

# SAMR: Getting To Transformation

---

Ruben R. Puentedura, Ph.D.

# SAMR: Framing Goals for Transformation

**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**

# 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?

# 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?

# 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...

# 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.”

# Wiliam: A Framework for Formative Assessment

---

	Where the learner is going	Where the learner is right now	How to get there
Teacher	Clarifying learning intentions and criteria for success	Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding	Providing feedback that moves learners forward
Peer	Understanding and sharing learning intentions and criteria for success	Activating students as instructional resources for one another	
Learner	Understanding learning intentions and criteria for success	Activating students as the owners of their own learning	

# 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>	

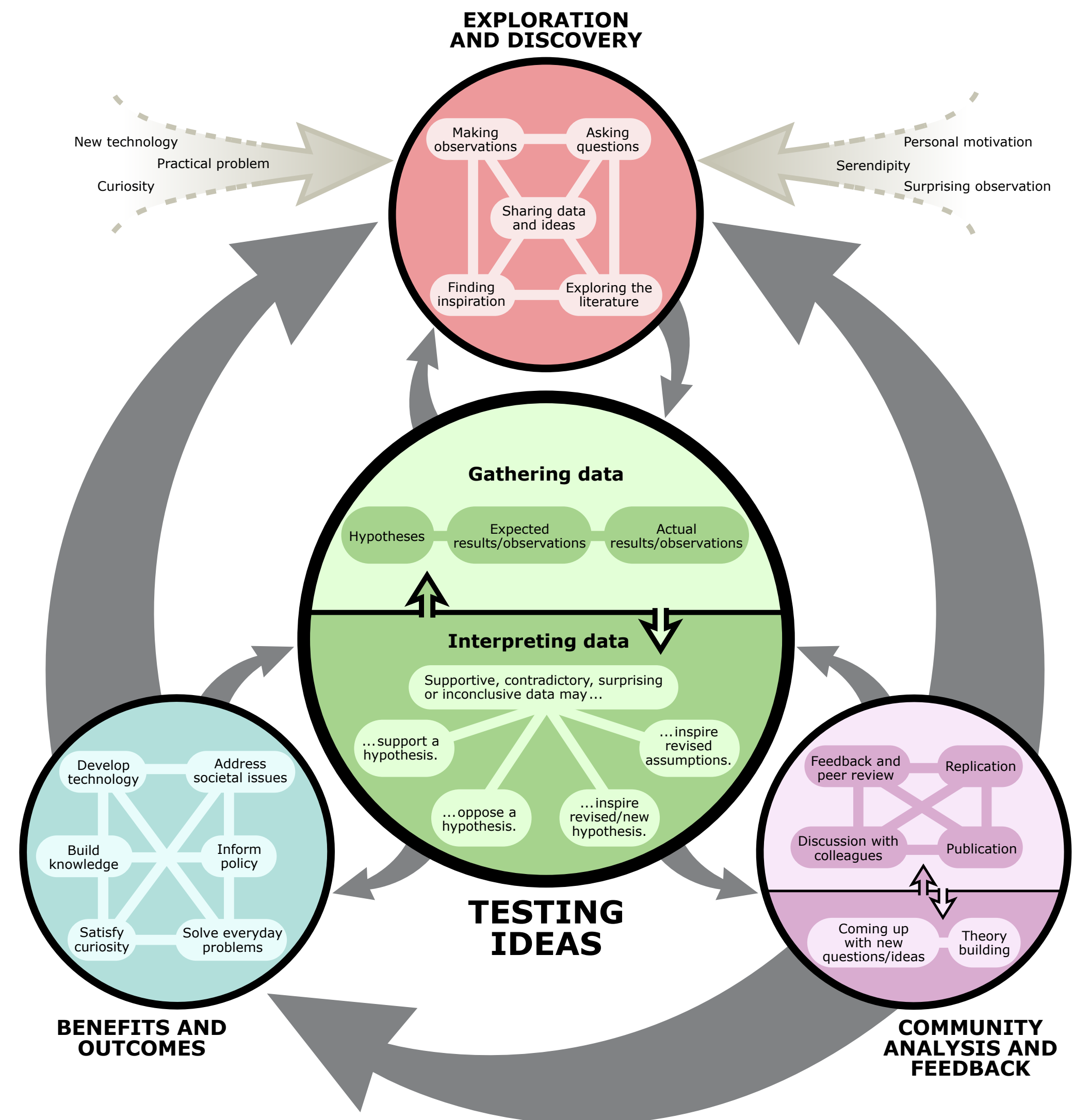
# Facione: Critical Thinking – Cognitive Skills and Subskills

---

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

# Understanding Science:

## How Science Works





## 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*

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

**bi•ome** | 'bī,ōm |  
noun Ecology  
a large naturally occurring community of flora and fauna occupying a major habitat, e.g., forest or tundra.

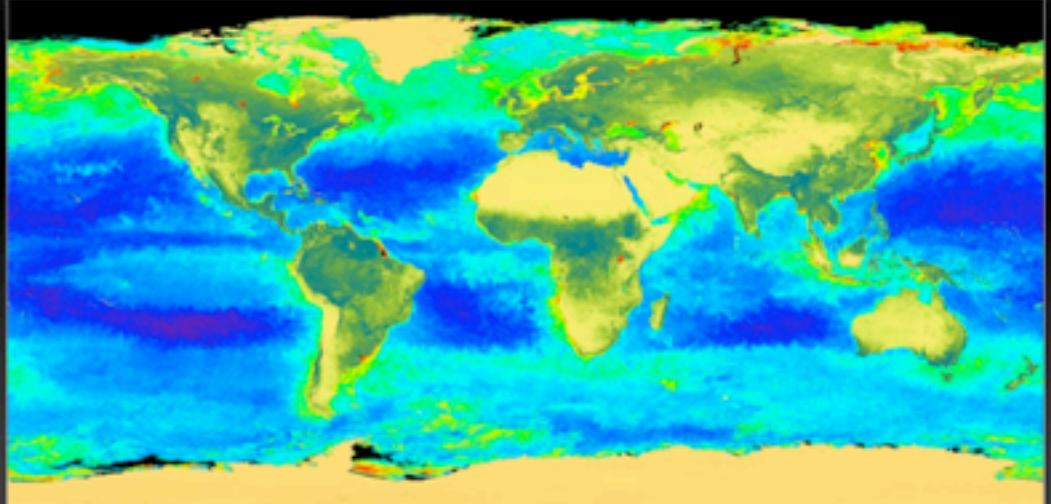
ORIGIN early 20th cent.: from **BIO-** 'life' + **-OME**

[Search Web](#) [Search Wikipedia](#)

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



Some aquatic organisms are adapted to both conditions for parts of their lives, such as salmon and some eels, but it

Interactive The latitudes of peak photosynthesis change with the seasons.

31

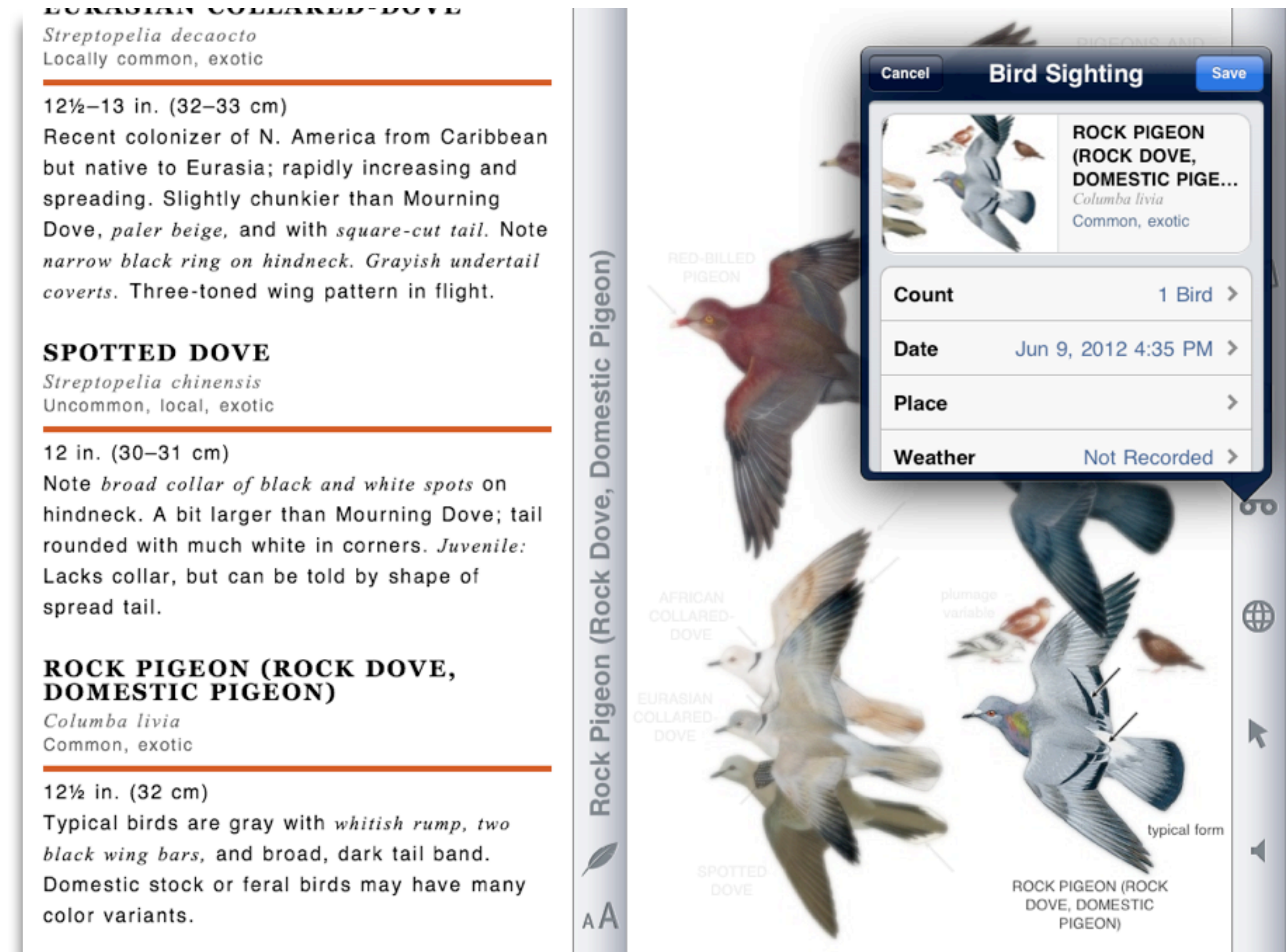


# Redefinition

# Augmentation

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

# Substitution



## Redefinition

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

## Modification

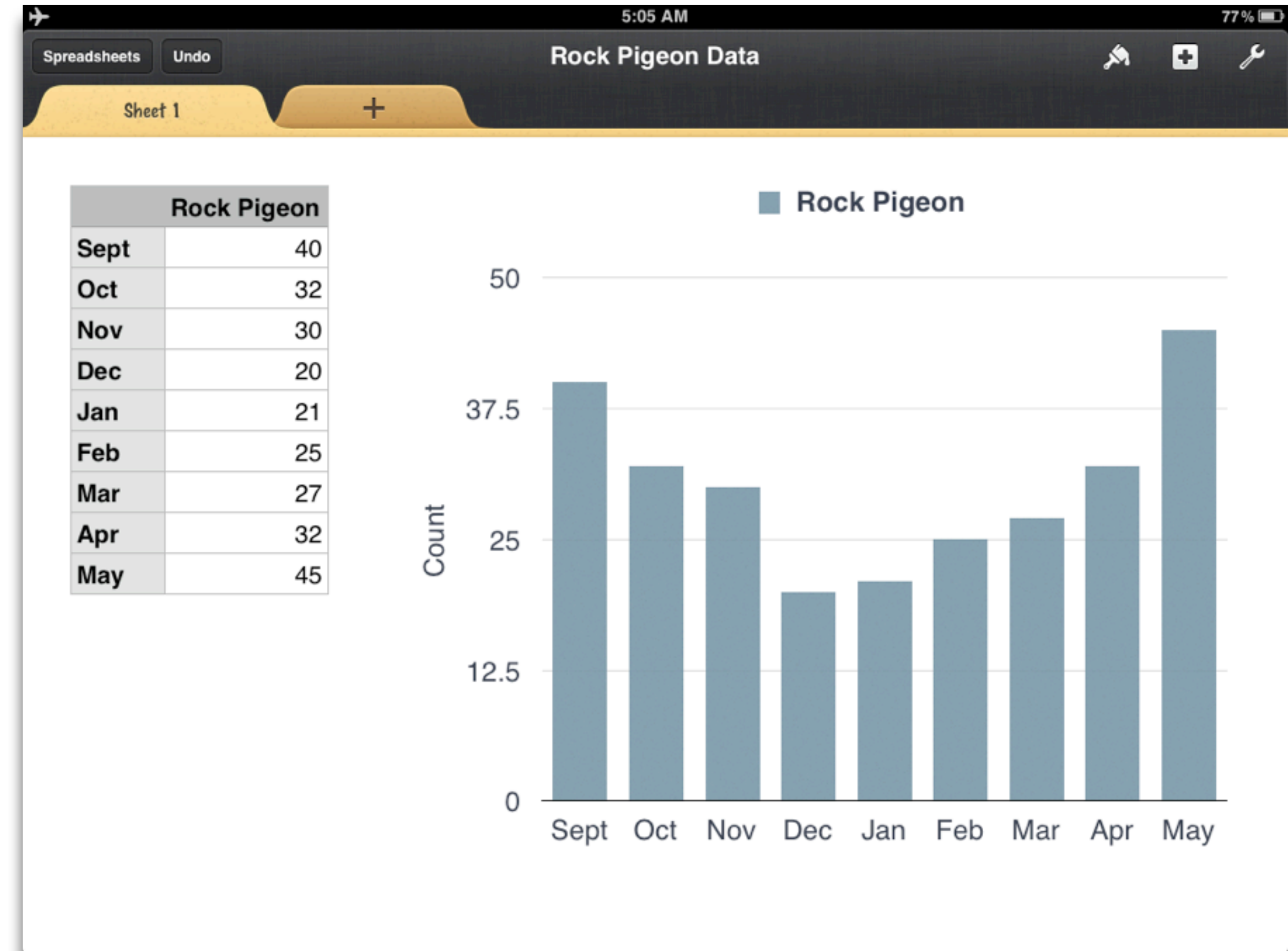
*Tech allows for significant task redesign*

## Augmentation

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

## Substitution

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





## 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*



# The PCK Question

# Why Study History?

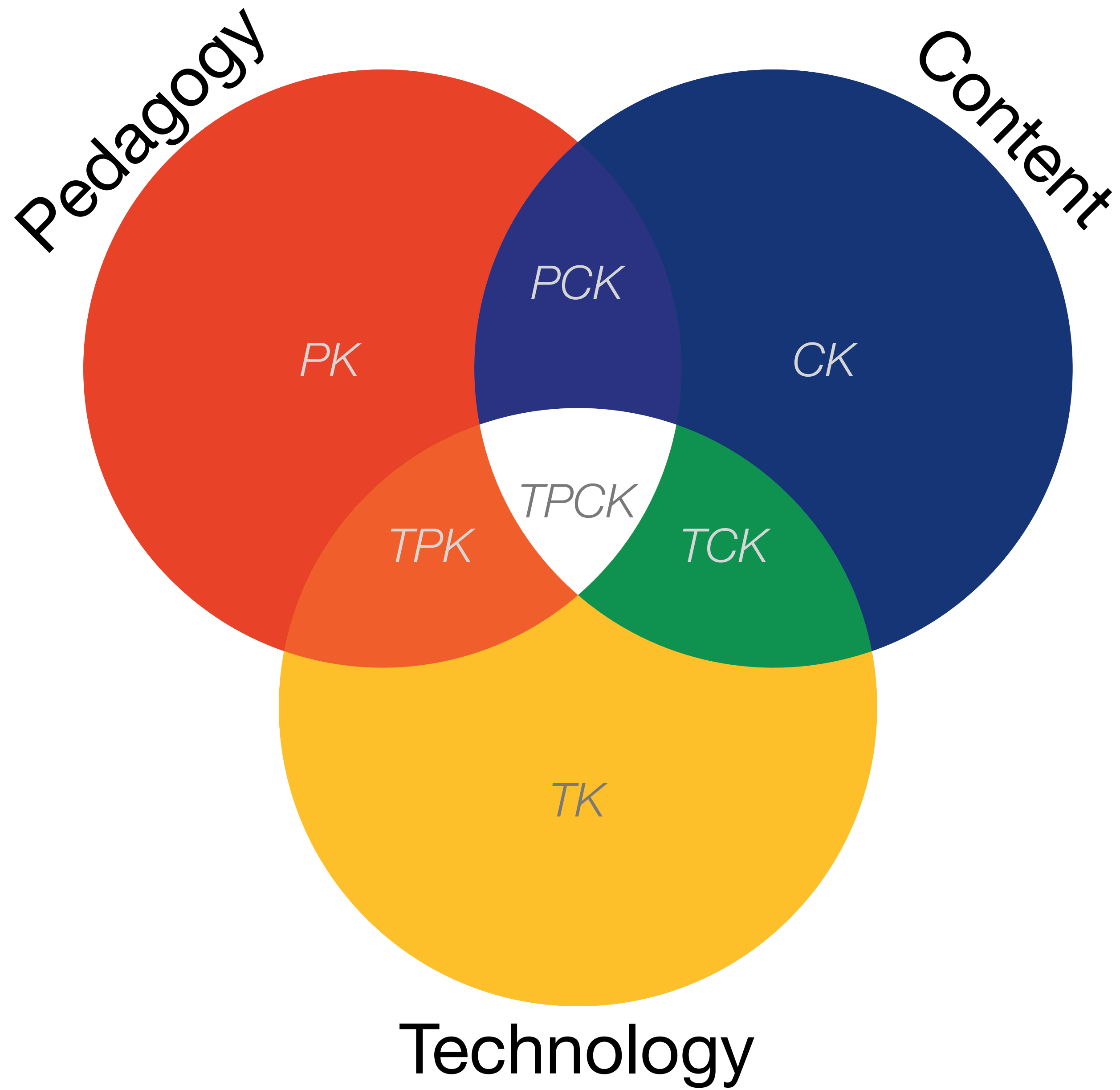
---

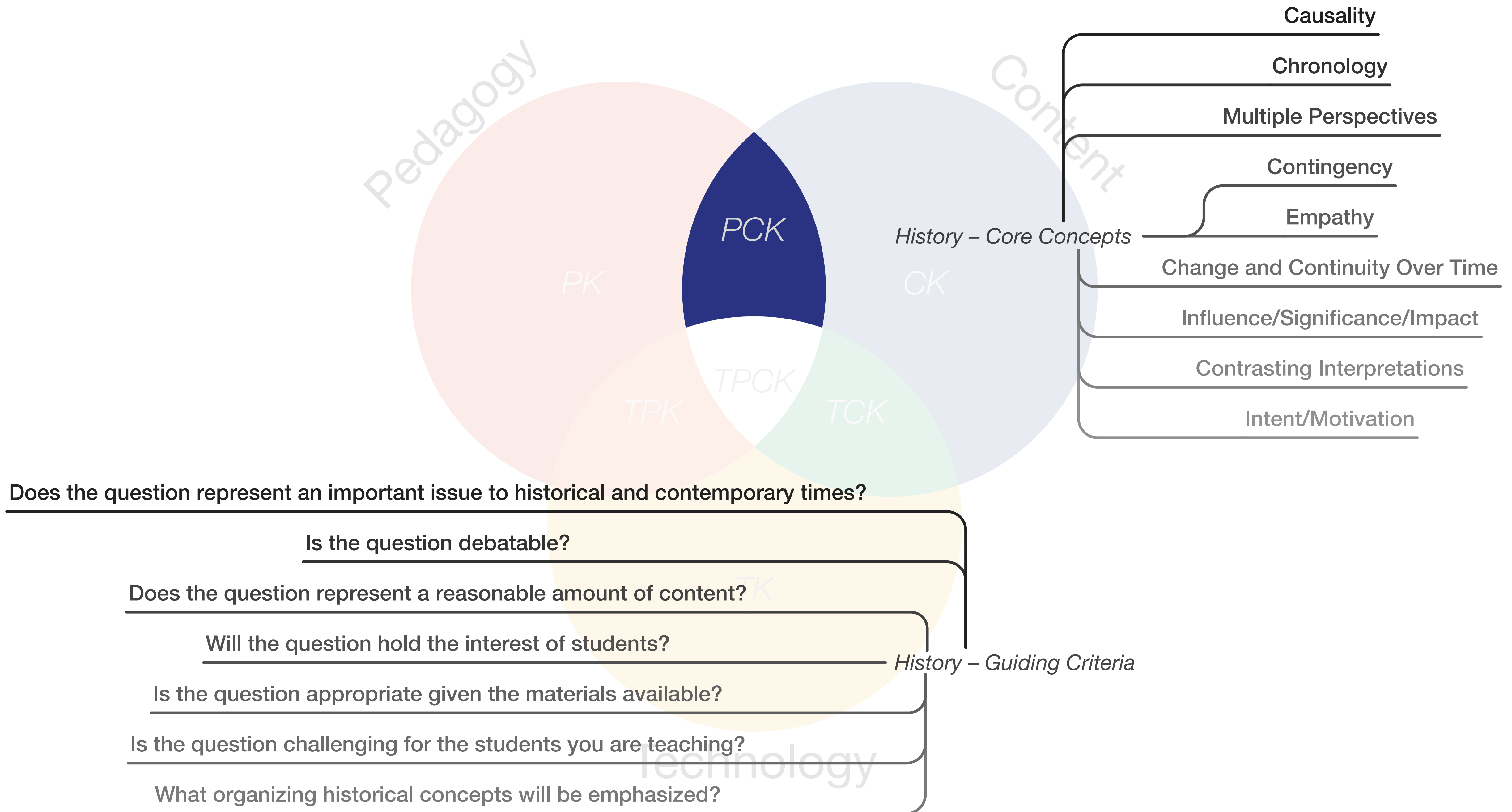
- **Problematic claims:**

- *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:**

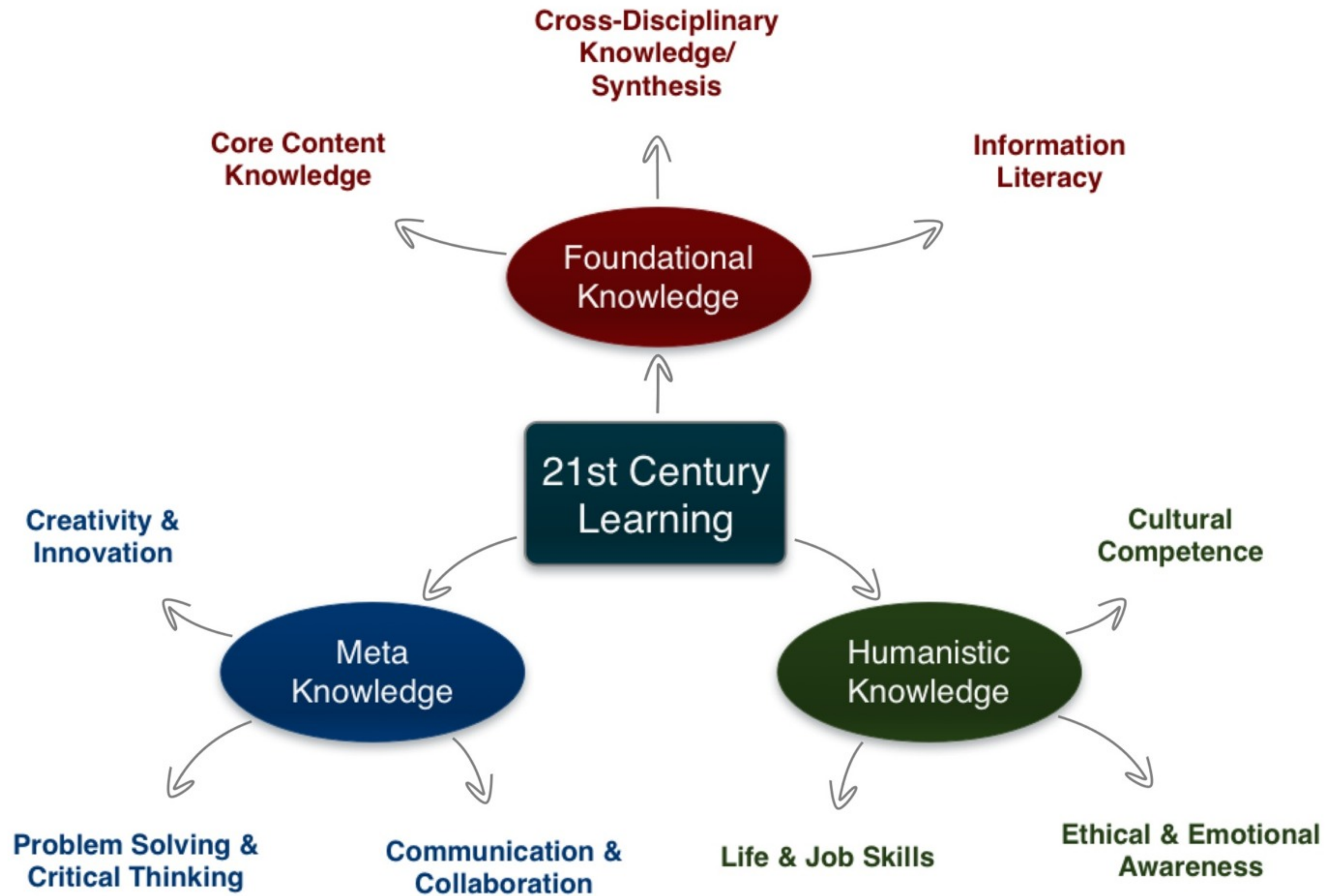
- *Enjoyment*
- *A tool for thought* - exploring an alternative world makes us more aware of our own lives and contexts
- *To be made aware of the possibility of doing things differently* - history is an argument, showing that there have always been many courses of action, many ways of being










# Information Literacy and Reading Comprehension: Digital Storytelling and Visualization Tools



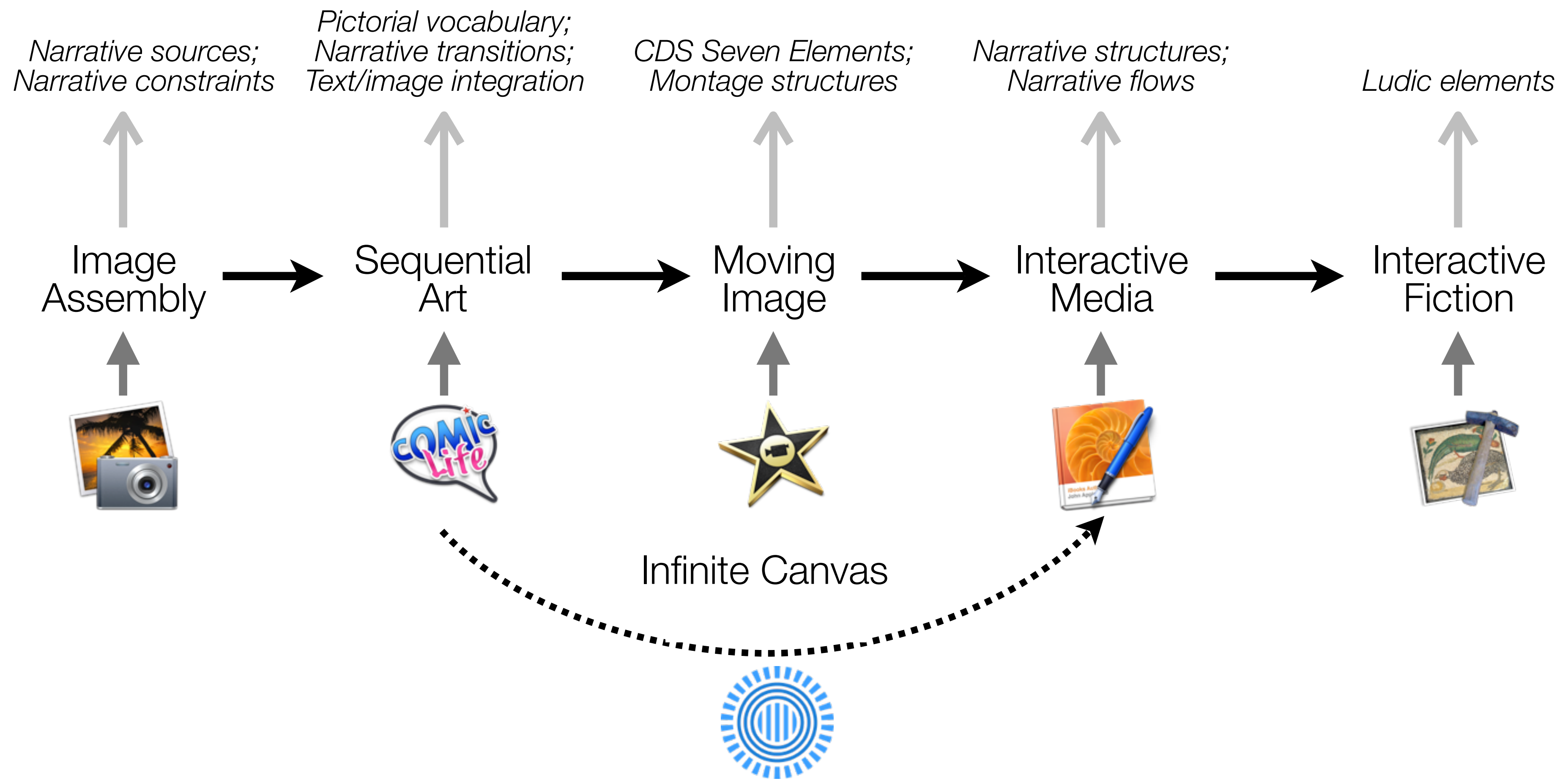


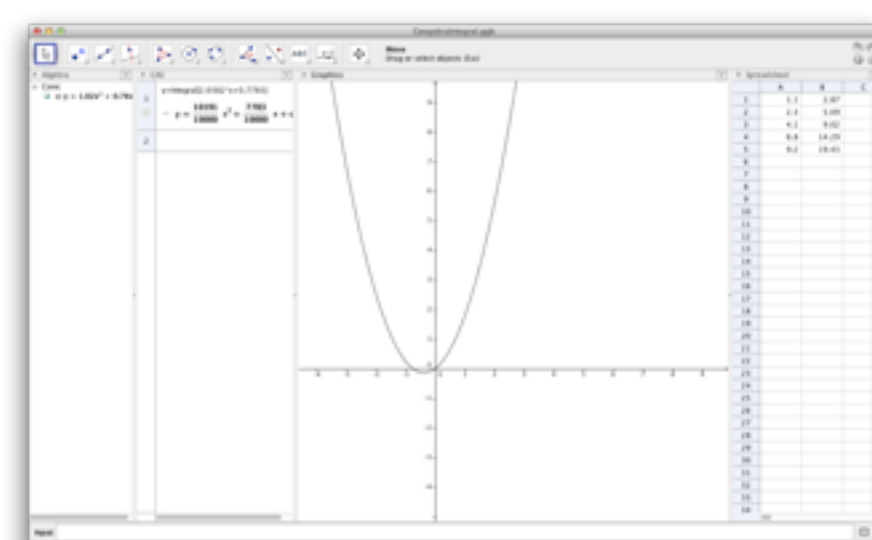
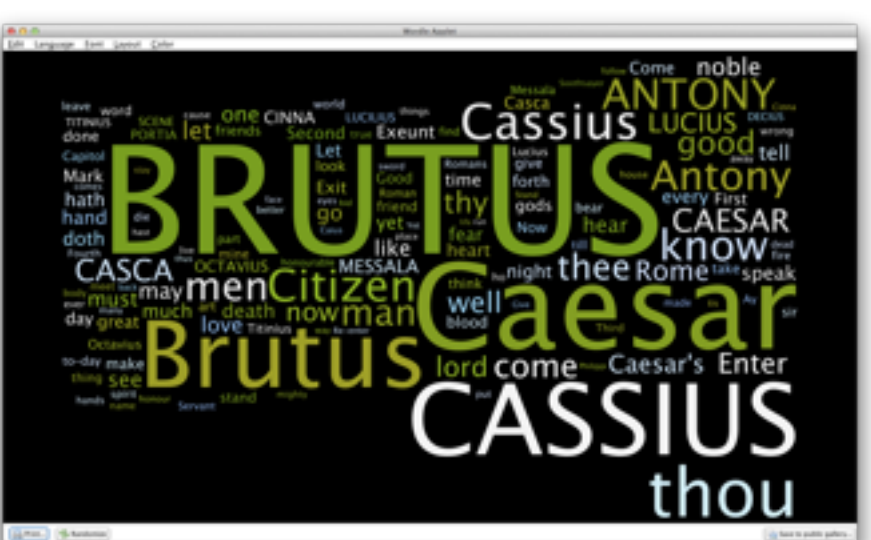
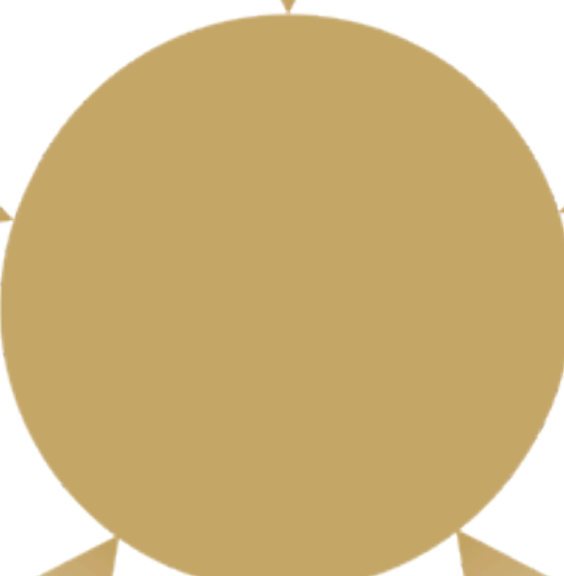
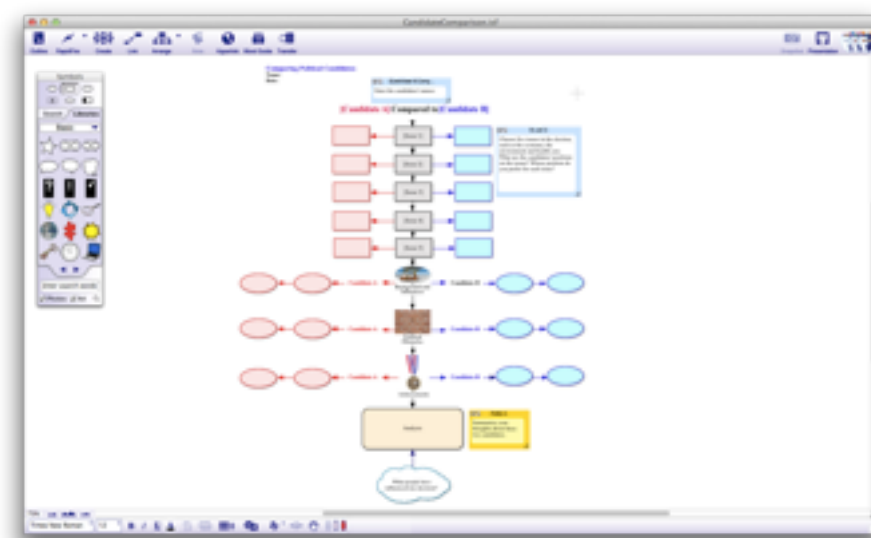
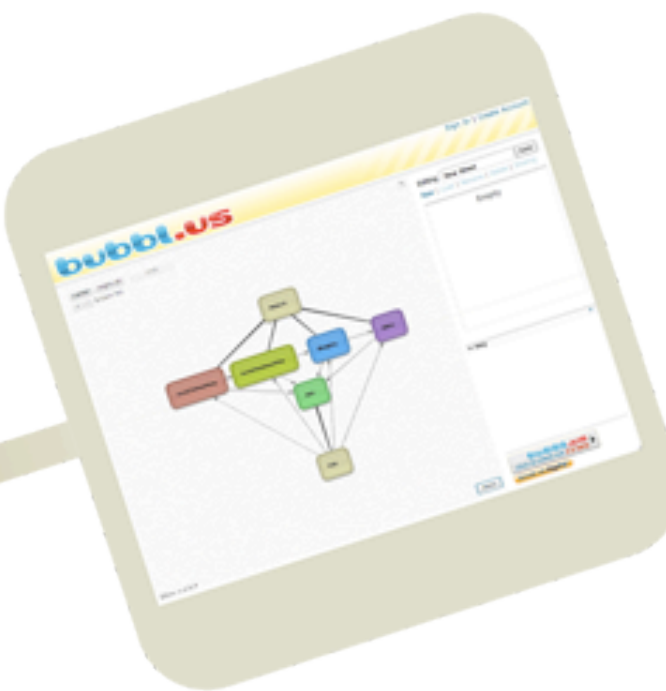
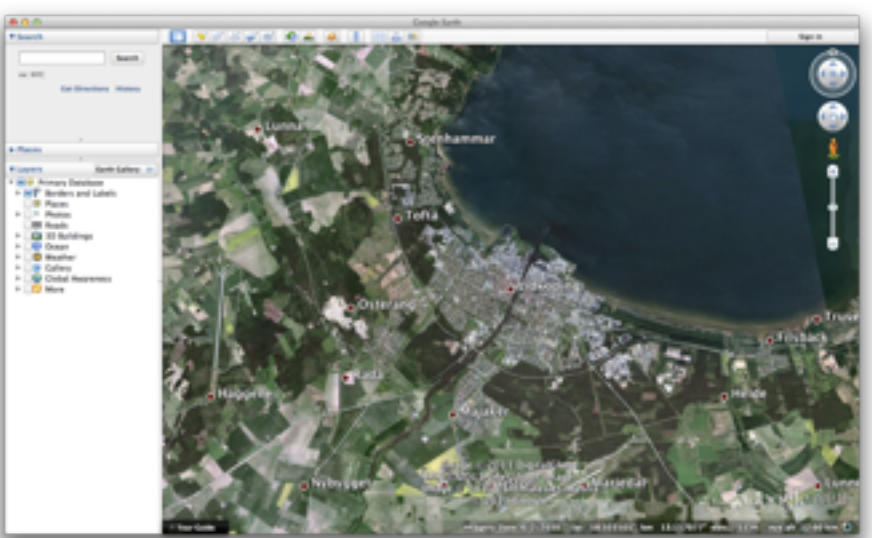
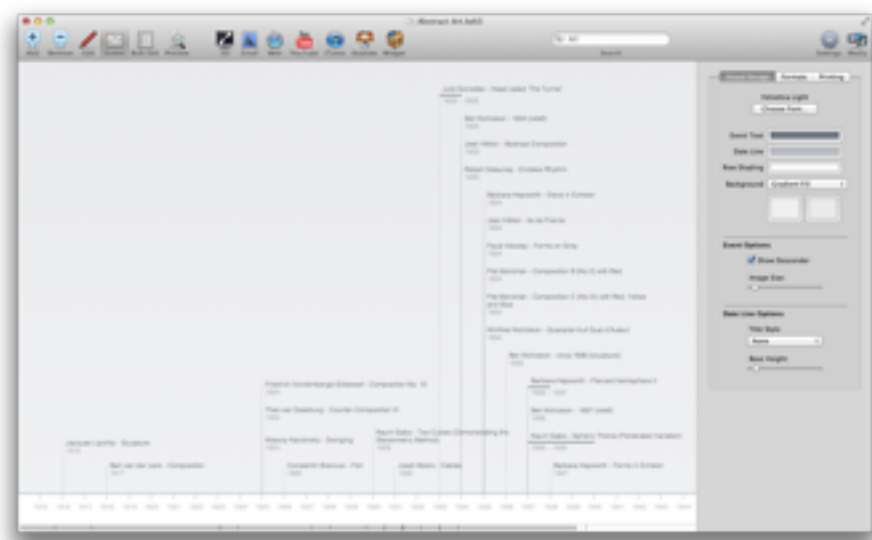


Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
				

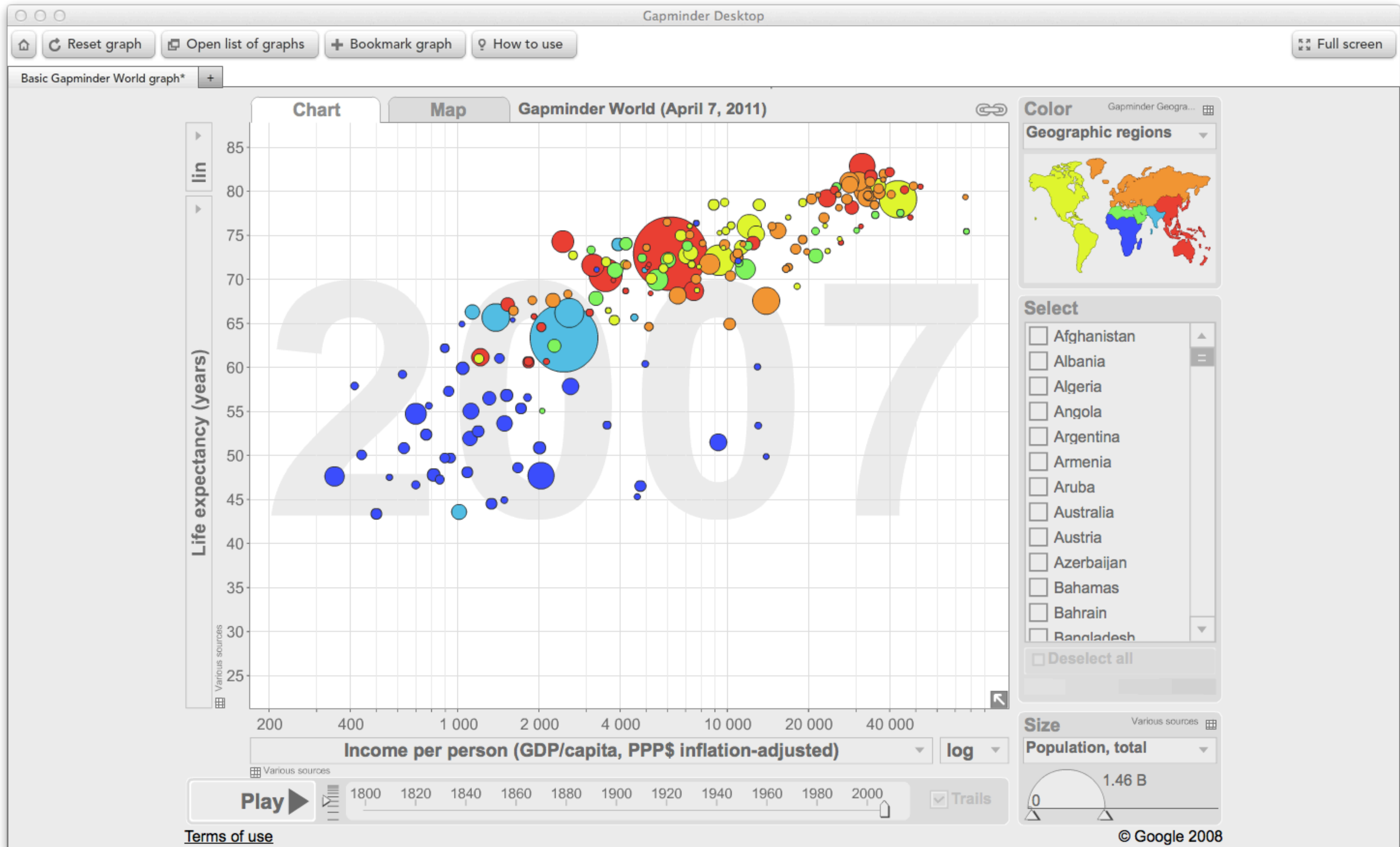




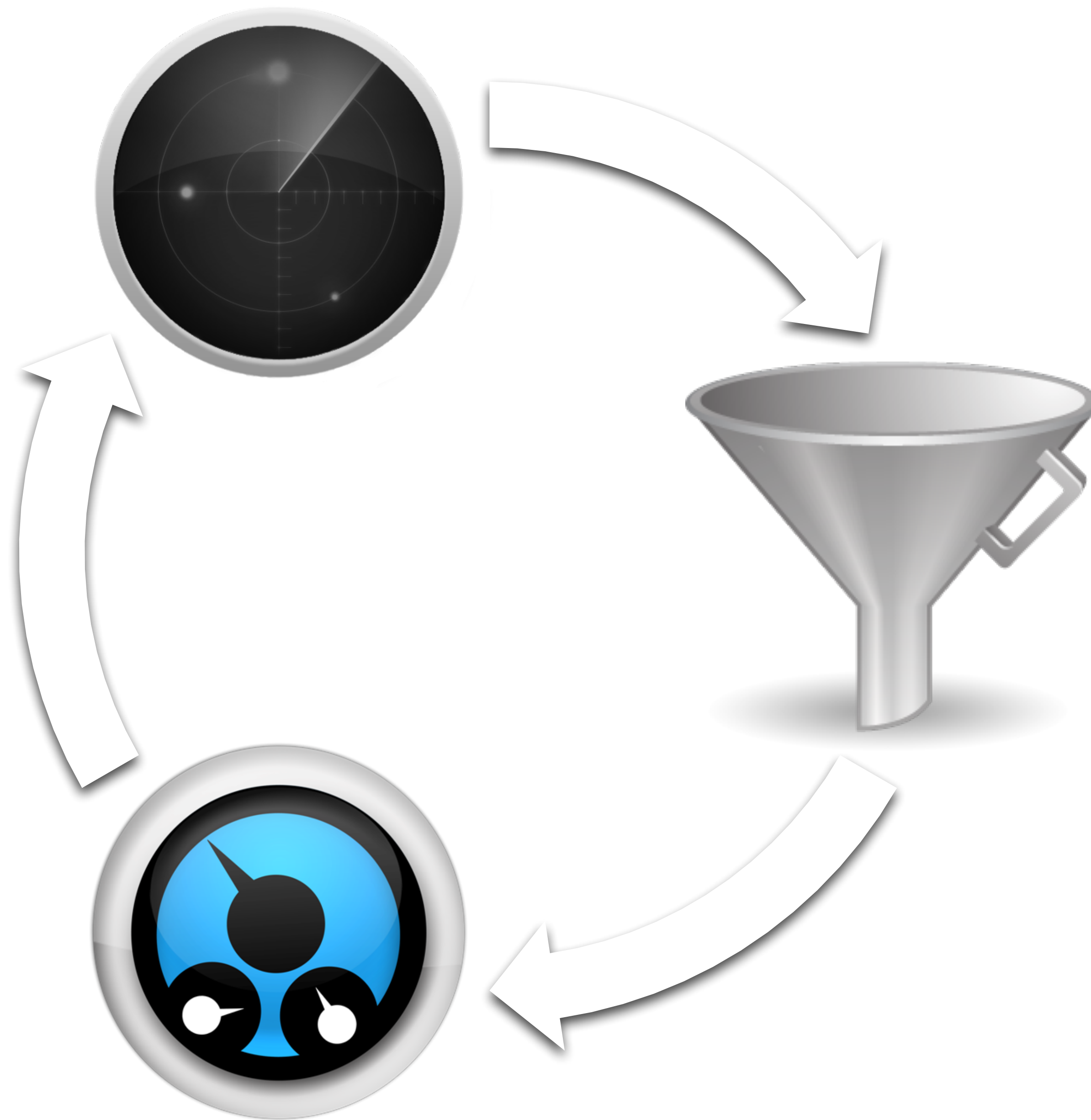


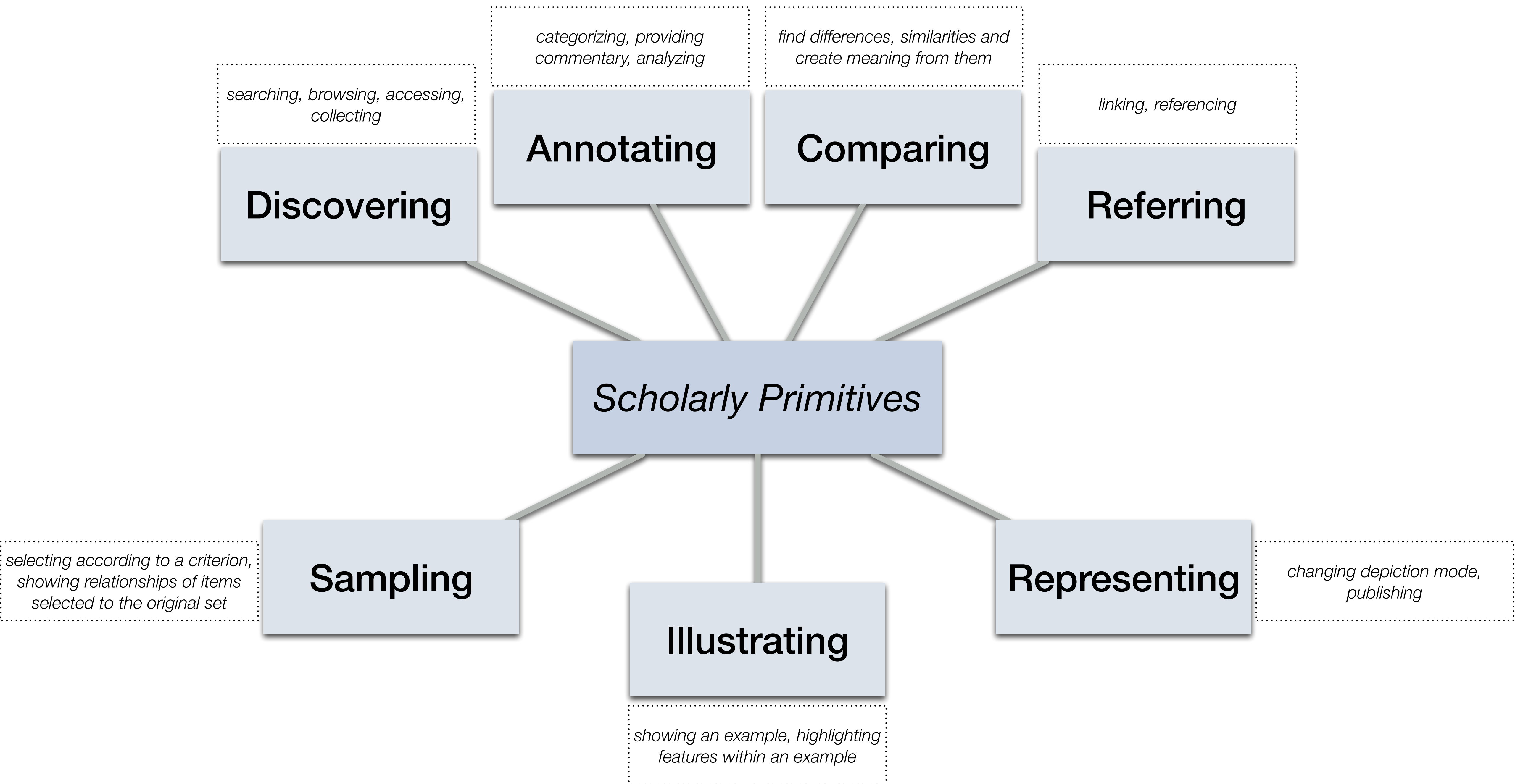






# Information Literacy and Reading Comprehension: Research Needs and Social Structures









# A Basic Toolkit

---

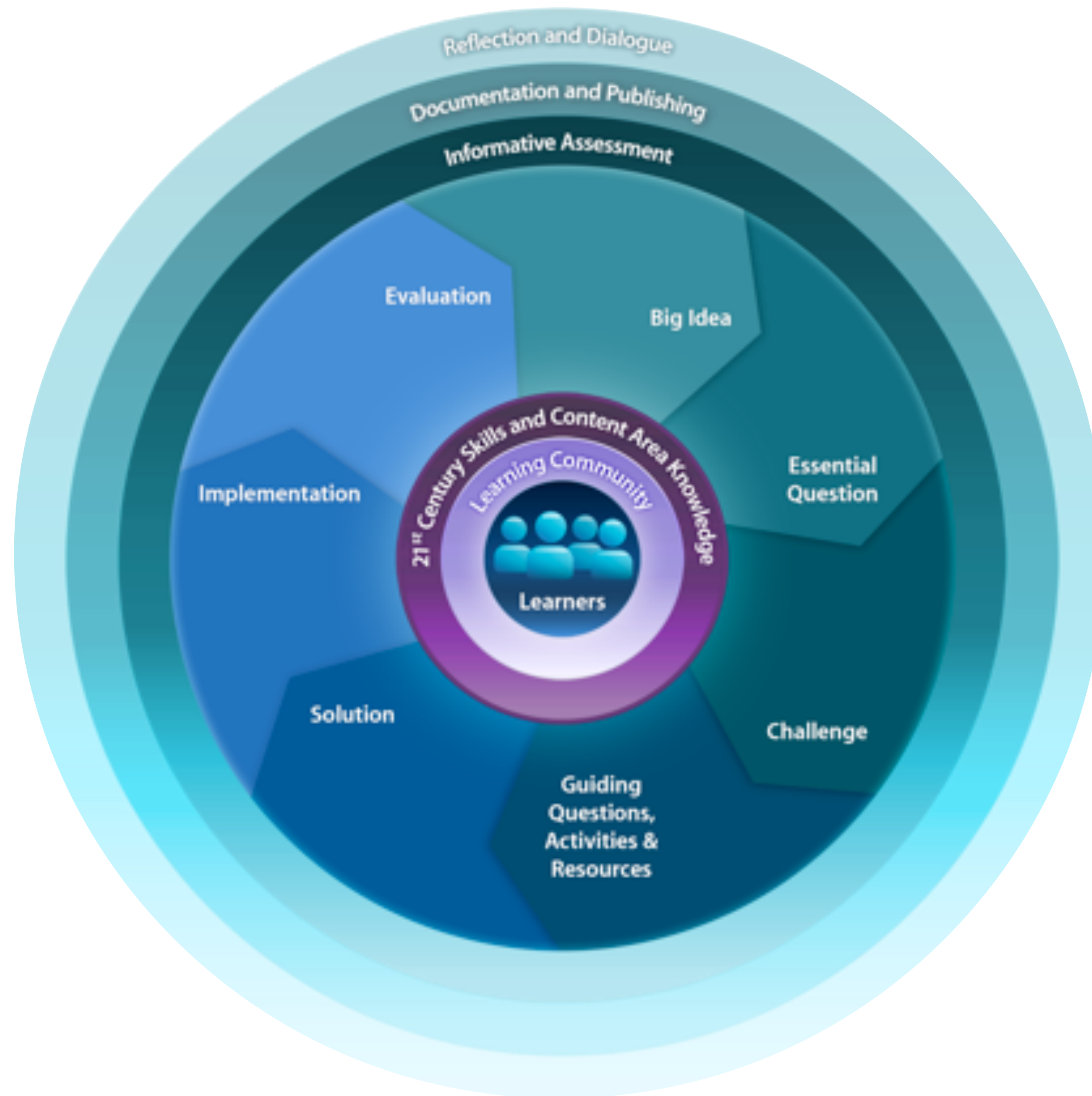
- Bookmarks: Delicious, Diigo
- RSS Feeds: Reeder
- Forums: itslearning
- Microblogging: Twitter
- Blogging: WordPress
- Wikis: MediaWiki

# Framing Cross-Disciplinary Work

# 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?



## **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*

**Big Idea**

```
graph LR; A["Redefinition  
Tech allows for the creation of new tasks,  
previously inconceivable"] -.-> E["Big Idea"]; B["Modification  
Tech allows for significant task redesign"] -.-> E; C["Augmentation  
Tech acts as a direct tool substitute, with  
functional improvement"] -.-> E; D["Substitution  
Tech acts as a direct tool substitute, with no  
functional change"] -.-> E;
```

## **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*

```
graph LR; A["Redefinition  
Tech allows for the creation of new tasks,  
previously inconceivable"] -.-> D["Solution"]; B["Modification  
Tech allows for significant task redesign"] -.-> D; C["Augmentation  
Tech acts as a direct tool substitute, with  
functional improvement"]; D["Substitution  
Tech acts as a direct tool substitute, with no  
functional change"];
```

**Solution**

## **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*

Evaluation

The diagram consists of four rounded rectangular boxes stacked vertically on the left, each containing a title and a description. A dashed line connects the right side of the top box to the 'Evaluation' box on the right. The boxes are colored in a gradient from dark blue at the top to light blue at the bottom. The 'Evaluation' box is a solid blue rectangle on the right.

# 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**

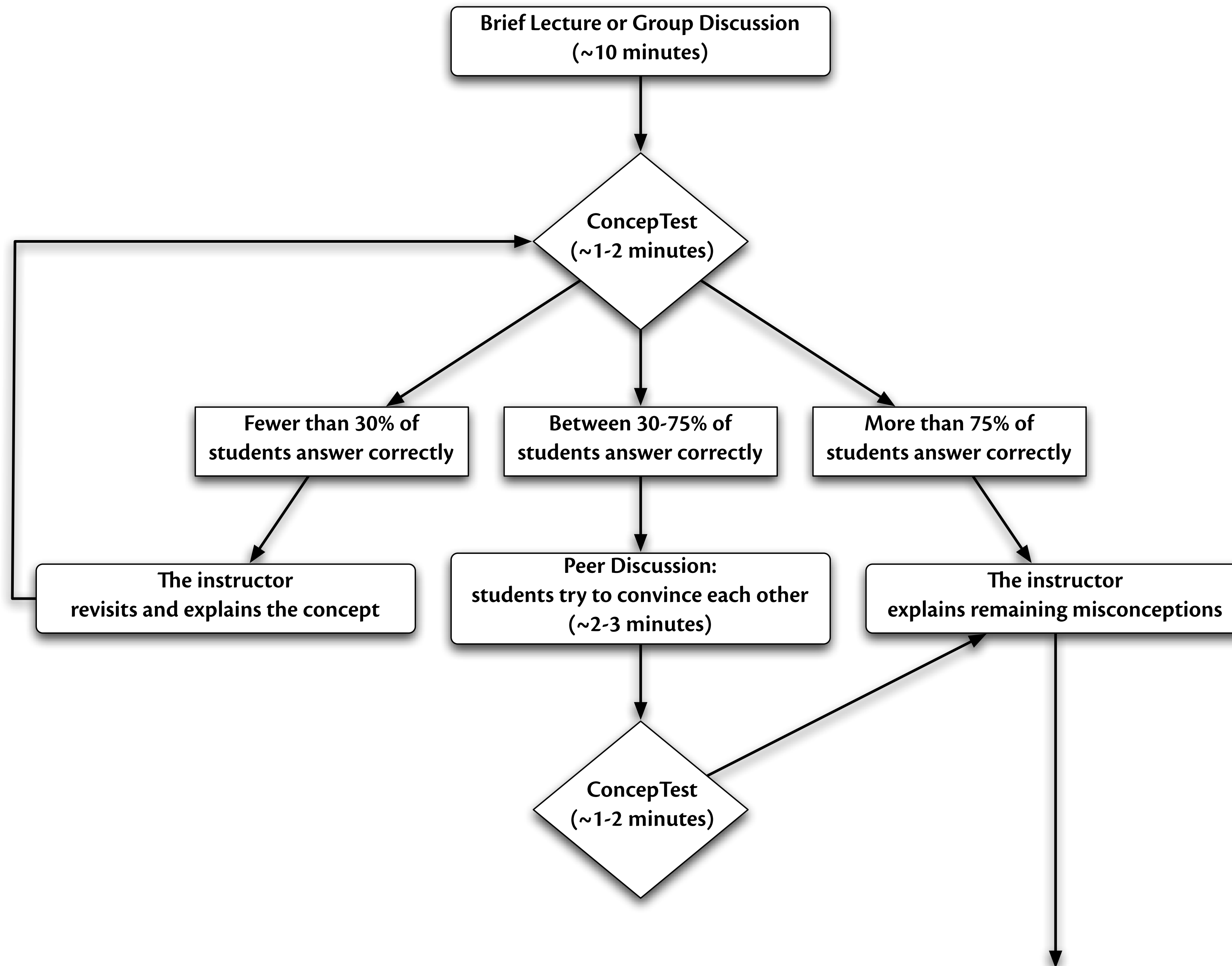
- What did we learn?
- What would we do differently?

## **Publish**

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



Thinking About Assessment



# Redefinition

Tech allows for the creation of new tasks, previously inconceivable

# Modification

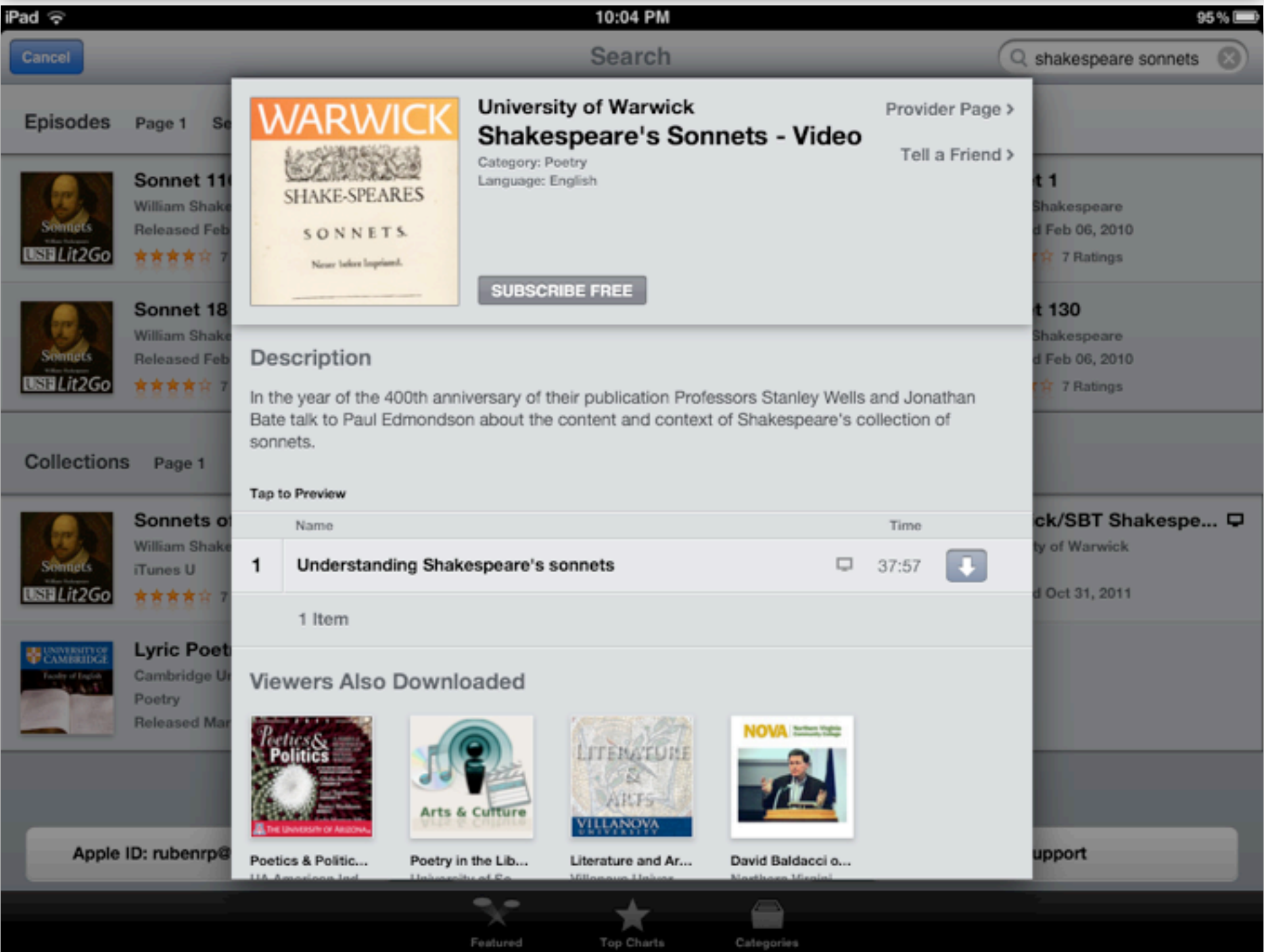
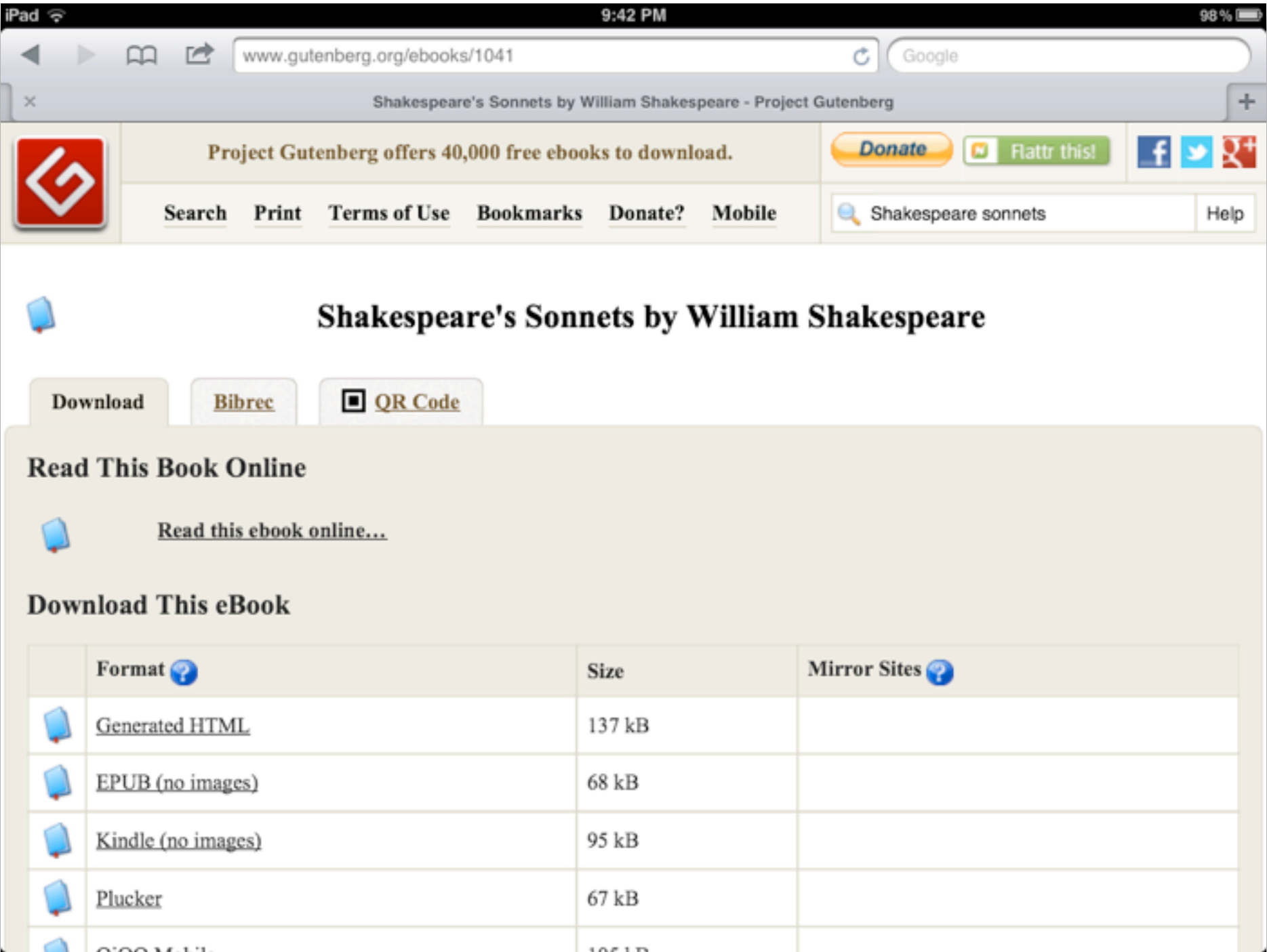
Tech allows for significant task redesign

# Augmentation

Tech acts as a direct tool substitute, with functional improvement

# Substitution

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

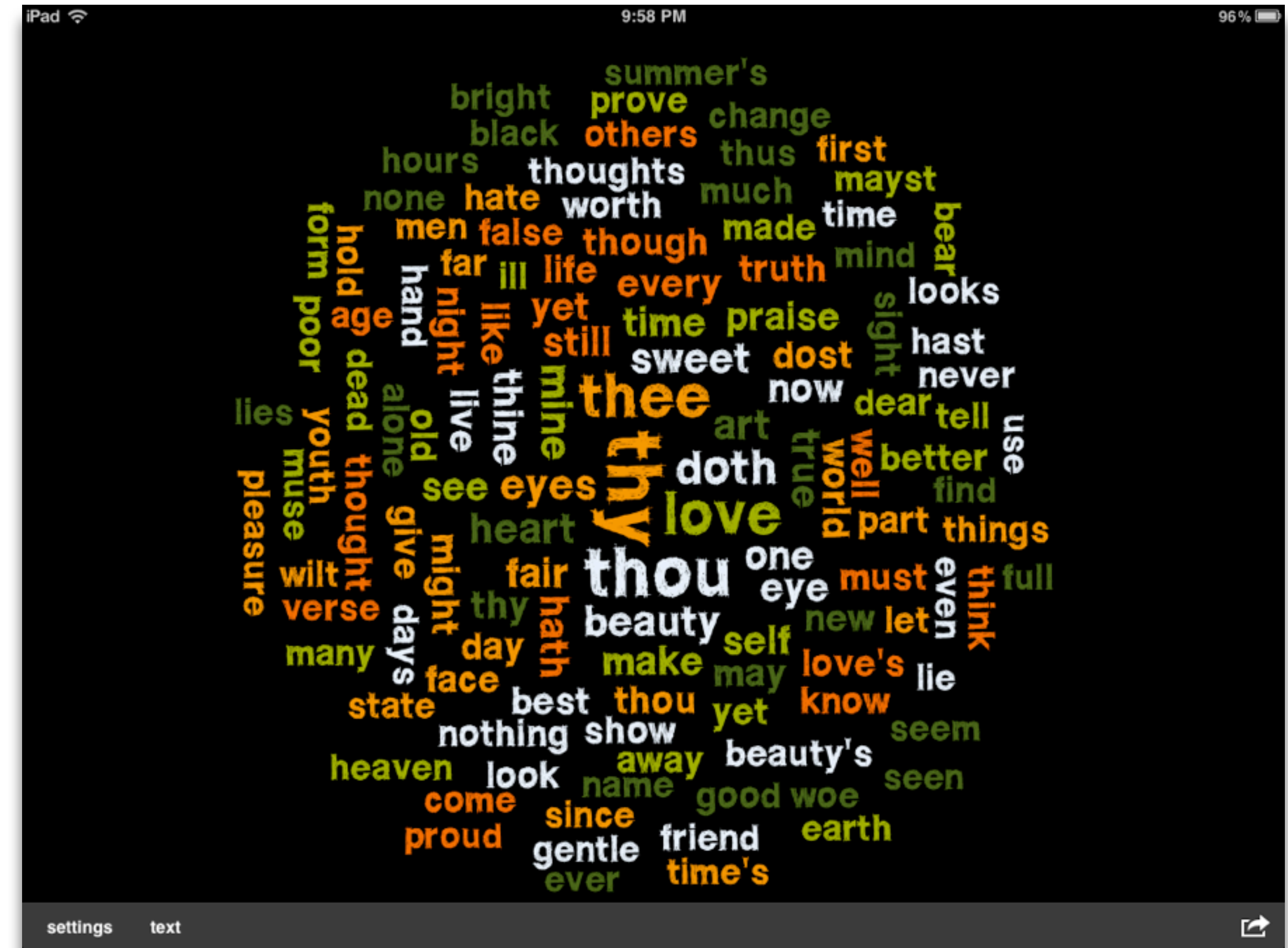


# Redefinition

# Augmentation

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

# Substitution





## Redefinition

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

## Modification

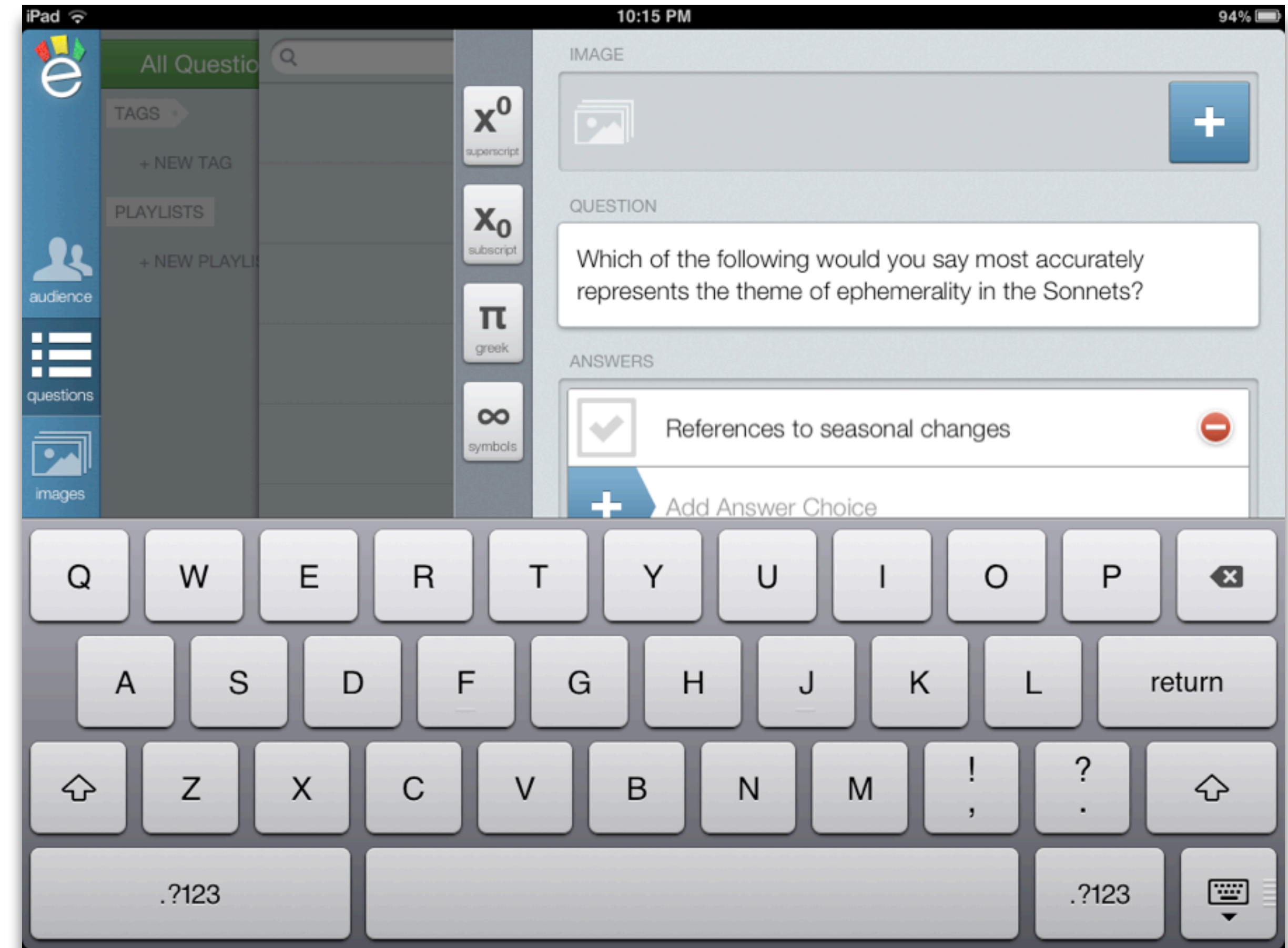
*Tech allows for significant task redesign*

## Augmentation

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

## Substitution

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

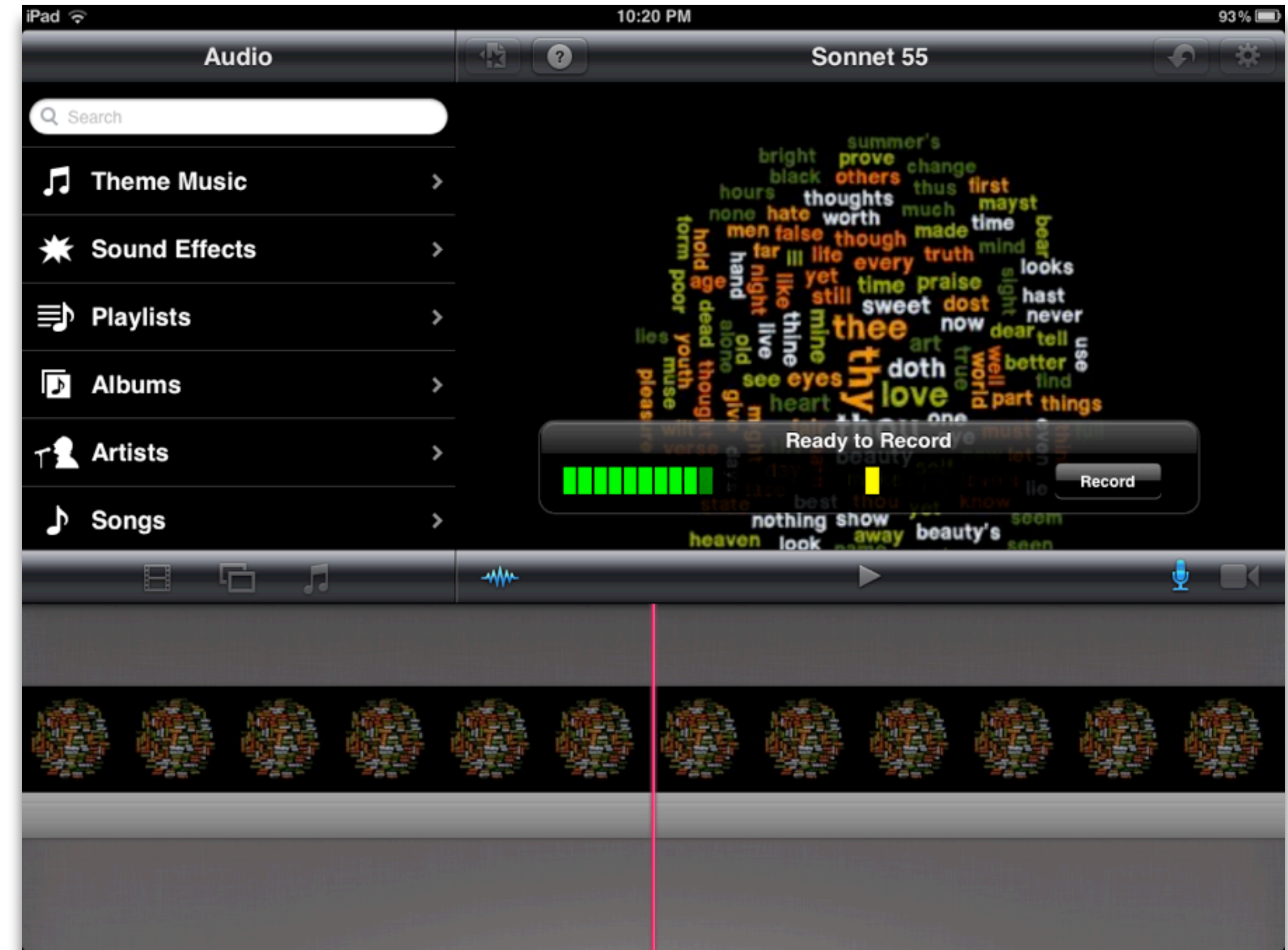


# Redefinition

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

# Augmentation

# Substitution



# Wiliam: A Framework for Formative Assessment

---

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

# 1. Clarifying, Sharing, & Understanding Learning Intentions & Success Criteria

---

- Task-specific vs. generic rubrics
  - Task-specific: best for summative
  - Generic: best for formative
- Product-focused vs. Process-focused
- Official vs. Student-Friendly Language



# Approaches to 1.

---

- Look at samples of other students' work, then rank them by quality
  - Engage students in quality process
  - Students frequently better at seeing issues in others' work
  - Not a "somebody wins" exercise, but a quality exercise
  - Consider using ranked voting, e.g. Condorcet
- Make explicit progressions within rubrics, and progressions across rubrics
- Have students design test items
- Presenting learning intentions and success criteria to students:
  - WALT: we are learning to
  - WILF: what I'm looking for
  - TIB: this is because

## 2. Eliciting Evidence of Learners' Achievement In the (Extended) Classroom

---

- Asking questions in class:
  - Discussion/thinking trigger
  - Examples: ConcepTest, POE, Virtual Whiteboard
    - Incorrect answers have to be "interesting"
  - Can allow for:
    - Multiple correct answers
    - Varying degrees of correctness
  - Should provide info for varying instruction on the fly and long term
- Make sure that answers cannot be constructed by accident

### 3. Providing Feedback that Moves Learning Forward

---

- **Feedback must provide a recipe for future action**
- **Feedback should:**
  - Be more work for the recipient than the donor
    - Not just right/wrong - make them think about what did not work
  - Be focused: less is more
  - Relate explicitly to goals/rubrics

# Characteristics and Models for Feedback that Satisfies 3.

---

- When:
  - Provide feedback post-problem engagement
    - More "mindfulness" = more learning
- How:
  - Scores or praise alone do not provide this; comments do
  - Supplying minimal scaffolded responses (i.e., addressing where the student got stuck) >> supplying a full response to the problem
    - This emphasizes the crucial role of the draft object and process
    - Oral feedback >> written feedback
      - Consider using recordings
    - Create (sometimes together with students) process rubrics that embody this scaffold
    - Provide time for students to use this feedback
- Minimize grading:
  - Avoid false stopping points
  - Avoid ratchet effect

## 4. Activating Students as Instructional Resources for One Another

---

- Two key elements:
  - Group goals
  - Individual accountability
- Effectiveness due to (in order of importance):
  - Personalization
  - Cognitive Elaboration
  - Motivation
  - Social Cohesion
- Reciprocal help only works when it takes the form of elaborated explanations
  - Not simple answers or procedures
  - Looks to the upper levels of Bloom for both participants
- More effective (by a factor of up to 4) if the product being assessed is the result of the aggregate of individual contributions, rather than just one group product

## 5. Activating Students as Owners of their Own Learning

---

- Effective self-assessment is up to twice as effective as other-assessment
- Two key components:
  - Metacognition:
    - Metacognitive knowledge: know what you know
    - Metacognitive skills: what you can do
    - Metacognitive experience: what you know about your cognitive abilities
  - Motivation:
    - Traditionally viewed as a cause (intrinsic/extrinsic)
    - Better viewed as an outcome:
    - Flow: the result of a match between capability and challenge
      - Students are motivated to reach goals that are:
        - Specific
        - Within reach
        - Offer some degree of challenge

# Student Sources for 5.

---

- 3 sources of info for students to decide what they will do:
  - Perceptions of the task and its context
  - Knowledge about the task and what it will take to be successful
  - Motivational beliefs
- The role of the draft process and object resurfaces as a crucial component here
- Crucial Tools:
  - Learning logs
  - Learning portfolios



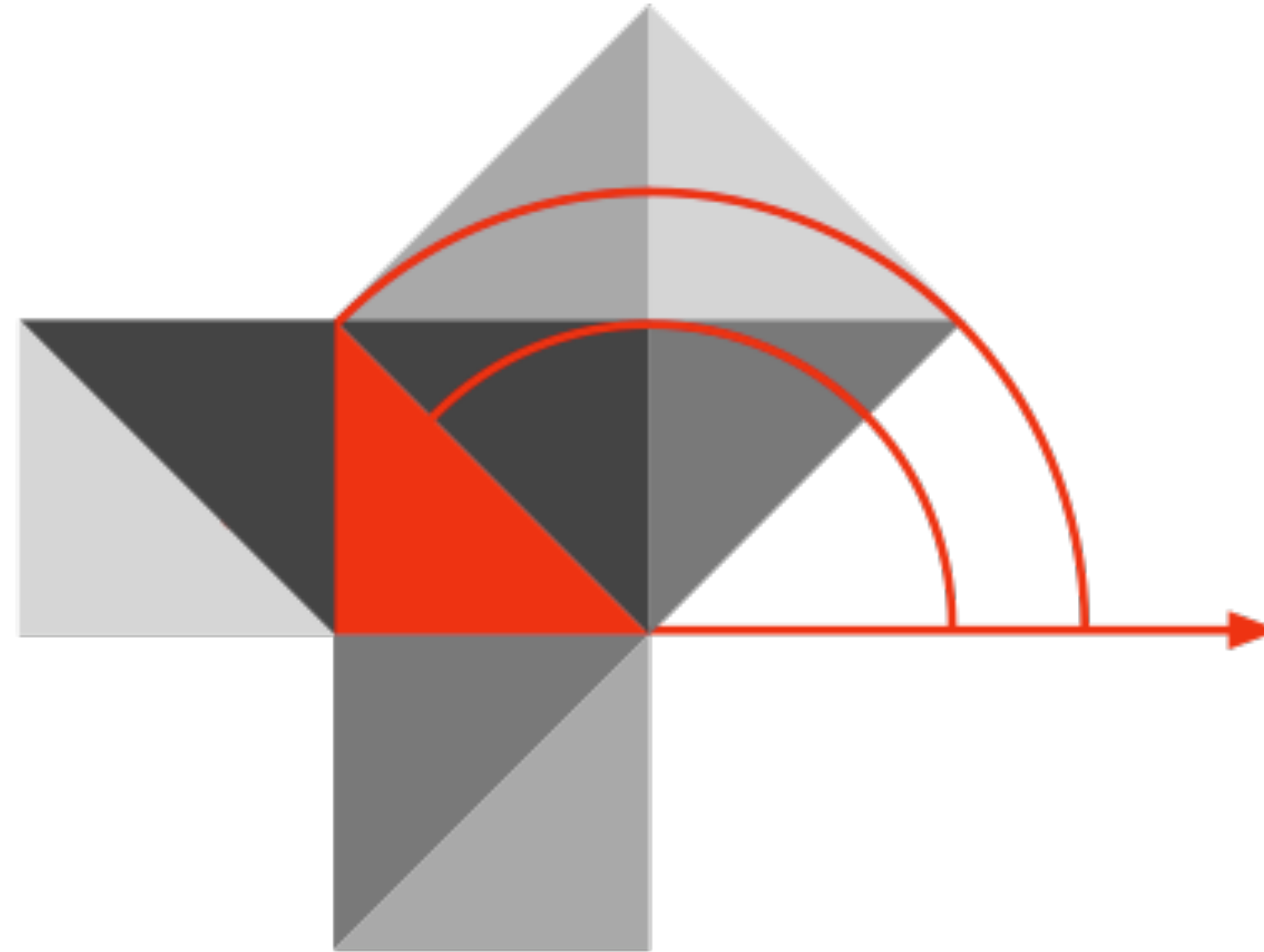
# Resources

---

- Ruben R. Puentedura, *Transformation, Technology, and Education*. (2006) Online at: <http://hippasus.com/resources/tte/>
- Ruben R. Puentedura, *As We May Teach: Educational Technology, From Theory Into Practice*. (2009) Online at: <http://tinyurl.com/aswemayteach>
- Punya Mishra & Matthew J. Koehler, “Technological pedagogical content knowledge: A framework for teacher knowledge”. *Teachers College Record*, 108(6). (2006) Online at: [http://mkoehler.educ.msu.edu/OtherPages/Koehler\\_Pubs/TECH\\_BY\\_DESIGN/TCRecord/mishra\\_koehler\\_tcr2006.pdf](http://mkoehler.educ.msu.edu/OtherPages/Koehler_Pubs/TECH_BY_DESIGN/TCRecord/mishra_koehler_tcr2006.pdf)
- *TPCK - Technological Pedagogical Content Knowledge*. Online at: <http://tpack.org>
- AACTE (Eds.) *The Handbook of Technological Pedagogical Content Knowledge for Educators*. Routledge. (2008)
- Ruben R. Puentedura, “Technology In Education: The First 200,000 Years” *The NMC Perspective Series: Ideas that Matter*. NMC Summer Conference. (2012) Online at: <http://www.youtube.com/watch?v=NemBarqD6qA>
- Punya Mishra and Kristen Kereluik, “What is 21st Century Learning? A review and synthesis.” Paper submitted to the SITE2011 Conference. (2011) Online at: [http://punya.educ.msu.edu/publications/21stCenturyKnowledge\\_PM\\_KK.pdf](http://punya.educ.msu.edu/publications/21stCenturyKnowledge_PM_KK.pdf)
- Punya Mishra and Kristen Kereluik, “What is 21st Century Learning? A review and synthesis.” SITE2011 Conference Presentation. (2011) Online at: [http://punya.educ.msu.edu/presentations/site2011/SITE\\_2011\\_21st\\_Century.pdf](http://punya.educ.msu.edu/presentations/site2011/SITE_2011_21st_Century.pdf)

# Hippasus

---



Blog: <http://hippasus.com/rrpweblog/>

Email: [rubenrp@hippasus.com](mailto:rubenrp@hippasus.com)

Twitter: @rubenrp

This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.

