

# Teaching, Learning, Technology, Memory, and Research

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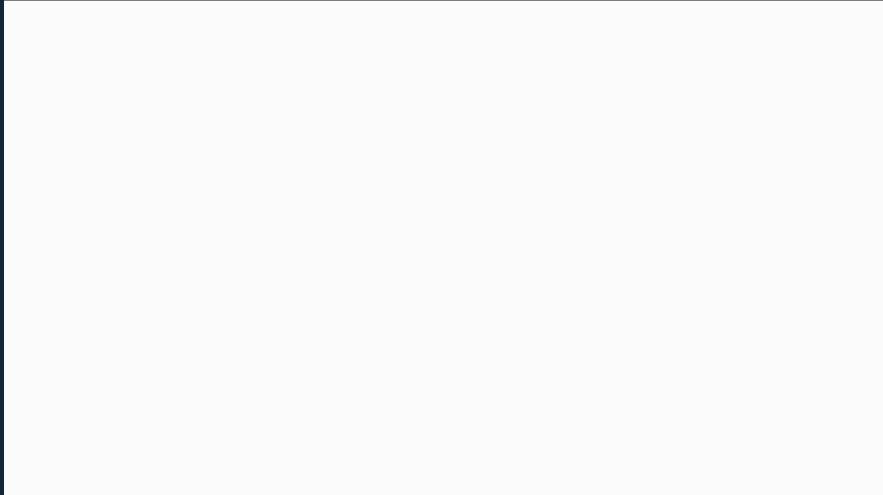
 Magna  
Teaching  
With Technology  
Conference  

## Anticipation Guide

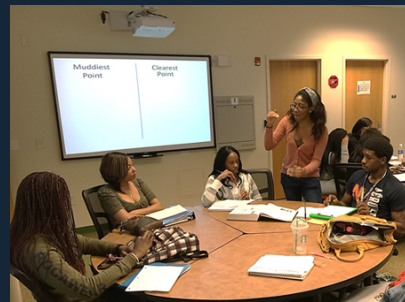
*Directions: Agree or Disagree or Edit.*

1. Anyone can teach.
2. Active learning in students is fostered by note taking and discussions with fellow students.
3. Technology allows teachers to teach more powerfully, more efficiently, and with less effort.

# Changing Perspective



# Active Learning



processing

words

Rest Snore Sound  
Tired Bed's all Comfort  
Awake Eat Wake  
Dream Slumber Night

## Activity Debrief

1. Meaning is **constructed** during experience and **constructed** during retrieval.
2. Construction results from **processing**.
3. Knowledge is **organized**.
4. When specifics are lost, **meaning** remains.
5. **Strategies** are used to function more effectively.
6. We can **assess** the effectiveness of our thinking.

(Engle, 2006; Halpern & Hakel, 2003; Mariano, Doolittle, & Hicks, 2009; Wagner, 2006)



The slide has a dark blue background with a geometric pattern. In the top right corner, there is a logo for the "Magna Teaching With Technology Conference" (MTWT). The main title is "6 Principles for Deep & Flexible Learning" in large, bold, yellow font. Below the title is a numbered list of six principles, with key terms highlighted in yellow:

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

At the bottom of the slide, there is a citation: "(Engle, 2006; Halpern & Hakel, 2003; Mariano, Doolittle, & Hicks, 2009; Wagner, 2006)" followed by "7 C's" and a small icon of a hand holding a pen.

Processing...


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## TwT Metacognitive Strategy


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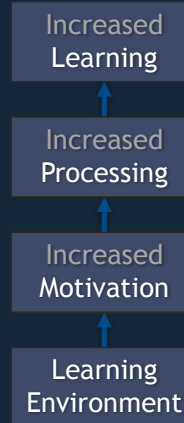
For all presentations and discussions within TwT, ask yourself these three questions:

1. Where's the **Processing**?
2. . videoconferencing \* flipping \* service learning  
microlearning \* padlet \* social media \* makerspace
3. . topHat \* PowerPoint \* critical thinking \* creative  
motivation \* assessment \* adaptive learning \* MOOCs  
blogs \* analytics \* UDL \* data visualization \* iPads  
backward design \* augmented reality \* videos \* humor  
presence \* ePortfolios \* VoiceThread \* microblogging

*intrinsic*  
**7 C's of Motivation**

*Agency*

1. Choice
2. Caring (Interest/Value)
3. Control
4. Challenge
5. Collaboration/Connectedness
6. Competence
7. Curiosity



(Deci & Ryan, 2000; Gagne & Deci, 2014; Jones et al., 2013; Schunk, Pintrich, & Meece, 2008) math

**Active Learning & Working Memory**



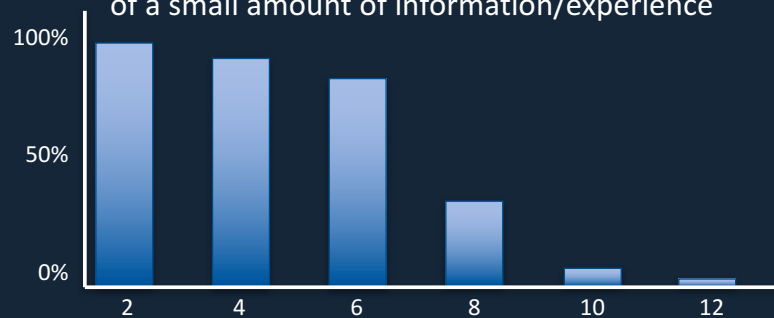
processing

18 letters

BCYHLPFTNWBWZSCPL

## Short-Term Memory

Short term memory = short term retention  
of a small amount of information/experience



(Baddeley & Hitch, 1974; Bray, 2017; Cowan, 2008; Engle et al., 1999)

## Working Memory Capacity

- Crucible of Thought
  1. Stores Immediate Experiences
  2. Access Long-Term Memory
  3. Processes Experience and Memory
  4. Maintains Current Goal for Processing  
(especially in the presence of distraction)
- $WMC = Storage + Processing = \text{Attentional Control}$

(Doolittle & Mariano, 2008; Unsworth & Engle, 2007; Vergauwe et al., 2015)

## Working Memory Capacity

- Positive impacts ( $\uparrow$ WMC) include:
  - Fluid Intelligence
  - LTM Activation
  - Attentional Control
  - Reading/Language Comprehension
  - Reasoning
  - Storytelling
  - **Complex Cognition**

(Cowan, 2012; Doolittle & Levi Alstader, 2009; Kane & Engle, 2003)



Recall the words out loud, in order.

$(8 + 3) \times 2 = 7 ? Star$

Operation Span Task

Recall the words out loud, in order.

$(5 - 3) \div 6 = 2 ? Glass$

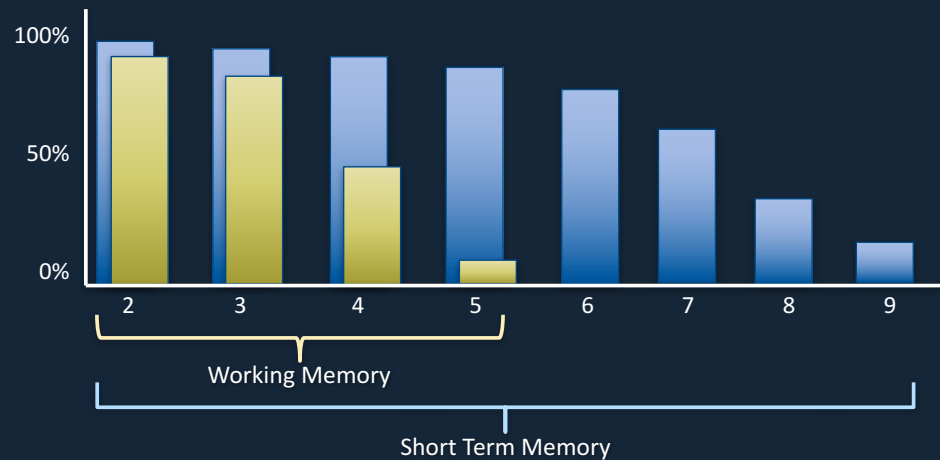
Recall the words out loud, in order.

White, Green, Purple

Recall the words out loud, in order.

System, Explore, Lips, Wisp, Spring

## Working Memory & Short-Term Memory



## Working Memory Capacity

- WMC = Storage + Processing = Attentional Control
- High WMC = Competent Complex Cognition
- Low WMC = Challenging Attentional Control
- Working Memory Training  $\neq$  Increased WMC
- Working Memory Training = Increased Efficiency
- Learn and Use Strategies

(Constantinidis & Klingberg, 2016; Sanbonmatsu et al., 2013)

## Working Memory Capacity Strategies

1. Segmenting Instruction
2. Scaffolding Instruction
3. Lower Cognitive Load/Lower Information Density
4. Examples, Examples, Examples
5. Practice with Feedback



## TwT Metacognitive Strategy

For all presentations and discussions within TwT, ask yourself these three questions:

1. Where's the **Processing**? (but respect memory)
2. .
3. .

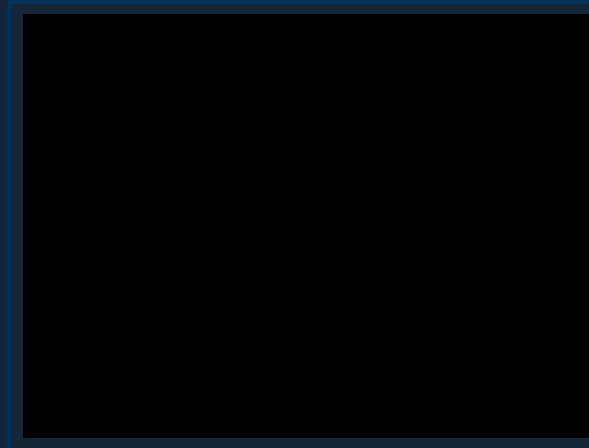
# Active Learning, Working Memory Instructional Design



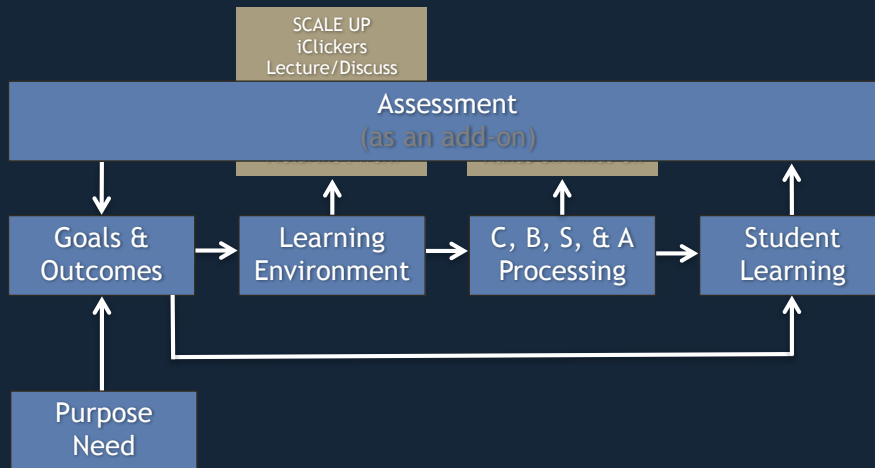
alignment

clarity

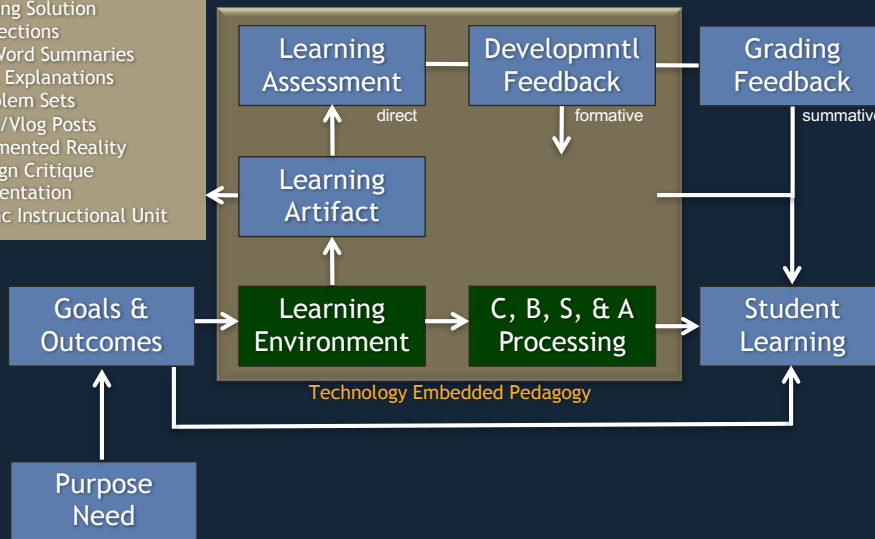
## The Need for Clarity



# Active Learning, Working Memory Instructional Design



- Design Projects
- Posters (Session)
- ePortfolio
- Problem Solving
- Case/Mini-Case Studies
- Video Review
- Simulations
- Coding Solution
- Reflections
- 25-Word Summaries
- Oral Explanations
- Problem Sets
- Blog/Vlog Posts
- Augmented Reality
- Design Critique
- Presentation
- Async Instructional Unit



## Active Learning Strategies



processing & alignment

## Oral Explanations

**Learning Environment:** Students create clear and coherently organized 10-15 minute videos that reflect the student's understanding of the current topic under discussion, plus an application to their lives.

**Learning Artifact Processing:** Students analyze and interpret readings, notes, and discussions; organize concepts and ideas; apply to a life issue; create an oral explanation.

**Learning Assessment:** Video are assessed using a scoring guide focused on organization, clarity of thought and expression, essential content explanation and application.

## Oral Explanation



## Oral Explanations

**Grading:** Each Oral Explanation is worth 100 pts and will be graded using the following criteria:

- |   |        |
|---|--------|
| 1. Organization   | 20 pts |
| a. are introductions and conclusions used effectively?                                  |        |
| b. do the expressed ideas follow a logical progression?                                 |        |
| c. are explanations and applications provided?  |        |
| 2. Clarity of Thought and Expression  | 20 pts |
| a. are the ideas expressed well, well thought out, and integrated?                      |        |
| b. are there clear and logical transitions between ideas?                               |        |
| c. are correct grammar and syntax used?   |        |
| 3. Essential Content Explanation  | 30 pts |
| a. does the content of the explanation accurately reflect the addressed constructivism? |        |
| b. does the explanation explain, rather than just list, the main concept components?    |        |
| c. is the content of the explanation free from personal interjections?                  |        |
| 4. Essential Content Application  | 30 pts |
| a. is a problem, issue, or situation explained clearly?                                 |        |
| b. are concepts from the texts and class used to address the cited problem?             |        |
| c. is the application thorough, meaningful, and appropriate?                            |        |



## 6 Principles for Deep & Flexible Learning

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

## TwT Metacognitive Strategy

For all presentations and discussions within TwT, ask yourself these three questions:

1. Where's the **Processing**? (but respect memory)
2. Where's the **Design**?
3. .

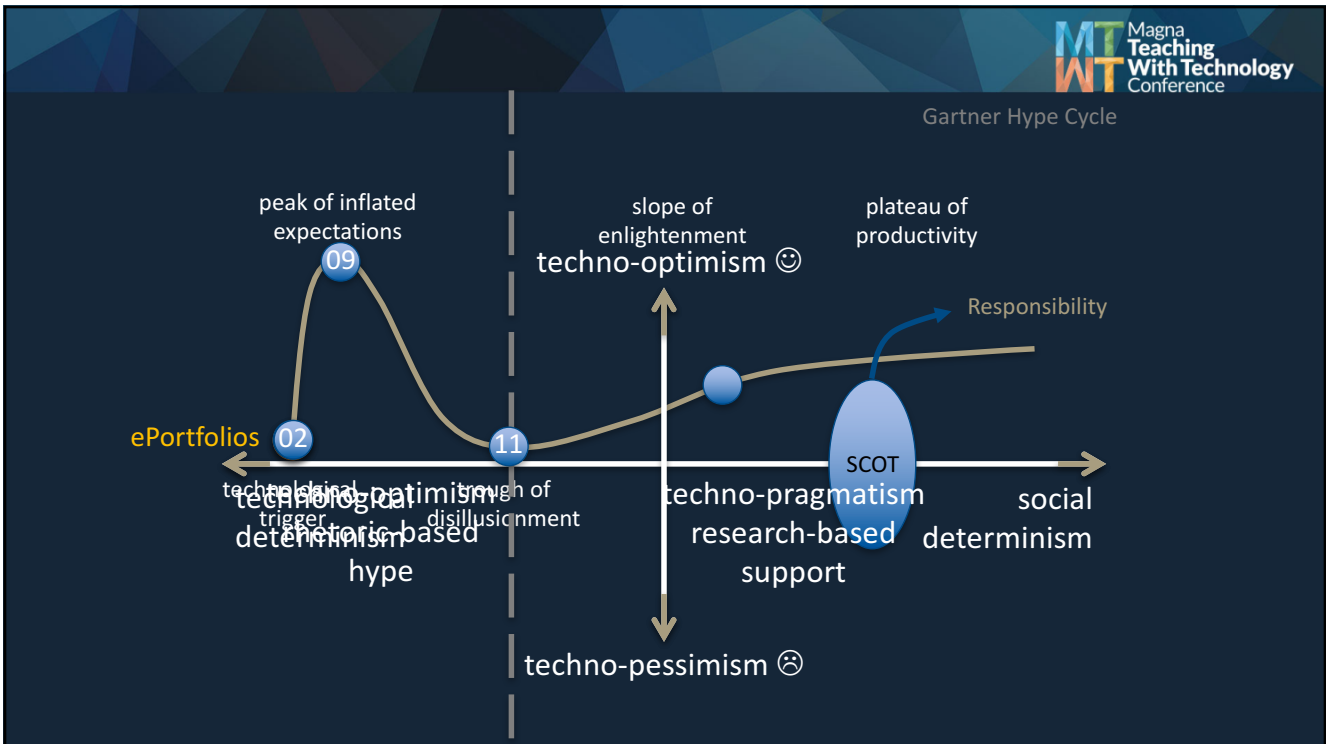
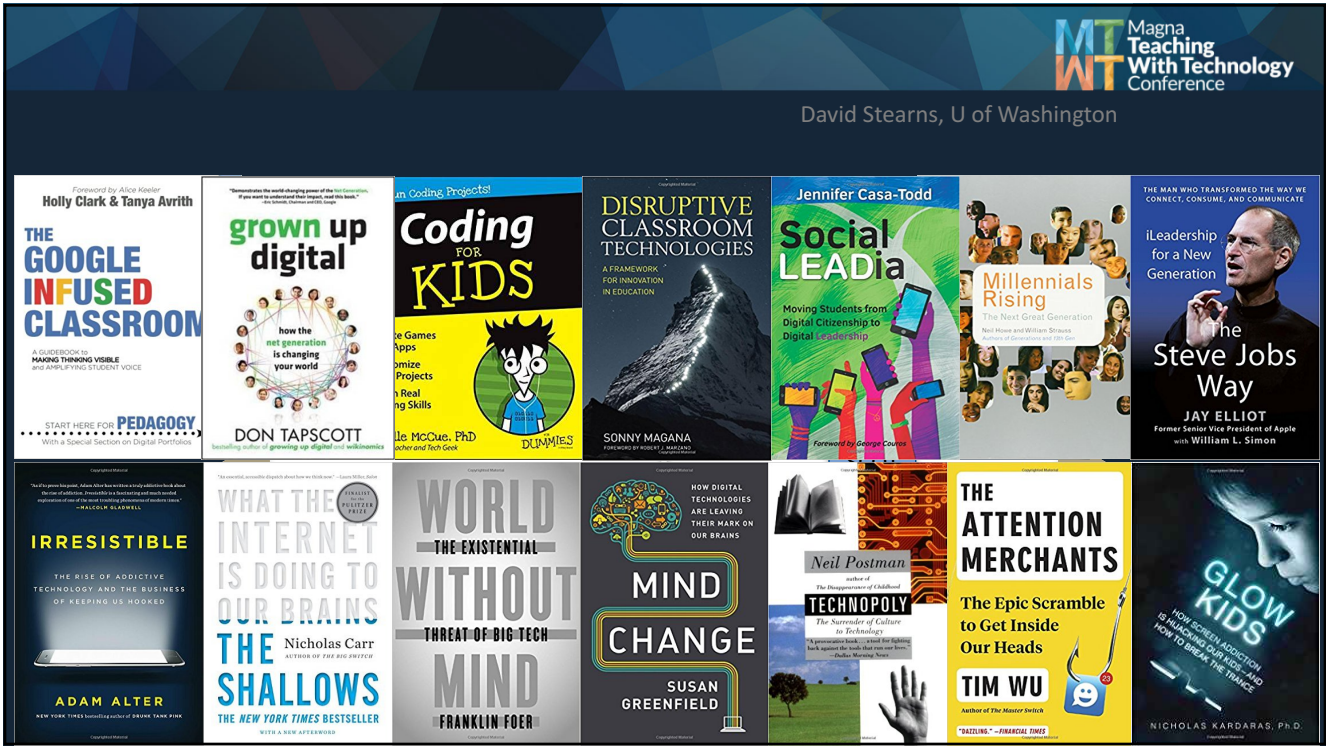
# Active Learning, Proactive Teaching Technology – Research and Rhetoric

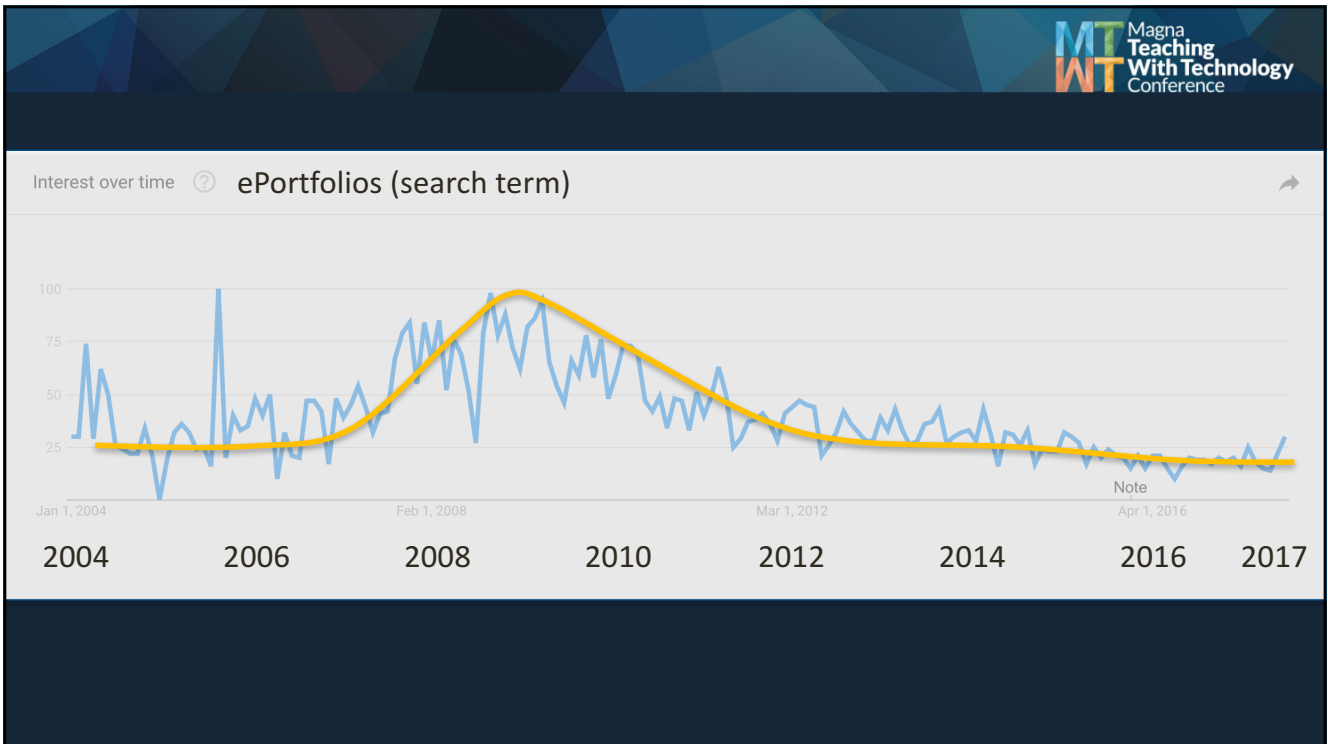
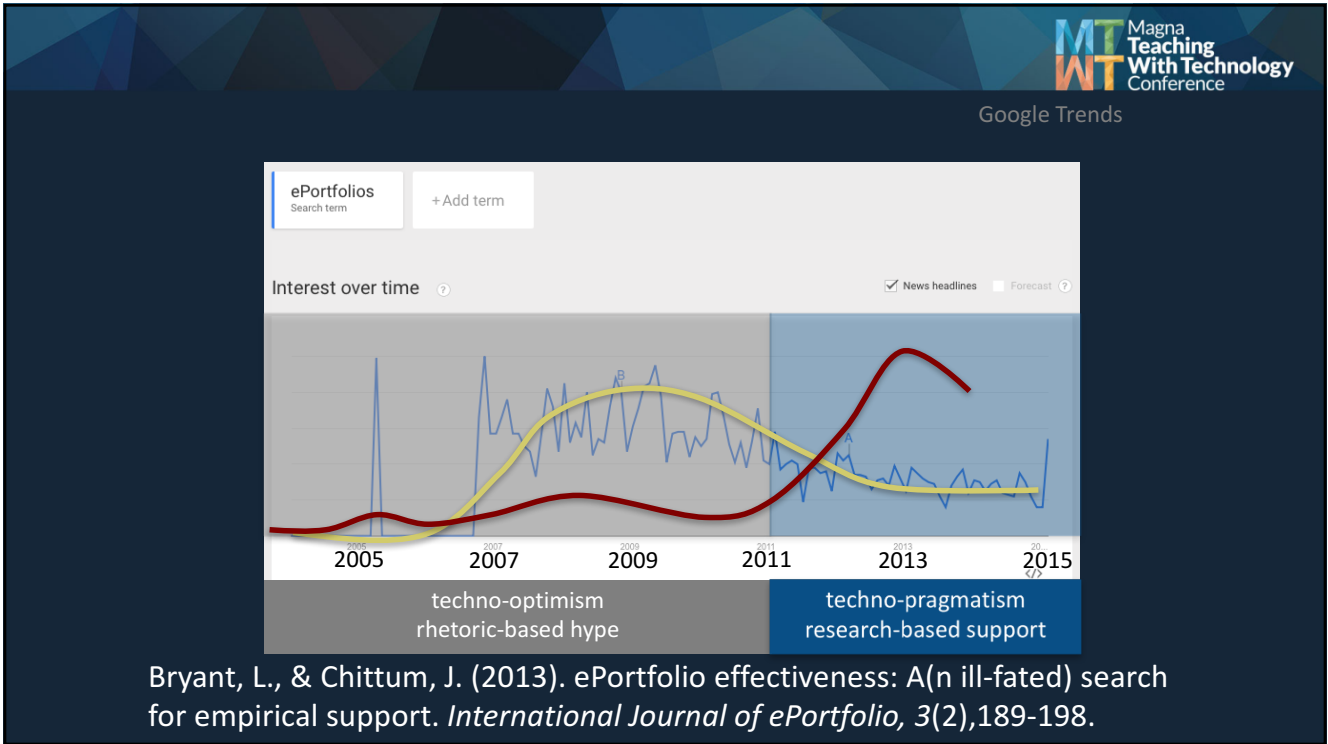


processing

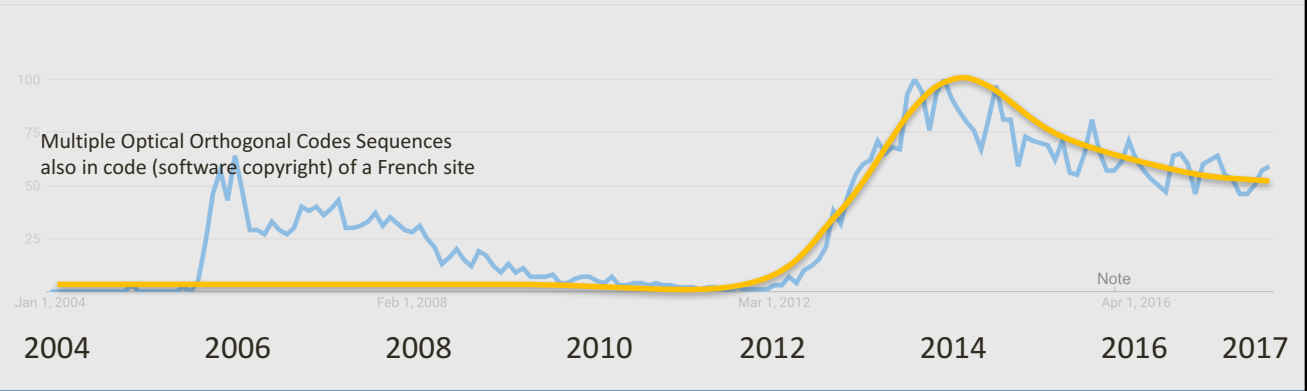
irish sea



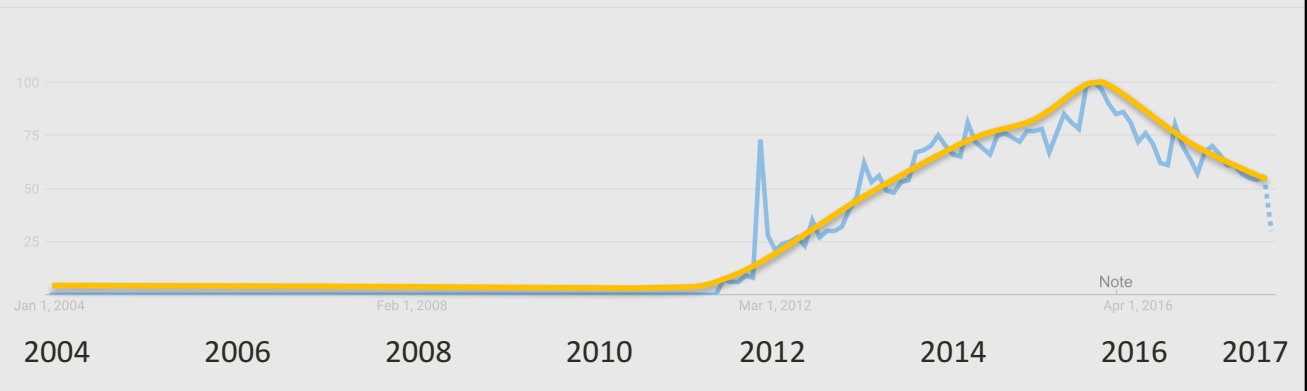


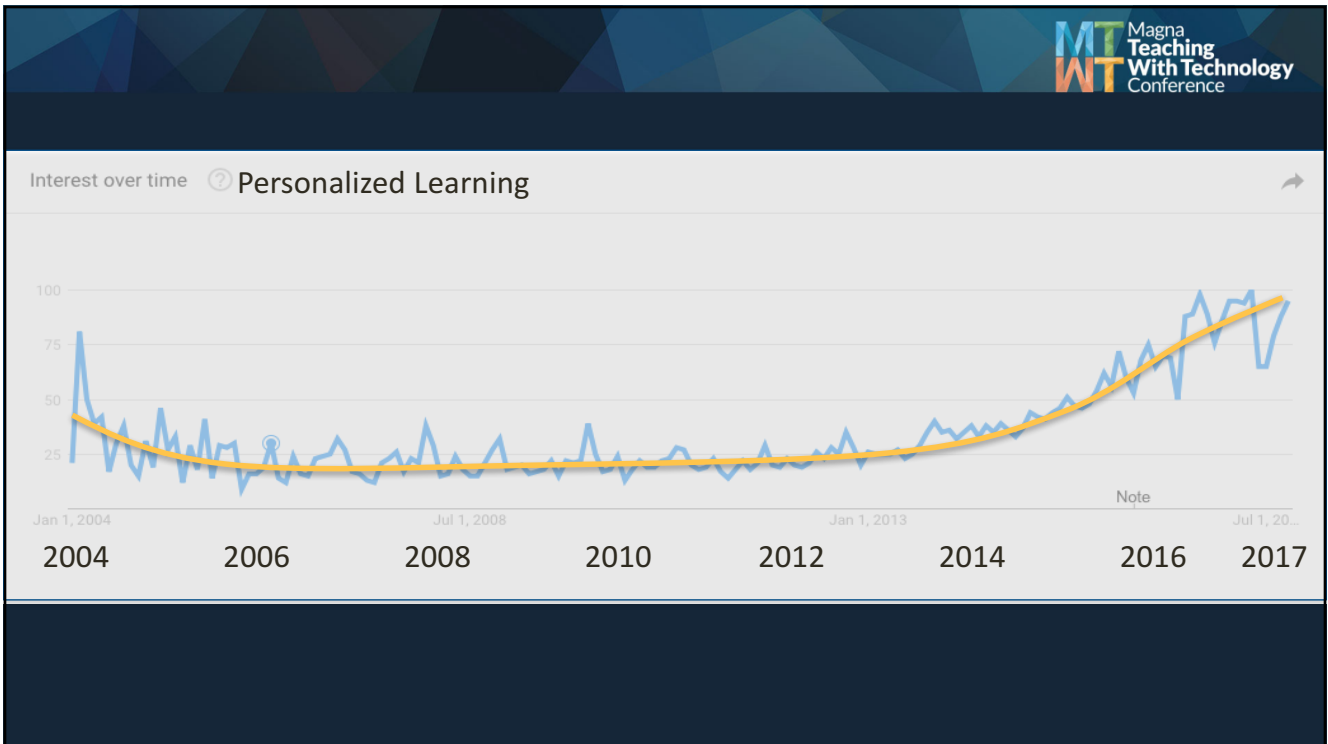
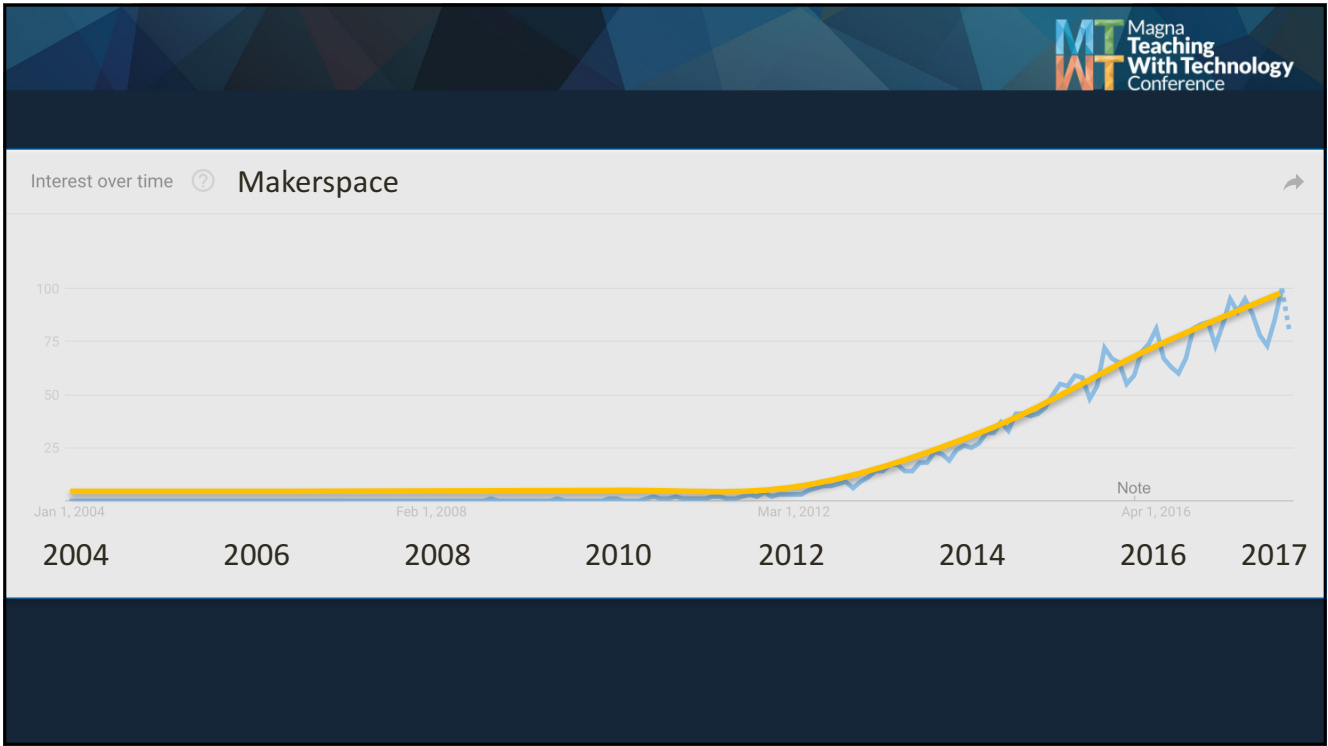


Interest over time ? MOOCs (search term)

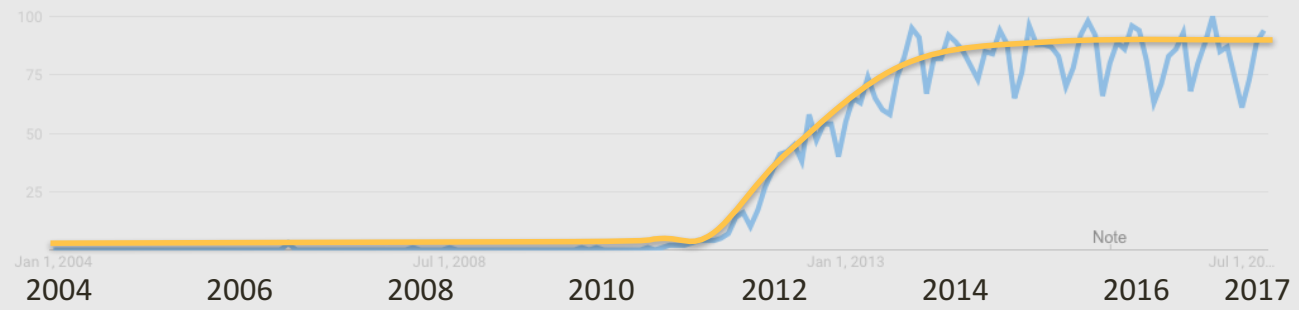


Interest over time ? CodeAcademy






Interest over time ? Flipped Classroom



# Flipping Essentials



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## Flipping Basics

Text  
Video  
Simulation

↑

initial  
processing

Problems  
Inquiry  
Case


↑

deeper  
content  
processing

Draw  
Blog  
ePortfolio

↑

subsequent  
processing




Learning is not magic,  
it's by design.

Flipped

- Practice at Retrieval
- Varied Tasks
- Principle Level
- Awareness & Control
- Developmental Feedback
- Prior Knowledge

- Learning Outcomes
- Learning Environment
- Learning Strategies
- C, B, S, & A Processing
- Embedded Assessment
- Deep/Flexible Learning

- Choice
- Challenge
- Collaboration
- Competence
- Caring
- Curiosity
- Control

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## TwT Metacognitive Strategy

For all presentations and discussions within TwT,  
ask yourself these three questions:

1. Where's the **Processing**? (but respect memory)
2. Where's the **Design**?
3. Where's the **Research**?





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