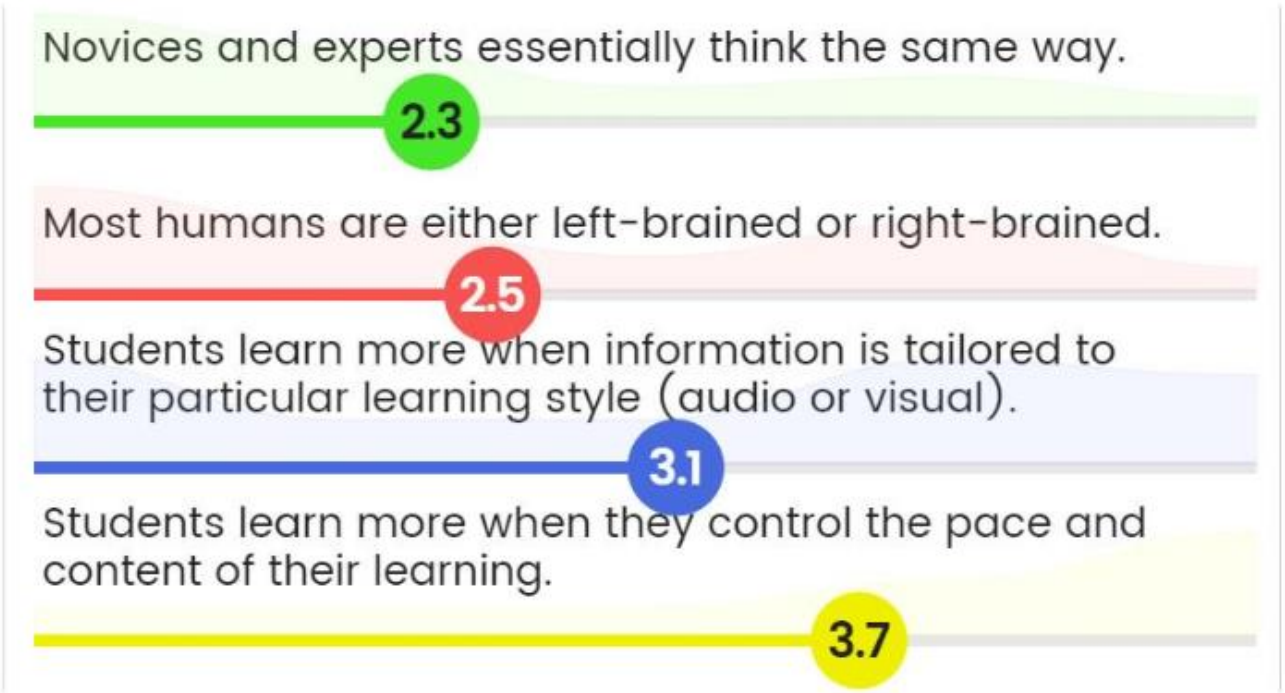
American education reporters



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Turn and talk

What would it take for school systems and preparation programs to work together to prepare and empower teachers to be learning engineers?

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THE SCIENCE OF LEARNING

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Design principles

Research organized around key questions

1 HOW DO STUDENTS UNDERSTAND NEW IDEAS?

COGNITIVE PRINCIPLES	PRACTICAL IMPLICATIONS FOR THE CLASSROOM
Students learn new ideas by reference to ideas they already know.[1]	• A well-sequenced curriculum is important to ensure that students have the prior knowledge they need to master new ideas.[2] • Teachers use analogies because they map a new idea onto one that students already know. But analogies are effective only if teachers elaborate on them, and direct student attention to the crucial similarities between existing knowledge and what is to be learned.[3]
To learn, students must transfer information from working memory (where it is consciously processed) to long-term memory (where it can be stored and later retrieved). Students have limited working memory capacities that can be overwhelmed by tasks that are cognitively too demanding. Understanding new ideas can be impeded if students are confronted with too much information at once.[4]	• Teachers can use "worked examples" as one method of reducing students' cognitive burdens.[5] A worked example is a step-by-step demonstration of how to perform a task or solve a problem. This guidance – or "scaffolding" – can be gradually removed in subsequent problems so that students are required to complete more problem steps independently. • Teachers often use multiple modalities to convey an idea; for example, they will speak while showing a graphic. If teachers take care to ensure that the two types of information complement one another – such as showing an animation while describing it aloud – learning is enhanced. But if the two sources of information are split – such as speaking aloud with different text displayed visually – attention is divided and learning is impaired.[6] • Making content explicit through carefully paced explanation, modeling, and examples can help ensure that students are not overwhelmed.[7] *(Note: "explanation" does not mean teachers must do all the talking.)*
Cognitive development does not progress through a fixed sequence of age-related stages. The mastery of new concepts happens in fits and starts.[8]	• Content should not be kept from students because it is "developmentally inappropriate." The term implies there is a biologically inevitable course of development, and that this course is predictable by age. To answer the question "is the student ready?" it's best to consider "has the student mastered the prerequisites?"[9]

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Design principles

Based on the best scientific consensus

1 HOW DO STUDENTS UNDERSTAND NEW IDEAS?

COGNITIVE PRINCIPLES

PRACTICAL IMPLICATIONS FOR THE CLASSROOM

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Accessible and useful for teachers and teacher-educators

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Provides practical implications for teaching

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Links to academic research

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Thank you

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