Slide 1

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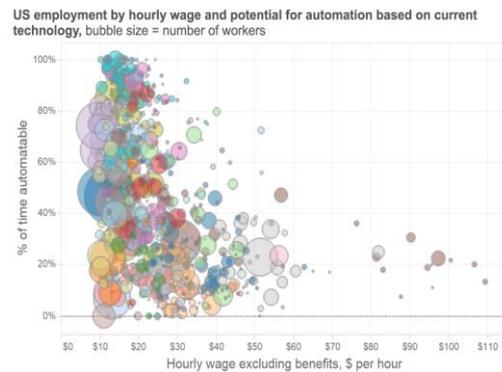
Leadership for teacher learning:
Strategies for promoting formative
assessment

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Slide 2

Outline

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- Why we need to improve American education
- What we're doing now (and why it won't help much)
- What we can do instead

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Slide 3

Robots aren't going to take your job…

3

US employment by hourly wage and potential for automation based on current technology, bubble size = number of workers

McKinsey & Co (2015)

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Slide 4

…but it will be more complex, or poorly paid

Employment change by job type: 2002-2014

Skill level	US	Japan	EU-28
High	↑7.2%	↑0.8%	↑5.5%
Medium non-routine	↓0.7%	↑2.5%	↑3.5%
Medium routine	↓9.5%	↓4.5%	↓8.8%
Low	↑3.0%	↑1.0%	↑0.2%

Organisation for Economic Cooperation and Development (2016)

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What we're doing right now (and why it won't help much)

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Current policy initiatives

- Getting smarter people into teaching
- Firing bad teachers
- Paying good teachers more
- Reducing class size
- Copying other countries
- Expanding school choice
  – Charter schools
  – Vouchers

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So, where should our efforts be focused?

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Learning from research

- Four questions we should be asking
  – Does this solve a problem we have?
  – How much will this improve learning?
  – How much will it cost?
  – Will it work here?

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Learning and performance

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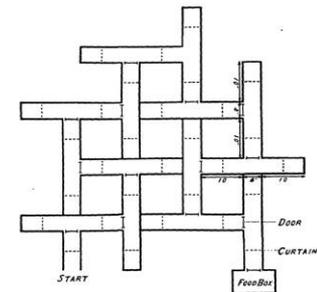## What psychology tells us about learning

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- Review of the research on techniques that help students learn better
- Focus on techniques that are relatively easy to use
- Evaluation in terms of generalizability of findings across
  - different material to be learned
  - different learning conditions
  - different kinds of student
  - different measures of learning

Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013)

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|	
1. Elaborative interrogation	Generating an explanation for why an explicitly stated fact or concept is true
2. Self-explanation	Explaining how new information is related to known information, or explaining steps taken during problem solving
3. Summarization	Writing summaries (of various lengths) of to-be-learned texts
4. Highlighting/underlining	Marking potentially important portions of to-be-learned materials while reading
	Using keywords and mental imagery to associate verbal materials

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Learning and performance

- Alley maze experiments
  - Hungry rats put in mazes
  - Removed when they reach the food box
  - Learning measured by number of entrances into blind alleys

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Learning and performance

Reinforcement

None · Regular · Delayed
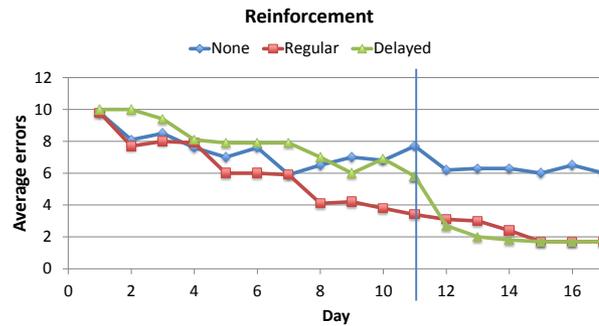
Tolman and Honzik (1930) adapted by Sodestrom and Bjork (2015)

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Do students know when they are learning?

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- Data: 10,534 students attending USAFA (2000-2007)
- Students randomly allocated to calculus instructors
  - Less-qualified, less experienced instructors
    - Higher end-of-course scores
    - Higher student evaluations
    - Lower scores on follow-on courses
  - More-qualified, more experienced instructors
    - Lower end-of-course scores
    - Lower student evaluations
    - Higher scores on follow-on courses

Carrell and West (2010)

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"Unskilled and unaware of it"

- 45 Cornell University undergraduates completed a 20-item logical reasoning test derived from the LSAT preparation guide
- After the test, students were asked to estimate
  - general logical reasoning ability
  - how their score would compare with classmates
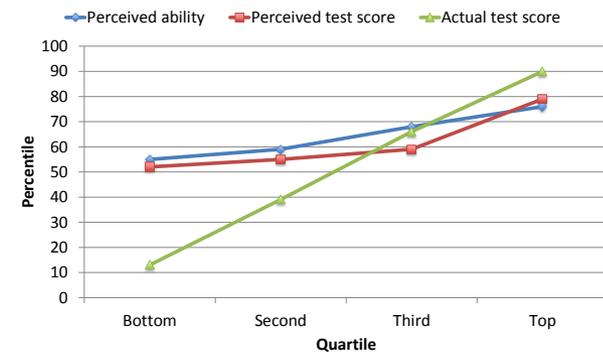 - how many questions they had answered correctly

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Logical reasoning

Perceived ability · Perceived test score · Actual test score

Kruger and Dunning (1999)

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Three propositions about learning

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1. Performance (how well a learner completes a learning task) and learning (the changes in long-term memory that result) are different
2. Students do not reliably know when they are learning
3. Students do not reliably know whether they know something

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The psychology of learning (Thorndike, 1913)

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- "The Law of Exercise comprises the laws of Use and Disuse." (p. 2)
  - "The Law of Use is : When a modifiable connection is made between a situation and a response, that connection's strength is, other things being equal, increased." (p. 2)
  - "The Law of Disuse is : When a modifiable connection is not made between a situation and a response during a length of time, that connection's strength is decreased." (p. 4)

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"The new theory of disuse"

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- An item in memory is characterized by
  - Storage strength
    - how well learned an item is
    - can only increase
  - Retrieval strength
    - how easy an item is to retrieve at a particular time
    - goes up and down

Bjork (1992)

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Storage strength and retrieval strength

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		Storage strength	
		Low	High
Retrieval strength	Low	Credit card number	First license plate number
	High	Current parking space number	Social security number

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How memory really works

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- Storage strength and retrieval strength are increased by
  - Re-studying an item
  - Retrieving it from memory
  - Retrieval has a greater impact than re-study
- Retrieval and re-study increase:
  - storage strength more when retrieval strength is *low*
  - retrieval strength more when
    - retrieval strength is low
    - storage strength is high
- Learners need "desirable difficulties" in learning

Bjork (1992)

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Which of these consistently improves learning?

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1. Elaborative interrogation
2. Self-explanation
3. Summarization
4. Highlighting/underlining
5. Keyword mnemonic
6. Imagery for text
7. Rereading
8. Practice testing
9. Distributed practice
10. Interleaved practice

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So, where does formative assessment fit in?

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The empirical case

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Which of these is most strongly associated with high student achievement?

A. Student speaks the language of instruction at home
B. Student behavior in the school is good
C. The amount of inquiry-based instruction
D. The amount of teacher-directed instruction
E. The school's socio-economic profile

OECD (2016, Fig II.7.2)

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The intuitive case

- A principle and an uncomfortable fact about the world
  - The principle:
    - "If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him [or her] accordingly" (Ausubel, 1968 p. vi)
  - The uncomfortable fact:
    - Students do not learn what we teach.
  - What is learning?
    - Learning is a change in long-term memory (Kirschner et al., 2006)
    - The fact that someone can do something now does not mean they will be able to do it in six weeks, **but**
    - If they cannot do something now, it is highly unlikely they will be able to do it in six weeks

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Building Plan "B" into Plan "A"

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Formative Assessment: A contested term

	Long-cycle	Medium-cycle	Short-cycle
Span	Across terms, teaching units	Within and between teaching units	Within and between lessons
Length	Four weeks to one year	One to four weeks	Minute-by-minute and day-by-day
Impact	Monitoring, curriculum alignment	Student-involved assessment	Engagement, responsiveness

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Reasons to do formative assessment

- Part of teachers' normal work
- Small impact on workload
  - 75 minutes a month (approximately 1% of contract time)
- Low additional cost
  - $1.50 per student per year
- Empirical evidence of impact on student achievement

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Embedding Formative Assessment

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- Whole-school 2-year PD program
- Focus on five strategies of formative assessment
  - clarifying, sharing and understanding learning intentions
  - eliciting evidence of achievement
  - feedback that moves learning forward
  - activating students as learning resources for one another
  - activating students as owners of their own learning
- Detailed resource packs for groups of 8 - 14 teachers
  - 18 monthly 75-minute meetings
  - Peer observations between meetings

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A "signature pedagogy" for teacher learning

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- Every monthly TLC meeting should follow the same structure and sequence of activities:
  - Activity 1: Introduction (5 minutes)
  - Activity 2: Starter activity (5 minutes)
  - Activity 3: Feedback (25–50 minutes)
  - Activity 4: New learning about formative assessment (20–40 minutes)
  - Activity 5: Personal action planning (15 minutes)
  - Activity 6: Review of learning (5 minutes)

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Every TLC needs a leader

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- The job of the TLC leader(s):
  - To ensure that all necessary resources (including refreshments!) are available at meetings
  - To ensure that the agenda is followed
  - To maintain a collegial and supportive environment
- But most important of all:
  - It is not to be the formative assessment "expert."

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Peer observation

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- Run to the agenda of the observed, not the observer:
  - Observed teacher specifies focus of observation:
    - E.g., teacher wants to increase wait time.
  - Observed teacher specifies what counts as evidence:
    - Provides observer with a stopwatch to log wait times.
  - Observed teacher owns any notes made during the observation.

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Evaluation

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- Design
  - Pre-registered randomized evaluation
  - Power: 80% chance to detect an effect size of 0.2
  - 140 schools recruited (70 treatment, 70 control)
- Participants
  - Excluding those with previous involvement in similar work
    - 58 treatment, 66 control
    - 22,709 students beginning 9th grade in Sep 2015
- Outcome measure
  - "Attainment 8"
    - Average score on exams in 8 subjects taken in May 2017
- "Intention to treat" analysis

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Impact on student achievement

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One year's learning for 15 year olds	0.3 sd
Attrition of learning per year	**0.1**
Expected progress for control group students in two years:	0.3*0.9 + 0.3*5/6 = 0.52 sd
Effect size on examinations (8 subjects) for those who had not previously participated	**0.13**
Increase in rate of learning	= 0.13/0.52 = 0.25

Speckesser, Runge, Foliano, Bursnall, Hudson-Sharpe, Rolfe, and Anders (2018)

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Reasons not to do formative assessment

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- Higher achievement isn't needed
- These students lack the aptitude
- I don't need to improve; I get great results
- It's not relevant to my subject
- I don't have time
- We have a pacing guide in our district
- I'm doing it already
- Parents won't like it

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Thank You

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