

# Working Memory and the Integration of Technology in Teaching & Learning

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1

## Agenda

Learning



Principles



Applications



2

## Review

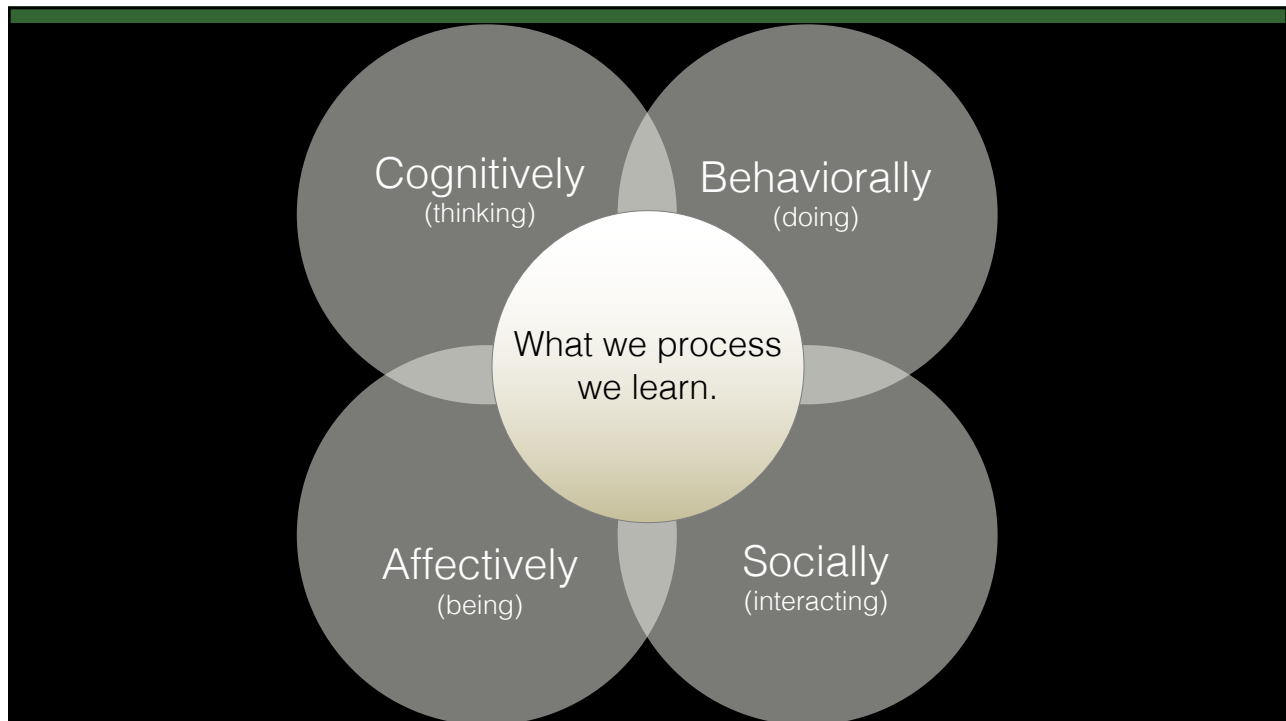


3

## Learning Principles and the Brain

1. Learning occurs through **experience**
2. Experience creates functional neural **pathways**
3. Pathways are created and activated through **attention**
4. Attention is **intentional** and **incidental**
5. Experience → Attention → Pathways is a **feedback** loop
6. Individual **brains differ** based on experience

4



5

## Learning Principles for Teaching and Learning

1. Learning through **practice at retrieval**
2. Learning through **varied tasks** and **purposes**
3. Learning by focusing on the **principle** ideas
4. Learning **awareness** and **control** (metacognition)
5. Learning in response to **developmental feedback**
6. Learning embedded in **prior knowledge** and **experience**

6

## Learning & Working Memory



7

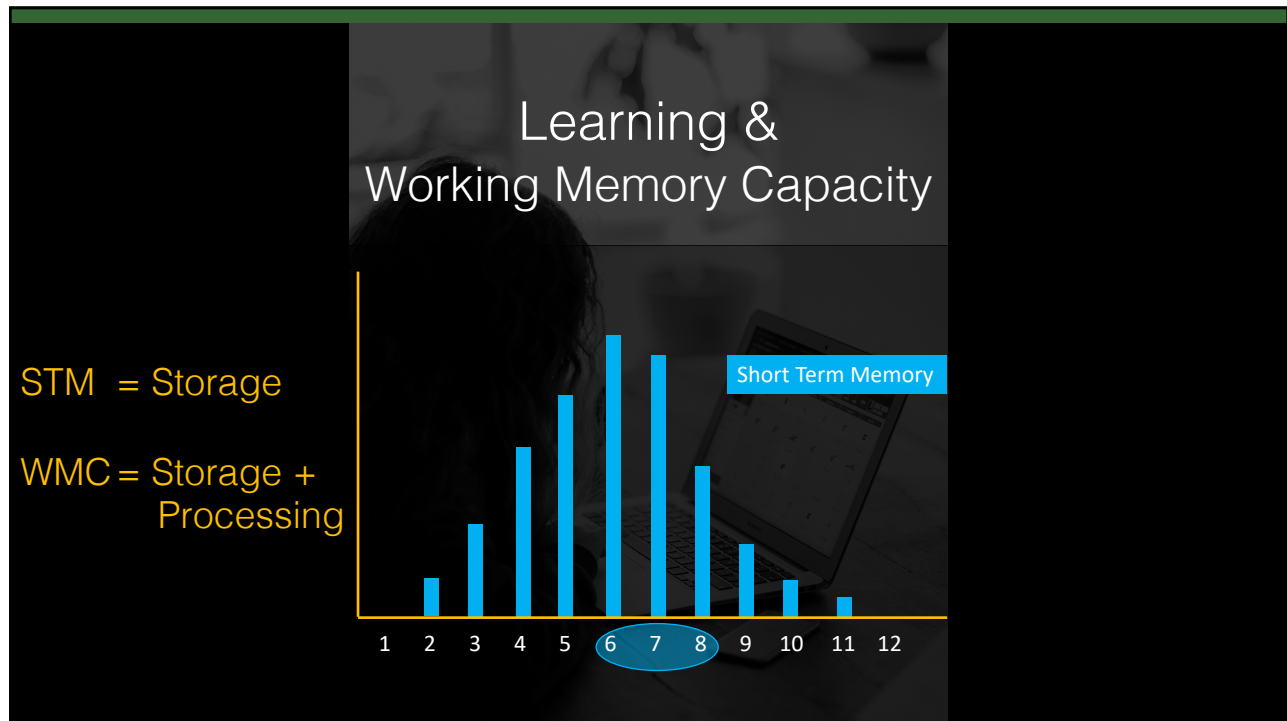
## Learning & Working Memory

### Engaging in Current Thought

1. Store Immediate Experiences
2. Access Long-Term Memory, as needed
3. Process Experiences and Memory
4. Maintaining Current Goals for Processing

} Attentional  
Control

8



9

## Learning & Working Memory Capacity

Write the words in the chat, in order.

$(3 + 7) / 2 = 5$  ? Cow  
 $(8 - 3) + 1 = 7$  ? Star  
 Cow, Star

10

## Learning & Working Memory Capacity

Write the words in the chat, in order.

$(9 - 6) / 3 = 2$  ? Grass

$(5 + 3) - 6 = 2$  ? Phone

Grass, Phone

11

## Learning & Working Memory Capacity

Write the words in the chat, in order.

$(7 + 2) + 1 = 9$  ? White

$(6 / 2) + 4 = 8$  ? Cement

$(2 - 0) / 2 = 2$  ? Pony

White, Cement, Pony

12

## Learning & Working Memory Capacity

Write the words in the chat, in order.

$(3 + 2) - 4 = 2$  ? Book

$(6 + 2) / 4 = 2$  ? Printer

$(8 - 3) * 2 = 10$  ? Speaker

$(4 / 2) - 4 = 4$  ? Duck

Book, Printer, Speaker, Duck

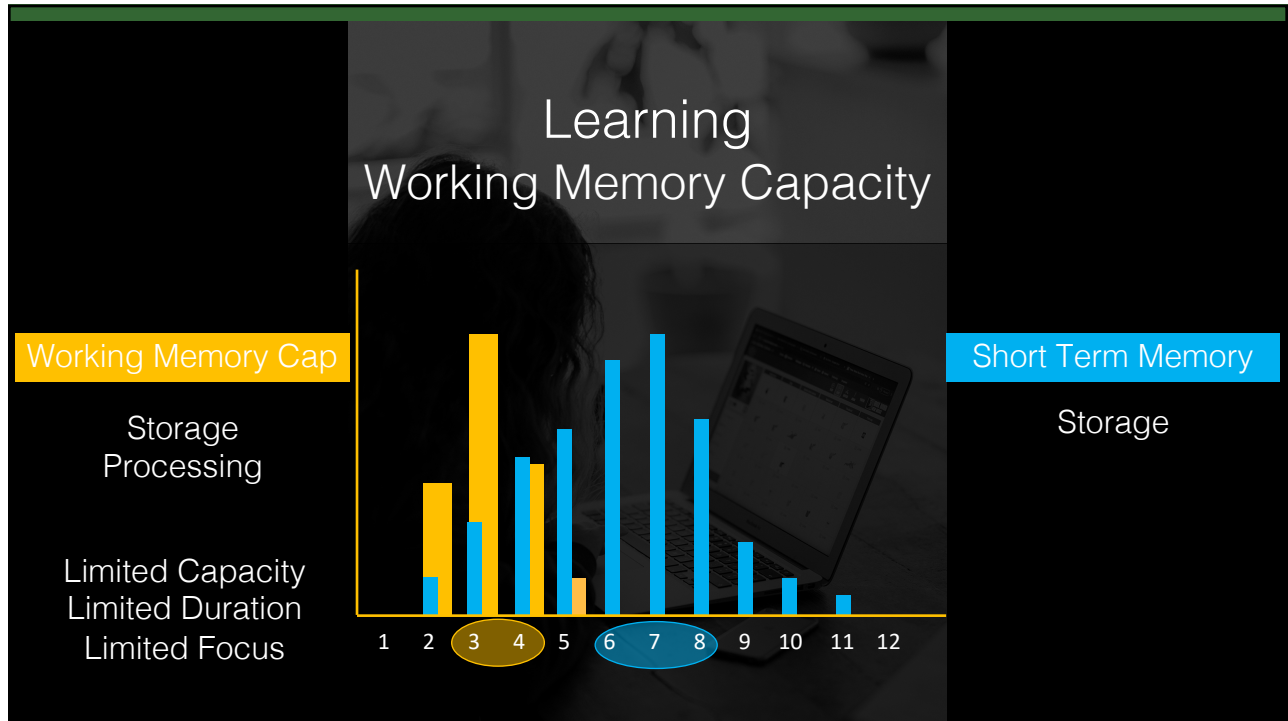
13

## Learning & Working Memory Capacity

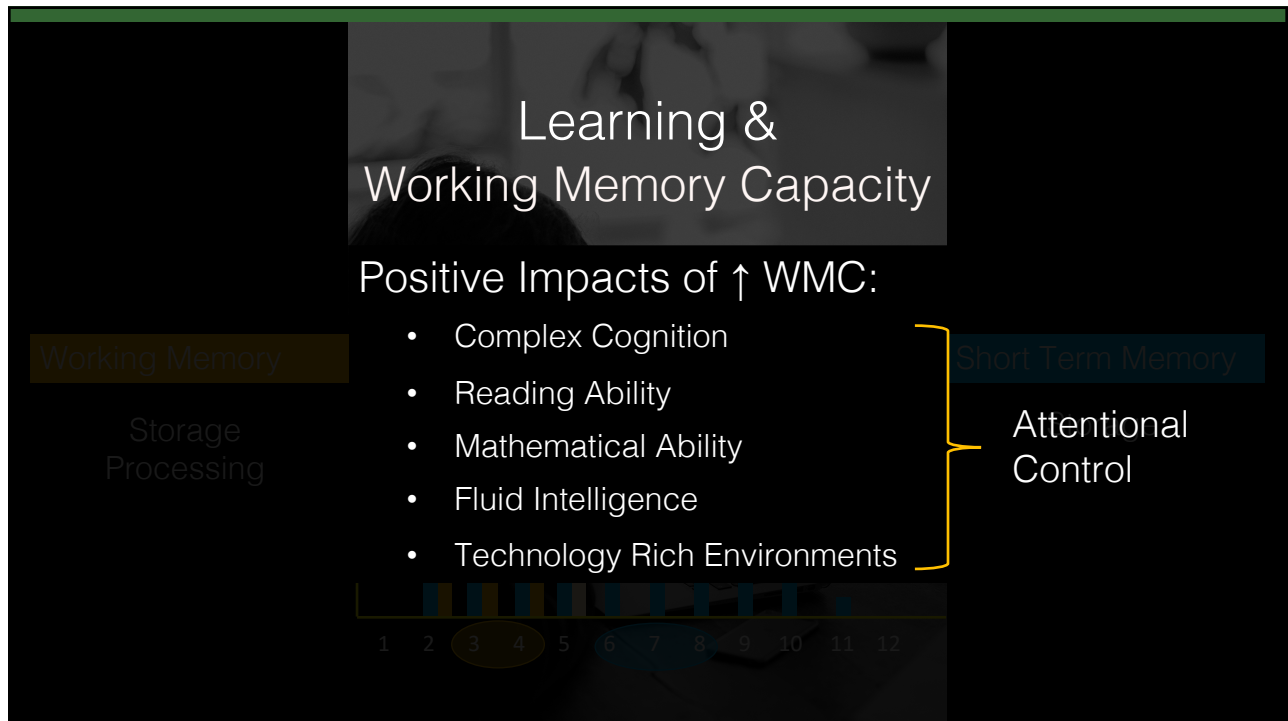
How did you do? 😊

In the chat, please type in the highest number of words (2, 3, or 4) that you were able to remember correctly and in order.

14



15



16



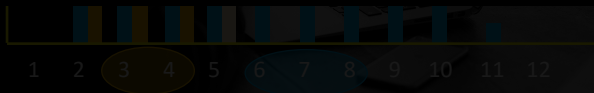
## Learning & Working Memory Capacity

Where should teachers focus?

Working Memory

Storage  
Processing

↑ Increasing WMC  
or  
Using Strategies



Short Term Memory

Storage

17

## Learning & Working Memory Capacity

### WMC Strategies

Working Memory

Storage  
Processing

1. Segmenting Instruction
2. Scaffolding Instruction
3. Lower Cognitive Load
4. Review Often
5. Practice with Feedback
6. Reduce Distractions

Short Term Memory

Storage

18

## Learning & Working Memory Capacity

### WMC Strategies

1. Segmenting Instruction
2. Scaffolding Instruction
3. Lower Cognitive Load
4. Review Often
5. Practice with Feedback
6. Reduce Distractions

### Learning Principles

1. Practice at Retrieval
2. Vary Tasks and Purposes
3. Focus on Principle Ideas
4. Foster Awareness and Control
5. Use Developmental Feedback
6. Embed in Prior Knowledge

19

## Instructional Strategies with Technology



20

## Instructional Strategies with Technology

Technology is neither good nor bad  
but using it makes it so.

21

## Instructional Strategies with Technology

1. Learning through **practice at retrieval**
2. Learning through **varied tasks** and **purposes**
3. Learning by focusing on the **principle** ideas
4. Learning **awareness** and **control** (metacognition)
5. Learning in response to **developmental feedback**
6. Learning embedded in **prior knowledge** and **experience**

22

## Start with Your LMS

What can your LMS do?

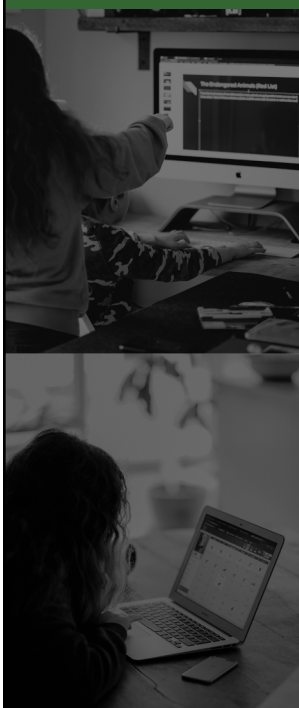
- Chats
- Video
- Quizzes
- Surveys/Polling
- Collaboration Tools

23

## Practice at Retrieval Varied Tasks & Purposes

**How to use technology to:**  
Motivate students to retrieve knowledge and skills to solve problems, answer questions, or create artifacts.

1. Provide explanations
2. Create a representation
3. Demonstrate problem solving
4. Brainstorm solutions



6:27 info.flipgrid.com — Private

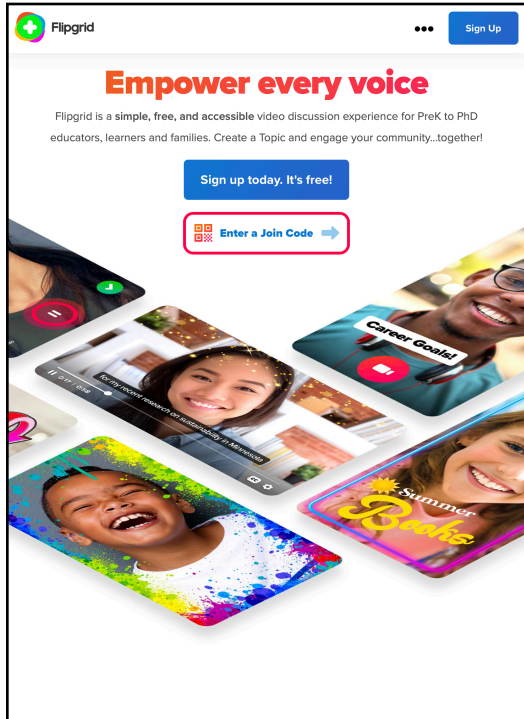
Microsoft Flipgrid

27 Awesome Responses

Flipgrid is social learning for PreK to PhD learners ... and beyond!

Join educators and learners across 180 countries as they experience the magic of student voices. When learners reflect upon, discuss and showcase what they are learning, making, reading, solving, experiencing, playing ... it's always better together!

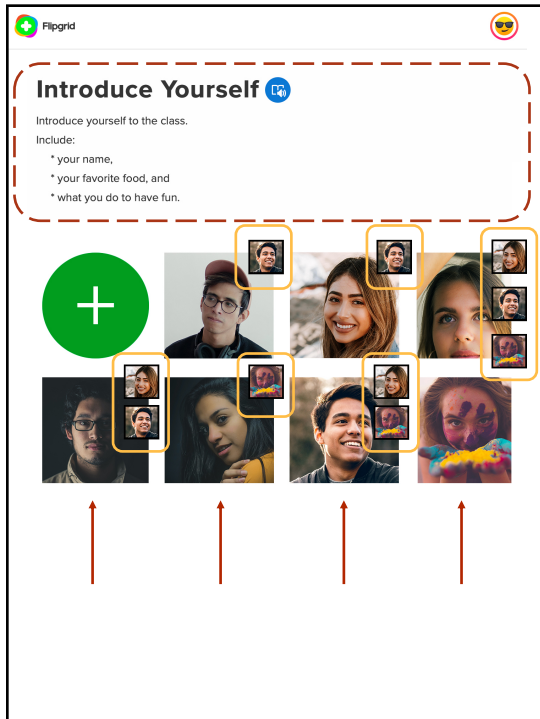
24



FlipGrid

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25



FlipGrid

Flipgrid: Video-based Discussions

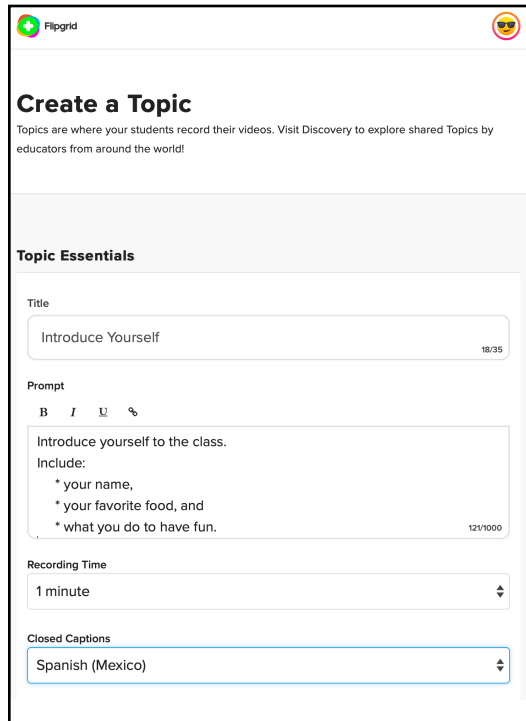
Create

Privacy

Access

Record

26



**Create a Topic**  
Topics are where your students record their videos. Visit Discovery to explore shared Topics by educators from around the world!

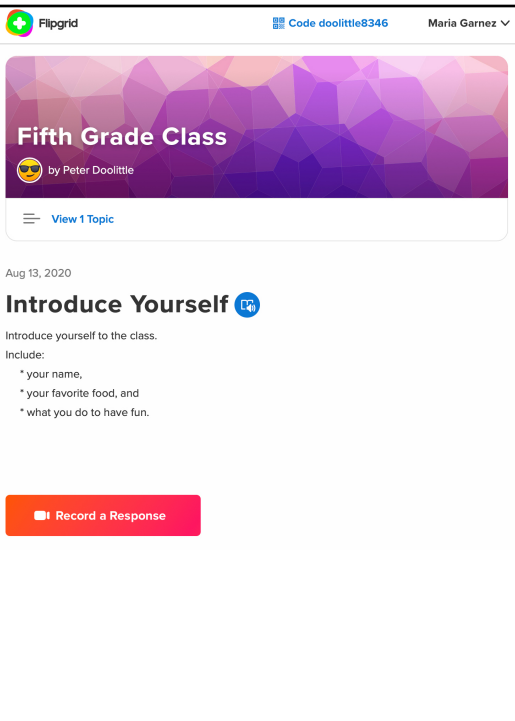
**Topic Essentials**

Title: Introduce Yourself (18/35)

Prompt: Introduce yourself to the class. Include: \* your name, \* your favorite food, and \* what you do to have fun. (121/1000)

Recording Time: 1 minute

Closed Captions: Spanish (Mexico)



**Fifth Grade Class**  
by Peter Doolittle

View 1 Topic

Aug 13, 2020

**Introduce Yourself**

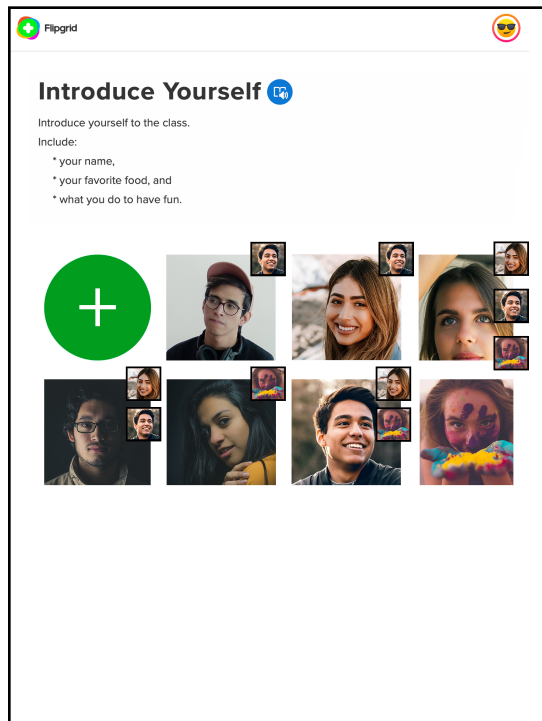
Introduce yourself to the class.

Include:

- \* your name,
- \* your favorite food, and
- \* what you do to have fun.

Record a Response

27




**Introduce Yourself**

Introduce yourself to the class.

Include:

- \* your name,
- \* your favorite food, and
- \* what you do to have fun.



FlipGrid

flipgrid.com

28

# Instructional Strategies with Technology

Technology is neither good nor bad  
but using it makes it so.

29

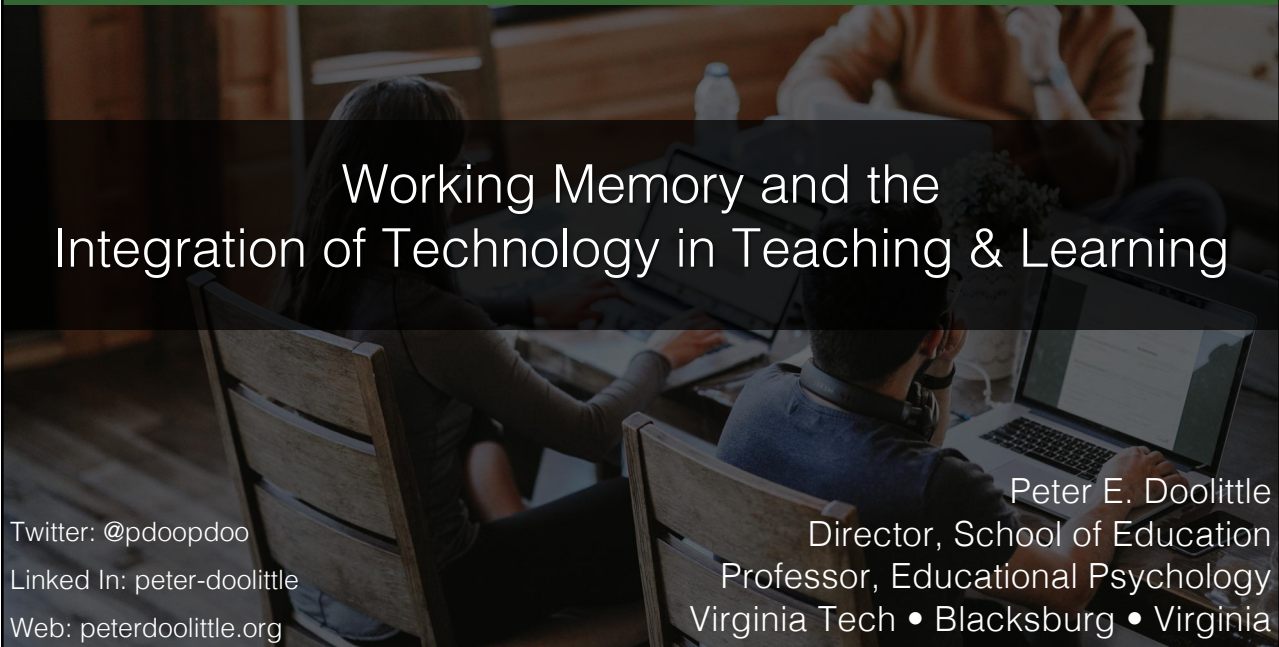
Questions?



30

Fundación Educativa Seminario  
Neuroscience and Education Seminar

[peterdoolittle.org](http://peterdoolittle.org)



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