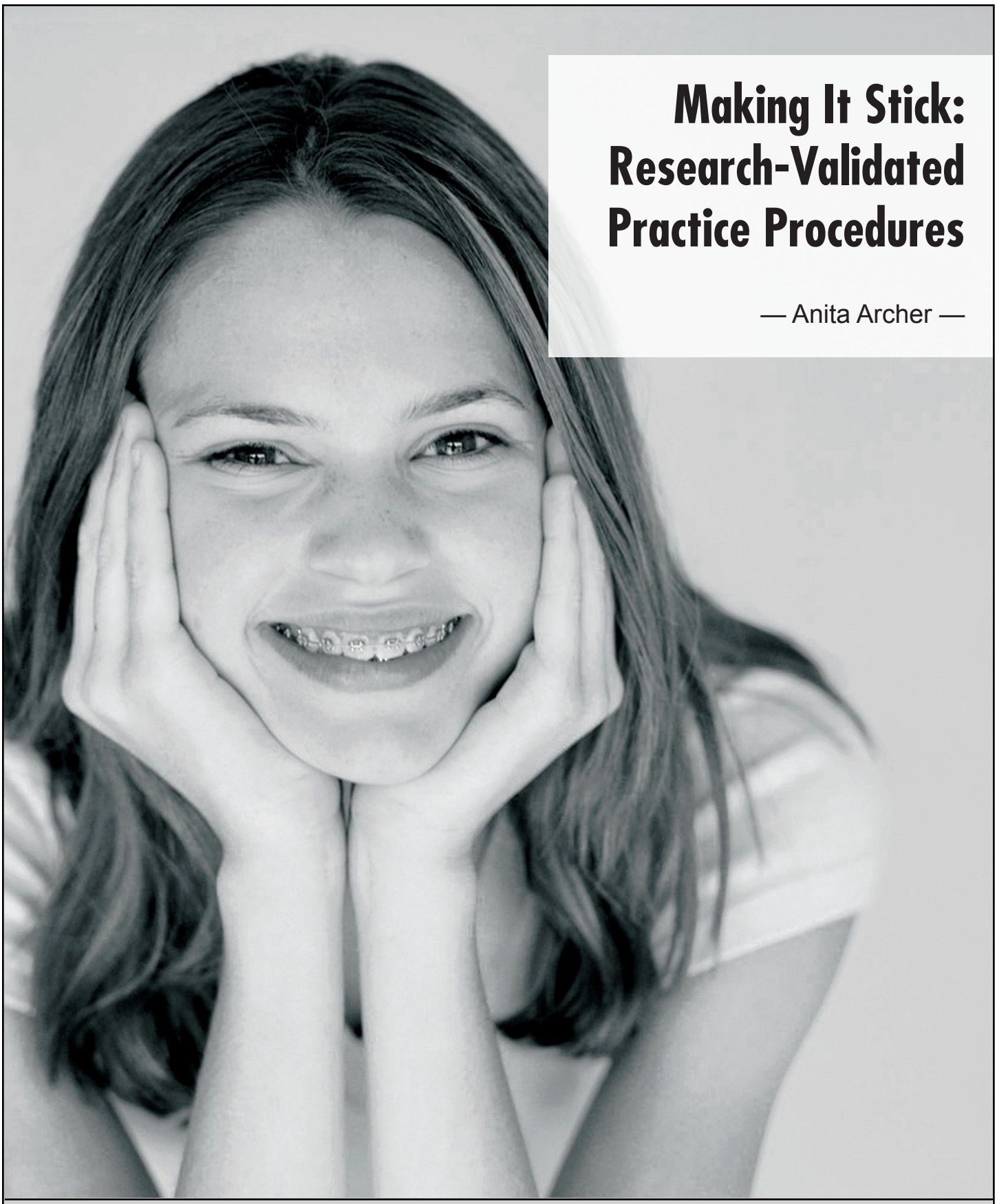

# Making It Stick: Research-Validated Practice Procedures

— Anita Archer —

**PLAIN TALK ABOUT LITERACY AND LEARNING**
**New Orleans, LA | February 17-19, 2016**

CDL the Center for DEVELOPMENT & LEARNING

# About the Presenter

**Anita Archer**

Anita Archer, Ph.D., recipient of ten Outstanding Educator awards, serves as an educational consultant to state departments, county agencies, and school districts on explicit instruction and literacy instruction. She has taught elementary and middle school students and has served on the faculties of San Diego State University, the University of Washington, and the University of Oregon. She is nationally known for her presentations and publications on instructional procedures and literacy instruction and has co-authored numerous curriculum materials with Mary Gleason including *REWARDS PLUS*, *REWARDS Writing* and *Skills for School Success*. Most recently, Anita wrote a textbook on explicit instruction with Charles Hughes entitled *Explicit Instruction: Effective and Efficient Teaching* (Guilford, 2011).

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# MAKING IT STICK:

**Research – Validated Practice Procedures**

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**ANITA L. ARCHER, PHD**
**AUTHOR, CONSULTANT, TEACHER**

For additional information on practice see Chapter 8 in:

Archer, A., & Hughes, C. (2011). *Explicit Instruction: Effective and Efficient Teaching.* NY: Guilford Publications.

www.explicitinstruction.org

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## Practice

It is virtually impossible to become proficient at a mental task without extended practice.
*Willingham, 2009*

Use it or lose it. *Anonymous*

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## How can we optimize practice?

1. Deliberate practice
2. Retrieval practice
3. Spaced practice
4. Varied practice
5. Mixed practice

5

## Deliberate Practice

Deliberate practice is **goal-oriented** practice **consciously** devoted to **improvement** of a skill.

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## Deliberate Practice? Why?

Why is A an example of *deliberate practice* and B is not?

A. As you write your paragraph, stop and reread your paragraph to be sure it makes sense. Add transition words or phrases to make your paragraph flow.

B. Using your paragraph plan, write a paragraph.

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## Retrieval Practice

The effect of **retrieval practice** is the finding that long-term memory is increased when some of the learning period is devoted to retrieving the to-be-remembered information.

The effect is also sometimes referred to as **testing effect** or **test-enhanced learning**.

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## Two Little Lessons

Lesson 1 – Traditional Review

Lesson 2 – Retrieval Practice

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# MATH REVIEW

Traditional Review

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## Review - Integer

Integer
- whole number
- no fractional or decimal part
- can be positive and negative

Examples

+3 -3 -16 198

11

## Review – Rational Numbers

Informal Definition: A rational number is a number that can be written as a **simple fraction**.

Formal Definition : A rational number is a number that can be in the form **p/q** where **p** and **q** are integers and q is not equal to zero.

Examples

½ 1.5 = 3/2 - 0.1 = - 1/10

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## Review - Absolute Value

- An absolute value is the distance a number is from zero.
- Absolute values are positive.

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# MATH REVIEW

Retrieval Practice

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## Review – Integers

Write down the integers.

-5 1.43 1 ¾ 97 .09

3.14 43

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## Review – Integers

-5 1.43 1 ¾ 97 .09 3.14 43

Integer
- whole number
- not a fractional or digital part
- can be positive and negative.

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## Review – Integers

-10 4.43 9 ¾ 100 .6 3.14

-43 ½ .09 5,643.1 3,043

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## Review – Integers

-10 4.43 9 ¾ 100 .6 3.14

- 43 ½ .09 5,643.1 3,043

Integer
- whole number
- not a fractional part
- can be positive and negative.

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## Rational Number

Show and explain why 2 is a rational number.

19

## Review – Rational Numbers

Informal Definition: A rational number is a number that can be written as a simple fraction.

Formal Definition : A rational number is a number that can be in the form **p/q** where **p** and **q** are integers and q is not equal to zero.

2 = 2/1

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## Review – Rational Numbers

Informal Definition: A rational number is a number that can be written as a simple fraction.

Formal Definition : A rational number is a number that can be in the form **p/q** where **p** and **q** are integers and q is not equal to zero.

2 = 2/1

21

## Rational Number

Show and explain why 0.75 is a rational number.

22

## Review – Rational Numbers

Informal Definition: A rational number is a number that can be written as a simple fraction.

Formal Definition : A rational number is a number that can be in the form **p/q** where **p** and **q** are integers and q is not equal to zero.

0.75 = 75/100 = 3/4

23

## Rational Number

Show and explain why 0.6 is a rational number.

24

## Review – Rational Numbers

Informal Definition: A rational number is a number that can be written as a simple fraction.

Formal Definition : A rational number is a number that can be in the form **p/q** where **p** and **q** are integers and q is not equal to zero.

0.6 = 6/10 = 3/5

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Write the absolute number for these numbers.

12 -7 0 215 - 66 - 5

26

Write the absolute number for these numbers.

12 -7 0 215 - 66 - 5

12 7 0 215 66 5

- An absolute value is the distance a number is from zero.
- Absolute numbers are positive.

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## Retrieval Practice – Why

Retrieval Practice makes learning STICK far better than re-exposure to the original material.

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## Retrieval Practice – Why

Retrieval Practice **strengthens memory** and interrupts forgetting.

Retrieval Practice makes that knowledge **easier to retrieve** in the future.

**Neural pathways** that make up a body of learning get **stronger.**

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## Effortful Retrieval Practice

Learning is deeper and more durable when it's EFFORTFUL. Learning that's easy is like writing in sand, here today and gone tomorrow. Brown, Roediger, and McDaniel (2014)

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## Retrieval Practice – Teacher - Guided

Example Procedures :

1. Practice without scaffolding
2. Rapid retrieval practice
3. Retrieval Practice Games
4. Quick write
5. Quick draw
6. Flash cards
7. Multiple-choice items using hand signals, Clickers, or Plickers
8. Written answers

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Retrieval Practice

Example

Rapid Retrieval Practice

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## Irregular Verbs

- The suffix ed is NOT used to form the past tense of irregular verbs.

| | |
|---|---|
| Today I speak. | Yesterday I spoke. |
| Today I write. | Yesterday I wrote. |
| Today I go . | Yesterday I went. |
| Today I drink. | Yesterday I drank.. |
| Today I swim. | Yesterday I swam. |
| Today I see. | Yesterday I saw. |
| Today I sing. | Yesterday I sang. |
| Today I fall. | Yesterday I fell. |
| Today I hide. | Yesterday I hid. |

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## Irregular Verbs

- The suffix ed is NOT used to form the past tense of irregular verbs.

| | |
|---|---|
| Today I speak. | Yesterday I _____. |
| Today I write. | Yesterday I _____. |
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| Today I drink. | Yesterday I _____. |
| Today I swim. | Yesterday I _____. |
| Today I see. | Yesterday I _____. |
| Today I sing. | Yesterday I _____. |
| Today I fall. | Yesterday I _____. |
| Today I hide. | Yesterday I _____. |

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## Retrieval Practice - Teacher- guided Quick Write

Example

List some benefits of retrieval practice.

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## Retrieval Practice - Teacher- guided Flash Cards

| Set # 1 | Set #2 |
|---|---|
| **New Content and Difficult from the past** | **Mastered Content** |

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## Retrieval Practice - Teacher-guided Hand Signals, Clickers, or Plickers

Select the best answer.

1. Retrieval practice that is effortful promotes more learning.
2. Retrieval practice should occur after modeling and guided practice.
3. Retrieval practice reduces forgetting and strengthens learning.
4. All of the above.

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## Summary - Retrieval Practice

**Retrieval Practice Benefits**
- learning
- durable retention

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## Summary - Retrieval Practice

**Retrieval Practice Benefits**
- learning
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**Effortful Retrieval Practice**
- stronger learning
- stronger retention

39

## Summary - Retrieval Practice

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**Delayed Effortful Retrieval**
- more learning
- more retention

40

## Summary - Retrieval Practice

**Retrieval Practice Benefits**
- learning
- durable retention

**Effortful Retrieval Practice**
- stronger learning
- stronger retention

**Delayed Effortful Retrieval**
- more learning
- more retention

**Repeated Retrieval**
- more learning
- more ease of retrieval

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## Summary - Retrieval Practice

**Retrieval Practice Benefits**
- learning
- durable retention

**Effortful Retrieval Practice**
- stronger learning
- stronger retention

**Delayed Effortful Retrieval**
- more learning
- more retention

**Repeated Retrieval**
- more learning
- more ease of retrieval

**Corrective Feedback**
- more learning

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## Spaced Practice

**Spaced practice** (also known as **distributed practice**) is a learning strategy, where **practice** is broken up into a number of short sessions - over a longer period of time.

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## Mass vs Spaced Practice

Mass Practice vs Spaced Practice –
Effect size d = 0.71 Hattie, 2009

Gains achieved in massed practice are transitory and melt away quickly. Brown, Roediger, McDaniel, 2014

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## Spaced VS Mass Practice – Why?

Same time
Same effort
but Remember More

45

## Spaced VS Mass Practice – Why?

"Distributed learning, in certain situations, can double the amount you remember later on."

Carey, 2014

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### Spaced Practice

- **Initial Practice**
- **Distributed Practice**
- **Cumulative Review**

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### Spaced Practice

**Initial Practice**

- Occurs under watchful eye of the teacher
- Provide numerous practice opportunities within the teacher-directed lesson to build accuracy. Provide immediate feedback after each item.

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### Spaced Practice

**Distributed Practice**

- Studying or practicing a skill in short sessions overtime.
- Distributing practice overtime (versus massing practice in one session) aids retention in a variety of academic areas.

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## Spaced Practice

### Cumulative Review

- Provide **intentional review** of previously taught skills/strategies/concepts /vocabulary/knowledge.
- Goal is to increase long-term retention.

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## Spaced Practice

What interval?

- Enough time that a little forgetting has set in leading to more effort.
- Not so much time that retrieval requires relearning of the material.

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## Spaced Practice

To retain factual information, foreign vocabulary, scientific definitions, use a schedule such as:

- Initial practice and study
- Retrieval practice one or two days later
- Retrieval practice a week later
- Retrieval practice a month later

(See Super Memo)

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## Example – Spaced Practice

Vocabulary – Core Reading Program

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|
| Introduction of vocabulary for Passage A | Quick retrieval practice | | Quick review and elaboration of difficult words | |
| Introduction of vocabulary for Passage B | Quick retrieval practice | | Quick review and elaboration of difficult words | Game - Mixed practice of difficult words A and B |
| Introduction of vocabulary for Passage C | Quick retrieval practice | | Quick review and elaboration of difficult words | Game - Mixed practice of difficult words A, B, and C |
| | | | | |

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## Varied Practice

**Varied practice** refers to use of a variety of practice tasks so that the performer is confronting novel examples of the to-be-learned information.

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## Varied Practice

Vary the practice conditions to increase ability to apply the skill or strategy to a new setting.

**Non- example** – 1st grade decoding

| Day #1 | Day #2 | Day #3 | Day #4 |
|---|---|---|---|
| man | ran | can | van |
| pan | ban | Jan | ban |
| fan | can | man | Jan |
| tan | Dan | Nan | fan |
| ran | fan | tan | ran |

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## Varied Practice

Vary the practice conditions to increase ability to apply the skill or strategy to a new setting.

**Example** – 1st grade decoding (*encoding)

| Day #1 | Day #2 | Day #3 | Day # 4 |
|---|---|---|---|
| at | am | an | had* |
| am * | sad* | Pat | ram |
| Sam | nap | lad* | Pam* |
| ad | mad | sap | fans |
| fan* | Sam* | had | map |
| man* | man | Nan* | taps* |
| rat | mat* | tap* | ham |
| The rat ran. | The man had a nap. | Pat and Nan sat | Pam and Pat had |
| Sam had a fan. | Sam is a sad man. | on mats. | fans. |

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## Varied Practice

| Non-Example | Example |
|---|---|
| bake + ing = baking<br>rake + ing = raking<br>make + ing = making<br>brake + ing = braking | ride + ing = riding<br>fame + ous = famous<br>excite + ing = exciting<br>excite + ment = excitement<br>race + ist = racist<br>shame + ed = shamed<br>shame + ful = shapeful |

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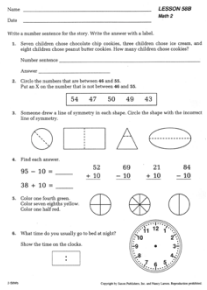
## Mixed Practice - Interleaving



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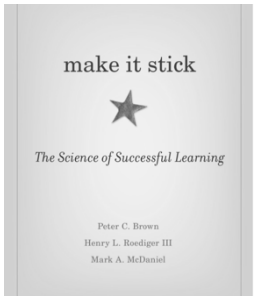
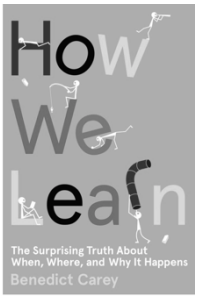
## Recommended Reading

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## Recommended Reading