SAMR: Paths to Growth

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

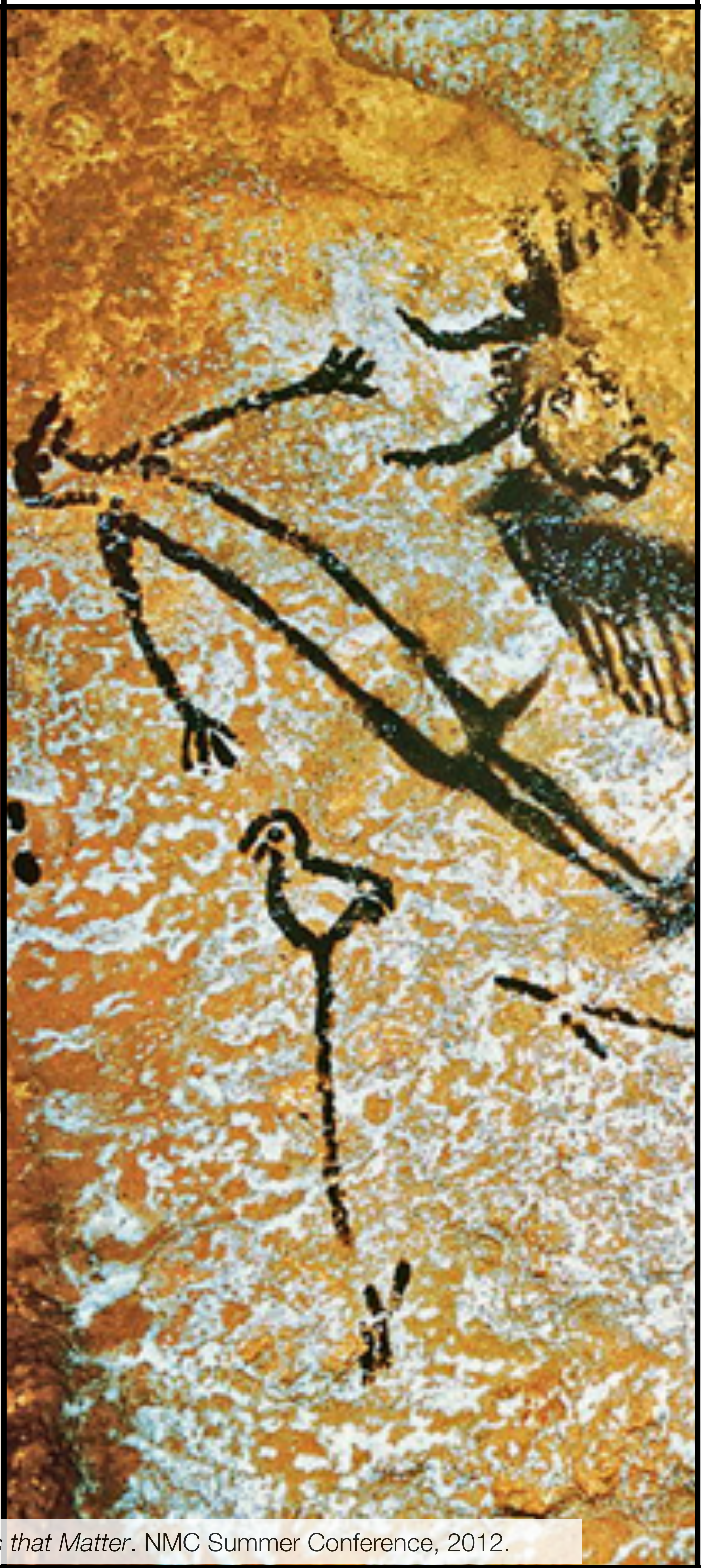
Tech acts as a direct tool substitute, with functional improvement

Substitution

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

Enhancement

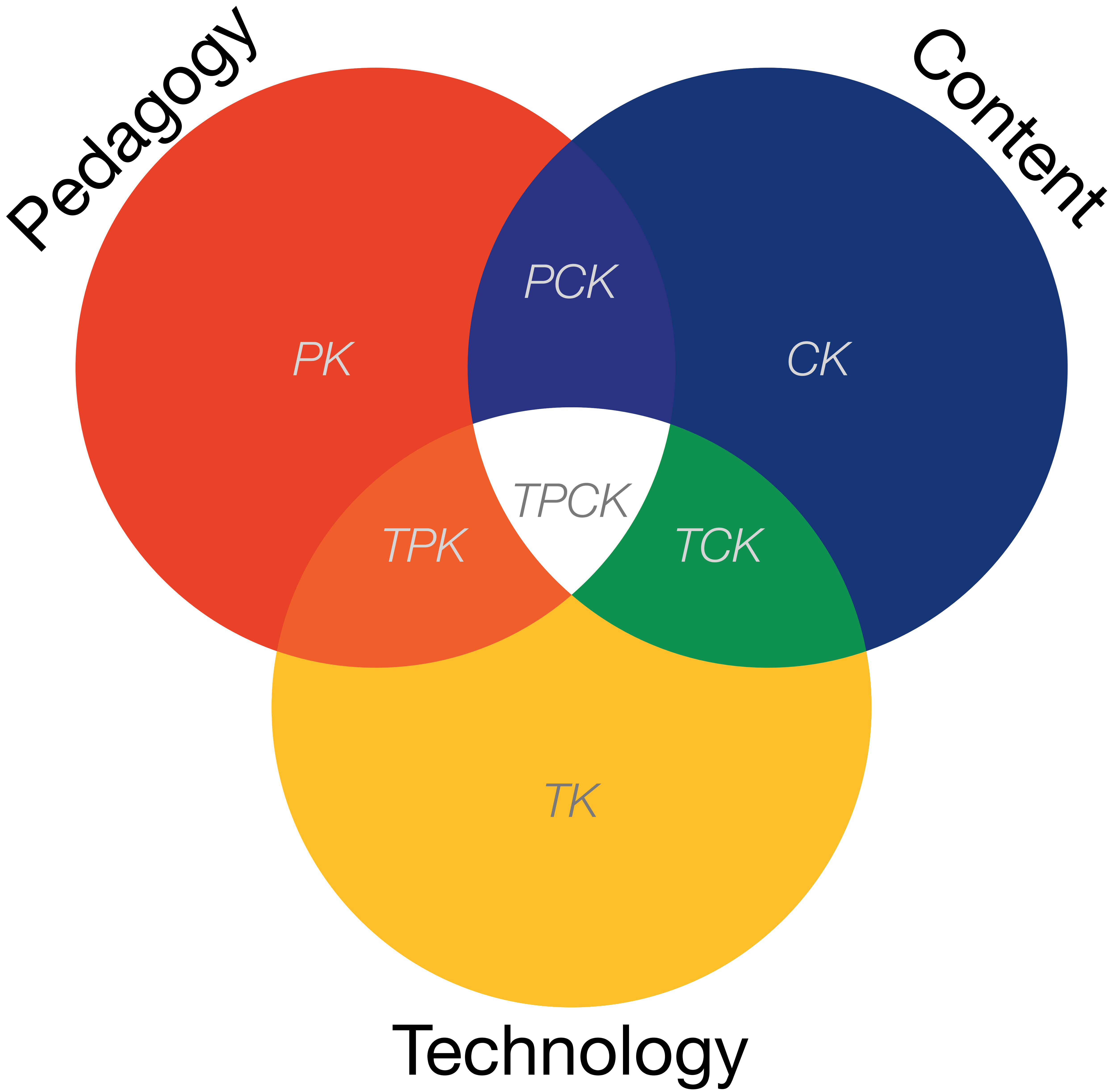
Ruben R. Puentedura, *As We May Teach: Educational Technology, From Theory Into Practice*. (2009)

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

Ruben R. Puentedura, “Technology In Education: The First 200,000 Years” *The NMC Perspective Series: Ideas that Matter*. NMC Summer Conference, 2012.

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


Pedagogy
Content
PCK
PK
CK
TPCK
TPK
TCK
TK
Technology

Punya Mishra & Matthew J. Koehler, “Technological pedagogical content knowledge: A framework for teacher knowledge”. *Teachers College Record, 108*(6). (2006)

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?

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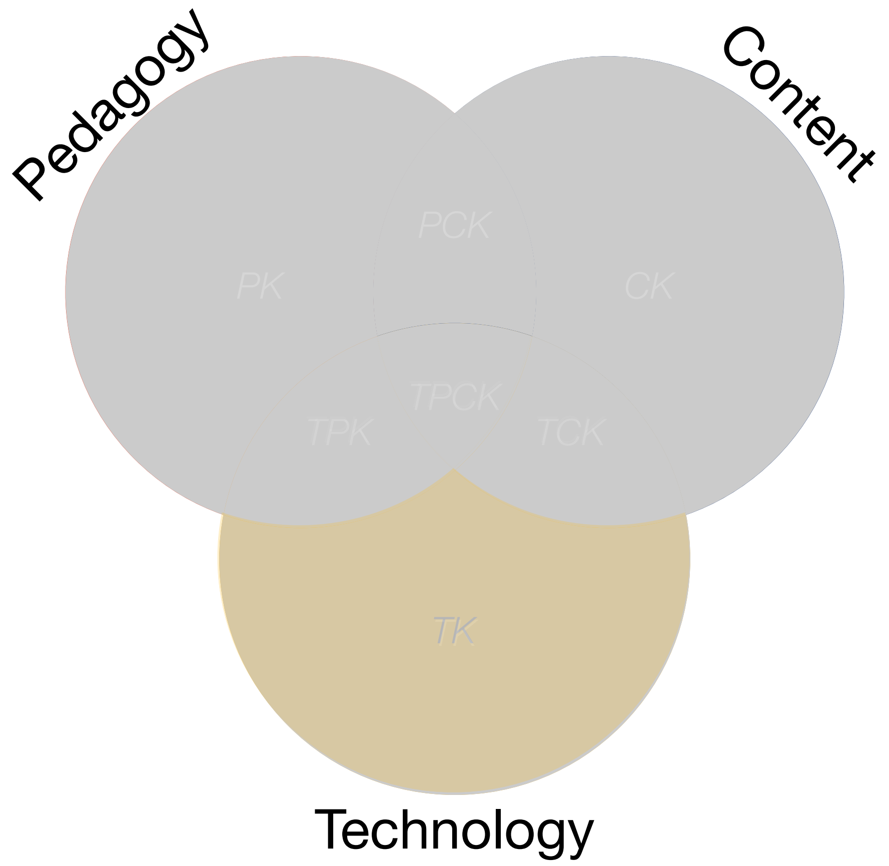

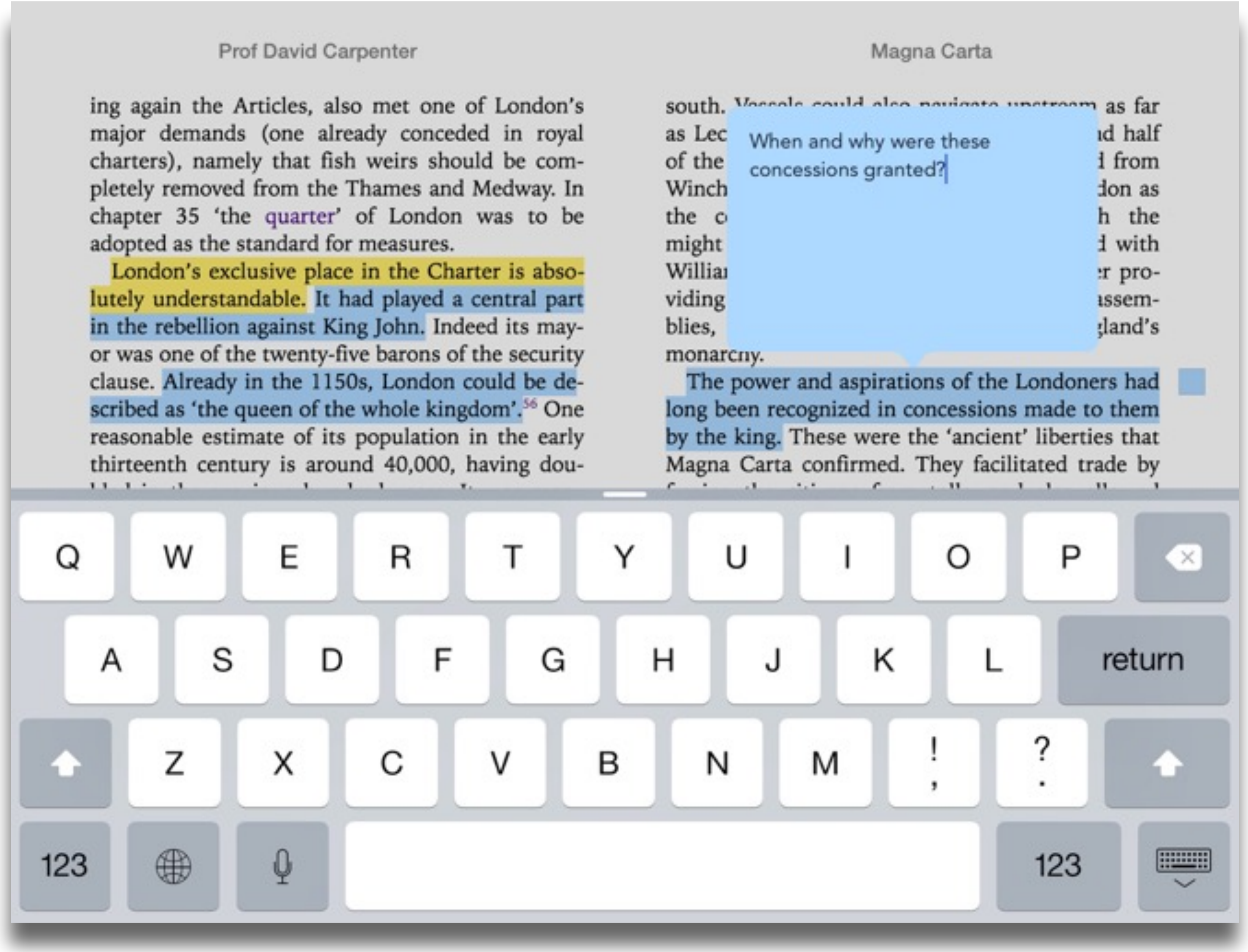
Prof David Carpenter

ing again the Articles, also met one of London's major demands (one already conceded in royal charters), namely that fish weirs should be completely removed from the Thames and Medway. In chapter 35 'the quarter' of London was to be adopted as the standard for measures.

London's exclusive place in the Charter is absolutely understandable. It had played a central part in the rebellion against King John. Indeed its mayor was one of the twenty-five barons of the security clause. Already in the 1150s, London could be described as 'the queen of the whole kingdom'.[56] One reasonable estimate of its population in the early thirteenth century is around 40,000, having dou-

Magna Carta

south. … as far
as Lec … ıd half
of the … from
Winch … don as
the c … h the
might … with
Willia … r pro-
viding … assem-
blies, … gland's
monarchy.

The power and aspirations of the Londoners had long been recognized in concessions made to them by the king. These were the 'ancient' liberties that Magna Carta confirmed. They facilitated trade by

When and why were these concessions granted?

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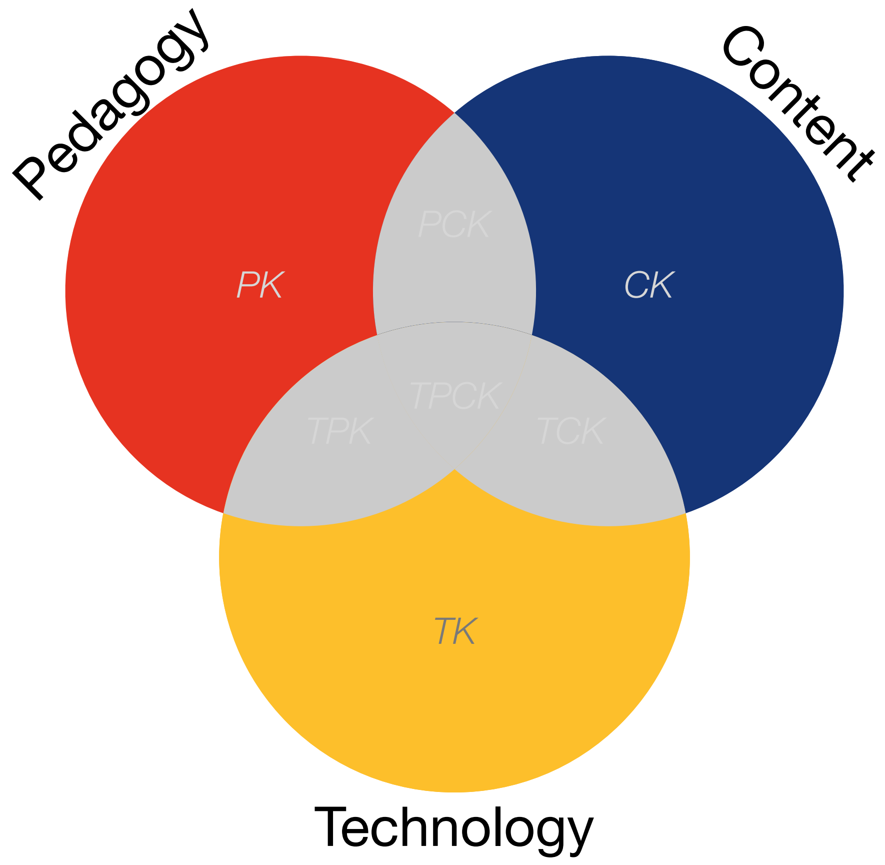
Pedagogy
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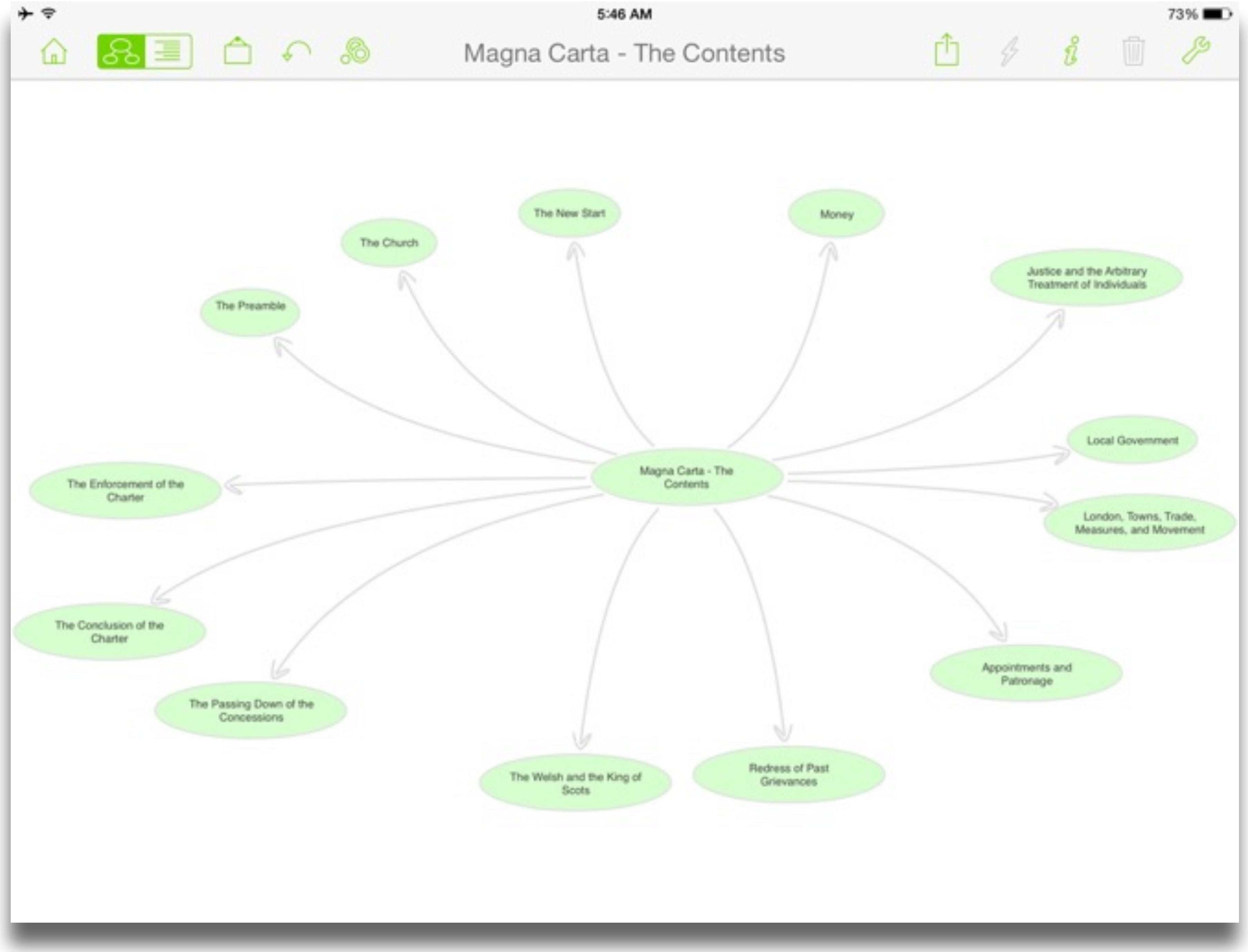
Technology


5:46 AM
73%
Magna Carta - The Contents
The New Start
Money
The Church
Justice and the Arbitrary Treatment of Individuals
The Preamble
Local Government
The Enforcement of the Charter
Magna Carta - The Contents
London, Towns, Trade, Measures, and Movement
The Conclusion of the Charter
Appointments and Patronage
The Passing Down of the Concessions
The Welsh and the King of Scots
Redress of Past Grievances

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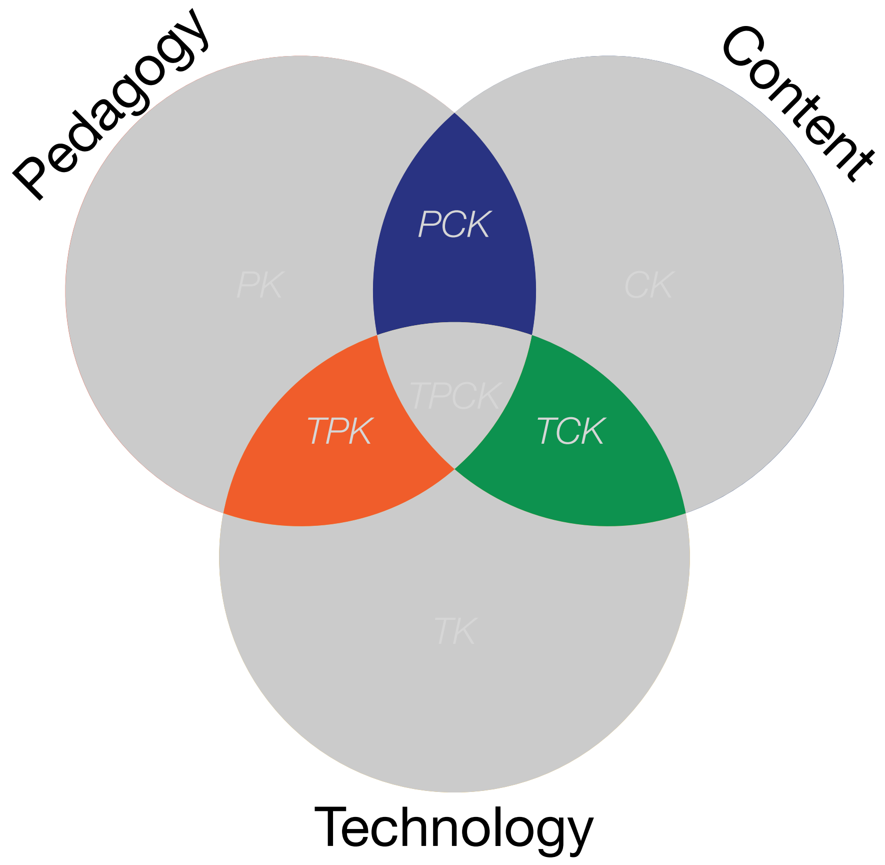
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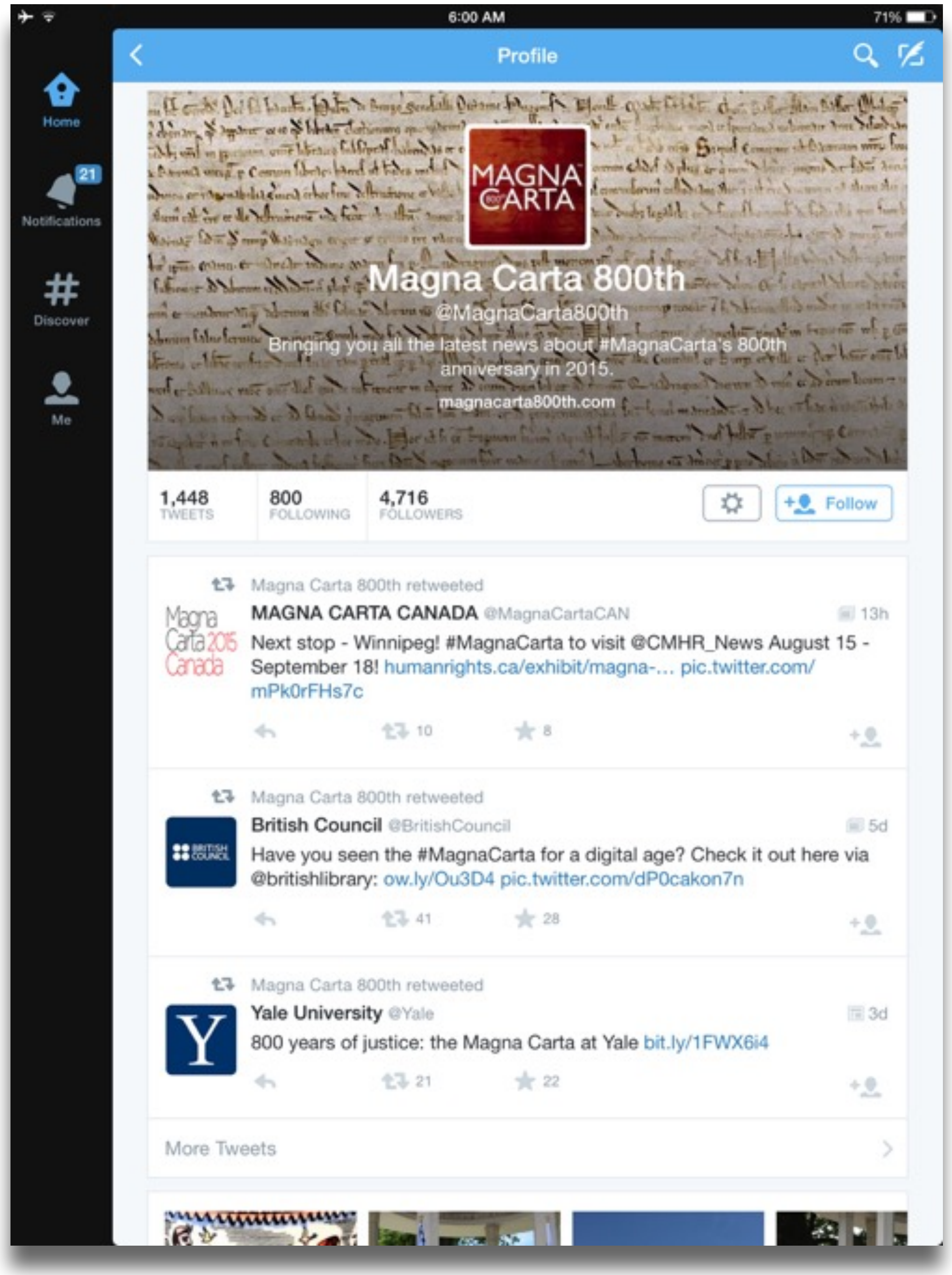
6:00 AM
71%
Profile
Home
21
Notifications
Discover
Me
MAGNA CARTA
Follow

Magna Carta 800th
@MagnaCarta800th
Bringing you all the latest news about #MagnaCarta's 800th anniversary in 2015.
magnacarta800th.com

1,448 TWEETS
800 FOLLOWING
4,716 FOLLOWERS

Magna Carta 800th retweeted
MAGNA CARTA CANADA @MagnaCartaCAN 13h
Next stop - Winnipeg! #MagnaCarta to visit @CMHR_News August 15 - September 18! humanrights.ca/exhibit/magna-... pic.twitter.com/mPk0rFHs7c
10 8

Magna Carta 800th retweeted
British Council @BritishCouncil 5d
Have you seen the #MagnaCarta for a digital age? Check it out here via @britishlibrary: ow.ly/Ou3D4 pic.twitter.com/dP0cakon7n
41 28

Magna Carta 800th retweeted
Yale University @Yale 3d
800 years of justice: the Magna Carta at Yale bit.ly/1FWX6i4
21 22

More Tweets

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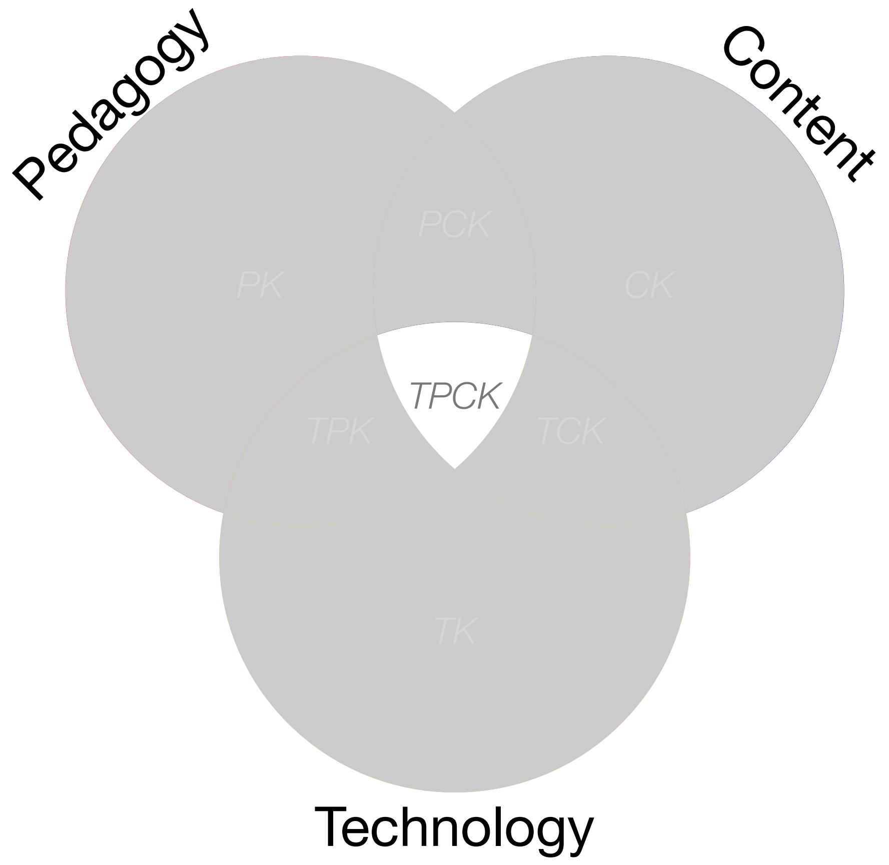
Pedagogy
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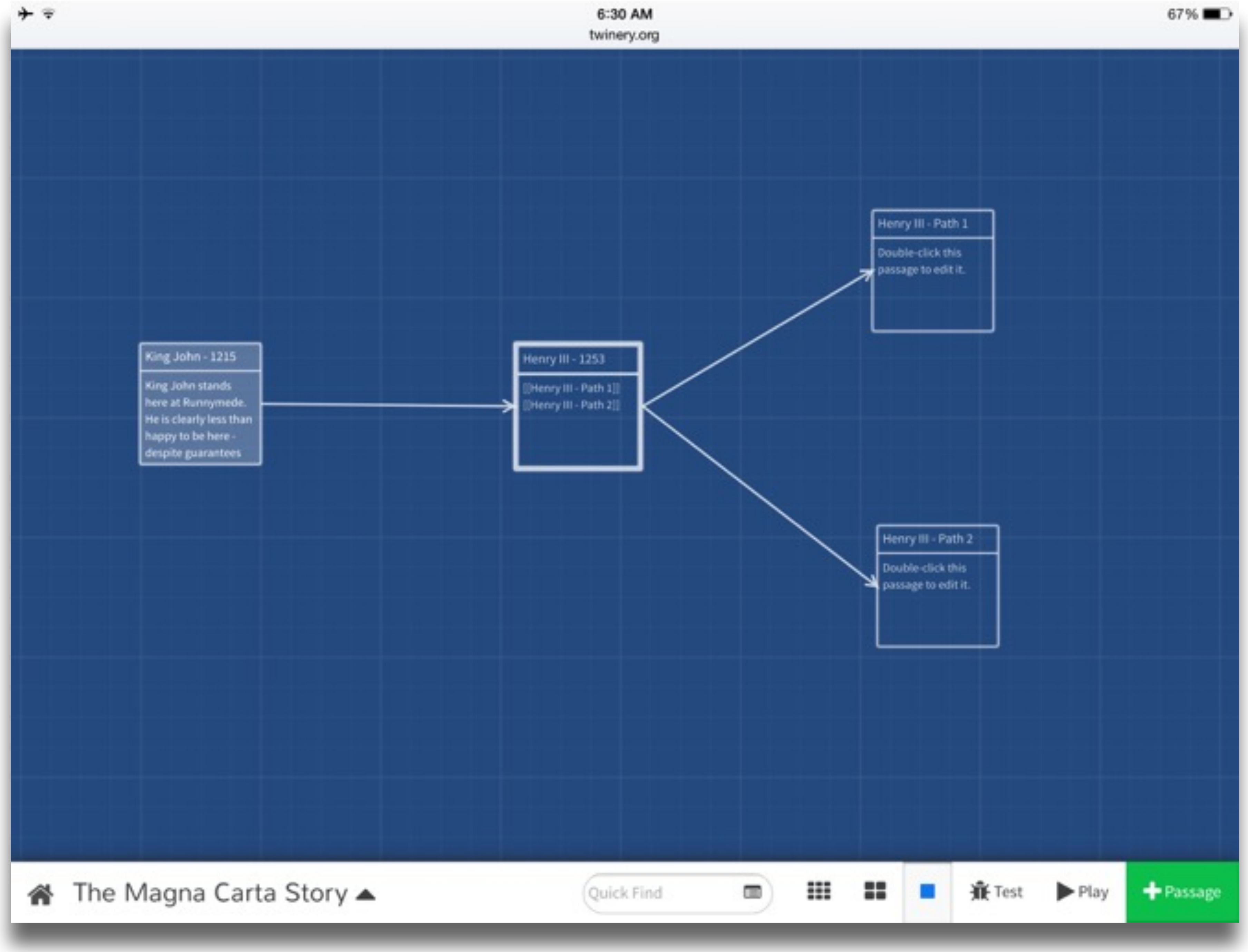

6:30 AM
twinery.org
67%
King John - 1215
Henry III - 1253
Henry III - Path 1
Henry III - Path 2
The Magna Carta Story
Quick Find
Test
Play
Passage

King John stands here at Runnymede. He is clearly less than happy to be here - despite guarantees

[[Henry III - Path 1]]
[[Henry III - Path 2]]

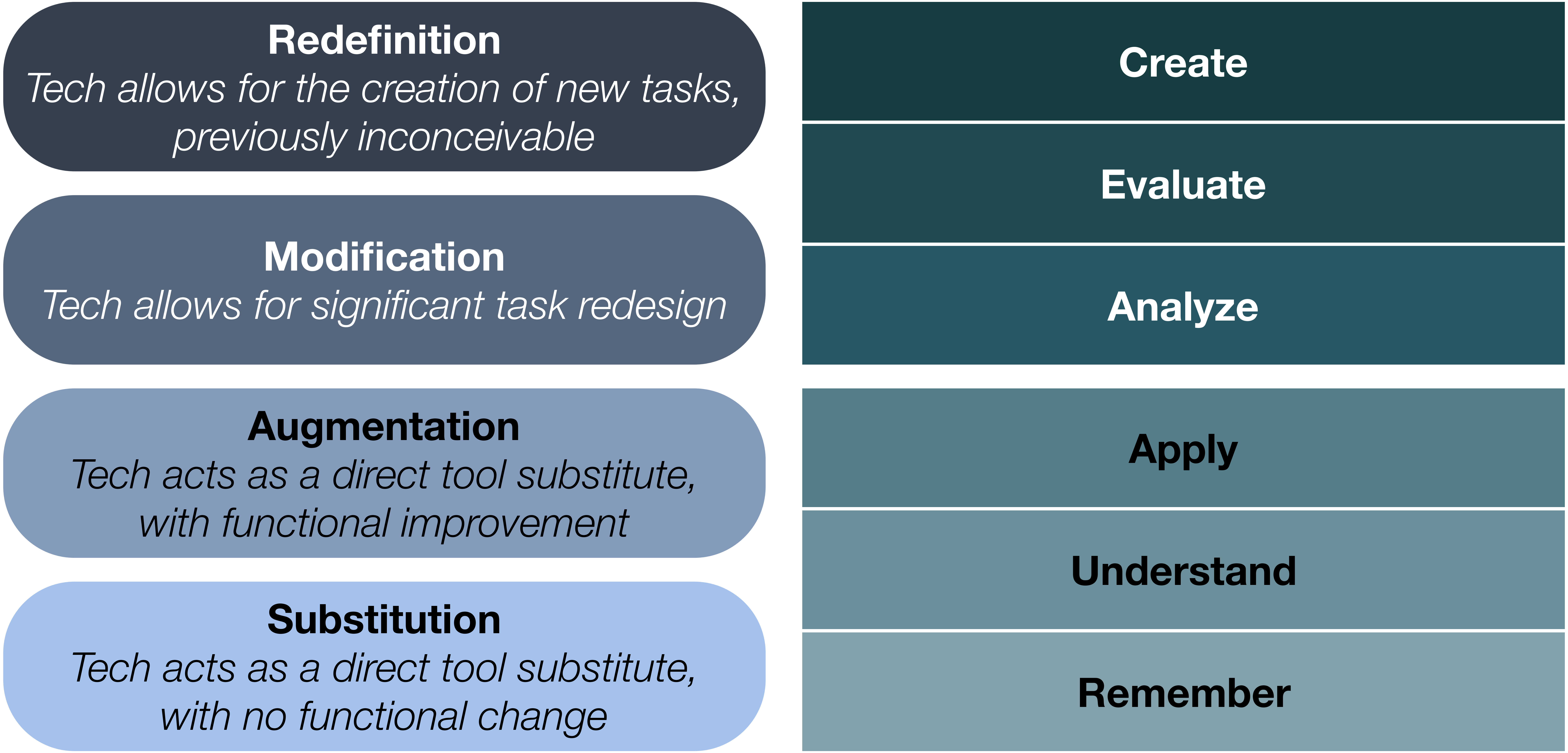
Double-click this passage to edit it.

Double-click this passage to edit it.

Bloom's Taxonomy: Cognitive Processes

Anderson & Krathwohl (2001)	**Characteristic Processes**	
Remember	• Recalling memorized knowledge • Recognizing correspondences between memorized knowledge and new material	
Understand	• Paraphrasing materials • Exemplifying concepts, principles • Classifying items • Summarizing materials	• Extrapolating principles • Comparing items
Apply	• Applying a procedure to a familiar task • Using a procedure to solve an unfamiliar, but typed task	
Analyze	• Distinguishing relevant/irrelevant or important/unimportant portions of material • Integrating heterogeneous elements into a structure • Attributing intent in materials	
Evaluate	• Testing for consistency, appropriateness, and effectiveness in principles and procedures • Critiquing the consistency, appropriateness, and effectiveness of principles and procedures, basing the critique upon appropriate tests	
Create	• Generating multiple hypotheses based on given criteria • Designing a procedure to accomplish an untyped task • Inventing a product to accomplish an untyped task	

Lorin W. Anderson and David R. Krathwohl (Eds.), *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives, Complete Edition*. Longman. (2000)



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Create

Evaluate

Analyze

Apply

Understand

Remember

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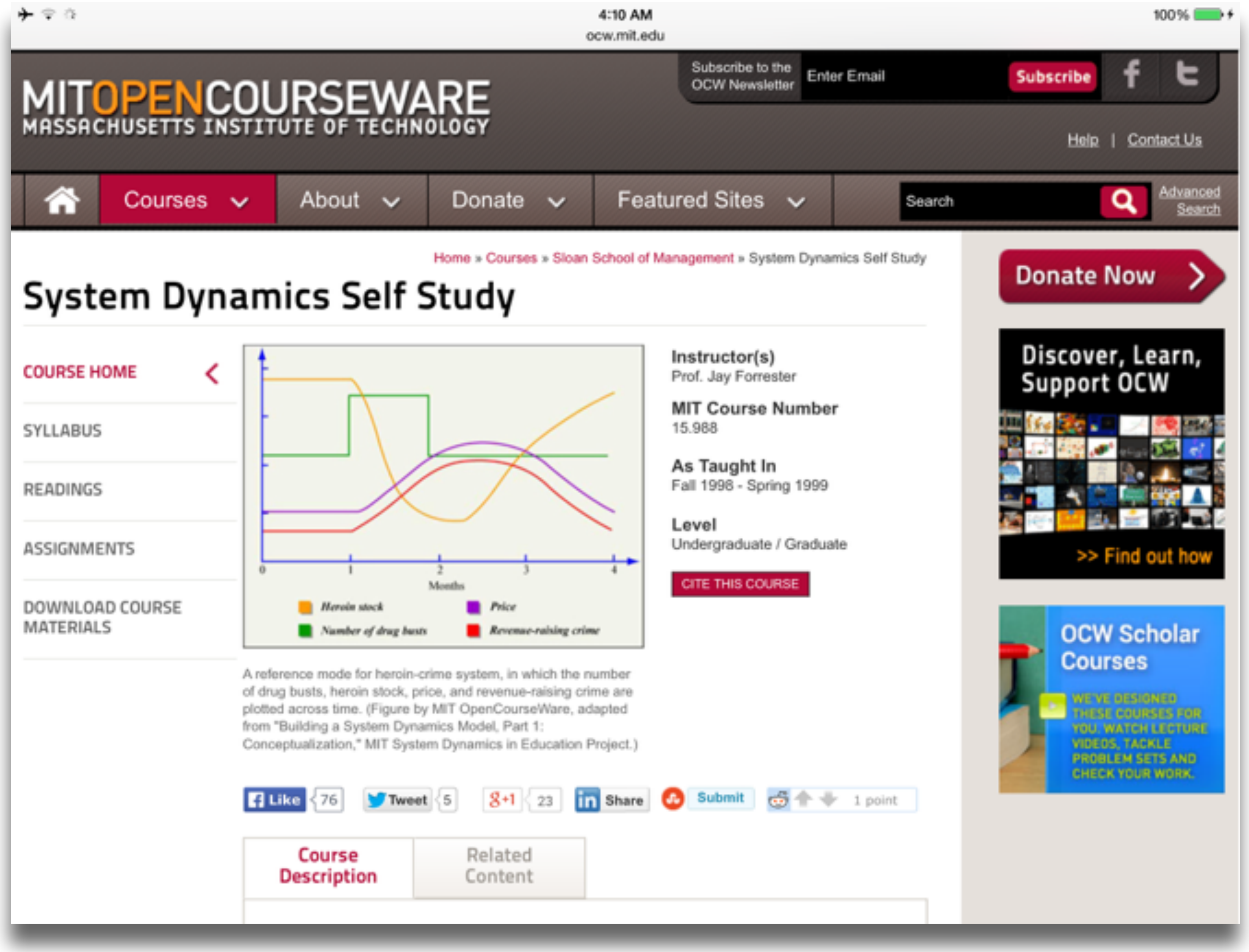
Understand

Remember


4:10 AM
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Enter Email
Subscribe
Help | Contact Us
Courses
About
Donate
Featured Sites
Search
Advanced Search

Home » Courses » Sloan School of Management » System Dynamics Self Study

System Dynamics Self Study

COURSE HOME
SYLLABUS
READINGS
ASSIGNMENTS
DOWNLOAD COURSE MATERIALS
0
1
2
3
4
Months
Heroin stock
Price
Number of drug busts
Revenue-raising crime

A reference mode for heroin-crime system, in which the number of drug busts, heroin stock, price, and revenue-raising crime are plotted across time. (Figure by MIT OpenCourseWare, adapted from "Building a System Dynamics Model, Part 1: Conceptualization," MIT System Dynamics in Education Project.)

Instructor(s)
Prof. Jay Forrester

MIT Course Number
15.988

As Taught In
Fall 1998 - Spring 1999

Level
Undergraduate / Graduate

CITE THIS COURSE
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Tweet 5
+1 23
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1 point
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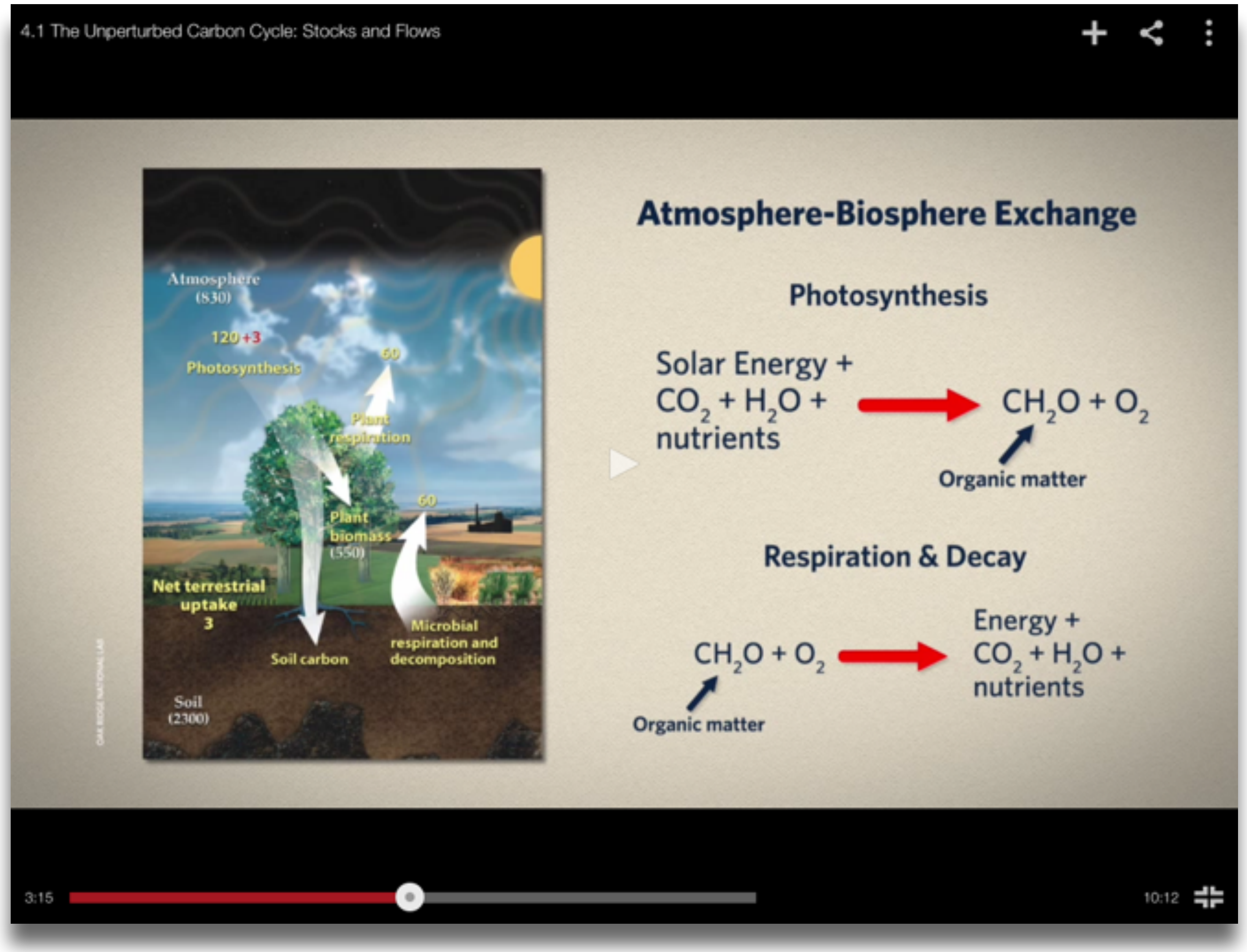
OCW Scholar Courses
WE'VE DESIGNED THESE COURSES FOR YOU. WATCH LECTURE VIDEOS, TACKLE PROBLEM SETS AND CHECK YOUR WORK.


4.1 The Unperturbed Carbon Cycle: Stocks and Flows

Atmosphere
(830)
120 +3
Photosynthesis
60
Plant respiration
Plant biomass
(550)
60
Net terrestrial uptake
3
Soil carbon
Microbial respiration and decomposition
Soil
(2300)
OAK RIDGE NATIONAL LAB

Atmosphere-Biosphere Exchange

Photosynthesis

Solar Energy + $CO_2 + H_2O$ + nutrients → $CH_2O + O_2$

Organic matter

Respiration & Decay

$CH_2O + O_2$ → Energy + $CO_2 + H_2O$ + nutrients

Organic matter

3:15
10:12

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Apply

Understand

Company Name
0.0%
"Platelayer"
$74,870
22 Feb 1925
Boulder Bay South
Upper Boulder Bay

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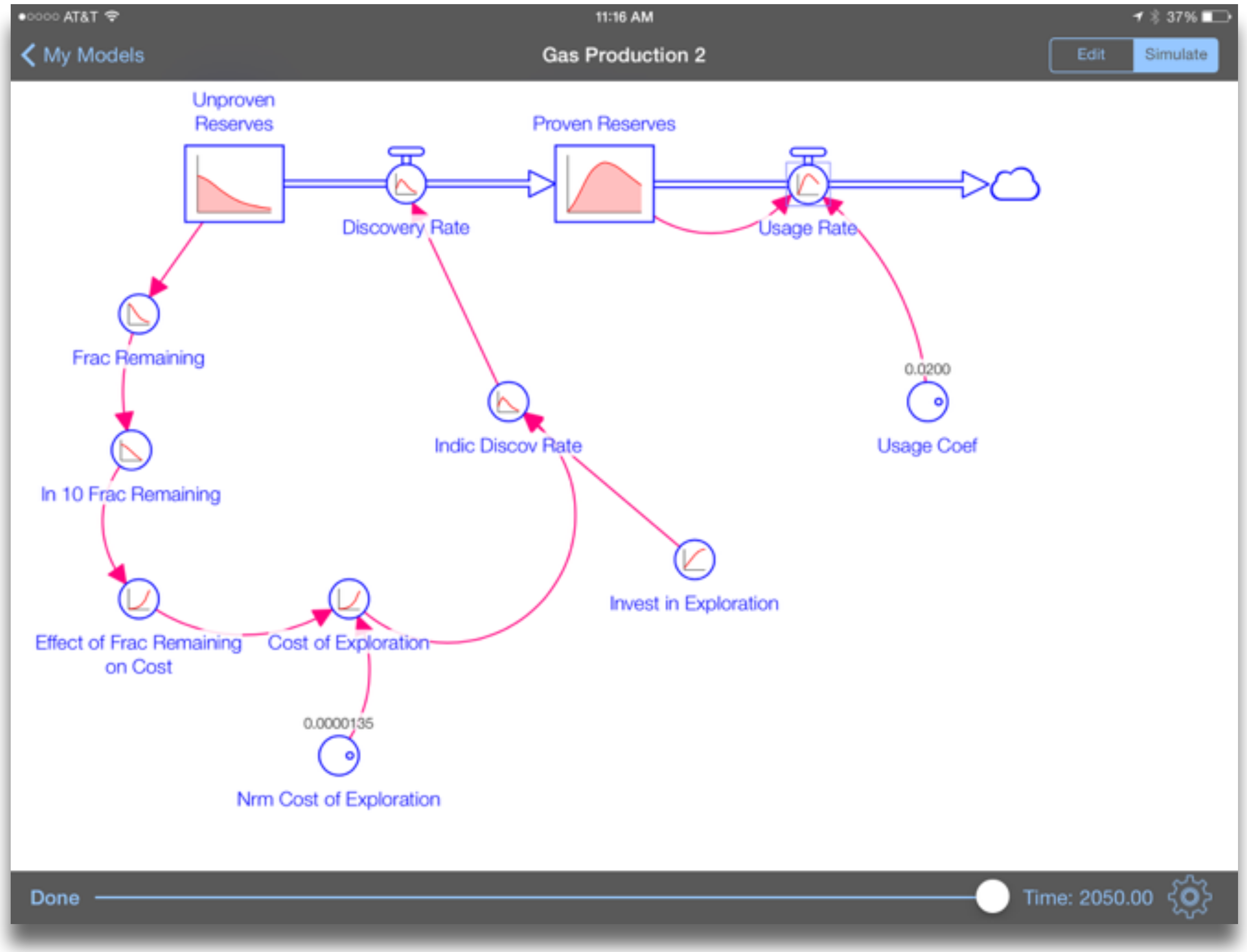
Evaluate

Analyze



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11:16 AM
37%
My Models
Gas Production 2
Edit
Simulate
Unproven Reserves
Discovery Rate
Proven Reserves
Usage Rate
Frac Remaining
In 10 Frac Remaining
Indic Discov Rate
0.0200
Usage Coef
Invest in Exploration
Effect of Frac Remaining on Cost
Cost of Exploration
0.0000135
Nrm Cost of Exploration
Done
Time: 2050.00

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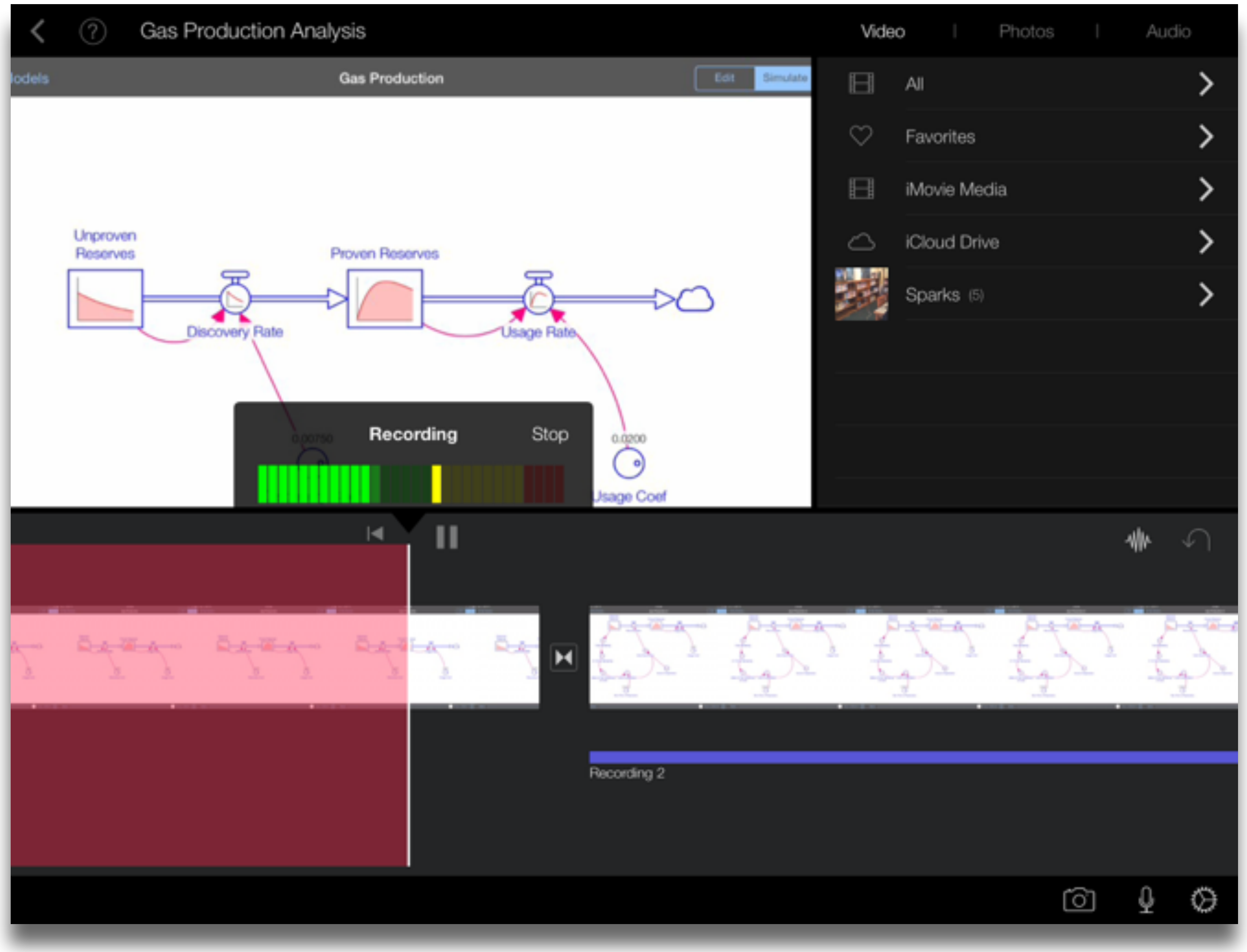
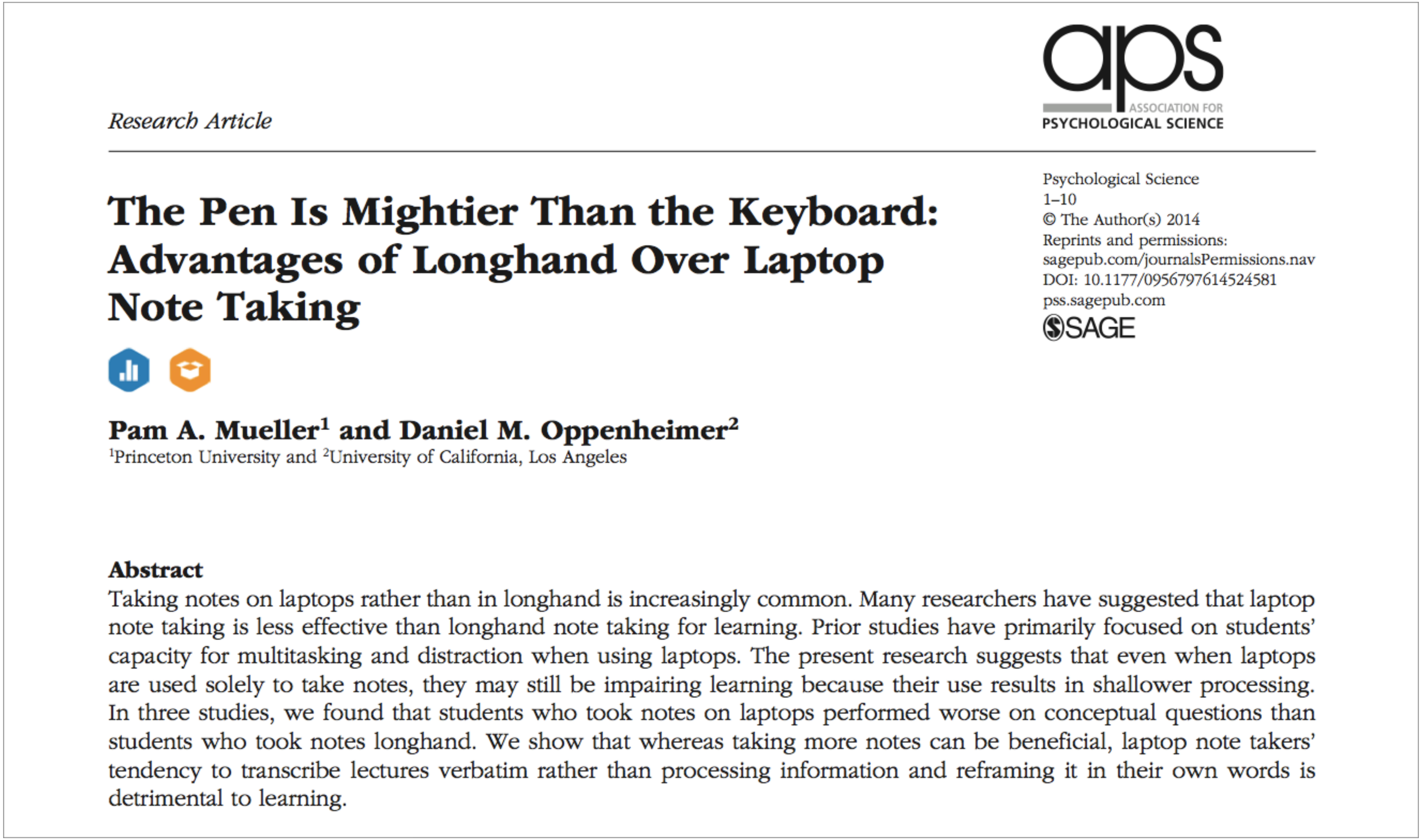
Create

Evaluate


Gas Production Analysis
Video
Photos
Audio
Models
Gas Production
Edit
Simulate
All
Favorites
iMovie Media
iCloud Drive
Sparks (5)
Unproven Reserves
Discovery Rate
Proven Reserves
Usage Rate
Recording
Stop
0.0200
Usage Coef
Recording 2

Some Valuable S/A Shared Practices

- Checklists
- Augmented Note Taking Strategies
- Visualization Methods (5 Primary Domains)
- Simple Blogging
- Simple Digital Storytelling Video
- Flipped Classroom – Materials Creation
- Flipped Classroom – Peer Discussion/Instruction Methods
- LMS Practices



Research Article

aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Psychological Science
1–10
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DOI: 10.1177/0956797614524581
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SAGE

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

Pam A. Mueller[1] **and Daniel M. Oppenheimer**[2]
[1]Princeton University and [2]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.

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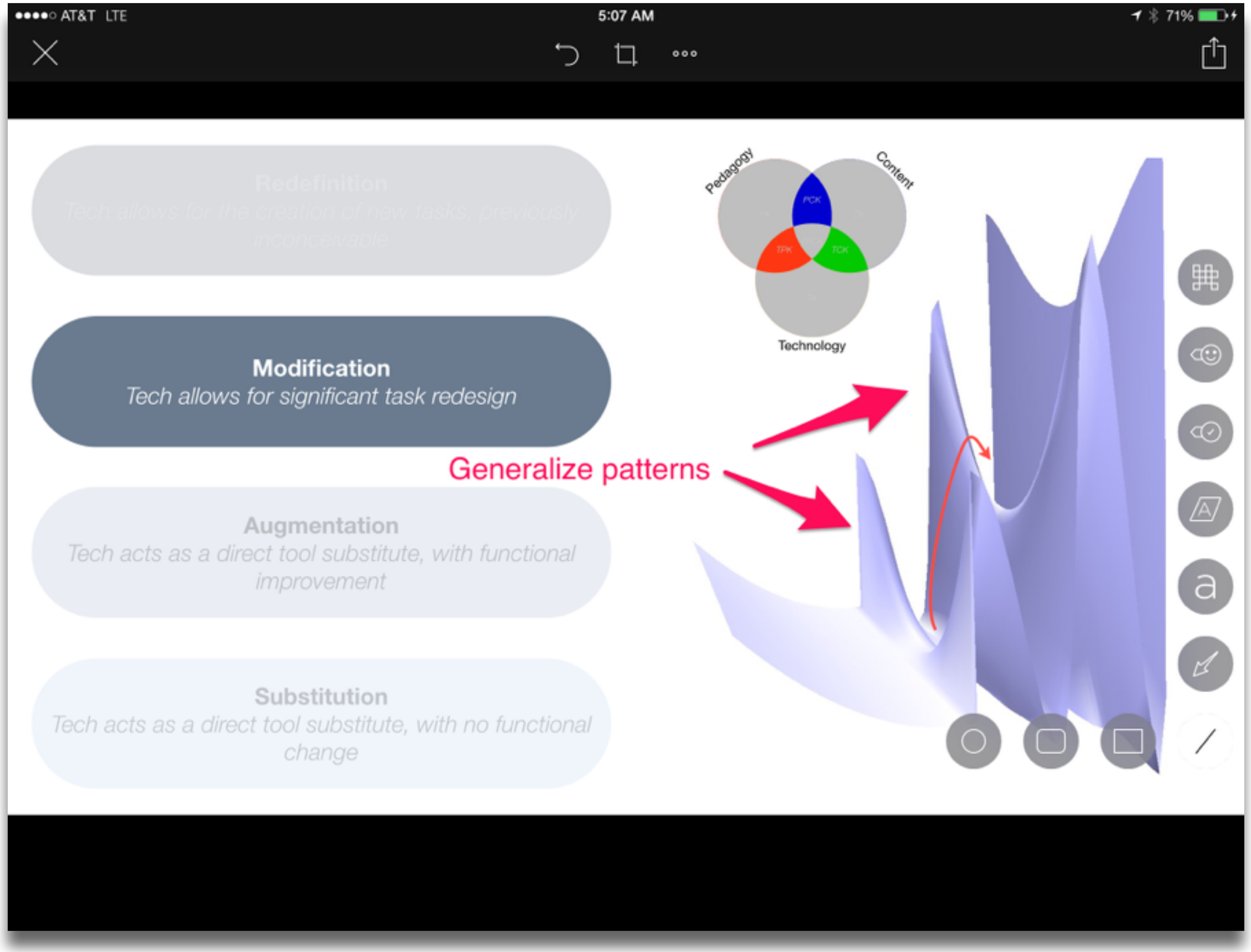

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Kenneth A. Kiewra, "Students' Note-Taking Behaviors and the Efficacy of Providing Instructor's Notes for Review". *Contemporary Educational Psychology,* v10 n4. (1985)

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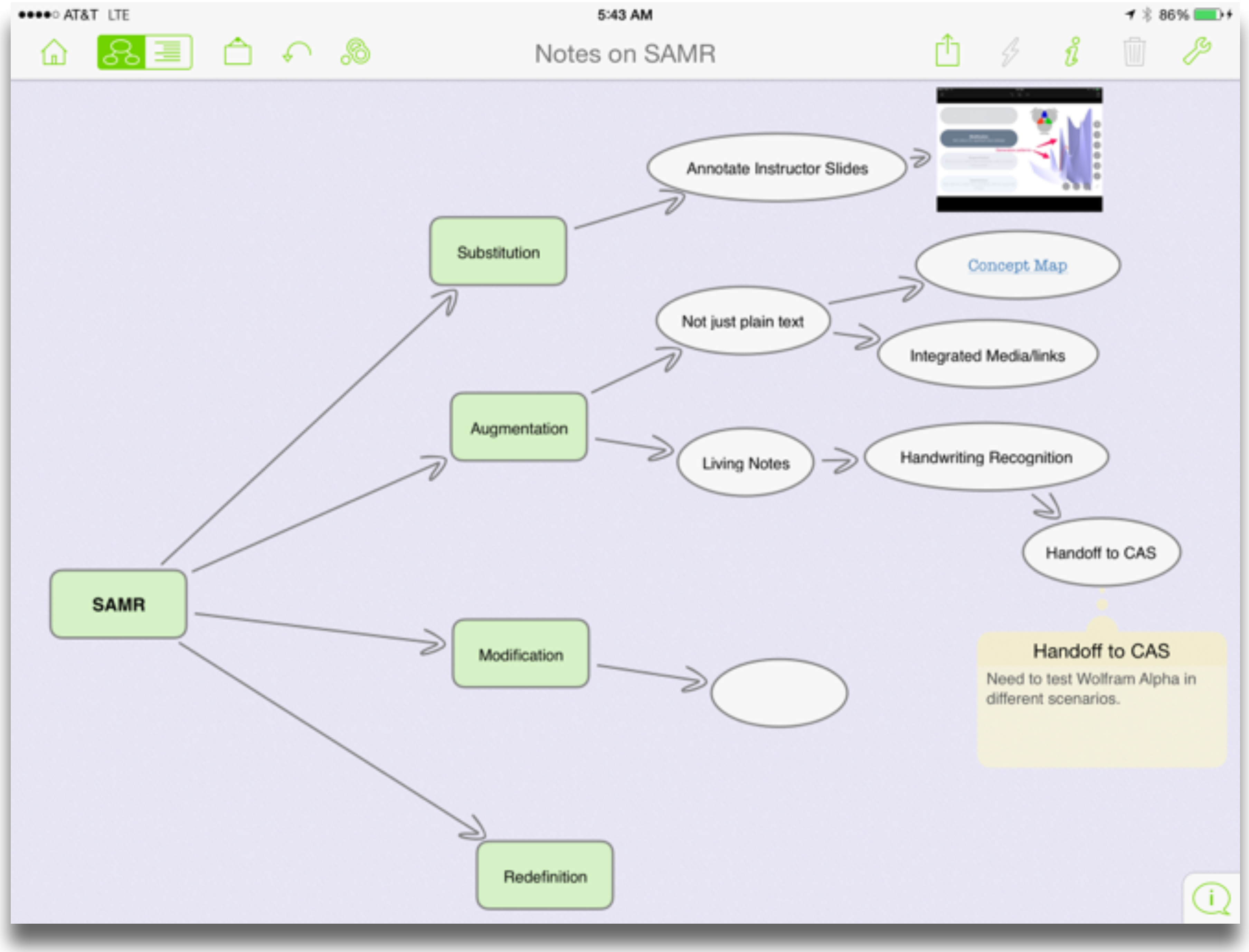
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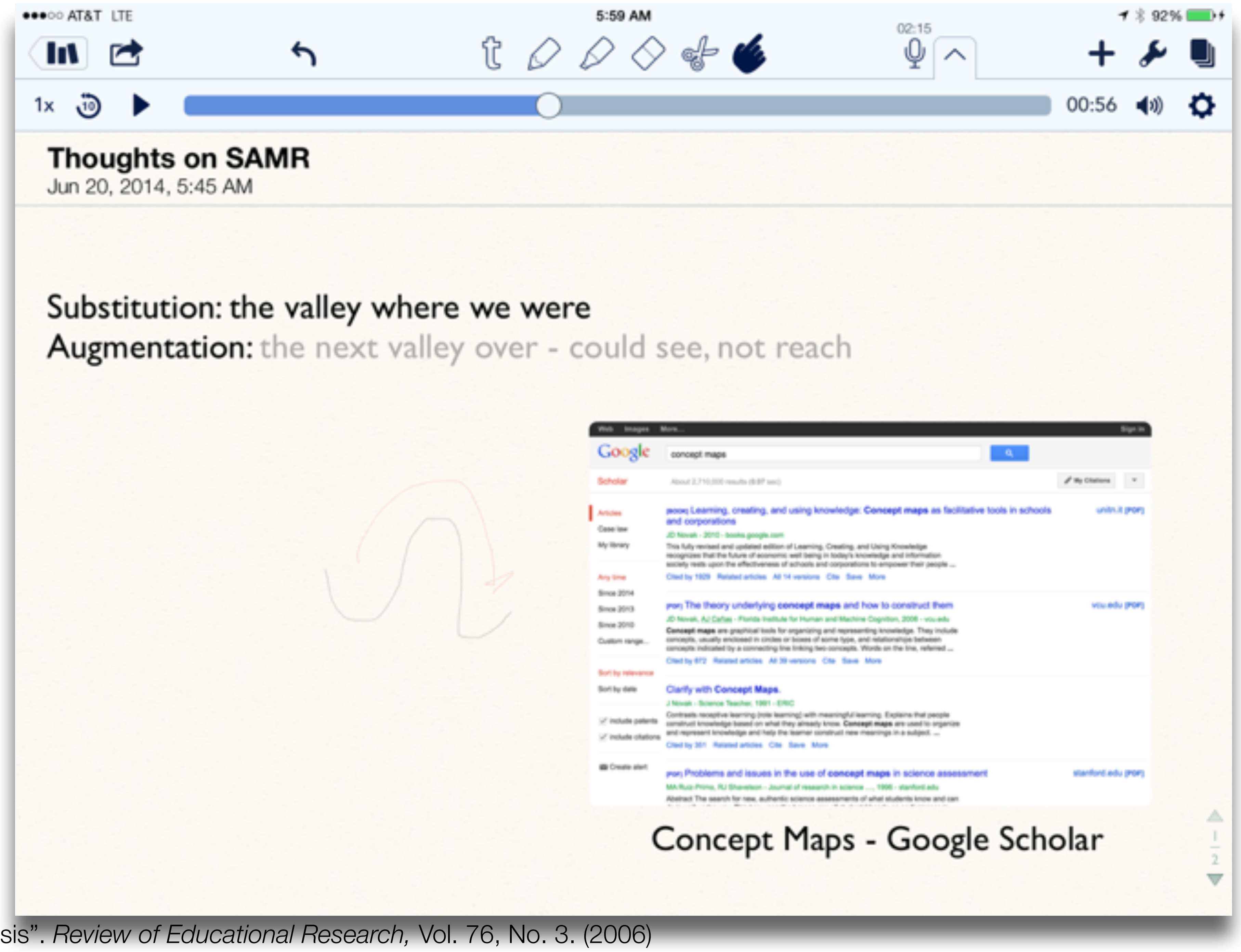
5:43 AM
86%
Notes on SAMR
SAMR
Substitution
Augmentation
Modification
Redefinition
Annotate Instructor Slides
Not just plain text
Concept Map
Integrated Media/links
Living Notes
Handwriting Recognition
Handoff to CAS

Handoff to CAS
Need to test Wolfram Alpha in different scenarios.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5:59 AM
92%
02:15
1x
00:56

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

John C. Nesbit and Olusola O. Adesope, “Learning With Concept and Knowledge Maps: A Meta-Analysis”. *Review of Educational Research,* Vol. 76, No. 3. (2006)

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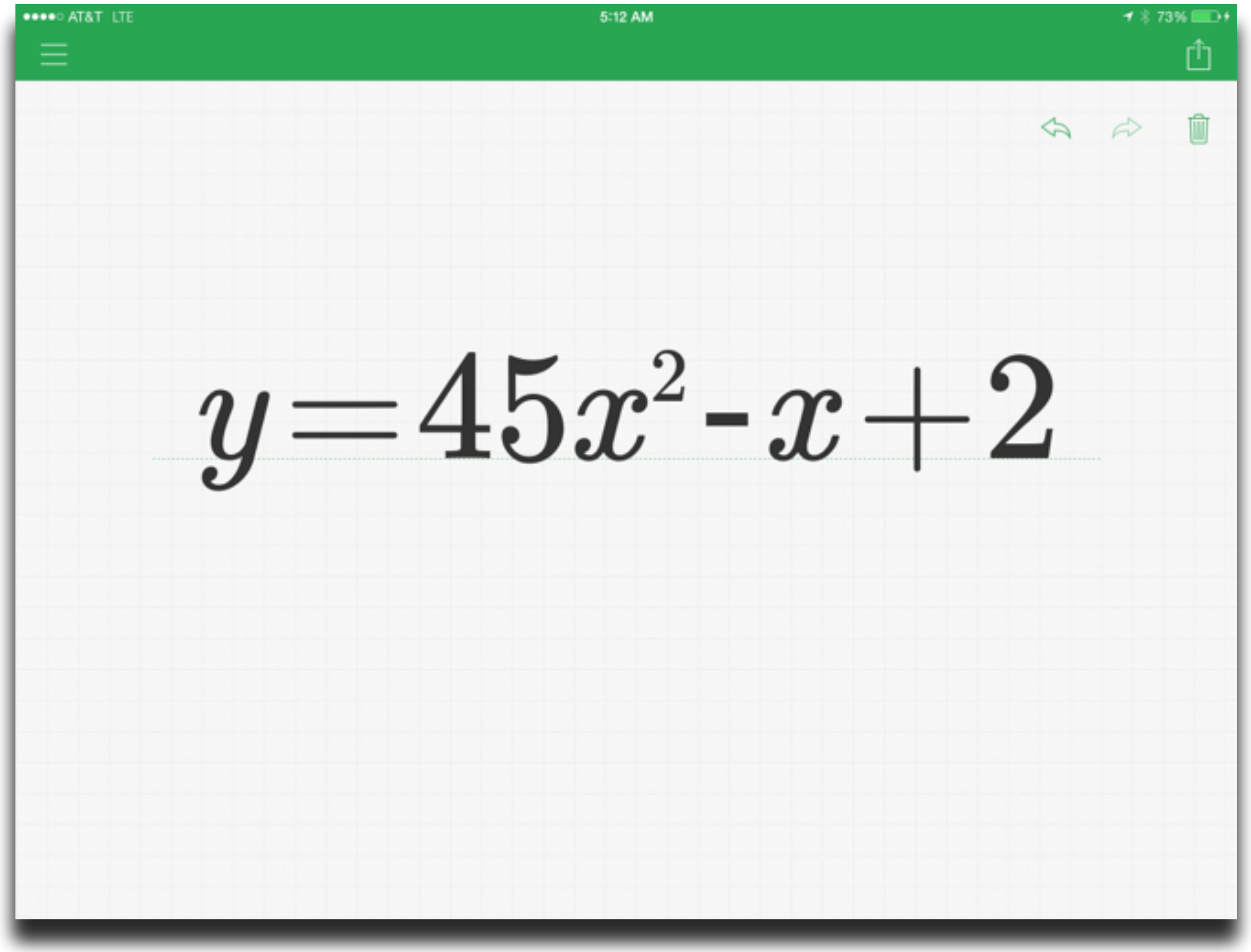
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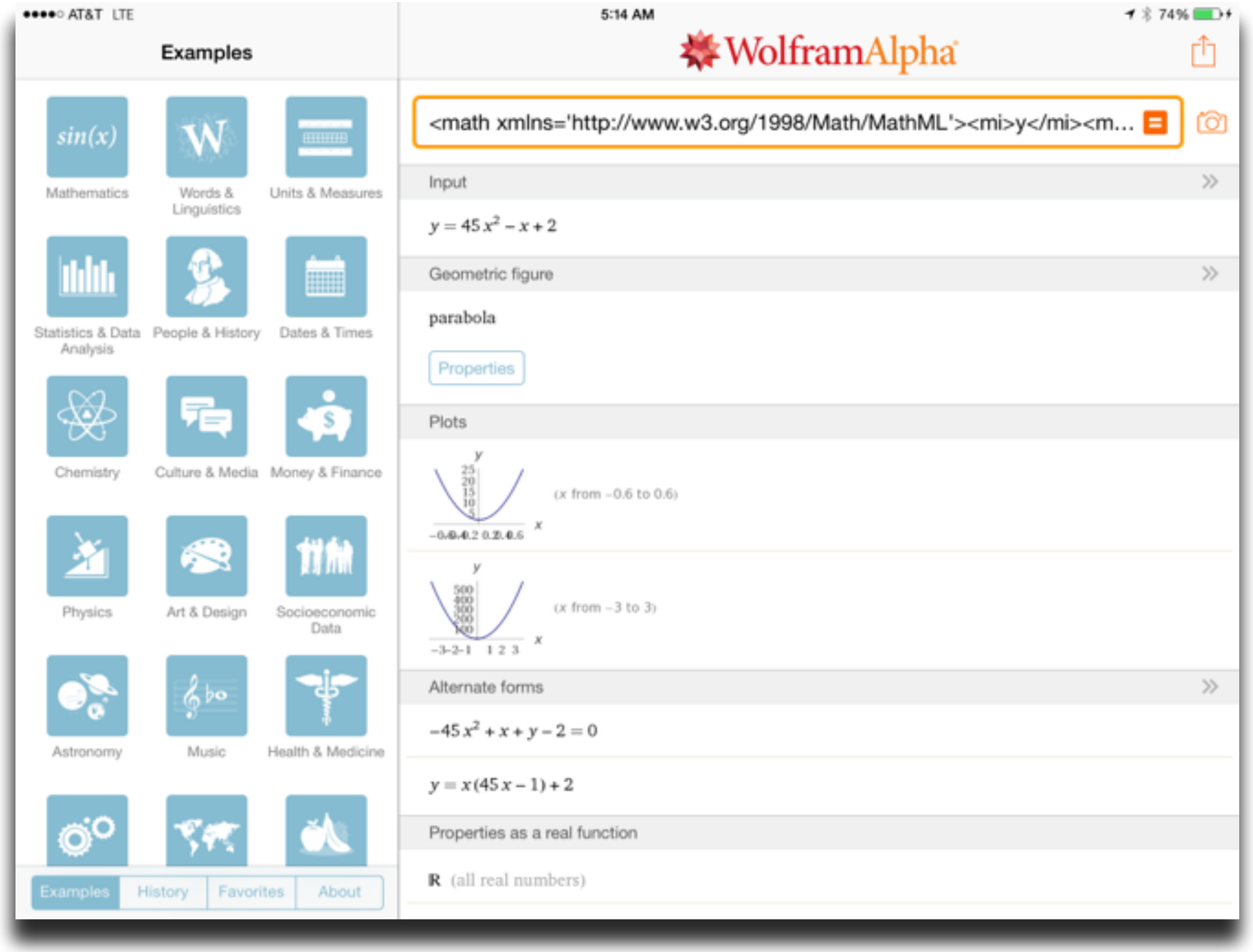
$$y = 45x^2 - x + 2$$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74%
Examples
WolframAlpha
sin(x)
Mathematics
Words & Linguistics
Units & Measures
Statistics & Data Analysis
People & History
Dates & Times
Chemistry
Culture & Media
Money & Finance
Physics
Art & Design
Socioeconomic Data
Astronomy
Music
Health & Medicine
Examples
History
Favorites
About
Properties
y
x
25
20
15
10
5
−0.6 −0.4 −0.2 0.2 0.4 0.6
500
400
300
200
100
−3 −2 −1 1 2 3

<math xmlns='http://www.w3.org/1998/Math/MathML'><mi>y</mi><m…

Input

$y = 45x^2 - x + 2$

Geometric figure

parabola

Plots

(x from −0.6 to 0.6)

(x from −3 to 3)

Alternate forms

$-45x^2 + x + y - 2 = 0$

$y = x(45x - 1) + 2$

Properties as a real function

$\mathbb{R}$ (all real numbers)

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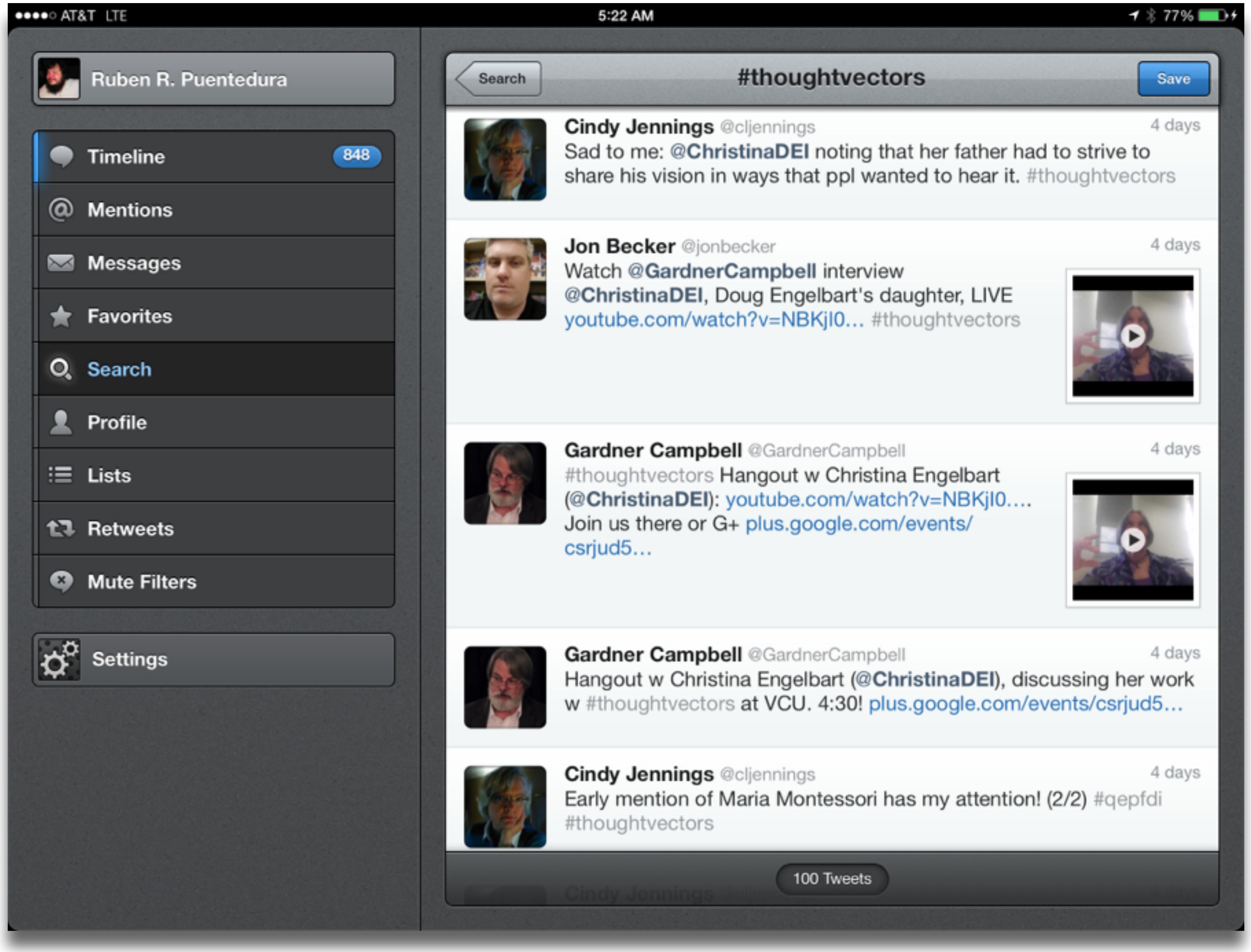

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5:22 AM
77%
Ruben R. Puentedura
Timeline 848
Mentions
Messages
Favorites
Search
Profile
Lists
Retweets
Mute Filters
Settings
Search
#thoughtvectors
Save
100 Tweets

Cindy Jennings @cljennings 4 days
Sad to me: @ChristinaDEI noting that her father had to strive to share his vision in ways that ppl wanted to hear it. #thoughtvectors

Jon Becker @jonbecker 4 days
Watch @GardnerCampbell interview @ChristinaDEI, Doug Engelbart's daughter, LIVE youtube.com/watch?v=NBKjl0... #thoughtvectors

Gardner Campbell @GardnerCampbell 4 days
#thoughtvectors Hangout w Christina Engelbart (@ChristinaDEI): youtube.com/watch?v=NBKjl0.... Join us there or G+ plus.google.com/events/csrjud5...

Gardner Campbell @GardnerCampbell 4 days
Hangout w Christina Engelbart (@ChristinaDEI), discussing her work w #thoughtvectors at VCU. 4:30! plus.google.com/events/csrjud5...

Cindy Jennings @cljennings 4 days
Early mention of Maria Montessori has my attention! (2/2) #qepfdi #thoughtvectors

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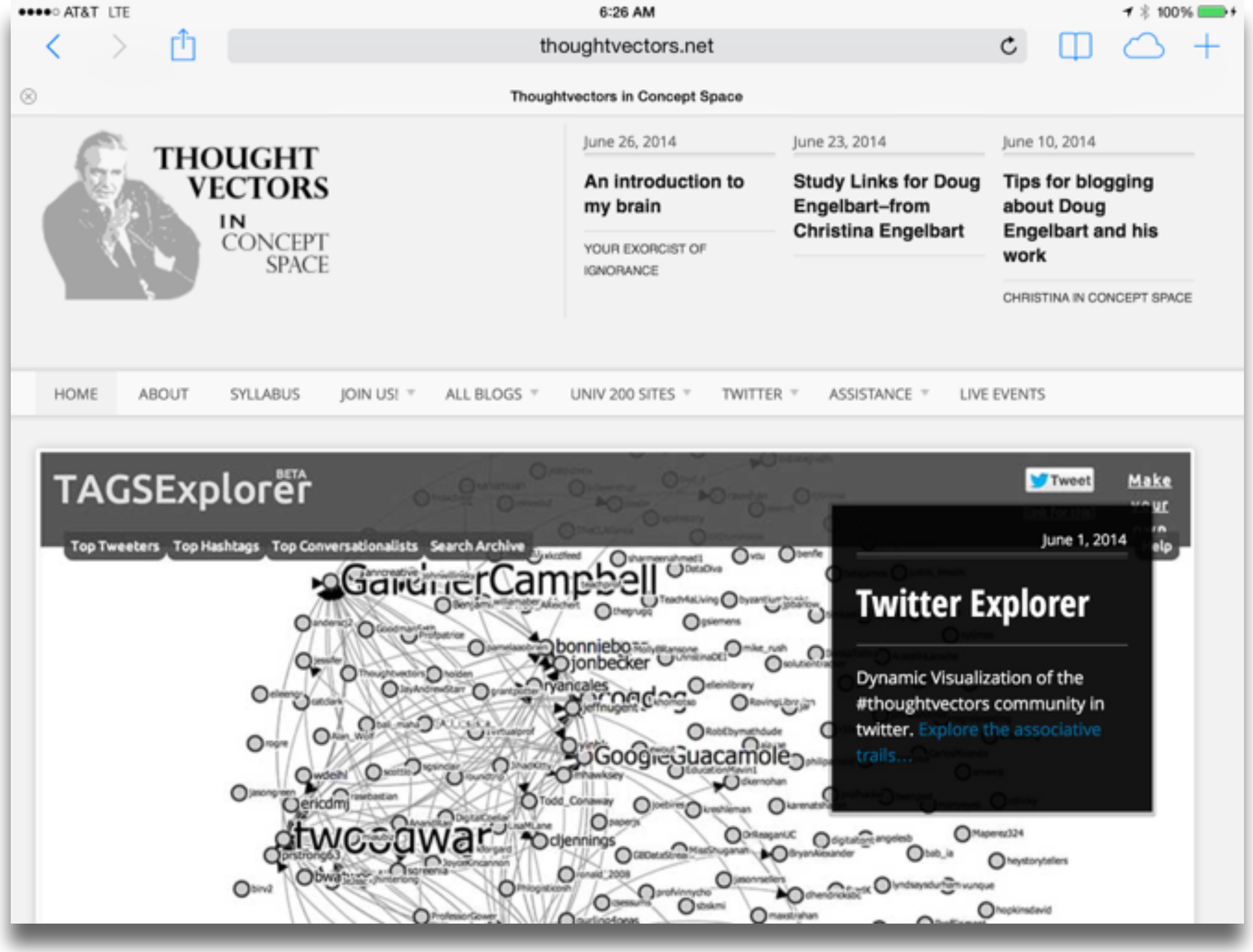
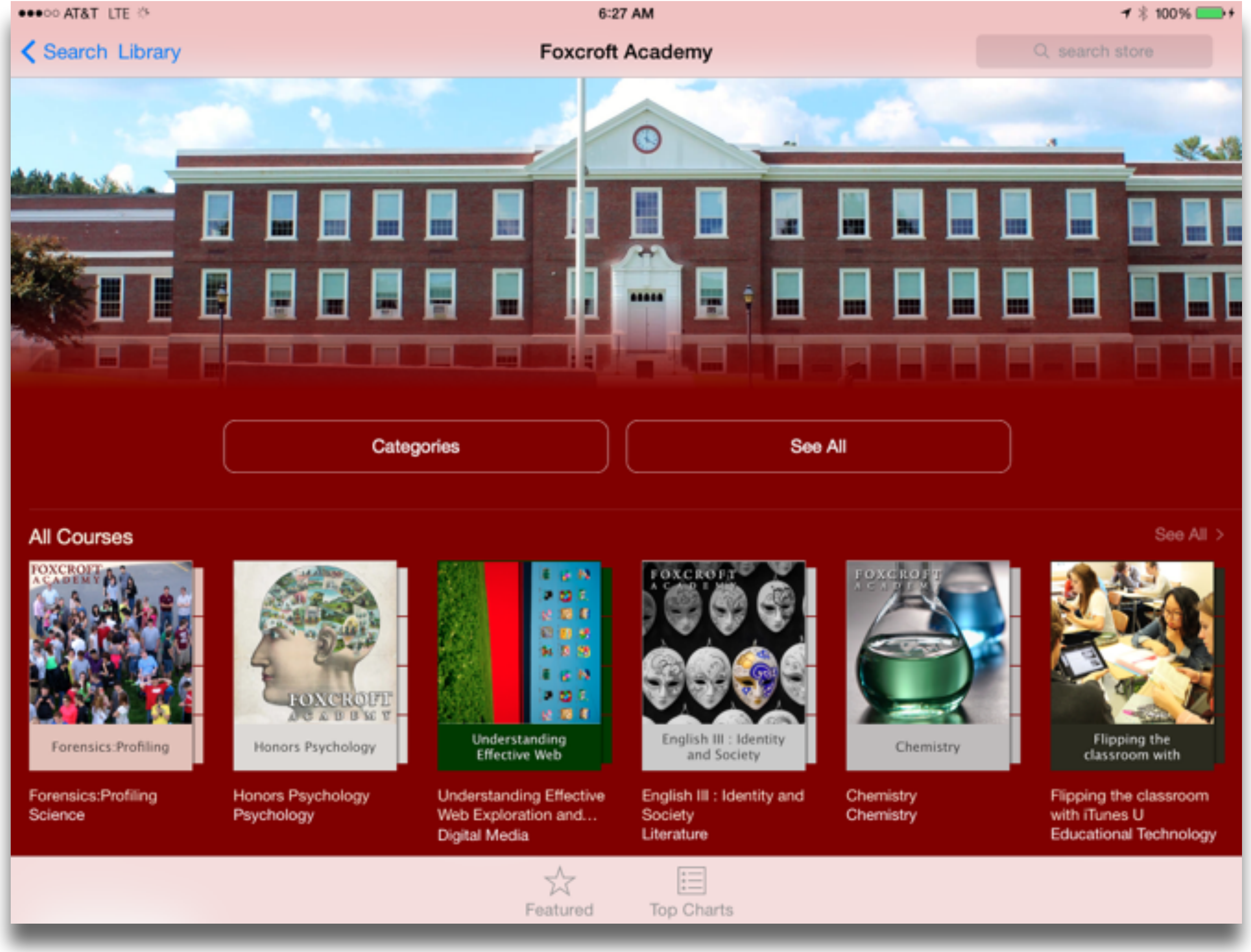

AT&T LTE
6:26 AM
100%
thoughtvectors.net
Thoughtvectors in Concept Space
THOUGHT VECTORS IN CONCEPT SPACE
HOME
ABOUT
SYLLABUS
JOIN US!
ALL BLOGS
UNIV 200 SITES
TWITTER
ASSISTANCE
LIVE EVENTS
TAGSExplorer BETA
Tweet
Top Tweeters
Top Hashtags
Top Conversationalists
Search Archive
GardnerCampbell
bonniebo
jonbecker
GoogleGuacamole
twoodwar

June 26, 2014
An introduction to my brain
YOUR EXORCIST OF IGNORANCE

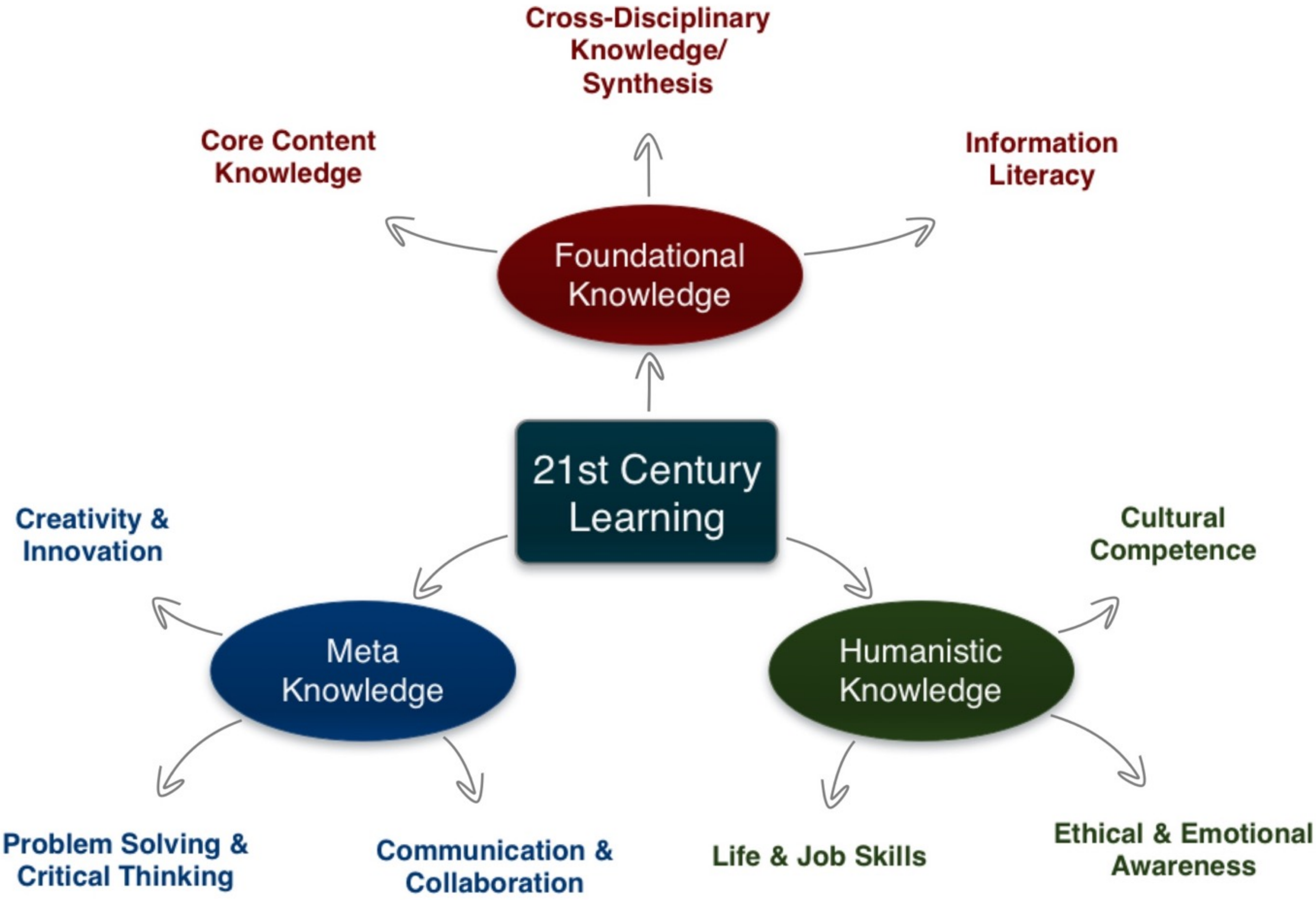
June 23, 2014
Study Links for Doug Engelbart–from Christina Engelbart

June 10, 2014
Tips for blogging about Doug Engelbart and his work
CHRISTINA IN CONCEPT SPACE

June 1, 2014
Twitter Explorer
Dynamic Visualization of the #thoughtvectors community in twitter. Explore the associative trails...


AT&T LTE
6:27 AM
100%
Search Library
Foxcroft Academy
search store
Categories
See All
All Courses
See All
Featured
Top Charts

- Forensics:Profiling Science
- Honors Psychology Psychology
- Understanding Effective Web Exploration and... Digital Media
- English III : Identity and Society Literature
- Chemistry Chemistry
- Flipping the classroom with iTunes U Educational Technology



21st Century Learning

Foundational Knowledge

Core Content Knowledge

Cross-Disciplinary Knowledge/ Synthesis

Information Literacy

Meta Knowledge

Creativity & Innovation

Problem Solving & Critical Thinking

Communication & Collaboration

Humanistic Knowledge

Cultural Competence

Life & Job Skills

Ethical & Emotional Awareness

Kristen Kereluik, Punya Mishra, Chris Fahnoe, and Laura Terry, “What Knowledge Is of Most Worth: Teacher Knowledge for 21st Century Learning”. *Journal of Digital Learning in Teacher Education (29)* 4 (2013)

Refraction

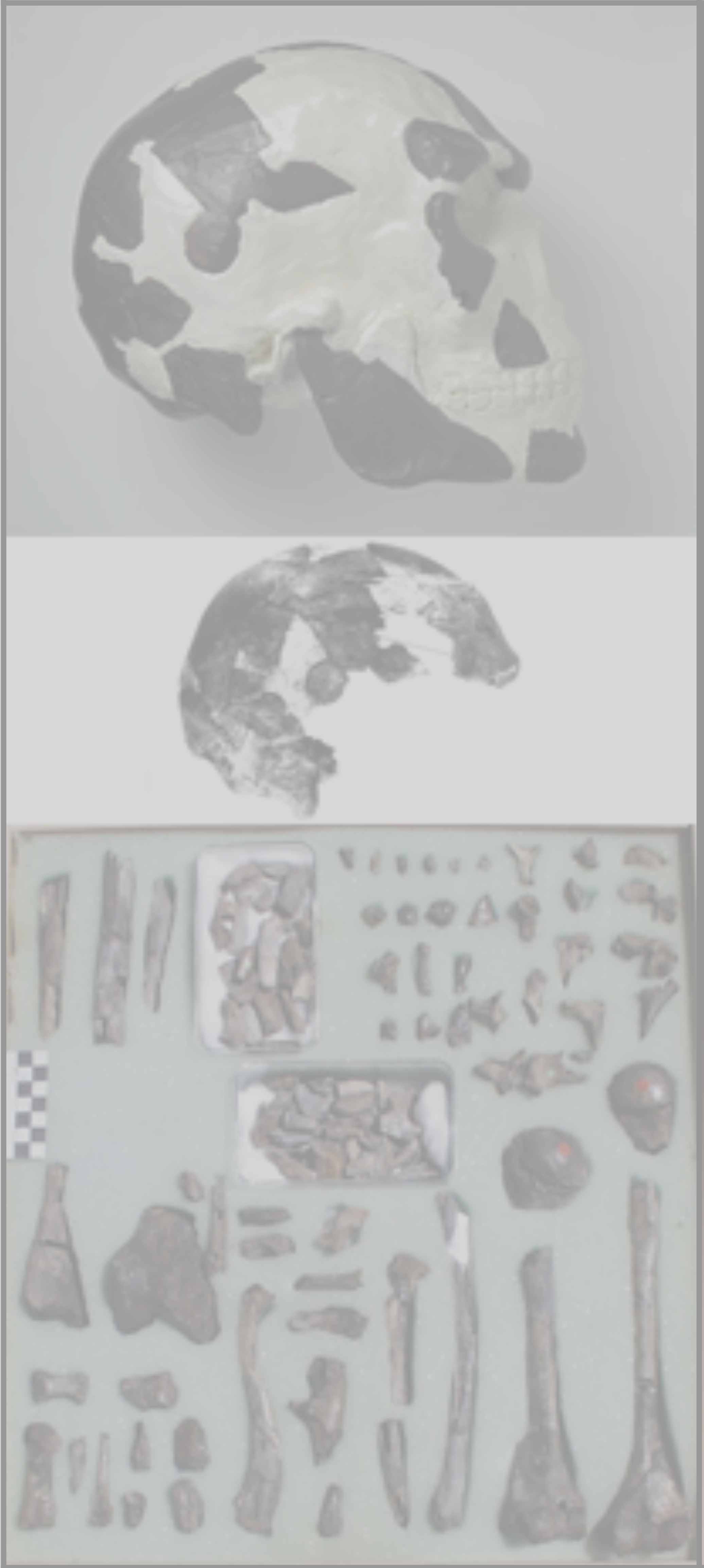
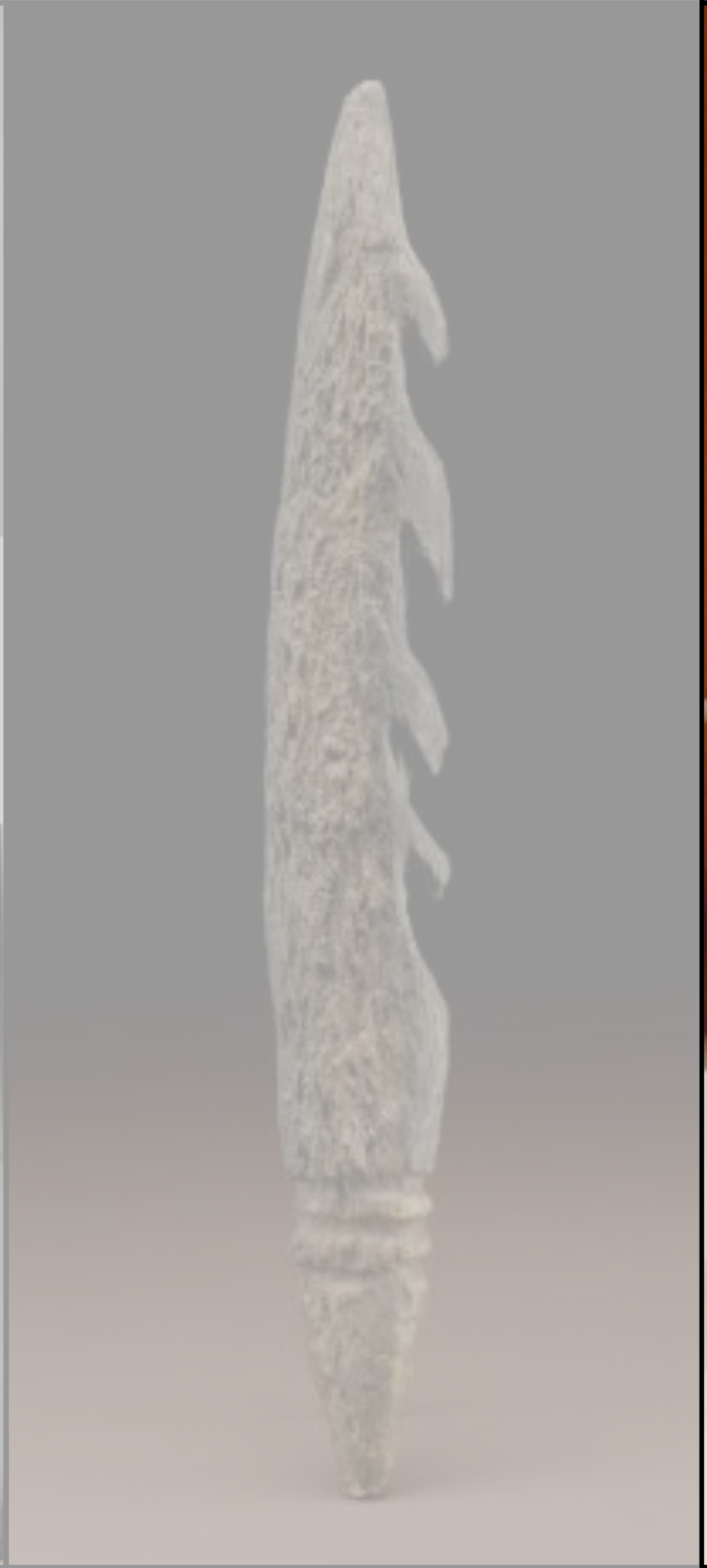
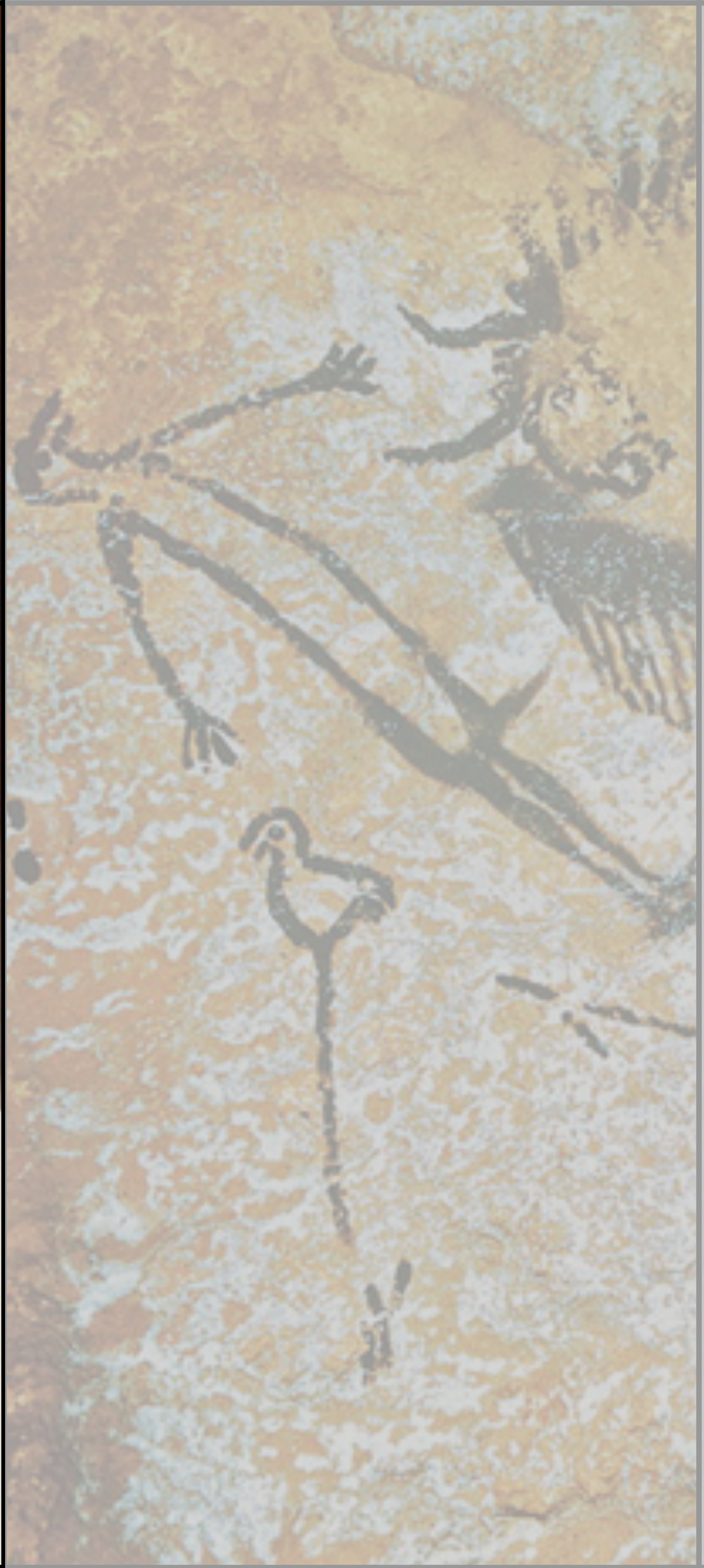
- Pick:

  1. A Content Area
  2. A 21C Learning Skill
  3. A Shared Practice

- Create a SAMR Ladder that looks at a topic in 1. through the lens of 2., focused into actual practice by 3.

Refraction Example: *Connecting the Dots*

Primary 21C Lens: Cross-Disciplinary Knowledge & Synthesis
Primary Shared Practice Focus: Visualization Methods

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

TimelineJS
Beautifully crafted timelines that are easy, and intuitive to use.
Website
3D
Chart 1
word tree
ipsum
Word
Collage
feugiat
ligula

Civilisation
Kenneth Clark
(1969)

The Ascent of Man
Jacob Bronowski
(1973)

Ways of Seeing
John Berger
(1972)

Connections
James Burke
(1978)

The Day the Universe Changed
James Burke
(1985)

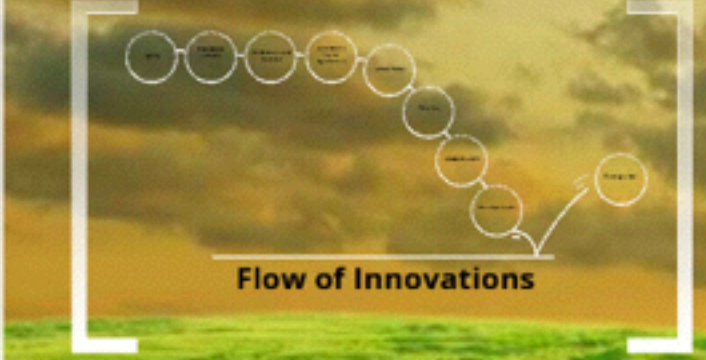
CONNECTIONS - # 4 FAITH IN NUMBERS

"The Road Ahead"

Content

Summary
Concept Map
Critical Thinking
Key points & Questions

SUMMARY



Flow of Innovations

CONCEPT MAP

Computer

Punched Cards

Jacquard Loom

Printing

Cheap Paper

Investment Capital Agreements

Fast Weaving & Spinning

Mechanical Devices

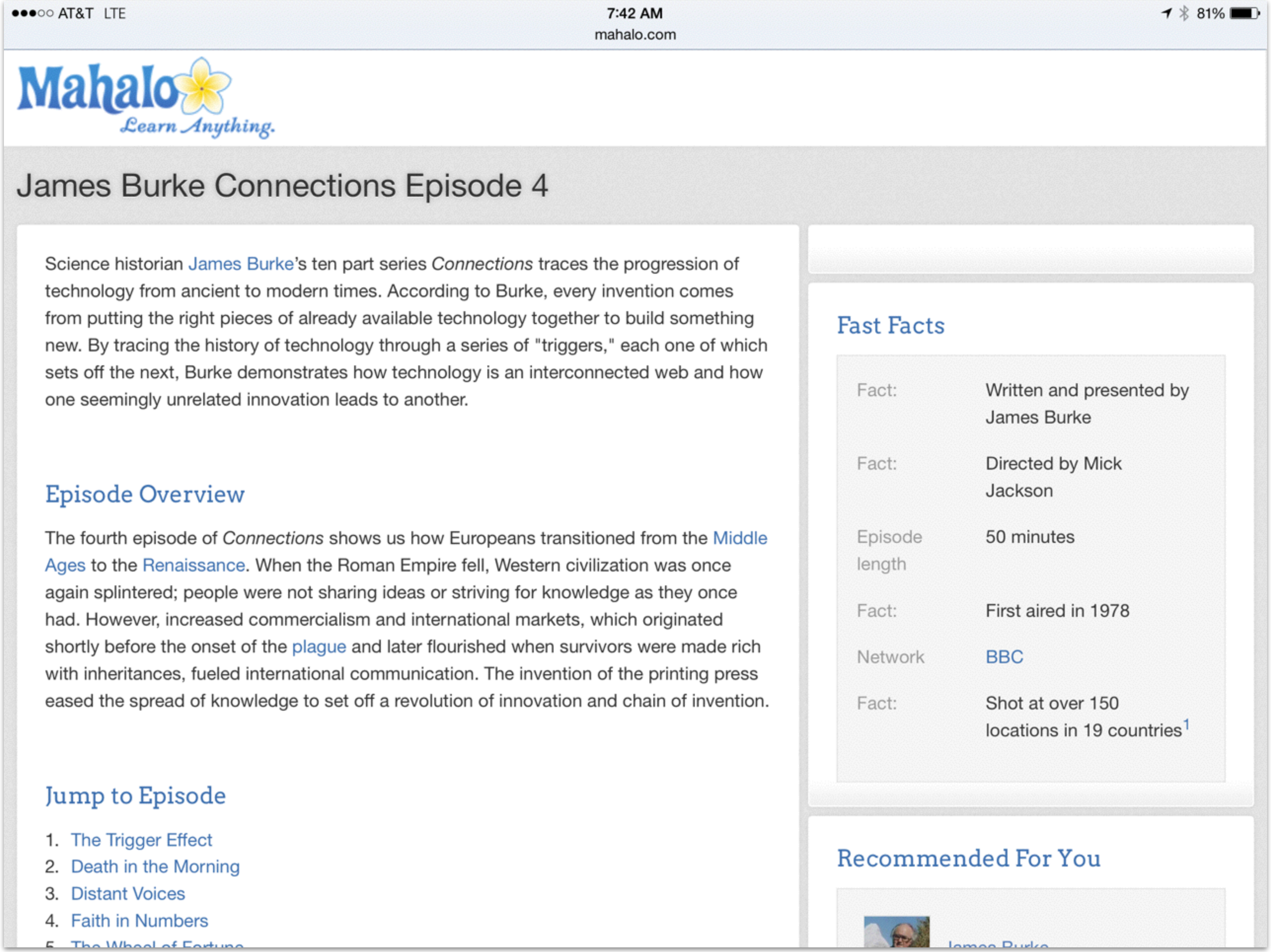
GPS

An Inference

The technical development is an exponential graph when represented with respect to time
A time will come when the development graph will reach its saturation, that time will be either when
- all is perfect
or when
-all is destroyed!

CRITICAL THINKING

- The solution to a problem can always be found from the lessons learnt in history, i-e Fall of Roman Empire
- Advancement is inevitable in life. Changing scenarios change the requirements and lead to evolution
- Evolution is never planned; its impossible to plan, indeed
- The history shows, technical development has been a game of musical chairs; its always about the right timing and the right problem- if you have it, you move further! An Example - The Romans (worn out cloth in abundance; hammers to make paper)
- The book boom : expanded knowledge; the internet boom: knowledge everywhere- These innovations were on the same line, just very different in scale



James Burke Connections Episode 4

Science historian James Burke's ten part series *Connections* traces the progression of technology from ancient to modern times. According to Burke, every invention comes from putting the right pieces of already available technology together to build something new. By tracing the history of technology through a series of "triggers," each one of which sets off the next, Burke demonstrates how technology is an interconnected web and how one seemingly unrelated innovation leads to another.

Episode Overview

The fourth episode of *Connections* shows us how Europeans transitioned from the Middle Ages to the Renaissance. When the Roman Empire fell, Western civilization was once again splintered; people were not sharing ideas or striving for knowledge as they once had. However, increased commercialism and international markets, which originated shortly before the onset of the plague and later flourished when survivors were made rich with inheritances, fueled international communication. The invention of the printing press eased the spread of knowledge to set off a revolution of innovation and chain of invention.

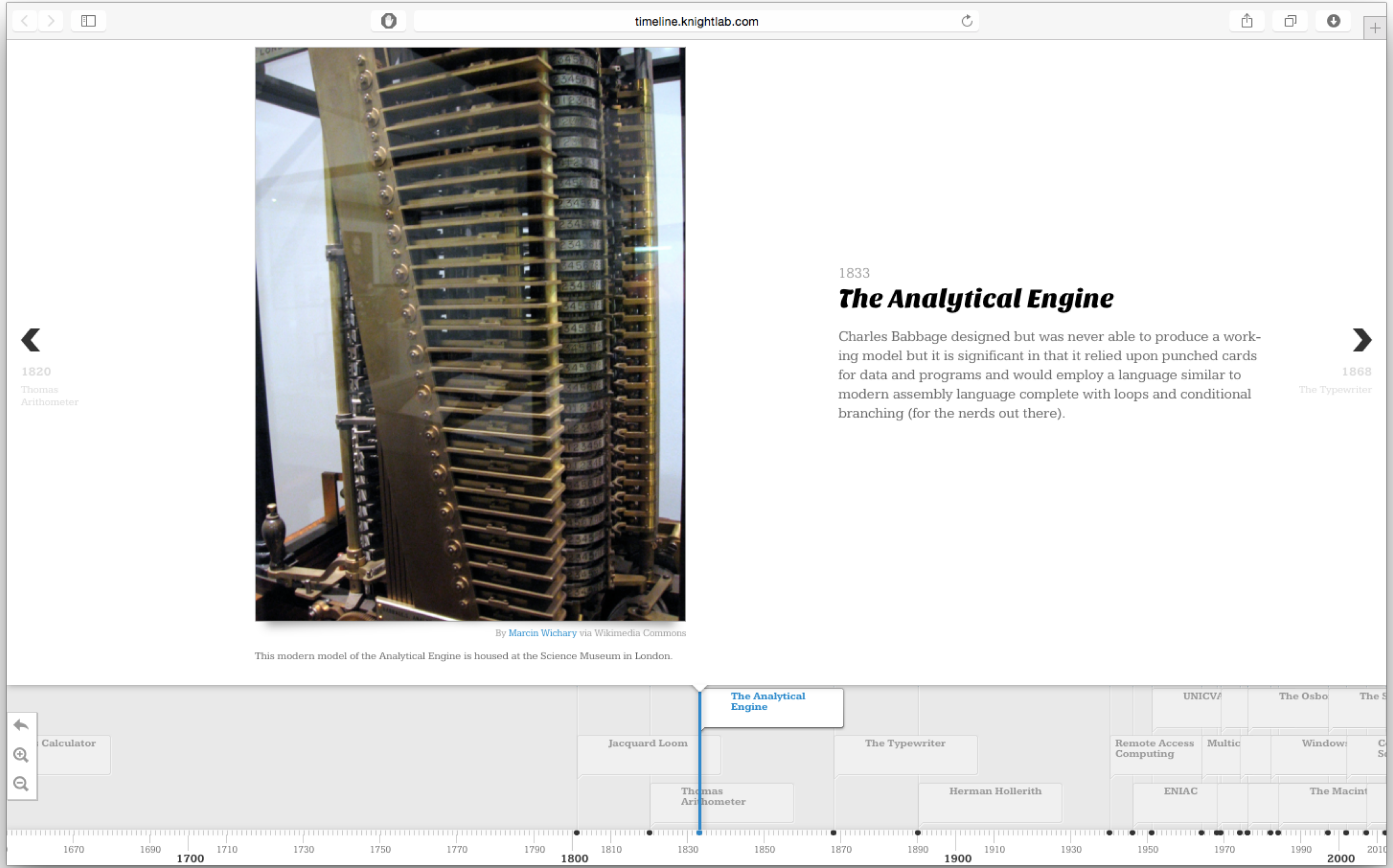
Jump to Episode

1. The Trigger Effect
2. Death in the Morning
3. Distant Voices
4. Faith in Numbers

Fast Facts

Fact:	Written and presented by James Burke
Fact:	Directed by Mick Jackson
Episode length	50 minutes
Fact:	First aired in 1978
Network	BBC
Fact:	Shot at over 150 locations in 19 countries[1]

Recommended For You


timeline.knightlab.com
1820
Thomas Arithometer
1868
The Typewriter
Calculator
Jacquard Loom
Thomas Arithometer
The Analytical Engine
The Typewriter
Herman Hollerith
UNICVA
The Osbo
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2010

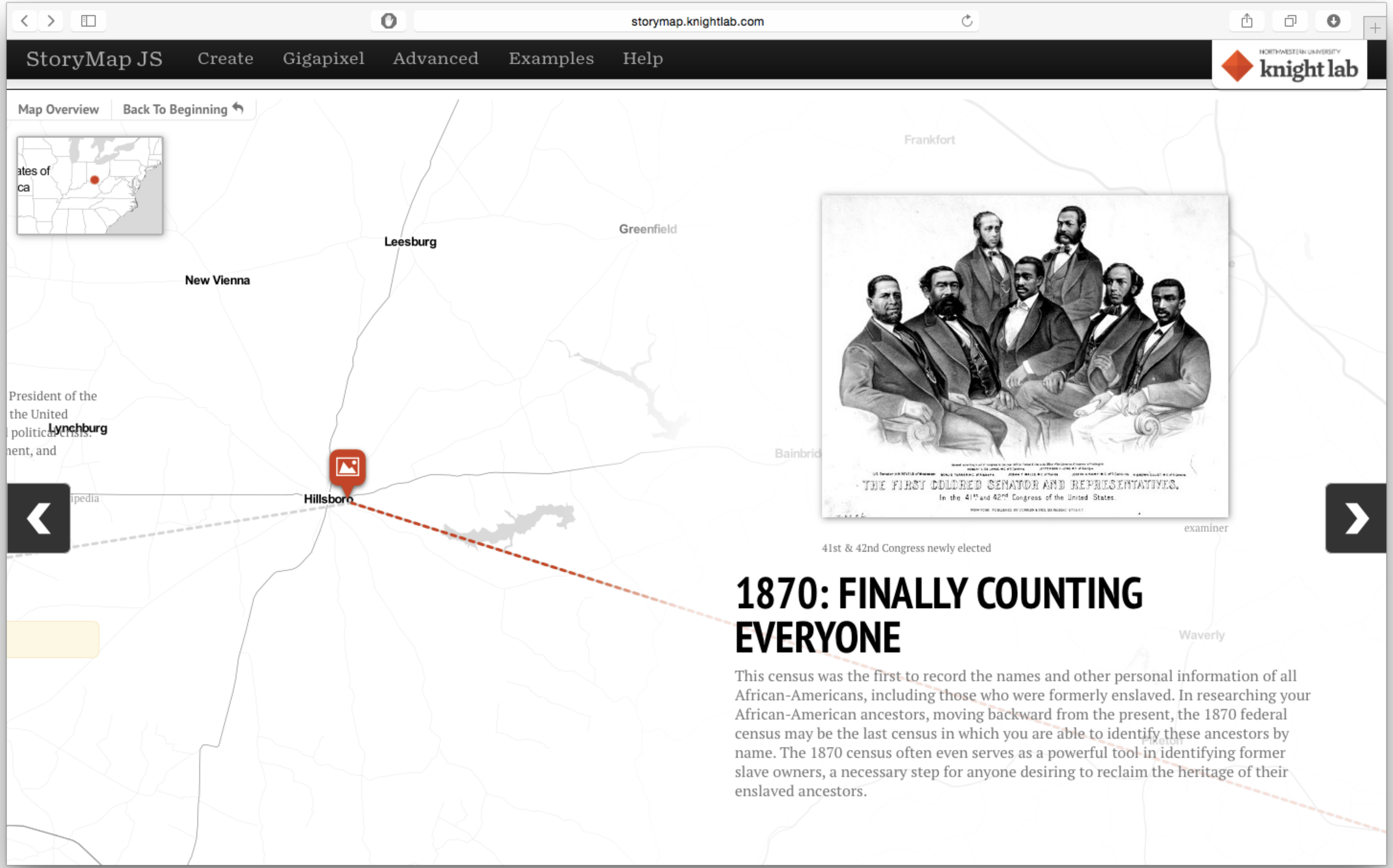
1833

The Analytical Engine

Charles Babbage designed but was never able to produce a working model but it is significant in that it relied upon punched cards for data and programs and would employ a language similar to modern assembly language complete with loops and conditional branching (for the nerds out there).

By Marcin Wichary via Wikimedia Commons

This modern model of the Analytical Engine is housed at the Science Museum in London.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New Vienna
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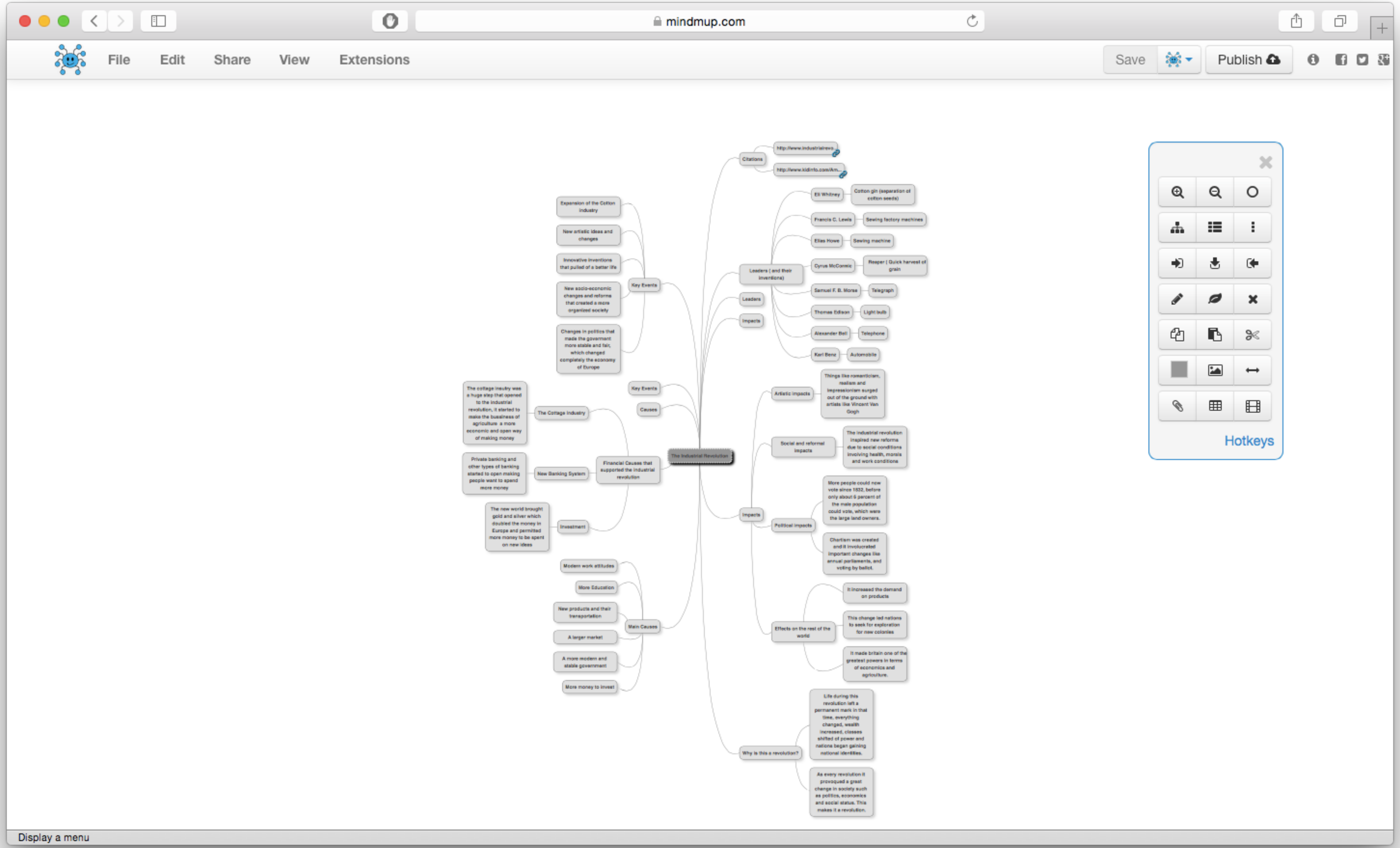
ipedia
THE FIRST COLORED SENATOR AND REPRESENTATIVES.
In the 41st and 42nd Congress of the United States.

examiner

41st & 42nd Congress newly elected

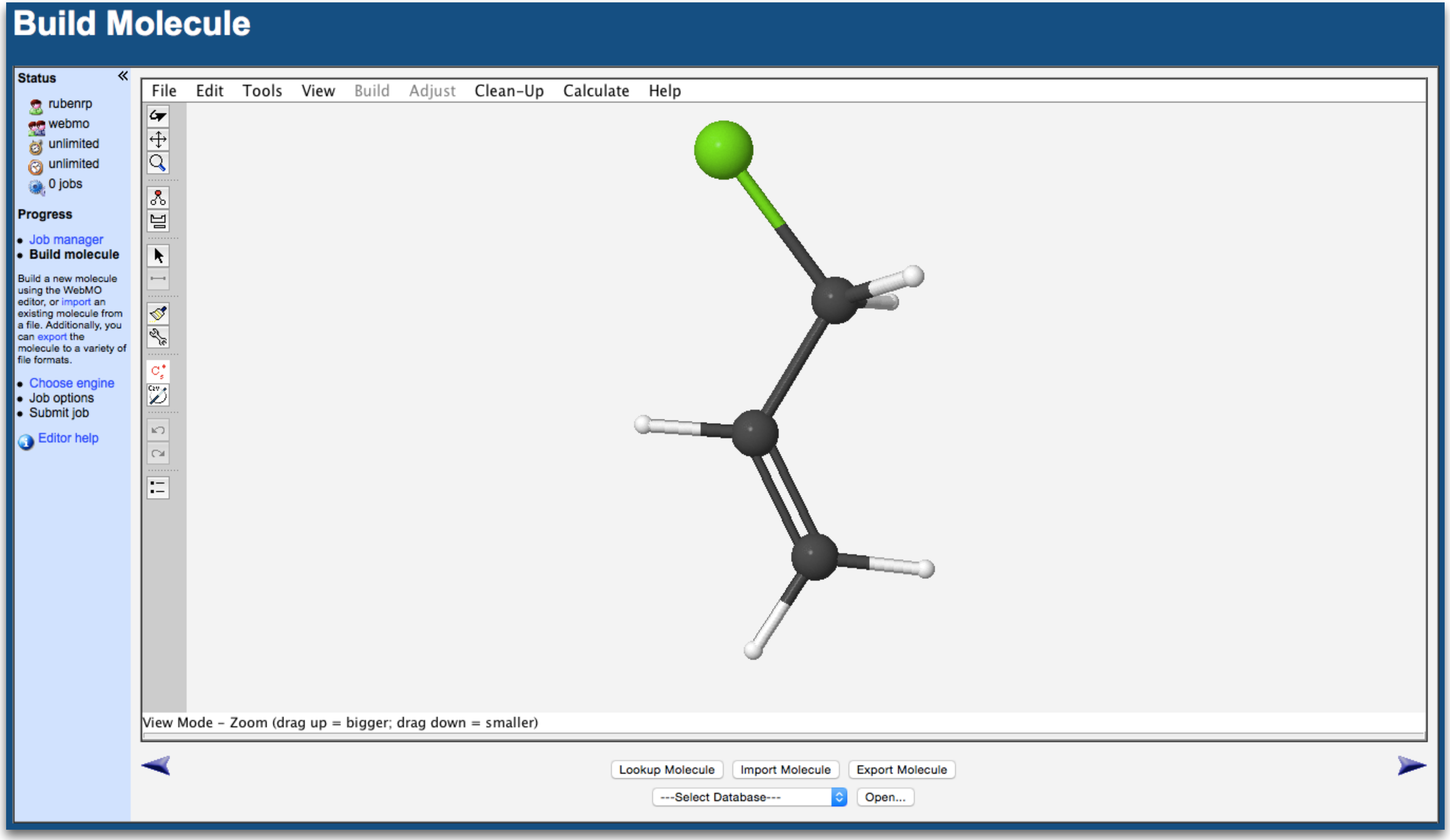
1870: FINALLY COUNTING EVERYONE

This census was the first to record the names and other personal information of all African-Americans, including those who were formerly enslaved. In researching your African-American ancestors, moving backward from the present, the 1870 federal census may be the last census in which you are able to identify these ancestors by name. The 1870 census often even serves as a powerful tool in identifying former slave owners, a necessary step for anyone desiring to reclaim the heritage of their enslaved ancestors.



- The Industrial Revolution
  - Key Events
    - Expansion of the Cotton industry
    - New artistic ideas and changes
    - Innovative inventions that pulled of a better life
    - New socio-economic changes and reforms that created a more organized society
    - Changes in politics that made the goverment more stable and fair, which changed completely the economy of Europe
  - Key Events
  - Causes
  - Financial Causes that supported the industrial revolution
    - The Cottage Industry
      - The cottage inudry was a huge step that opened to the industrial revolution, it started to make the bussiness of agriculture a more economic and open way of making money
    - New Banking System
      - Private banking and other types of banking started to open making people want to spend more money
    - Investment
      - The new world brought gold and silver which doubled the money in Europe and permitted more money to be spent on new ideas
  - Main Causes
    - Modern work attitudes
    - More Education
    - New products and their transportation
    - A larger market
    - A more modern and stable government
    - More money to invest
  - Citations
    - http://www.industrialrevo...
    - http://www.kidinfo.com/Am...
  - Leaders (and their inventions)
    - Eli Whitney
      - Cotton gin (separation of cotton seeds)
    - Francis C. Lewis
      - Sewing factory machines
    - Elias Howe
      - Sewing machine
    - Cyrus McCormic
      - Reaper (Quick harvest of grain
    - Samuel F. B. Morse
      - Telegraph
    - Thomas Edison
      - Light bulb
    - Alexander Bell
      - Telephone
    - Karl Benz
      - Automobile
  - Leaders
  - Impacts
  - Impacts
    - Artistic impacts
      - Things like romanticism, realism and impressionism surged out of the ground with artists like Vincent Van Gogh
    - Social and reformal impacts
      - The industrial revolution inspired new reforms due to social conditions involving health, morals and work conditions
    - Political impacts
      - More people could now vote since 1832, before only about 5 percent of the male population could vote, which were the large land owners.
      - Chartism was created and it involucrated important changes like annual parliaments, and voting by ballot.
    - Effects on the rest of the world
      - It increased the demand on products
      - This change led nations to seek for exploration for new colonies
      - It made britain one of the greatest powers in terms of economics and agriculture.
  - Why is this a revolution?
    - Life during this revolution left a permanent mark in that time, everything changed, wealth increased, classes shifted of power and nations began gaining national identities.
    - As every revolution it provoqued a great change in society such as politics, economics and social status. This makes it a revolution.

From Shared Practices to Aspirational Goals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webmo
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Progress
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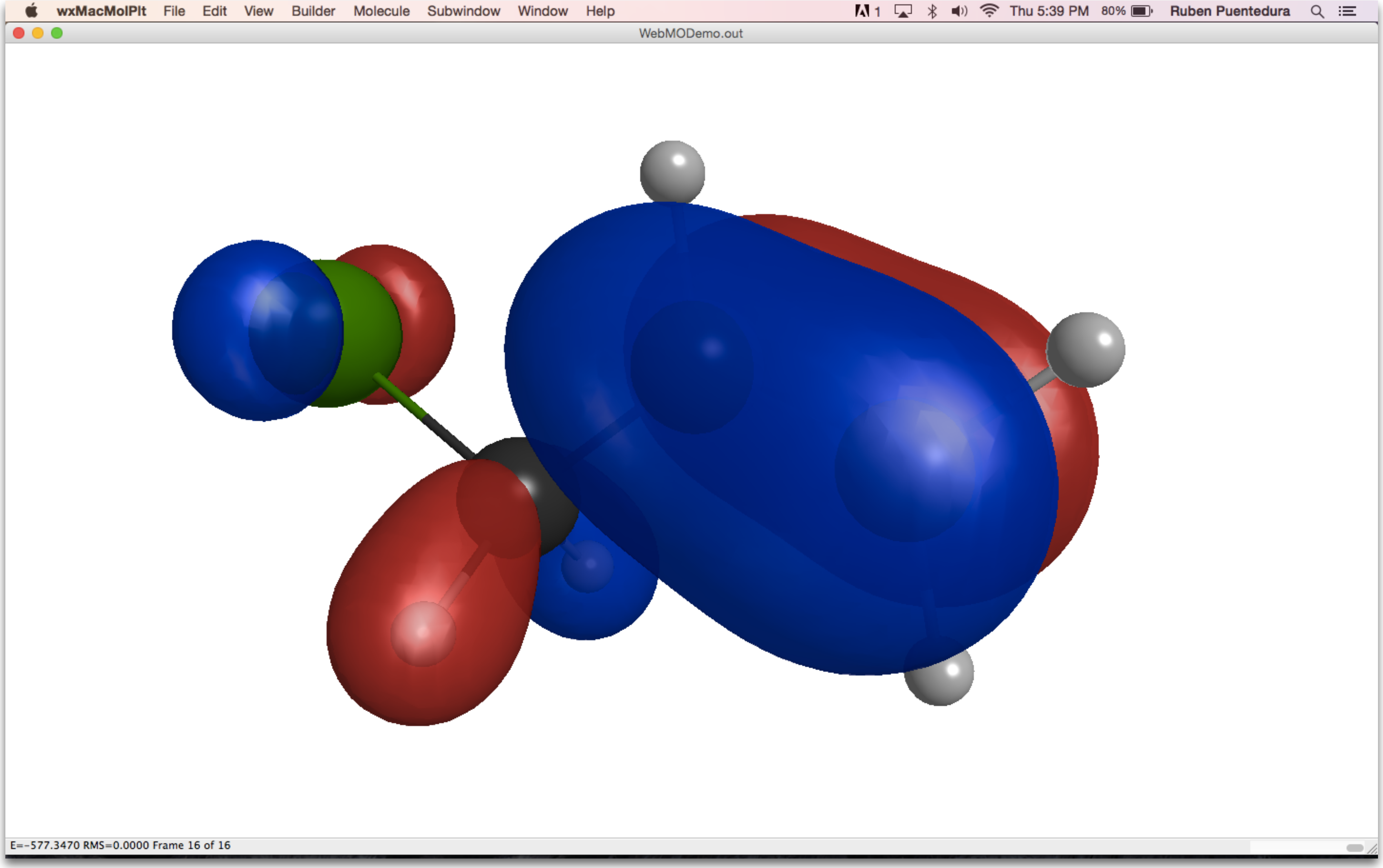
Build molecule
Choose engine
Job options
Submit job
Editor help
File
Edit
Tools
View
Build
Adjust
Clean-Up
Calculate
Help
Lookup Molecule
Import Molecule
Export Molecule
---Select Database---
Open...

Build a new molecule using the WebMO editor, or import an existing molecule from a file. Additionally, you can export the molecule to a variety of file formats.

View Mode – Zoom (drag up = bigger; drag down = smaller)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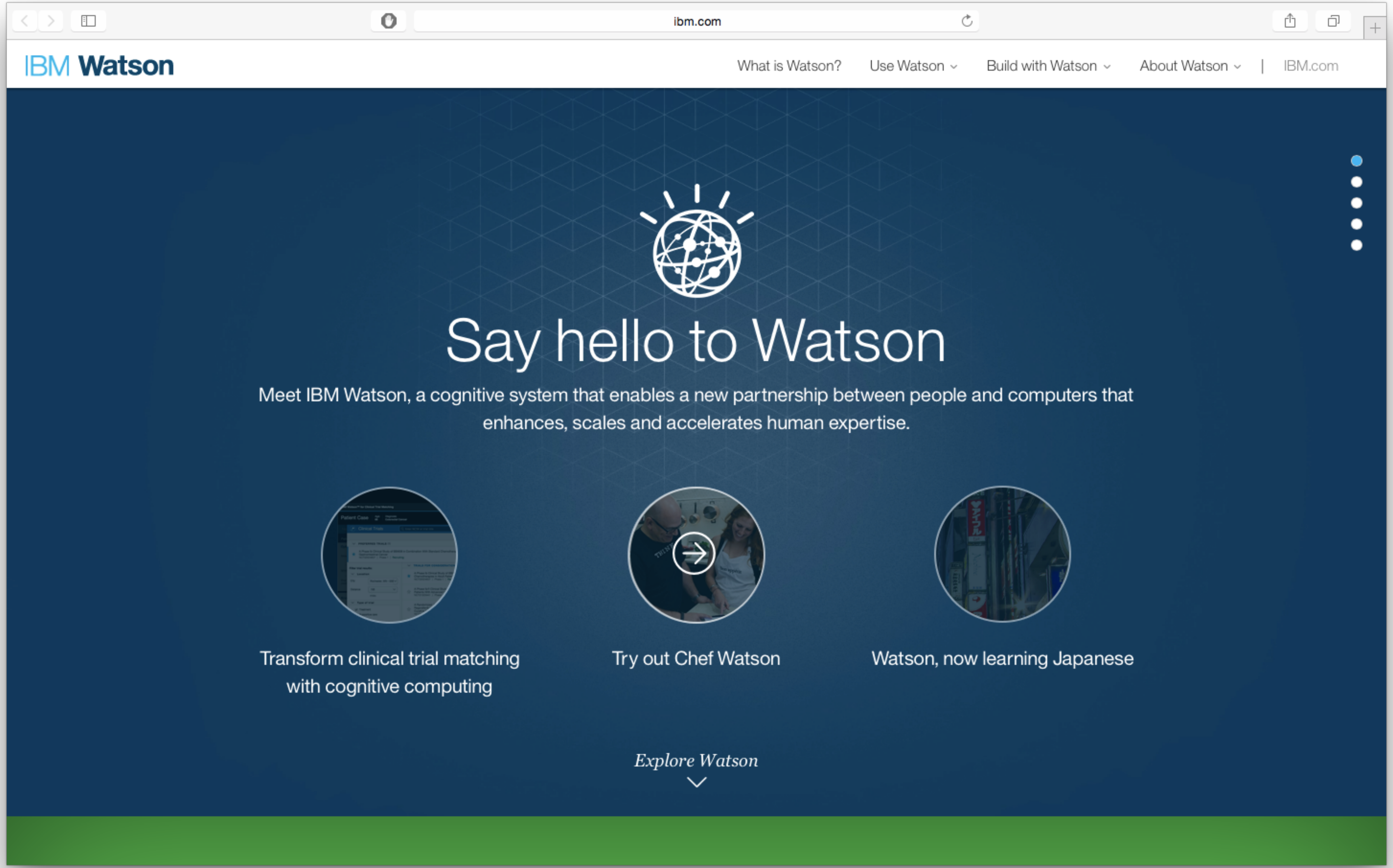
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Build with Watson
About Watson
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Say hello to Watson

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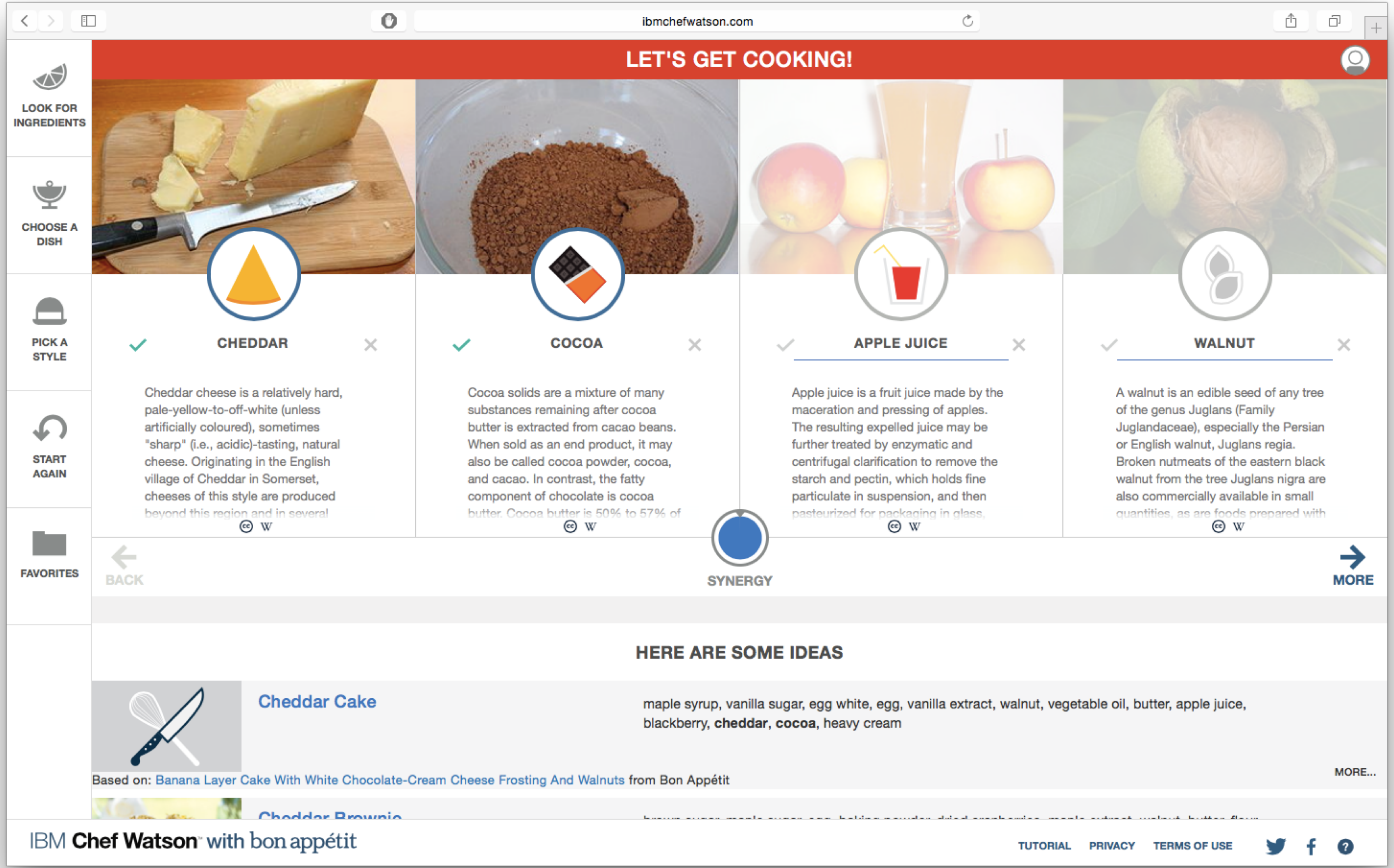
Transform clinical trial matching with cognitive computing

Try out Chef Watson

Watson, now learning Japanese

Explore Watson



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LOOK FOR INGREDIENTS
CHOOSE A DISH
PICK A STYLE
START AGAIN
FAVORITES

LET'S GET COOKING!

CHEDDAR

Cheddar cheese is a relatively hard, pale-yellow-to-off-white (unless artificially coloured), sometimes "sharp" (i.e., acidic)-tasting, natural cheese. Originating in the English village of Cheddar in Somerset, cheeses of this style are produced beyond this region and in several

COCOA

Cocoa solids are a mixture of many substances remaining after cocoa butter is extracted from cacao beans. When sold as an end product, it may also be called cocoa powder, cocoa, and cacao. In contrast, the fatty component of chocolate is cocoa butter. Cocoa butter is 50% to 57% of

APPLE JUICE

Apple juice is a fruit juice made by the maceration and pressing of apples. The resulting expelled juice may be further treated by enzymatic and centrifugal clarification to remove the starch and pectin, which holds fine particulate in suspension, and then pasteurized for packaging in glass,

WALNUT

A walnut is an edible seed of any tree of the genus Juglans (Family Juglandaceae), especially the Persian or English walnut, Juglans regia. Broken nutmeats of the eastern black walnut from the tree Juglans nigra are also commercially available in small quantities, as are foods prepared with

BACK
SYNERGY
MORE

HERE ARE SOME IDEAS

Cheddar Cake

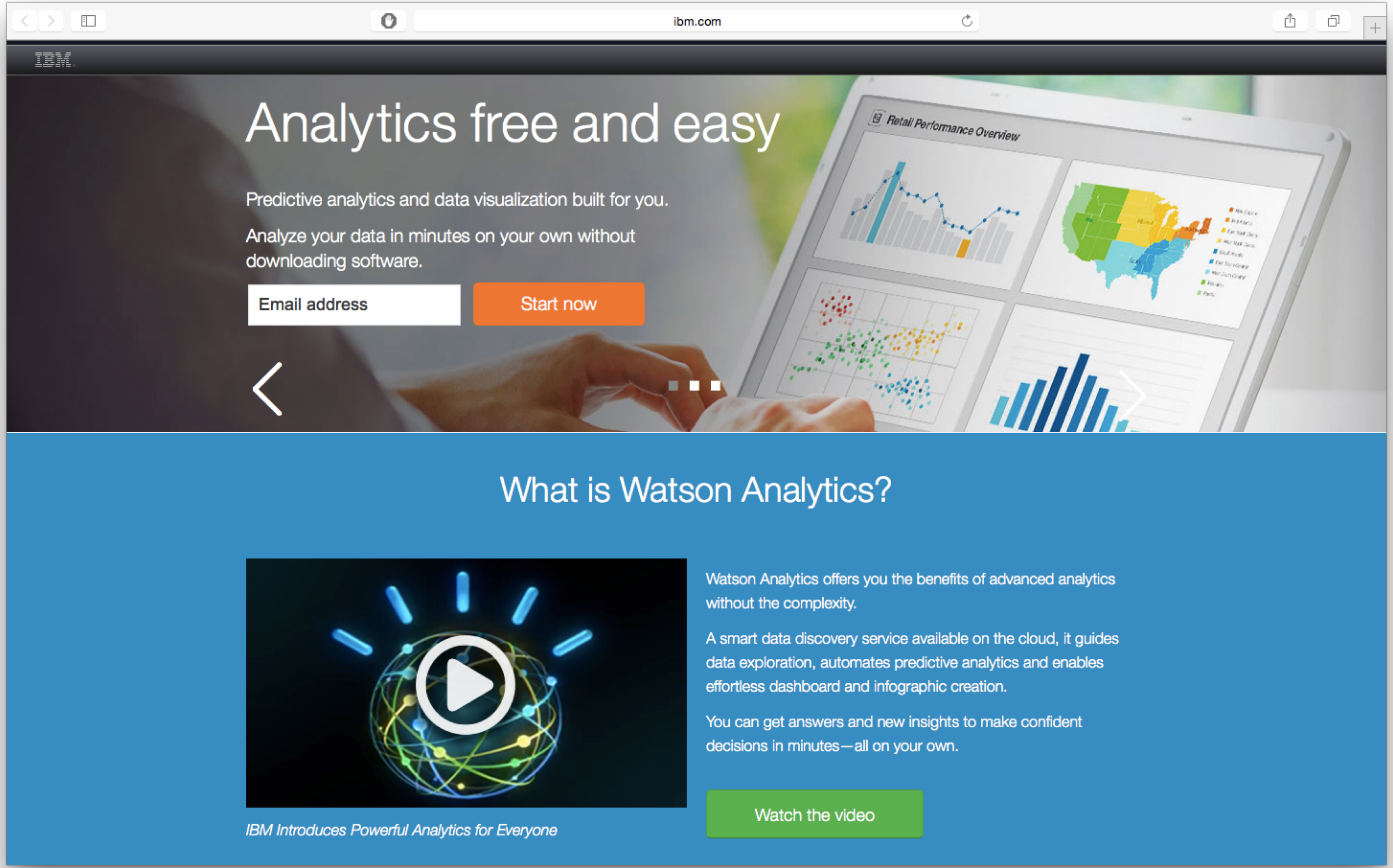
maple syrup, vanilla sugar, egg white, egg, vanilla extract, walnut, vegetable oil, butter, apple juice, blackberry, **cheddar**, **cocoa**, heavy cream

MORE...

Based on: Banana Layer Cake With White Chocolate-Cream Cheese Frosting And Walnuts from Bon Appétit

Cheddar Brownie

IBM Chef Watson with bon appétit
TUTORIAL
PRIVACY
TERMS OF USE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Analytics free and easy

Predictive analytics and data visualization built for you.

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What is Watson Analytics?

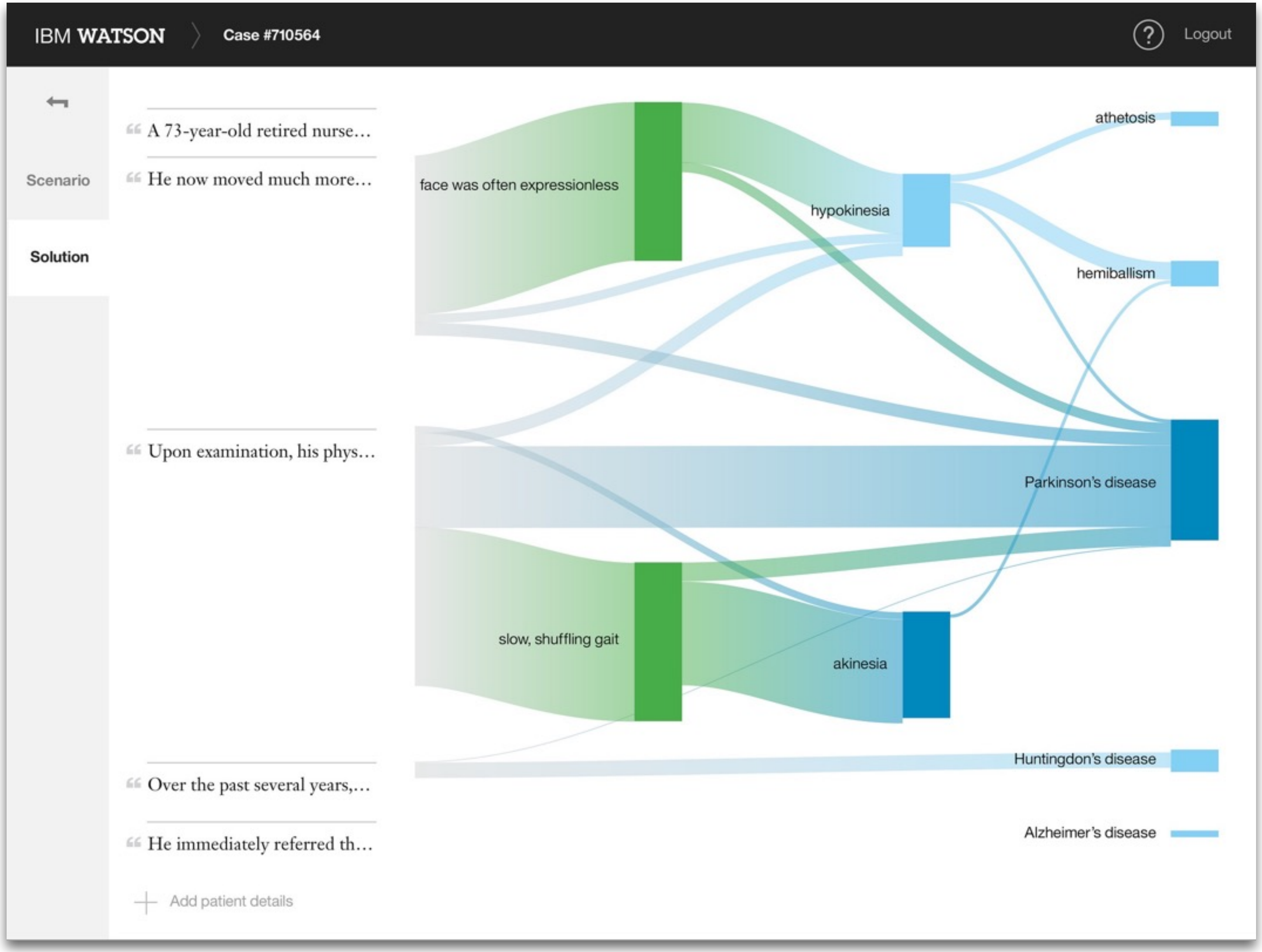
IBM Introduces Powerful Analytics for Everyone

Watson Analytics offers you the benefits of advanced analytics without the complexity.

A smart data discovery service available on the cloud, it guides data exploration, automates predictive analytics and enables effortless dashboard and infographic creation.

You can get answers and new insights to make confident decisions in minutes—all on your own.

IBM Research – WatsonPaths


IBM WATSON
Case #710564
Logout
Scenario
Solution
Add patient details
face was often expressionless
hypokinesia
athetosis
hemiballism
Parkinson's disease
slow, shuffling gait
akinesia
Huntingdon's disease
Alzheimer's disease

“ A 73-year-old retired nurse…

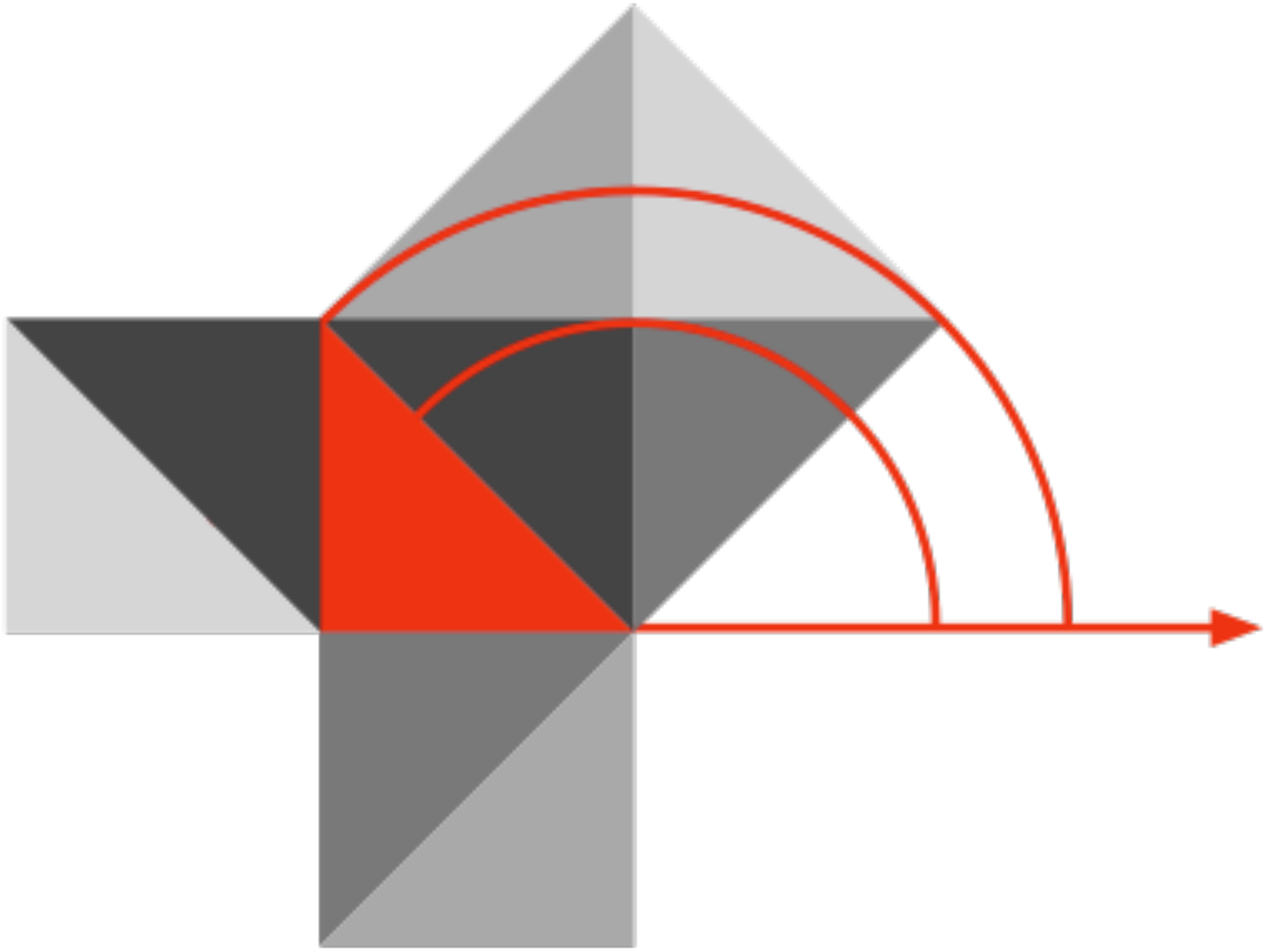
“ He now moved much more…

“ Upon examination, his phys…

“ Over the past several years,…

“ He immediately referred th…

Hippasus



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