

# Creating Engaging and Effective Whiteboard Videos

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CFP Education Workshop Series



HARVARD MEDICAL SCHOOL  
CURRICULUM FELLOWS PROGRAM



# Why use video in education?

- Online education
  - Primary mode of instruction
- Flipped classroom
  - Assigned videos and in-class problem solving
- Public outreach

# Outline

- Engaging: How to get students to watch and pay attention to your videos
- Effective: How to get students to learn from your videos

# Video can increase student engagement

Leading Edge  
Commentary

Cell

## Blended Learning Improves Science Education

Brent R. Stockwell,<sup>1,2,3,\*</sup> Melissa S. Stockwell,<sup>4,5,6</sup> Michael Cennamo,<sup>7</sup> and Elise Jiang<sup>1</sup>

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<http://dx.doi.org/10.1016/j.cell.2015.08.009>

Students assigned videos attended class more frequently than those assigned textbook reading

# Video and Student Engagement

## How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos

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MIT CSAIL / University of Rochester  
pg@cs.rochester.edu

**Juho Kim**

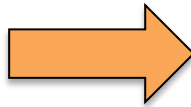
MIT CSAIL  
juhokim@mit.edu

**Rob Rubin**

edX  
rrubin@edx.org

### Assessed behavior from:

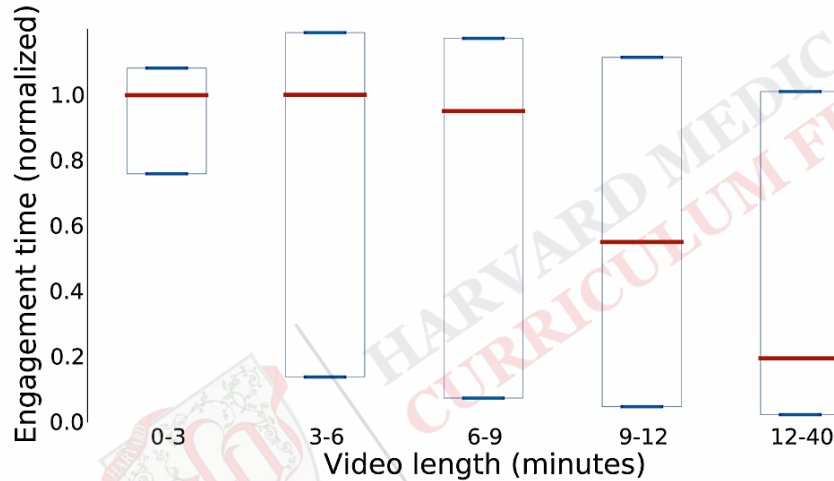
- 4 edX courses
- 862 videos
- 127,839 students
- 6,902,358 total views



### Correlated behavior with:

- Production style (slides, code, whiteboard, lecture, studio, office)
- Video type (lecture, tutorial, other)
- Video length
- Speaking rate

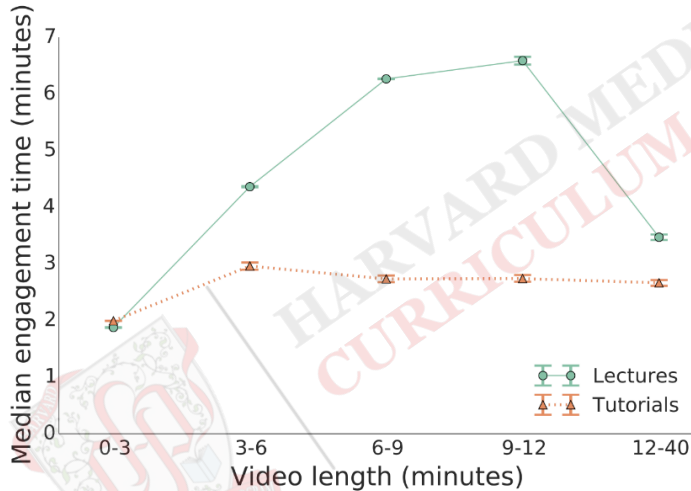
# Video and Student Engagement



The best indicator of engagement is video length

**Optimal length: 6 minutes or less**

# Video and Student Engagement



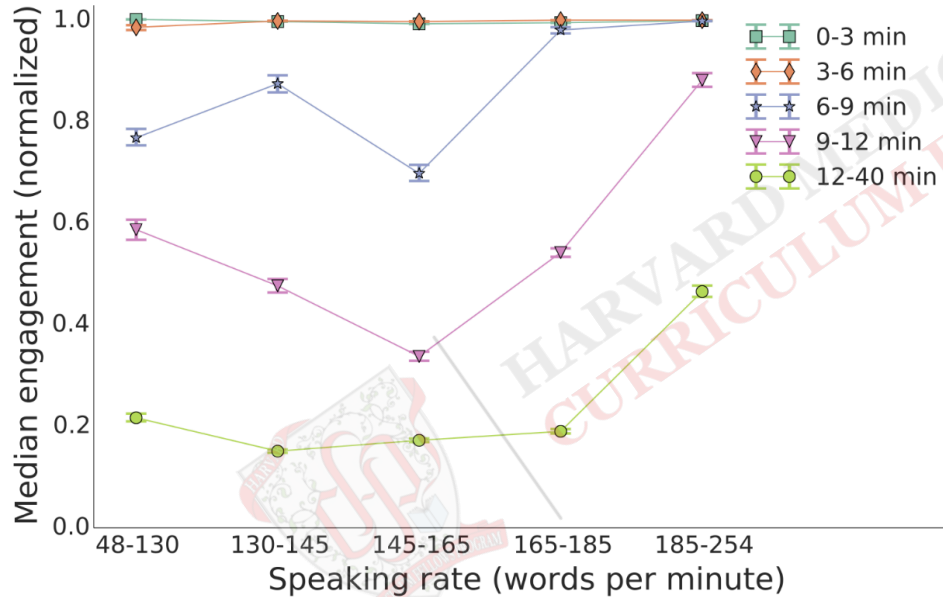
The best indicator of engagement is video length

**Optimal length: 6 minutes or less**





# Video and Student Engagement



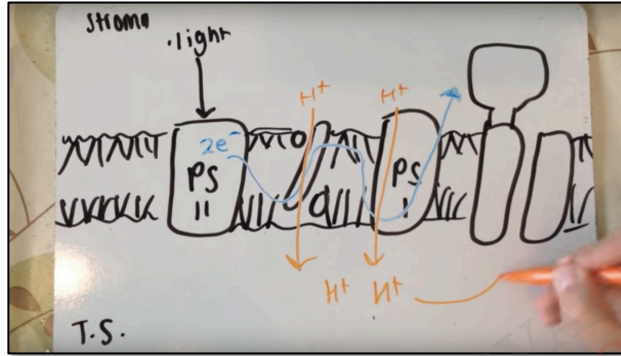
## OTHER FACTORS THAT INCREASED ENGAGEMENT

- Speaking rate and enthusiasm
- Personalization

# Video and Student Engagement

- Takeaway messages:
  - Keep videos short (~6 minutes or less)
  - Speak quickly, conversationally, enthusiastically
  - Personalize the video wherever possible

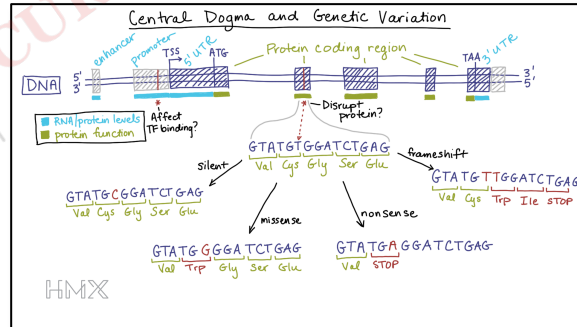
# Principles in Effective Design



YouTube: Jack A-Level TTC



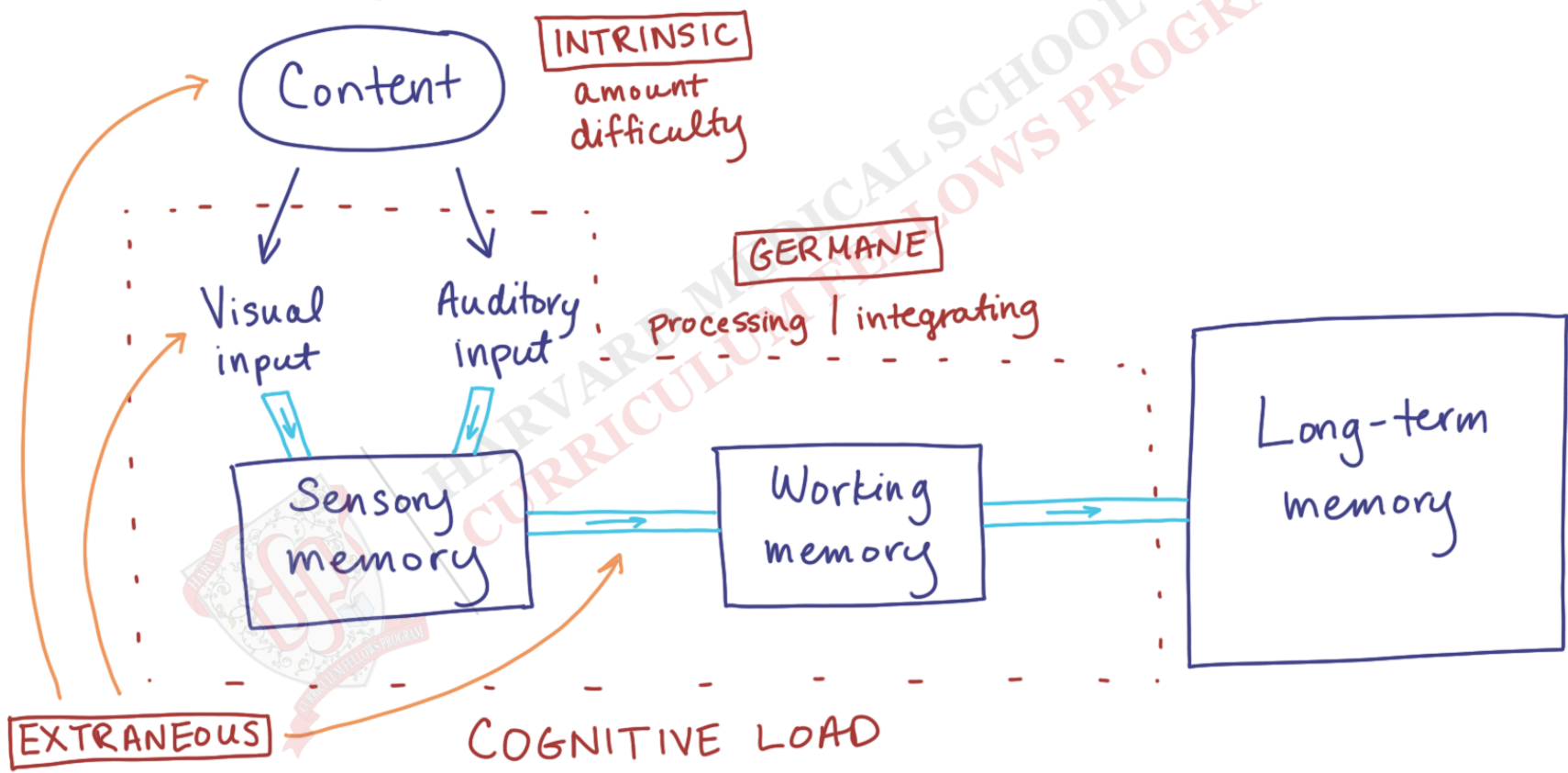
Khan Academy



HMX

How can learning science inform our decisions when planning a whiteboard video?

# Cognitive Load and Video Design



# Cognitive Load and Video Design

Cognitive load: limits what can be taken into long-term memory

Sensory memory: visual and auditory inputs

↓  
Working memory: short term memory

↓  
Long-term memory: unlimited resource

Cognitive load

① Intrinsic: content

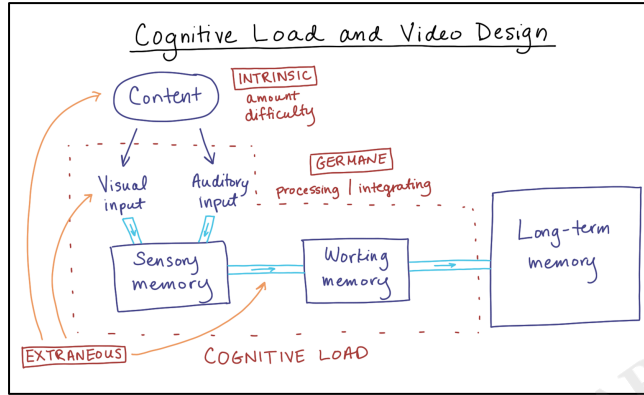
② Germane: processing/  
integration

③ Extraneous: not important  
for teaching

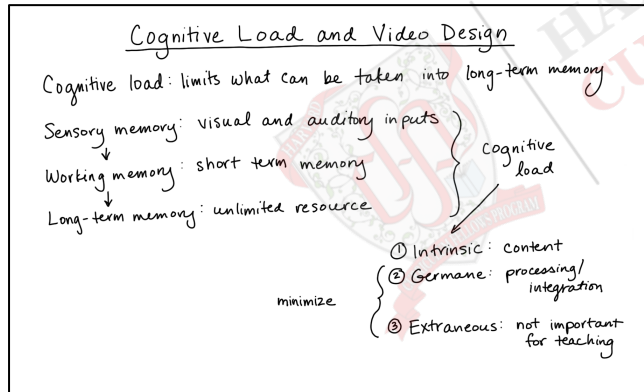
minimize



# Principles in Effective Design



- How did these videos differ?
- What did you like and dislike about each video?



- What features could be used in a video to reduce cognitive load?

# Principles in Effective Design

## Maximize uptake

- Select appropriate amount of content
- Target level of content to your audience
- Use complementary audio and visual cues
- Speak conversationally
- Provide framing material

## Reduce distractions

- Eliminate extraneous and highlight essential material
- Avoid redundancy
- Use spatial/temporal contiguity
- Consider legibility, size, color

# Activity: Planning a Whiteboard Video

- Define your learning objectives
- List key terms and concepts
- Plan out your visual representation





# Activity: Planning a Whiteboard Video

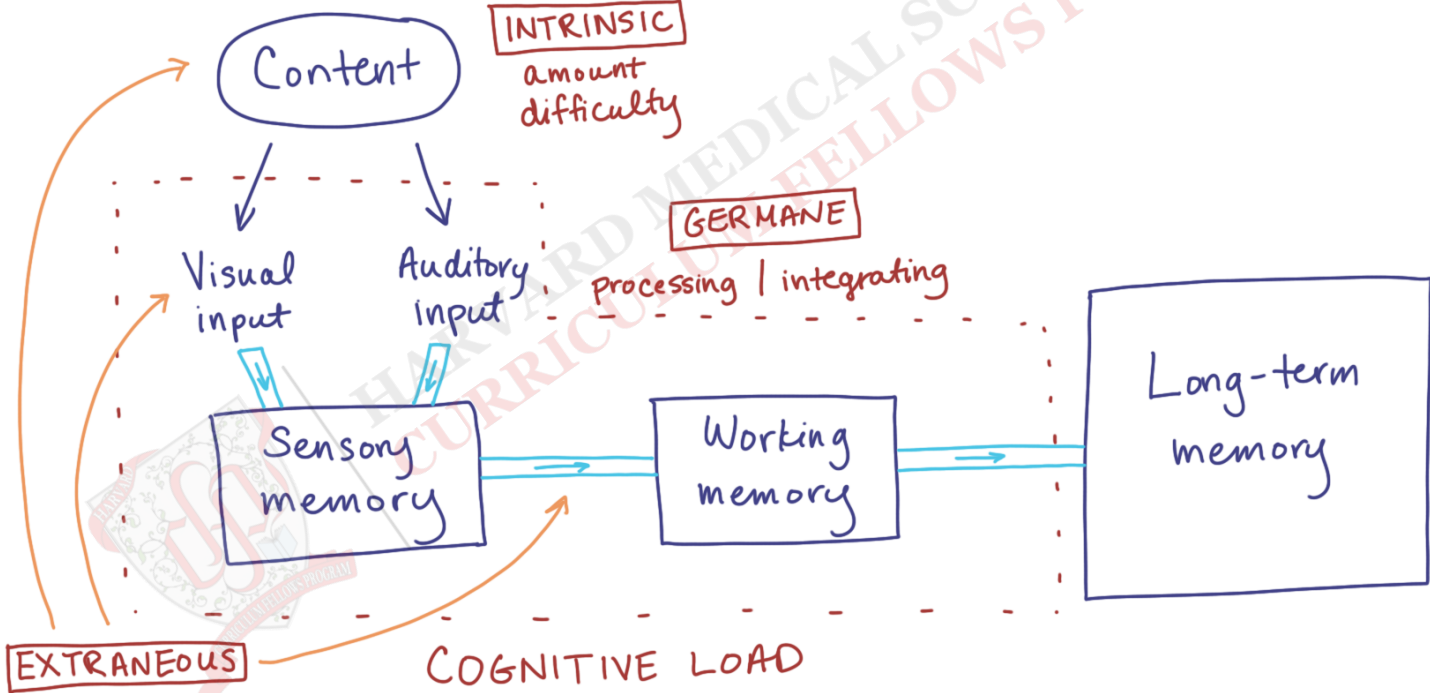
## Learning objectives

- Describe how information from the environment reaches long term memory.
- Name and define the three types of cognitive load.
- Identify characteristics of a video that increase or reduce cognitive load.

## Key terms and concepts

- Cognitive load
  - Intrinsic
  - Germane
  - Extraneous
- Memory types
  - Sensory (visual/auditory input)
  - Working
  - Long-term

# Activity: Planning a Whiteboard Video



# Tips for Video Production

- Hardware and software come in all price ranges – select a setup that works for you
- Plan and practice (but not too much)
- Ask for and incorporate feedback

# Beyond the Video

- Accessibility



**U.S. Department of Justice**

**Civil Rights Division**

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**The United States' Findings and Conclusions Based on its Investigation Under Title II of the Americans with Disabilities Act of the University of California at Berkeley, DJ No. 204-11-309**

**INSIDE  
HIGHER ED**

**Berkeley Will Delete Online Content**

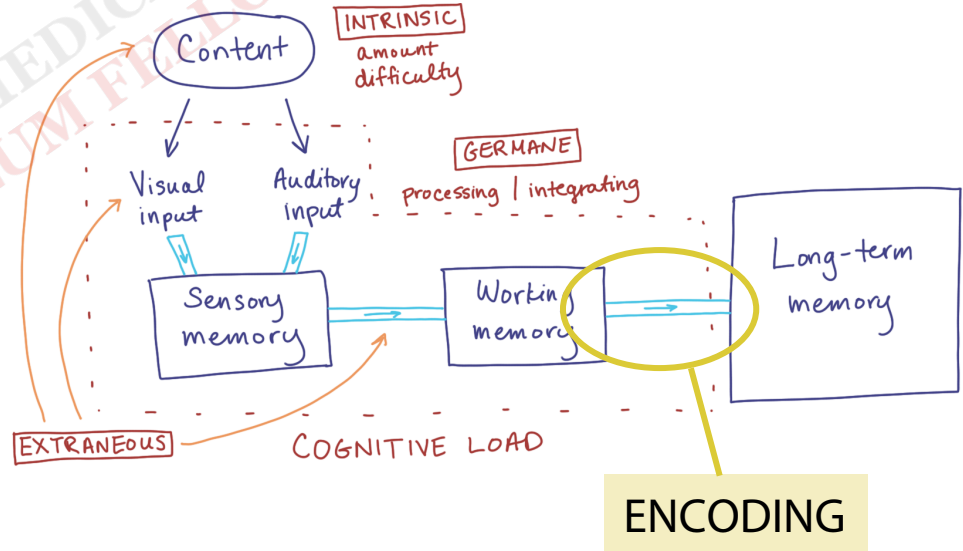
Starting March 15, the university will begin removing more than 20,000 video and audio lectures from public view as a result of a Justice Department accessibility order.

By **Carl Straumsheim** // March 6, 2017

123 COMMENTS

# Beyond the Video

- Accessibility
- Framing material
  - Guiding text
  - Note-taking guides
  - Assessment
  - In class activities



# References and Resources

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  - *Largest study on student engagement with video content, covering a broad range of video types. Offers guidelines for video planning and design to increase engagement.*
- Brame CJ. 2016. Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content. CBE Life Sci Educ 15.
  - *Excellent review about designing videos for effective learning. Provides an overview of cognitive load and provides concrete suggestions to incorporate into video design.*
- Mayer RE. 2008. Applying the science of learning: evidence-based principles for the design of multimedia instruction. Am Psychol 63:760–769.
  - *More technical review on cognitive theory and recommendations for applying these principles to the design of multimedia teaching materials.*
- <http://www.celt.iastate.edu/wp-content/uploads/2015/09/RevisedBloomsHandout-1.pdf>
  - *Helpful summary of Bloom's taxonomy and designing learning objectives from the Center for Excellence in Learning and Teaching at Iowa State University.*