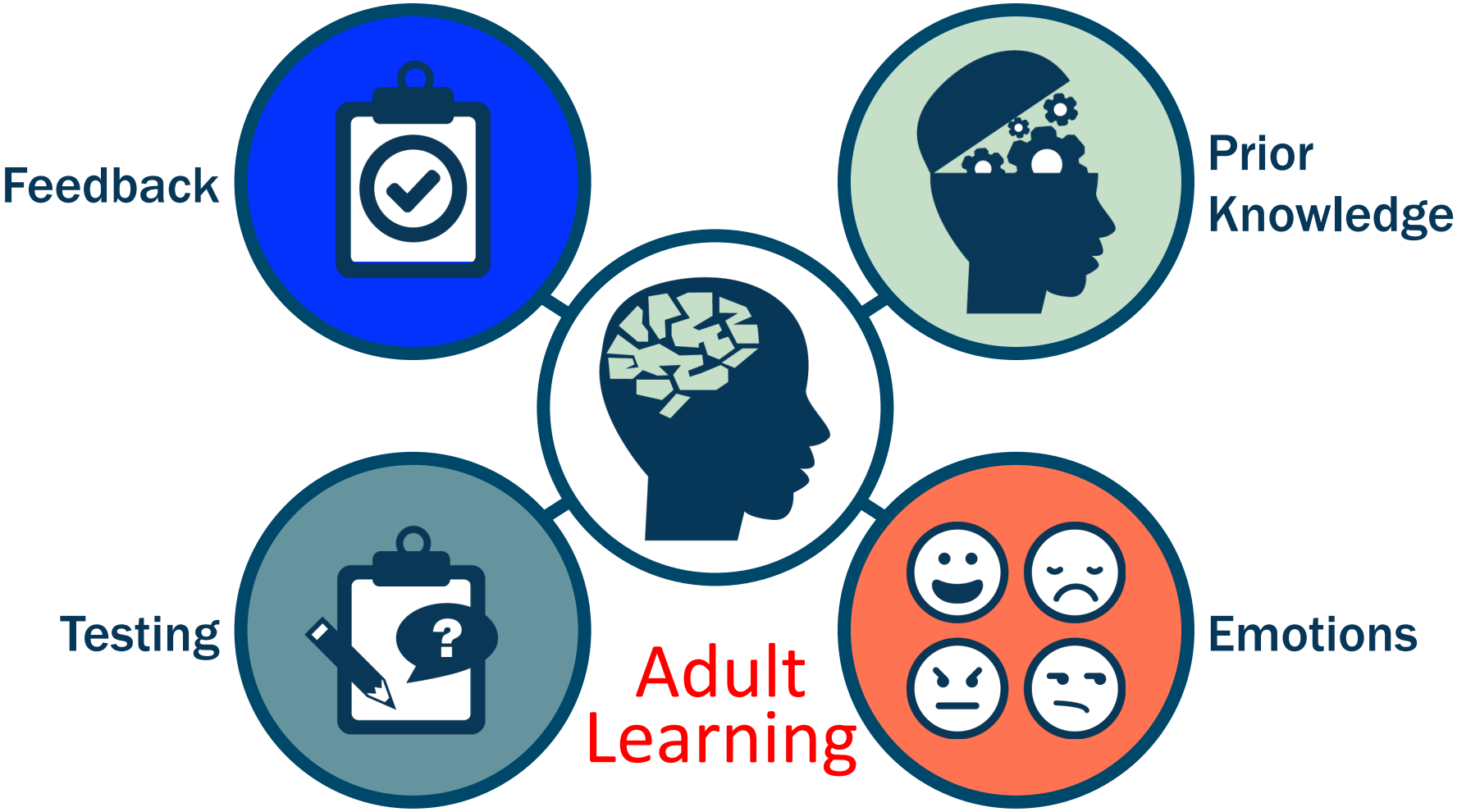
Four Enduring Keys to Adult Learning:

What do we know now,
that we didn't know 50 years ago?

Dan Pratt
Centre for Health Education Scholarship

Four Enduring Keys to Adult Learning



Adults also come with prior beliefs

What if their beliefs are wrong?

The rational brain shuts down when we have strong beliefs about something.

How might we convince them of the error of their thinking?

Consider this:

Introductory physics course to non-science majors

Explained basics of sound

Showed class a violin and explained:

The strings cannot move enough air to make sound

Pointed inside to show strings are attached to the sound post

Strings cause back of violin to move; that makes the sound

What you hear actually comes from the back of violin

15 minutes later asked class…

The sound you hear from a violin comes:

a. Mostly from the strings
b. Mostly from wood in back of violin
c. Equally from both wood and strings
d. None of the above

What % of students got it right?

Raise your hand

0% 10% 30% 50% 80%

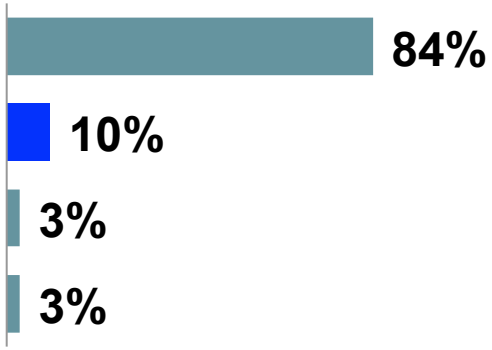
The sound you hear from a violin comes:

a. Mostly from the strings
b. Mostly from wood in back of violin
c. Equally from both wood and strings
d. None of the above

Results

The sound you hear from a violin comes:

a. Mostly from the strings
b. Mostly from wood in back of violin
c. Equally from both wood and strings
d. None of the above



What’s going on here?

Telling them involves
‘passive engagement’
of prior knowledge

Unlikely to counter deeply held
beliefs or assumptions …

no matter how credible the source!

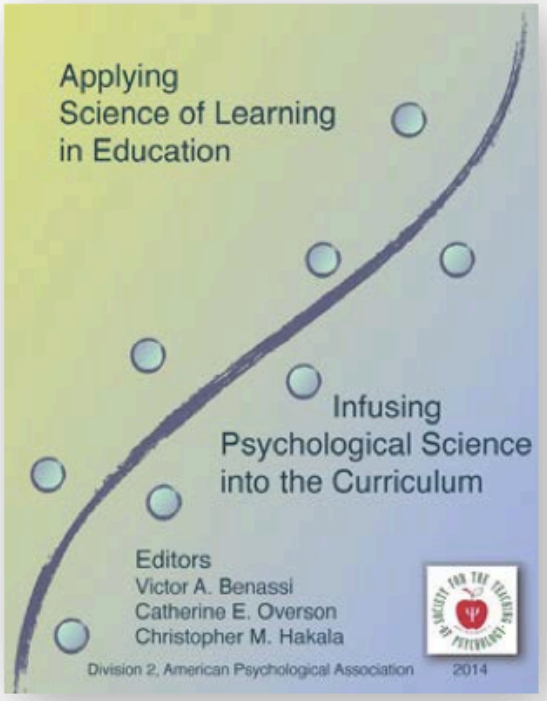
What might he have done, instead?

Why might that work better?

Prior knowledge...

Needs to be **actively** engaged,
especially when it is wrong

Google: "Free ebook on applying science of learning in education"



Prior Knowledge is More Than Content: Skills and Beliefs Also Impact Learning

Susan A. Ambrose
Northeastern University

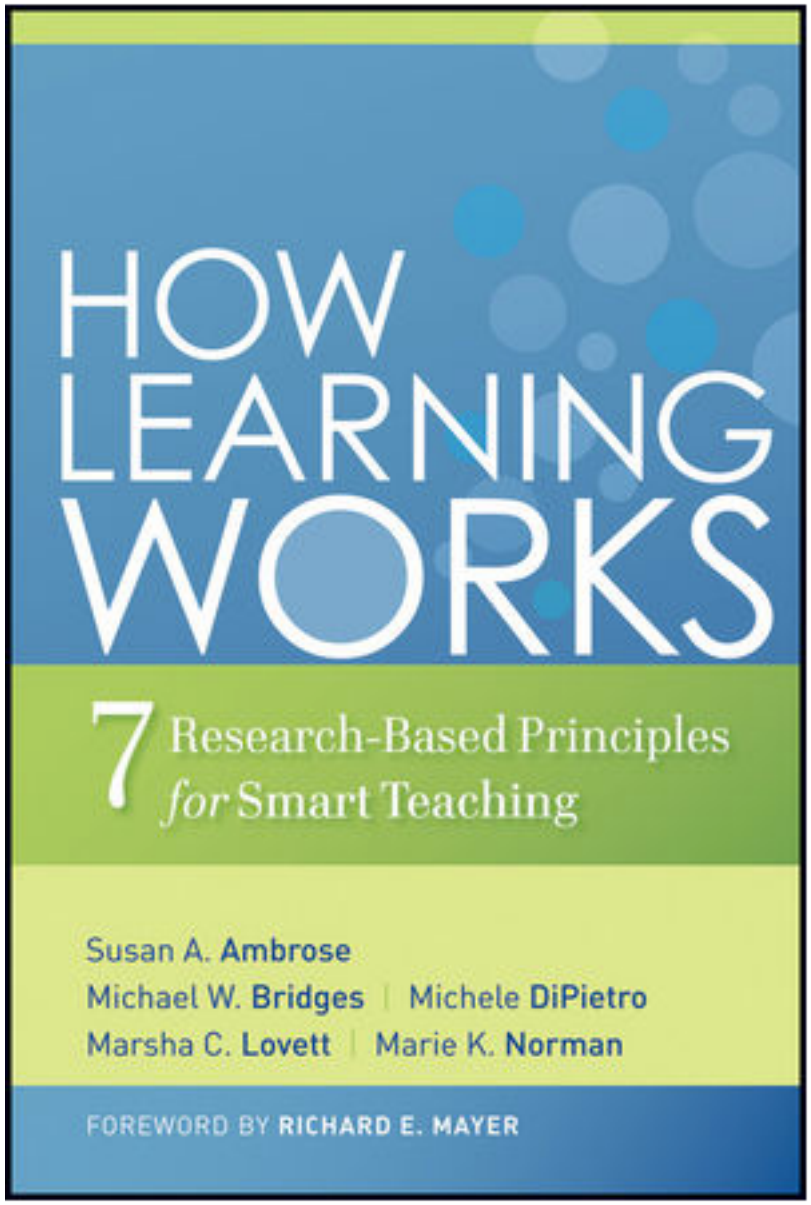
Marsha C. Lovett
Carnegie Mellon University

Another Recommendation

How Learning Works:

7 Principles For Smart Teaching

Ambrose, Bridges, DiPietro, Lovett, & Norman (2010). Jossey-Bass Publishers



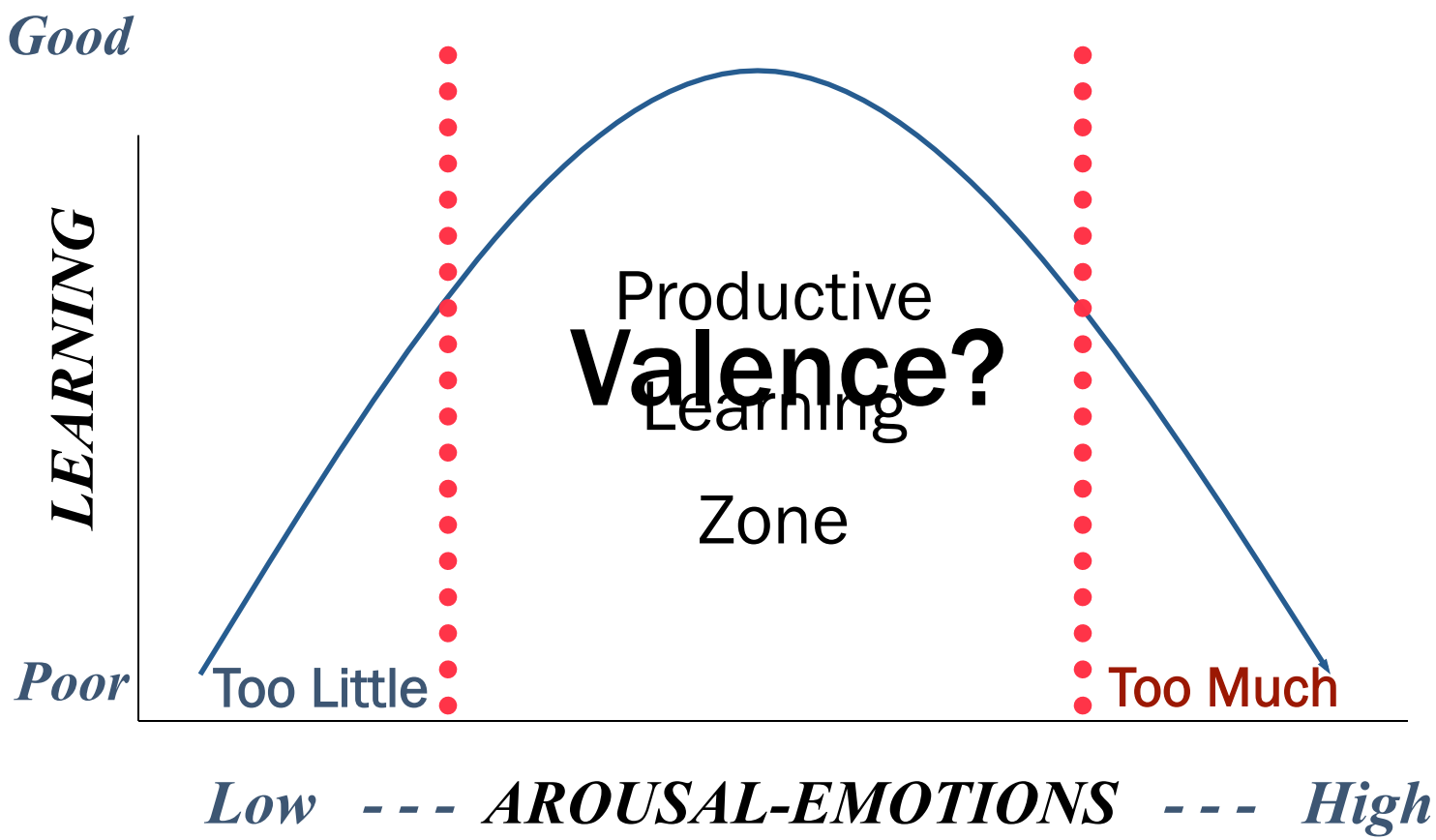
Four things that influence engagement

What we remember often depends on the emotional significance of an event.

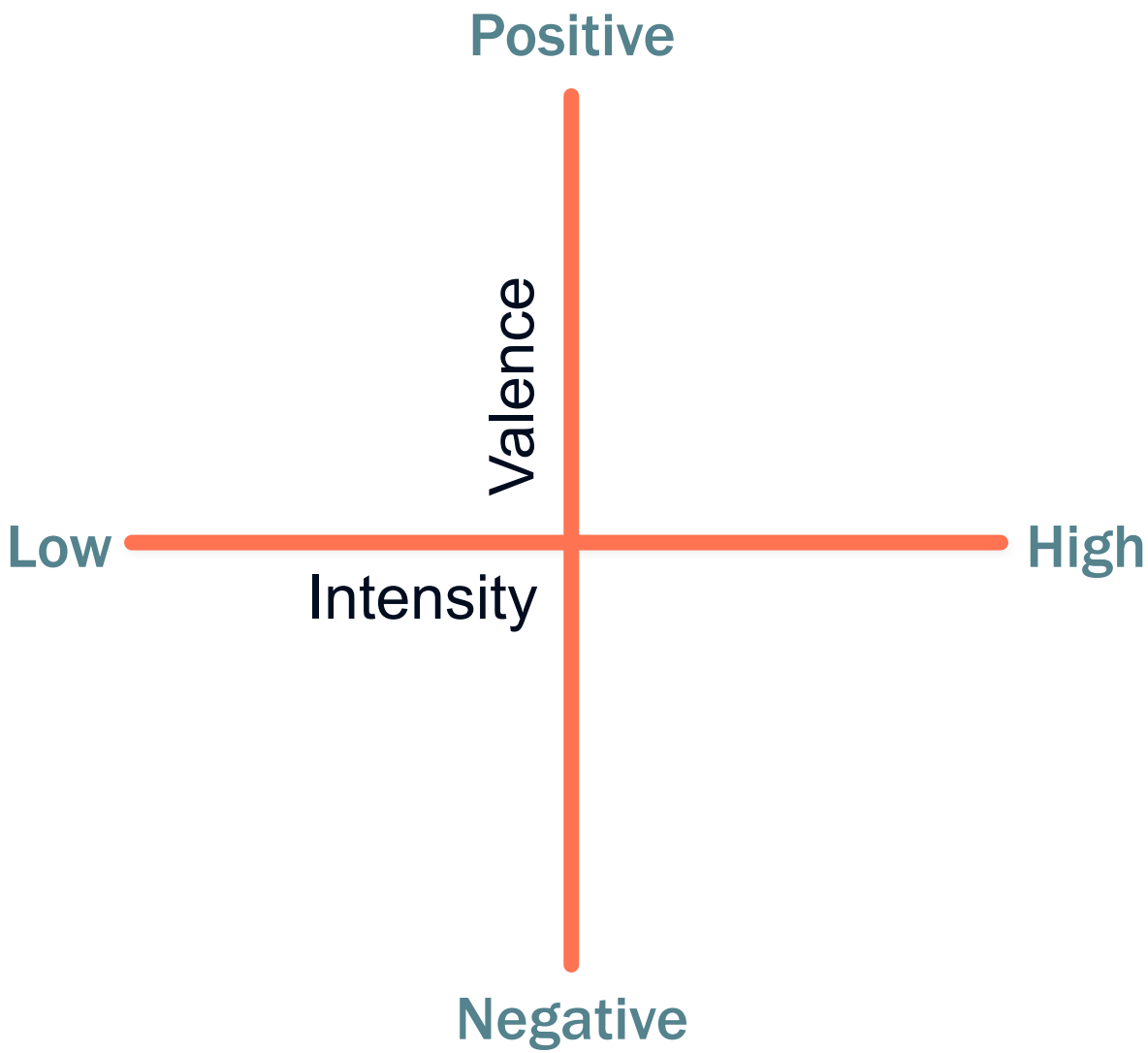
Think back to an emotional experience as a learner.

How long ago?
What happened?
What stands out in your memory?

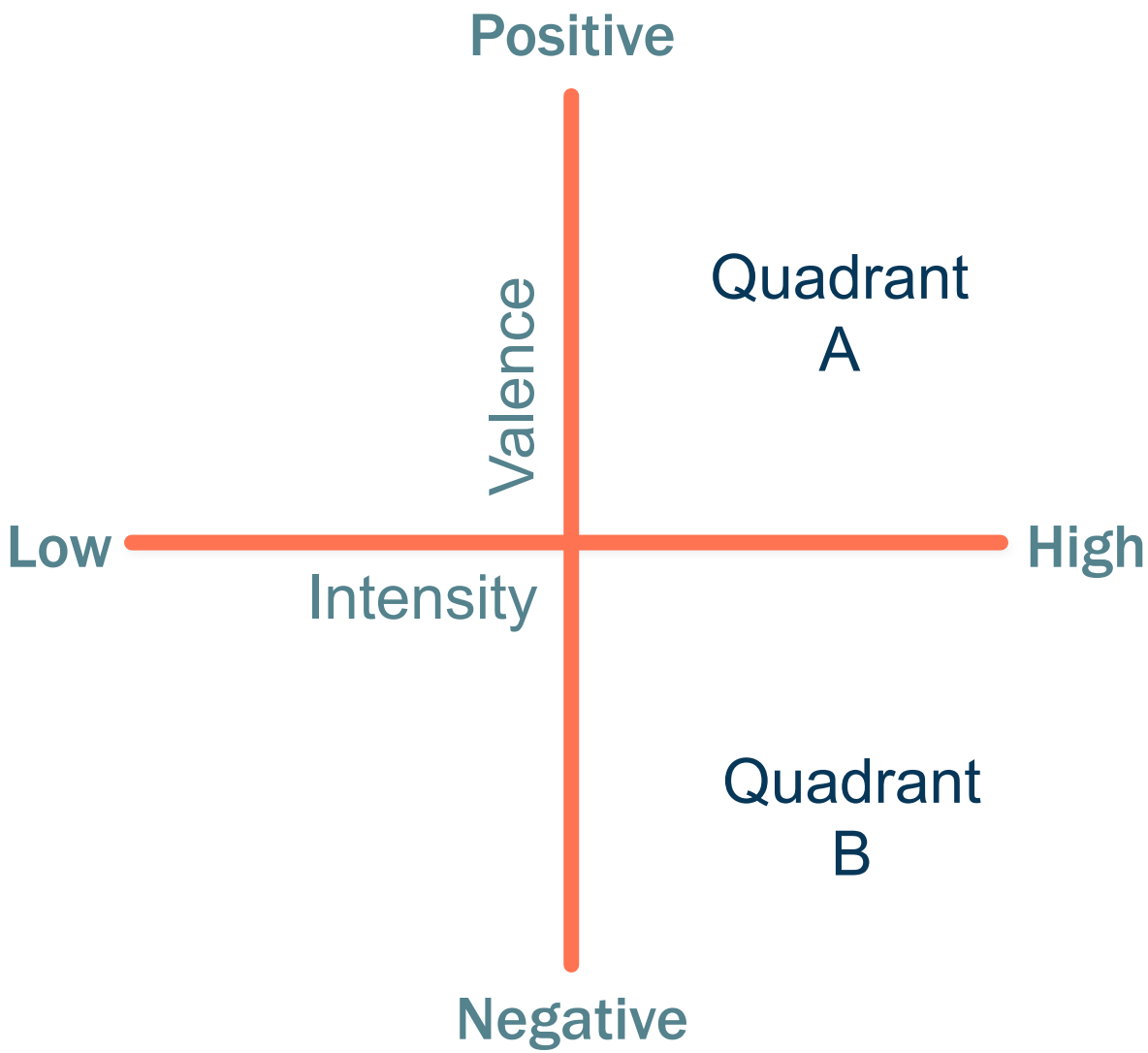
Relationship between Learning & Emotions



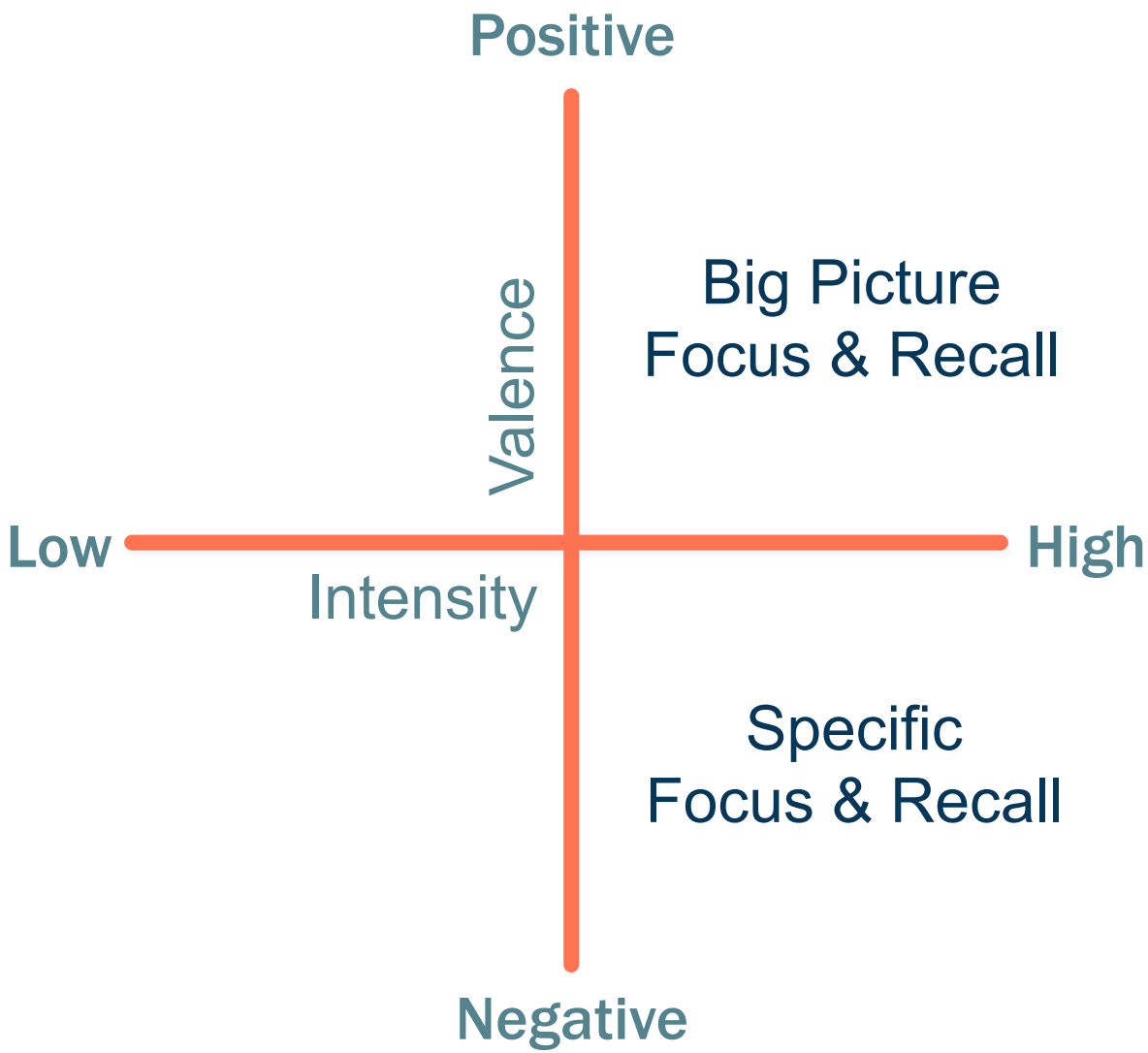
Emotions vary along two dimensions



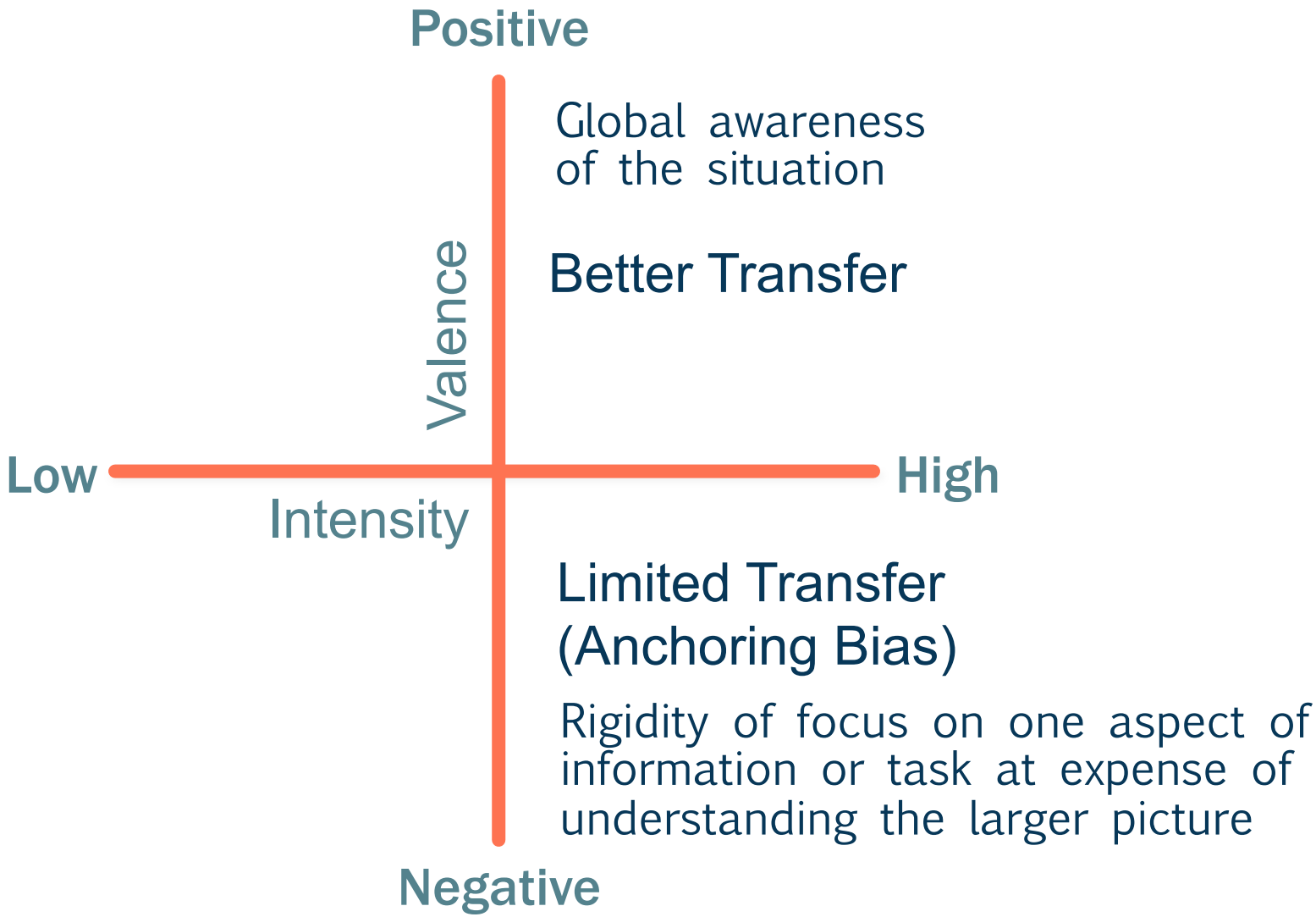
Valence also effects learning



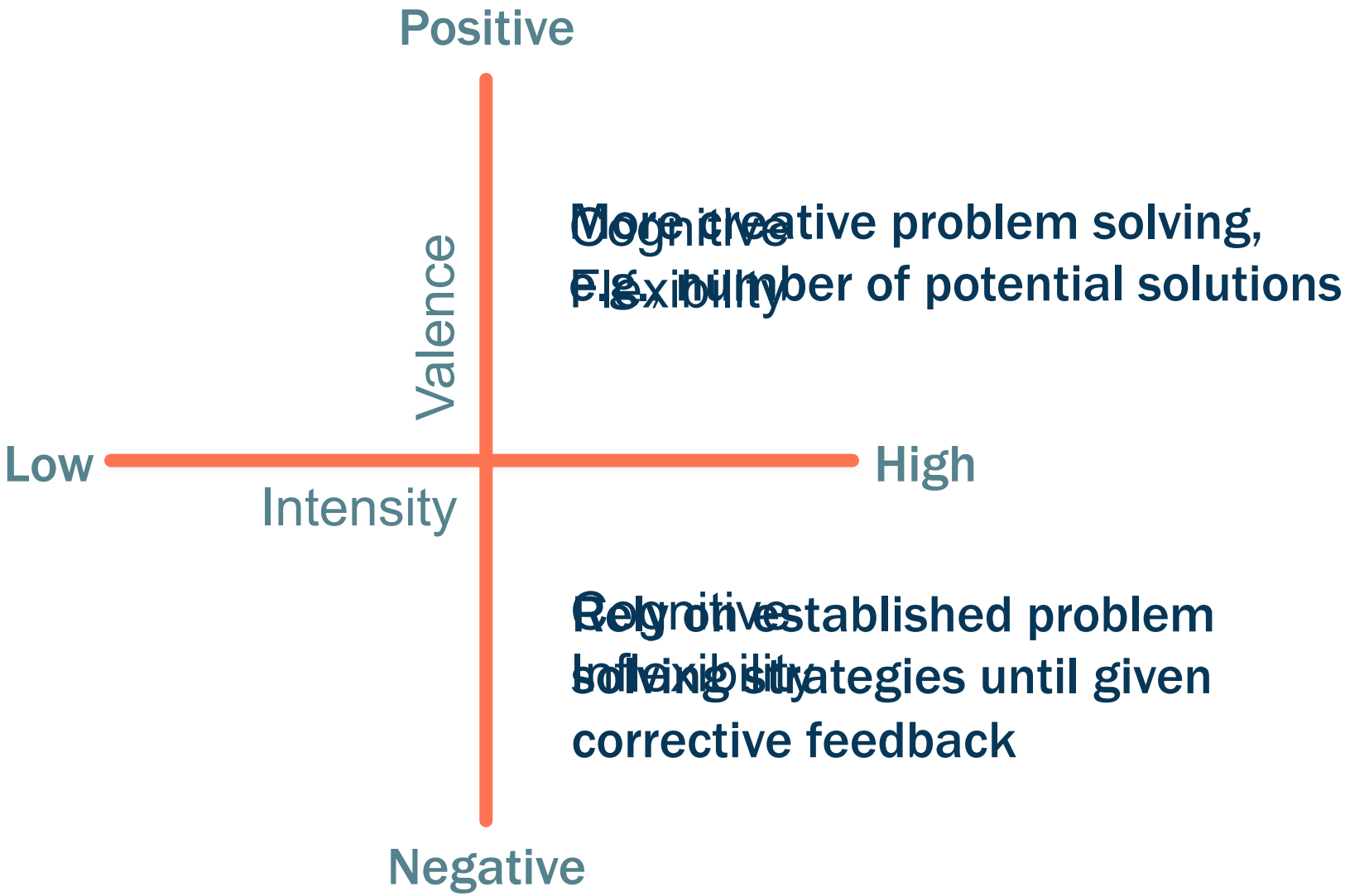
Emotions and cognitive engagement



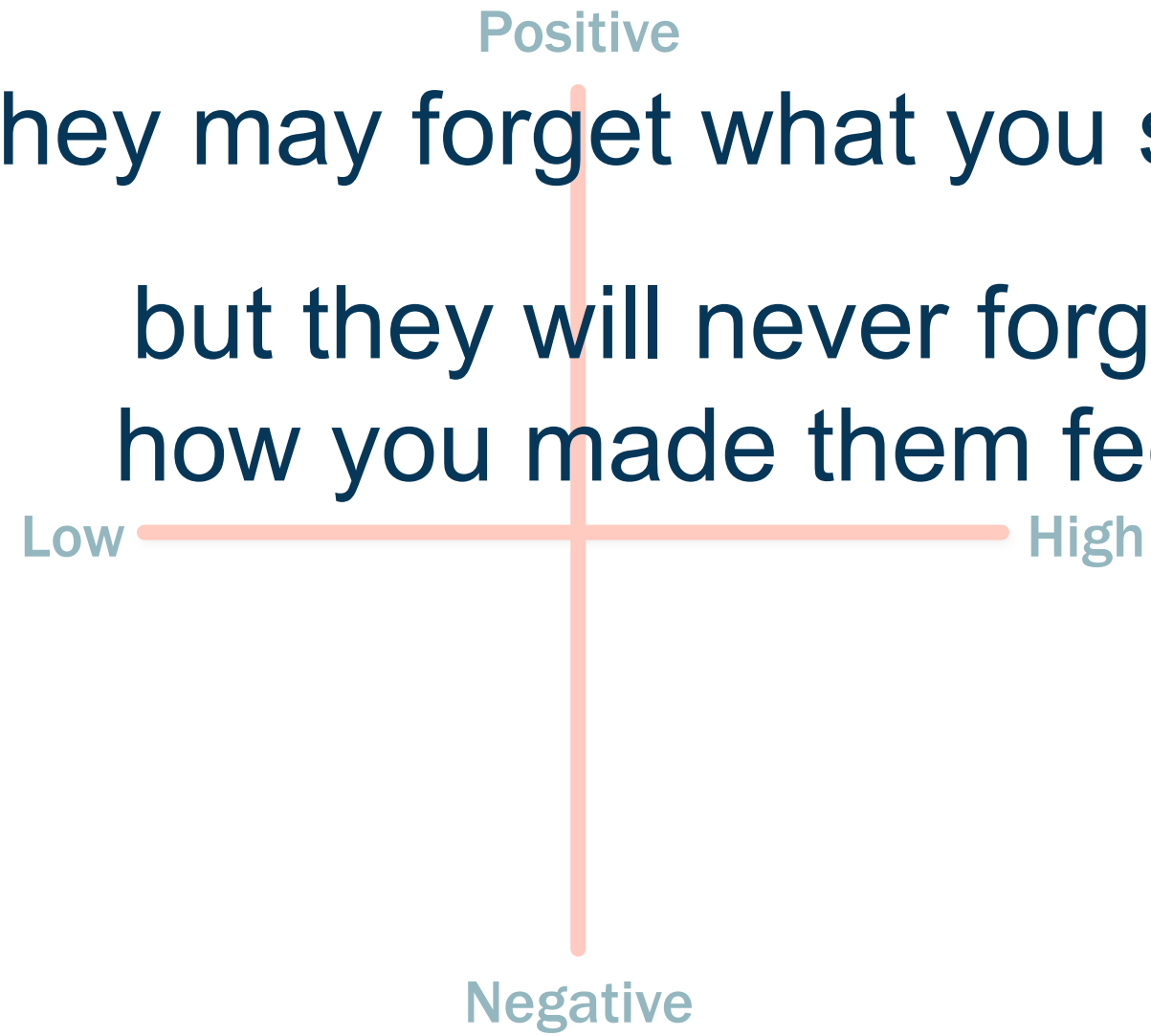
Emotions and cognitive engagement



Emotions and cognitive engagement



Emotions and cognitive engagement



They may forget what you said,

but they will never forget
how you made them feel.

A Recommendation ...

McConnell & Eva.

The role of emotion in the learning of clinical skills and knowledge.

Academic Medicine, 2012, 87:1316-1322.

A Question:

If your students had only 20 minutes to learn important concepts related to dental practice that had to be recalled accurately a week from now, which of the following would produce the best results? And why?

1. **(SSSS) <u>Four study sessions</u> of 5 minutes each;**

2. **(SSST) <u>Three study sessions</u> of 5 minutes each, plus one 5 minute test of free recall, writing down as much as they can remember;**

3. **(STTT) <u>One study session</u> of 5 minutes, followed by three consecutive 5 min. tests of free recall, writing down as much as they can remember;**

NOTE: No feedback given in any of these options.

One Study (of many):

Three groups of students studied general science concepts:

1. (SSSS) <u>Four study sessions</u> of 5 minutes each;

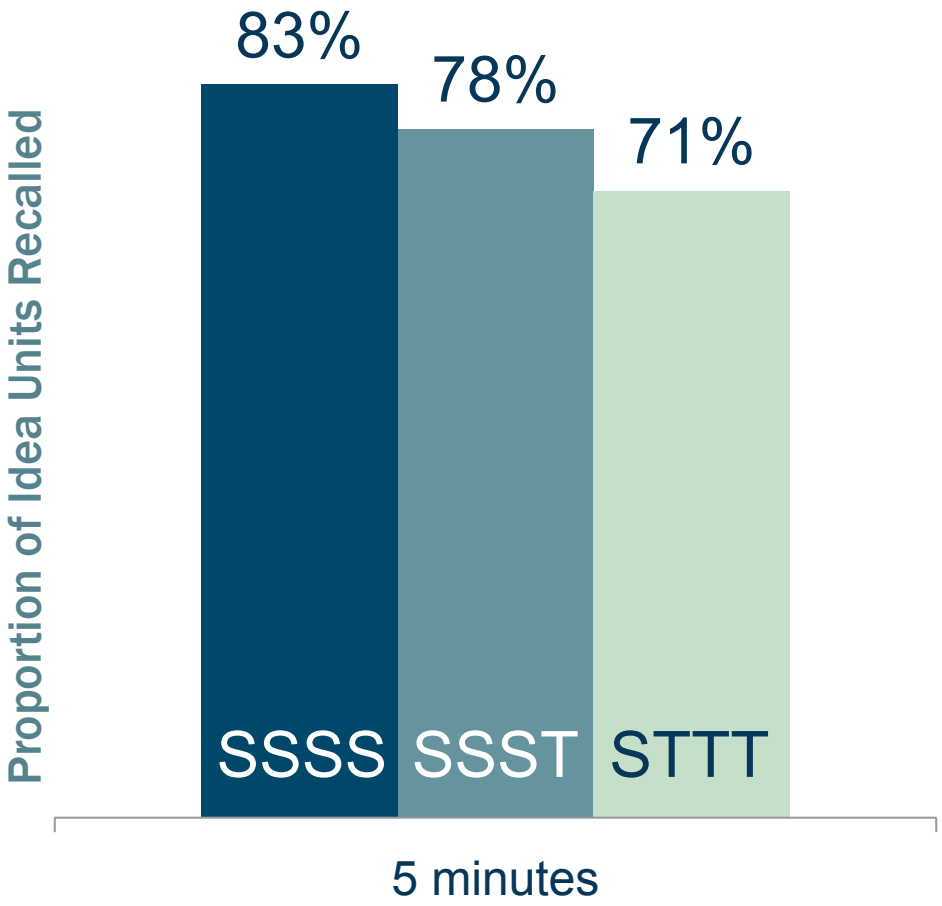
2. (SSST) <u>Three study sessions</u> of 5 minutes each, plus one 5 minute test of free recall, writing down as much as they can remember;

3. (STTT) <u>One study session</u> of 5 minutes, followed by three consecutive 5 min. tests of free recall, writing down as much as they can remember;

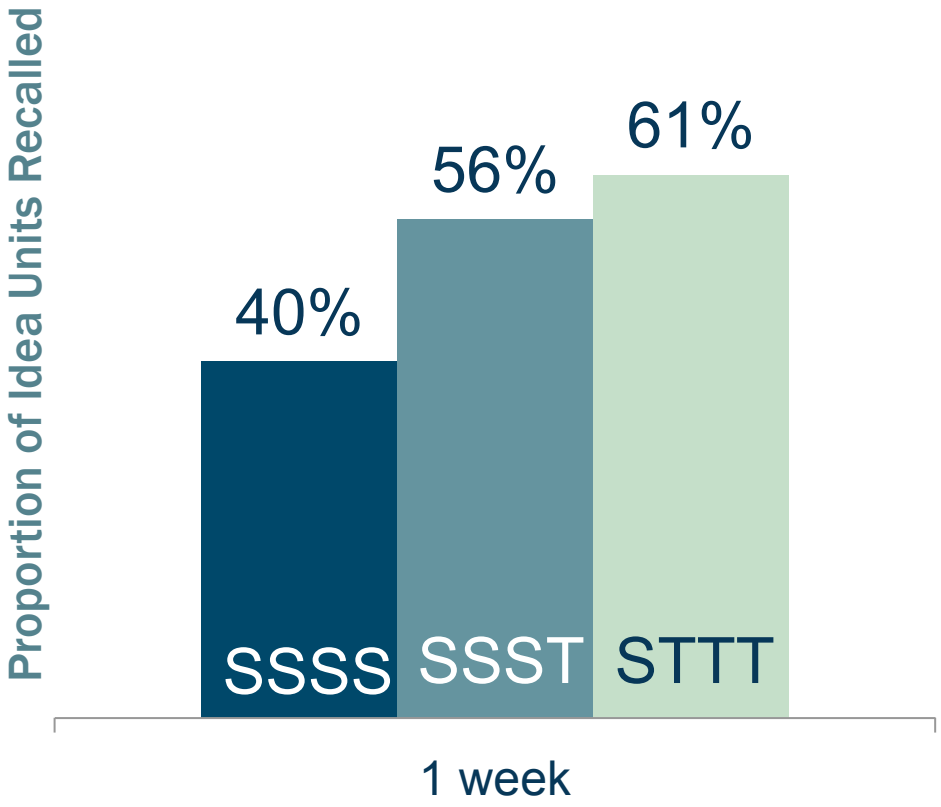
Each group spent a total of 20 minutes with no feedback.

Roediger HL III, Memory Lab at Washington University, St. Louis, MO.

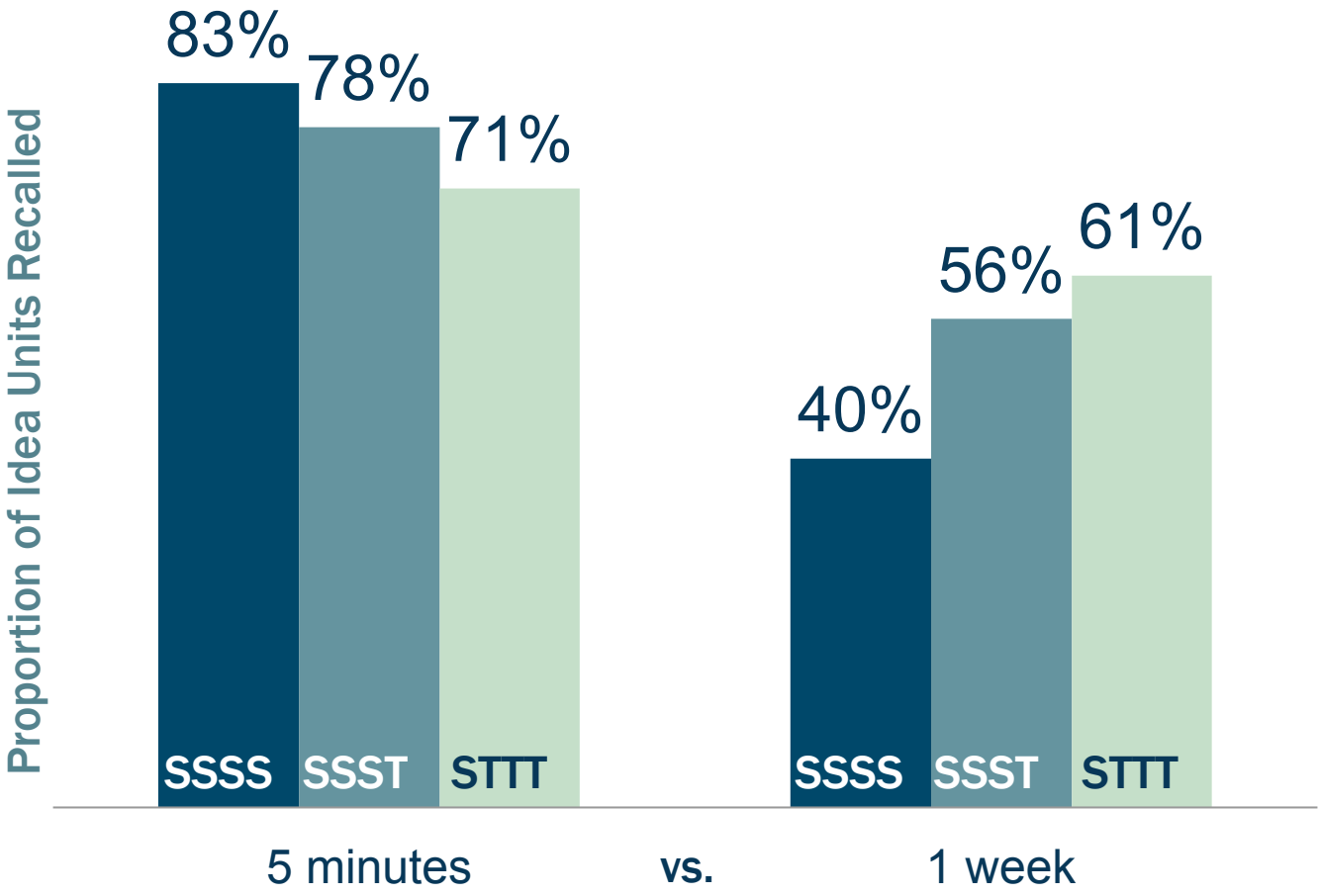
Study Results



Study Results



Study Results



What happens when studying more?

“It keeps me from looking at my phone every two seconds.”

What happens when studying more?

Illusion of Knowing: Belief that because something is easy to remember right now, it will remain that way tomorrow or next week.

Illusion of knowing renders us poor judges of what we need to study or practice again.

Pre-testing & Guessing as Active Engagement

Ask them questions before telling them something

Even if they don't know, encourage them to guess

Getting it wrong improves learning
compared to
Studying without pre-testing/guessing

***Scientific American*, Oct. 20, 2009**
Productive Failure: Manu Kapur, **2008, 2012**
Making it Stick, Brown, Roediger, & McDaniel, **2014**

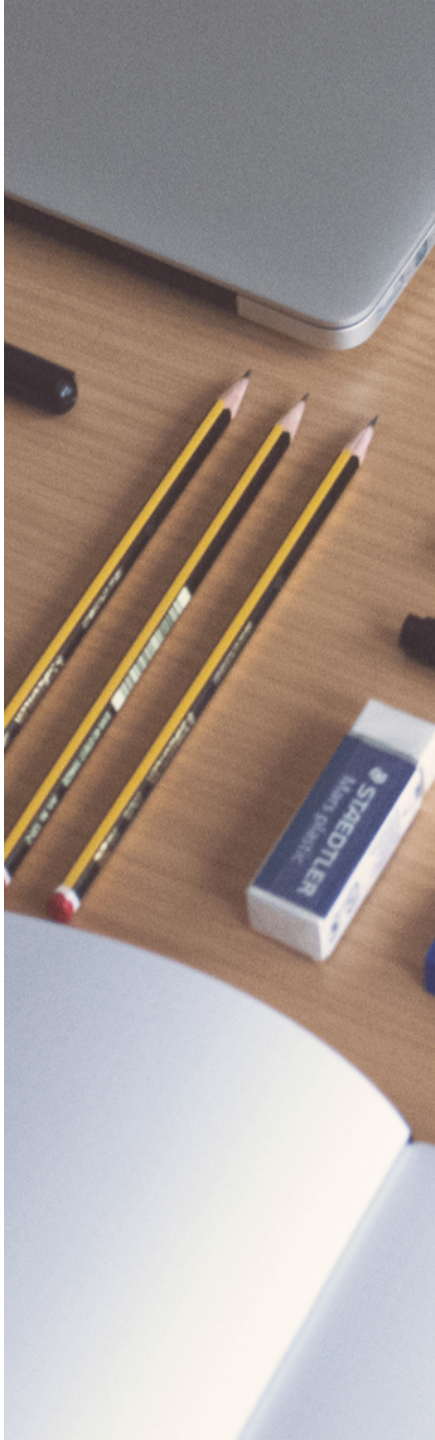
Exercise in repeated recalling a thing strengthens the memory.

(Aristotle)

To Learn … Retrieve!

- Repeated & Spaced
- Interleaved & Effortful
- Corrective Feedback

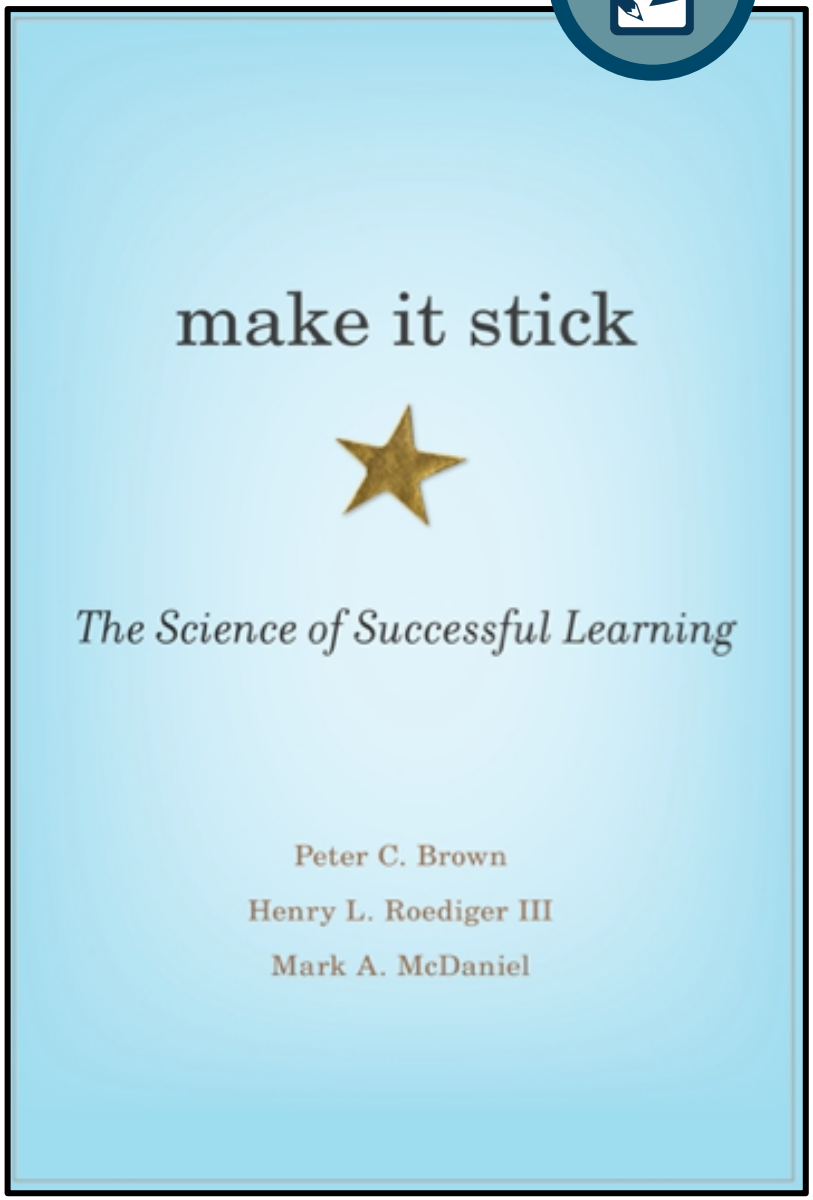
Better:
Transfer to new contexts & problems
Self-assessment & self-regulation



A Recommendation

Make it Stick: *The science of successful learning*

Brown, Roediger, & McDaniel (2014). Harvard University Press



A Question for you:

What does the evidence suggest would be the single most important thing you can do to have a positive effect on students' learning?

And why?

Research tells us three things about feedback:

1. Teachers say they routinely provide feedback to learners

2. Trained observers report little or no feedback given to learners

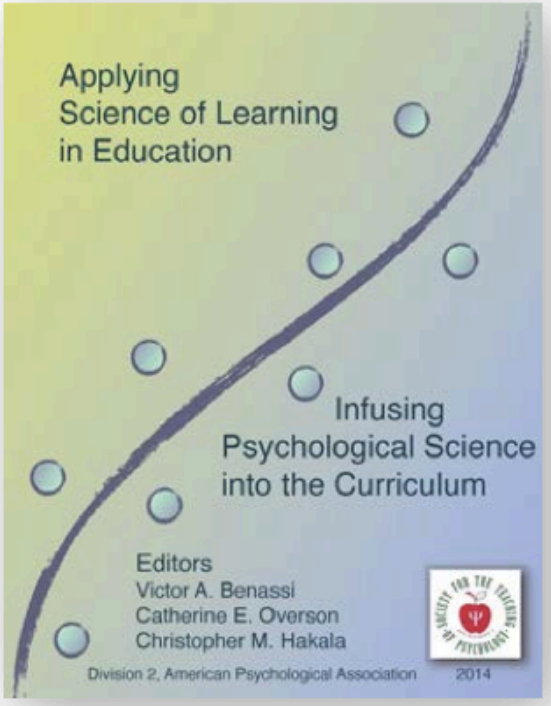
3. Learners report receiving little or no feedback to help them learn

Research tells us:

1. Teachers say feedback on learning is routinely provided
2. Trained observers report low levels or no feedback observed
3. Students report low levels or virtually no feedback received

There's something wrong with this picture

Google: "Free ebook on applying science of learning in education"



Using Feedback to Promote Learning

John A. C. Hattie
University of Melbourne

Gregory C. R. Yates
University of South Australia

Qualities of Effective Feedback:

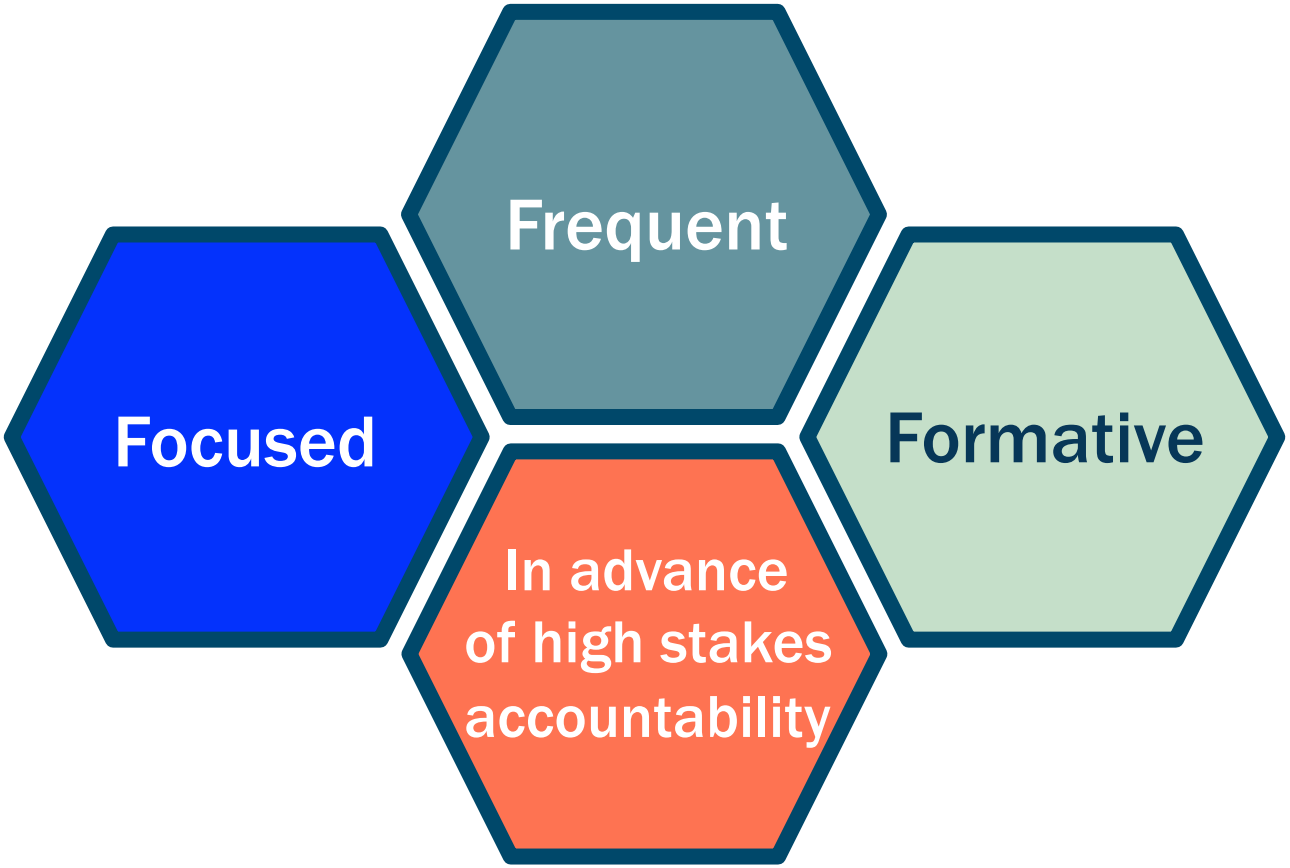
1. Depends on learner's interpretation
2. Criteria for success known in advance
3. Focused on task rather than learner
4. Targeted to Zone of Proximal Development
5. Climate where errors are natural and welcomed
6. Difficulties are seen to be normal & productive

That Question:

What does the evidence suggest would be the single most important thing you can do to have a positive effect on students' learning?

And why?

Feedback that is …



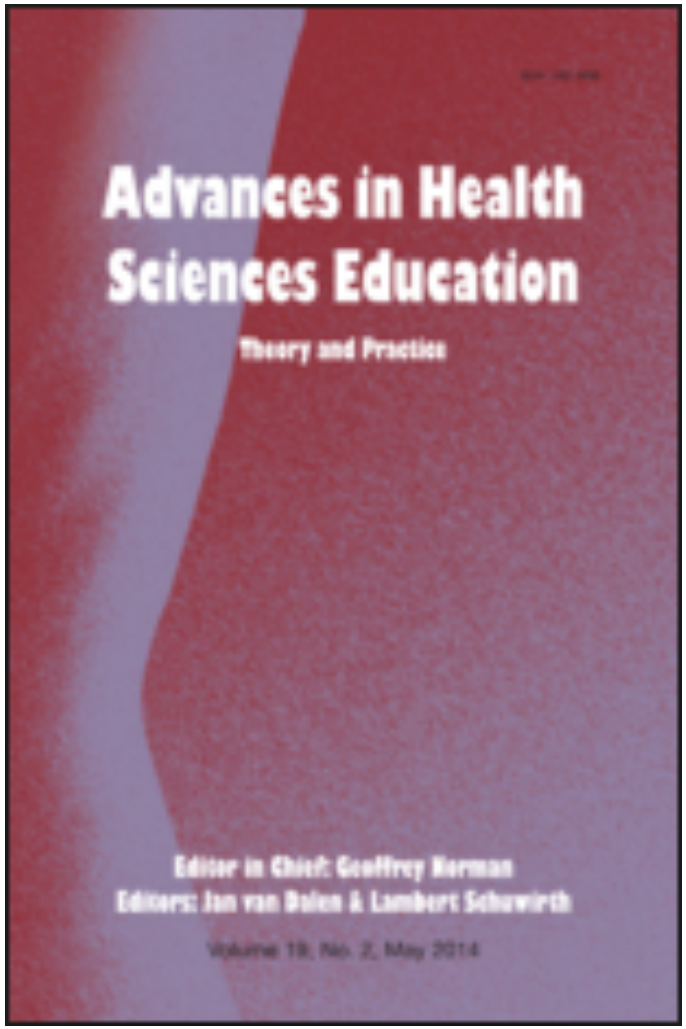
Bain 2004
Medical Education 45(9) 2011
Eva, et al. Adv in Health Sci 17, 15-26 (2012)

A Recommendation

Kevin Eva, et al

Factors influencing responsiveness to feedback: on the interplay between fear, confidence, and reasoning processes

Adv in Health Sci Educ
vol 17, pp. 15–26 (2012)

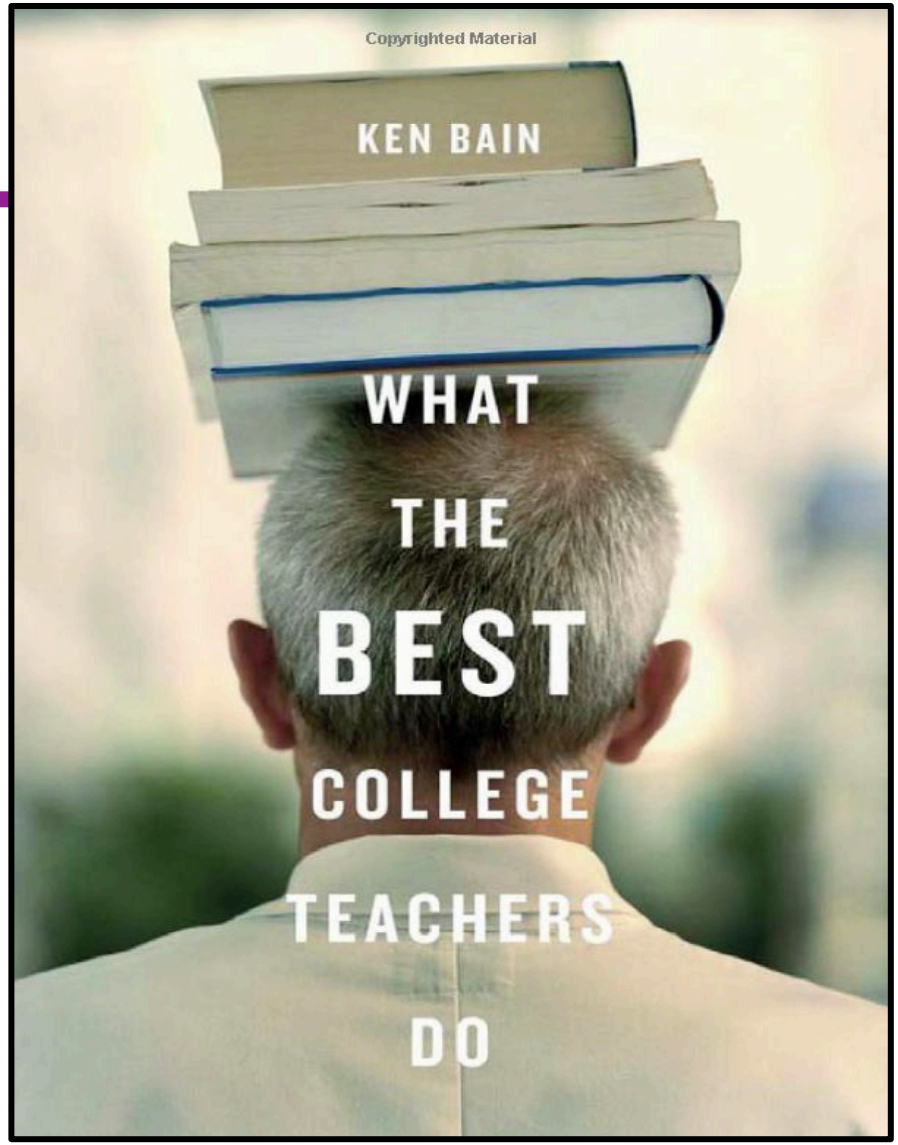


Another Recommendation

Ken Bain

<u>What the Best College Teachers Do</u>

Harvard University Press, 2004



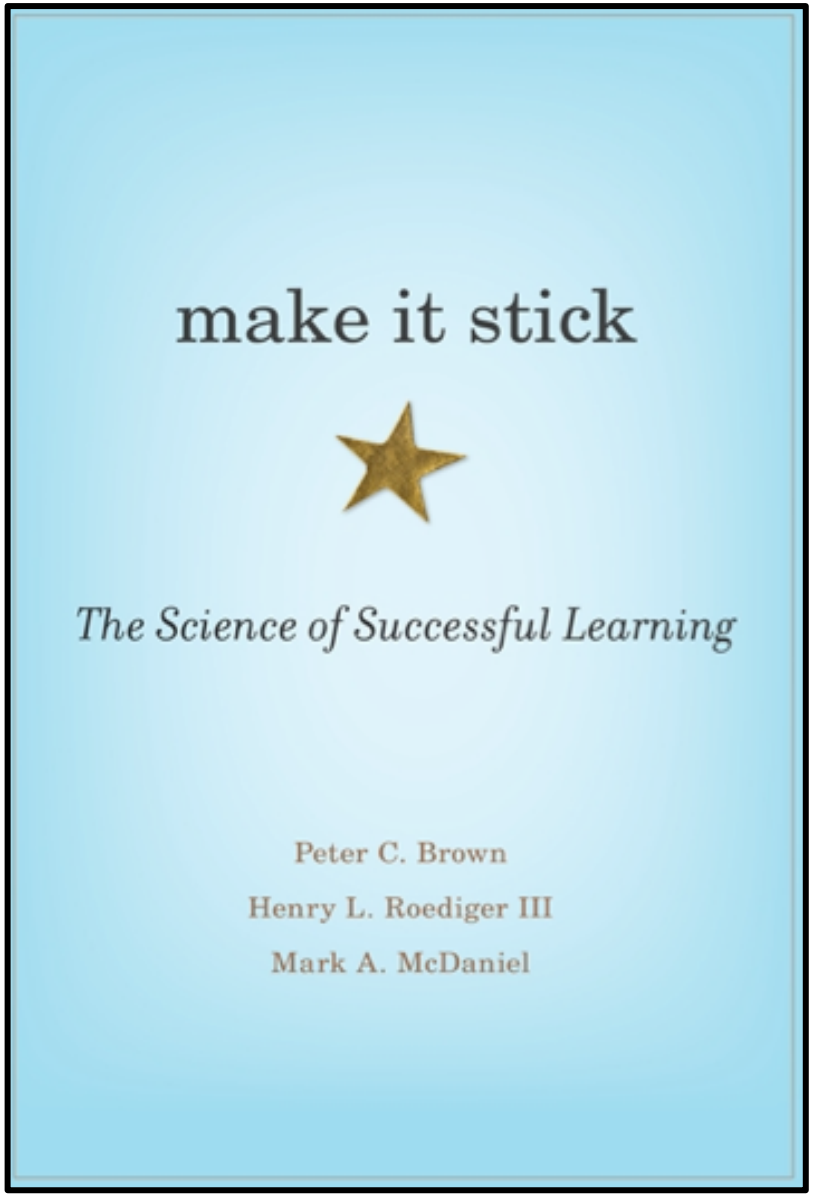
Where to from here?

Top Four Recommendations

1st Recommendation

Make it Stick: *The science of successful learning*

Brown, Roediger, & McDaniel (2014). Harvard University Press

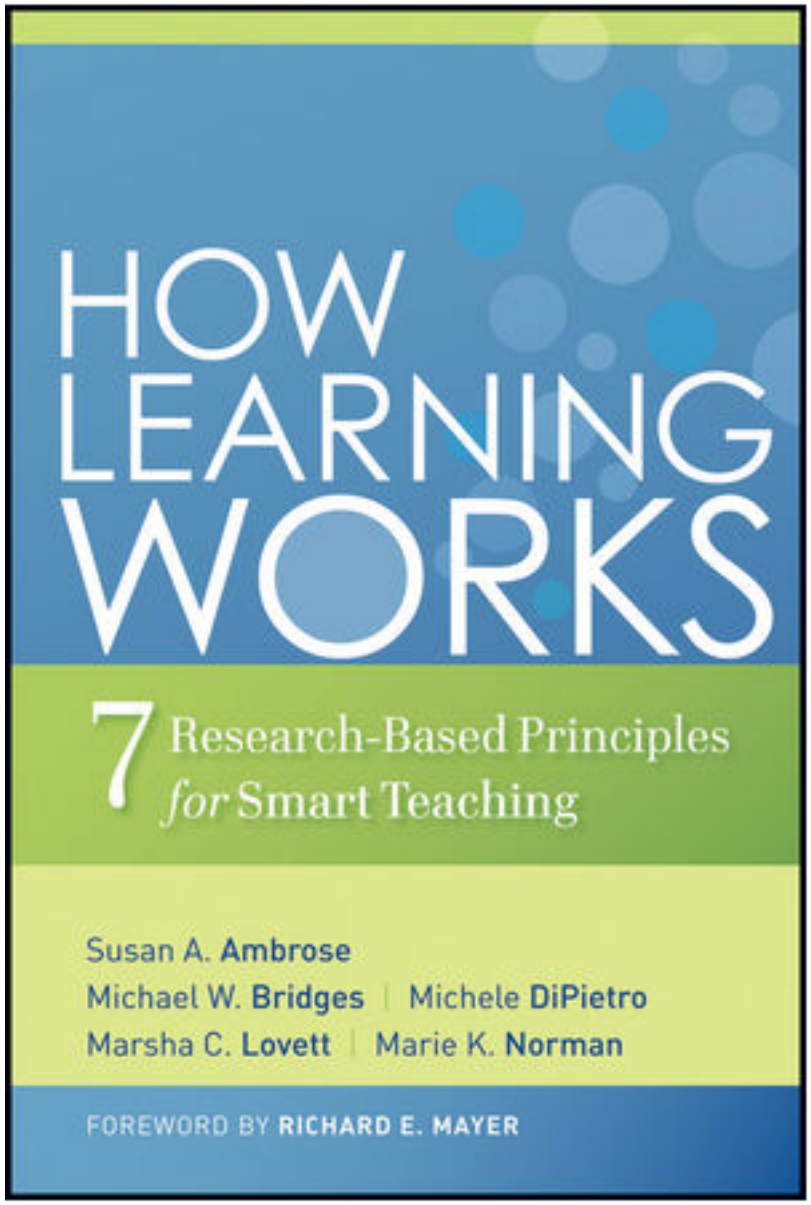


2nd Recommendation

How Learning Works:

7 Principles For Smart Teaching

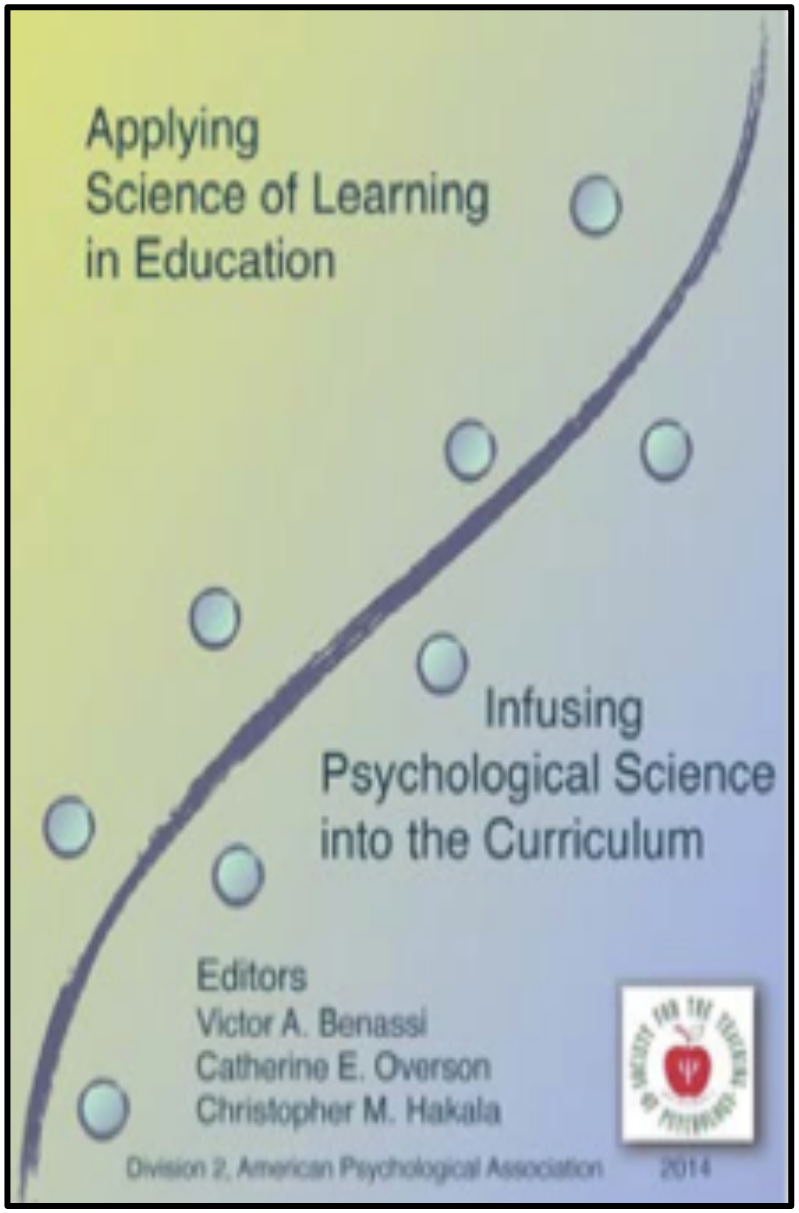
Ambrose, Bridges, DiPietro, Lovett, & Norman (2010). Jossey-Bass Publishers



3rd Recommendation

Applying Science of Learning in Education:
Infusing Psychological Science into the Curriculum

Benassi, Overson, Hakala (2014). Am Psych Assoc.



4th Recommendation

Pratt & Smulders (Fall of 2015).

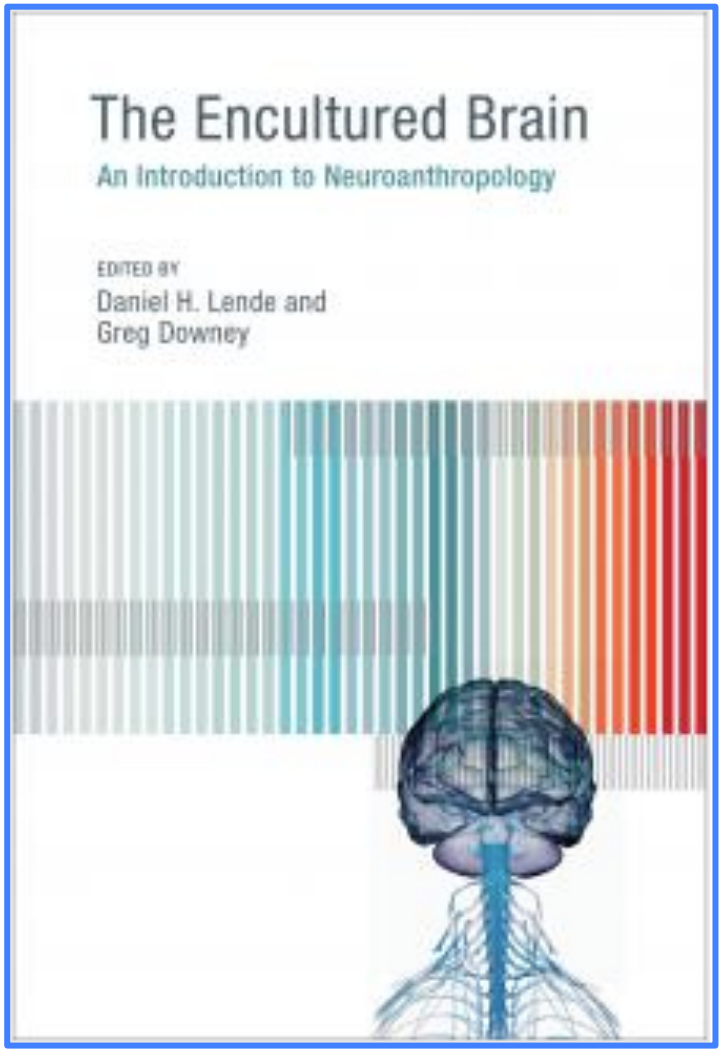
Five Perspectives on Teaching:
Mapping a Plurality of the Good.

For a completely different point of view

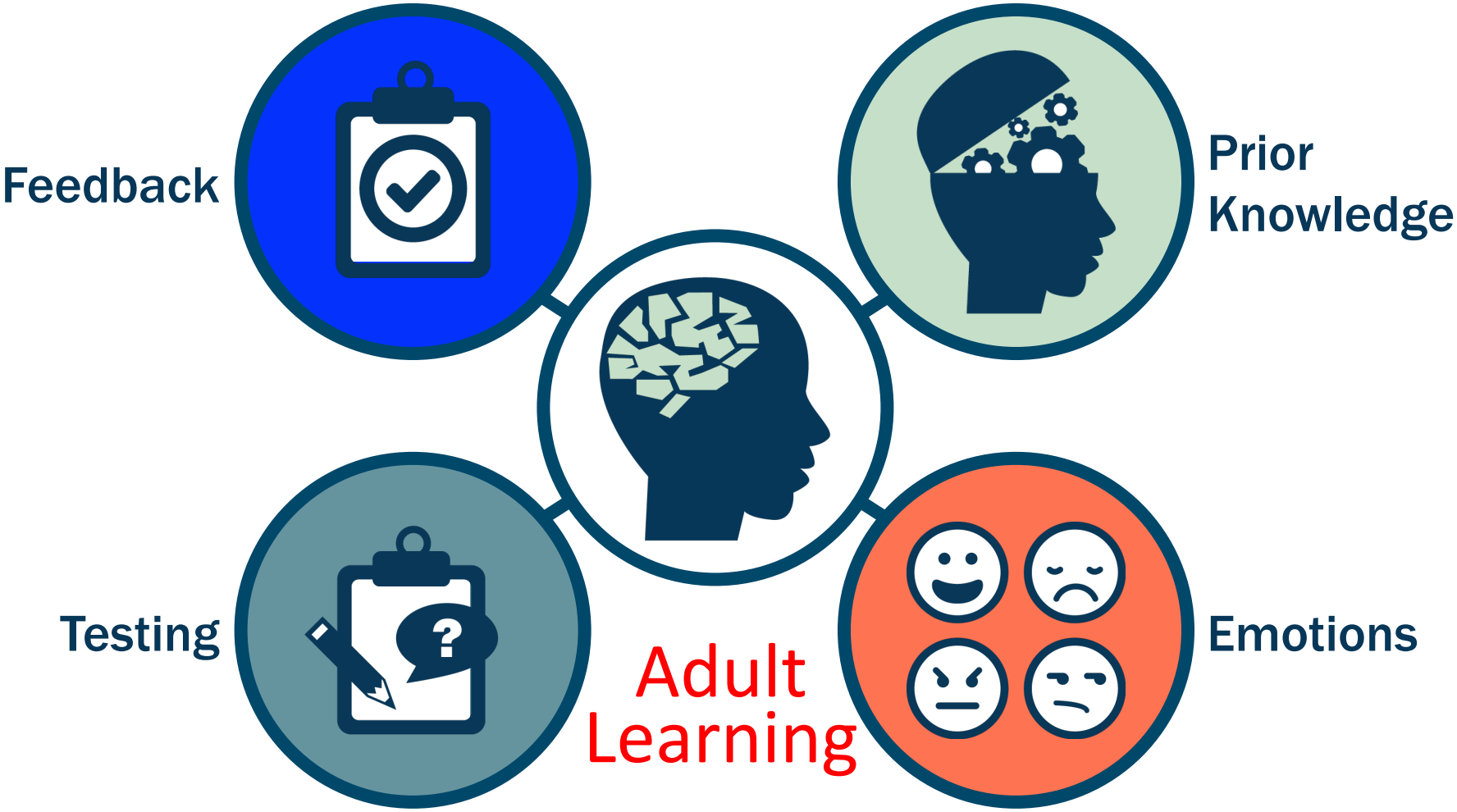
The Encultured Brain:

An Introduction to Neuroanthropology

Lende and Downey (eds.), (2012).



Questions & Comments welcome




Thank You