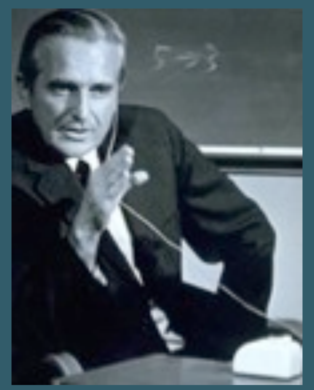
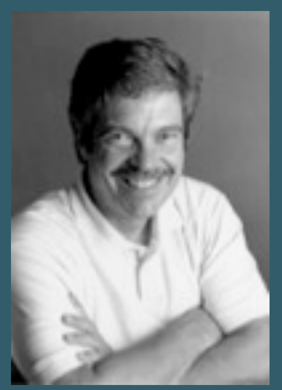
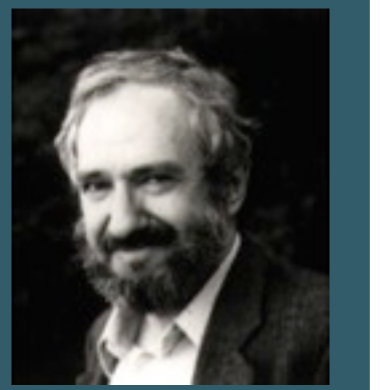
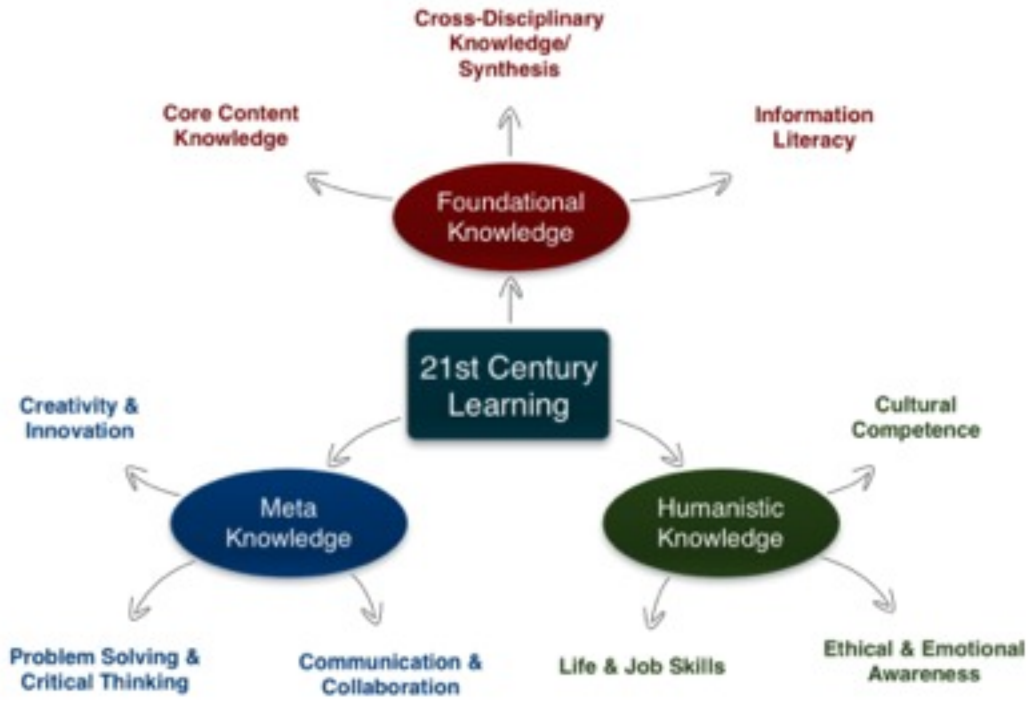
# SAMR: Beyond the Basics

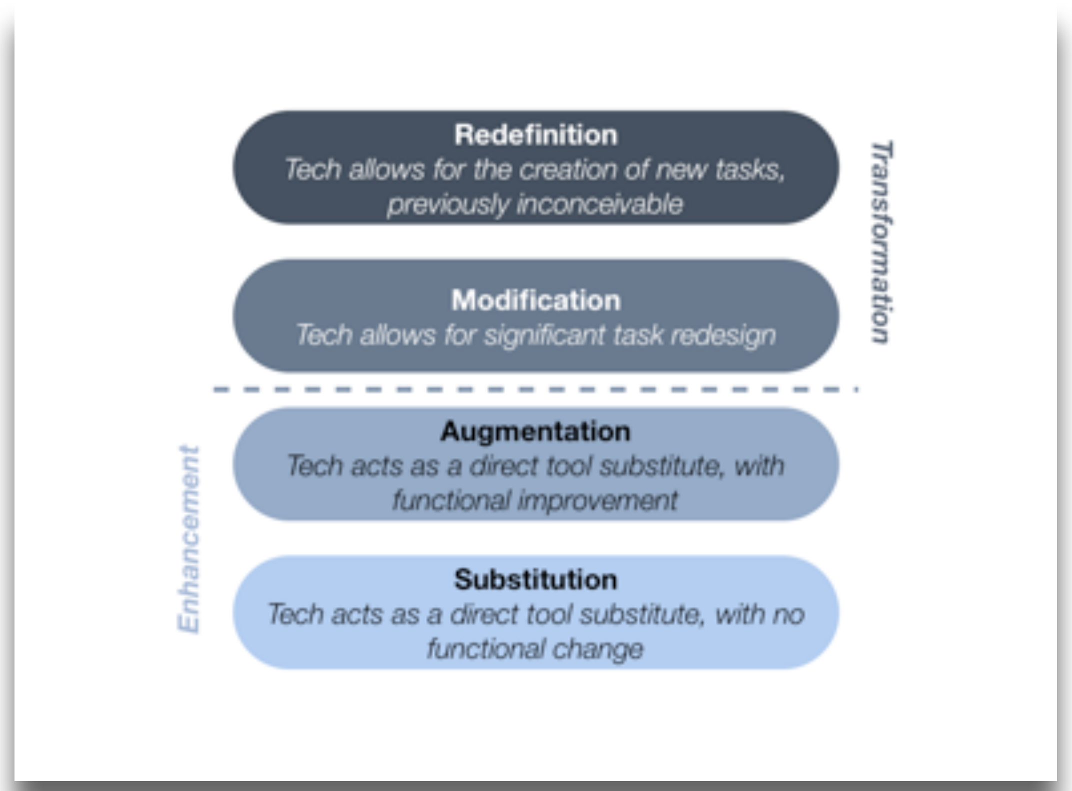
Ruben R. Puentedura, Ph.D.

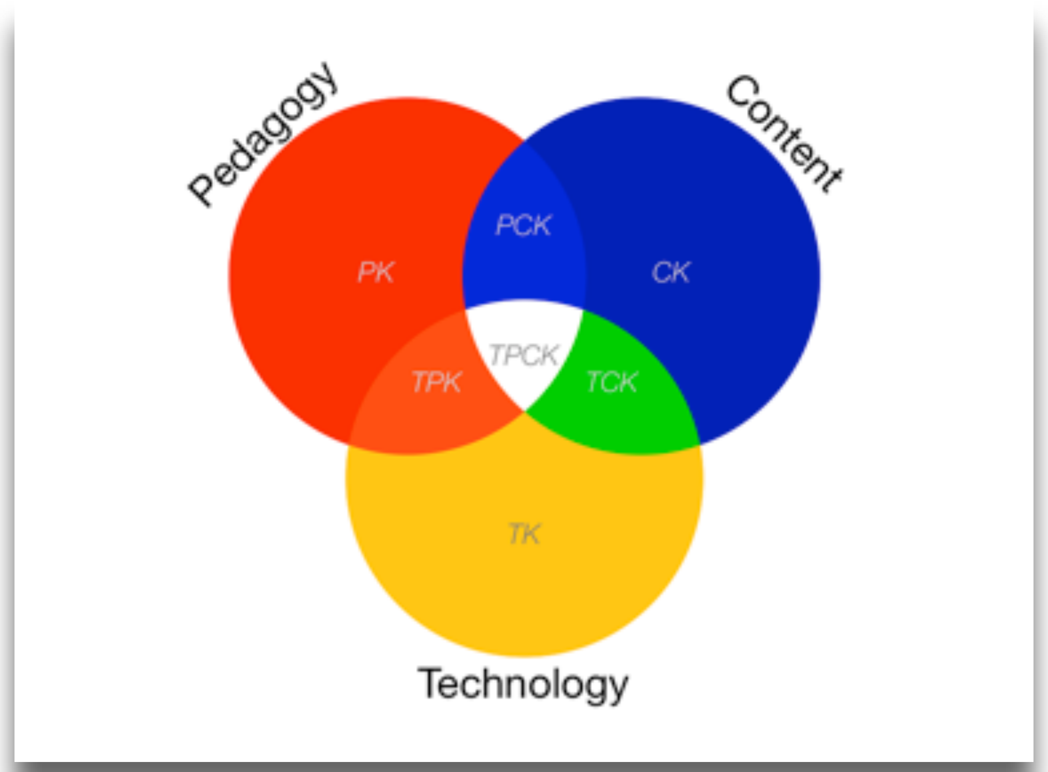
# Augmenting Human Intellect & Learning Capacity




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




## One-to-One Technologies

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|---|---|---|---|---|
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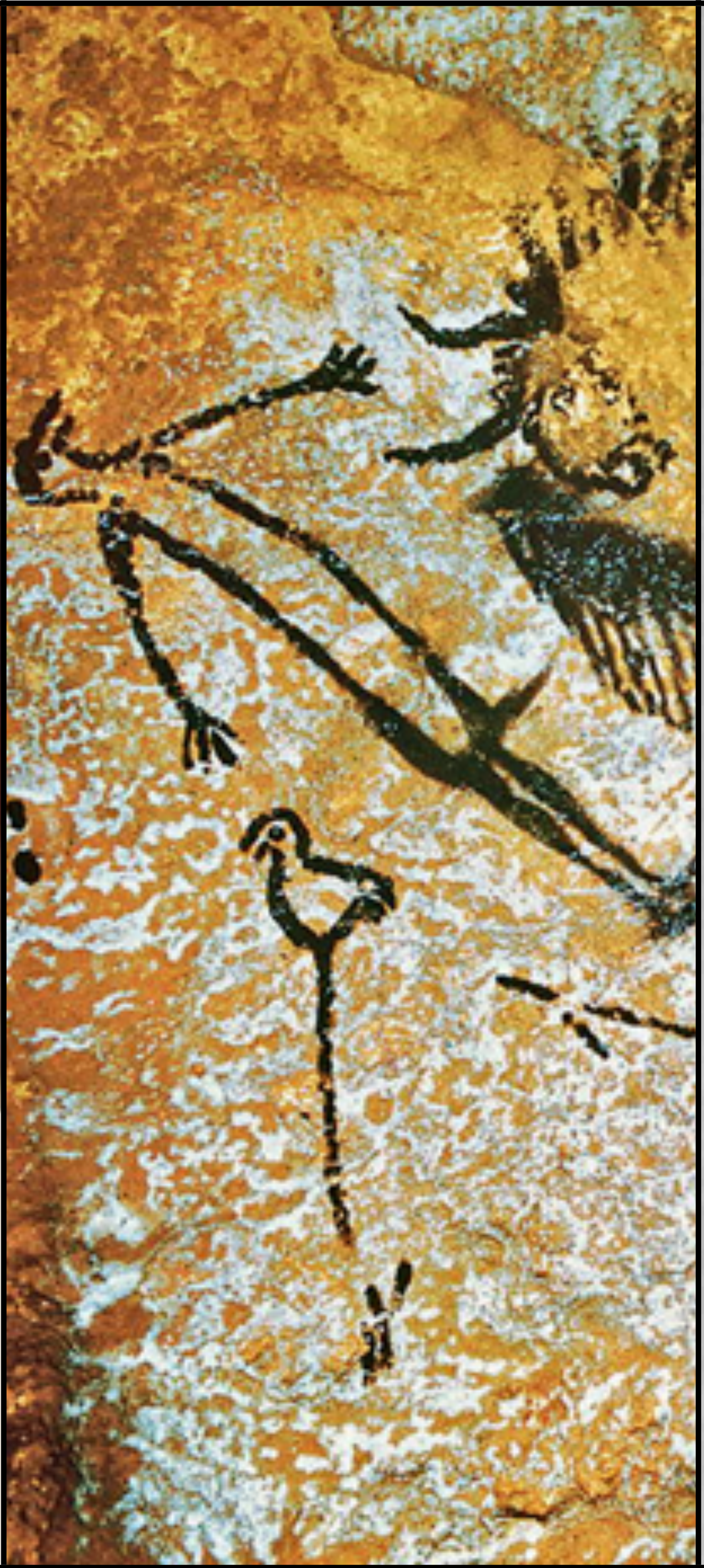

# SAMR: Framing Goals for Transformation

Transformation

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

**Modification**
*Tech allows for significant task redesign*

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Enhancement

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

**Substitution**
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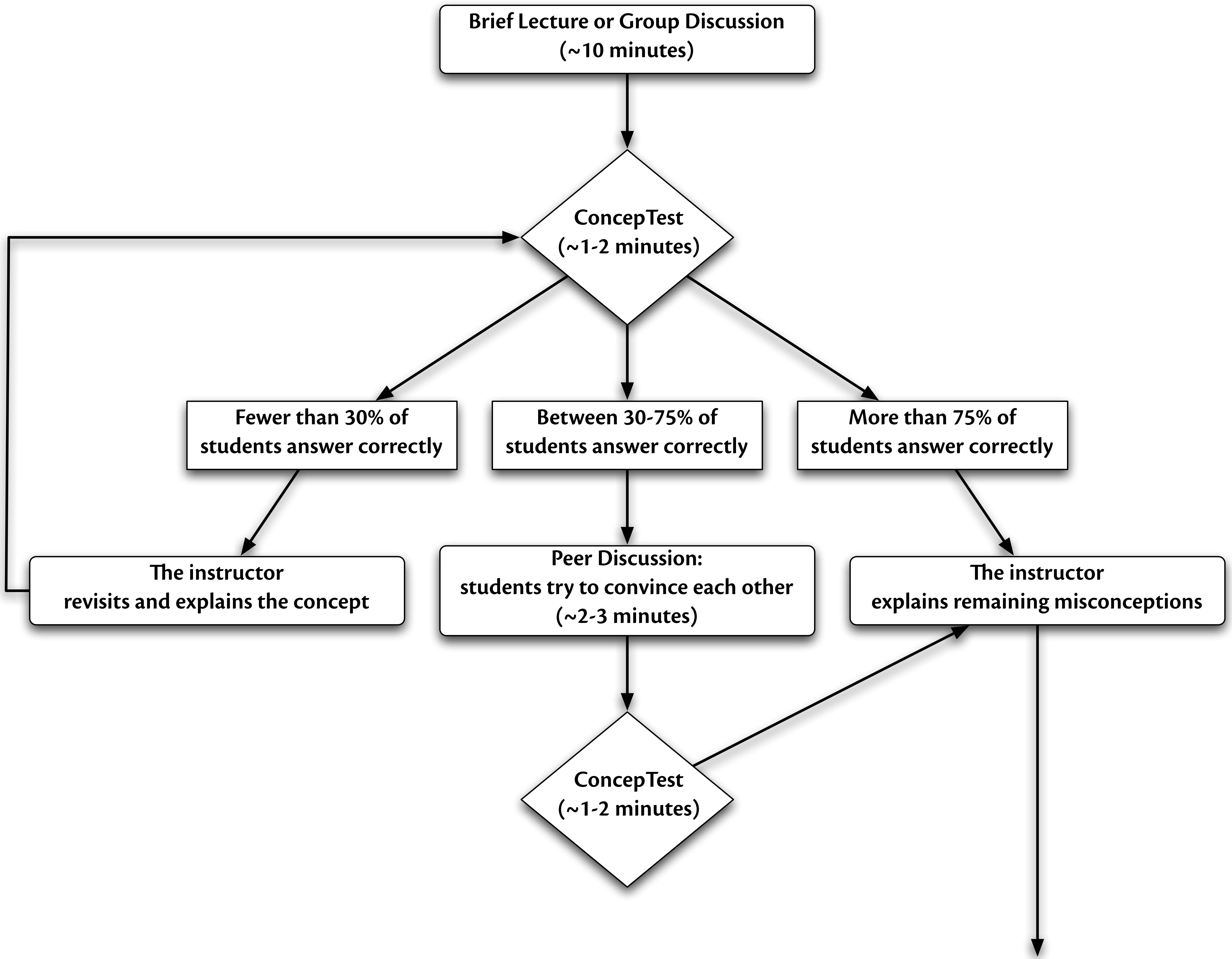
# Choosing Your First SAMR Ladder Project: Three Options

- **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?




Mazur, E. *Peer Instruction - A User's Manual*. Prentice Hall (1997)

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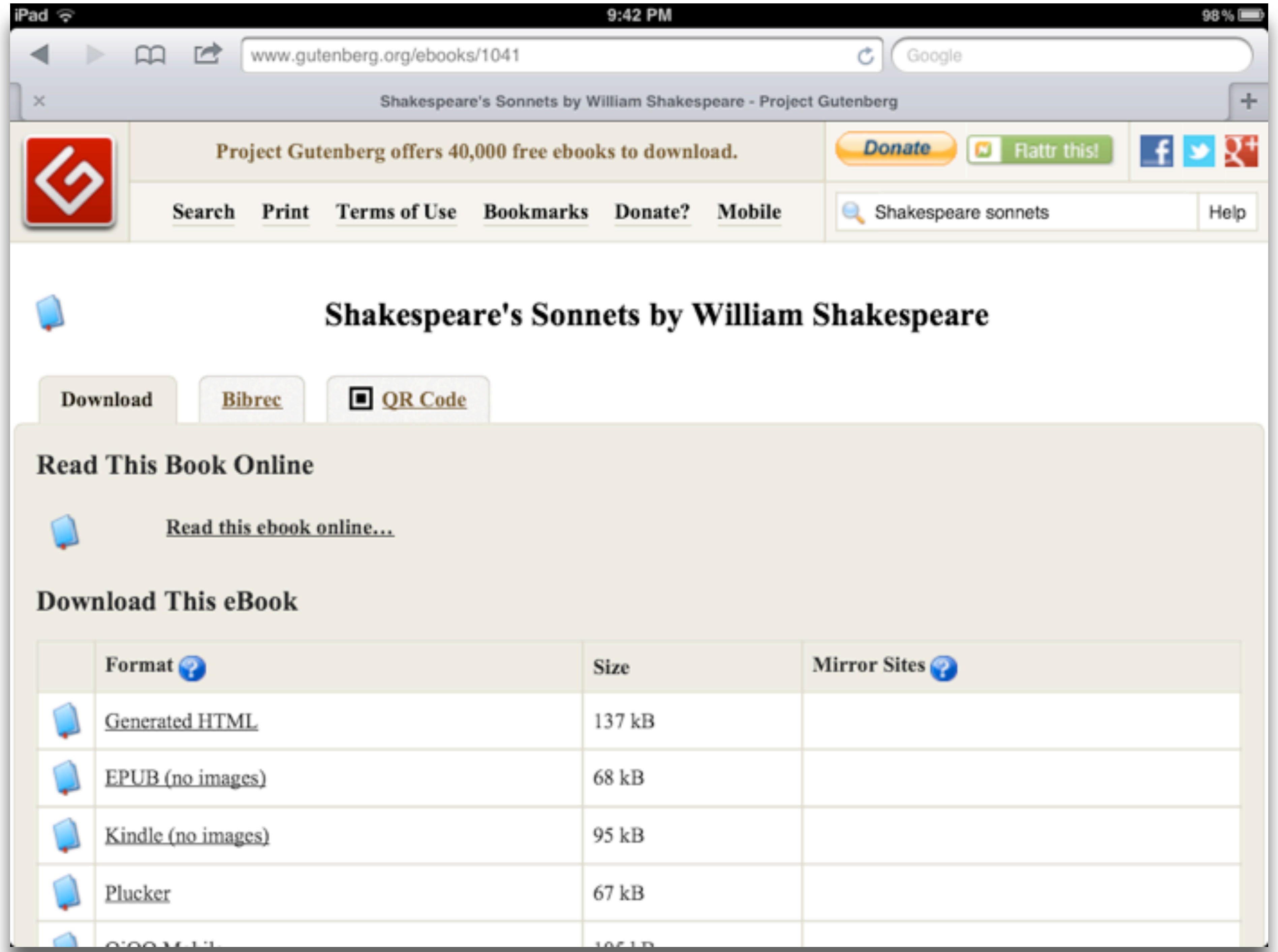


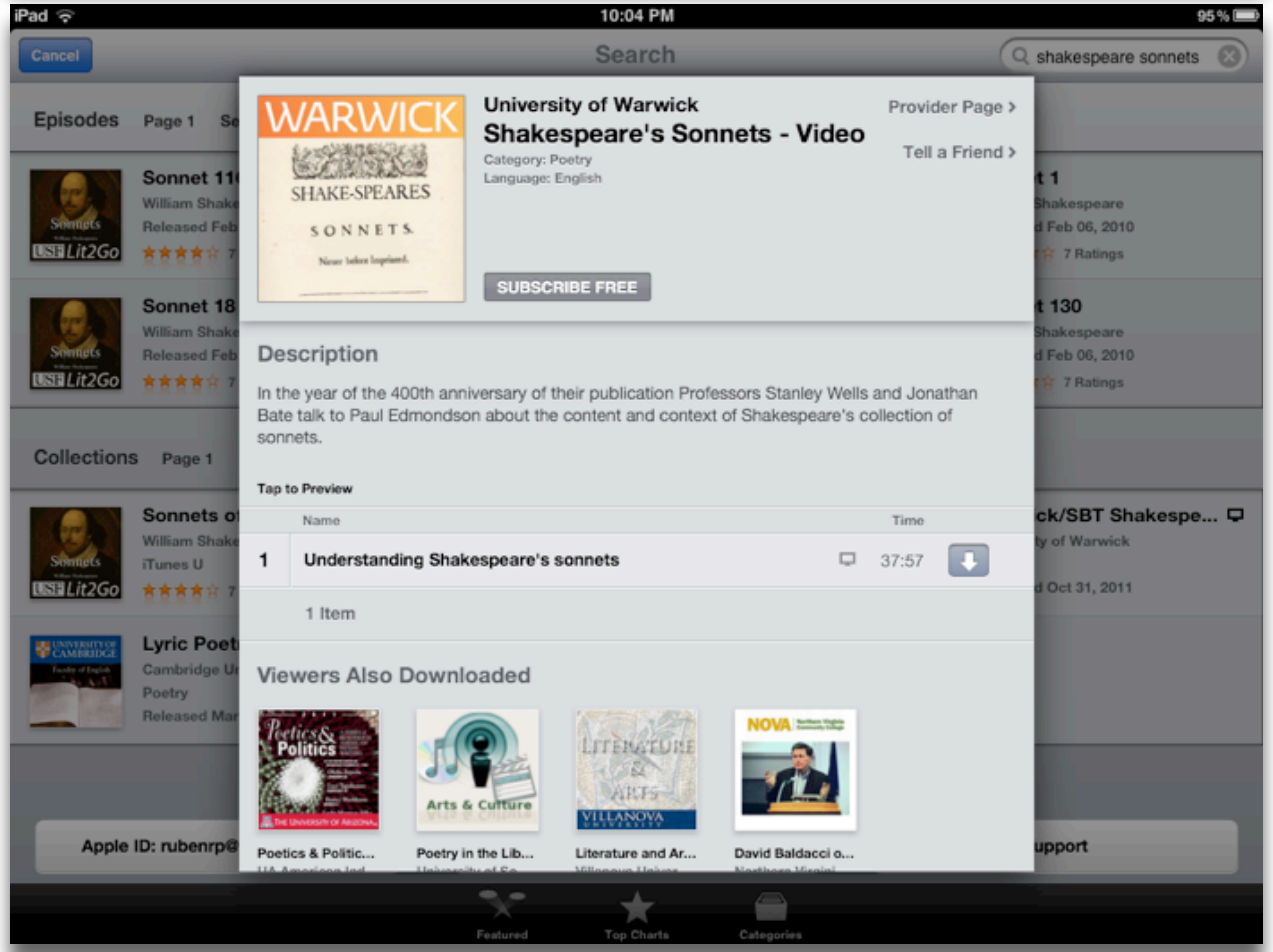

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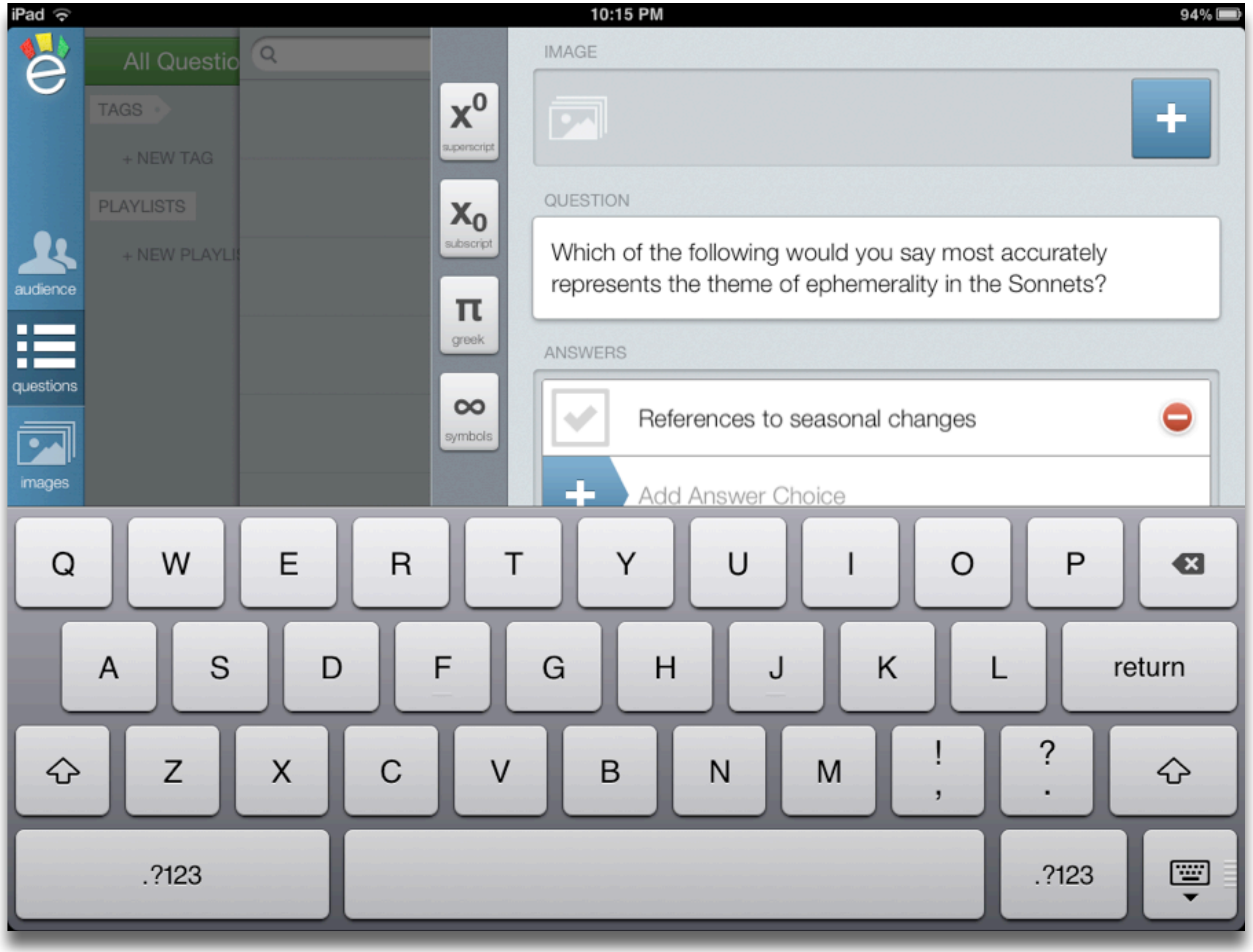

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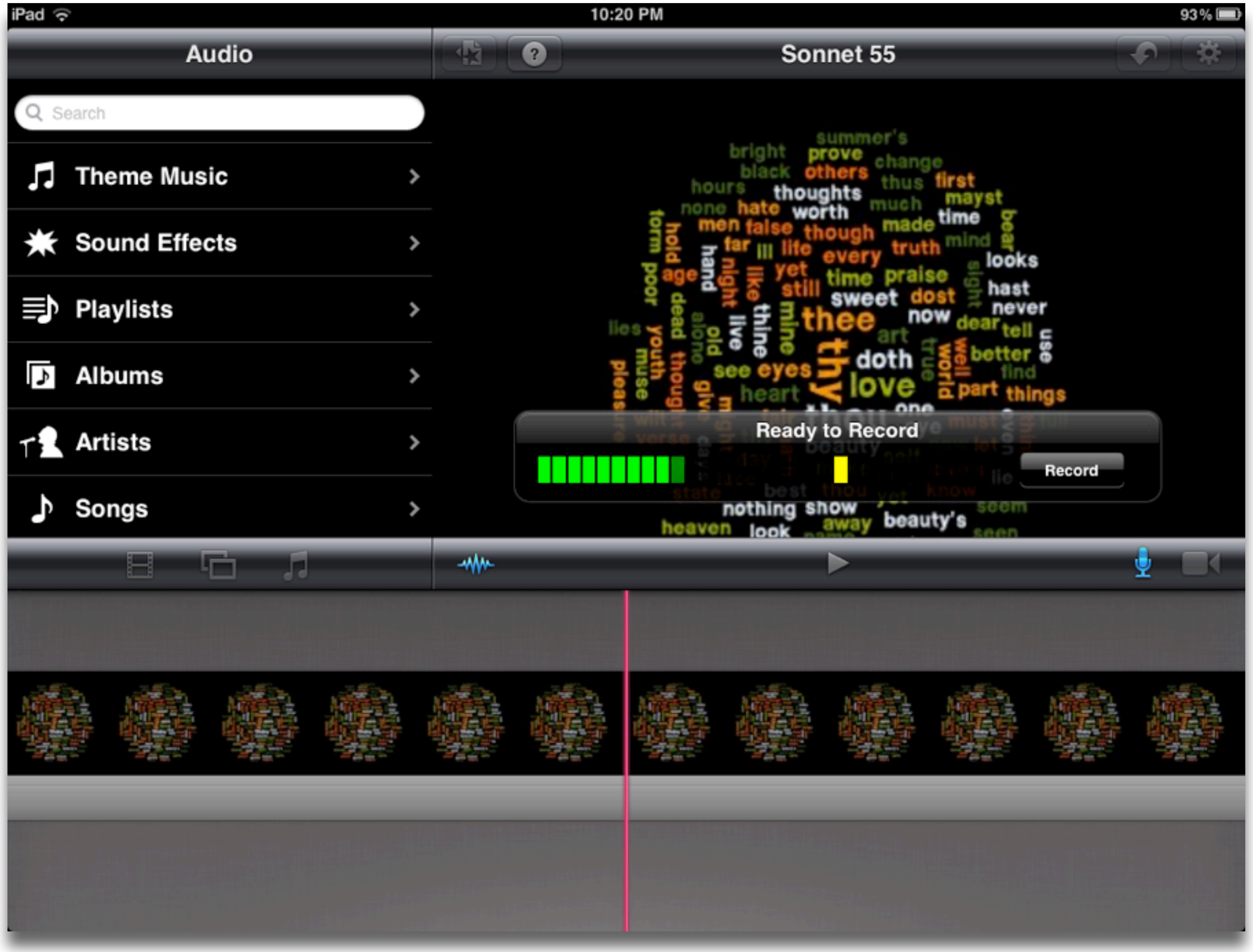

# The SAMR Ladder: Questions and Transitions

- **Substitution:**
  - What will I gain by replacing the older technology with the new technology?
- **Substitution to Augmentation:**
  - Have I added an improvement to the task process that could not be accomplished with the older technology at a fundamental level?
  - How does this feature contribute to my design?
- **Augmentation to Modification:**
  - How is the original task being modified?
  - Does this modification fundamentally depend upon the new technology?
  - How does this modification contribute to my design?
- **Modification to Redefinition:**
  - What is the new task?
  - Will any portion of the original task be retained?
  - How is the new task uniquely made possible by the new technology?
  - How does it contribute to my design?

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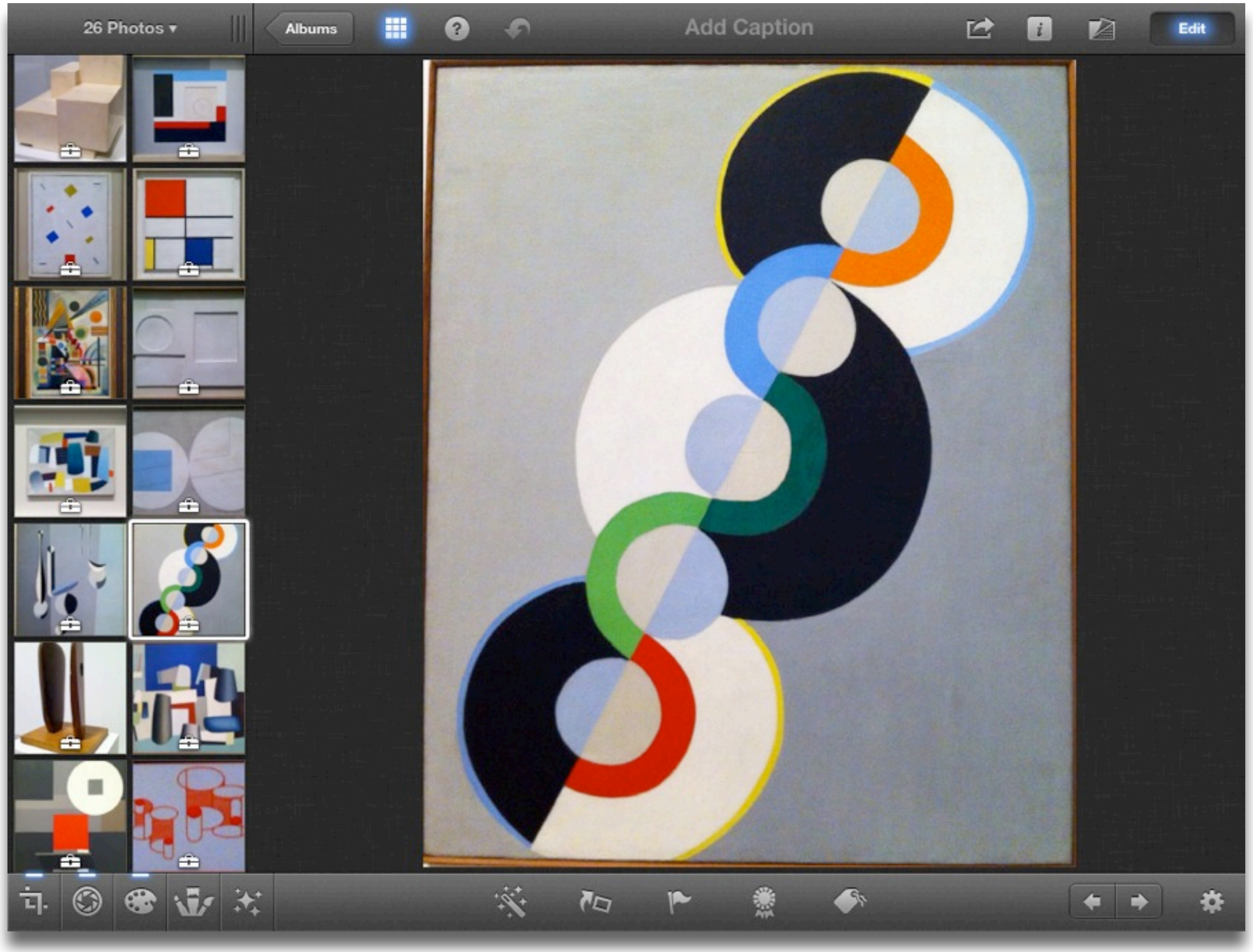

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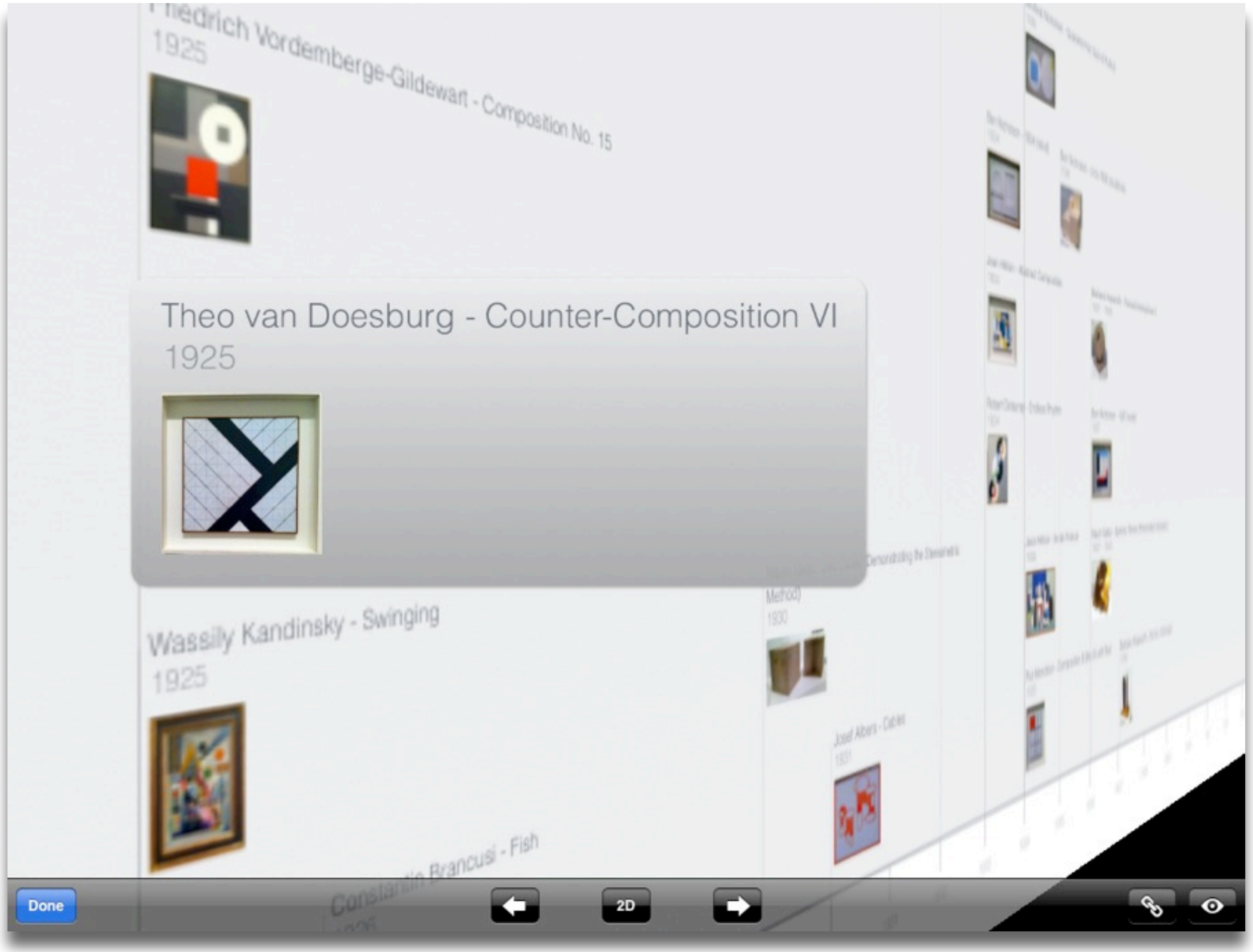

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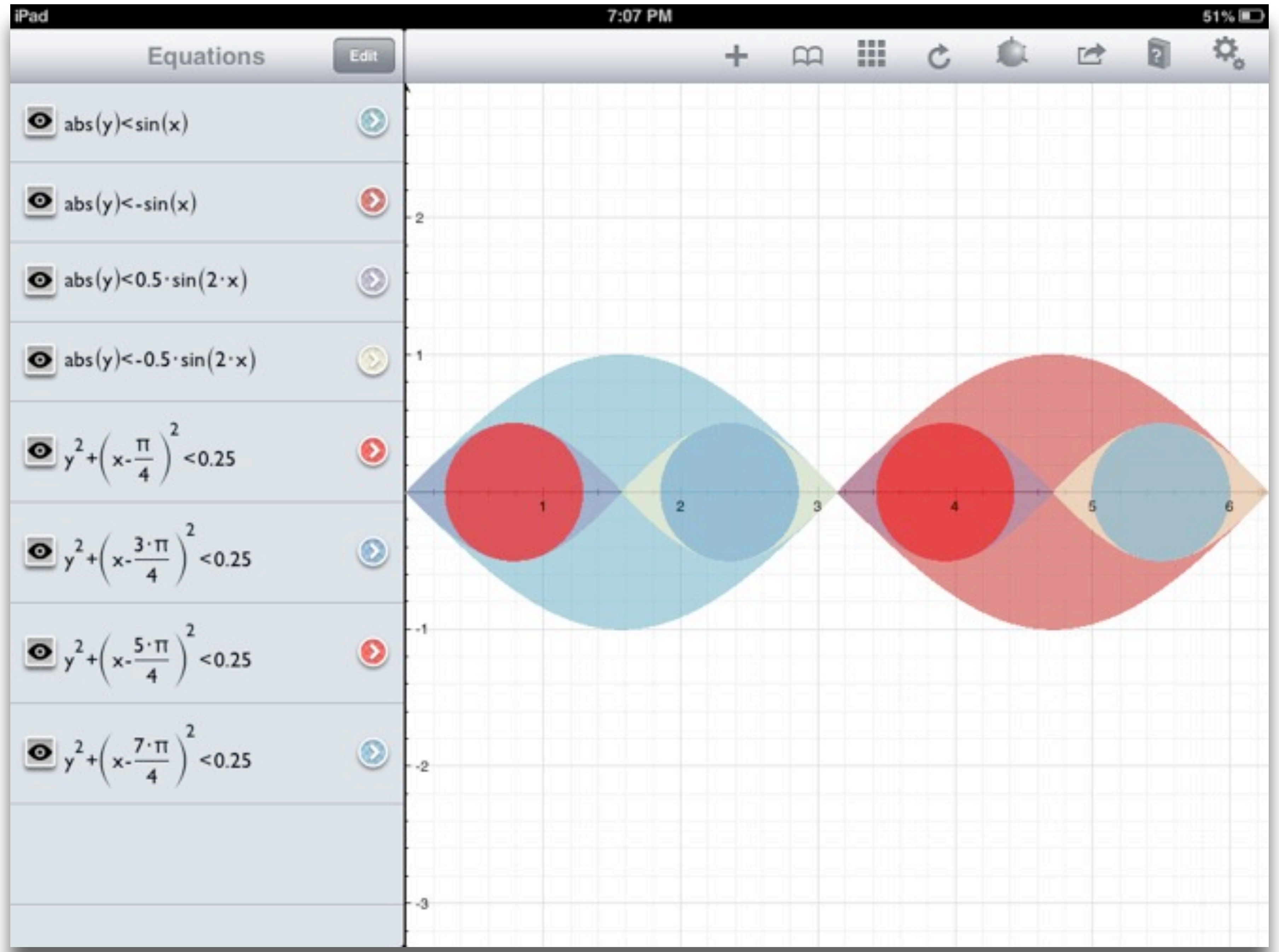


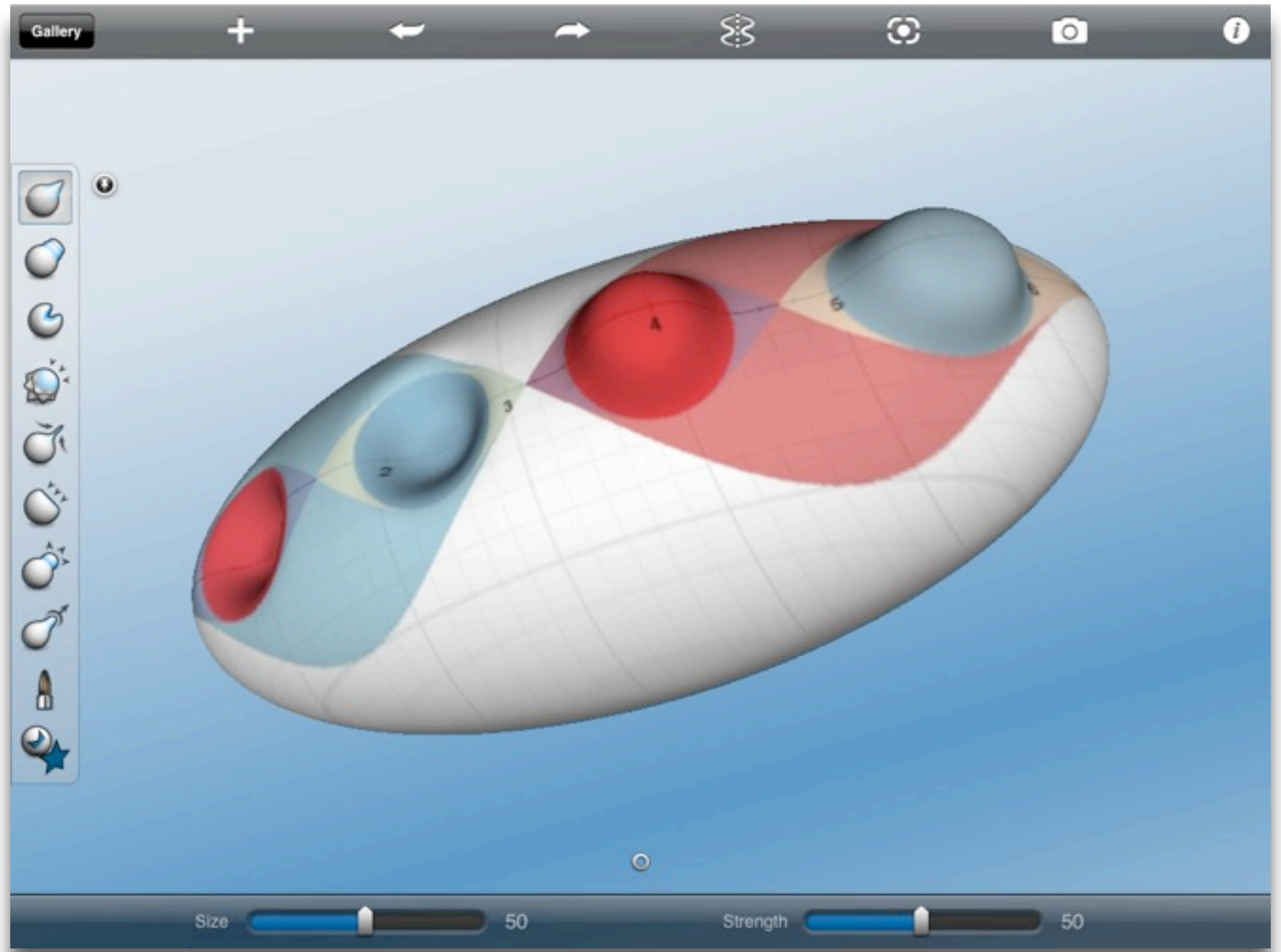

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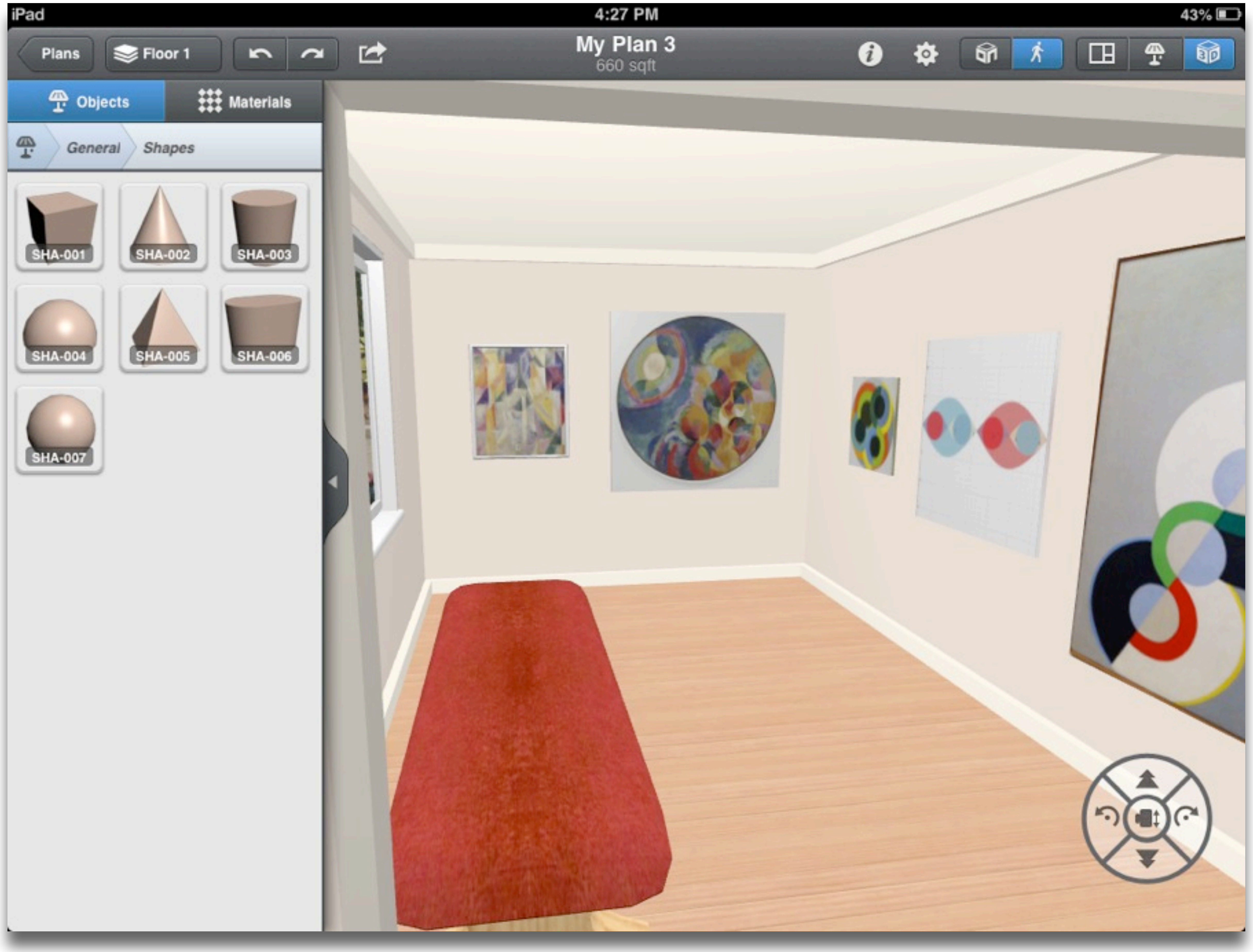


# Design From Expectations

# Seymour Papert: Four Expectations

- **Expectation 1:** the scholastically unsuccessful group among the students will advance by several grade levels on standard achievement tests in mathematics and language. We shall, of course, confirm the significance of any such observation by comparison with a control group matched on a series of variables set up before the outset of the experiment.
- **Expectation 2:** observers will agree that the student in the experiment not only learned more than in a traditional class, but learned it in a more articulate, richer, more integrated way.
- **Expectation 3:** students will develop, or adapt concepts and metaphors derived from computers and use them not only as intellectual tools in the construction of models of such things as "number" and "theory" but also in elaborating models of their own cognitive processes. This will in turn have an impact on their styles of learning and problem-solving.
- **Expectation 4:** the use of computer metaphors by children will have effects beyond what is normally classed as "cognitive skill". We expect it will influence their language, imagery, games, social interactions, relationships, etc…

S. Papert. *An Evaluative Study of Modern Technology in Education*. MIT Artificial Intelligence Laboratory Memo No. 371. (June, 1976)

# Measuring the Four Expectations

- **Expectation 1:** suitably designed formative/summative assessment rubrics will show improvement when compared to traditional instruction.
- **Expectation 2:** students will show more instances of work at progressively higher levels of Bloom's Taxonomy.
- **Expectation 3:** student work will demonstrate more – and more varied – critical thinking cognitive skills, particularly in areas related to the examination of their own thinking processes.
- **Expectation 4:** student daily life will reflect the introduction of the technology. This includes (but is not limited to) directly observable aspects such as reduction in student attrition, increase in engagement with civic processes in their community, and engagement with communities beyond their own.

# Black and Wiliam: Defining Formative Assessment

"Practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited."

Black, P. and Wiliam D. "Developing the theory of formative assessment." *Educational Assessment, Evaluation and Accountability*. 21:5-31 (2009)

# Wiliam: A Framework for Formative Assessment

<table>
<tr><th></th><th>Where the learner is going</th><th>Where the learner is right now</th><th>How to get there</th></tr>
<tr><td>Teacher</td><td>1<br>Clarifying learning intentions and criteria for success</td><td>2 Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding</td><td>3<br>Providing feedback that moves learners forward</td></tr>
<tr><td>Peer</td><td>Understanding and sharing learning intentions and criteria for success</td><td colspan="2">4<br>Activating students as instructional resources for one another</td></tr>
<tr><td>Learner</td><td>Understanding learning intentions and criteria for success</td><td colspan="2">5<br>Activating students as the owners of their own learning</td></tr>
</table>

Dylan Wiliam, *Embedded Formative Assessment*. Solution Tree (2011)

# Bloom's Taxonomy: Cognitive Processes

<table>
<tr><th>Anderson & Krathwohl (2001)</th><th colspan="2">Characteristic Processes</th></tr>
<tr><td>Remember</td><td colspan="2">• Recalling memorized knowledge<br>• Recognizing correspondences between memorized knowledge and new material</td></tr>
<tr><td>Understand</td><td>• Paraphrasing materials<br>• Exemplifying concepts, principles<br>• Classifying items<br>• Summarizing materials</td><td>• Extrapolating principles<br>• Comparing items</td></tr>
<tr><td>Apply</td><td colspan="2">• Applying a procedure to a familiar task<br>• Using a procedure to solve an unfamiliar, but typed task</td></tr>
<tr><td>Analyze</td><td colspan="2">• Distinguishing relevant/irrelevant or important/unimportant portions of material<br>• Integrating heterogeneous elements into a structure<br>• Attributing intent in materials</td></tr>
<tr><td>Evaluate</td><td colspan="2">• Testing for consistency, appropriateness, and effectiveness in principles and procedures<br>• Critiquing the consistency, appropriateness, and effectiveness of principles and procedures, basing the critique upon appropriate tests</td></tr>
<tr><td>Create</td><td colspan="2">• Generating multiple hypotheses based on given criteria<br>• Designing a procedure to accomplish an untyped task<br>• Inventing a product to accomplish an untyped task</td></tr>
</table>

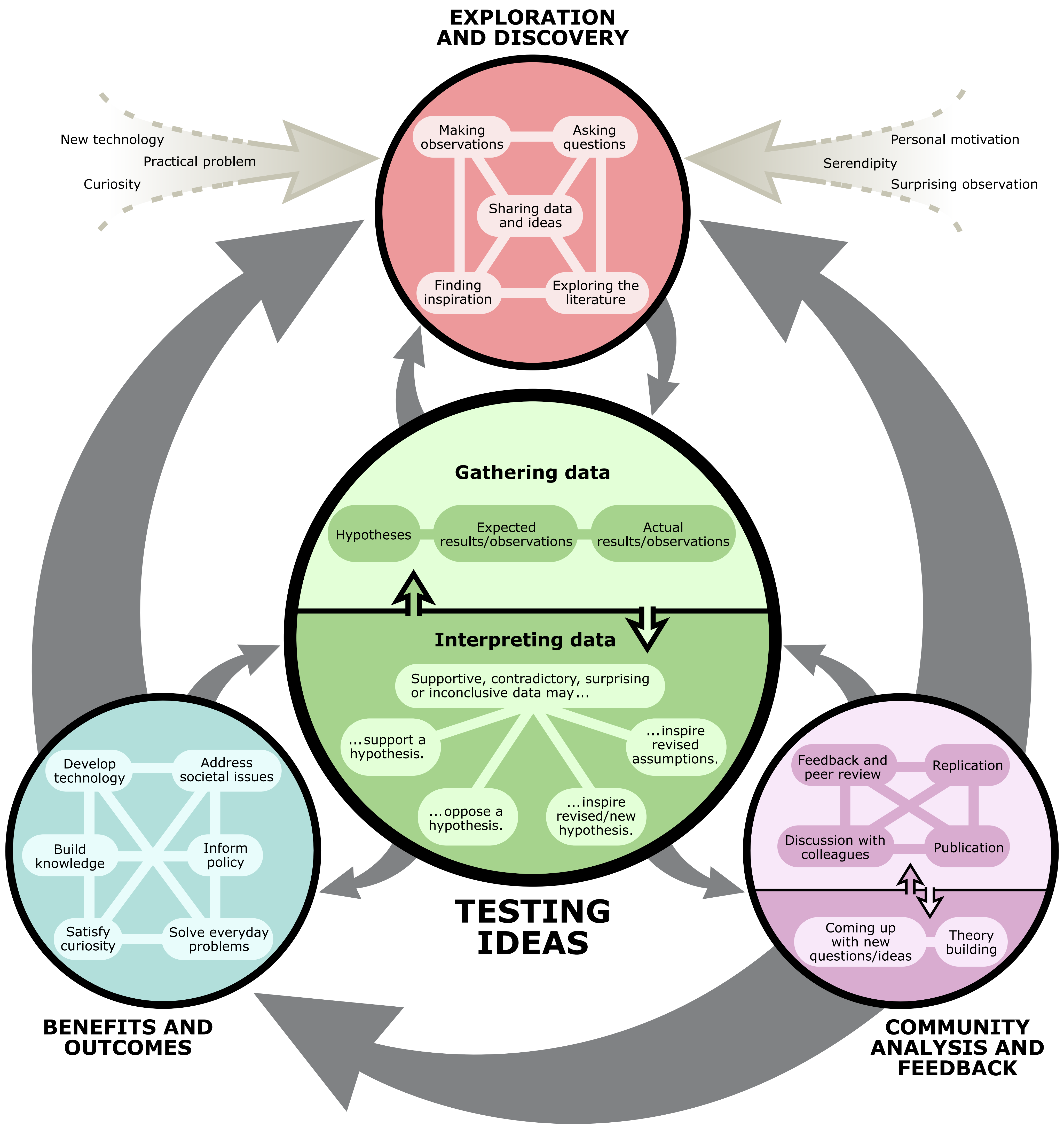
Lorin W. Anderson and David R. Krathwohl (Eds.), *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives, Complete Edition*. Longman. (2000)

# Facione: Critical Thinking – Cognitive Skills and Subskills

| Skill | Subskills |
|---|---|
| **Interpretation** | Categorization<br>Decoding Significance<br>Clarifying Meaning |
| **Analysis** | Examining Ideas<br>Identifying Arguments<br>Analyzing Arguments |
| **Evaluation** | Assessing Claims<br>Assessing Arguments |
| **Inference** | Querying Evidence<br>Conjecturing Alternatives<br>Drawing Conclusions |
| **Explanation** | Stating Results<br>Justifying Procedures<br>Presenting Arguments |
| **Self-Regulation** | Self-examination<br>Self-correction |

Peter Facione, *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction - Executive Summary*. "The Delphi Report". American Philosophical Association, Committee on Pre-College Philosophy. California Academic Press, 1990

# Understanding Science:
# How Science Works



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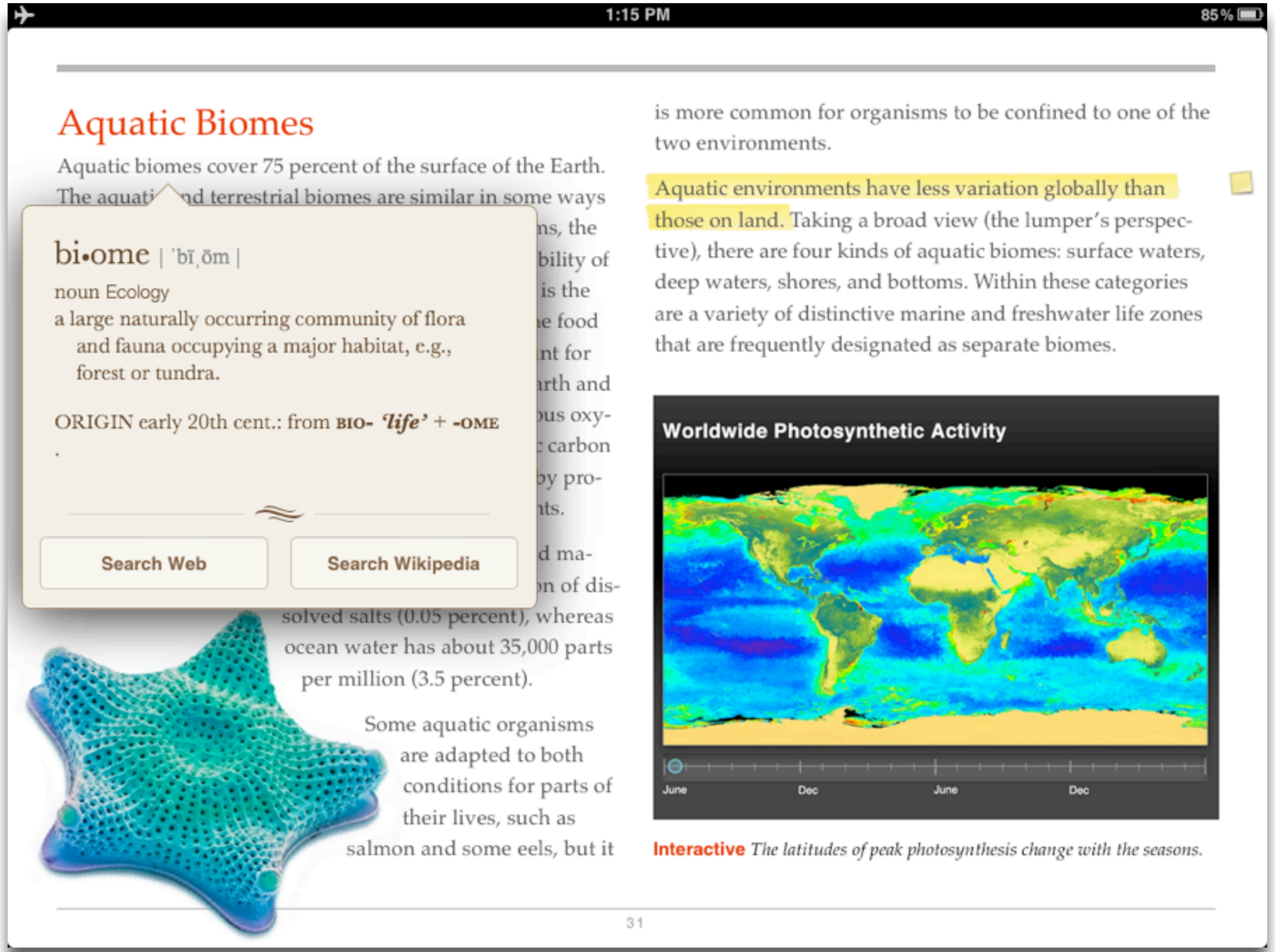

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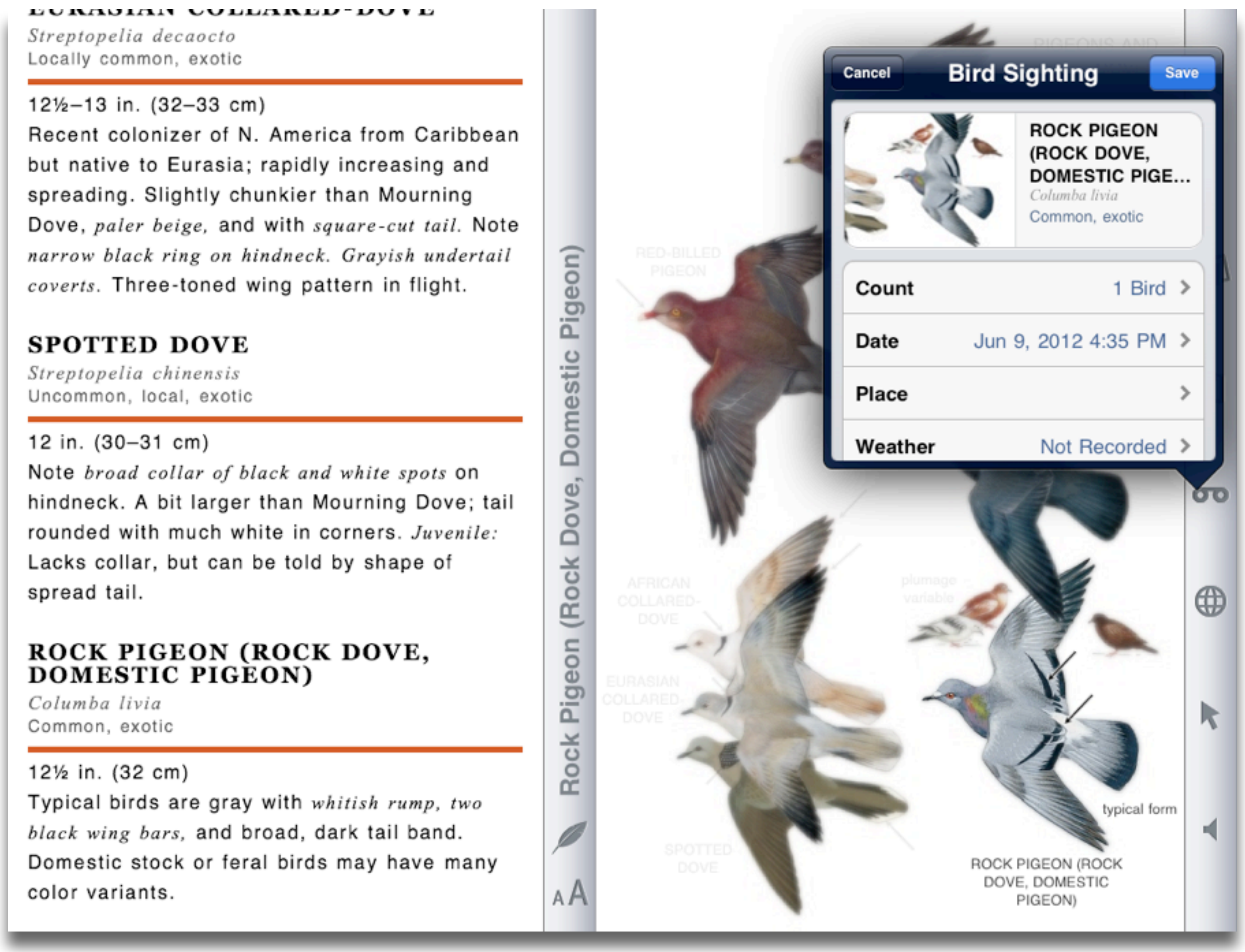

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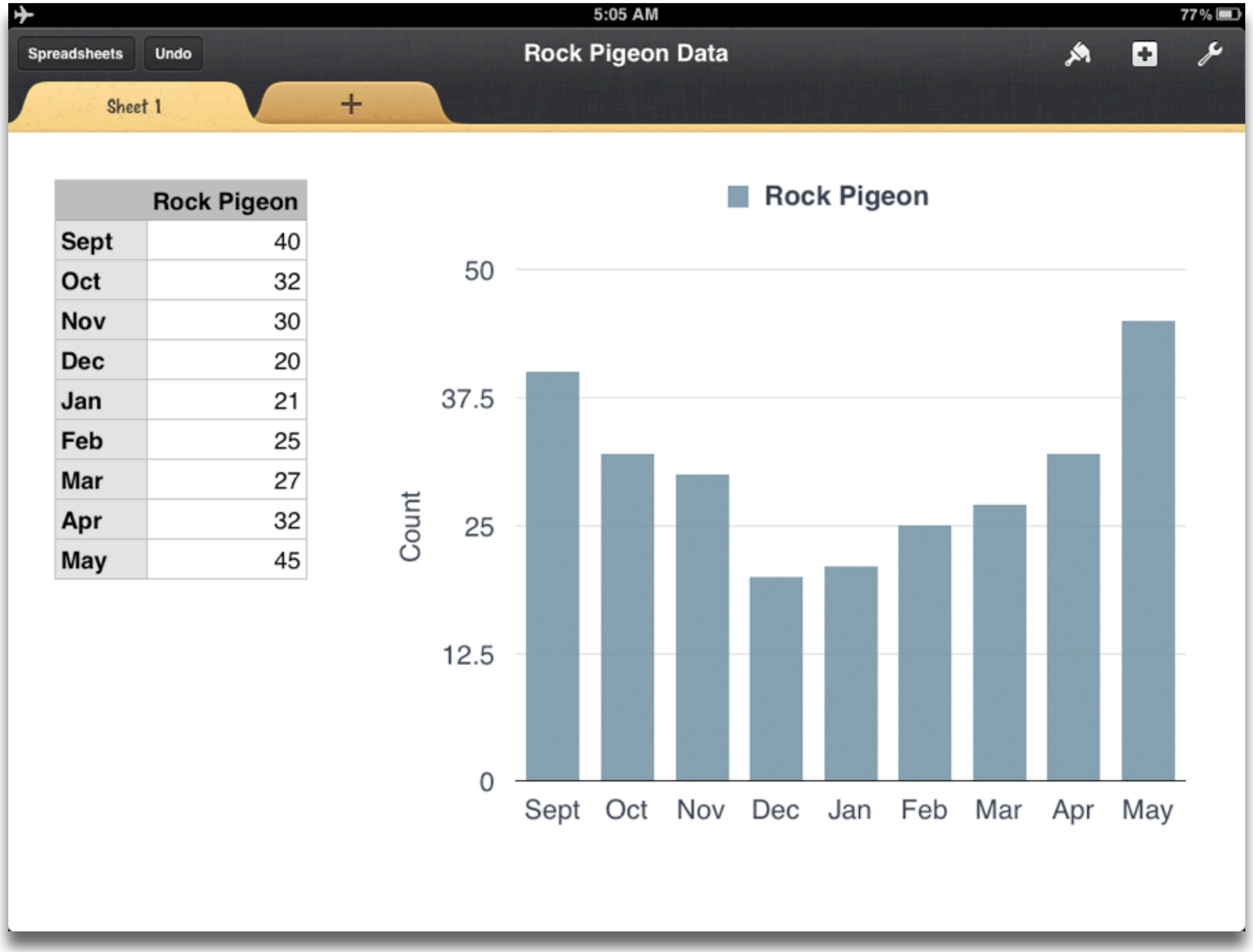

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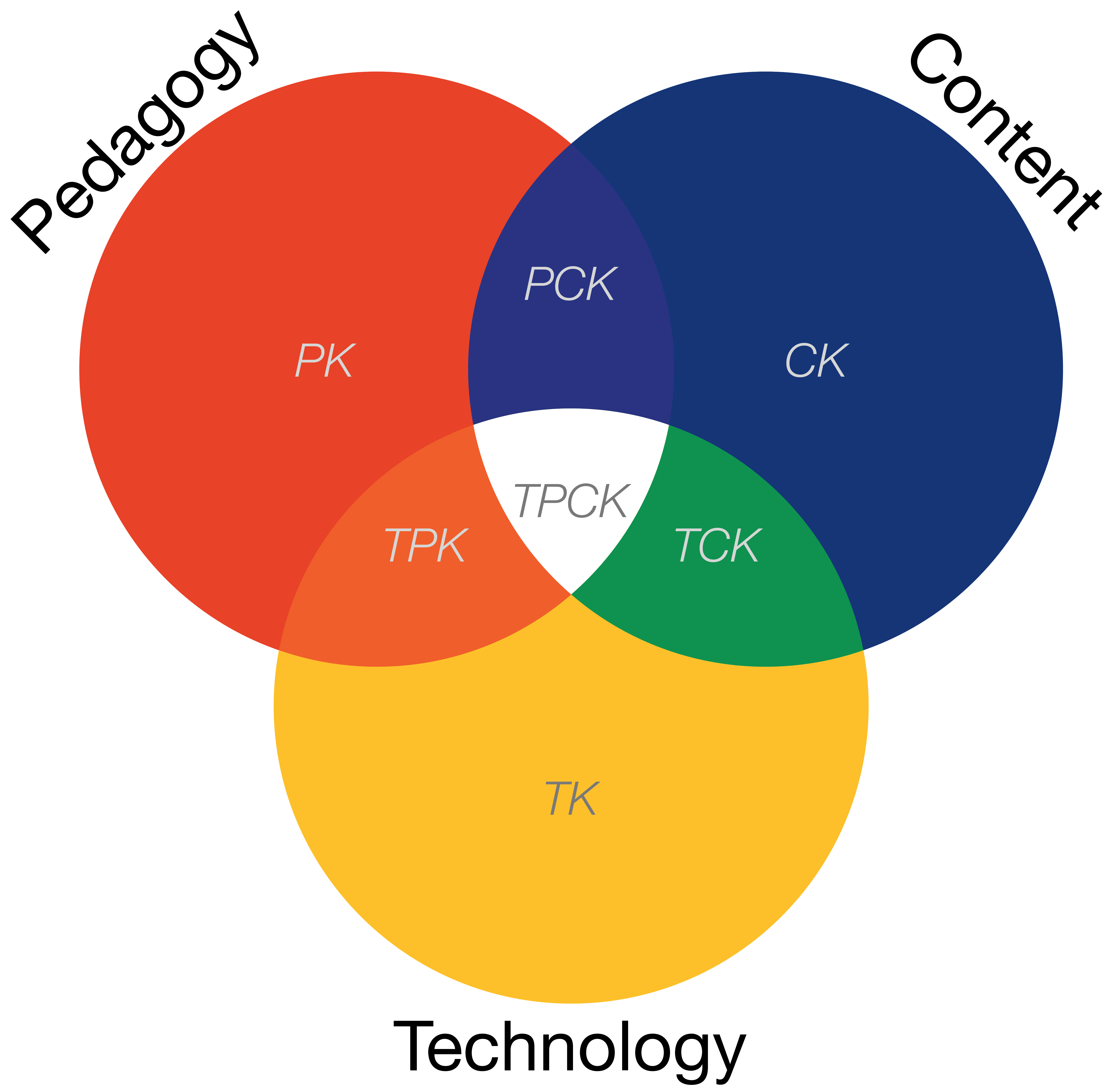
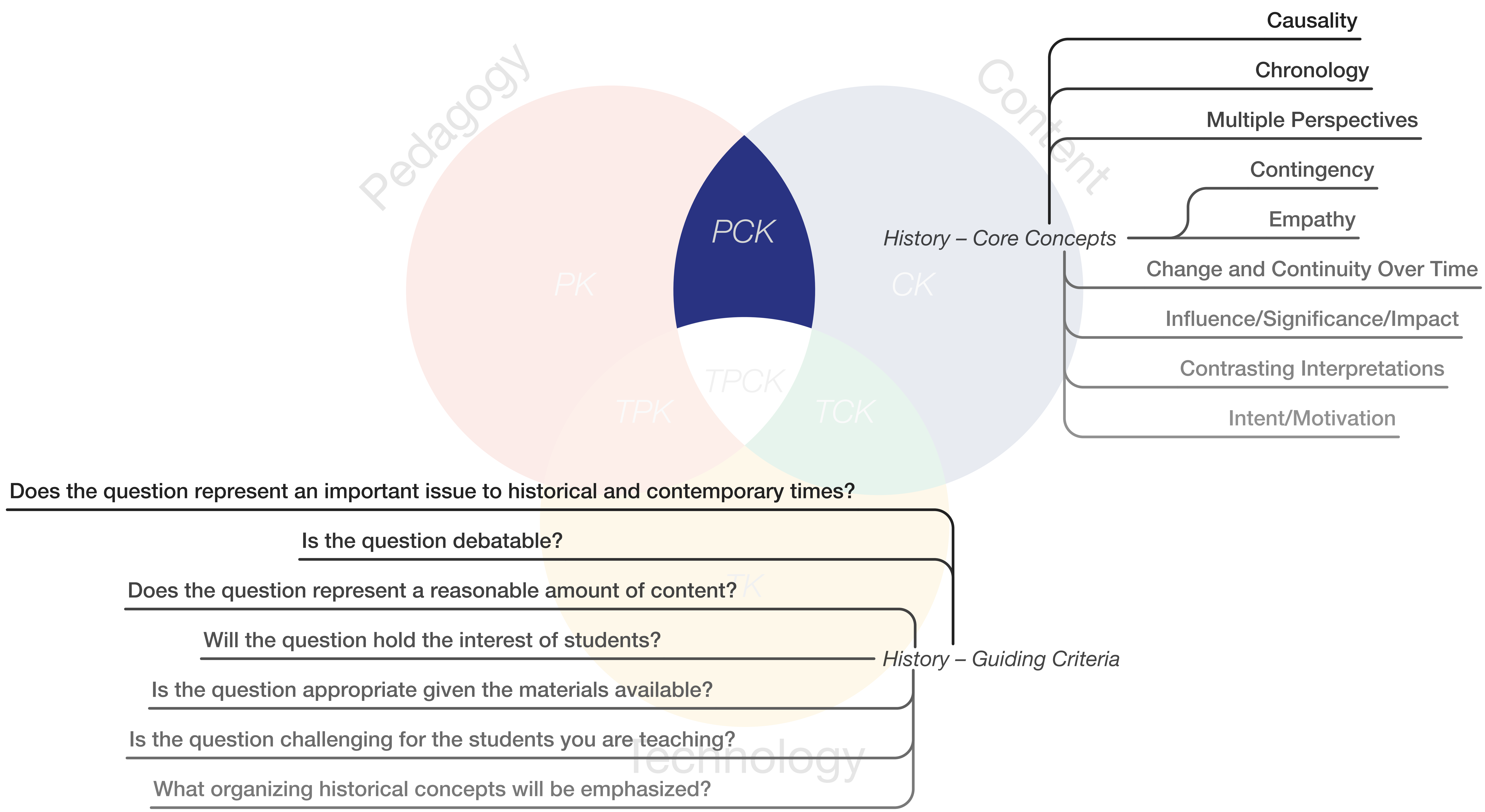
# The PCK Question

# Why Study History?

- **Problematic claims:**
  - *To learn lessons for the present* - implies definite predictions of an unknowable future
    - Better: *To draw lessons for consideration* - examples through which we might contemplate our future actions
  - *History provides us with an identity* - true, but the past as a basis for identity can also become a prison for the present, limiting choices for action and for seeing ourselves
  - *To divine essential aspects of the human condition* - not only are such essences not in evidence, assuming that they exist can have a high price
- **Stronger reasons:**
  - *Enjoyment*
  - *A tool for thought* - exploring an alternative world makes us more aware of our own lives and contexts
  - *To be made aware of the possibility of doing things differently* - history is an argument, showing that there have always been many courses of action, many ways of being

John Arnold. *History: A Very Short Introduction*. Oxford University Press. (2000)


Pedagogy
Content
PCK
PK
CK
TPCK
TPK
TCK
TK
Technology




Lee S. Shulman, "Those Who Understand: Knowledge Growth in Teaching." *Educational Researcher*, Vol. 15, No. 2 (Feb., 1986)
Bruce Lesh. ''*Why Won't You Just Tell Us the Answer?'' Teaching Historical Thinking in Grades 7-12*. Stenhouse Publishers. (2011)

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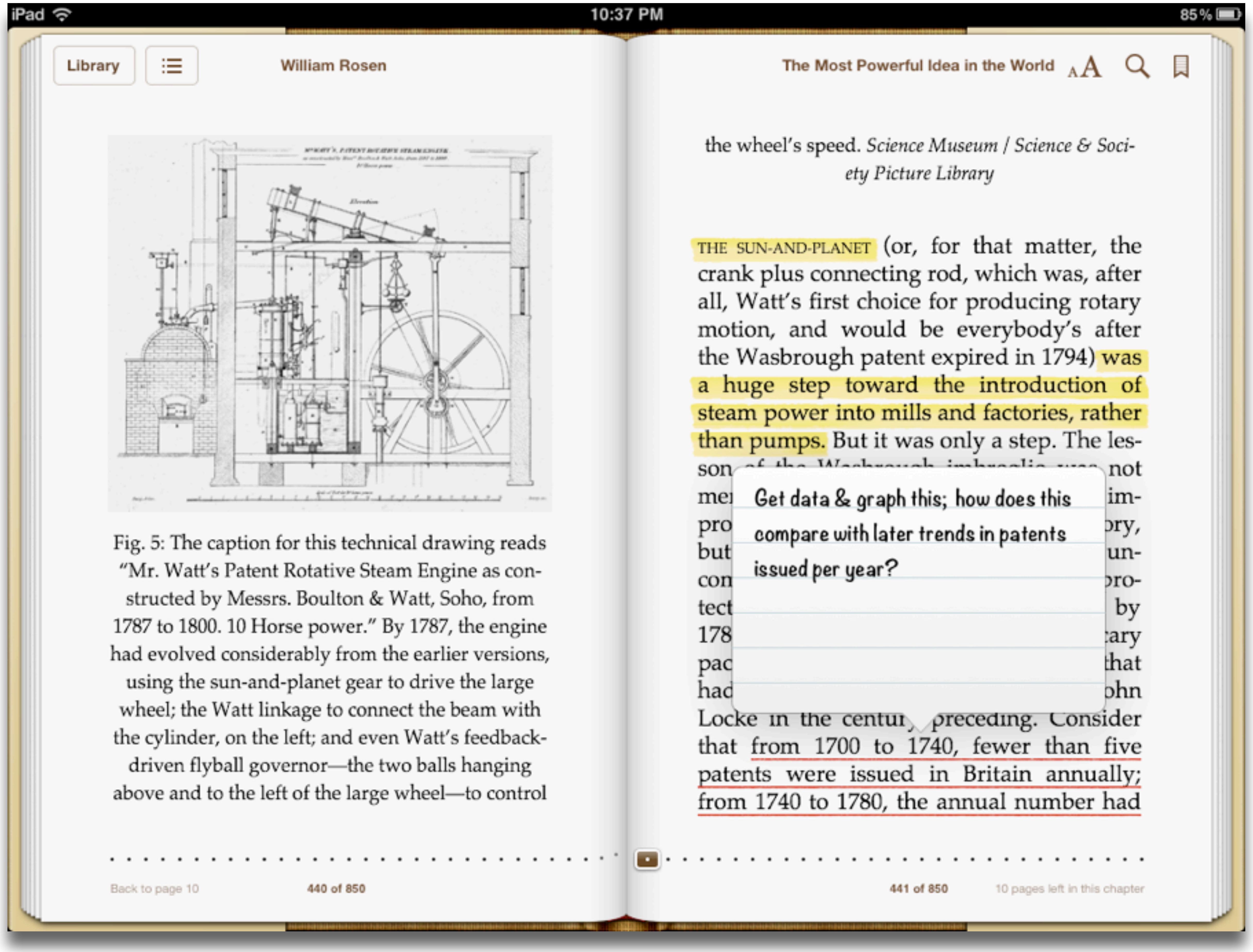

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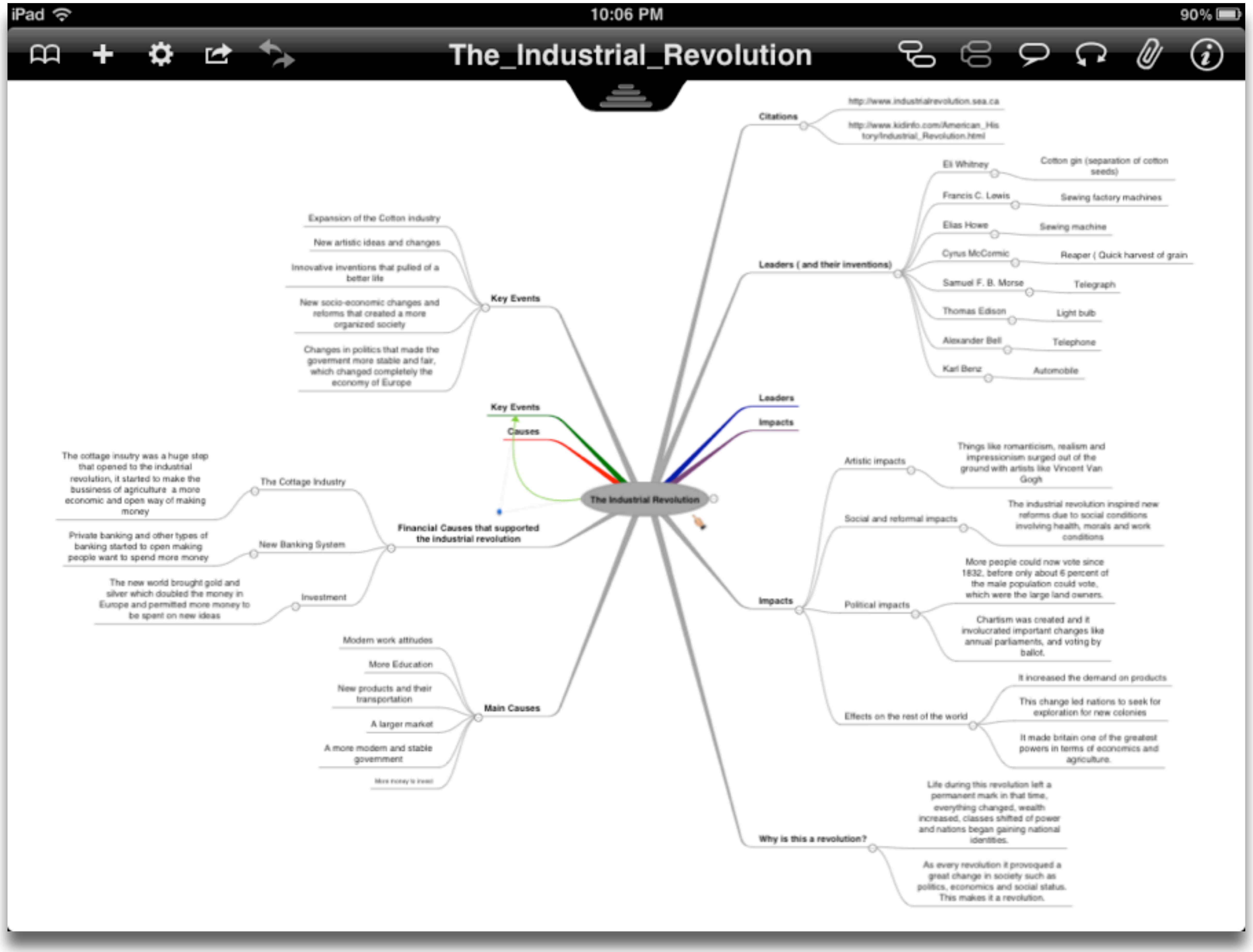

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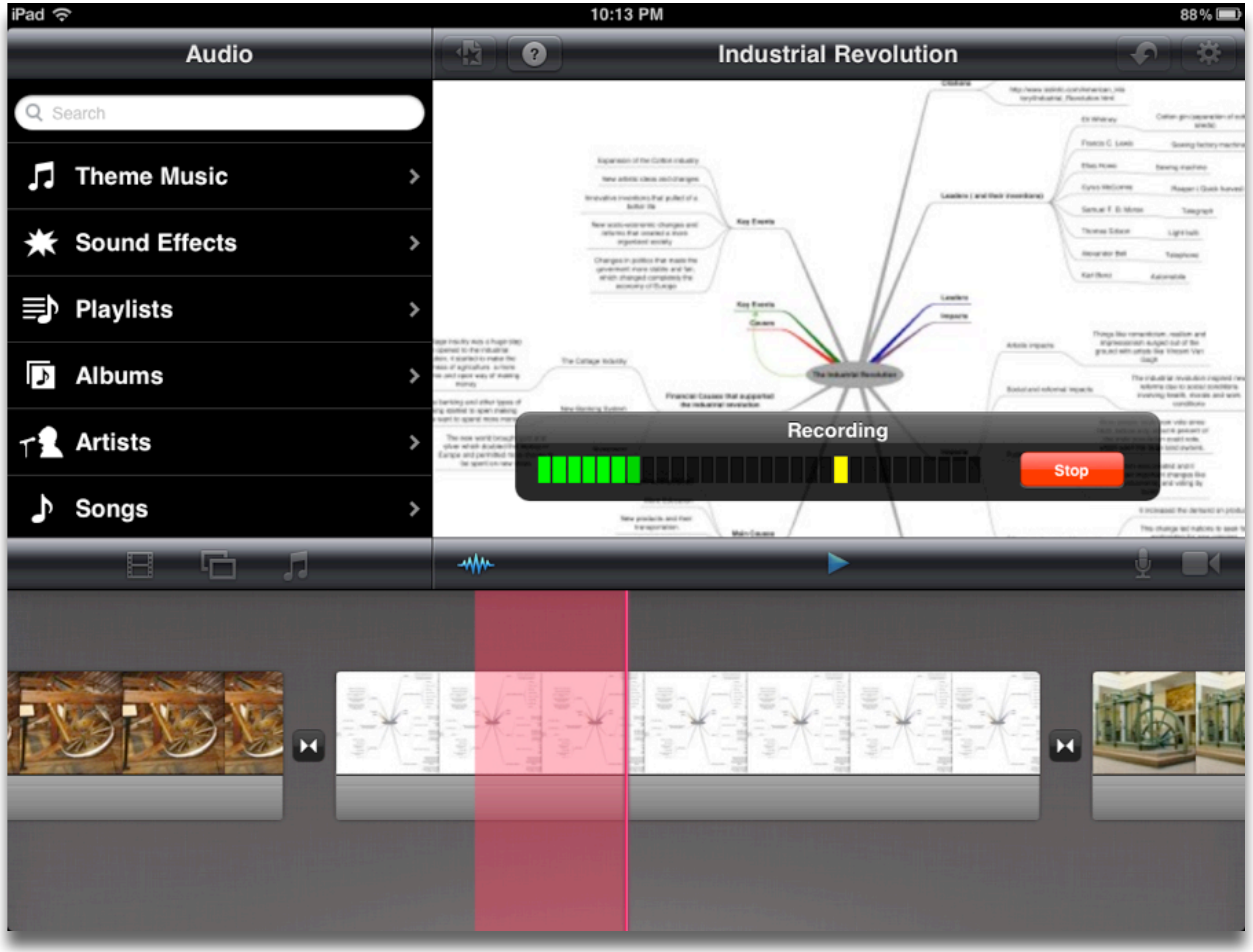

# Gersmehl:
# Teaching Geography – Four Cornerstones

- Location
  - Position in space
- Condition
  - Mix of natural & artificial features that give meaning to a location
- Links
  - Connections between places
- Region
  - Formal region: group of places with similar conditions
  - Functional region: group of places linked together by a flow

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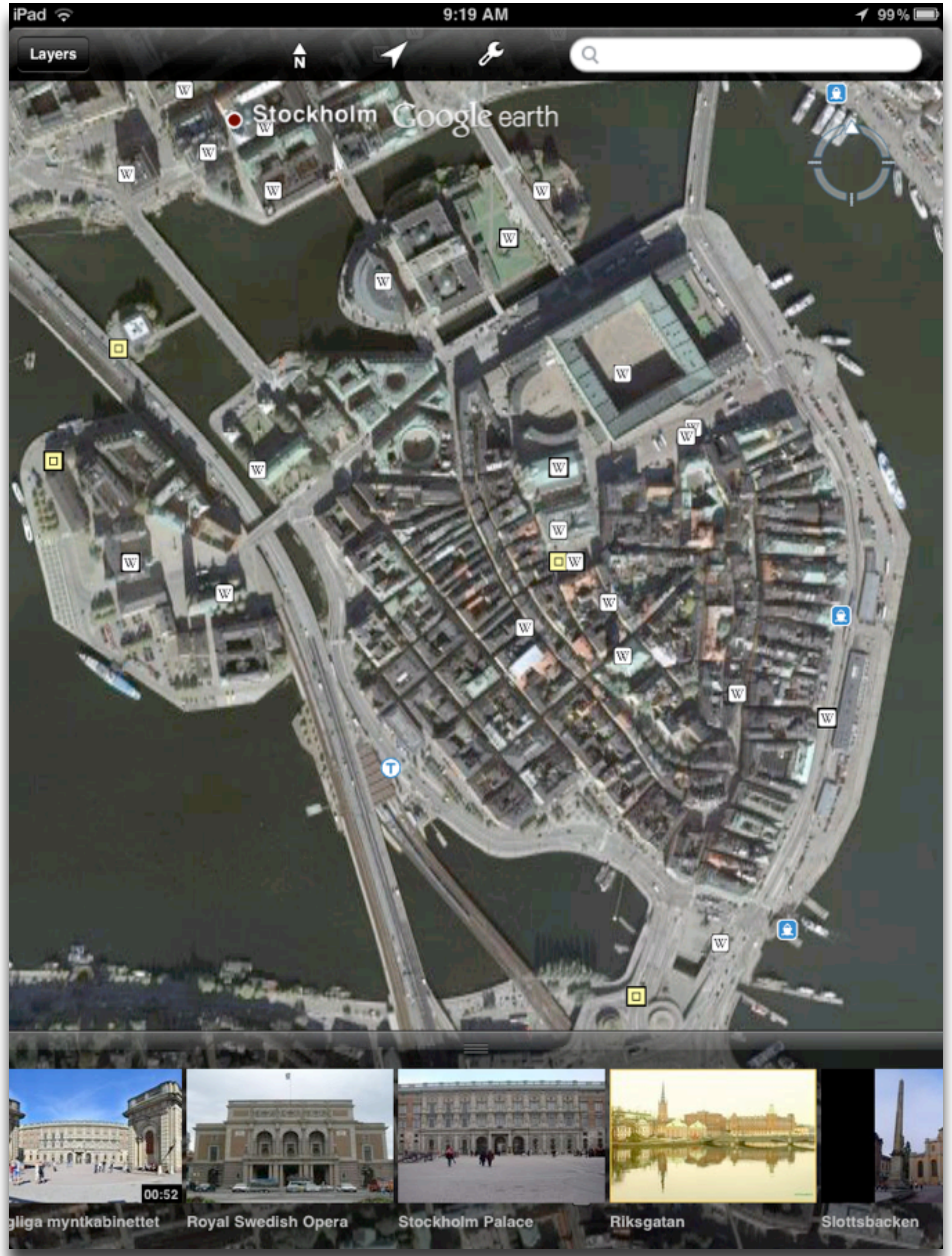

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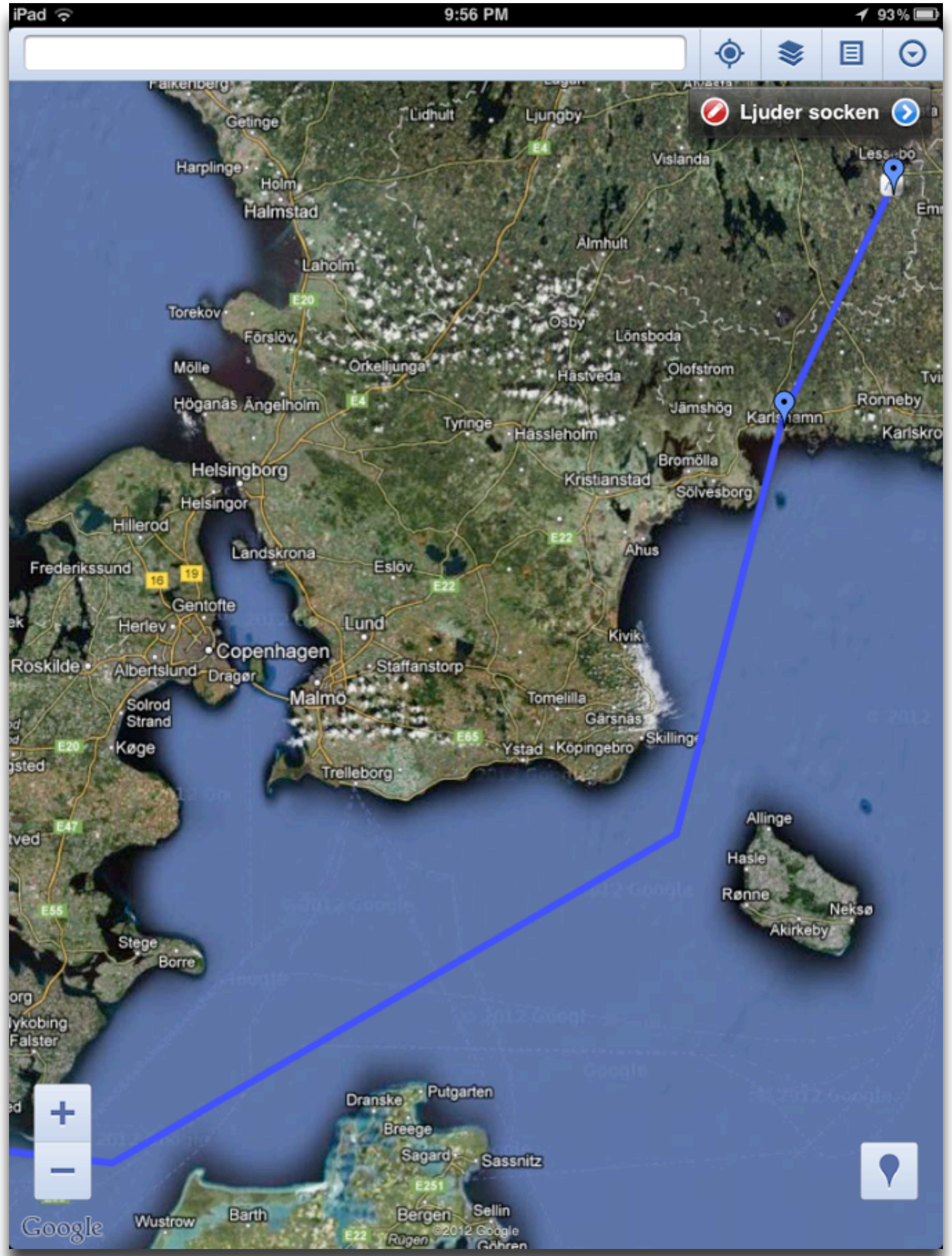

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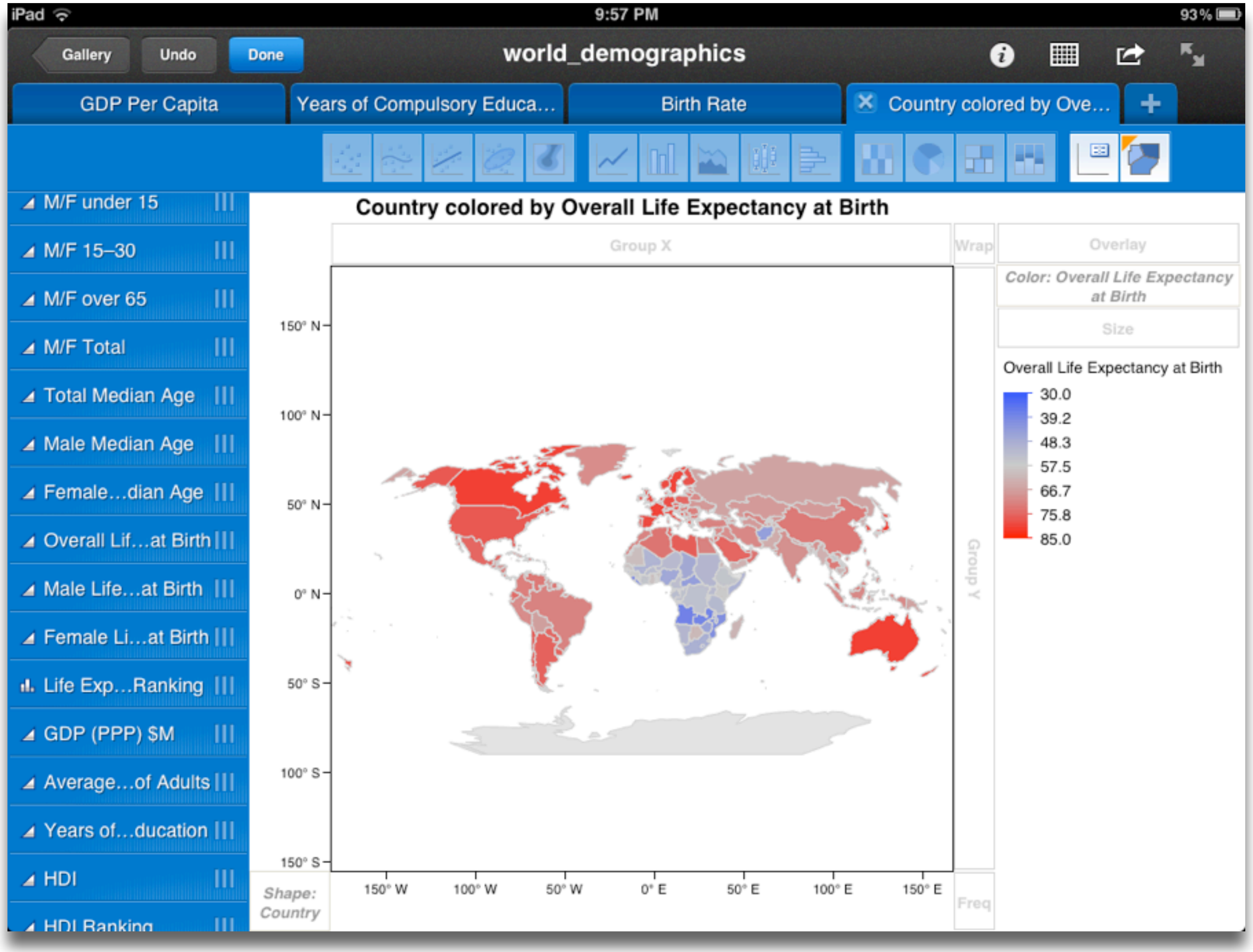

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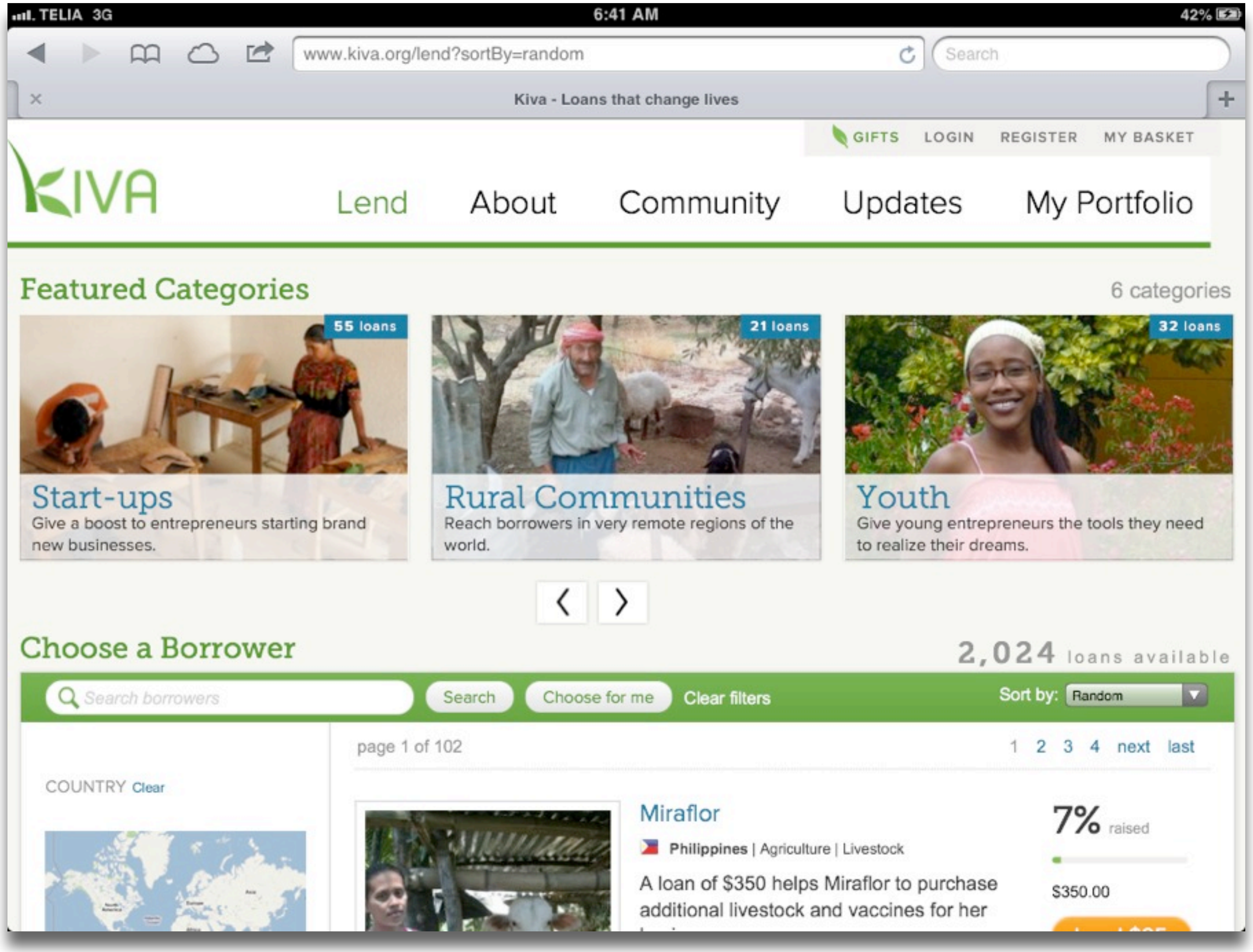
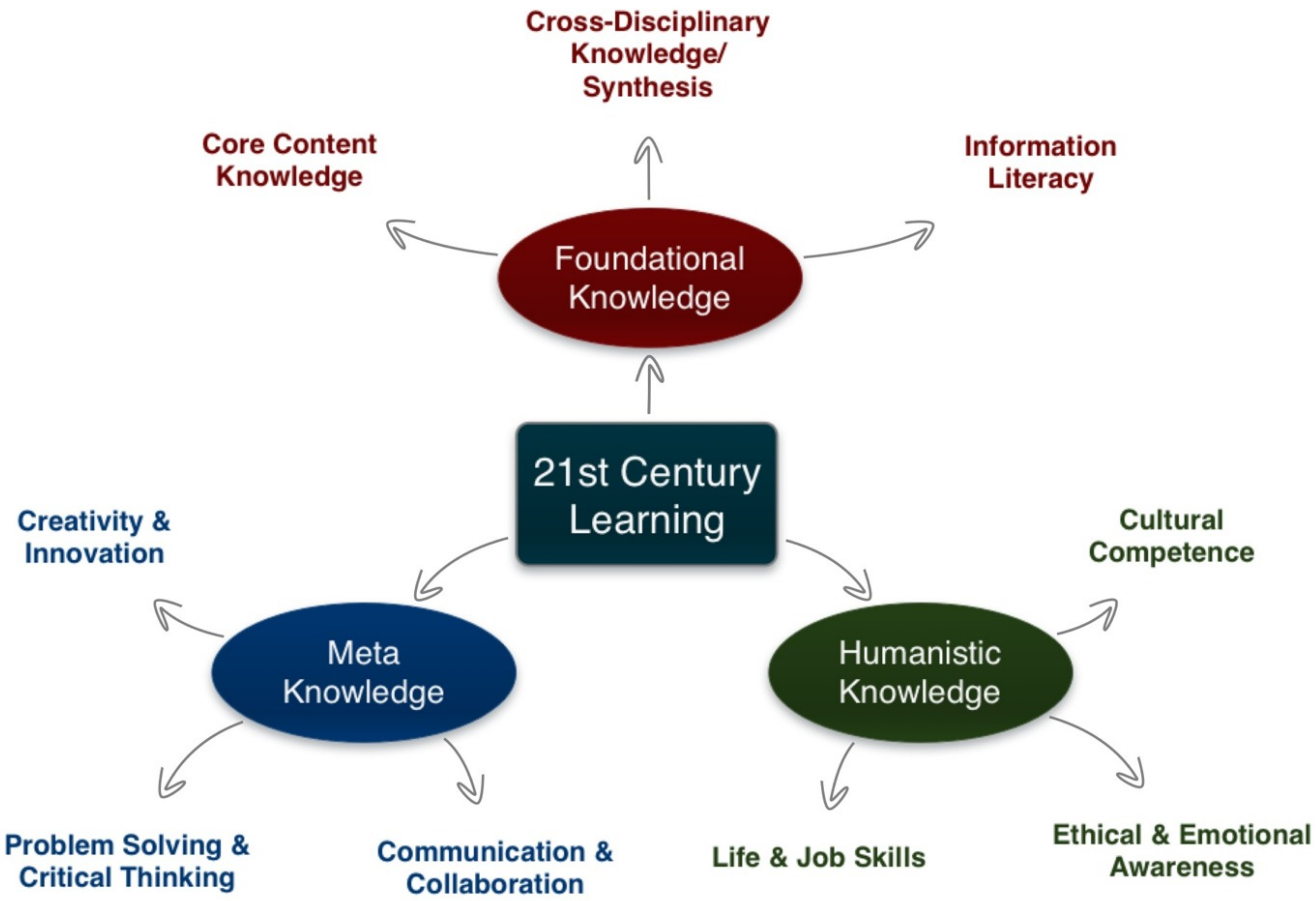
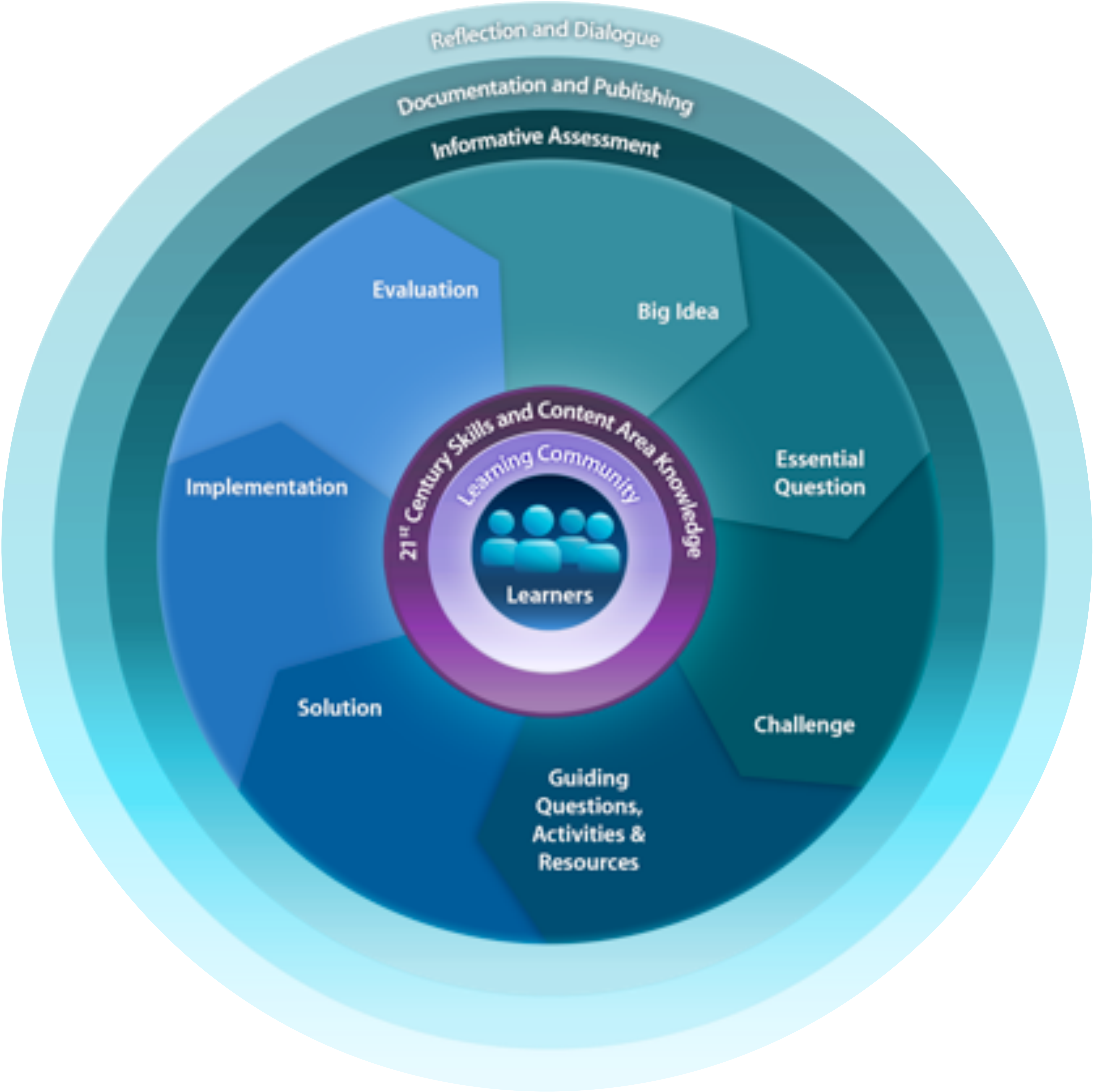


# Framing Cross-Disciplinary Work


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

# Three Categories

- Convergent Design
  - What is a common underlying feature connecting different activities in different subject areas?
  - Example: how does marketing appear as a common feature to be addressed across vocational areas?
- Divergent Design
  - What do different disciplines have to say about one central theme?
  - Example: what do different subject areas contribute to the understanding of the European Union?
- Challenge Based Learning
  - How do we go from a big idea, to a challenge, to implementing a solution, to assessing it?
  - Example: what challenge and response could we derive from the idea of sustainability?


Reflection and Dialogue
Documentation and Publishing
Informative Assessment
Evaluation
Big Idea
Essential Question
Implementation
Challenge
Solution
Guiding Questions, Activities & Resources
21st Century Skills and Content Area Knowledge
Learning Community
Learners

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Big Idea

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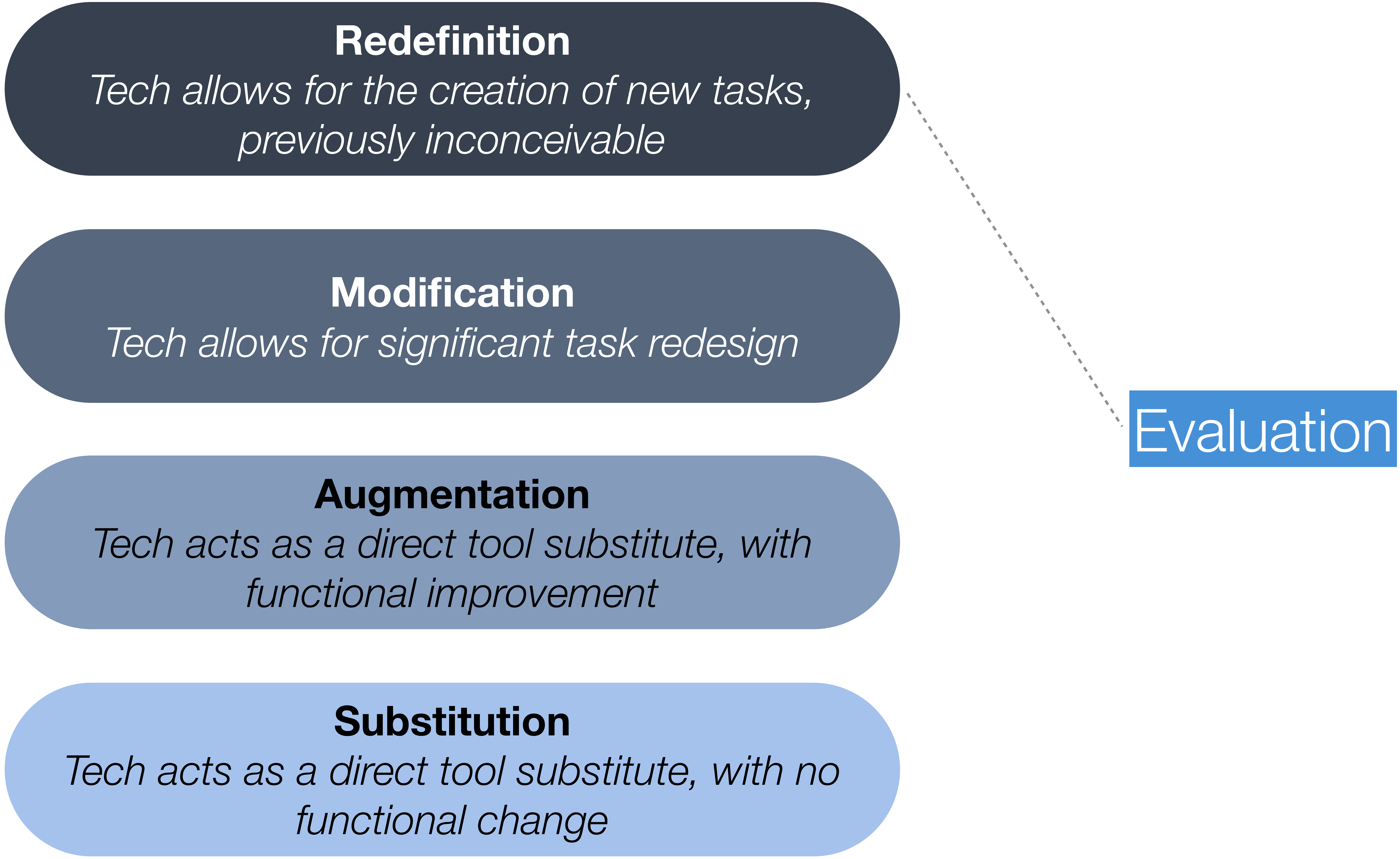
Solution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*Tech acts as a direct tool substitute, with no functional change*
Evaluation

# The CBL Process

**Collaborative Space**
- How will the teams communicate?
- Where will resources be shared?

**Introduction**
- Why is this idea important to the students?
- Why is this idea important to the community?

**Team Formation**
- What makes up a productive design team?
- How do we capitalize on everyone's skills?

**Assessment**
- How will the process be assessed?
- How will the solution be assessed?

**Guiding Questions**
- What do we need to know in order to meet the challenge?

**Guiding Activities**
- What do we need to do to answer our guiding questions?
- What resources are needed?

**Solution Development**
- How do we meet the challenge?
- Is the solution justified?

**Implement and Assess**
- How can the solution be tested?
- Did the solution work?

**Document/Reflect**
- What did we learn?
- What would we do differently?

**Publish**
- How do we share our results?
- What is the story behind the solution?

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