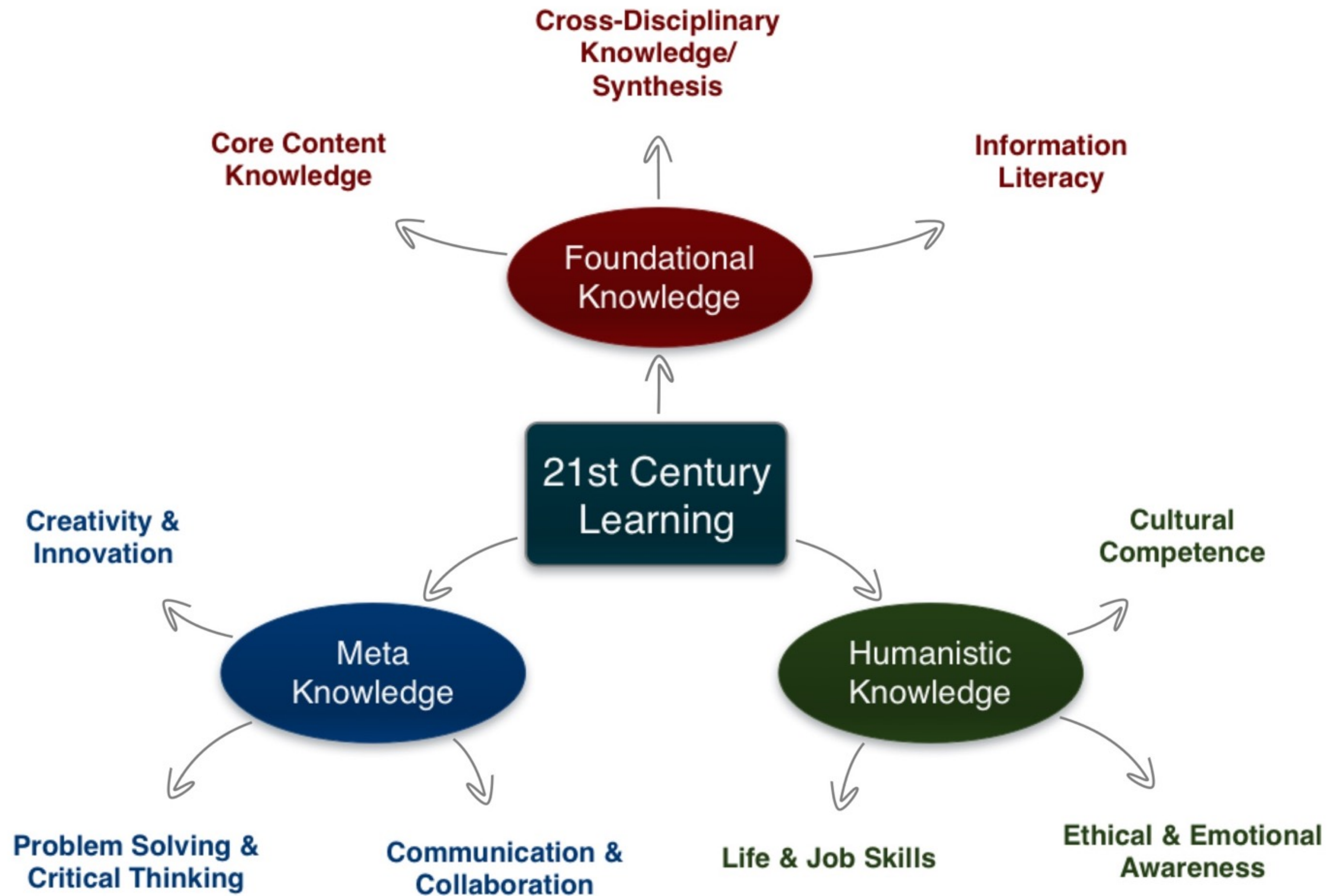


# Technology, SAMR, and Learning

---

Ruben R. Puentedura, Ph.D.



## Transformation

### **Redefinition**

*Tech allows for the creation of new tasks,  
previously inconceivable*

### **Modification**

*Tech allows for significant task redesign*

---

### **Augmentation**

*Tech acts as a direct tool substitute, with  
functional improvement*

### **Substitution**

*Tech acts as a direct tool substitute, with no  
functional change*

## Enhancement







# Redefinition

Tech allows for the creation of new tasks, previously inconceivable

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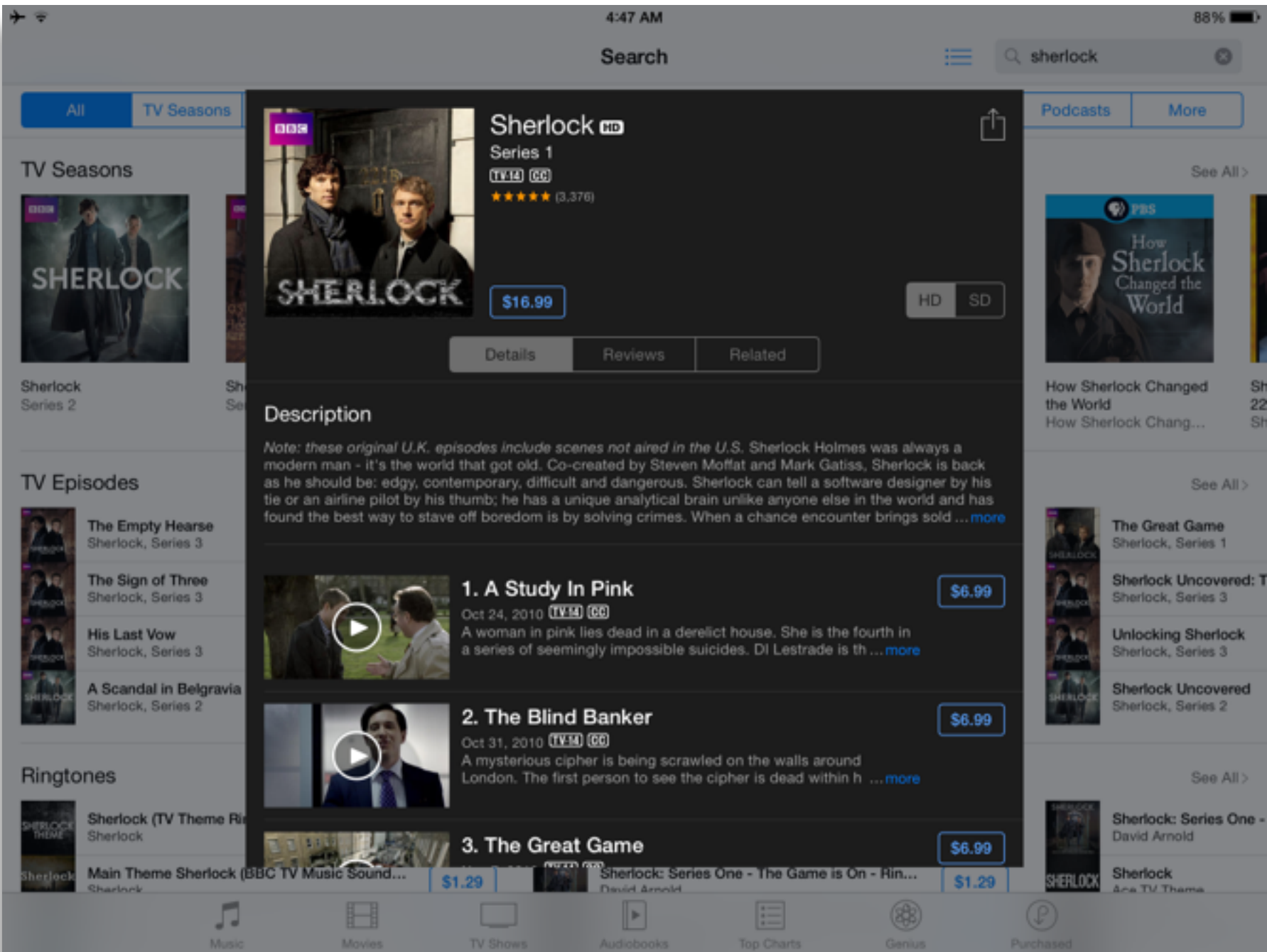
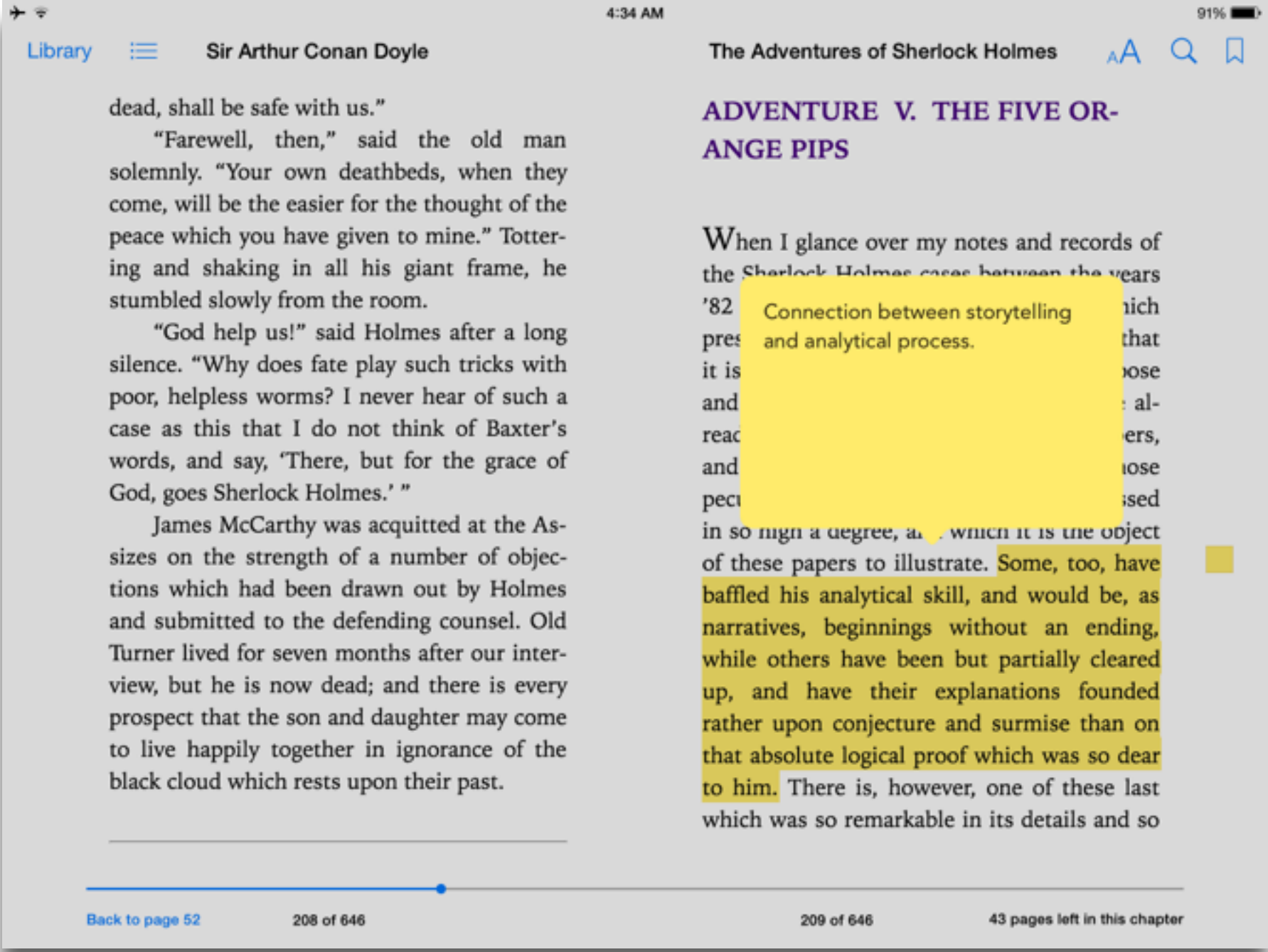
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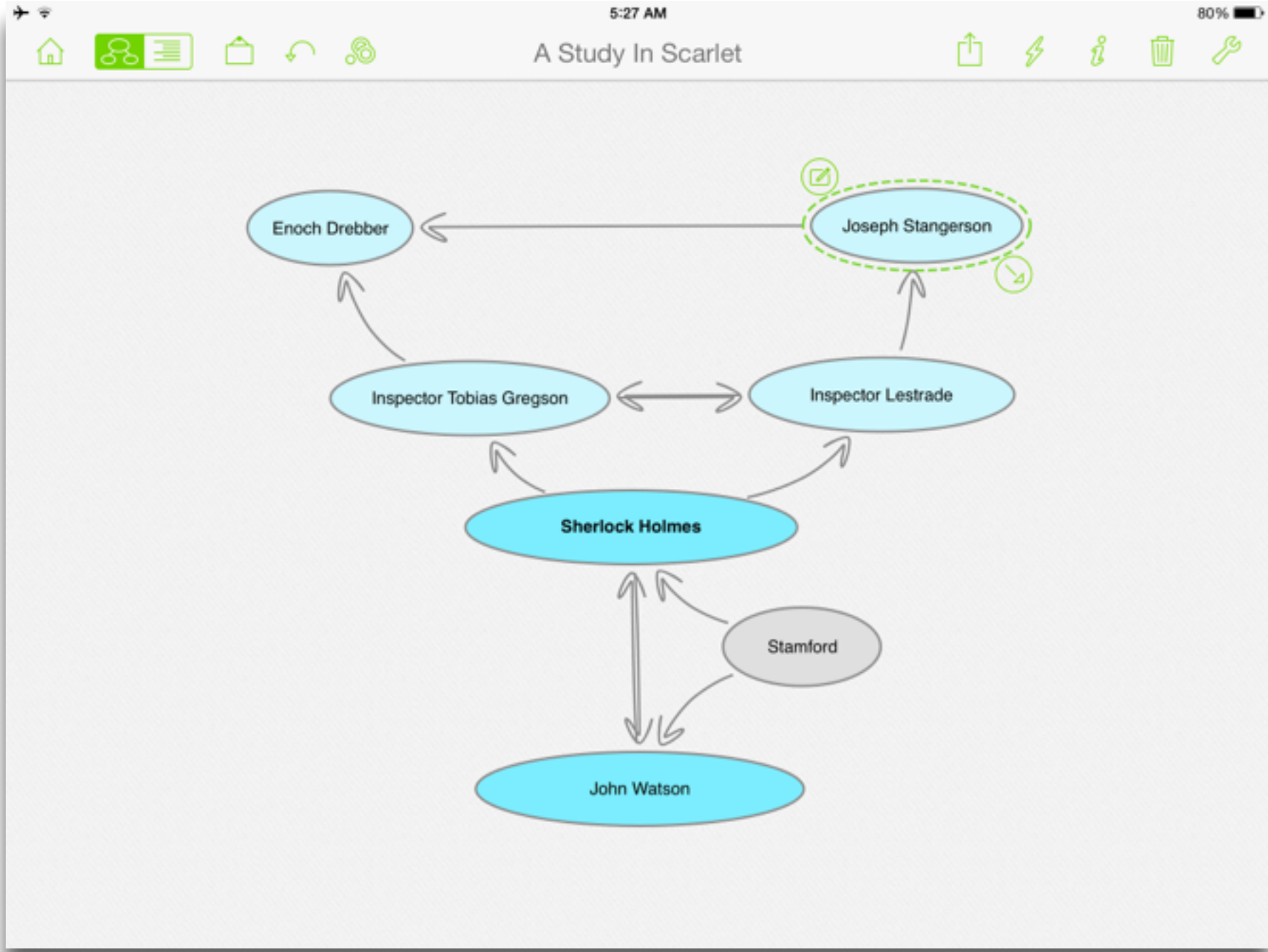
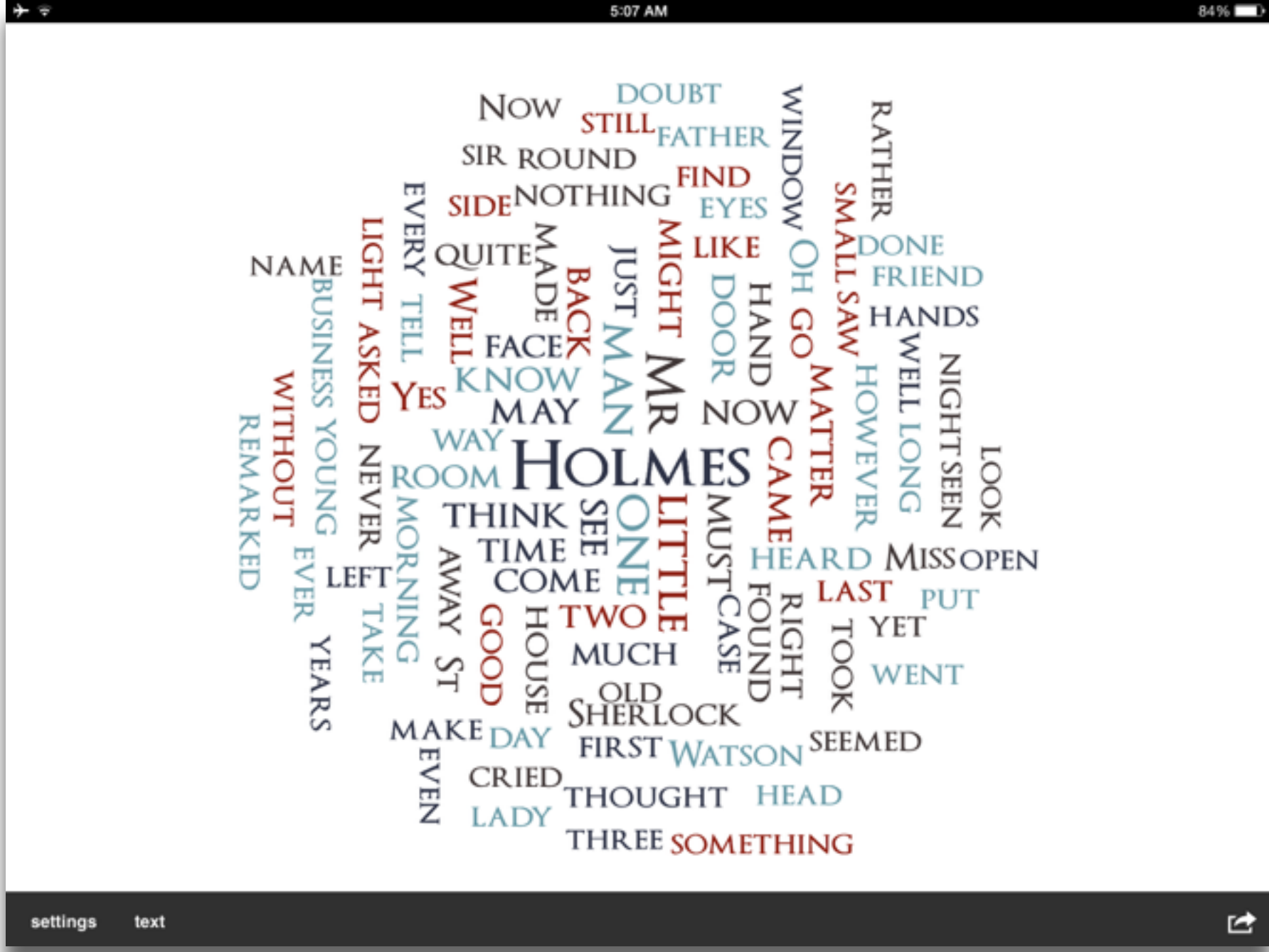
# Substitution

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**Augmentation**  
*Tech acts as a direct tool substitute, with functional improvement*

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## Redefinition

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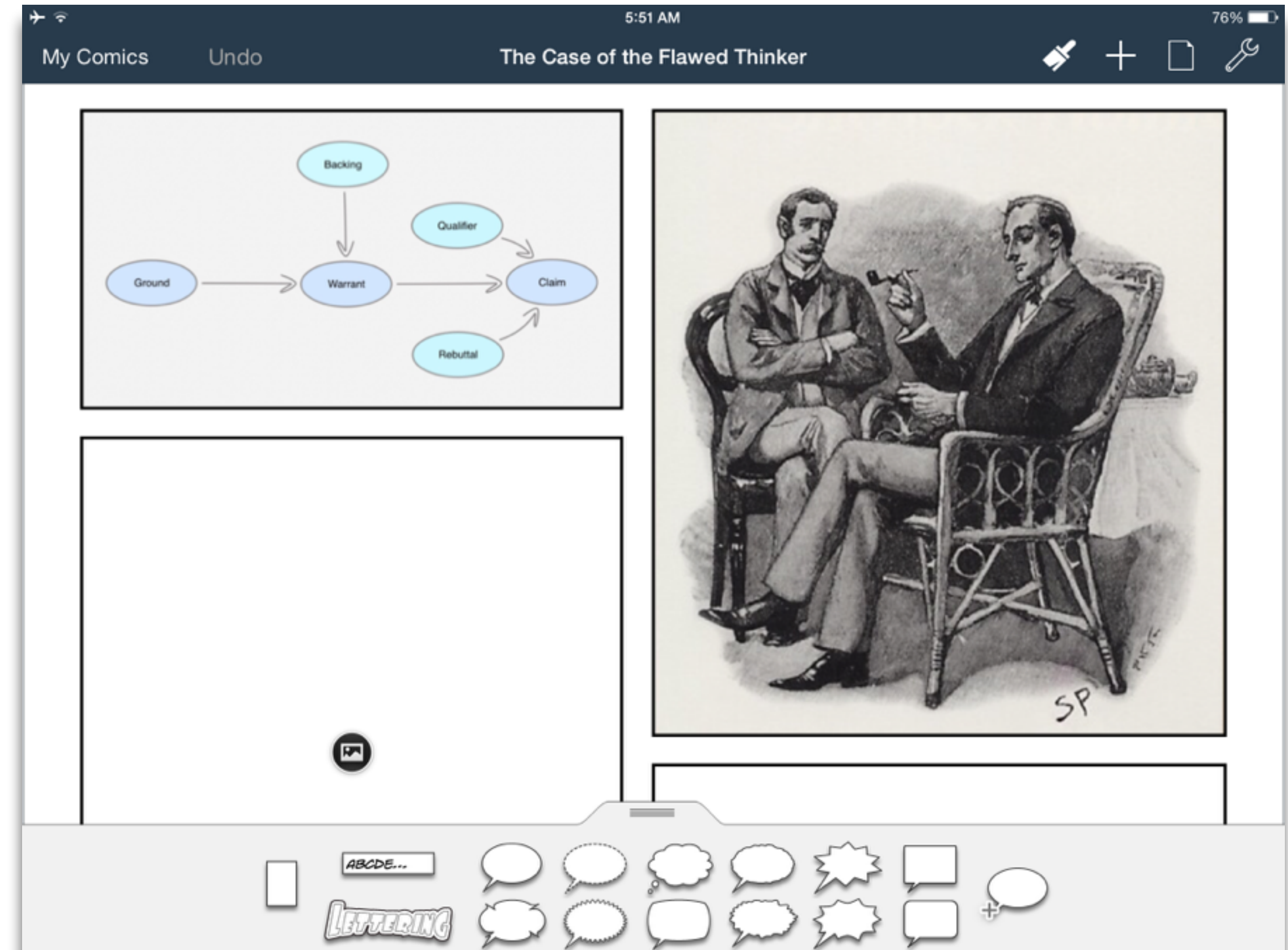
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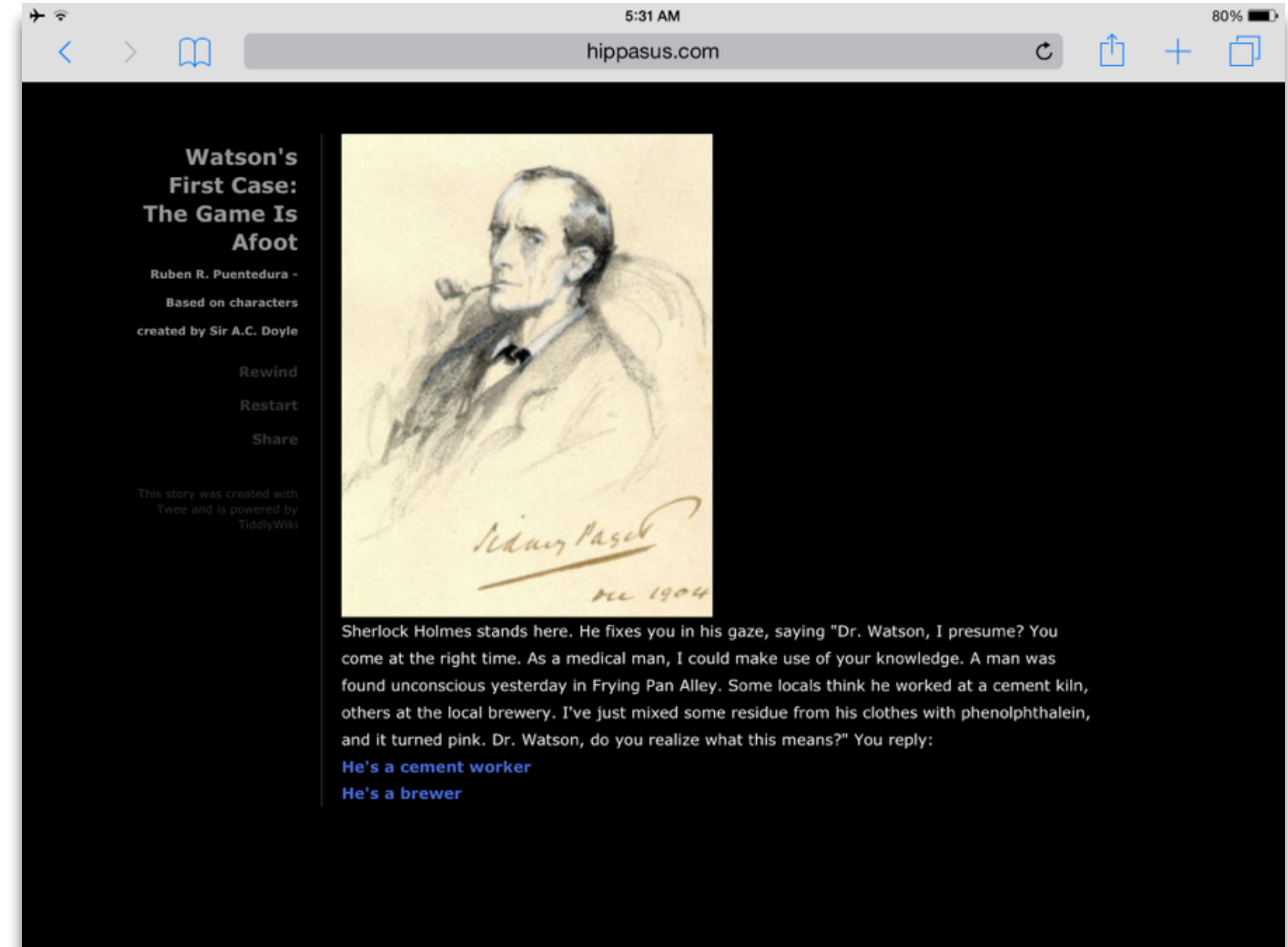
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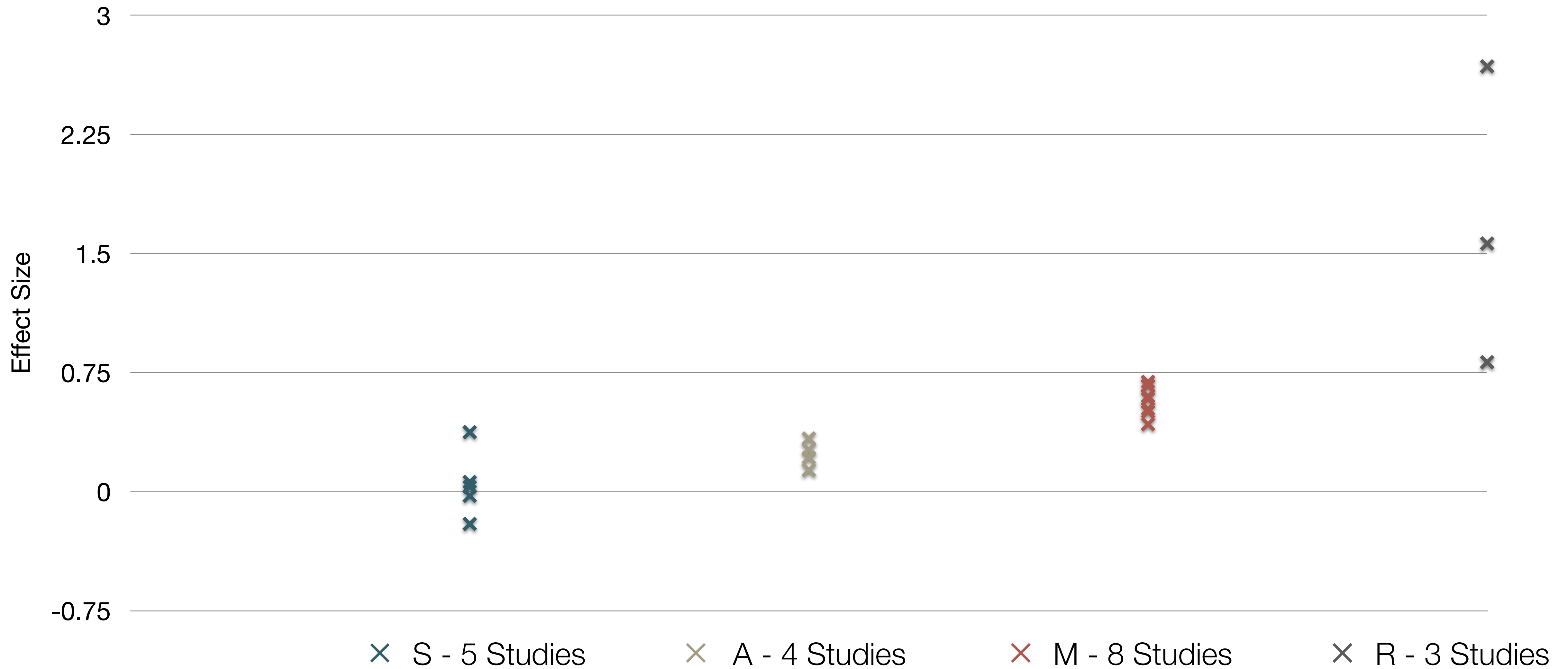
Meta-analysis	Number of studies	<i>ES</i> type	Mean <i>ES</i>	<i>SE</i>
Bangert-Drowns (1993)	19	Missing	0.27	0.11
Bayraktar (2000)	42	Cohen's <i>d</i>	0.27	0.05
Blok, Oostdam, Otter, and Overmaat (2002)	25	Hedges's <i>g</i>	0.25	0.06
Christmann and Badgett (2000)	16	Missing	0.13	0.05
Fletcher-Flinn and Gravatt (1995)	120	Glass's $\Delta$	0.24	0.05
Goldberg, Russell, and Cook (2003)	15	Hedges's <i>g</i>	0.41	0.07
Hsu (2003)	25	Hedges's <i>g</i>	0.43	0.03
Koufogiannakis and Wiebe (2006)	8	Hedges's <i>g</i>	-0.09	0.19
Kuchler (1998)	65	Hedges's <i>g</i>	0.44	0.05
Kulik and Kulik (1991)	239	Glass's $\Delta$	0.30	0.03
Y. C. Liao (1998)	31	Glass's $\Delta$	0.48	0.05
Y.-I. Liao and Chen (2005)	21	Glass's $\Delta$	0.52	0.05
Y. K. C. Liao (2007)	52	Glass's $\Delta$	0.55	0.05

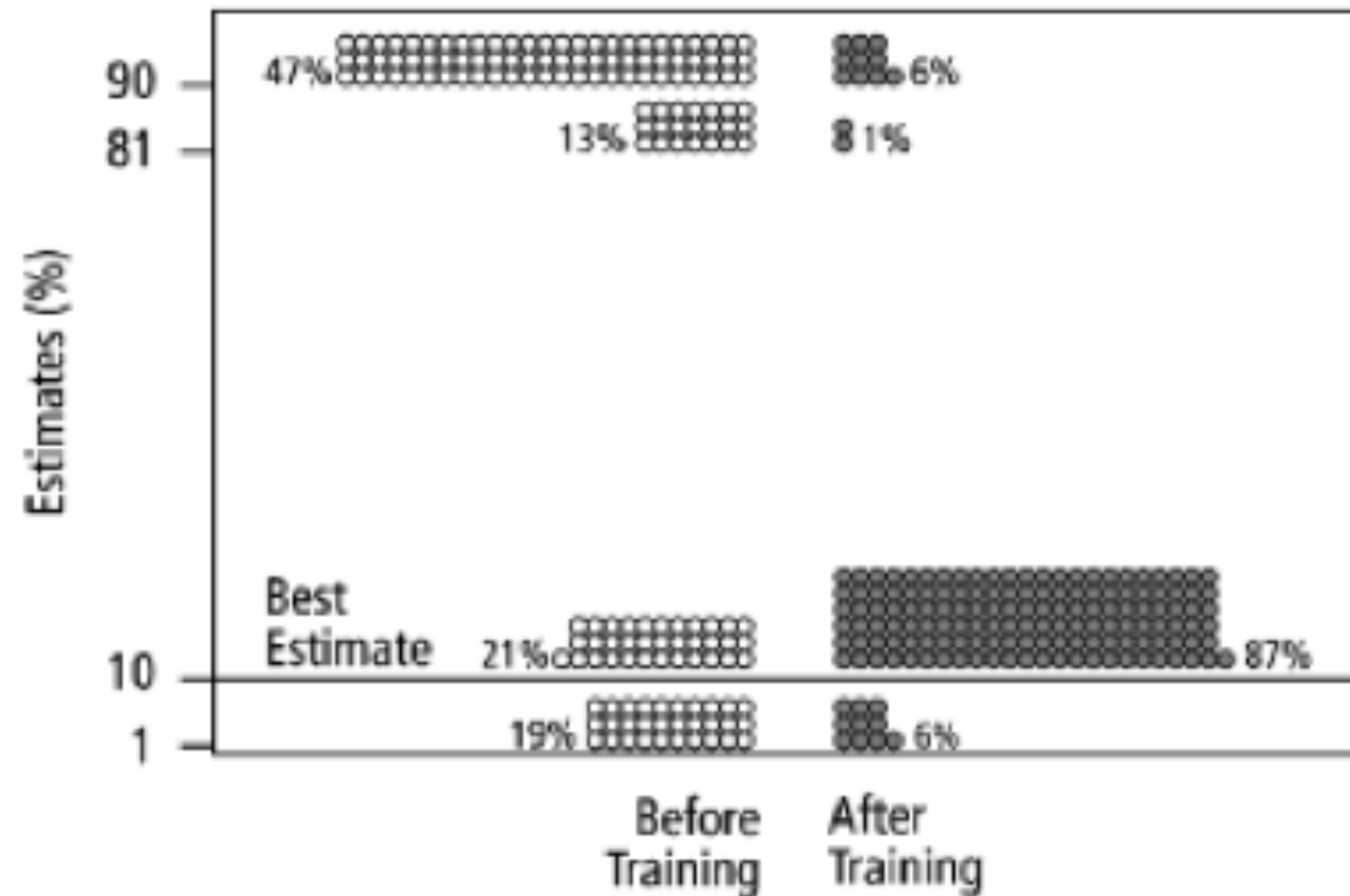
Meta-analysis	Number of studies	<i>ES</i> type	Mean <i>ES</i>	<i>SE</i>
Michko (2007)	45	Hedges's <i>g</i>	0.43	0.07
Onuoha (2007)	35	Cohen's <i>d</i>	0.26	0.04
Pearson, Ferdig, Blomeyer, and Moran (2005)	20	Hedges's <i>g</i>	0.49 <sup>a</sup>	0.11
Roblyer, Castine, and King (1988)	35	Hedges's <i>g</i>	0.31	0.05
Rosen and Salomon (2007)	31	Hedges's <i>g</i>	0.46	0.05
Schenker (2007)	46	Cohen's <i>d</i>	0.24	0.02
Soe, Koki, and Chang (2000)	17	Hedges's <i>g</i> and Pearson's <i>r</i> <sup>a</sup>	0.26 <sup>a</sup>	0.05
Timmerman and Kruepke (2006)	114	Pearson's <i>r</i> <sup>a</sup>	0.24	0.03
Torgerson and Elbourne (2002)	5	Cohen's <i>d</i>	0.37	0.16
Waxman, Lin, and Michko (2003)	42	Glass's $\Delta$	0.45	0.14
Yaakub (1998)	20	Glass's $\Delta$ and <i>g</i>	0.35	0.05
Zhao (2003)	9	Hedges's <i>g</i>	1.12	0.26

a. Converted to Cohen's *d*.

Study	SAMR Level	Description	Effect Size
Ligas (2002)	S	CAI system used to support direct instruction approach for at-risk students.	<b>0.029</b> (50th perc. → 51st perc.)
Xin & Reith (2001)	A	Multimedia resources provided to contextualize learning of word meanings and concepts.	<b>0.264</b> (50th perc. → 60th perc.)
Higgins & Raskind (2005)	M	Software/hardware used for text-to-speech, definitions, pronunciation guide for children with reading disabilities.	<b>0.600</b> (50th perc. → 73rd perc.)
Salomon, Globerson & Guterman (1989)	R	Software presents students with reading principles and metacognitive questions as part of the reading process.	<b>1.563</b> (50th perc. → 94th perc.)







**Fig. 2.** Estimates by 160 gynecologists of the probability that a woman has breast cancer given a positive mammogram, before and after receiving training in how to translate conditional probabilities into natural frequencies.



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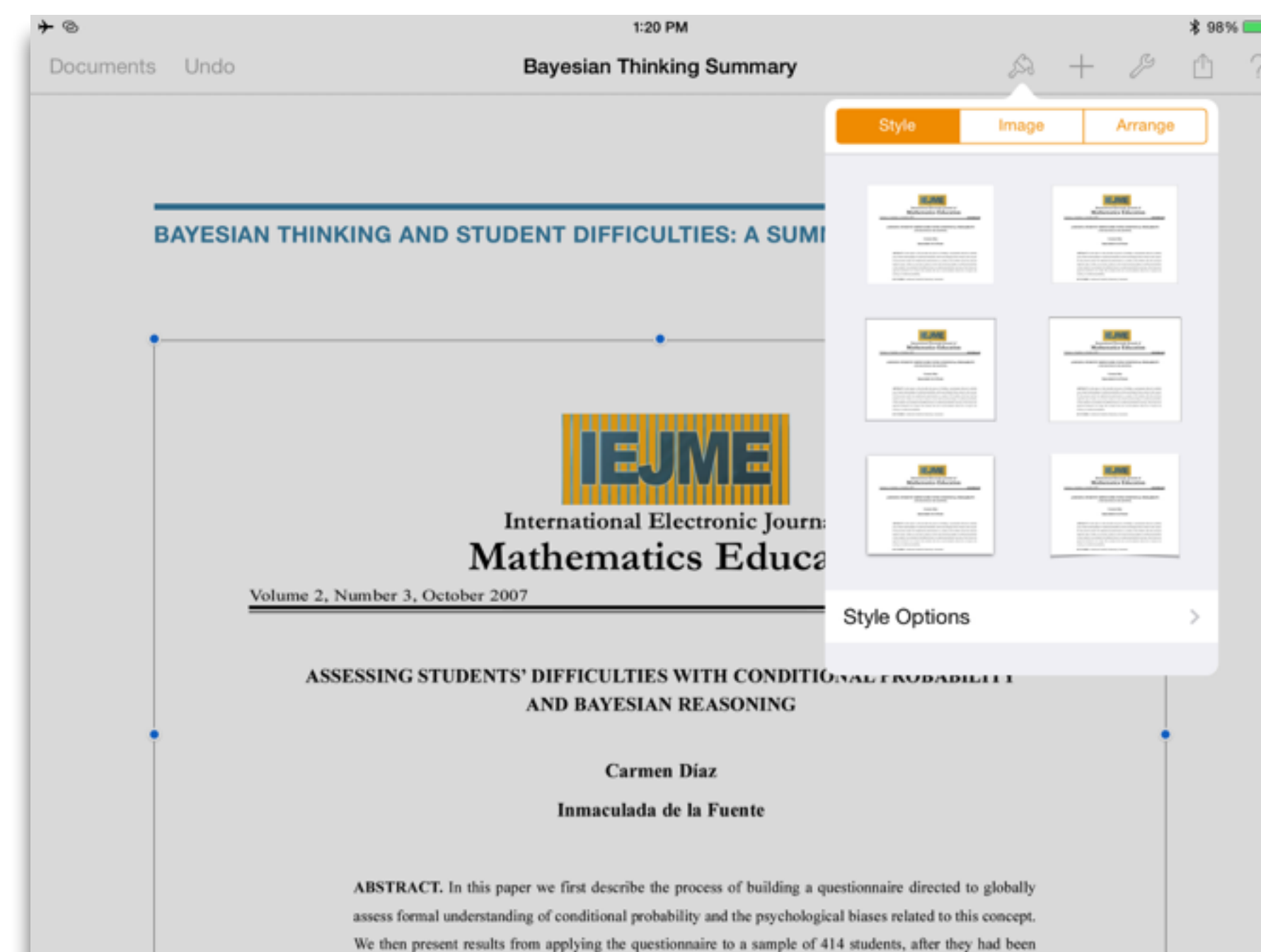
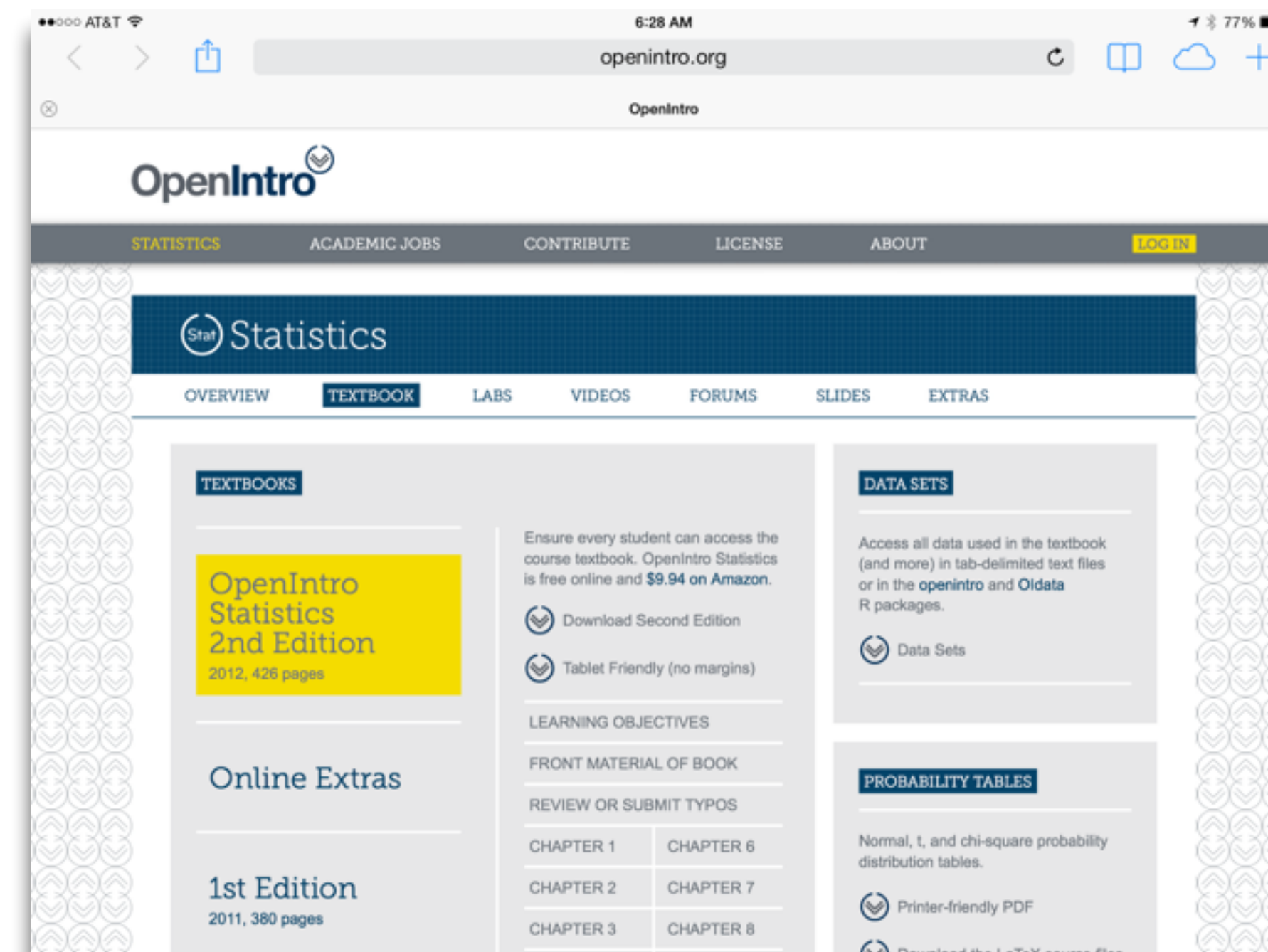
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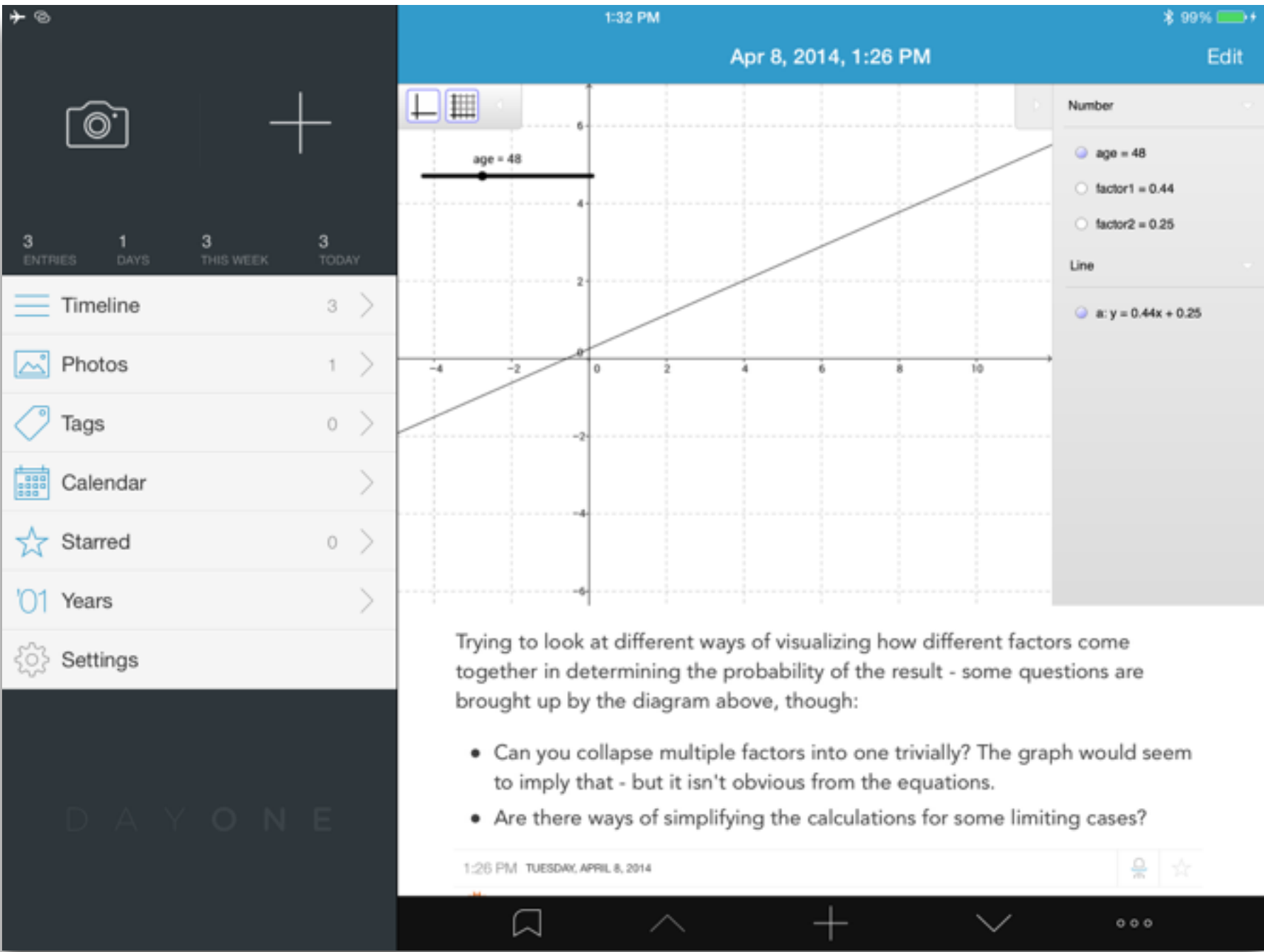
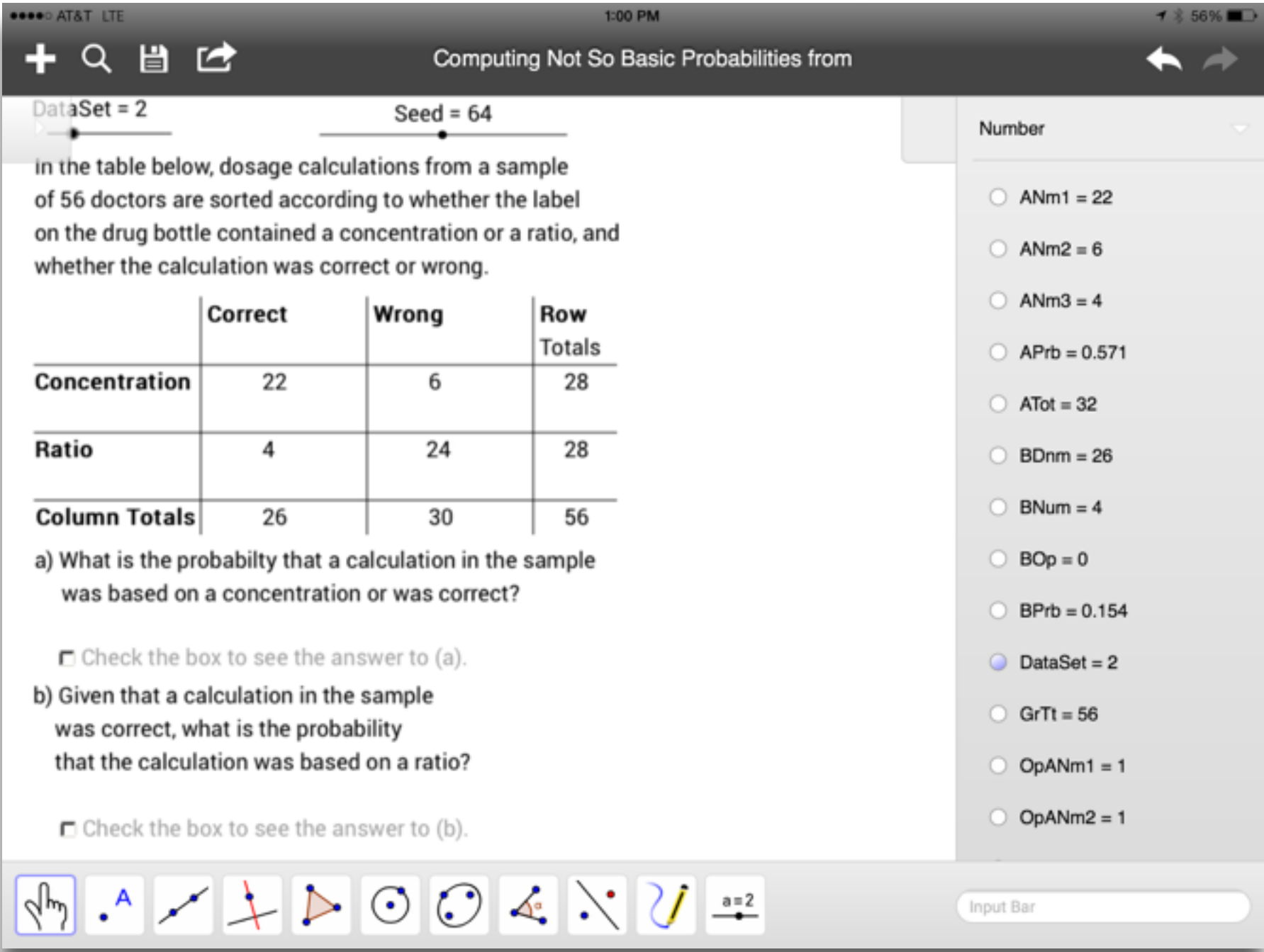
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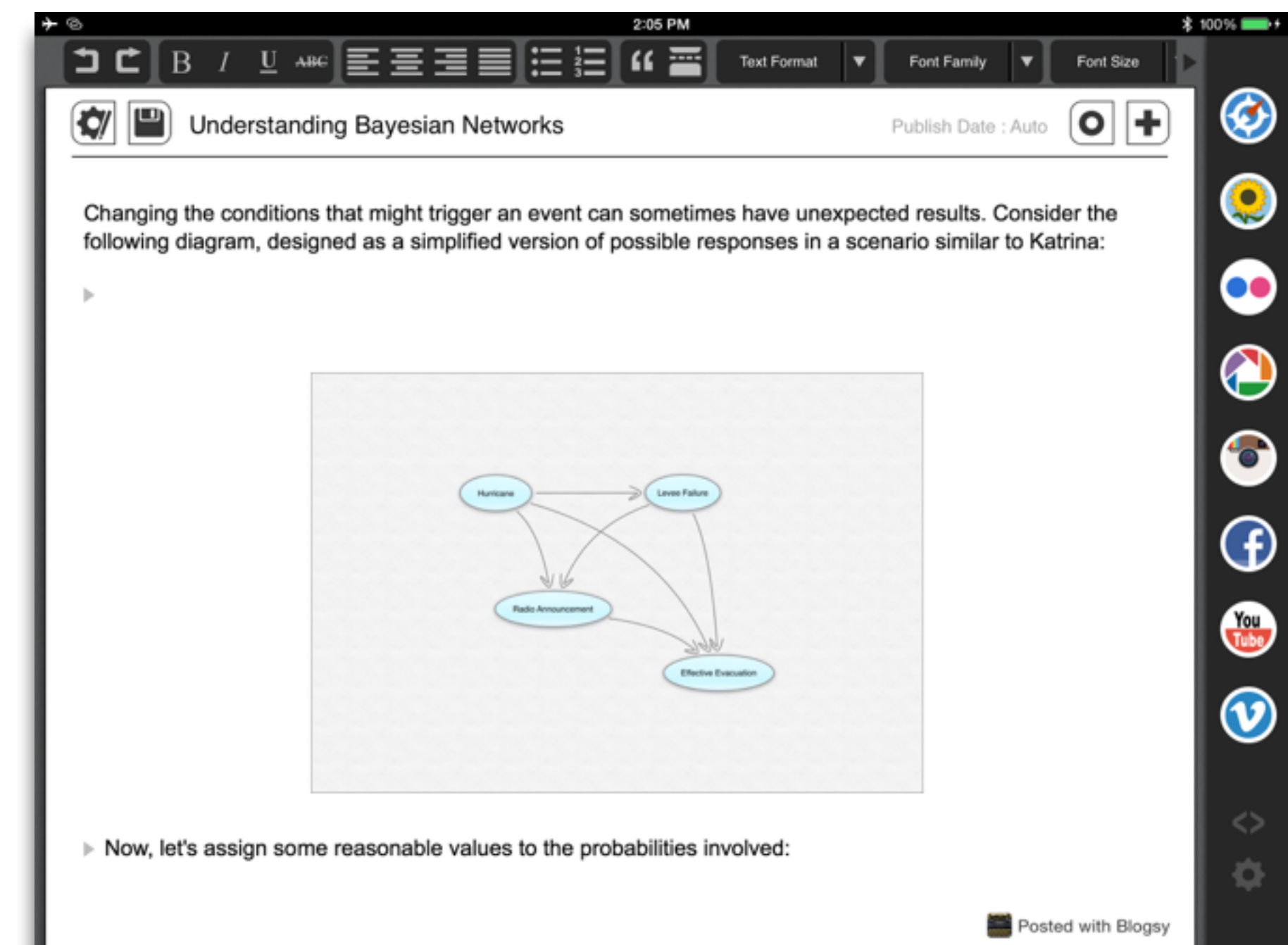
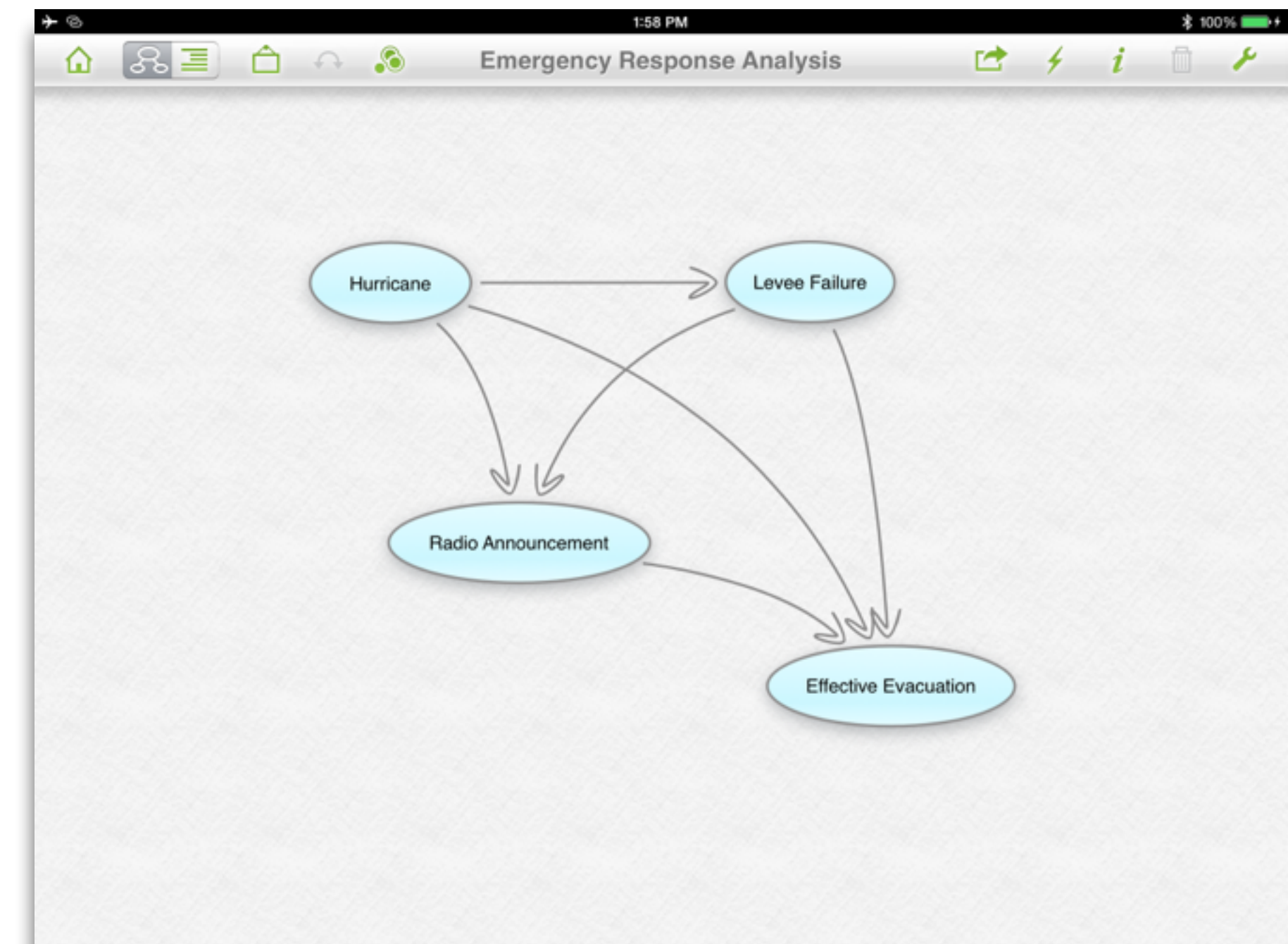
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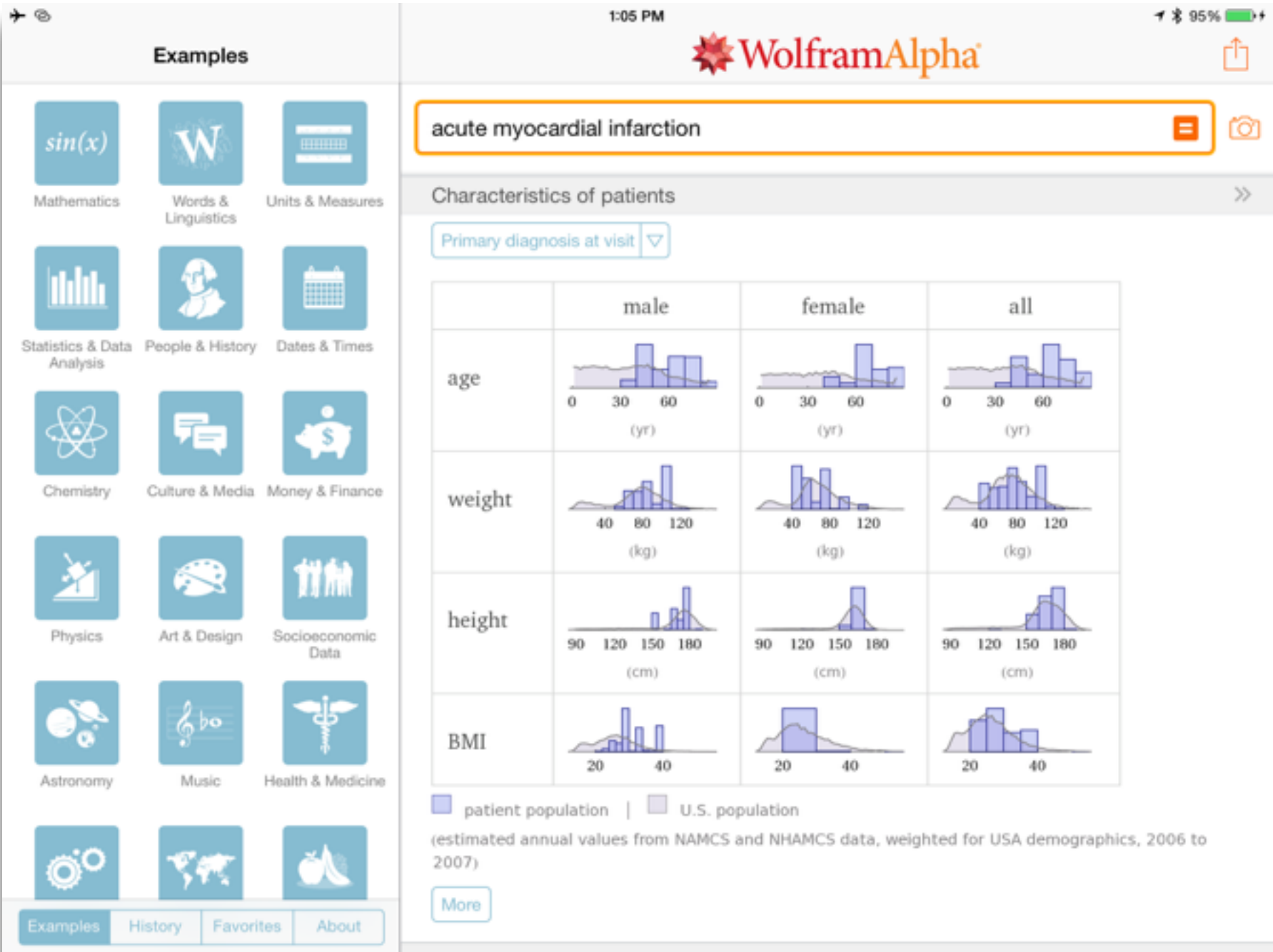
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AT&T 2:39 PM 40% Stent Policy Analysis

Presentations Undo

1 Policy Analysis: Stents

2

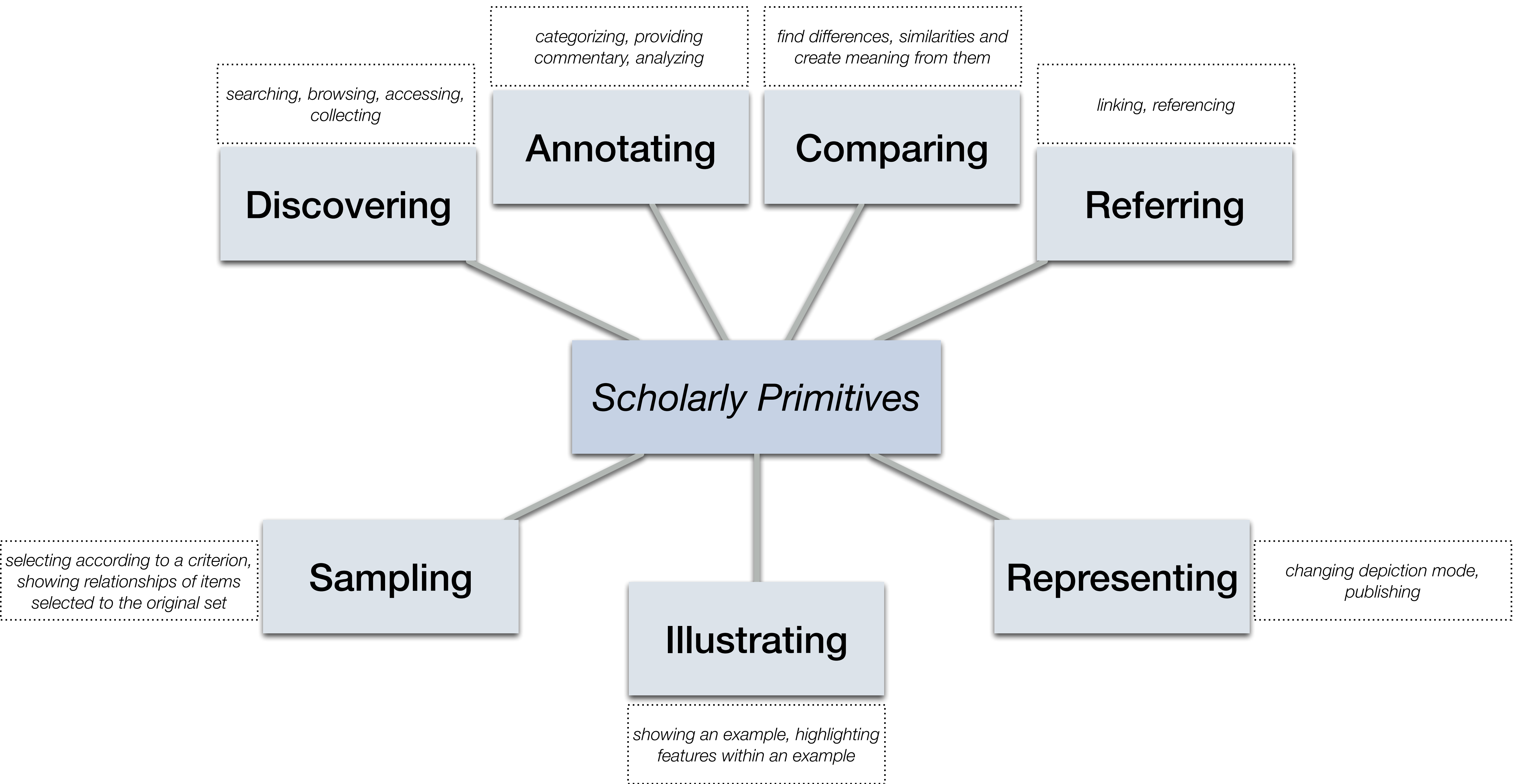
3

Independent Predictor	Hazard Ratio	95% CI	P Value
<b>30-Day Major Adverse Cardiac or Cerebrovascular Event</b>			
>1 vessel treated	1.416	1.138-1.762	0.0018
Urgent procedure	3.27	2.5-5.54	<0.0001
Female sex	1.464	1.03-2.07	0.0321
Chronic obstructive pulmonary disease	1.541	1.04-2.276	0.03
Hypertension	1.622	1.037-2.535	0.0339
<b>3-Year Survival</b>			
>1 vessel treated	1.252	1.072-1.462	0.0045
NYHA functional class III or IV	1.35	1.015-1.796	0.0389
Prior myocardial infarction	1.411	1.077-1.848	0.0047
Age >65 yr	2.182	1.663-2.864	<0.0001
Chronic renal insufficiency	1.963	1.481-2.602	<0.0001
Valvulopathy	1.641	1.183-2.277	0.0031
Family history of coronary artery disease	0.615	0.437-0.865	0.0039
Hyperlipidemia	0.66	0.518-0.841	0.0002
Congenital heart disease	2.312	1.692-3.16	<0.0001
Peripheral vascular disease	1.921	1.452-2.541	<0.0001






Will Stent Revascularization Replace Coronary Artery Bypass Grafting?

James M. Wilson, MD







Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
				



Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
  				



Bookmarks



RSS Feeds

Discussions



Microblogging

Blogging










Wikis

Telepresence



File Sharing

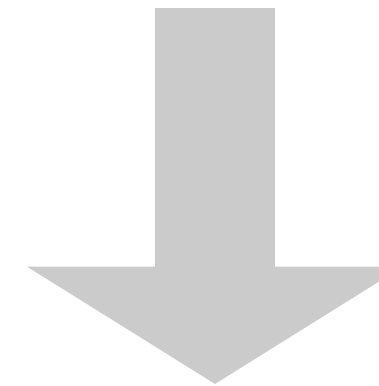


Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
  				 



Class

Homework



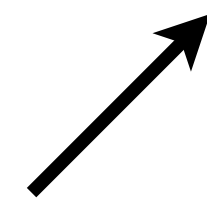
School

World

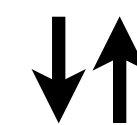
Home



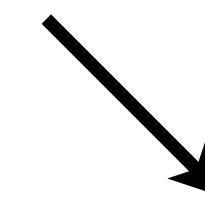
Learning Environments



*Contextual Search*  
*Augmented Reality*






*Cloud Resources*  
*Mobile Tools*

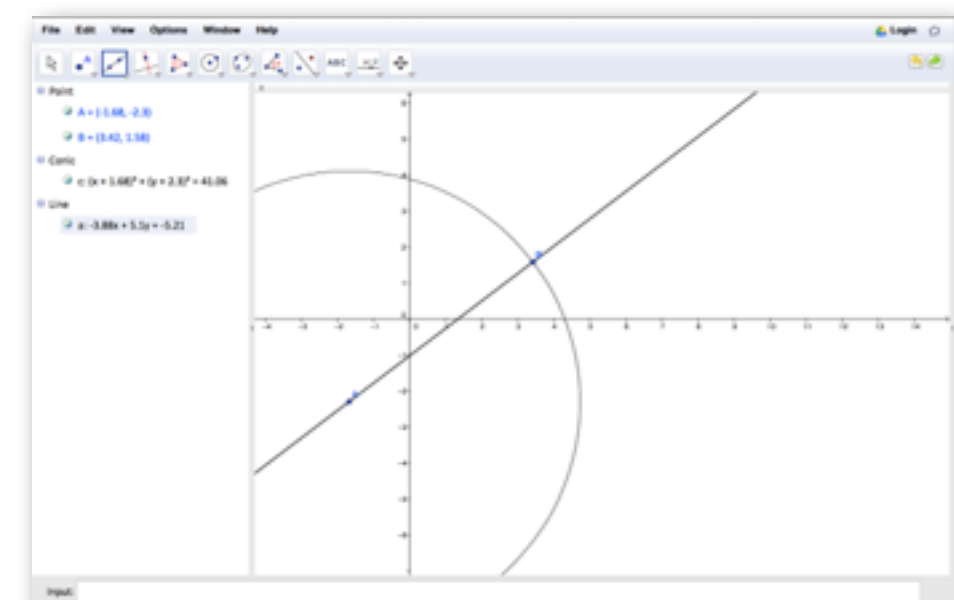
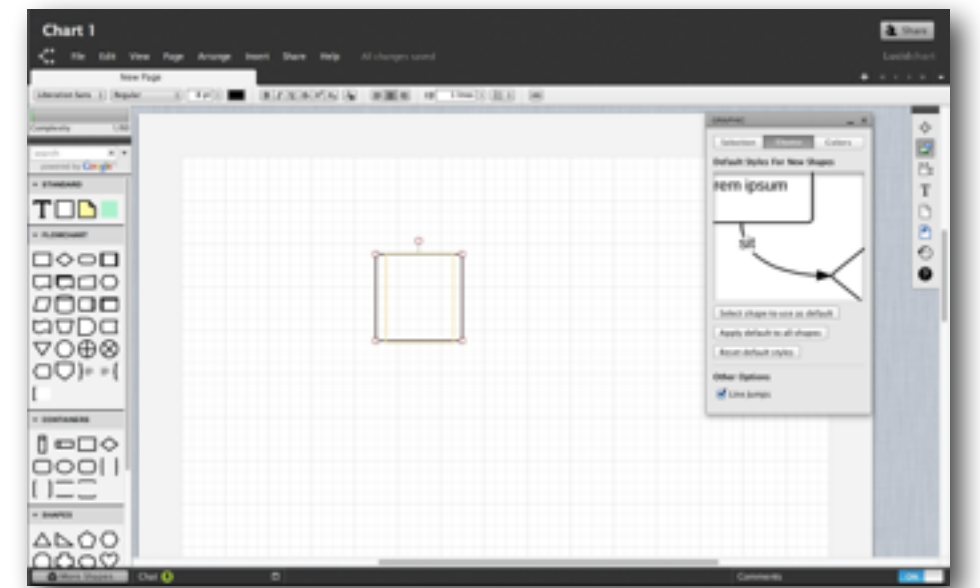
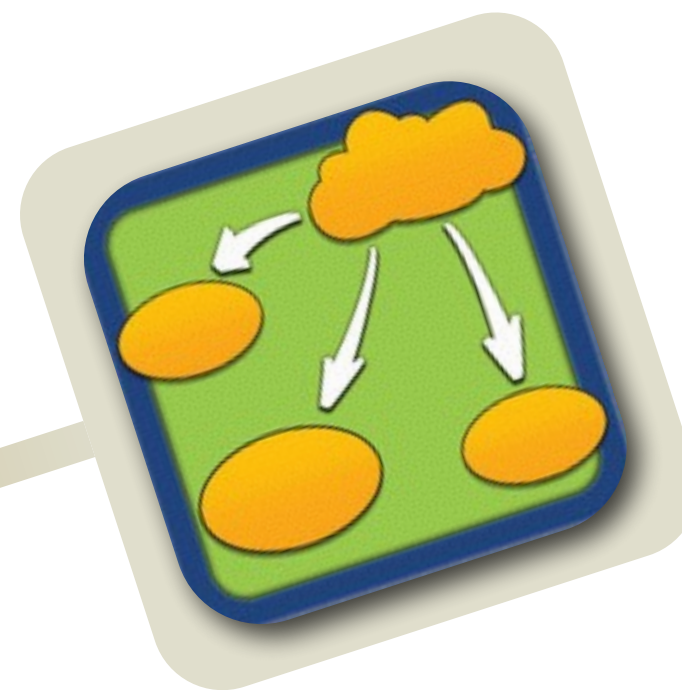
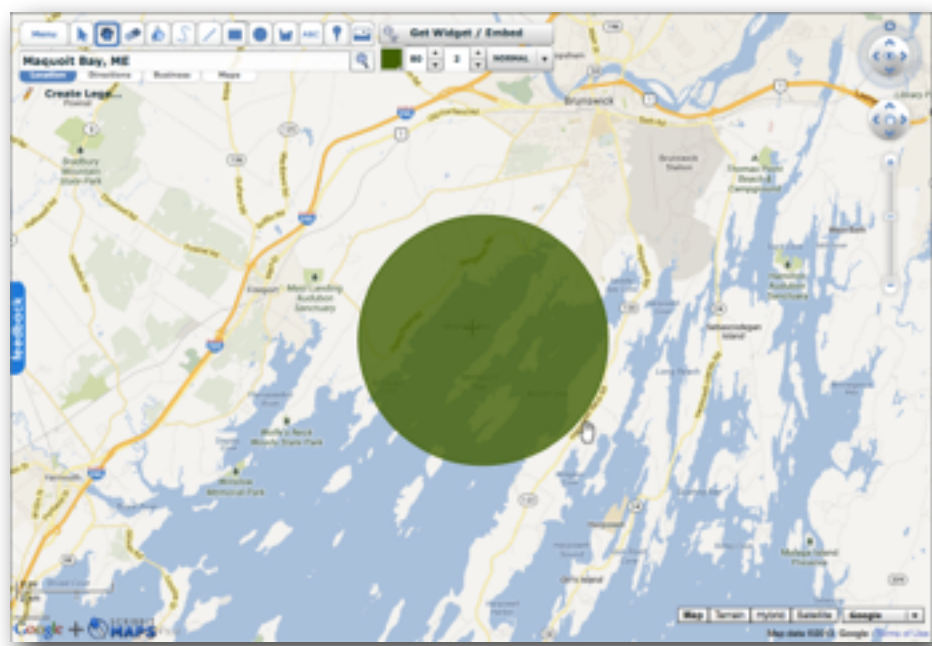


*Sensors*  
*Recorders*



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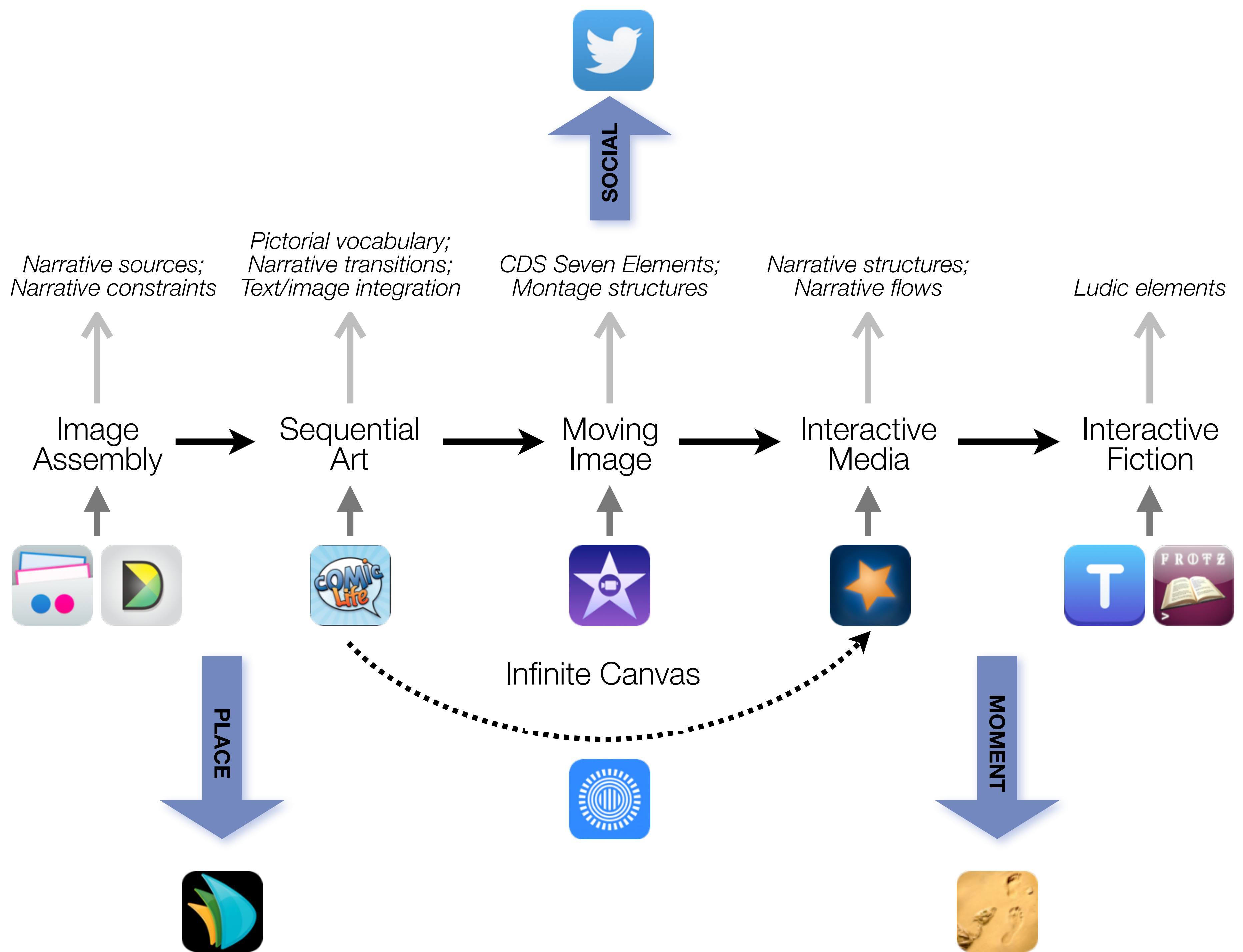






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200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
  				 



## Formal Definition of **Game** (Salen & Zimmerman)

---

“A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.”



## The EdTech Quintet – Associated Practices

Social	Communication, Collaboration, Sharing
Mobility	Anytime, Anyplace Learning and Creation
Visualization	Making Abstract Concepts Tangible
Storytelling	Knowledge Integration and Transmission
Gaming	Feedback Loops and Formative Assessment

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# THE FUTURE OF MUSEUMS CONFERENCE

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### /// TWIN MUSEUM EVENTS

The [New Media Consortium](#) and [Learning Revolution](#) held twin events about the future of museums on **July 23rd & 24th, 2014**. Both events were focused on four main themes from the [NMC Horizon Report > 2013 Museum Edition](#):

- Bring Your Own Device
- Location-Based Services
- Crowdsourcing
- Makerspaces

**July 23rd** - The [NMC Virtual Symposium on the Future of Museums](#) was an exclusive symposium for you, the curators, creators, innovators, museum professionals, and educators. In this limited-space event, participants engaged with panels on these topics and helped to shape the conversation around the future of museums.

More information at [go.nmc.org/future-museums](http://go.nmc.org/future-museums)

**July 24th** - The Learning Revolution

### /// WELCOME!



The Future of Museums Conference was held from 10am - 5pm US-Eastern Time on **July 24th, 2014**, and featured keynote speakers and crowd-sourced presentations by your peers.

The conference was a collaborative global conversation about technology, museums, and the future. A welcome letter with the conference strands is [here](#).

To be kept informed of future conference news and updates, please [join this network!](#)

### /// KEYNOTES



Welcome to The Future of Museums Conference

[Sign Up](#) or [Sign In](#)

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### /// 2014 CONFERENCE

**Conference**

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- [Con](#)

Sign in to chat!



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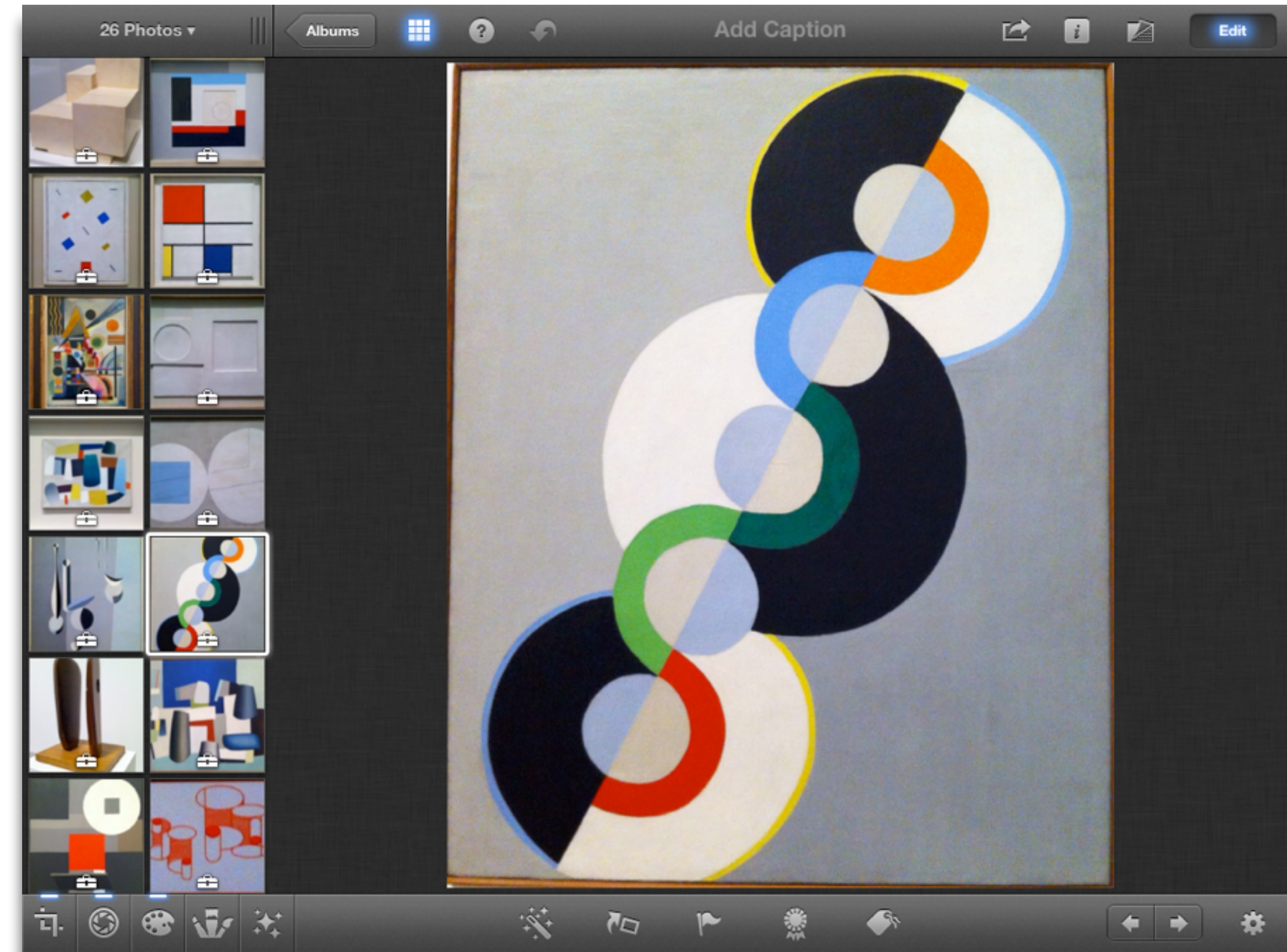
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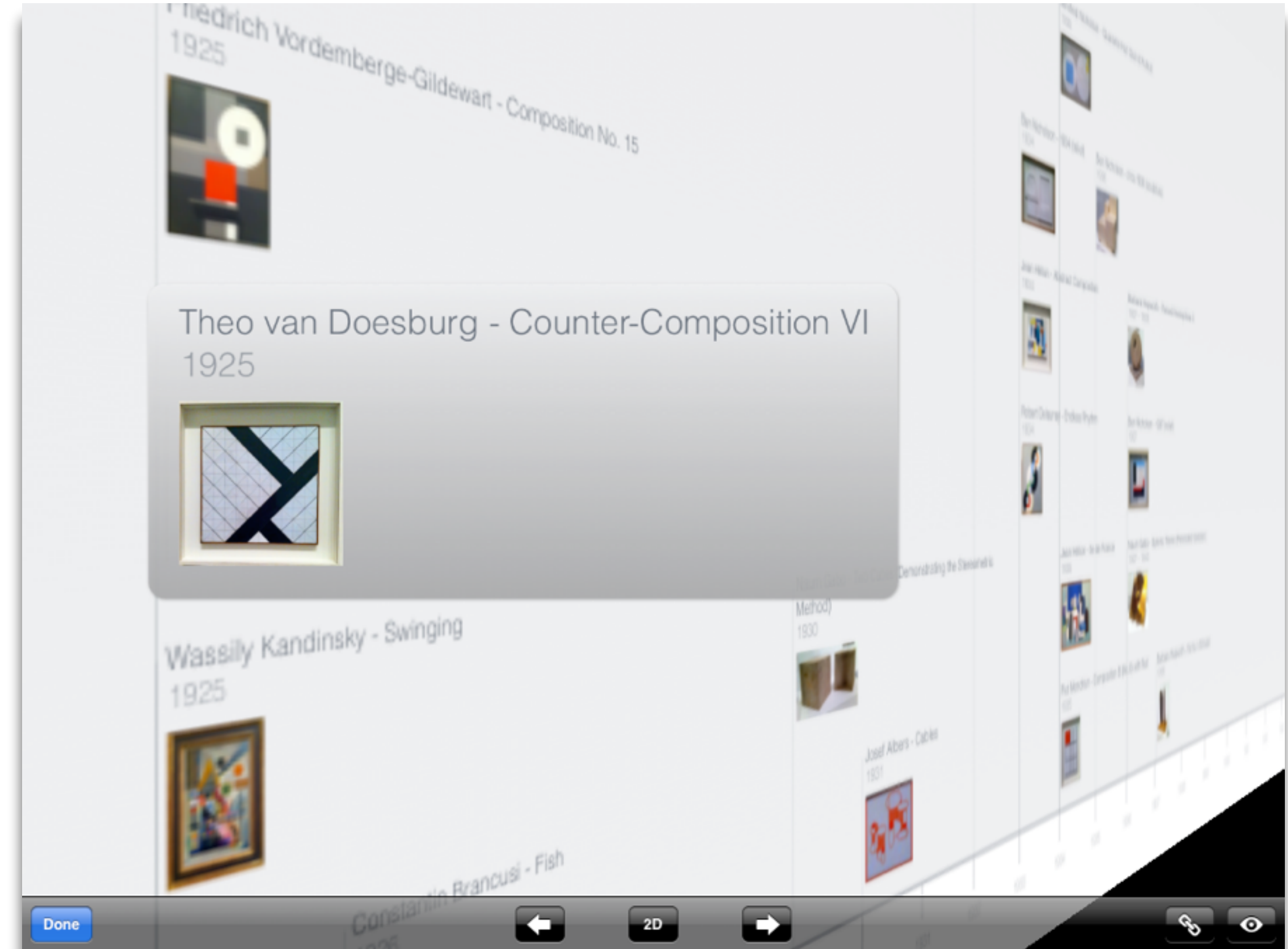
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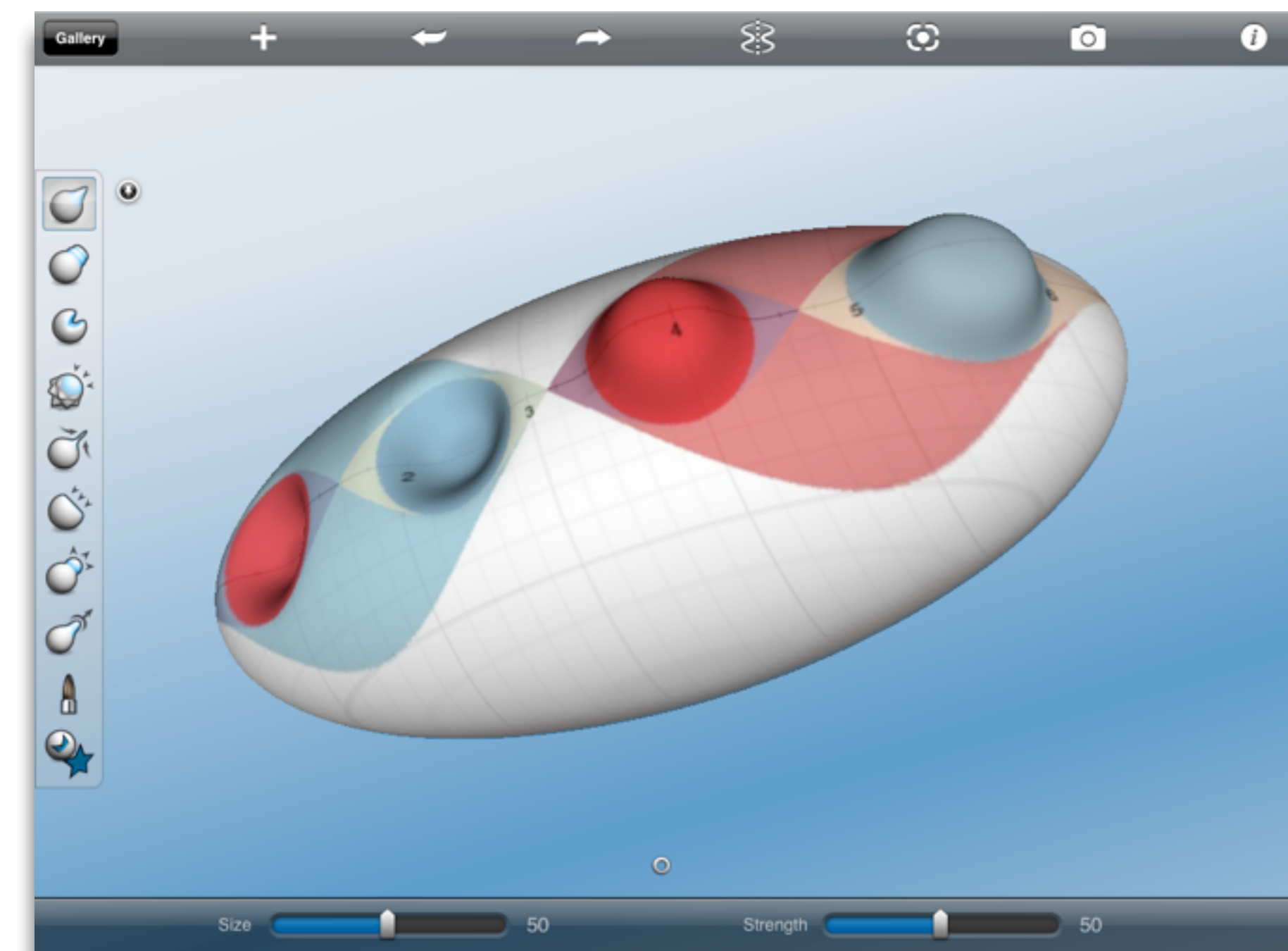
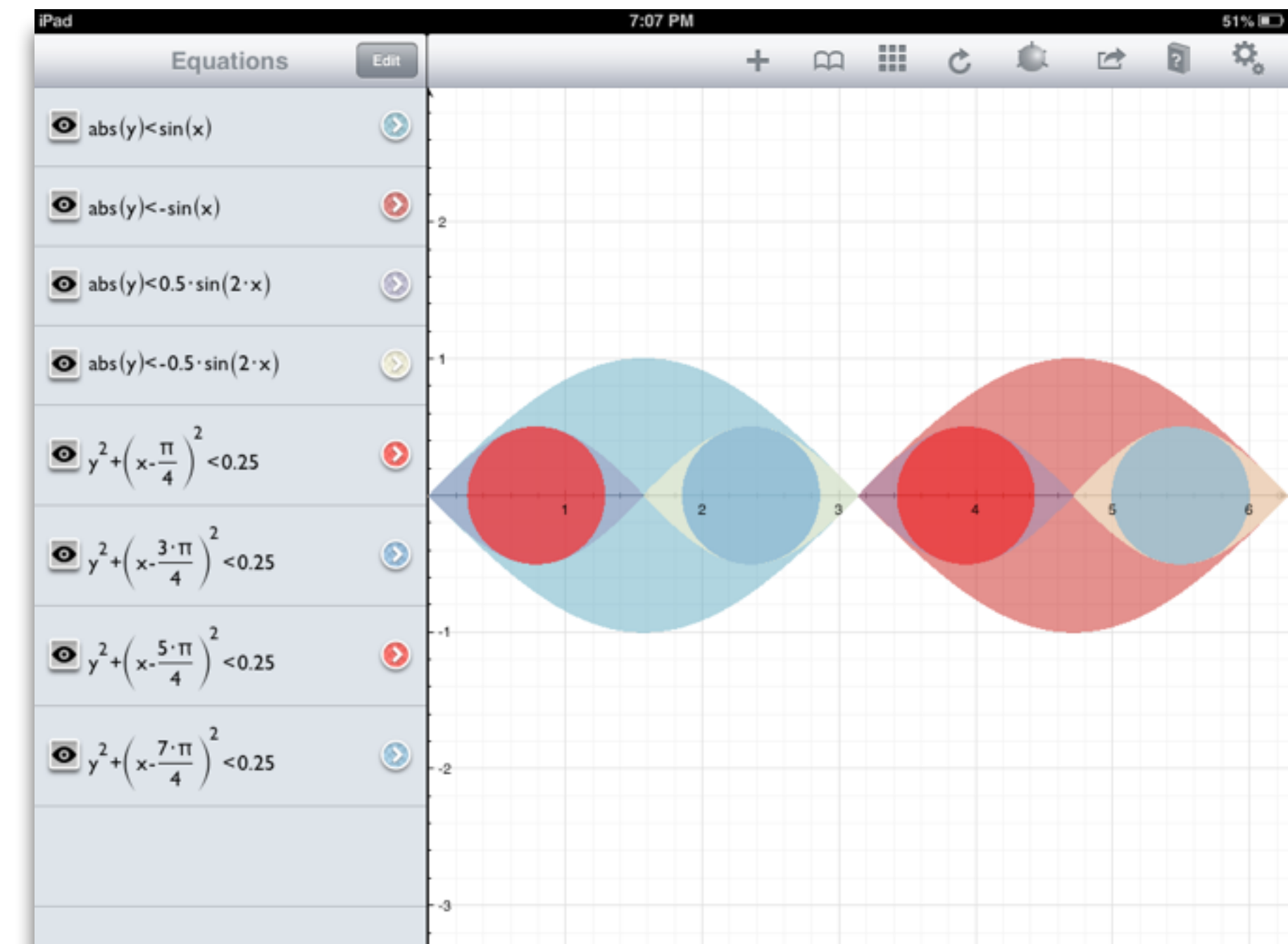
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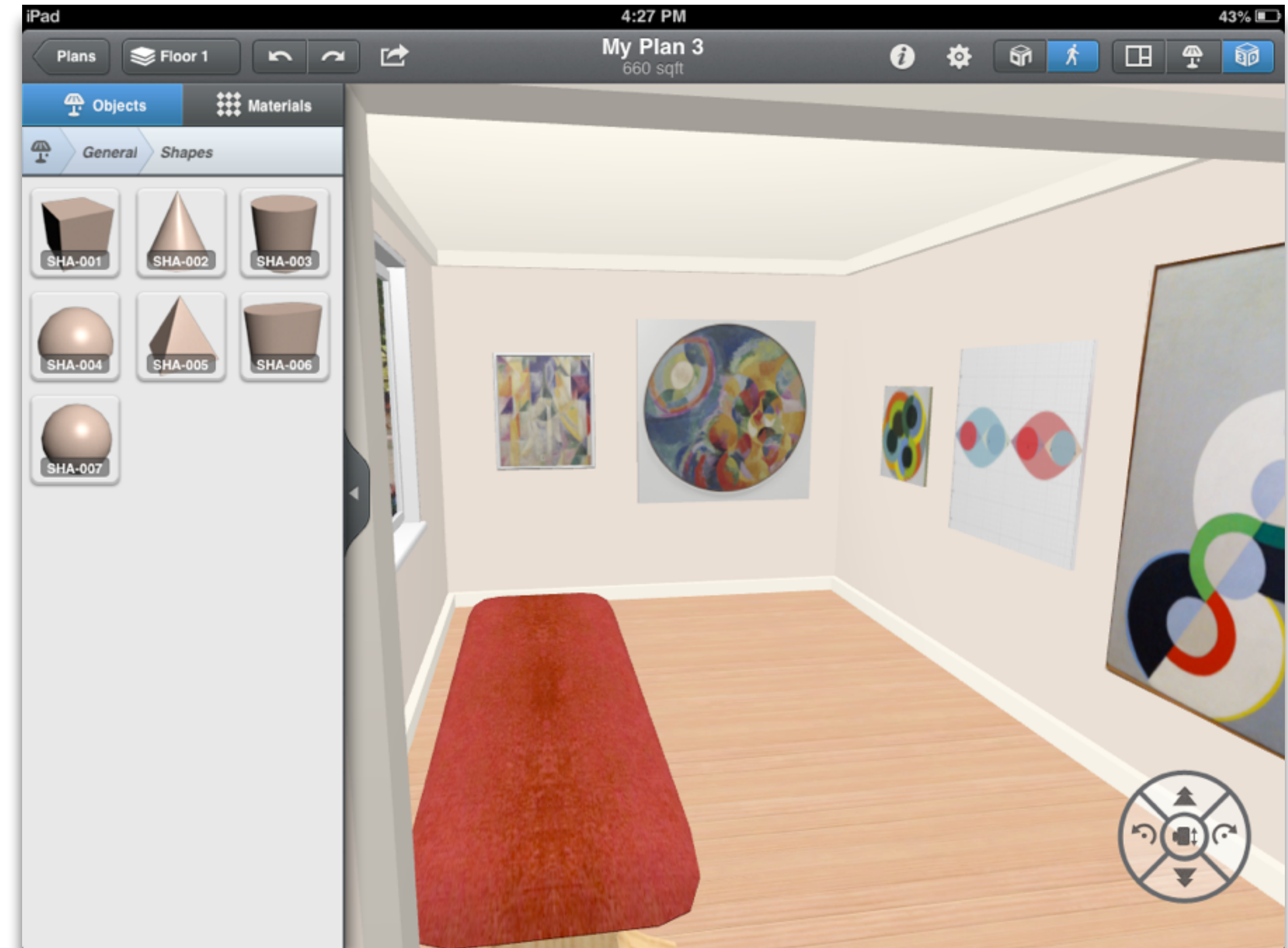
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# Choosing the First SAMR Ladder Project: Three Options

---

- **Your Passion:**

- If you had to pick one topic from your class that best exemplifies why you became fascinated with the subject you teach, what would it be?

- **Barriers to Your Students' Progress:**

- Is there a topic in your class that a significant number of students get stuck on, and fail to progress beyond?

- **What Students Will Do In the Future:**

- Which topic from your class would, if deeply understood, best serve the interests of your students in future studies or in their lives outside school?



# The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking



**Pam A. Mueller<sup>1</sup> and Daniel M. Oppenheimer<sup>2</sup>**

<sup>1</sup>Princeton University and <sup>2</sup>University of California, Los Angeles

## Abstract

Taking notes on laptops rather than in longhand is increasingly common. Many researchers have suggested that laptop note taking is less effective than longhand note taking for learning. Prior studies have primarily focused on students' capacity for multitasking and distraction when using laptops. The present research suggests that even when laptops are used solely to take notes, they may still be impairing learning because their use results in shallower processing. In three studies, we found that students who took notes on laptops performed worse on conceptual questions than students who took notes longhand. We show that whereas taking more notes can be beneficial, laptop note takers' tendency to transcribe lectures verbatim rather than processing information and reframing it in their own words is detrimental to learning.

Psychological Science

1–10

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DOI: 10.1177/0956797614524581

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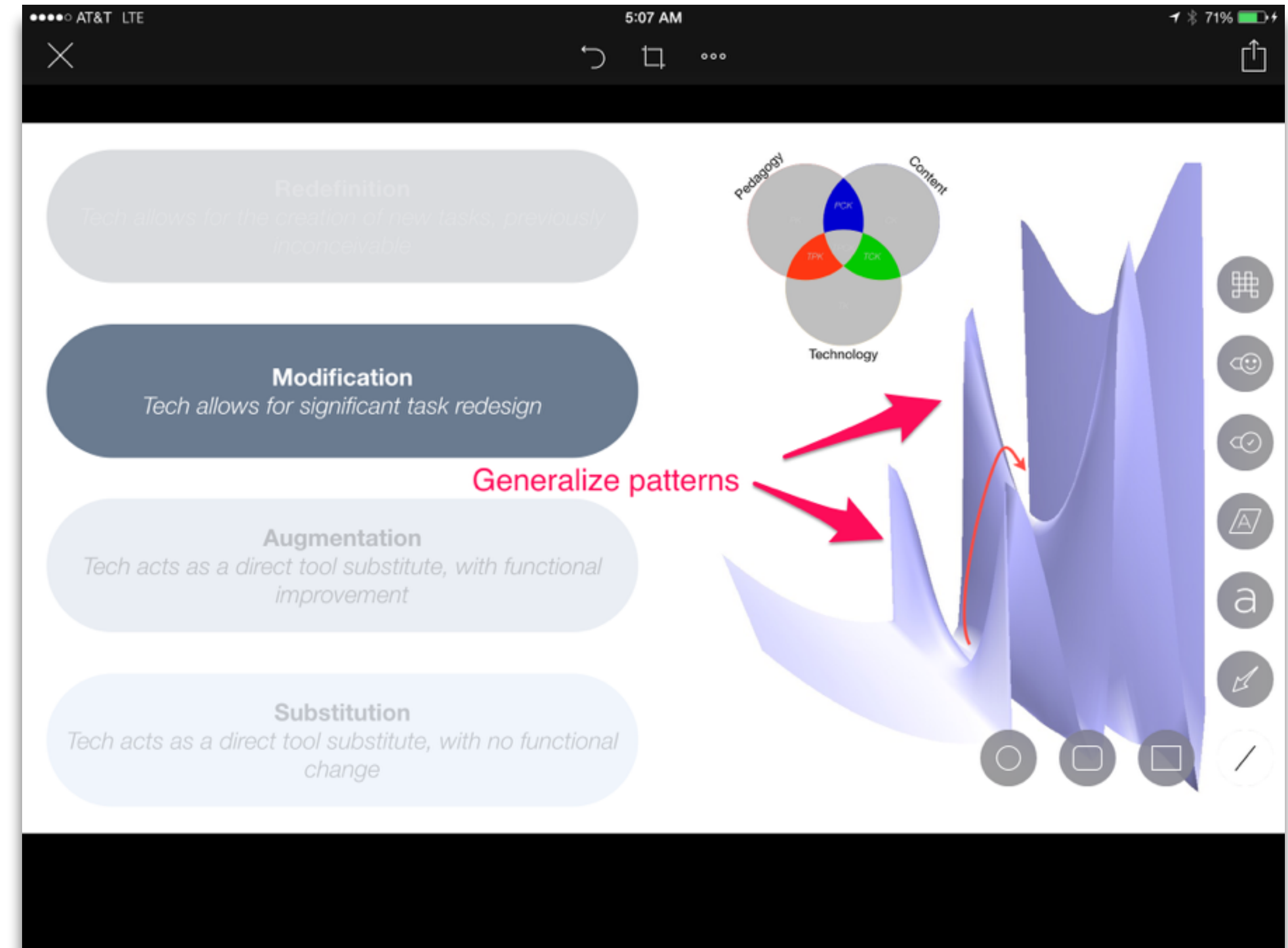
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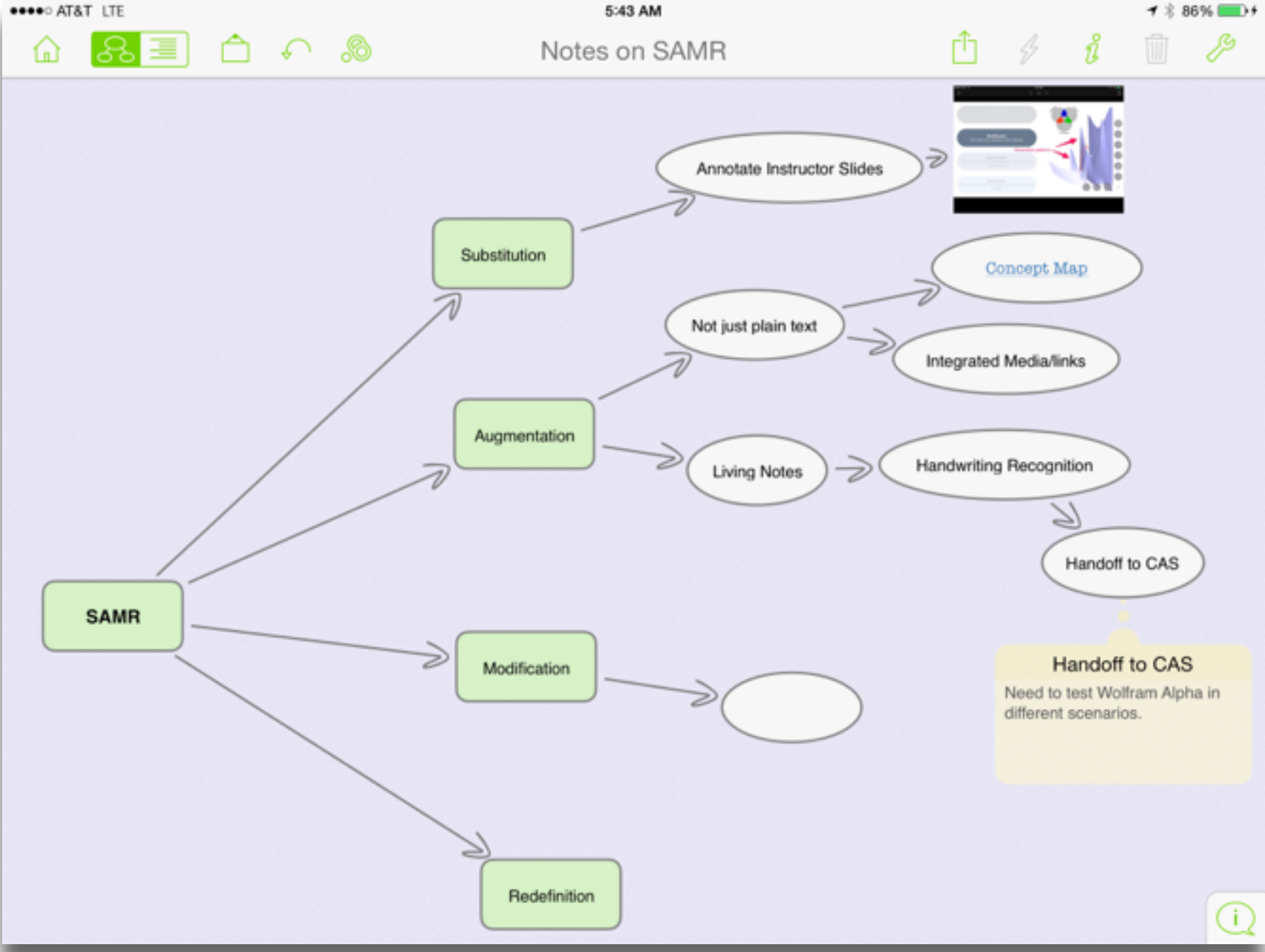


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Thoughts on SAMR  
Jun 20, 2014, 5:45 AM

Substitution: the valley where we were  
Augmentation: the next valley over - could see, not reach

Concept Maps - Google Scholar



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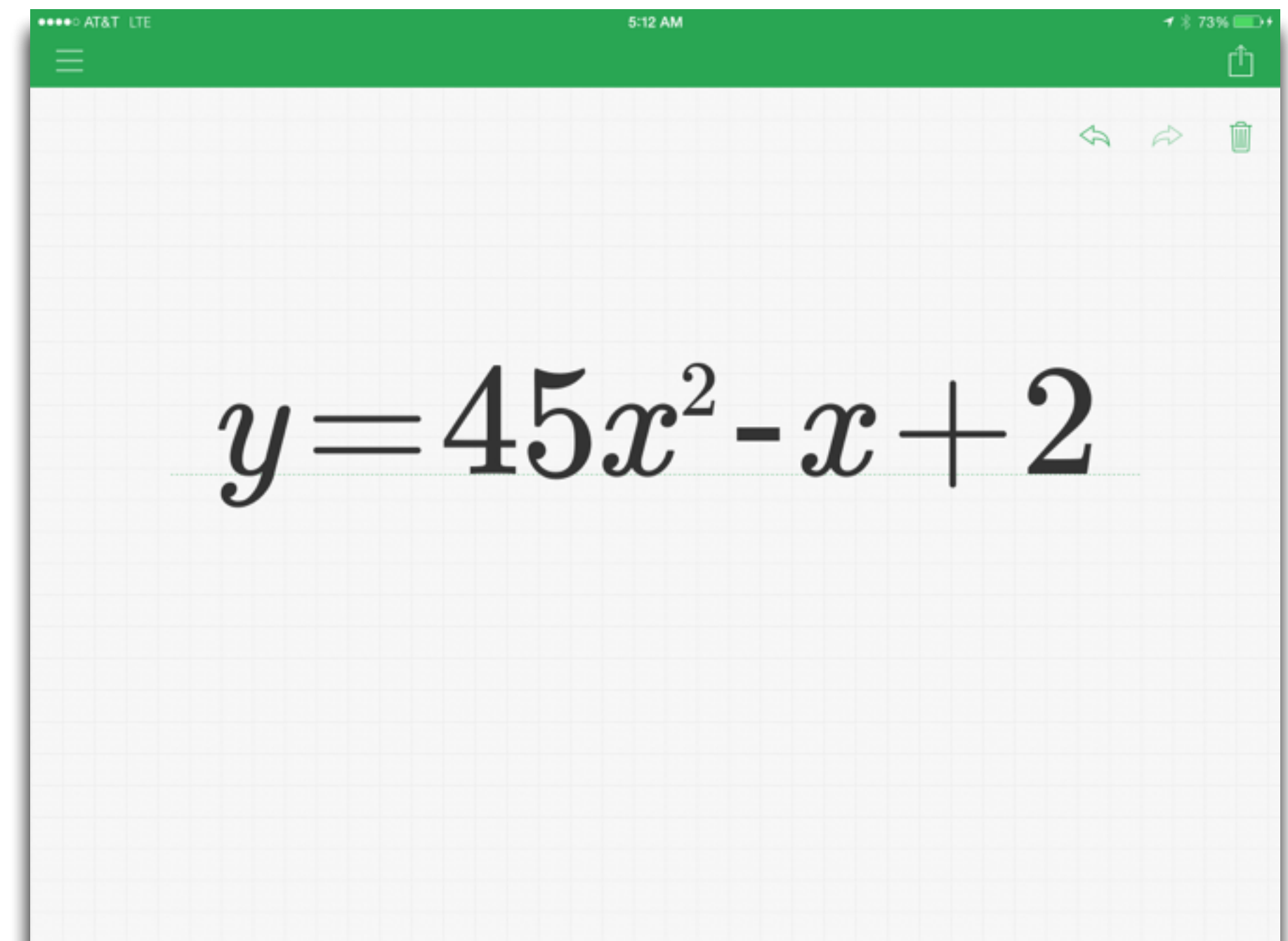
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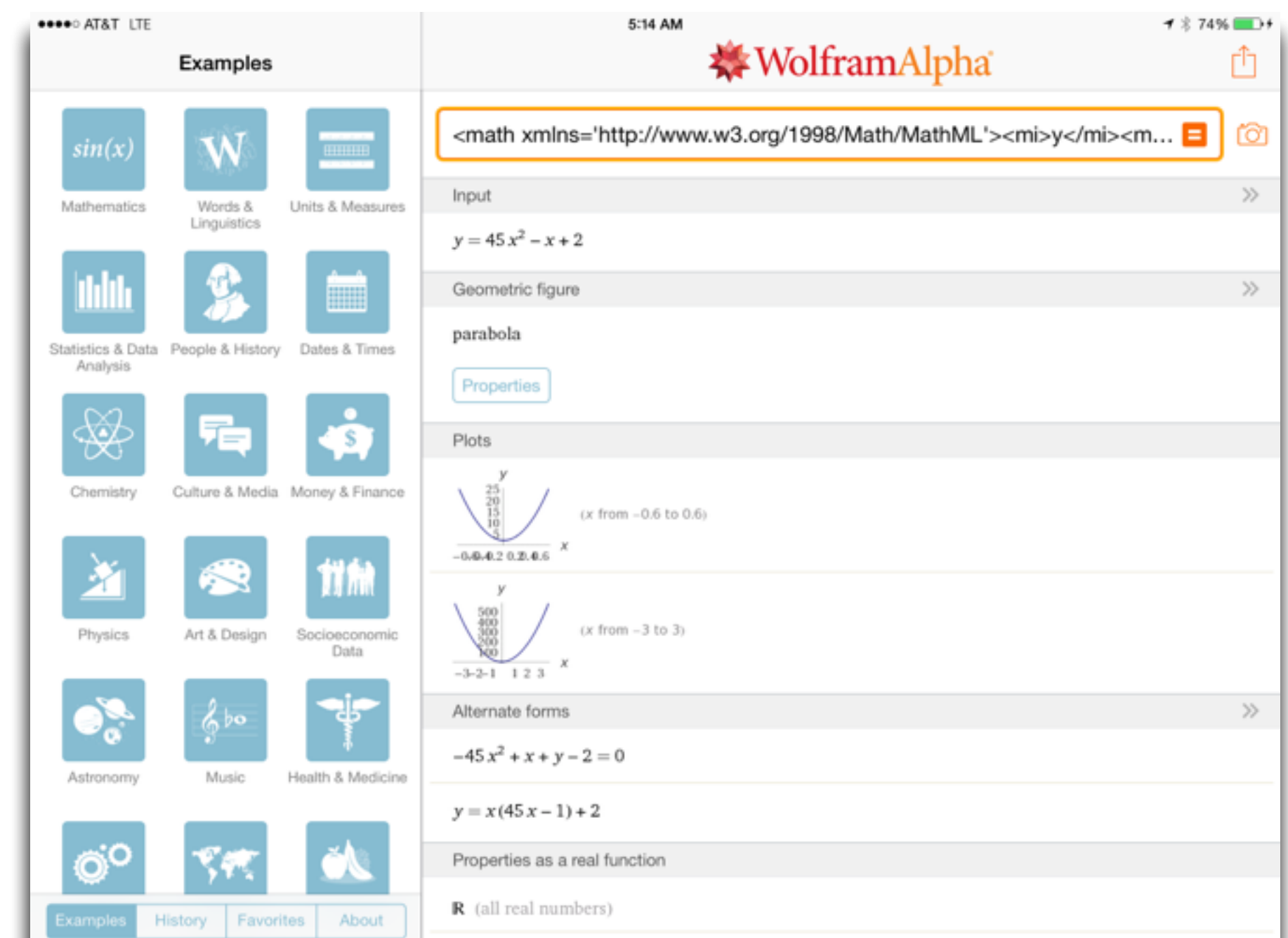
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A screenshot of a mobile application interface with a green header bar. The main area is a light gray grid. In the center, the quadratic equation  $y = 45x^2 - x + 2$  is displayed in a large, black, serif font.





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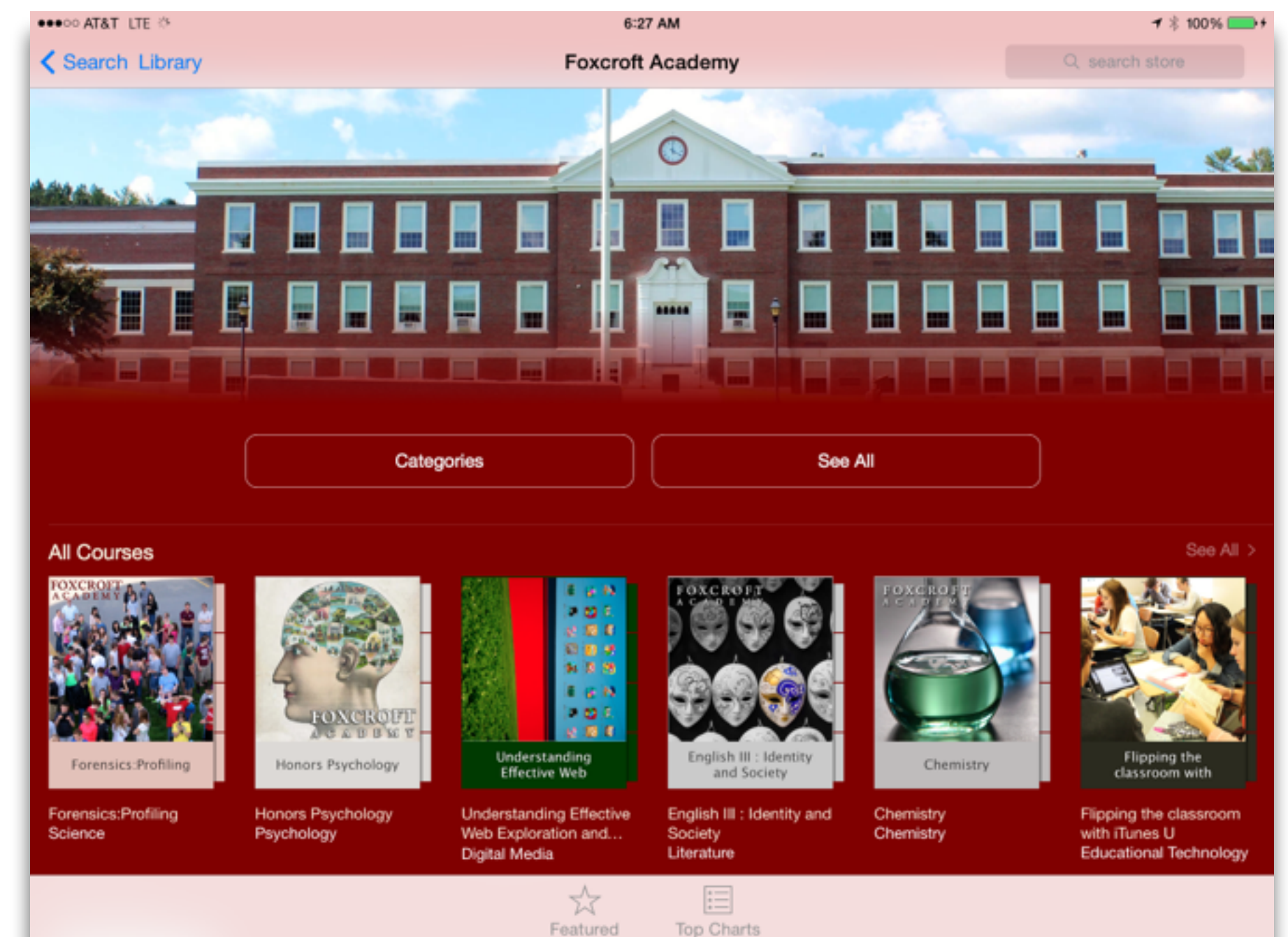
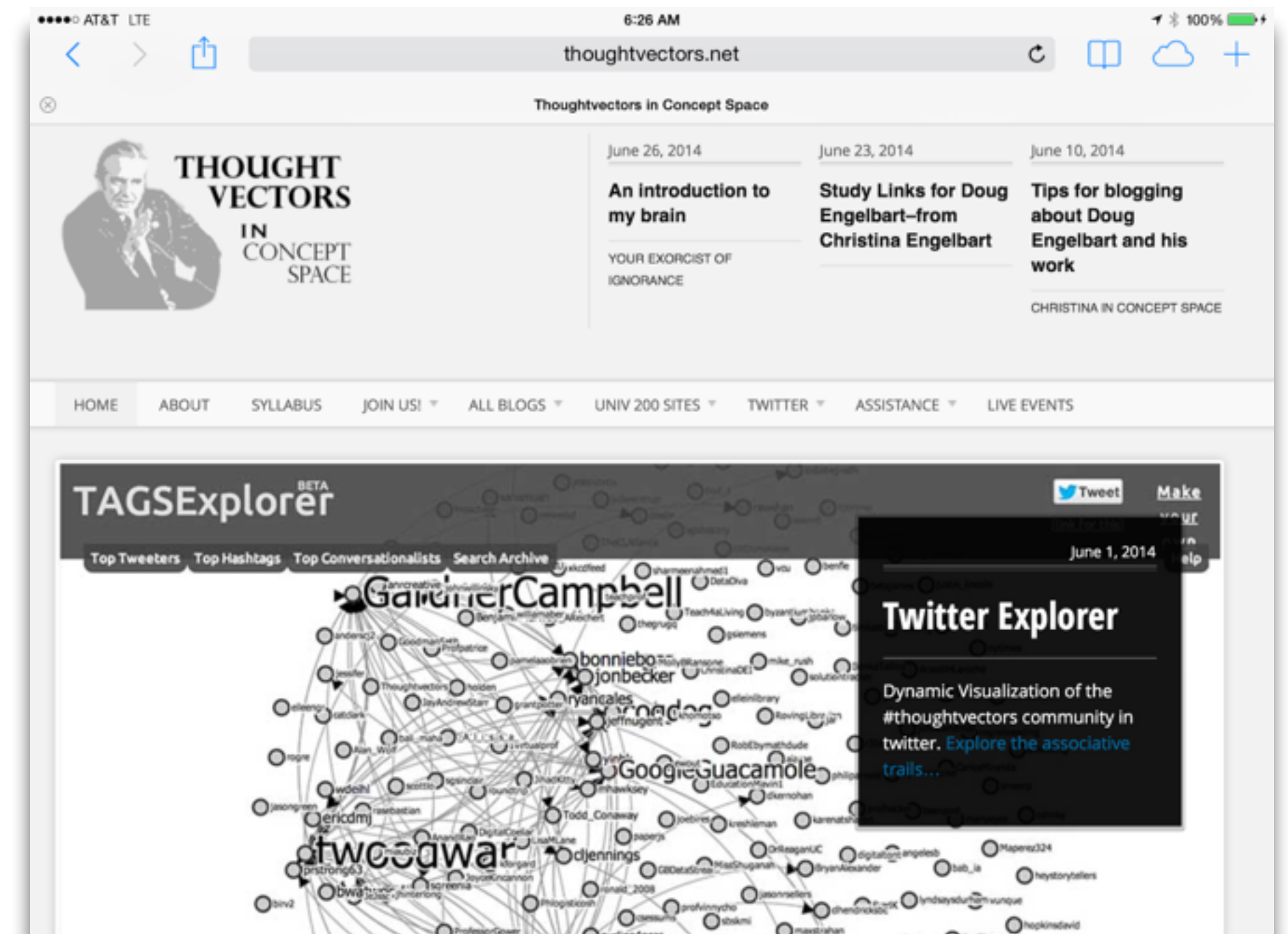
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# Bloom's Taxonomy: Cognitive Processes

Anderson & Krathwohl (2001)	Characteristic Processes	
Remember	<ul style="list-style-type: none"><li>• Recalling memorized knowledge</li><li>• Recognizing correspondences between memorized knowledge and new material</li></ul>	
Understand	<ul style="list-style-type: none"><li>• Paraphrasing materials</li><li>• Exemplifying concepts, principles</li><li>• Classifying items</li><li>• Summarizing materials</li></ul>	<ul style="list-style-type: none"><li>• Extrapolating principles</li><li>• Comparing items</li></ul>
Apply	<ul style="list-style-type: none"><li>• Applying a procedure to a familiar task</li><li>• Using a procedure to solve an unfamiliar, but typed task</li></ul>	
Analyze	<ul style="list-style-type: none"><li>• Distinguishing relevant/irrelevant or important/unimportant portions of material</li><li>• Integrating heterogeneous elements into a structure</li><li>• Attributing intent in materials</li></ul>	
Evaluate	<ul style="list-style-type: none"><li>• Testing for consistency, appropriateness, and effectiveness in principles and procedures</li><li>• Critiquing the consistency, appropriateness, and effectiveness of principles and procedures, basing the critique upon appropriate tests</li></ul>	
Create	<ul style="list-style-type: none"><li>• Generating multiple hypotheses based on given criteria</li><li>• Designing a procedure to accomplish an untyped task</li><li>• Inventing a product to accomplish an untyped task</li></ul>	



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**Create**

**Evaluate**

**Analyze**

**Apply**

**Understand**

**Remember**



## Redefinition

*Tech allows for the creation of new tasks, previously inconceivable*

## Modification

*Tech allows for significant task redesign*

## Augmentation

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## Substitution

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# Understand

# Remember

1:15 PM 85%

### Aquatic Biomes

Aquatic biomes cover 75 percent of the surface of the Earth. The aquatic and terrestrial biomes are similar in some ways. In both, the ability of organisms to survive is determined by the availability of food and the physical environment. On land, organisms are often confined to a specific area, such as a forest or tundra. In aquatic environments, organisms are more common for organisms to be confined to one of the two environments.

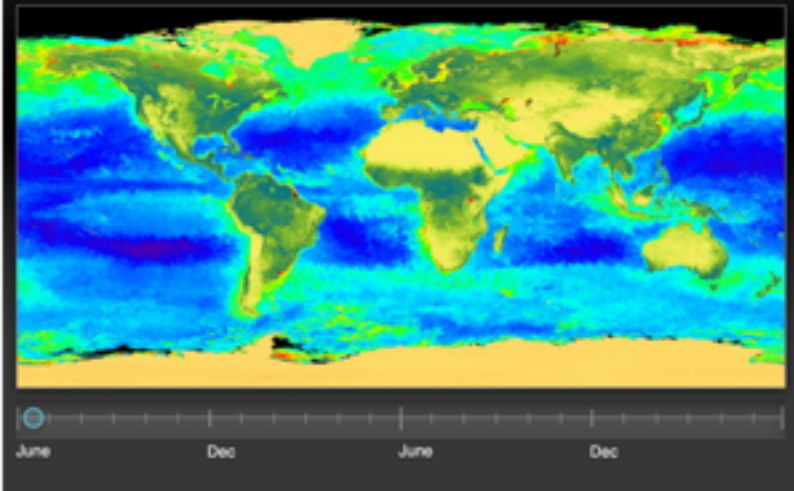
**bi•ome** | 'bī, ōm |  
noun Ecology  
a large naturally occurring community of flora and fauna occupying a major habitat, e.g., forest or tundra.  
ORIGIN early 20th cent.: from **BIO-** 'life' + **-OME**

Search Web Search Wikipedia

Some aquatic organisms are adapted to both conditions for parts of their lives, such as salmon and some eels, but it is more common for organisms to be confined to one of the two environments.

Aquatic environments have less variation globally than those on land. Taking a broad view (the lumpers' perspective), there are four kinds of aquatic biomes: surface waters, deep waters, shores, and bottoms. Within these categories are a variety of distinctive marine and freshwater life zones that are frequently designated as separate biomes.

#### Worldwide Photosynthetic Activity



Interactive The latitudes of peak photosynthesis change with the seasons.

31

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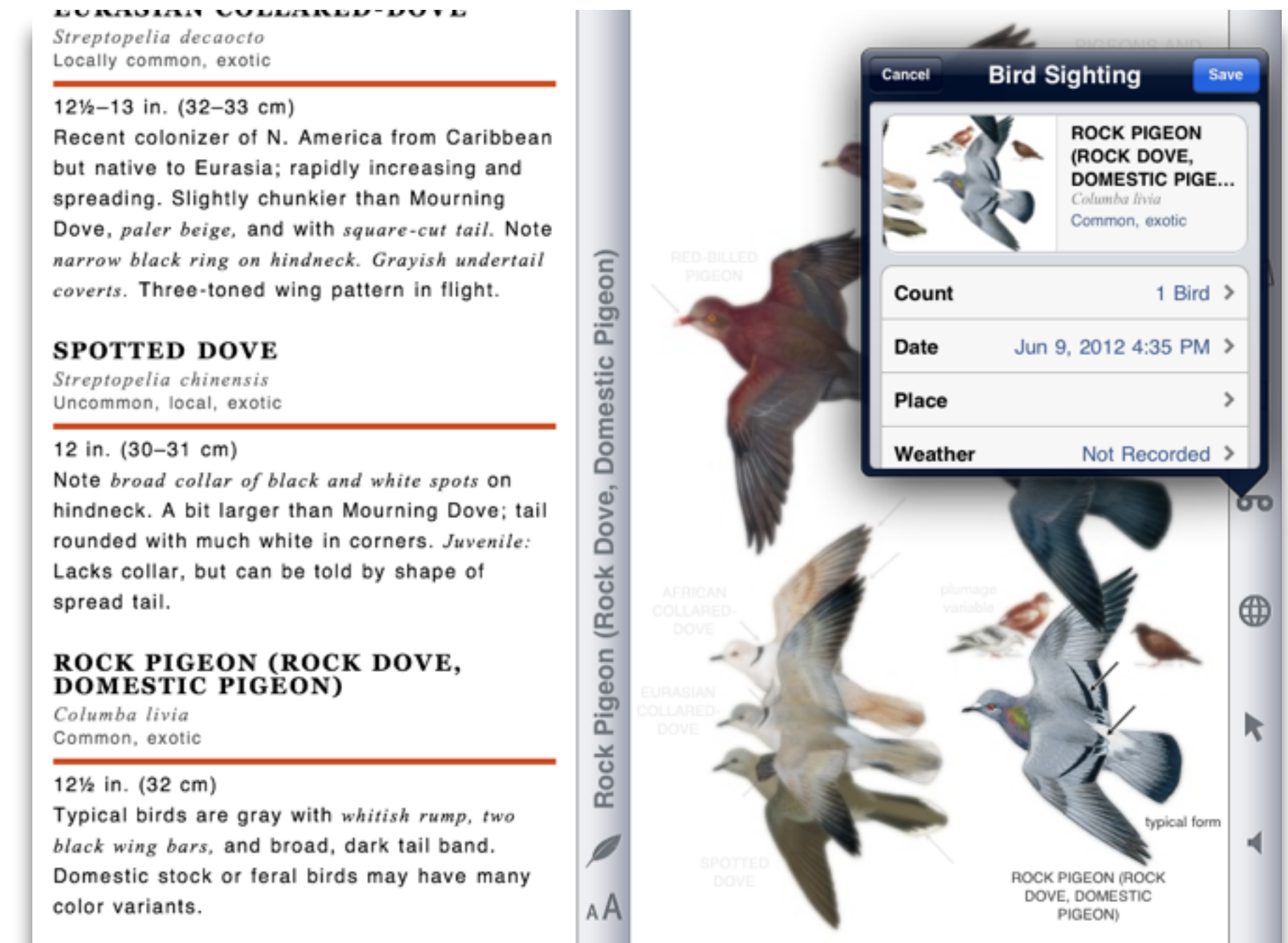
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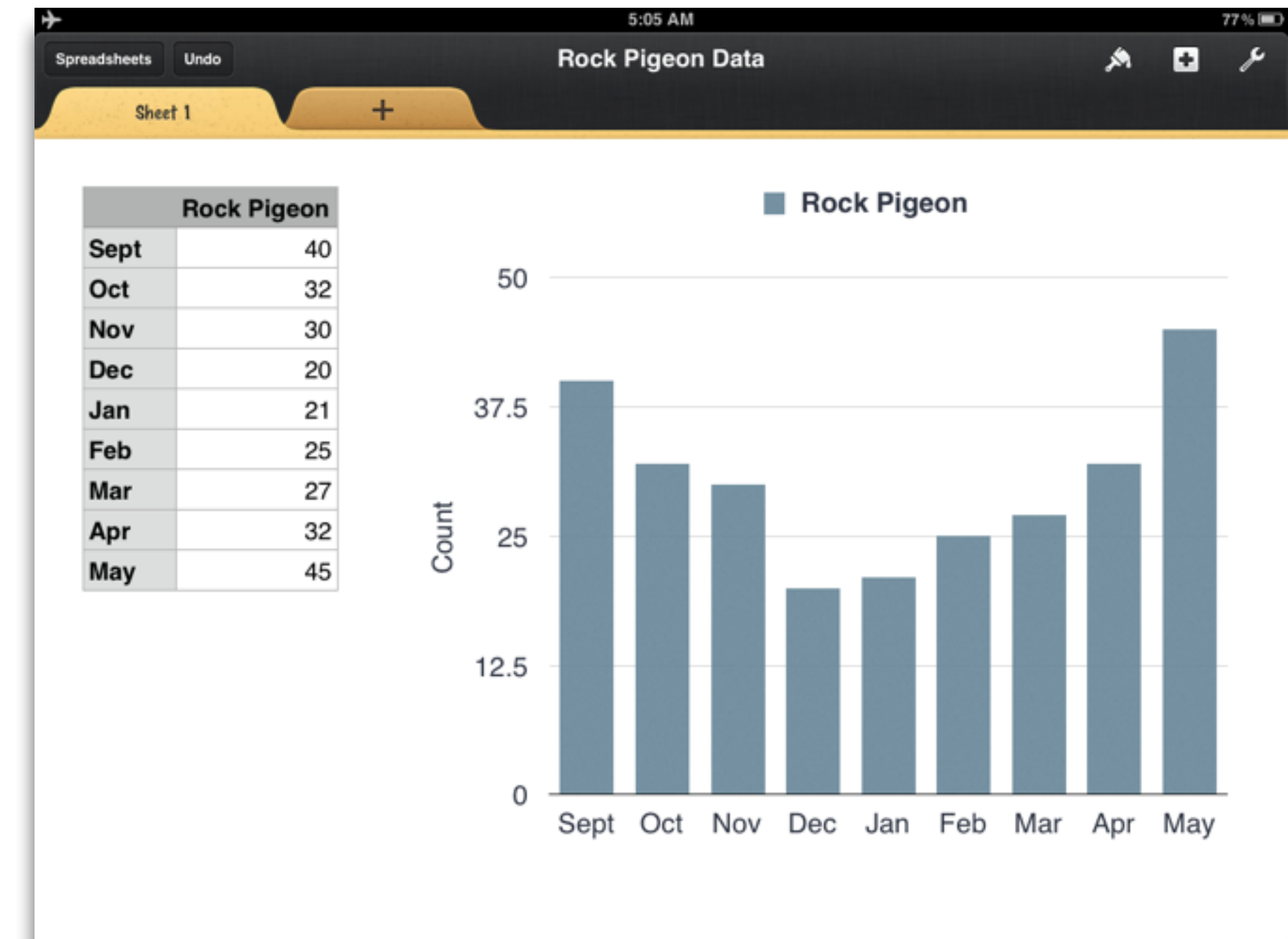
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# Create

# Evaluate





# Hippasus

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