

An Intro to SAMR: Building Ladders

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

Competency Concept	Evaluate Historical Accounts	Interpret Primary Sources	Apply Chronological Reasoning	Contextualize	Construct Acceptable Historical Accounts
History as an Interpretive Account					
The Relationship of Past and Present					
Historical Evidence					
Complex Causality					
Significance					

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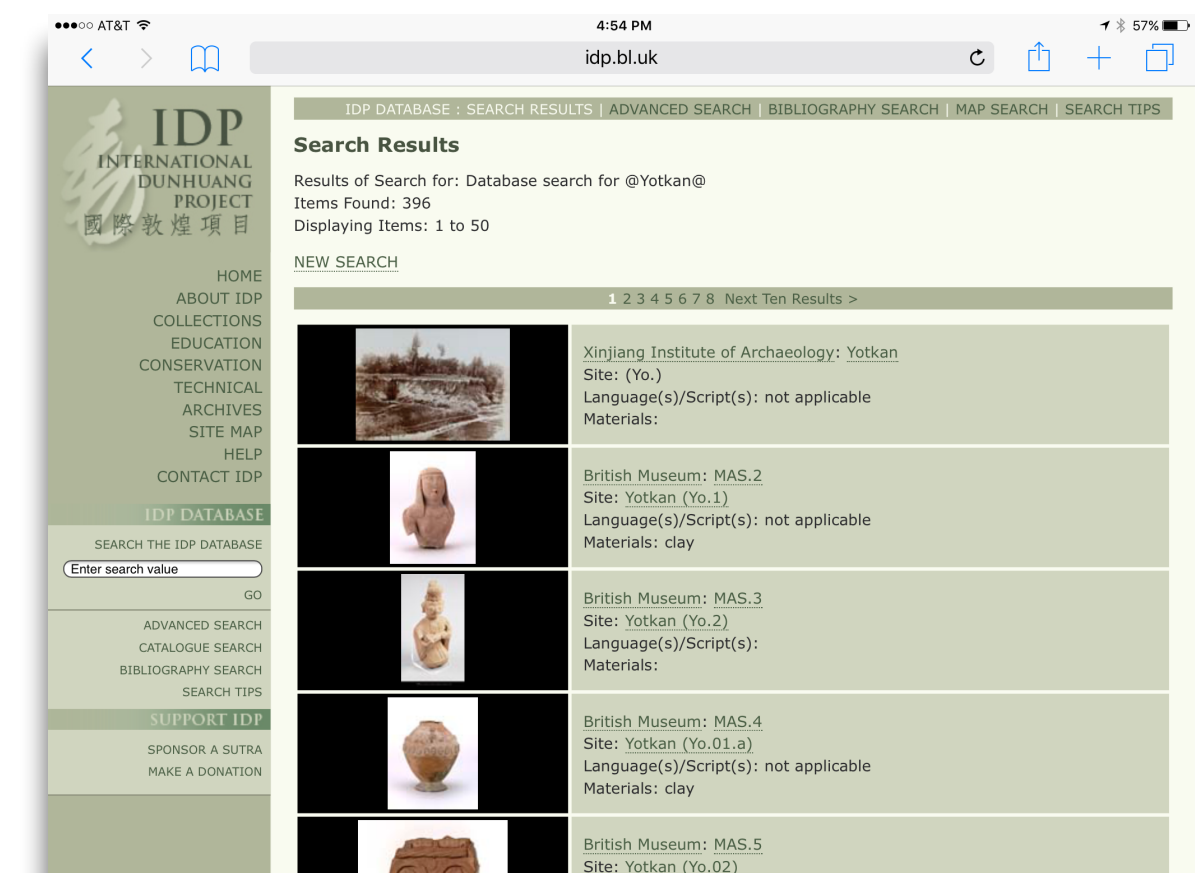
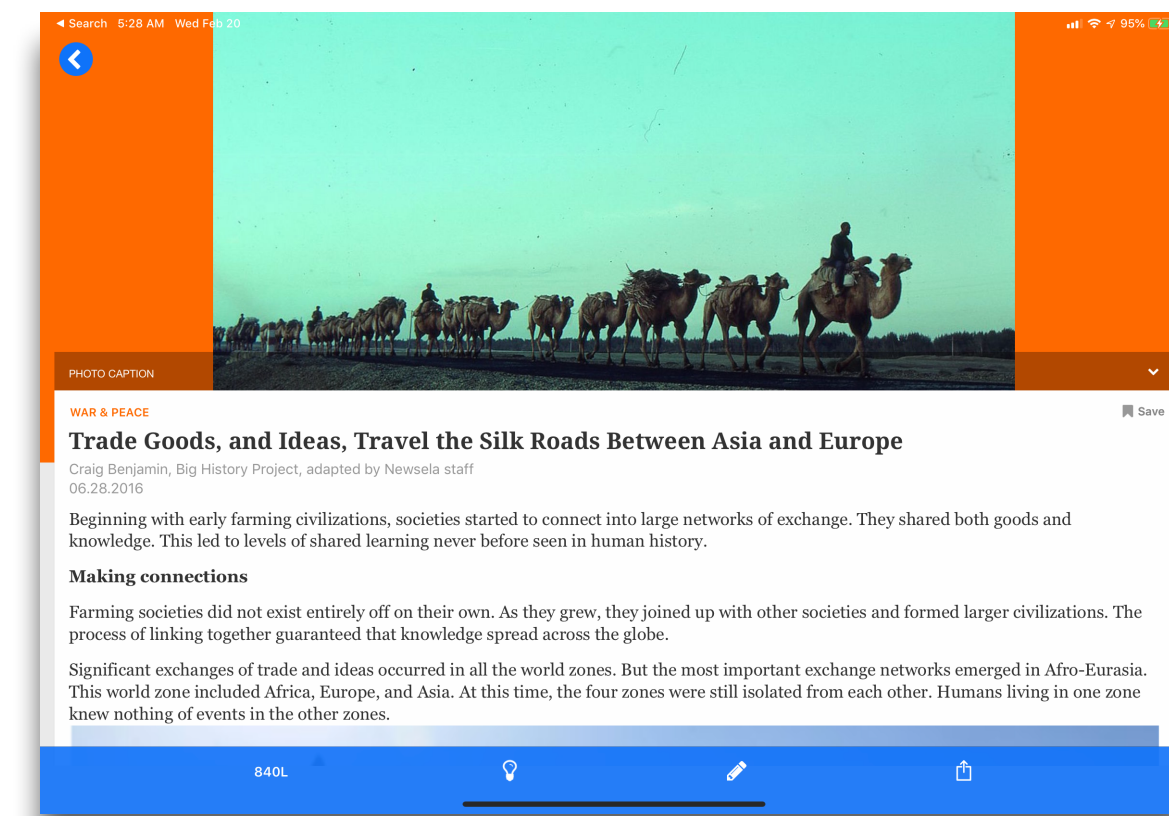
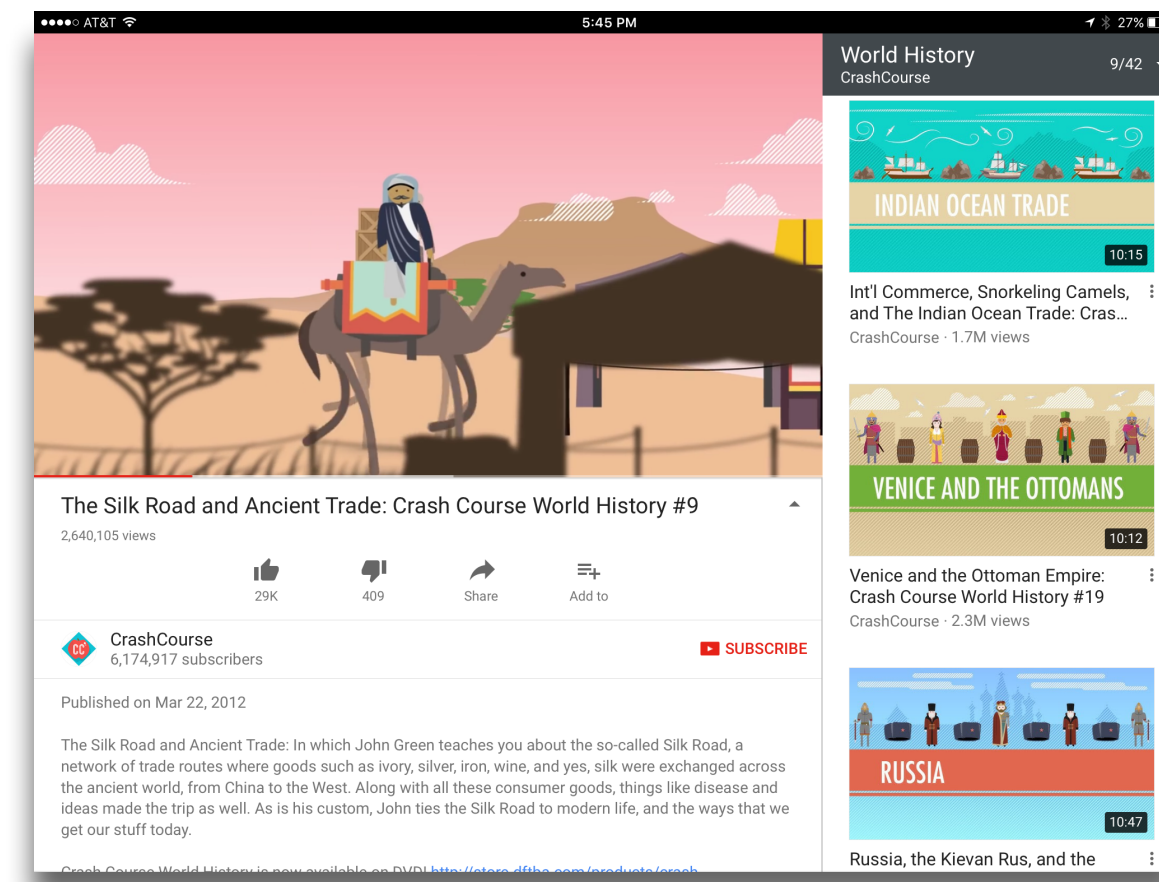
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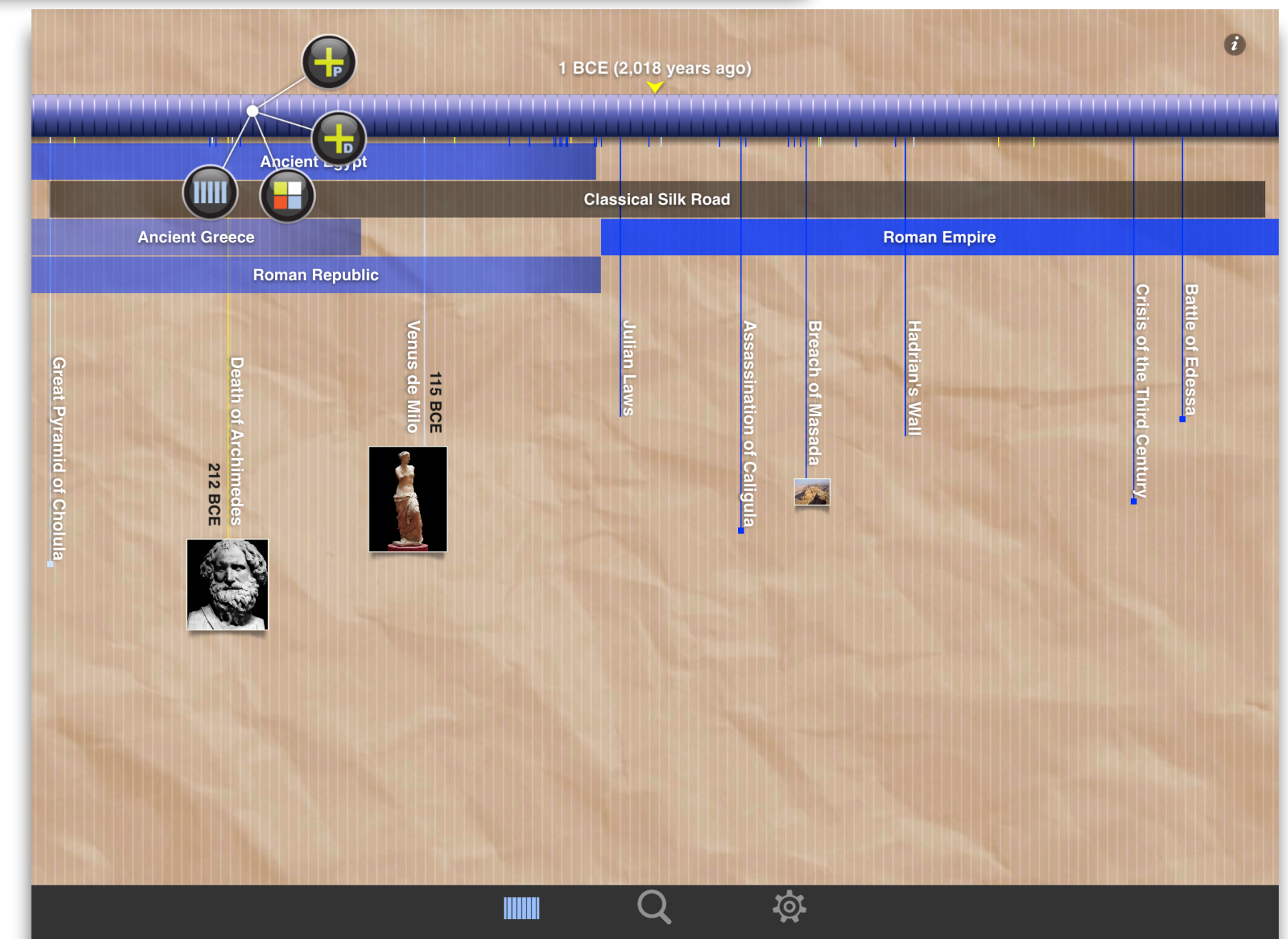
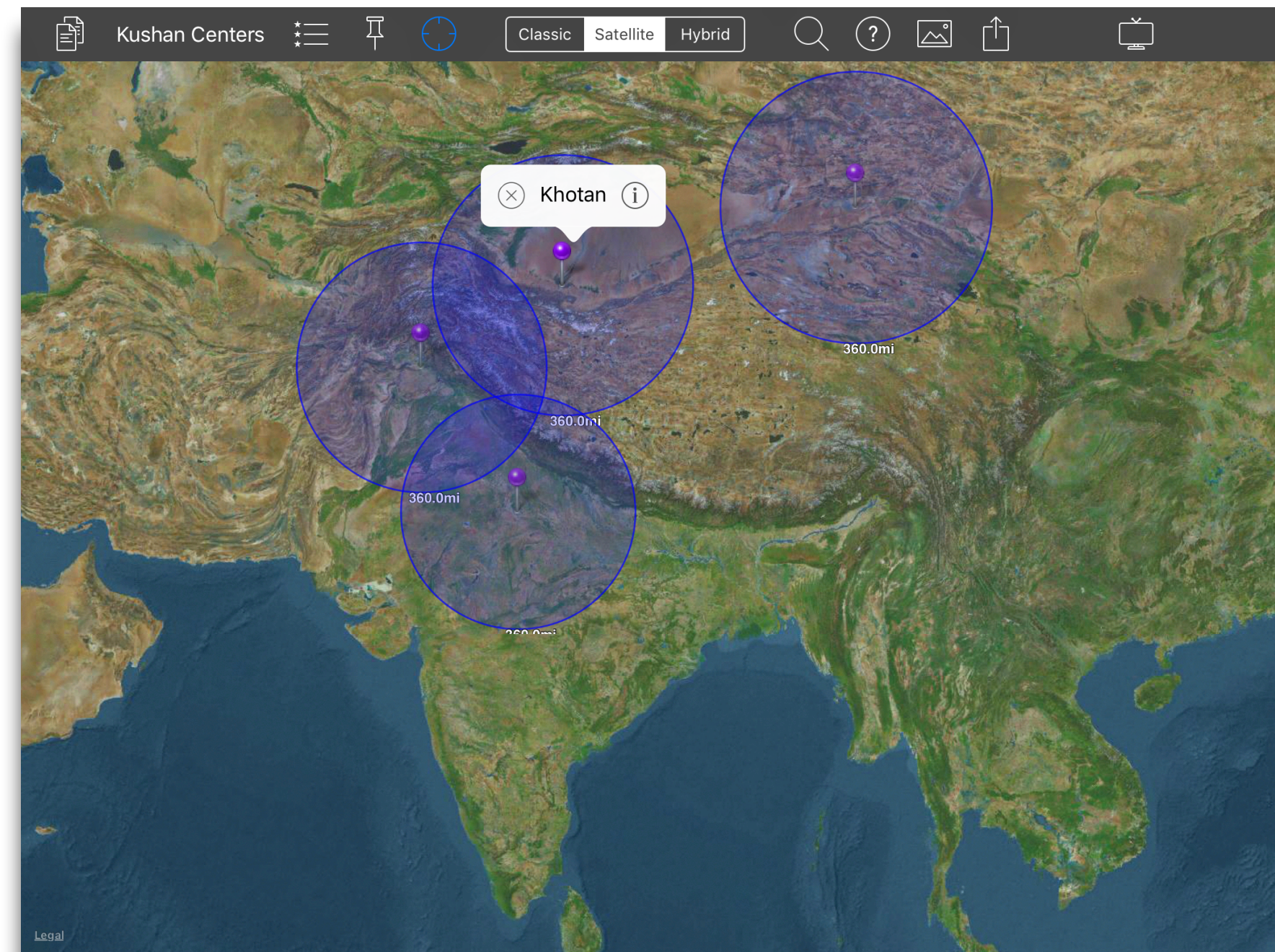
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The screenshot displays a mobile browser interface for a StoryMapJS application. The browser's address bar shows the URL `storymap.knightlab.com`. The application's navigation bar includes buttons for "My Maps", "Options", "Save", "Publish Changes", "Help", and "Share". Below the navigation bar, there are tabs for "Edit" and "Preview". The main content area features a map of Central and South Asia, with a dashed line tracing the Silk Road route. A red pin is placed on the map, and a small image of a lute is overlaid on it. To the right of the map, the title "THE LUTE AND THE SILK ROAD" is displayed in large, bold, black letters. Below the title is a photograph of a person playing a lute. A red button labeled "Start Exploring" is positioned at the bottom right of the map area. The footer of the application contains the text "StoryMapJS | Leaflet | Map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under CC BY SA."

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The screenshot shows a mobile presentation app interface. At the top, the status bar displays "AT&T", "12:59 AM", and "100%". The app title is "Presentations" and the slide title is "Cahokia and Trade". The slide content includes:

- A thumbnail of the current slide in the top-left corner.
- A thumbnail of the next slide (slide 2) in the top-left corner.
- A large historical map of Illinois with French text labels such as "le Malcourens ou Nation du Feu", "les Quicapou", "Ancien Village des Illinois", and "Rivière le-Rocher".
- A satellite map of the United States with a red circle highlighting the location of Cahokia Mounds in Illinois.
- A photograph of a grassy hill with a red line indicating a path or feature, with the text "Photo Credit: Steve Moses" at the bottom.

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Extended Thinking

Strategic Thinking

Skills and Concepts

Recall and Reproduction

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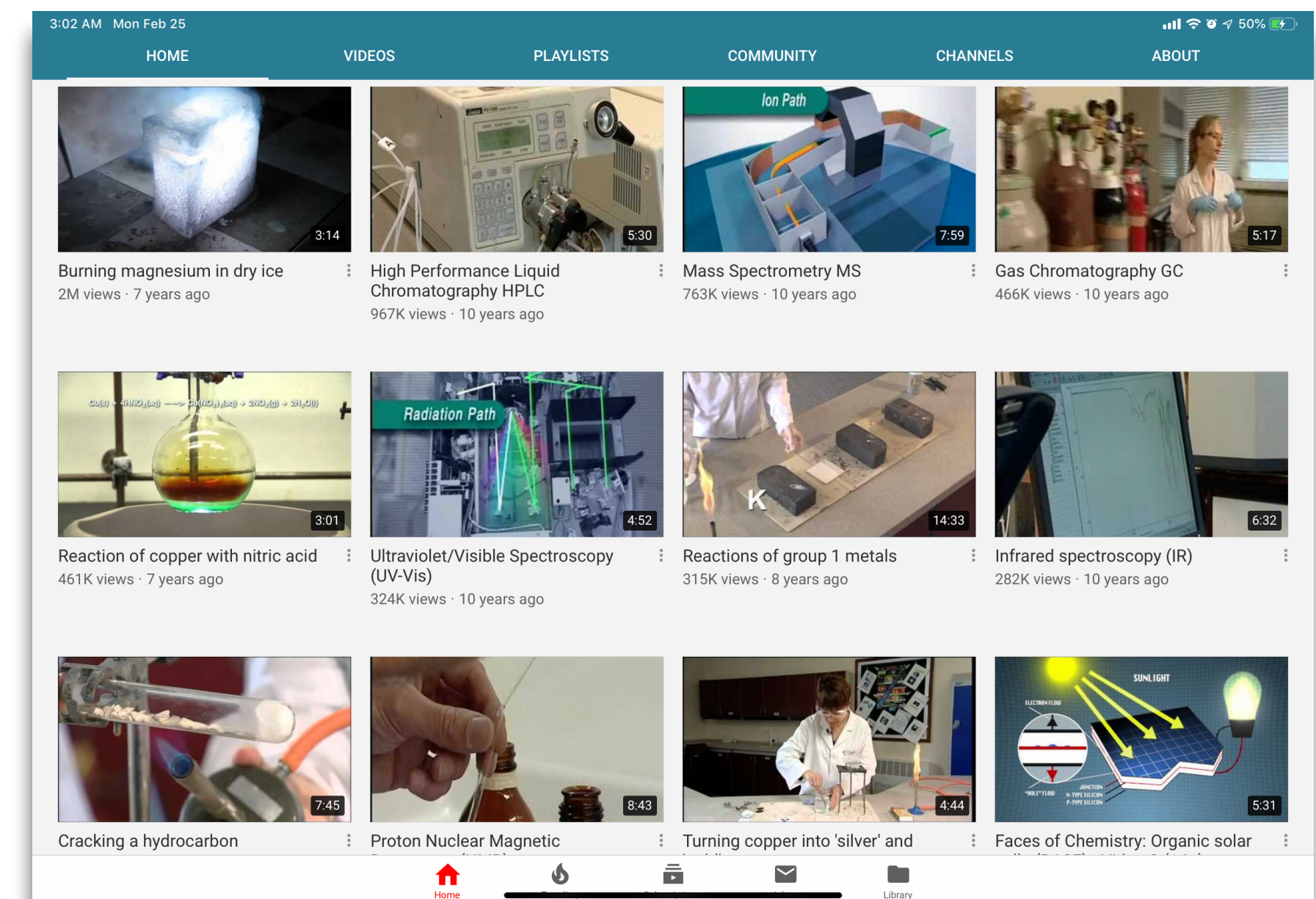
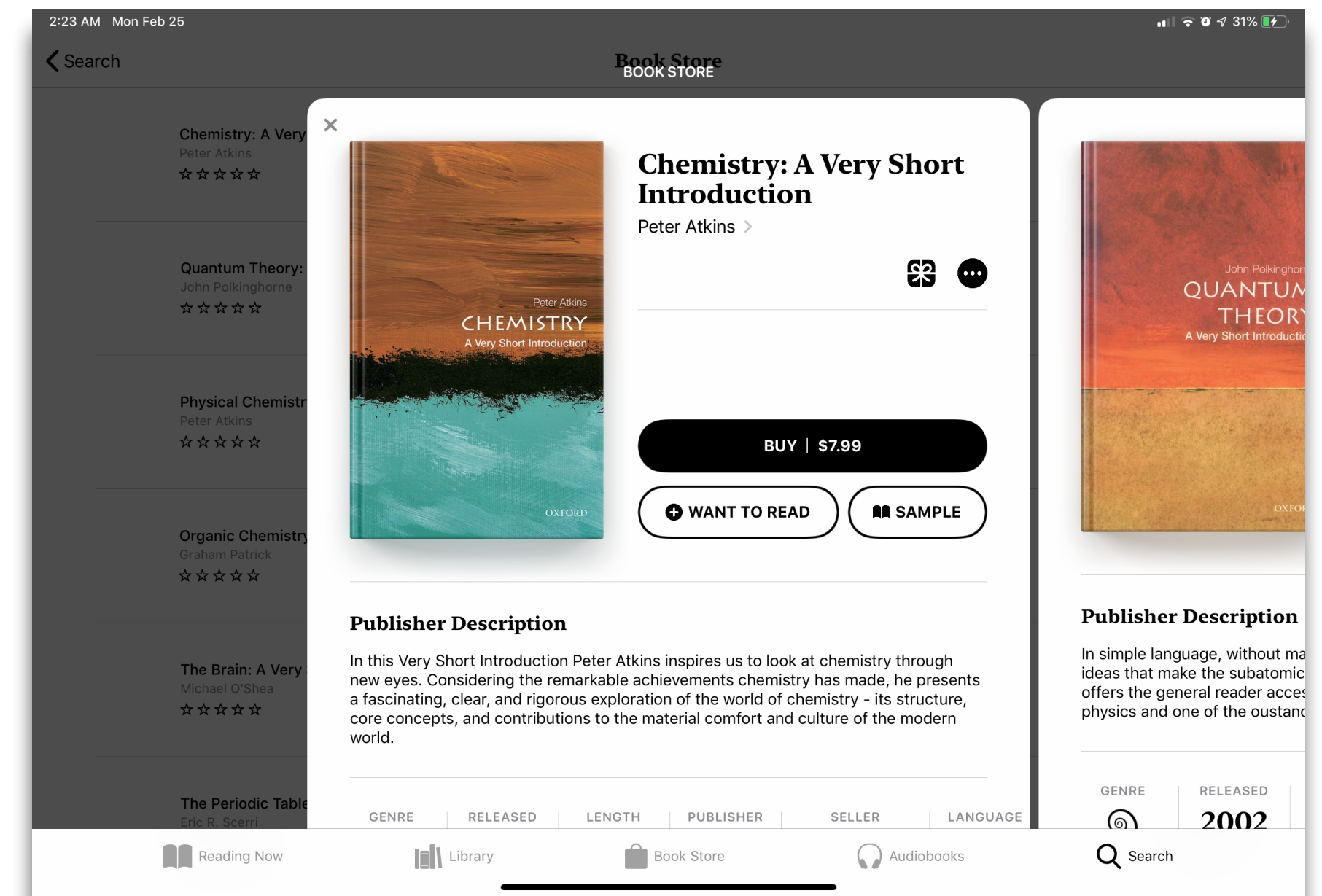
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Skills and Concepts

WolframAlpha Chemistry interface showing a chemical reaction and its thermodynamic properties.

Input: $0.2 \text{ mol CH}_4 + \text{O}_2 \rightarrow 7 \text{ mL H}_2\text{O} + \text{CO}_2$

Chemical Reactions

Balance a chemical equation:

octane + O₂ → water + CO₂

Calculate reaction stoichiometry:

0.2 mol CH₄ + O₂ → 7 mL H₂O + CO₂

Find chemical reactions using reactants or products:

hydrogen + oxygen →

→ nitrate

Chemical Thermodynamics

Find properties of a substance in a given phase:

trimethylamine gas

Compute properties at a specified temperature:

vapor pressure of ethanol at 300K

Do computations with the Arrhenius equation:

Arrhenius equation

Estimate thermodynamic properties using the Joback method:

2,3-methano-5,6-dichloroindene

Structures

Skeletal structure

Names

methane + oxygen → water + carbon dioxide

Reaction thermodynamics

Enthalpy

$\Delta H_{\text{rxn}}^{\circ}$ - 965.2 kJ/mol - 74.6 kJ/mol = - 890.6 kJ/mol (exothermic)

Gibbs free energy

$\Delta G_{\text{rxn}}^{\circ}$ - 868.6 kJ/mol - 412.4 kJ/mol = - 1281 kJ/mol (exergonic)

Entropy

$\Delta S_{\text{rxn}}^{\circ}$ 353.8 J/(molK) - 596 J/(molK) = - 242.2 J/(molK) (exoentropic)

Equilibrium constant

$$K_c = \frac{[\text{H}_2\text{O}]^2 [\text{CO}_2]}{[\text{CH}_4] [\text{O}_2]^2}$$


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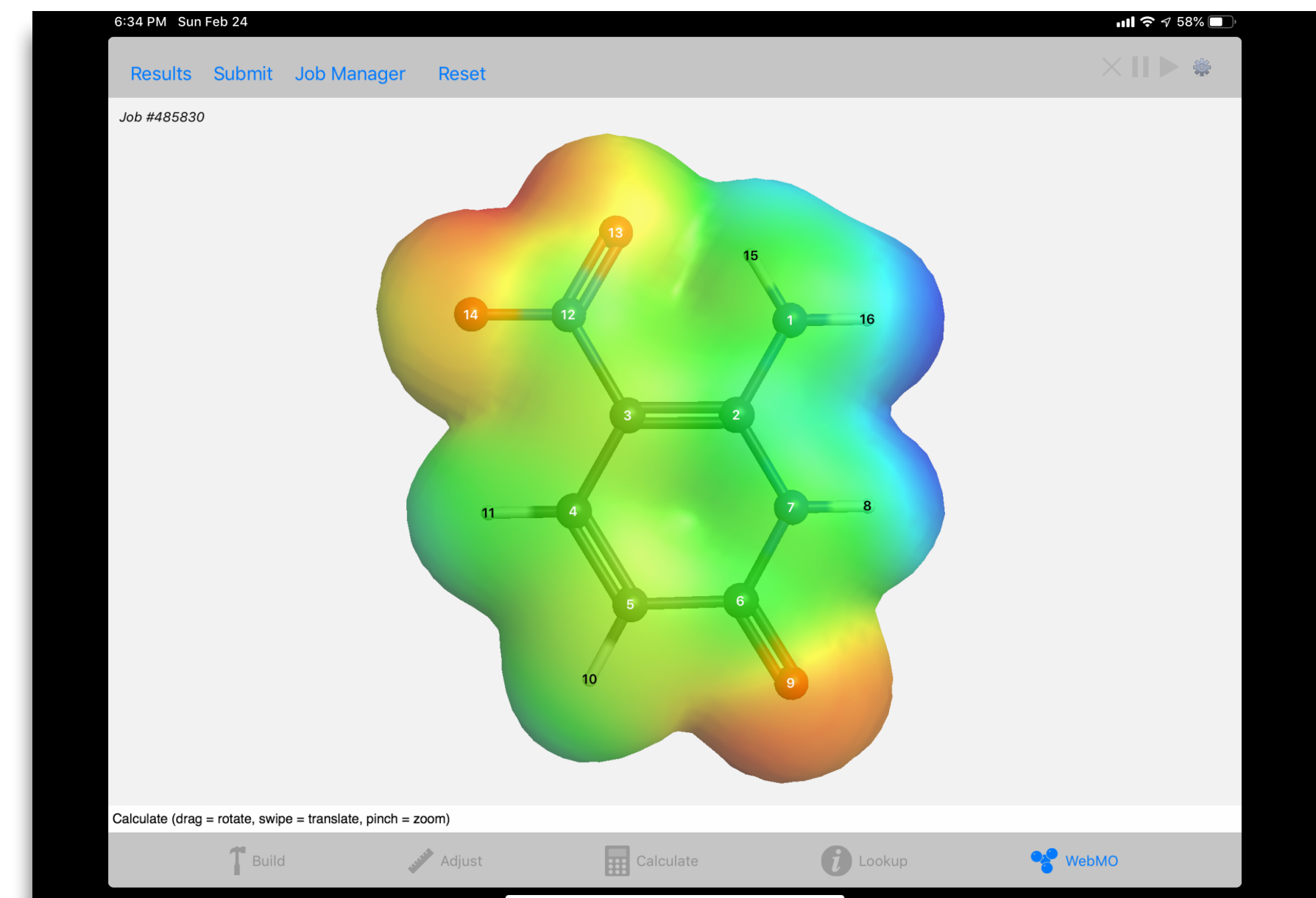
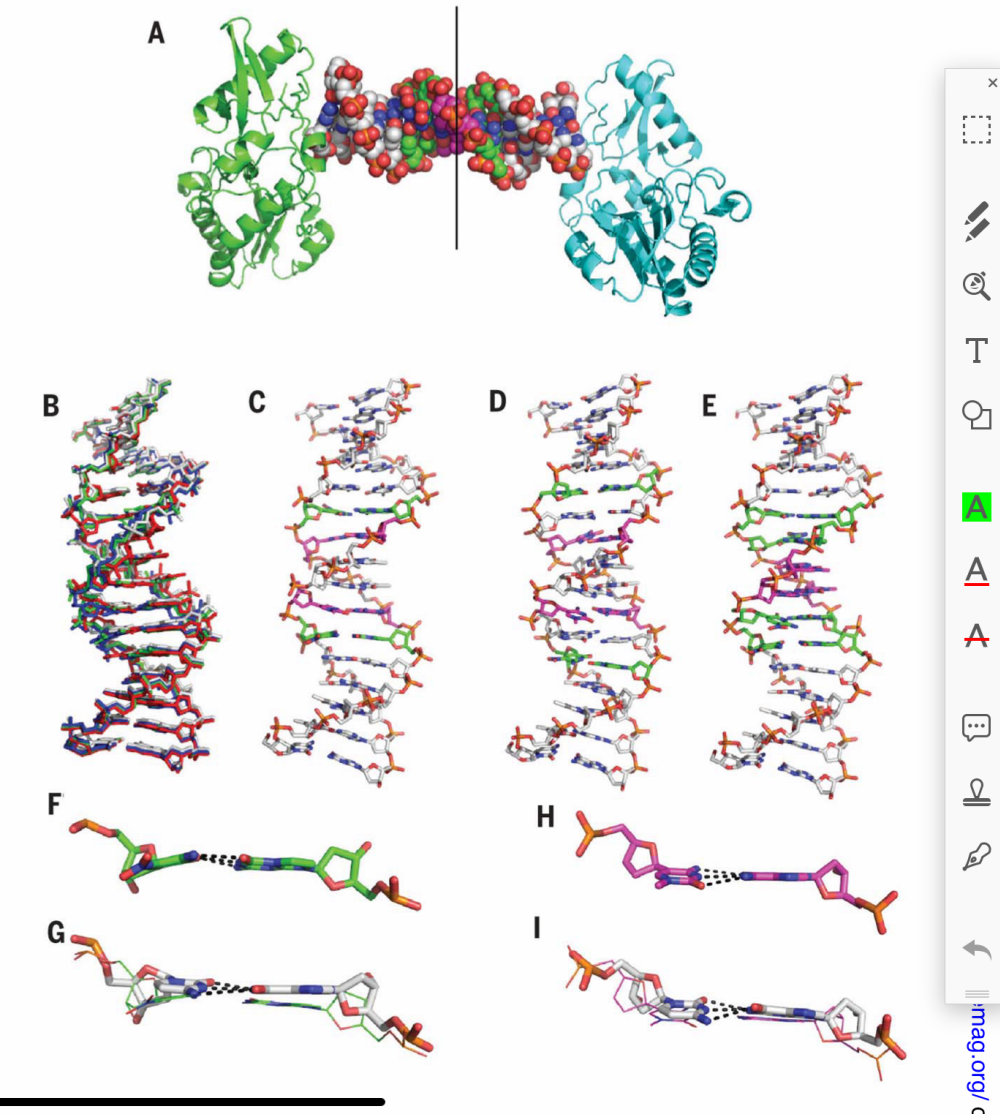
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Strategic Thinking

RESEARCH | REPORT

Fig. 3. Crystal structures of PB, PC, and PP hachimoji DNA. (A) The host-guest complex with two N-terminal fragments from Moloney murine leukemia virus reverse transcriptase (in green and cyan) bound to a 16-mer PP hachimoji DNA; in the duplex sphere model, Z:P pairs are green and S:B pairs are magenta. The asymmetric unit includes one protein molecule and half of the 16-mer DNA, as indicated by the line. (B) Hachimoji DNA structures PB (green), PC (red), and PP (blue) are superimposed with GC DNA (gray). (C) Structure of hachimoji DNA with self-complementary duplex 5'-CTTATPBTASZATAAG ("PB"). (D) Structure of hachimoji DNA with self-complementary duplex 5'-CTTAPCBTASGZTAAG ("PC"). (E) Structure of hachimoji DNA with self-complementary duplex with six consecutive nonstandard 5'-CTTATPPSBZZATAAG (PP) components. DNA structures are shown as stick models with P:Z pairs (carbon atoms, green), B:S pairs (carbon atoms, magenta), and natural pairs (carbon atoms, gray). (F to I) Examples of largest differences in detailed structures. The Z:P pair from the PB structure (F) is more buckled than the corresponding G:C pair (G). The S:B pair from the PB structure (H) exhibits a propeller angle similar to that in the corresponding G:C pair (I).



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Extended Thinking

Modification

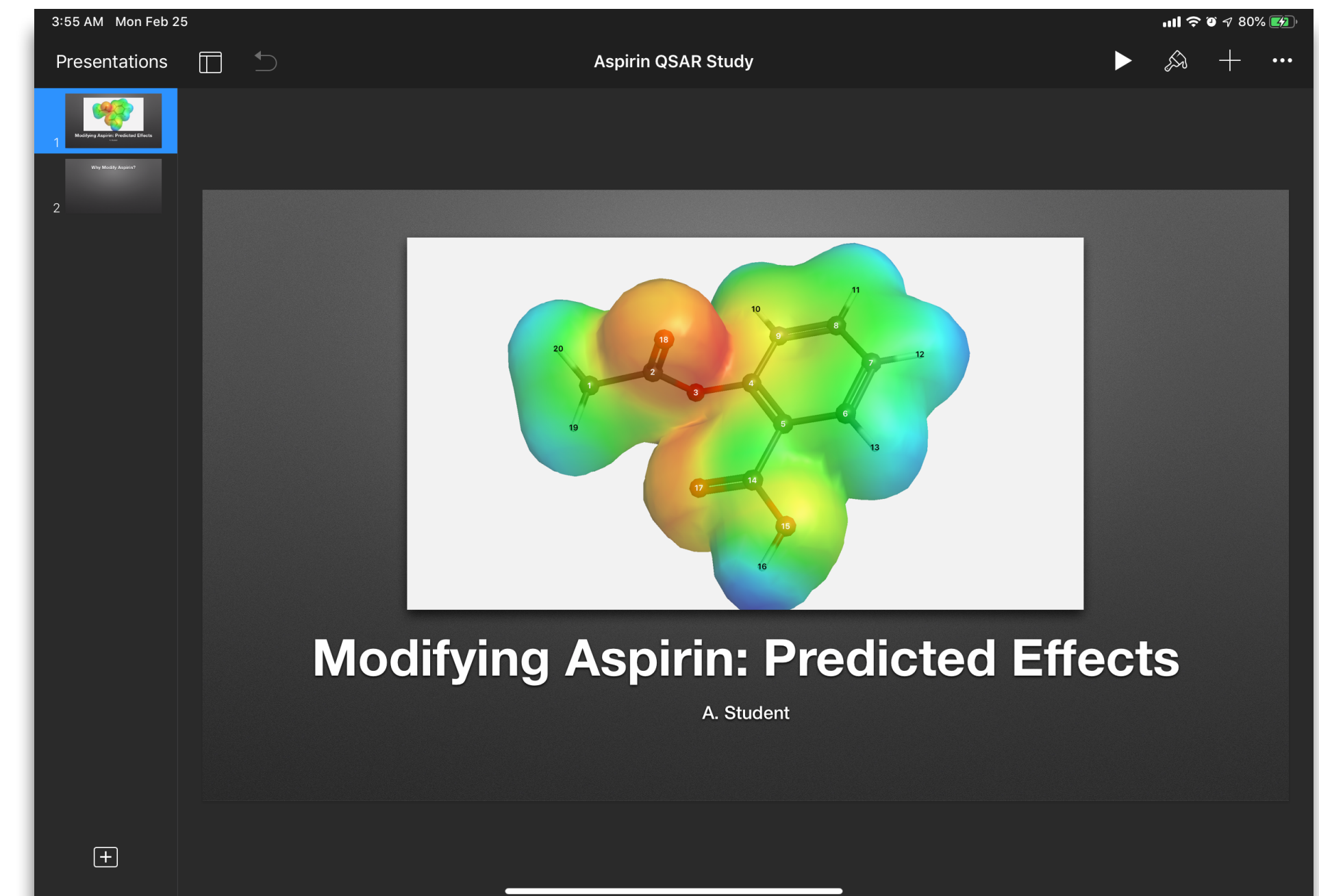
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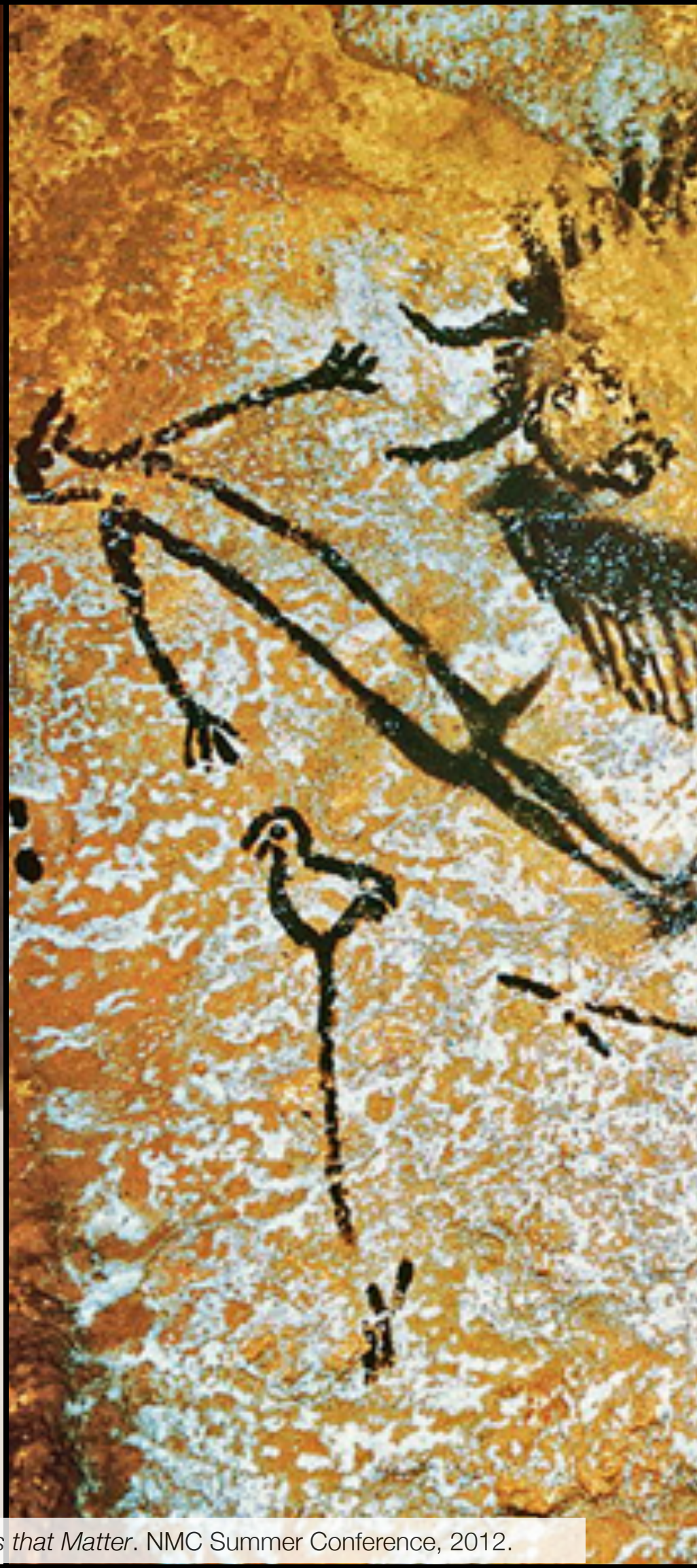

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Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
				

Bookmarks



RSS Feeds

Discussions



Microblogging

Blogging

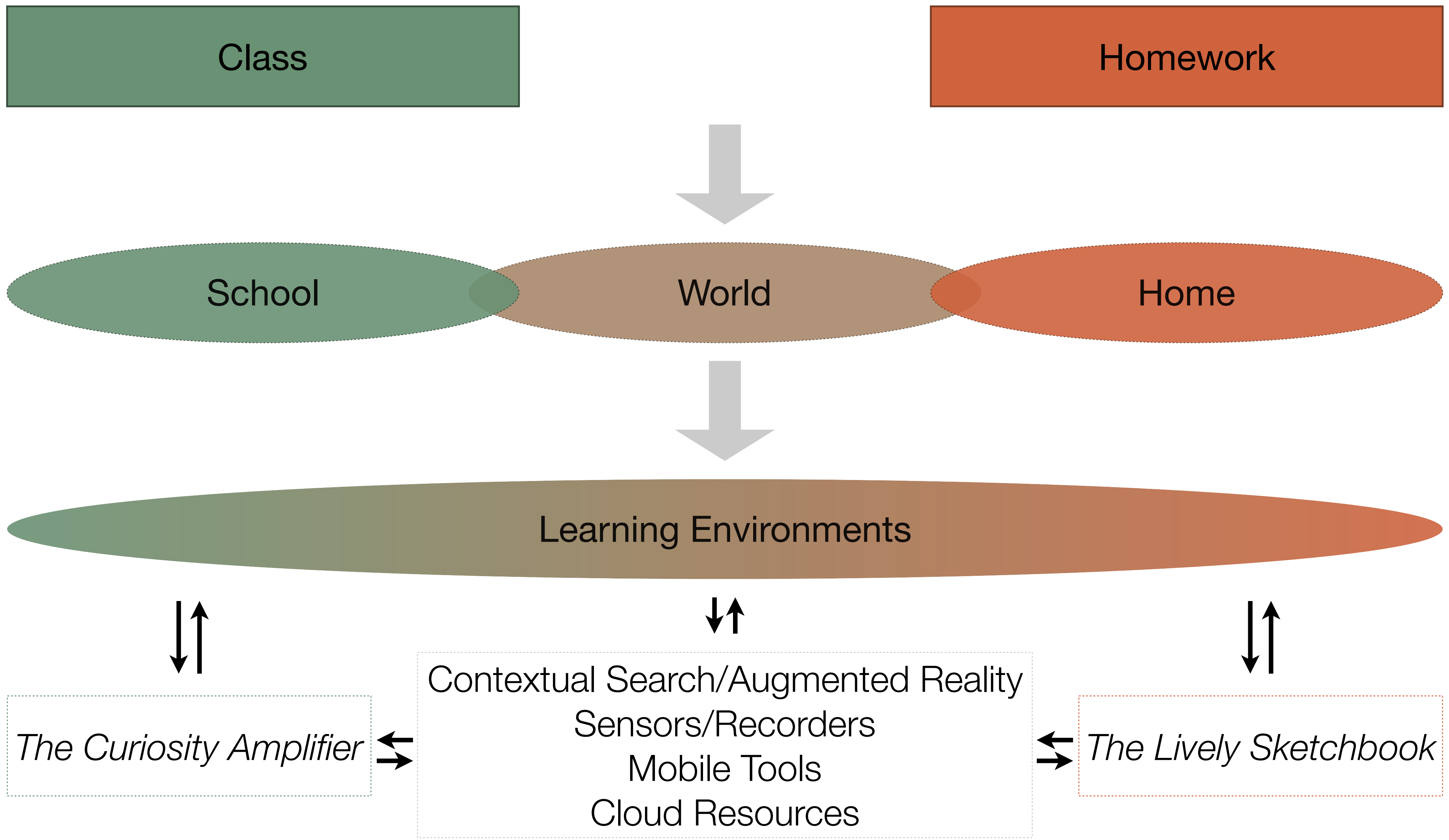


Wikis

Telepresence



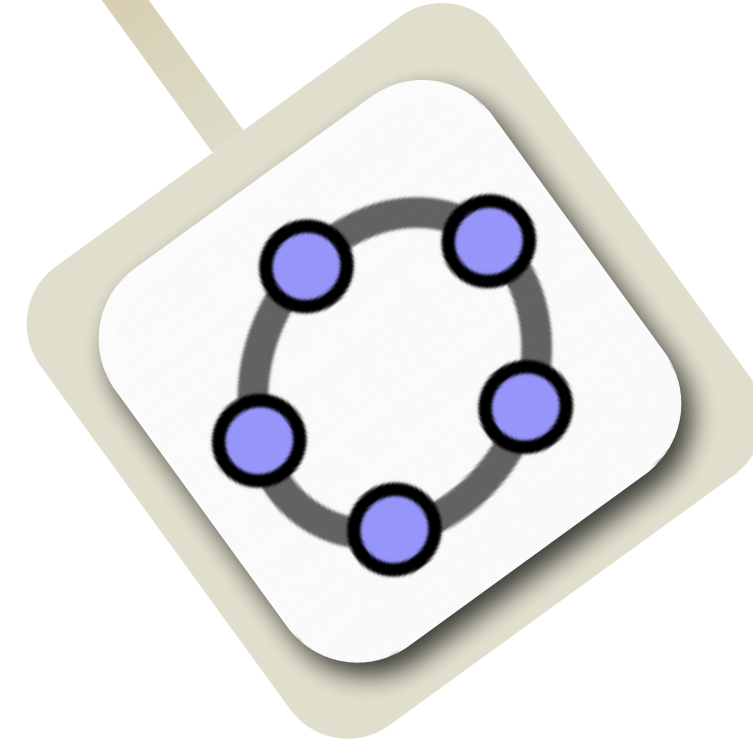
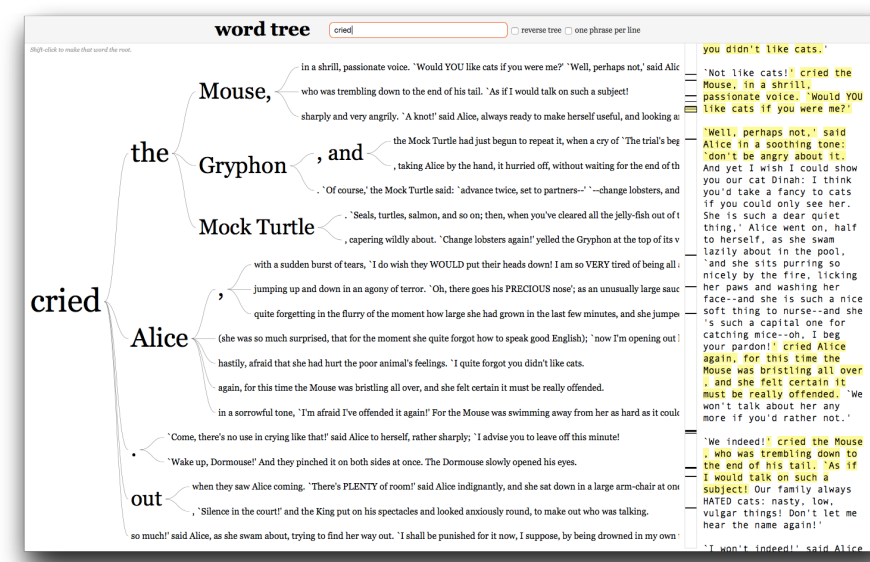
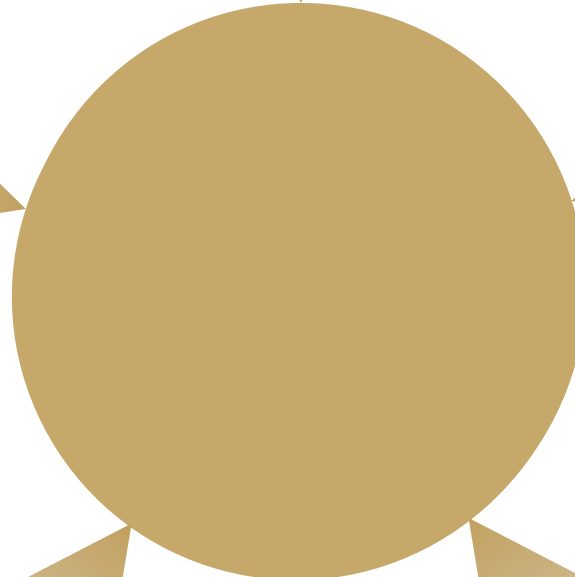
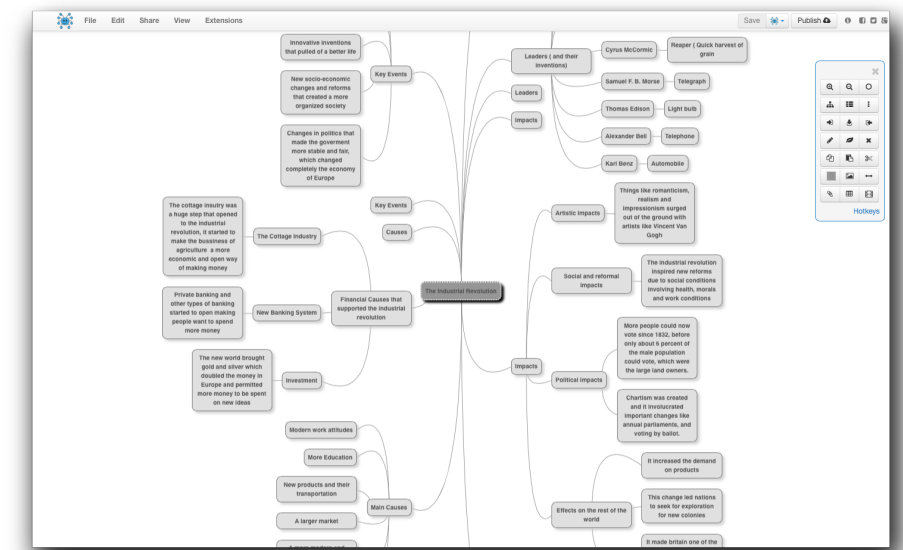
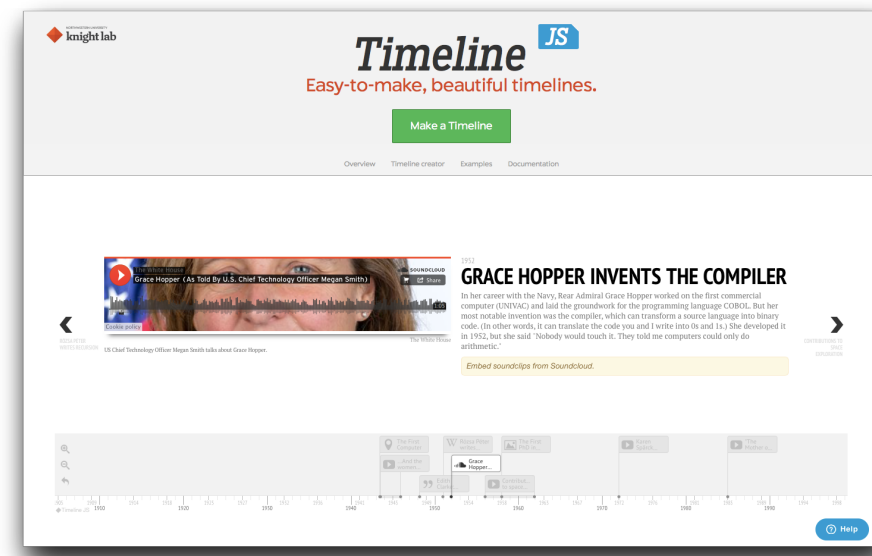
File Sharing



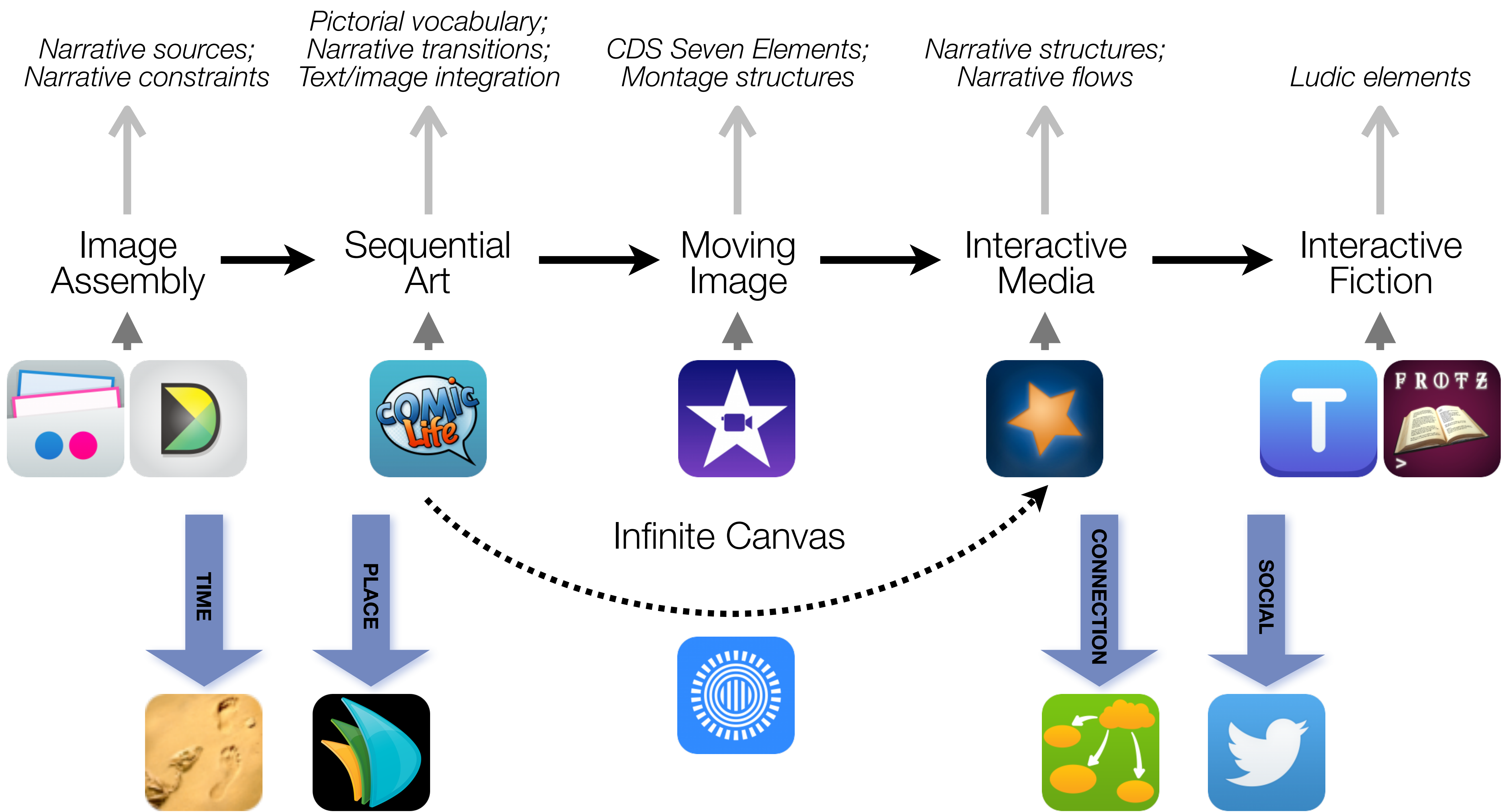
John Seely Brown. "A New Culture of Learning". NMC Summer Conference, Closing Keynote. (2010)

Ruben R. Puentedura, "The Lively Sketchbook". Hippasus Blog. (2010)

Visualization



Storytelling



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

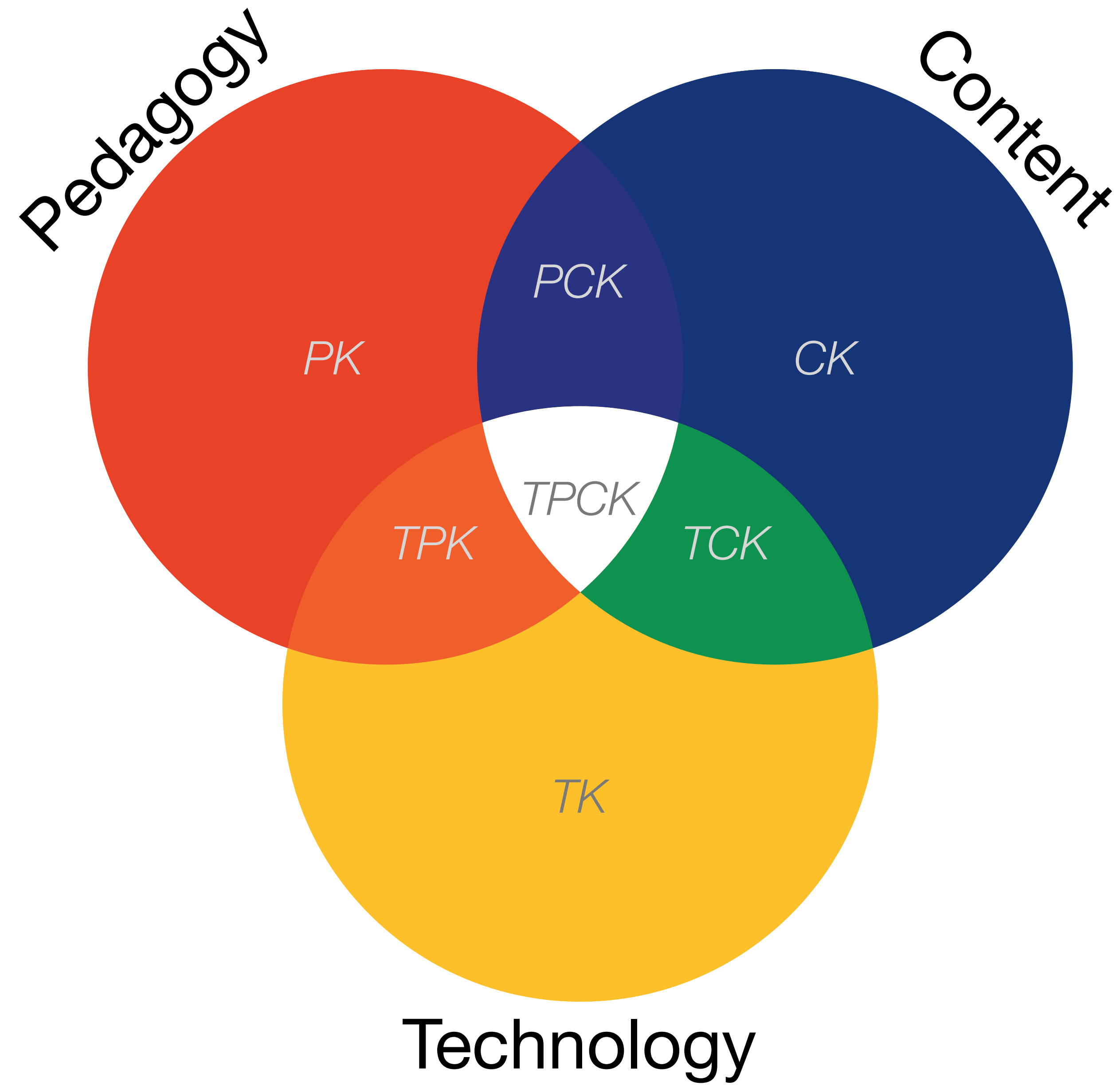
“A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.”

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

S to A: The Value of Shared Practices

- Augmented Note Taking and Annotation
- Visualization Methods:
 - 5 Primary Domains: Space, Time, Networks, Text, Number
- Simple Blogging
- Simple Digital Storytelling Video
- Flipped Classroom:
 - Materials Creation
 - Peer Discussion/Instruction Methods
- Simple Interactive Fiction
- LMS Practices



Building a SAMR Ladder

- Four steps:
 - Select a unit of instruction
 - Redesign the intro to the unit (basic knowledge, materials) at the S level
 - Redesign the development of the unit at the A, M levels
 - Redesign/create a student culminating experience for the unit at the R level

Why Build a Ladder?

- Only one of many possible approaches to redesigning a unit of instruction using SAMR
- Particularly well-suited to “first efforts” in technology-based curricular redesign
- Some advantages in this context:
 - Proximity to existing practice
 - Sustainability of effort
 - Option for gradual implementation

Three Questions (and Followups)

- Which unit of instruction would you like to redesign?
 - Why?
- What did you do before in this unit that worked?
 - Why did you do it?
- What would you like to change or replace?
 - Why?

The Two-Pass Ladder – Pass 1

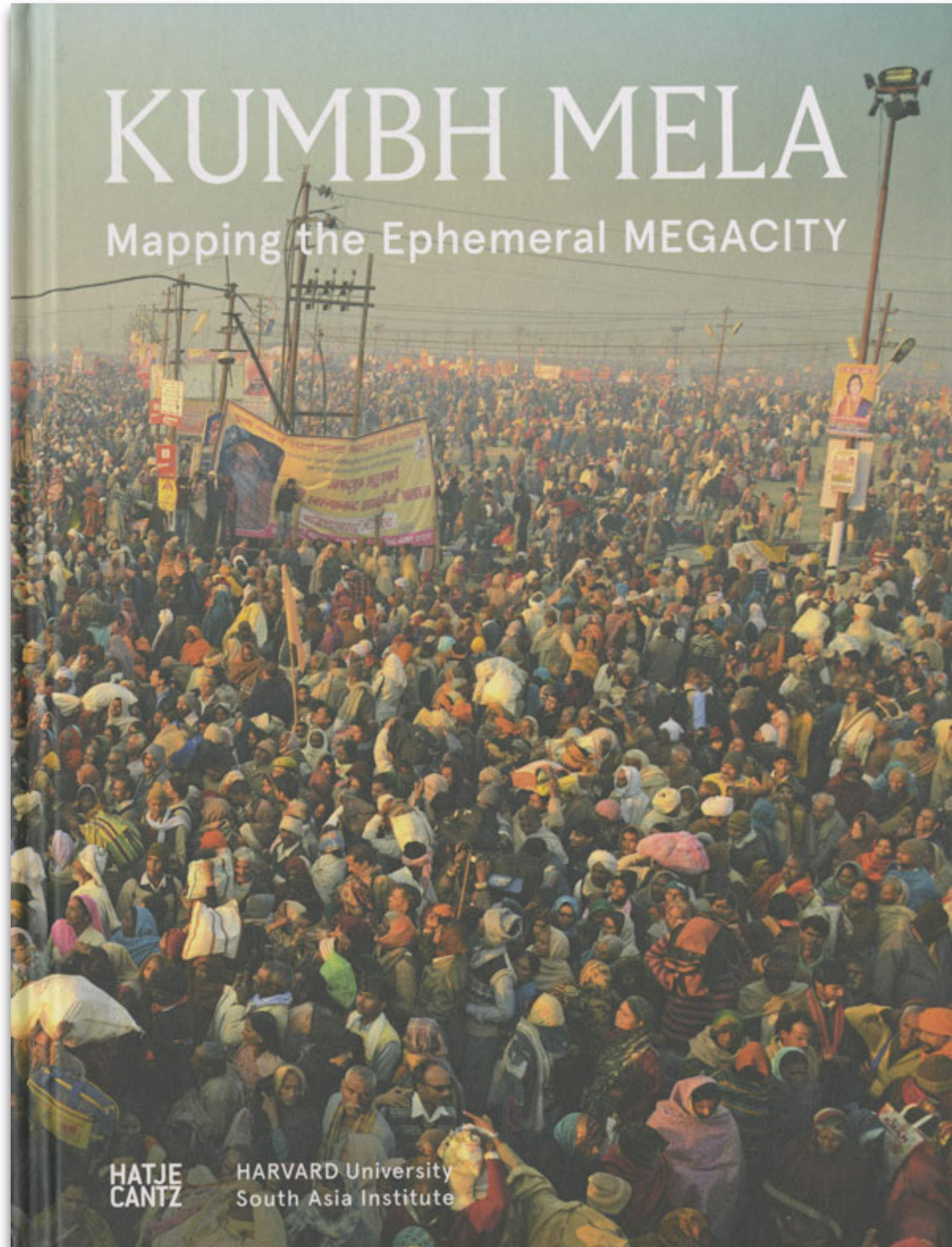
- Redesign at the S/A levels, using **one** of Technology, Pedagogy, or Content as your driver:
 - S: Go for low-hanging fruit, e.g.
 - access to resources
 - coordination of social environments
 - basic approaches to information management
 - A: Go for enhancing what you chose in S, e.g.
 - curation of resources
 - organization of peer discussion/instruction experiences
 - information analysis and visualization

The Two-Pass Ladder – Pass 2

- Now, redesign at the M/R levels for a **different** driver (from Technology, Pedagogy, or Content), but **in light of** the first pass driver:
 - M: Go for defining extended experiences in student exploration/creation that leverage the choices made for A
 - R: Go for student agency, allowing them to build their own exploration/creation using the experiences developed at M

KUMBH MELA

Mapping the Ephemeral MEGACITY



HATJE
CANTZ

HARVARD University
South Asia Institute

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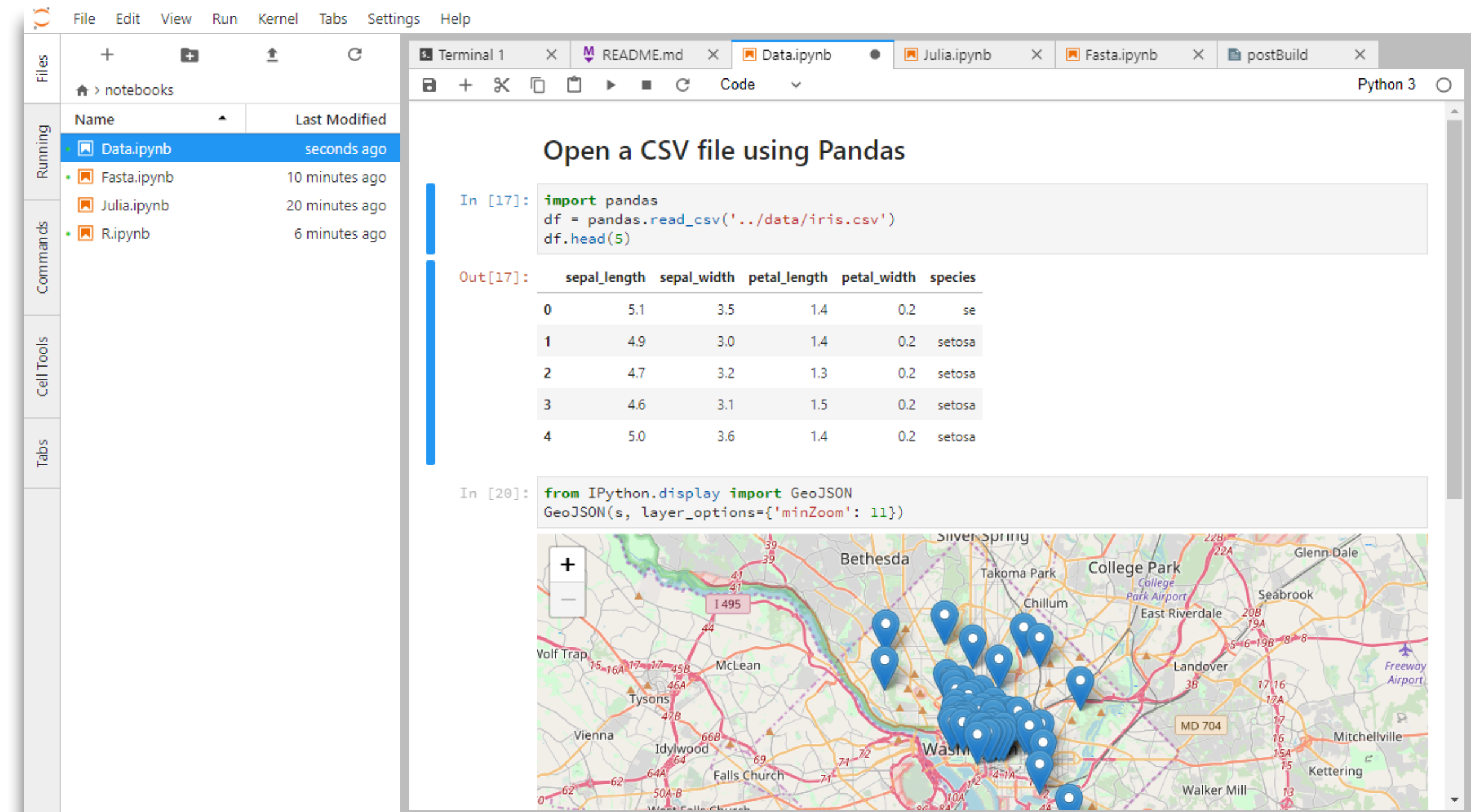
Driver: T

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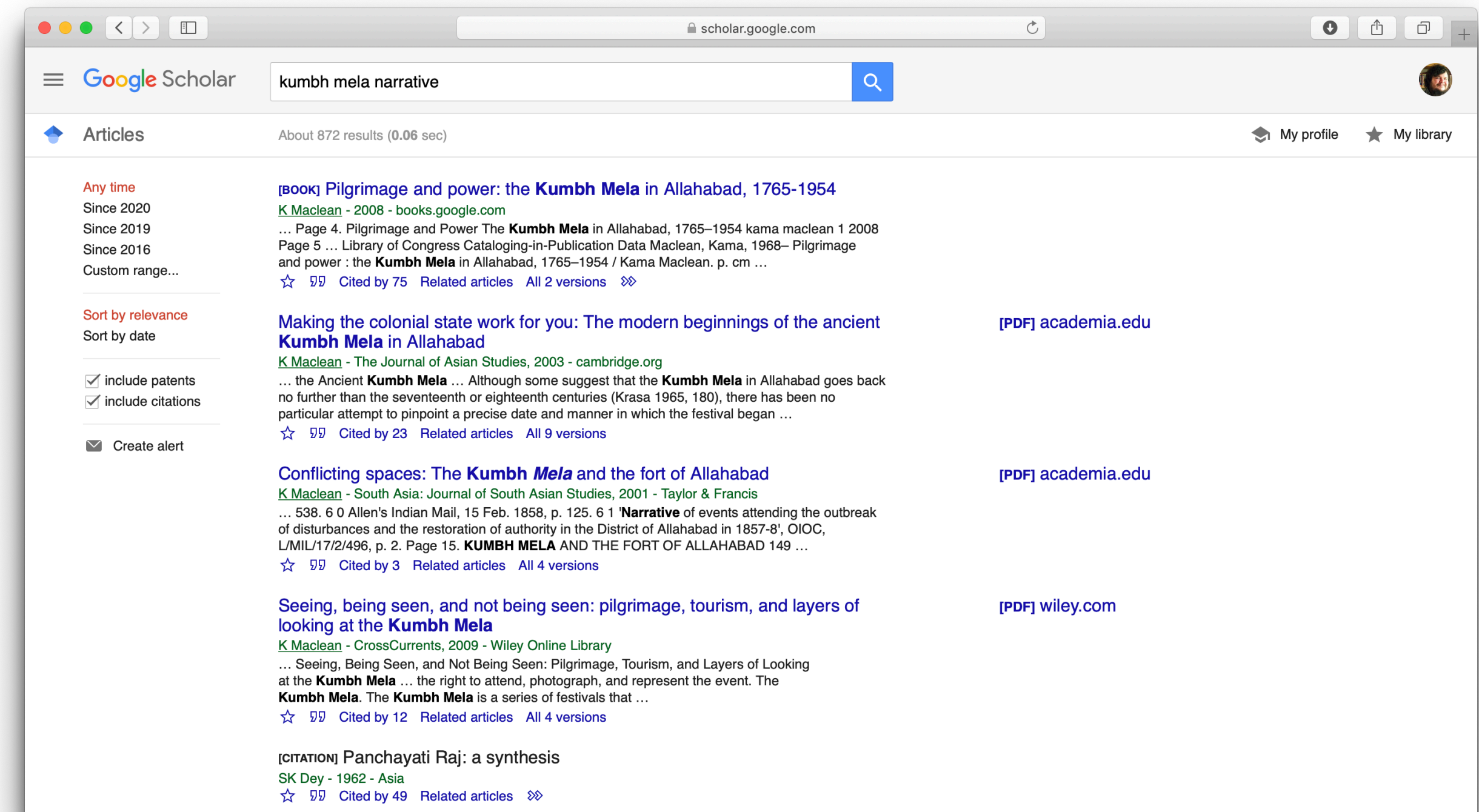
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The screenshot shows a Jupyter Notebook environment with several tabs open: README.md, Data.ipynb, Julia.ipynb, Fasta.ipynb, and postBuild. The active notebook, Data.ipynb, contains two code cells. The first cell imports pandas and reads a CSV file, displaying the first five rows of data:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	se
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

The second cell imports GeoJSON and displays a map of the Washington D.C. area with blue pins indicating specific locations.



The screenshot shows a Google Scholar search results page for the query "kumbh mela narrative". The search returned approximately 872 results. The first result is a book titled "Pilgrimage and power: the Kumbh Mela in Allahabad, 1765-1954" by K Maclean, published in 2008. The second result is an article titled "Making the colonial state work for you: The modern beginnings of the ancient Kumbh Mela in Allahabad" by K Maclean, published in The Journal of Asian Studies in 2003. The third result is an article titled "Conflicting spaces: The Kumbh Mela and the fort of Allahabad" by K Maclean, published in South Asia: Journal of South Asian Studies in 2001. The fourth result is an article titled "Seeing, being seen, and not being seen: pilgrimage, tourism, and layers of looking at the Kumbh Mela" by K Maclean, published in CrossCurrents in 2009. The fifth result is a citation for "Panchayati Raj: a synthesis" by SK Dey, published in Asia in 1962.

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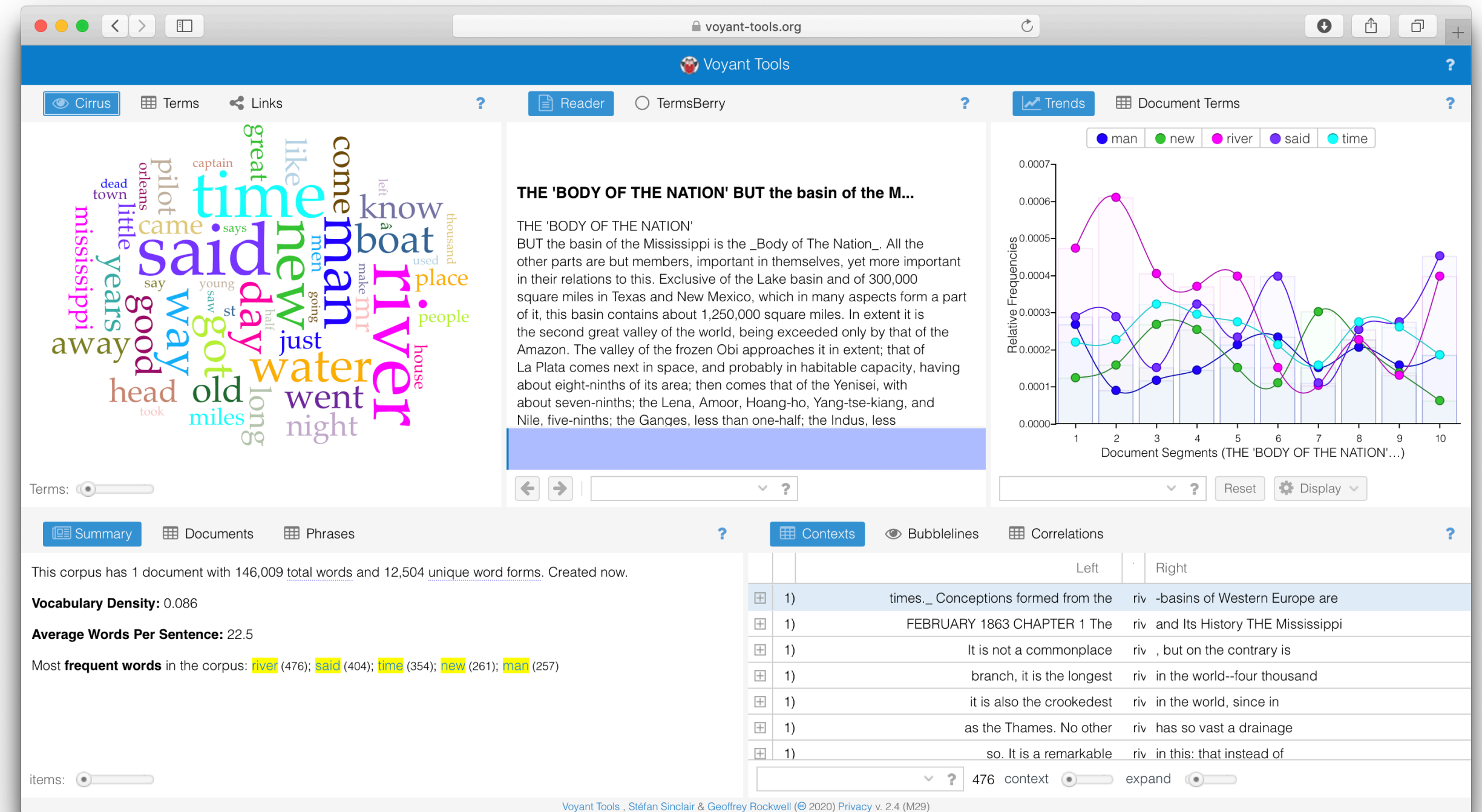
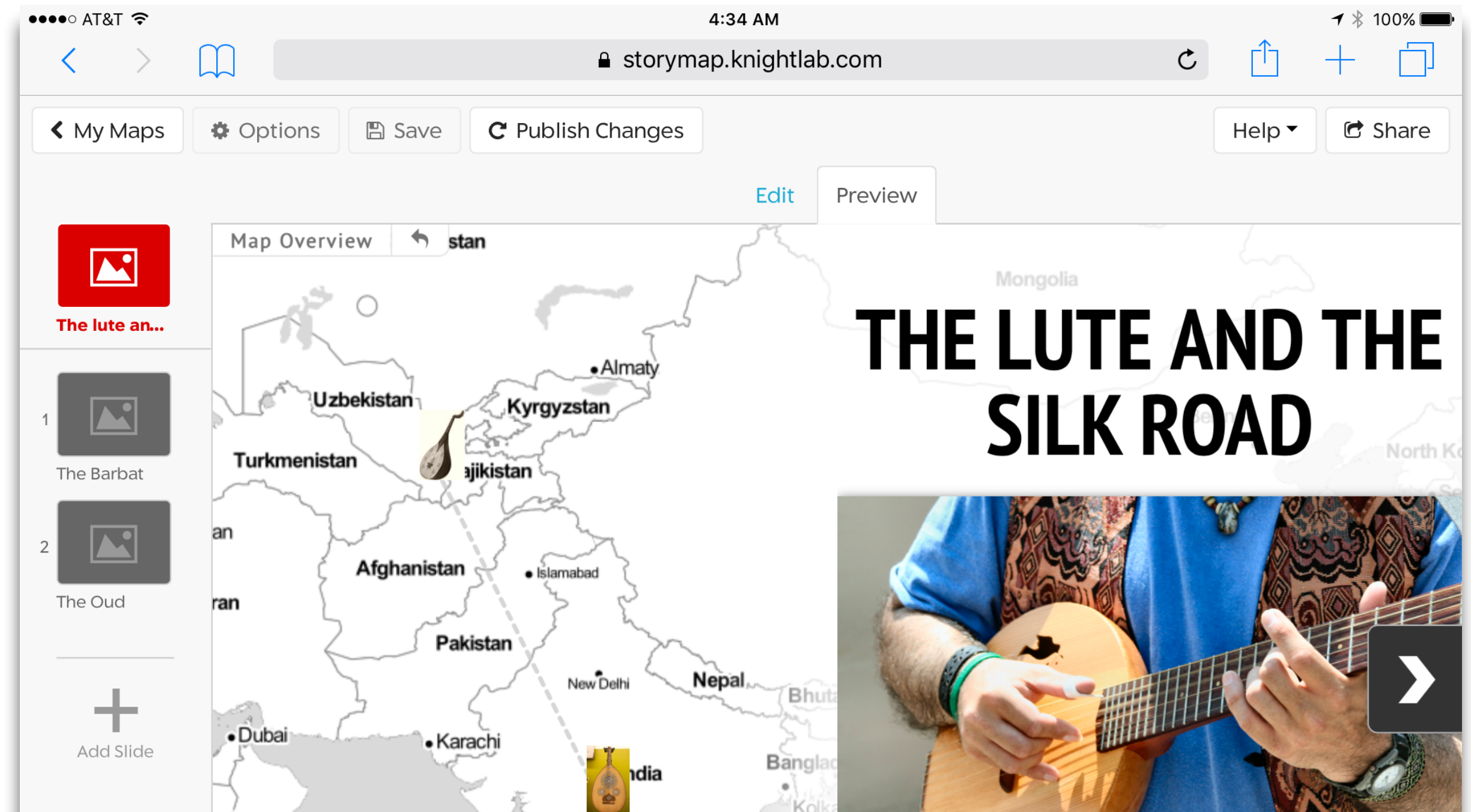
Driver: C

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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?

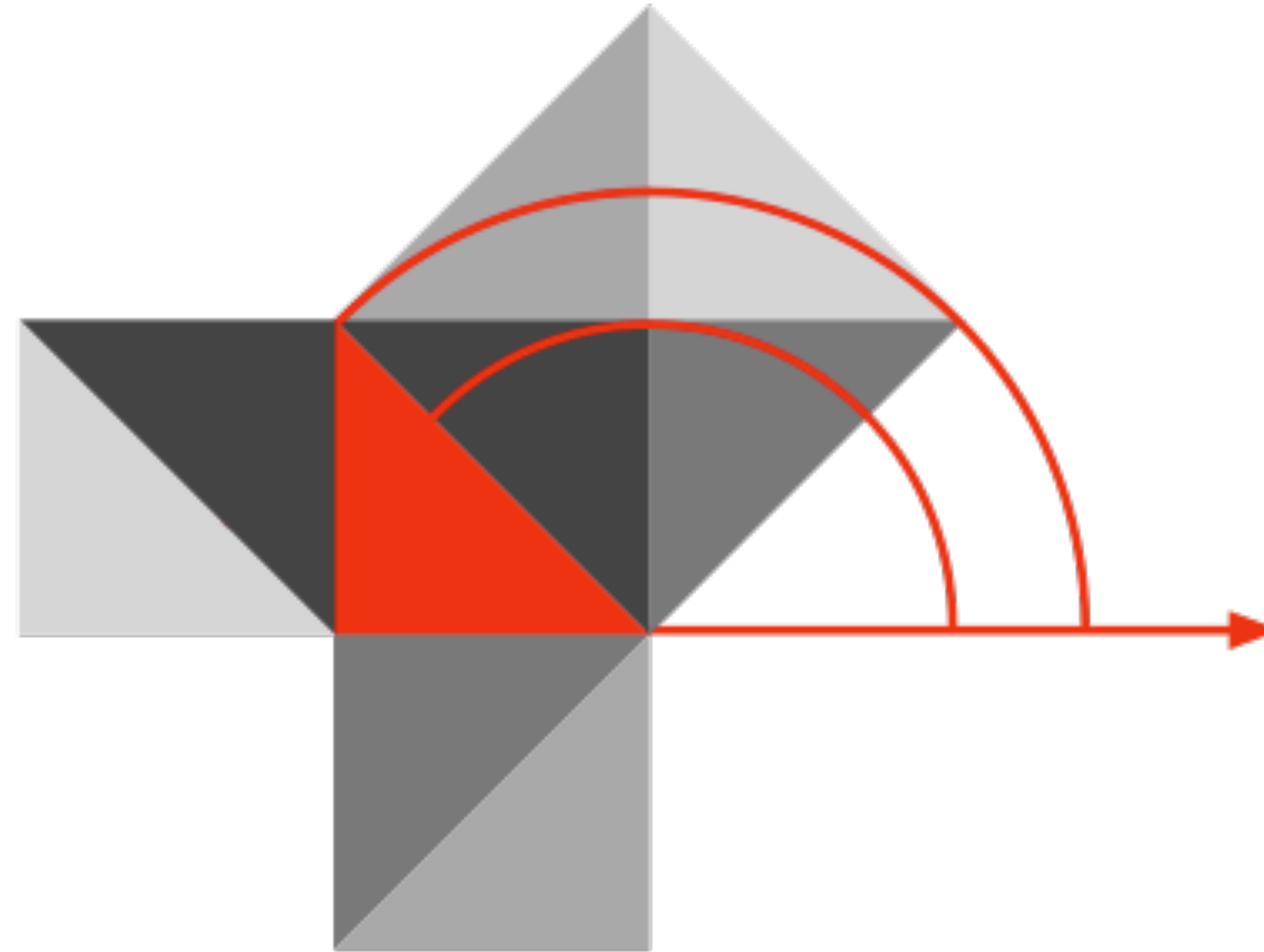
- **Barriers to Your Students' Progress:**

- 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?

Hippasus



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