Evaluating Videos for Flipped Instruction

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- Introductions
- Overview of our Study
- Flipped Classroom Framework
- Videos Examples
- Discussion
- Q&A

Introductions

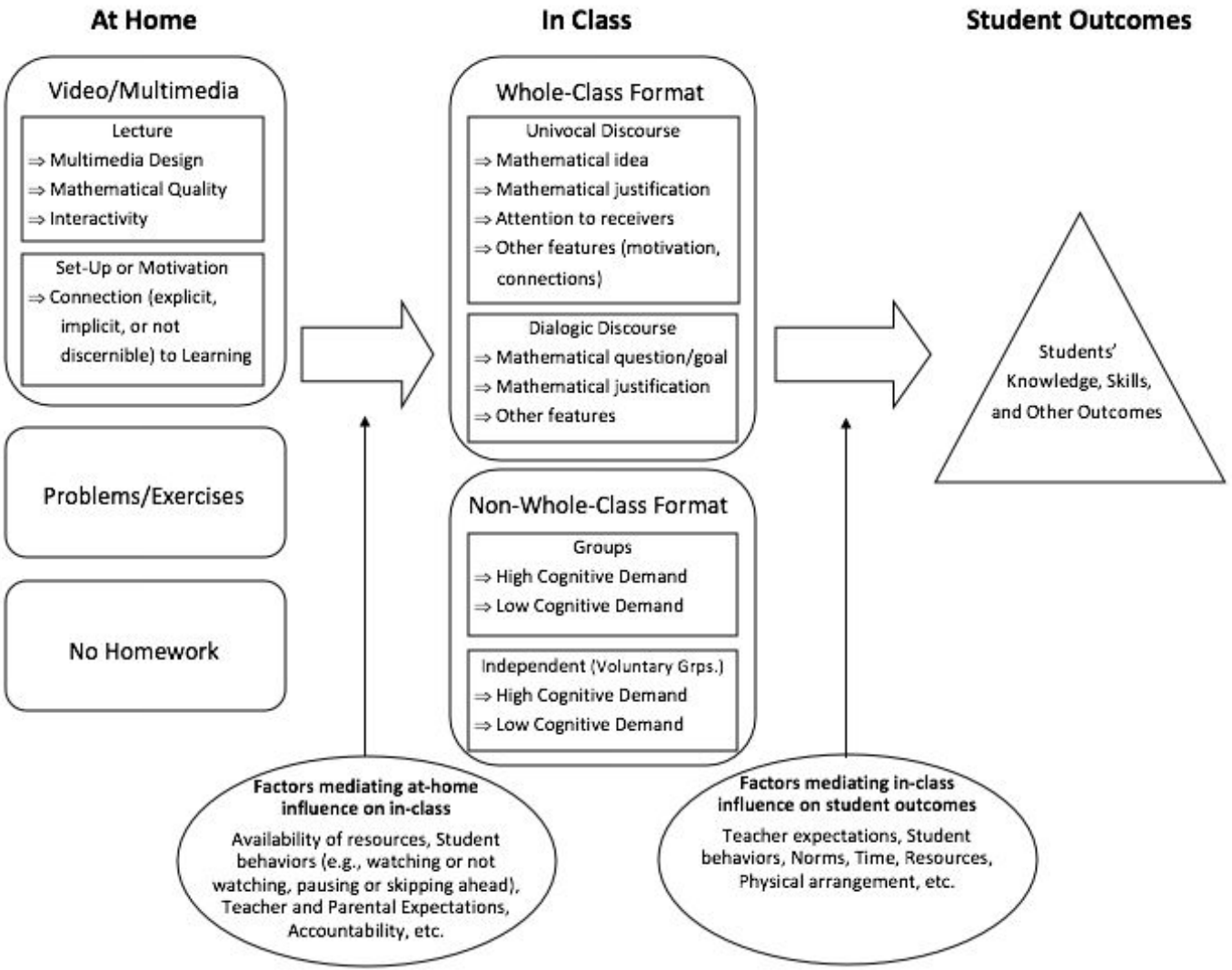
Introduce yourself to your neighbor and then discuss the following questions:

- Have you ever made or assigned videos for homework (as in flipped classes)?
- When you think of videos in flipped classes, what comes to mind?

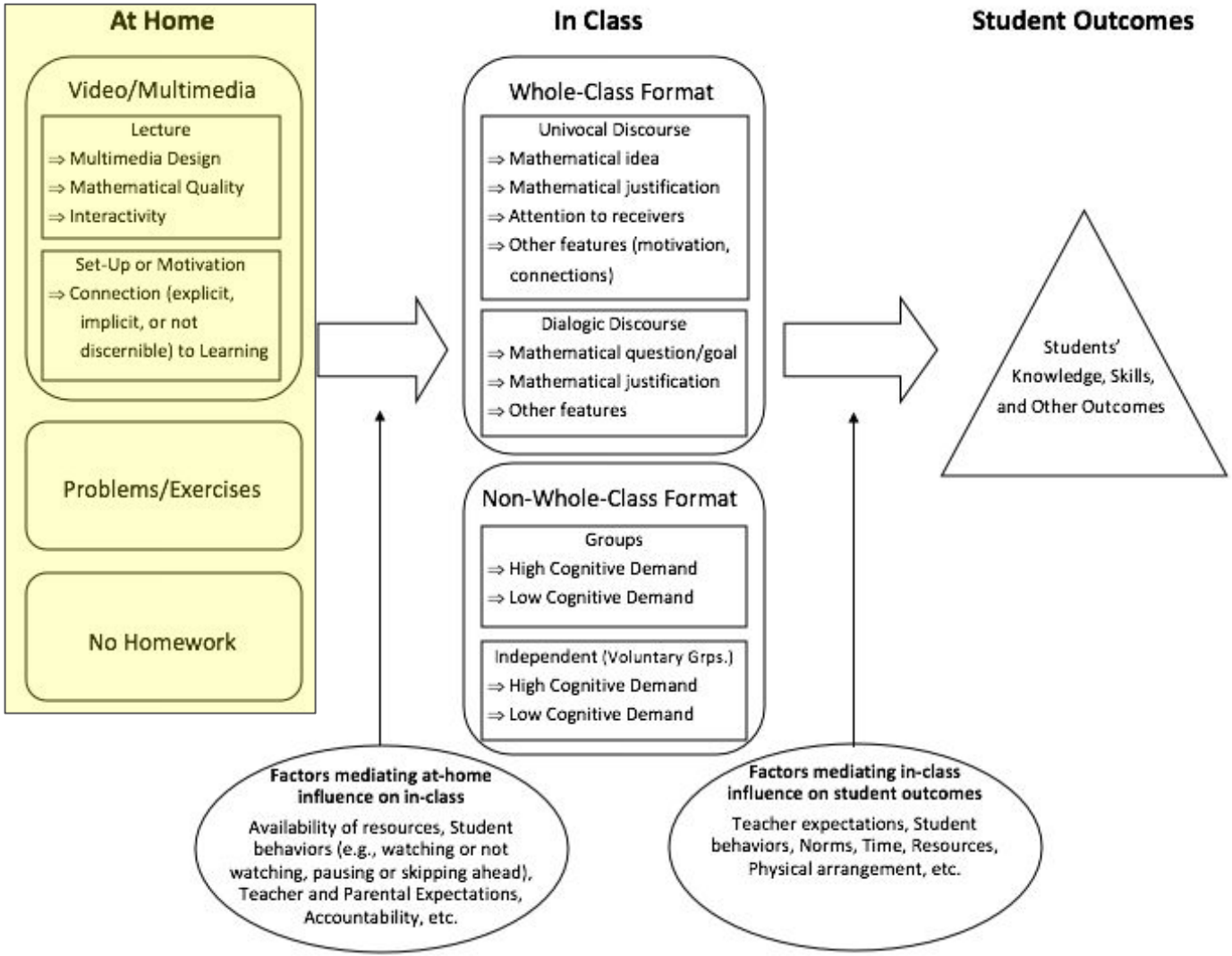
Our Study - FlippedMathStudy.net

- Why study flipped mathematics?
- Scope of the study

Framework


At Home
In Class
Student Outcomes
Video/Multimedia
Lecture
⇒ Multimedia Design
⇒ Mathematical Quality
⇒ Interactivity
Set-Up or Motivation
⇒ Connection (explicit, implicit, or not discernible) to Learning
Problems/Exercises
No Homework
Whole-Class Format
Univocal Discourse
⇒ Mathematical idea
⇒ Mathematical justification
⇒ Attention to receivers
⇒ Other features (motivation, connections)
Dialogic Discourse
⇒ Mathematical question/goal
⇒ Mathematical justification
⇒ Other features
Non-Whole-Class Format
Groups
⇒ High Cognitive Demand
⇒ Low Cognitive Demand
Independent (Voluntary Grps.)
⇒ High Cognitive Demand
⇒ Low Cognitive Demand
Students' Knowledge, Skills, and Other Outcomes
Factors mediating at-home influence on in-class
Availability of resources, Student behaviors (e.g., watching or not watching, pausing or skipping ahead), Teacher and Parental Expectations, Accountability, etc.
Factors mediating in-class influence on student outcomes
Teacher expectations, Student behaviors, Norms, Time, Resources, Physical arrangement, etc.

Framework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Video/Multimedia

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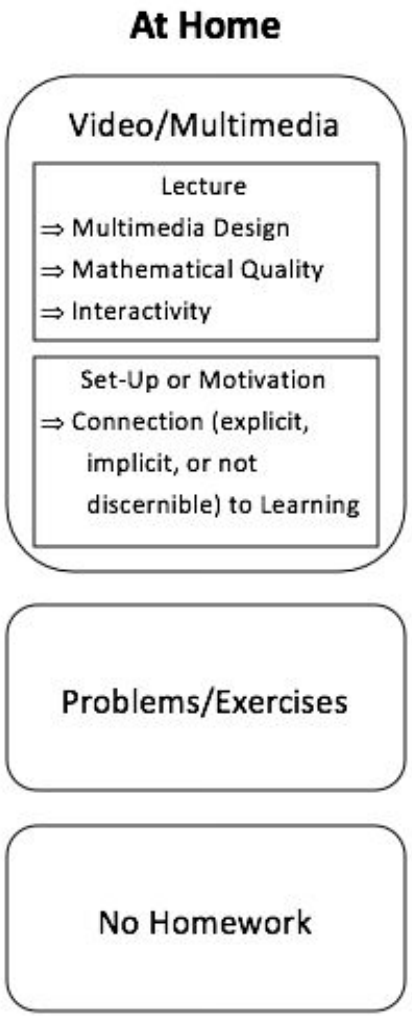
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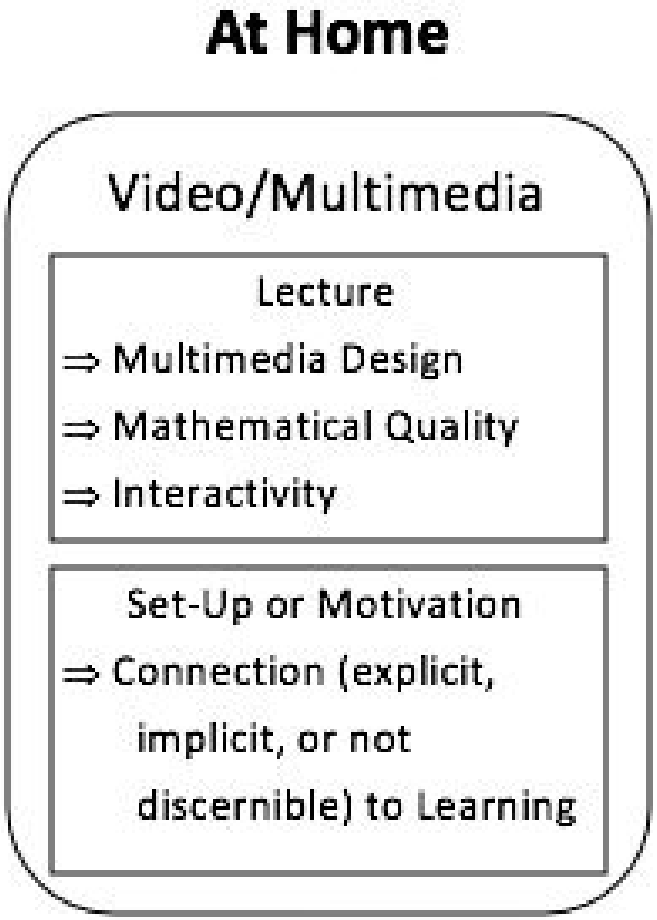
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Set-Up or Motivation
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Framework - Lecture Videos

Mathematical Quality	**Multimedia Design**	**Interactivity**
● Richness and development of the mathematics ● Precise language ● No unmitigated mathematical errors	● Multimedia principle ● Contiguity principle ● Redundancy principle ● Modality principle ● Coherence principle ● Personalization principle	● Virtual manipulatives ● Digital interactive features (e.g., embedded questions) ● Dynamic representations of mathematical concepts

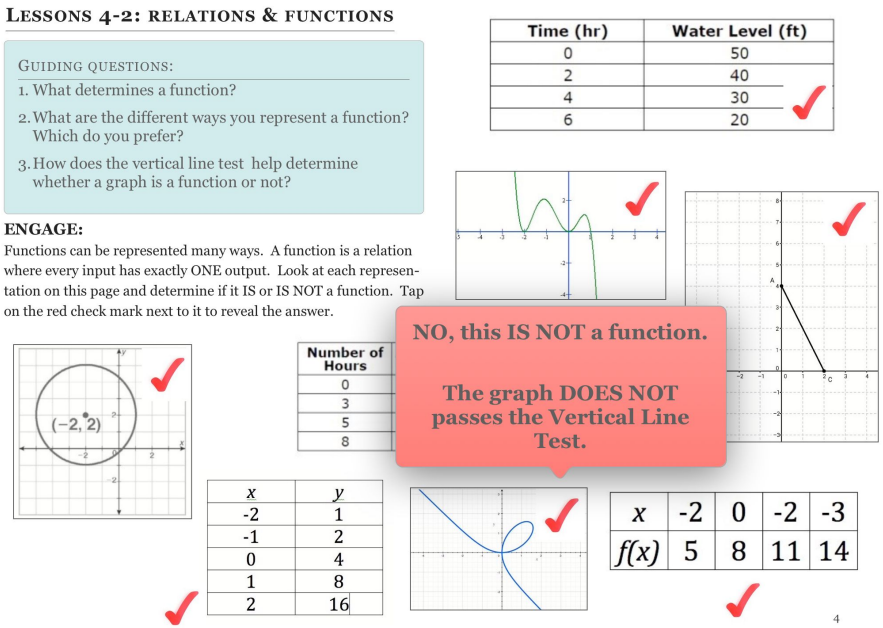
Framework

Mathematical Quality
● Richness and development of the mathematics ● Precise language ● No unmitigated mathematical errors

Framework

Mathematical Quality

- **Richness and development of the mathematics**
- Precise language
- No unmitigated mathematical errors



Framework

Mathematical Quality
• Richness and development of the mathematics • **Precise language** • No unmitigated mathematical errors

Use “dancing at a ball” to describe the structure of a function. “For every one person, you can only dance with one more person at the dance. If you decided to dance with two people, it is not going to be pretty by the end of the night.”

---- Quote from our MTMS paper

Framework

Mathematical Quality
• Richness and development of the mathematics • Precise language • **No unmitigated mathematical errors**

Framework

Multimedia Design
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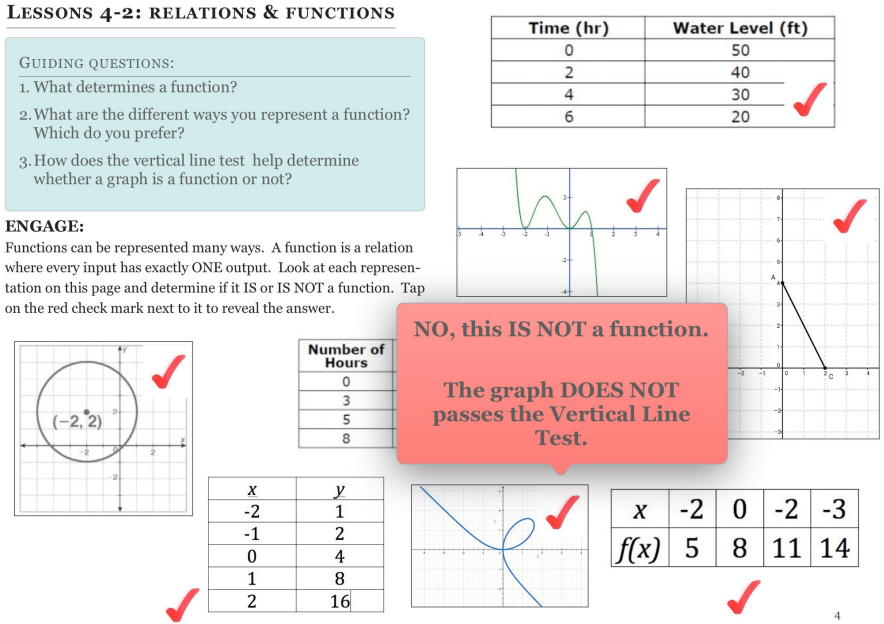
Framework

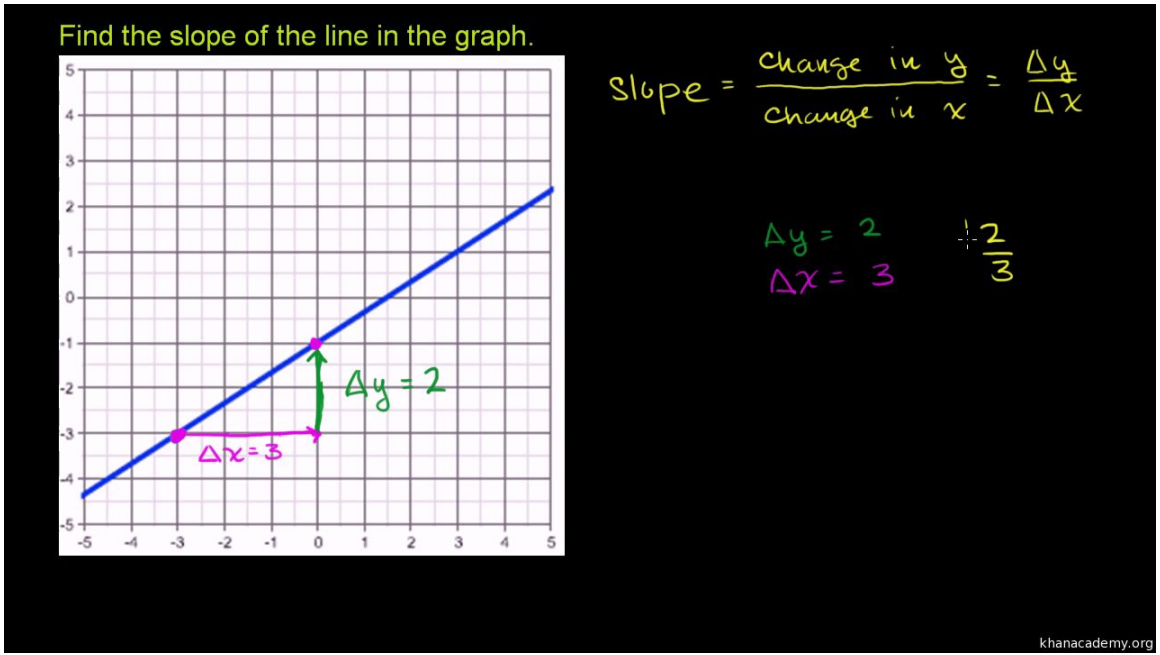


Multimedia Design

- **Multimedia principle**
- Contiguity principle
- Redundancy principle
- Modality principle
- Coherence principle
- Personalization principle

Multimedia principle: judiciously select and add graphics to text (there are some relevant graphics or animations included, so a complete absence of graphics would be coded as “does not adhere”)

Framework

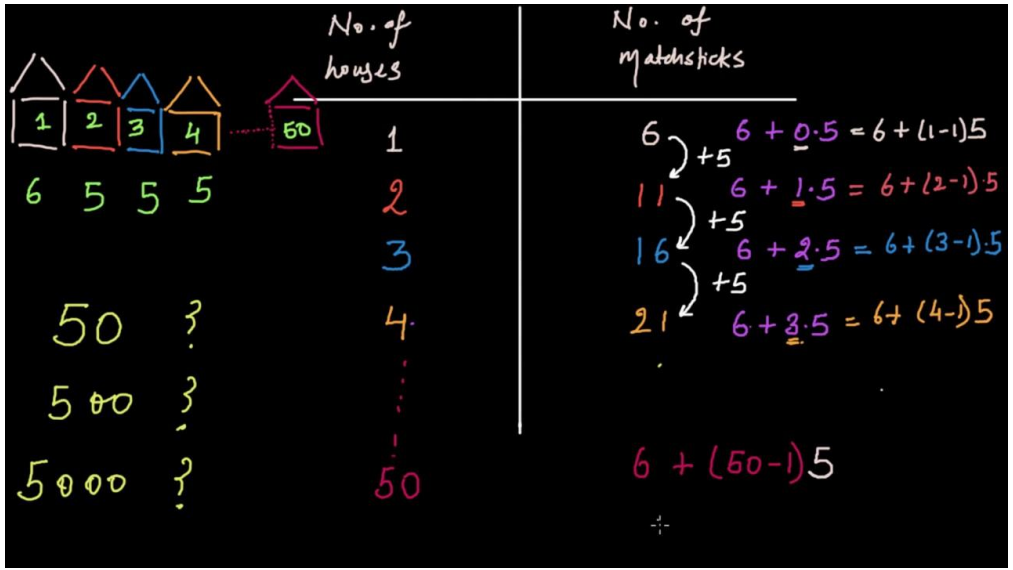


Multimedia Design

- Multimedia principle
- **Contiguity principle**
- Redundancy principle
- Modality principle
- Coherence principle
- Personalization principle

Contiguity principle: place relevant text near graphics (textual and graphic elements are placed near each other when appropriate)

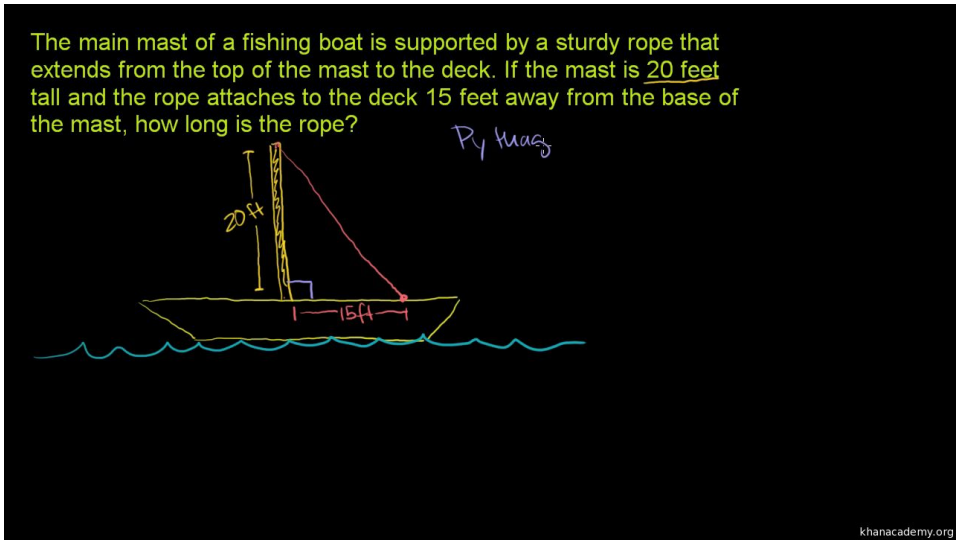
Framework



Multimedia Design
• Multimedia principle • Contiguity principle • **Redundancy principle** • Modality principle • Coherence principle • Personalization principle

Redundancy principle: do not include audio that simply reads aloud written text (this would be "does not adhere" if it were relatively large blocks of text that were read aloud, but of course words or short phrases are allowed to appear multi-modally)

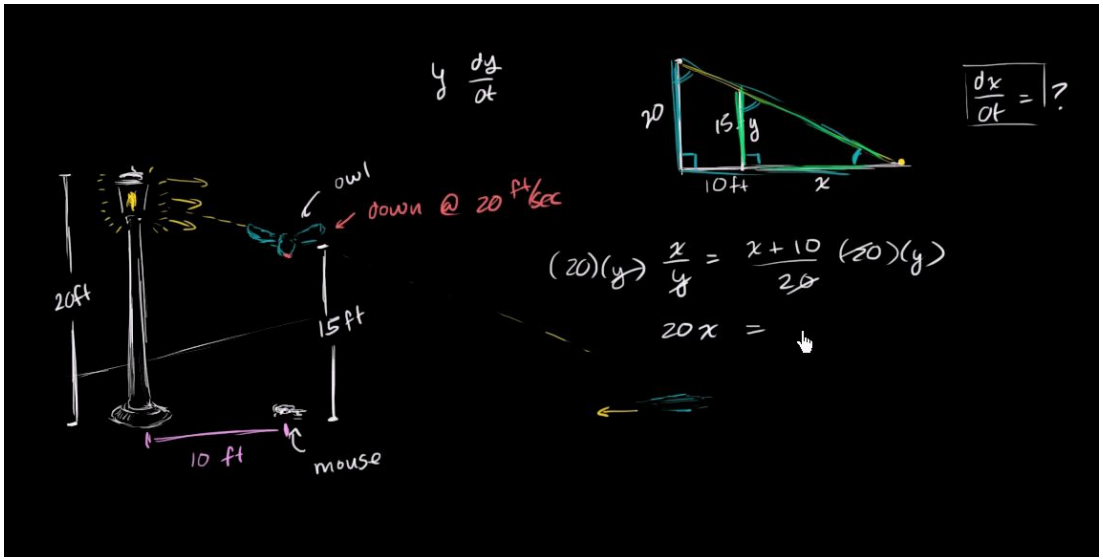
Framework



Multimedia Design
• Multimedia principle • Contiguity principle • Redundancy principle • **Modality principle** • Coherence principle • Personalization principle

Modality principle: explain graphics with audio (the narrator or the text points out important features of the graphics -- it would be a problem if there are important graphics that are not unpacked or interpreted)

Framework



Multimedia Design
• Multimedia principle • Contiguity principle • Redundancy principle • Modality principle • **Coherence principle** • Personalization principle

Coherence principle: use only pertinent graphics and audio (“does not adhere” would be videos where the graphics become cluttered or has irrelevant things included)

Framework

"As I move [the vertical line], uh oh, look what happens!"
--quote from Ms. Temple's iBook

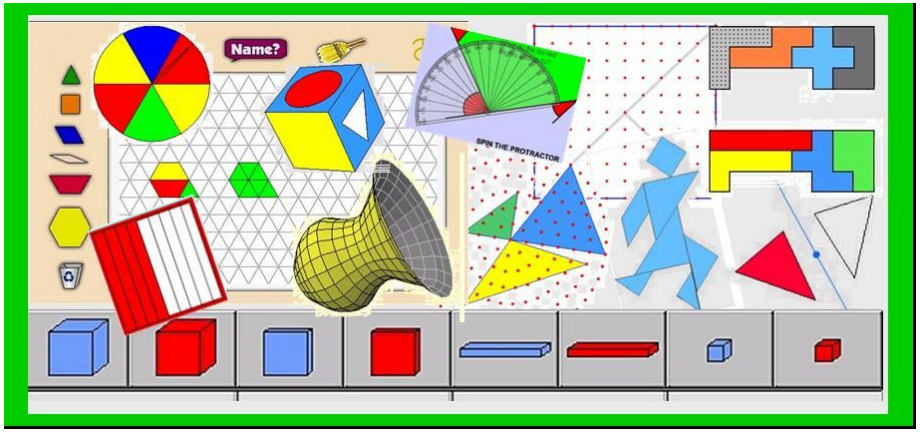
Multimedia Design
• Multimedia principle • Contiguity principle • Redundancy principle • Modality principle • Coherence principle • **Personalization principle**

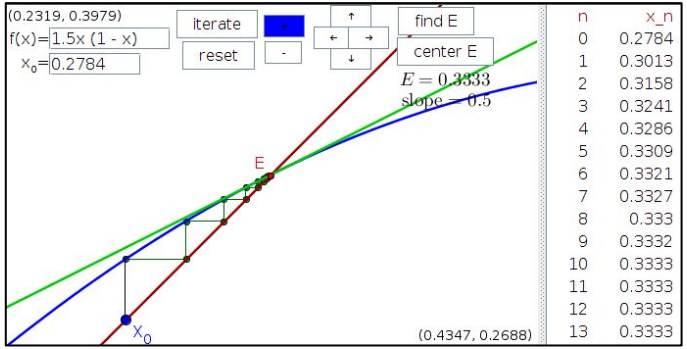
Personalization principle: use a conversational tone when possible (audio that is extremely formal or sounds like someone stiffly reading from pre-written text would be coded as "does not adhere")

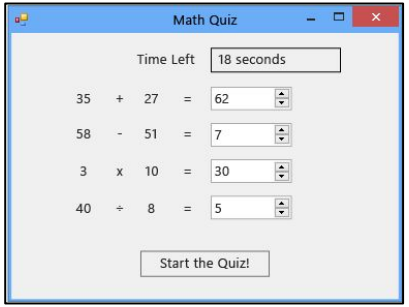
Framework

Interactivity

- Virtual manipulatives
- Digital interactive features (e.g., embedded questions)
- Dynamic representations of mathematical concepts







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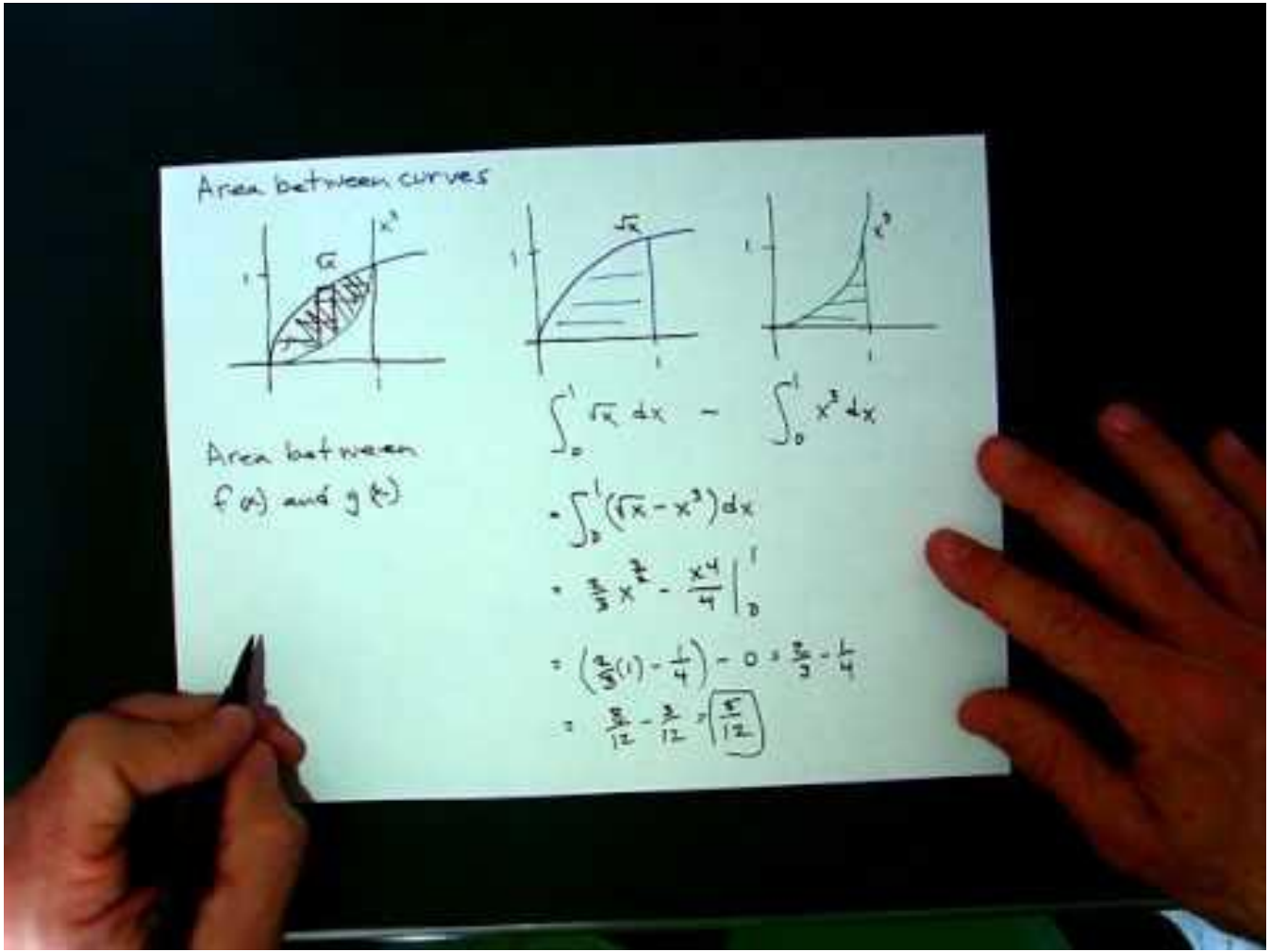
Video #1

Video #2


Area between curves
Area between
f(x) and g(x)
$\int_0^1 \sqrt{x}\,dx - \int_0^1 x^3\,dx$
$= \int_0^1 (\sqrt{x} - x^3)\,dx$
$= \frac{2}{3}x^{\frac{3}{2}} - \frac{x^4}{4}\Big|_0^1$
$= \left(\frac{2}{3}(1) - \frac{1}{4}\right) - 0 = \frac{8}{12} - \frac{3}{12}$
$= \frac{5}{12}$

Framework - Set Up/Motivation Videos

Set-Up Videos
Clarity of Mathematical Goal/Problem
● Mathematical goal or problem is clearly evident ● Mathematical goal or problem is evident with clarification or specification ● Mathematical goal or problem is not evident

Video #3

Recommendations

Create or find videos that have conceptual development and interactivity

Look for opportunities to use set-up videos

Prepare as much (or more) for the in-class time as for the video homework

Questions?

Interested in participating our study? Visit

FlippedMathStudy.net