SAMR, STEM and Assessment

Ruben R. Puentedura, Ph.D.

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 Transformation

Augmentation

Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
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	Ruben R. Puentedura, "Technology In Education	The First 200,000 Years" The NMC Perspective Series: Ideas	that Matter. NMC Summer Conference, 2012.	

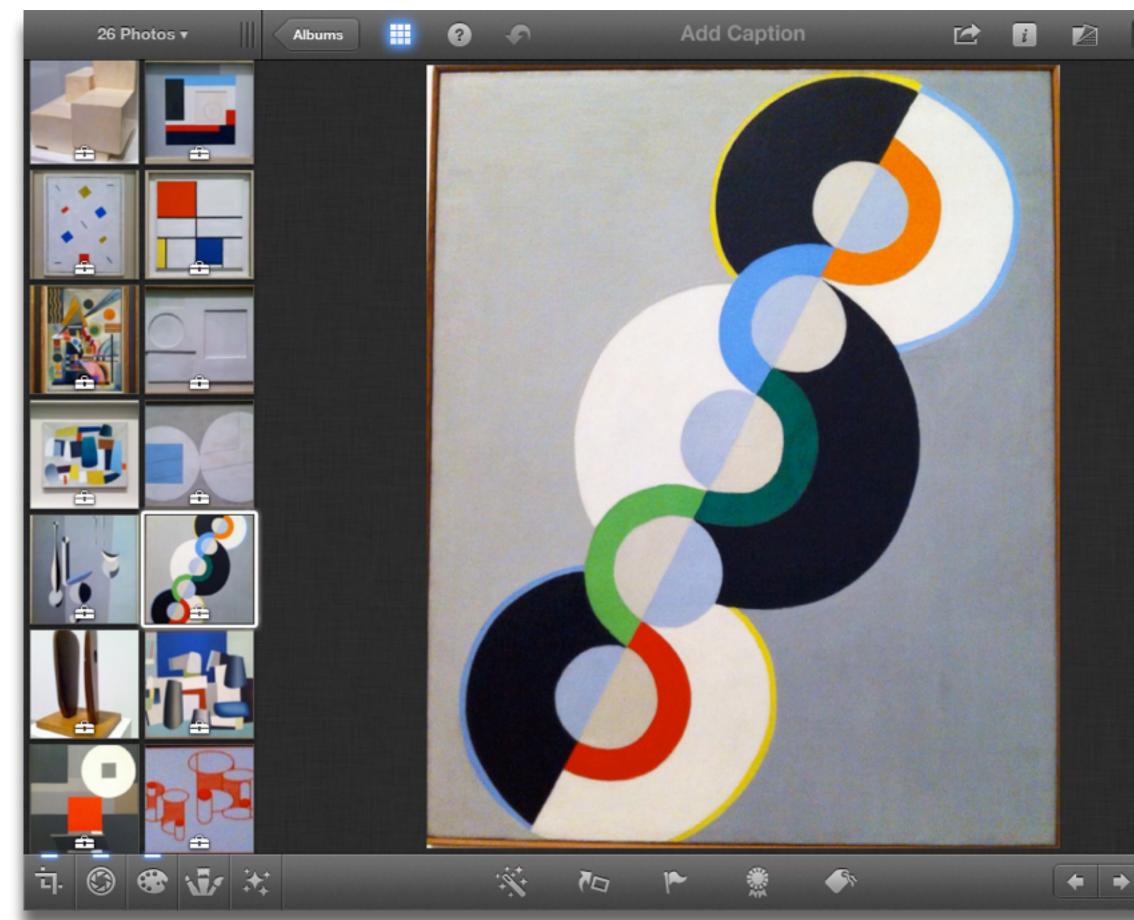




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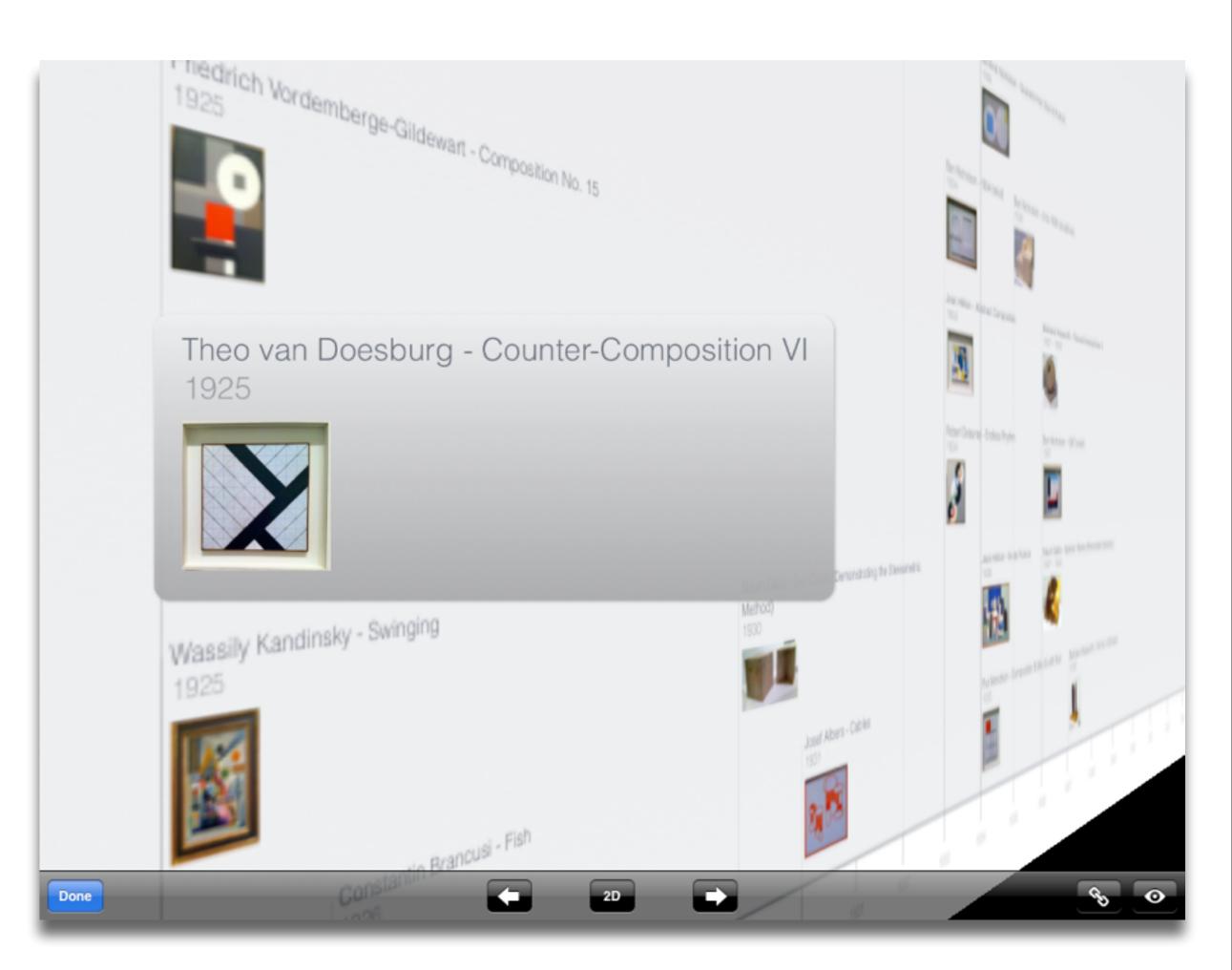


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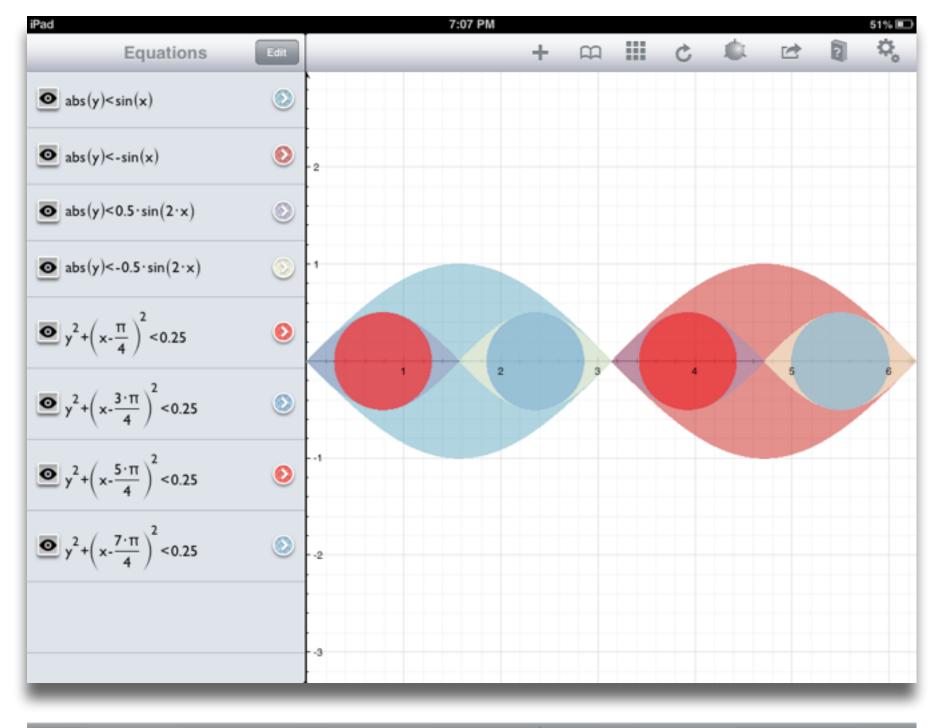
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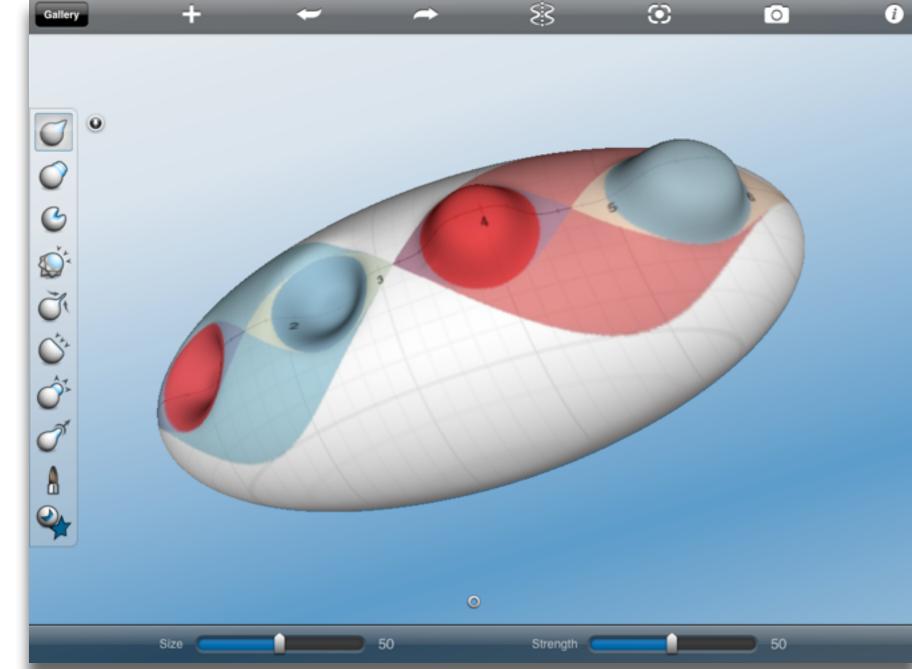
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Redefinition

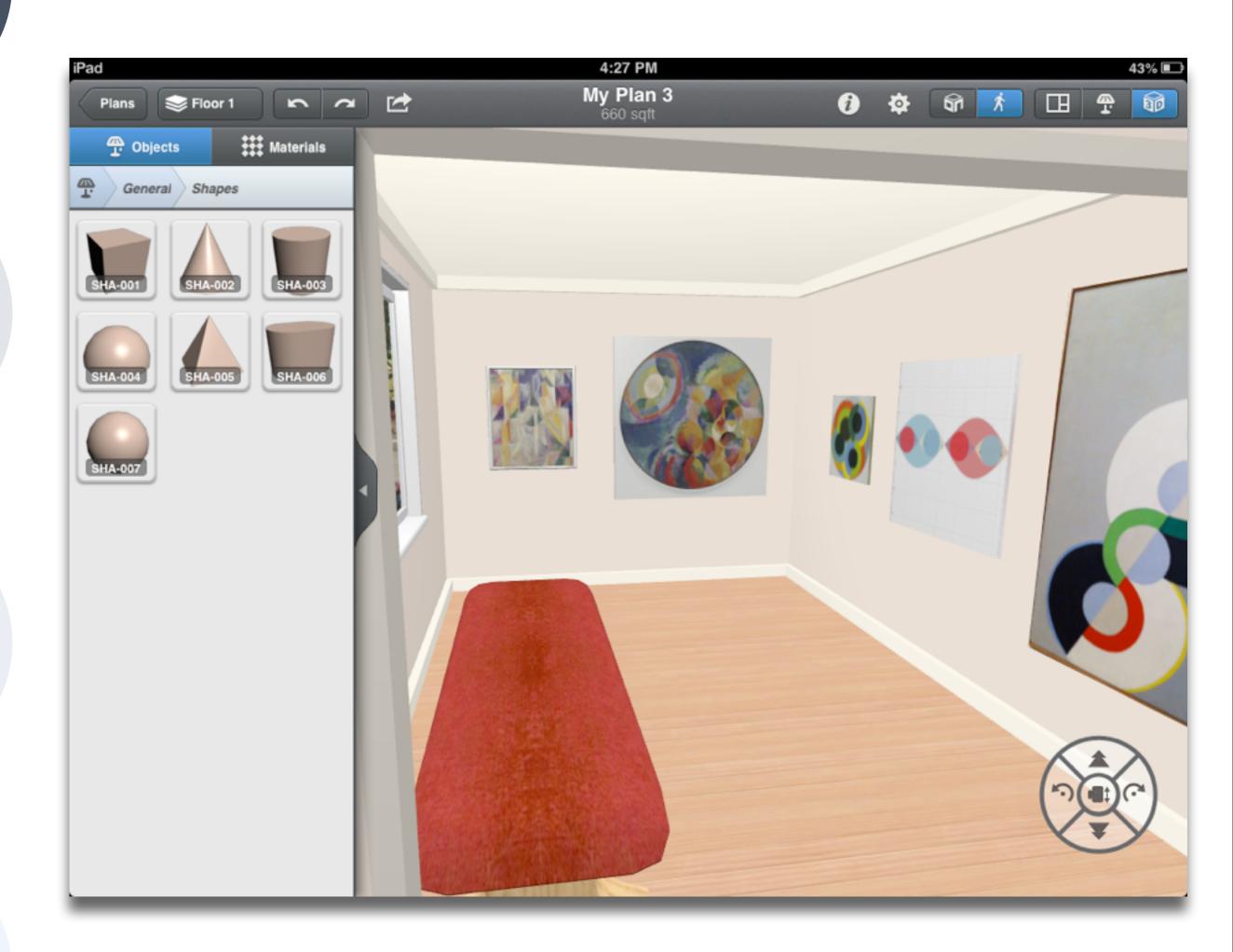
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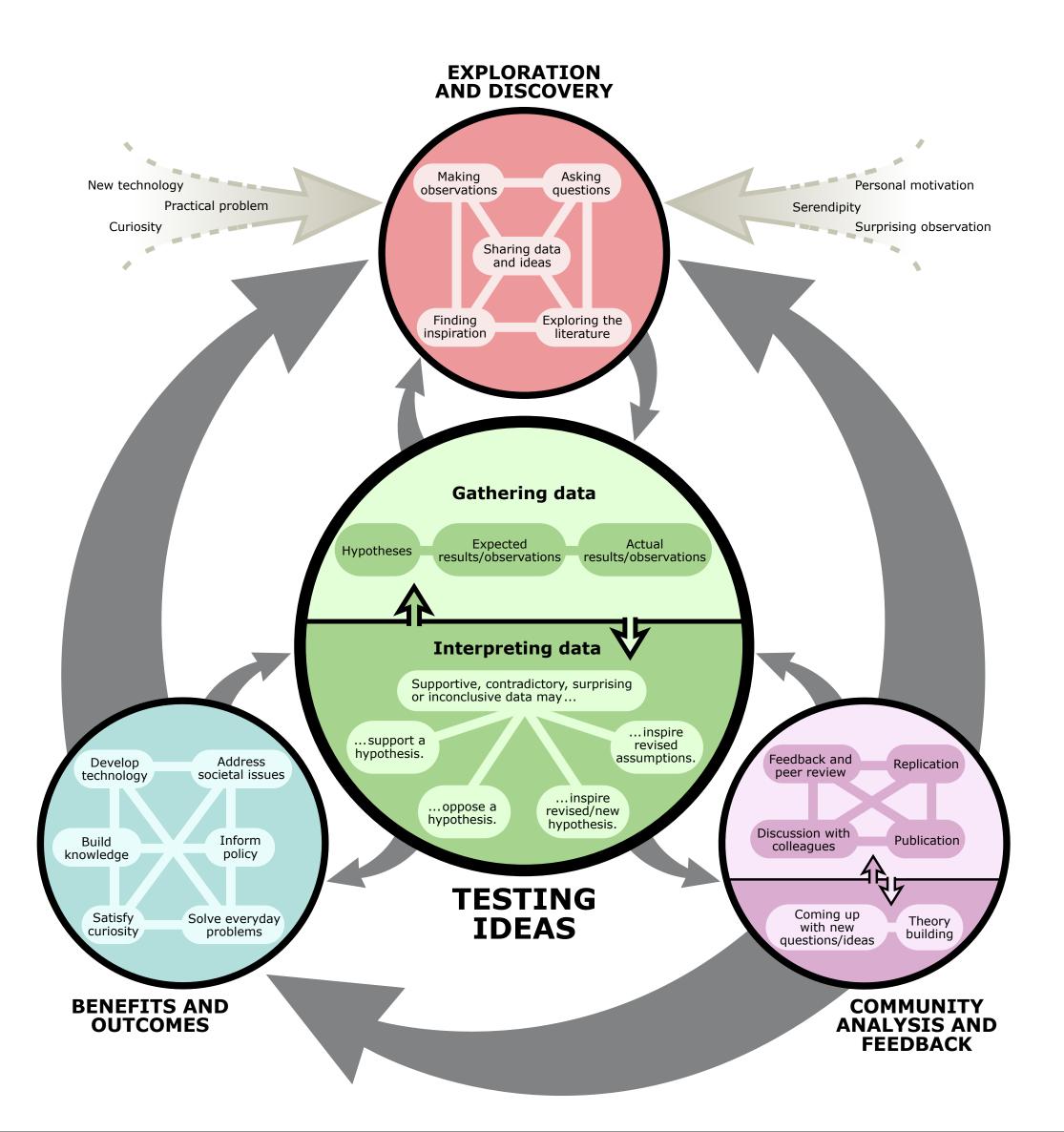
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1. SAMR and STEM

Understanding Science: How Science Works

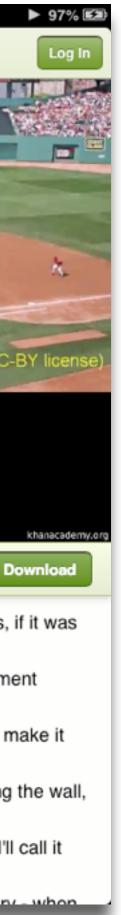


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Two-dimensio	Two-dimensional	
and the	rojectite	
Construction Co	Projectile on an Incline Challenging problem of a projectile on an inclined plane	
The second secon	Unit Vectors and Engineering Notation Using unit vectors to represent the components of a vector	
	Clearing the Green Monster at Fenway Setting up the problem to determine the minimum veloc	Photo by Jared Vincent (under CC- $\overrightarrow{v}_{i} = \frac{\sqrt{2}}{2} v_{i} \hat{c} + \frac{\sqrt{2}}{2} v_{i} \hat{c}$
	Green Monster at Fenway Part 2 Solving the problem to determine the minimum veloc	V: SIVUS" V: SIVUS" J 15" VIZ J 1 V: COST B"
	Unit Vector Notation Expressing a vector as the scaled sum of unit vectors	Clearing the Green Monster at Fenway
1) 2:51-12 2+5=(40)		5:48 right when its crossing the wall, it should be, or lets think about it right when its, just
€: 11+4] [[[[]]] [[]+6]	Unit Vector Notation (part 2) More on unit vector notation.	5:53 good enough to hit the top part of the wall, let's think about what that displacement vector would have
140) (11 P + 1420	Showing that adding the x an	5:57 to be and we'll solve for that velocity and then any velocity better than that will m go even further
	Projectile Motion with Ordered Set Notation Solving the second part to the	6:02 and faster and higher and all of the rest of the things. So right when its crossing if we want
	projectile motion problem (wit 14 videos	6:07 it to just skim by or just hit the tip of the wall, our displacement vector, maybe I'll 'displacement
		6:14 percessant' when its 96 meters in the x direction - Livet put this 'n' for percessant

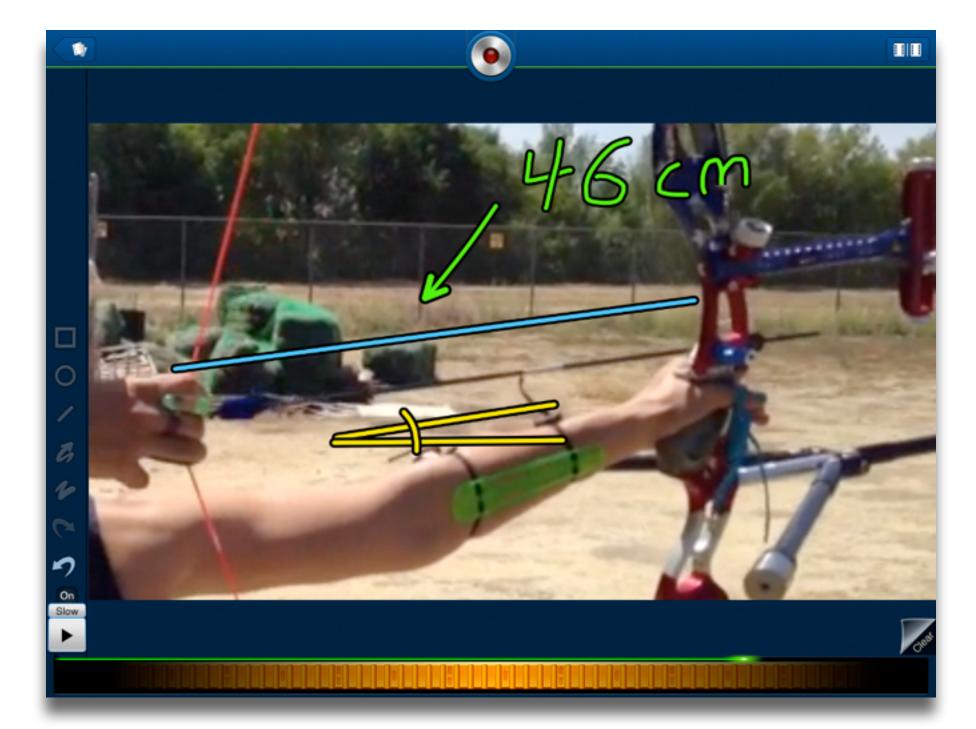


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Back Vectors	🗱 Wolfrar	nAlpha 🗠
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compute properties of a vector		
vector {2, -5, 4}	Input interpretation	
specify a vector as a linear combination of unit	(1, 3, -1) + (-2, 1, 6)	
vectors	Result	>>
vector 3i + 5j	(-1, 4, 5)	
vector 2i - 4j + 3k	Vector plot	
compute the norm of a vector	2 3 4 2 -1 0 1	
norm {12, -5}	2	
Vector Algebra	6	
do vector computations		
vector (1,3,-1) + (-2,1,6)	2	
7 {1, 0, -2, 1} - 4 {2, -1, 1, -1}	0 (-1, 4, 5)	
	- (-2, 1, 6)	
(i + j + k) + (2i - 3j + 8k)	- (1.3,-1)	
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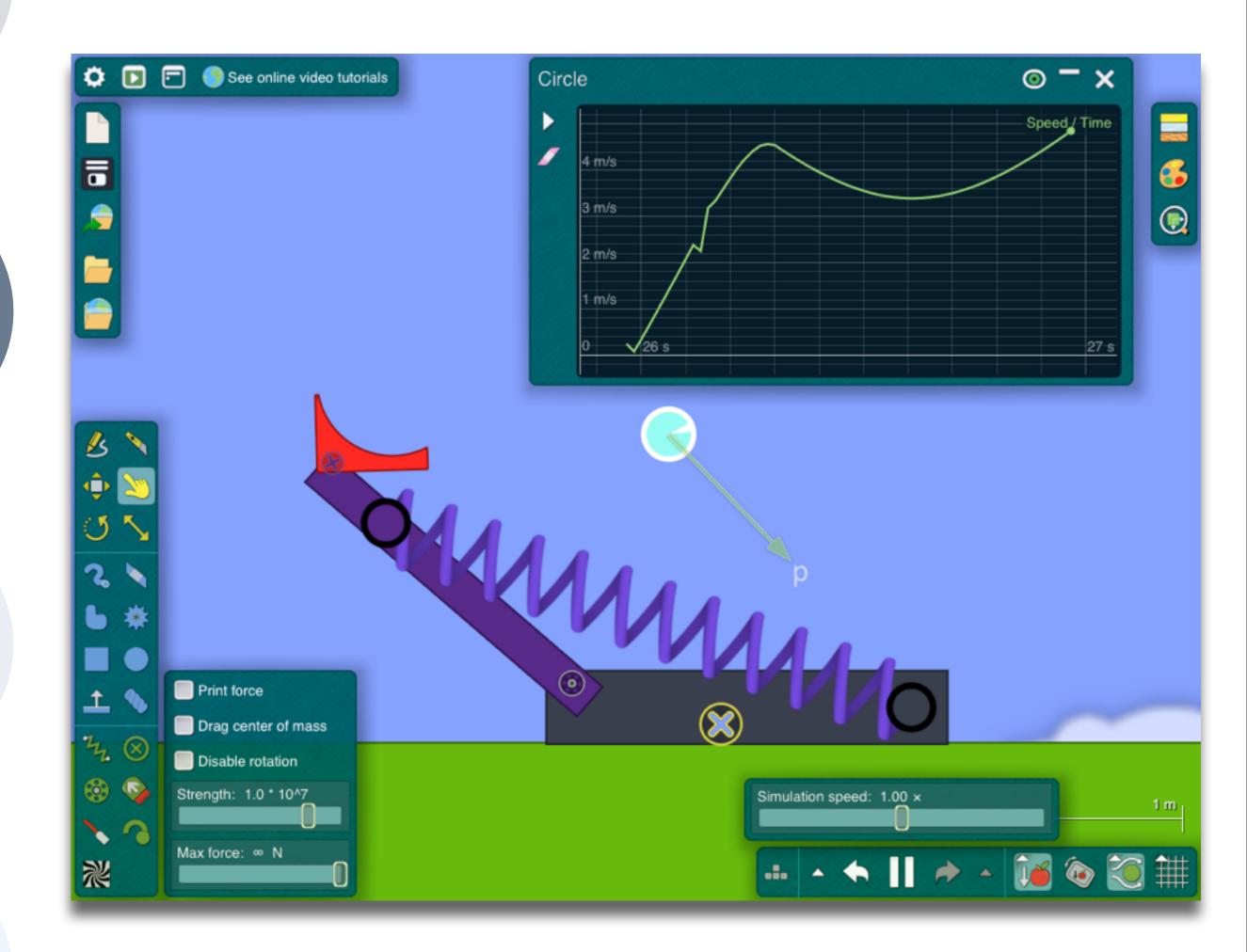
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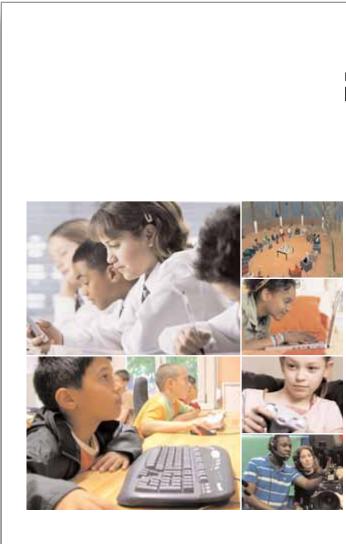
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Confronting the Challenges of Participatory Culture: Media Education for the 21st Century



Building the Field of Digital Media and Learning

An occasional paper on digital media and learning

Confronting the Challenges of Participatory Culture: Media Education for the 21st Century

Henry Jenkins, Director of the Comparative Media Studies Program at the Massachusetts Institute of Technology

with

Katie Clinton Ravi Purushotma Alice J. Robison Margaret Weigel



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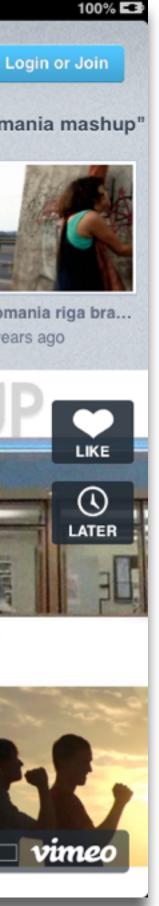
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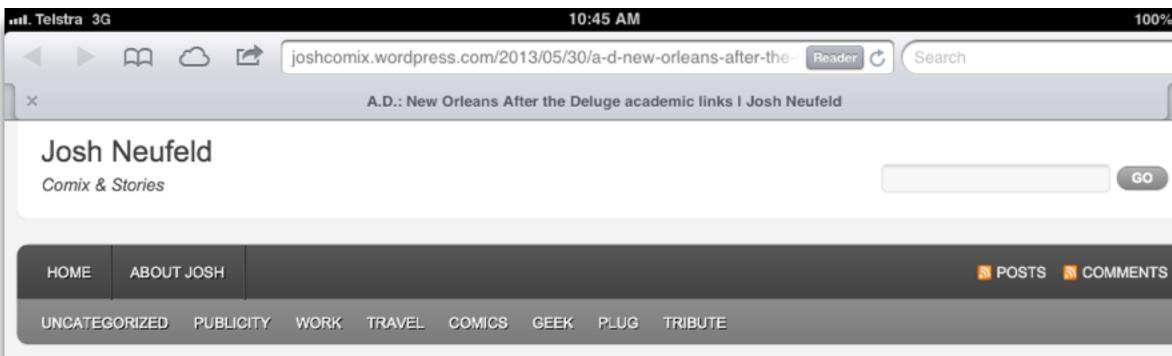
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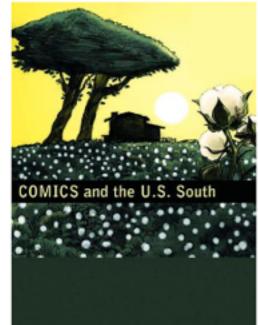
← Sari Wilson & I have a new piece in the comics anthology The Big Feminist BUT A.D.: New Orleans After the Deluge academic links

MAY 30, 2013 D LEAVE A COMMENT

[cross-posted from A.D. on Smith]

I just stumbled upon a long essay about *A.D.: New Orleans After the Deluge* in the new book *Comics and the U.S. South*, edited by Brannon Costello and Qiana J. Whitted (University Press of Mississippi, 2012). The essay, "A Re-Vision of the Record: The Demands of Reading Josh Neufeld's *A.D.: New Orleans After the Deluge*," is by Anthony Dyer Hoefer, a professor at George Mason University. And a PDF of the essay is available as a free download right here.

Leaving aside the fact that I was stunned to see 30 pages of academic writing devoted to *A.D.*, I was excited to see how much Dr. Hoefer gets from the project—particularly its online component, which **debuted on Smith Magazine**. He focuses on *A.D.*'s "pedagogical impulse" and how it uses the comics form to expose the highly mediated way in which we were informed about Hurricane Katrina. In this context, Hoefer guotes the great Scott McCloud



Josh Neufeld Comix & Stories

I am the writer/artist of the nonfiction graphic novel A.D.: New Orleans After the Deluge (Pantheon). Most recently, I illustrated the bestselling graphic nonfiction book The Influencing Machine: Brooke Gladstone on the Media (W.W. Norton).

Twitter Updates

A.D.: New Orleans After the Deluge academic links wp.me/pXNhp-nf 6 hours ago

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Sari Wilson & I have a new piece in the comics anthology The Big Feminist BUT

Instead of Coffee, I'll have TCAF



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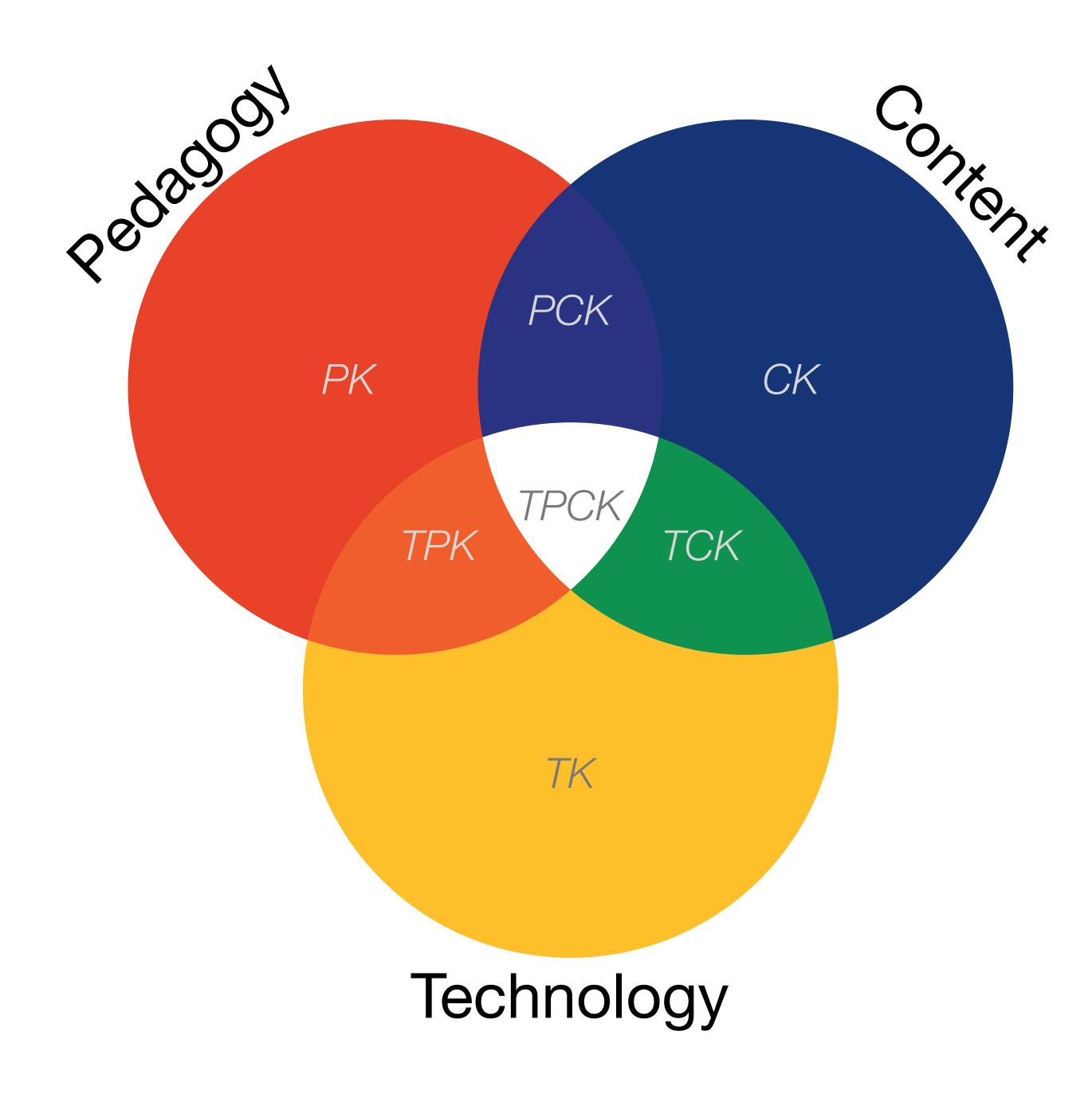
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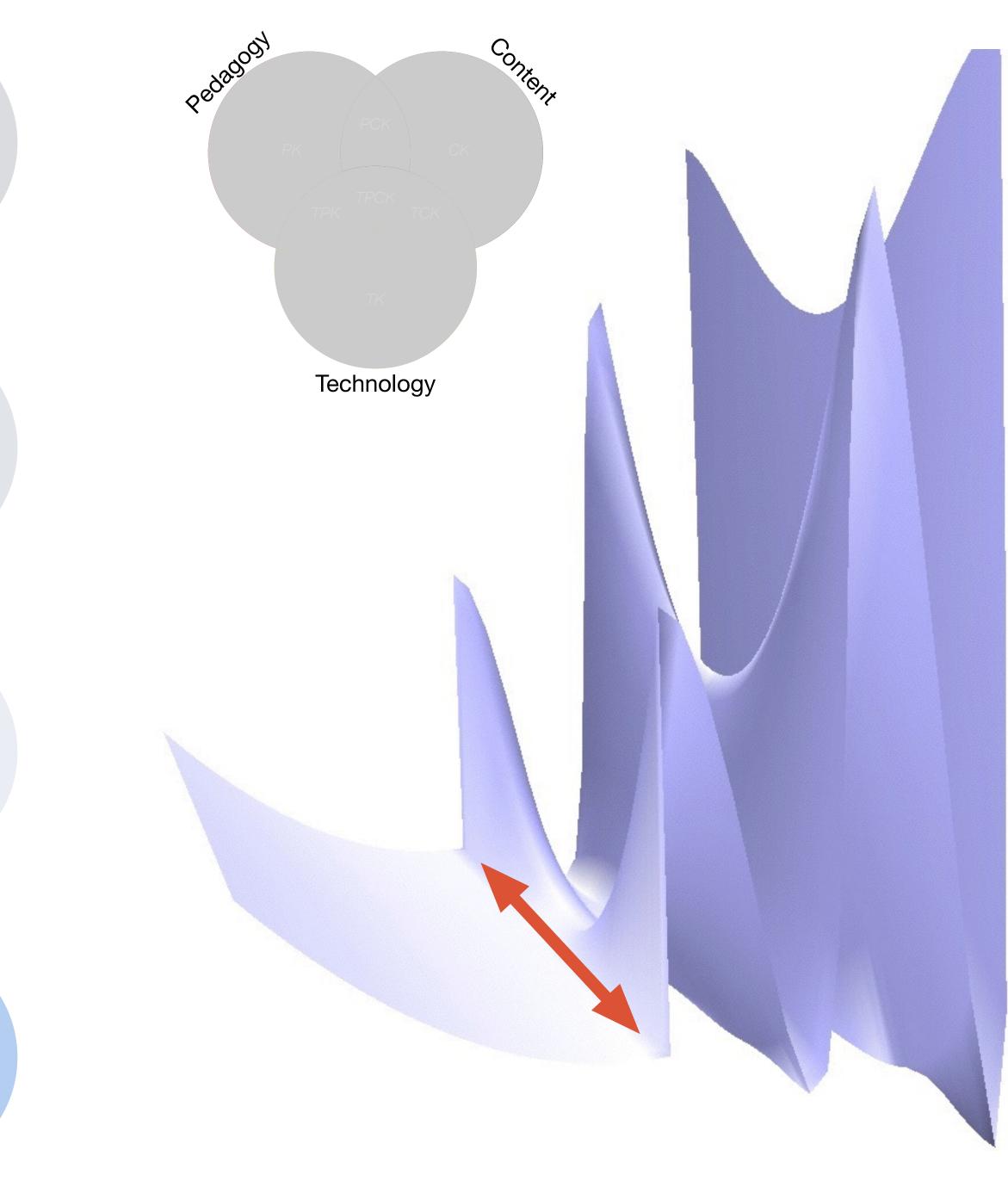
Punya Mishra & Matthew J. Koehler, "Technological pedagogical content knowledge: A framework for teacher knowledge". Teachers College Record, 108(6). (2006)



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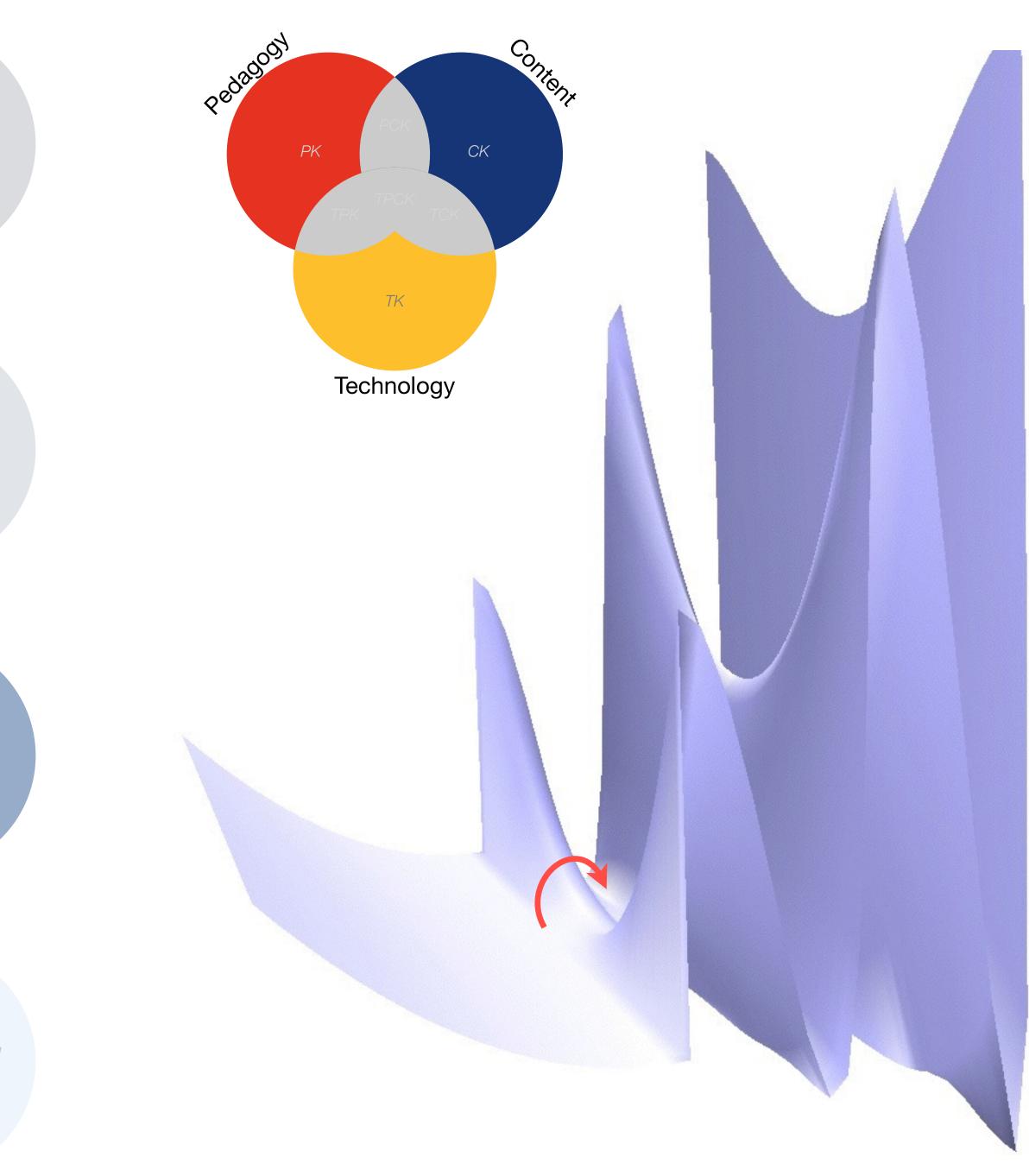


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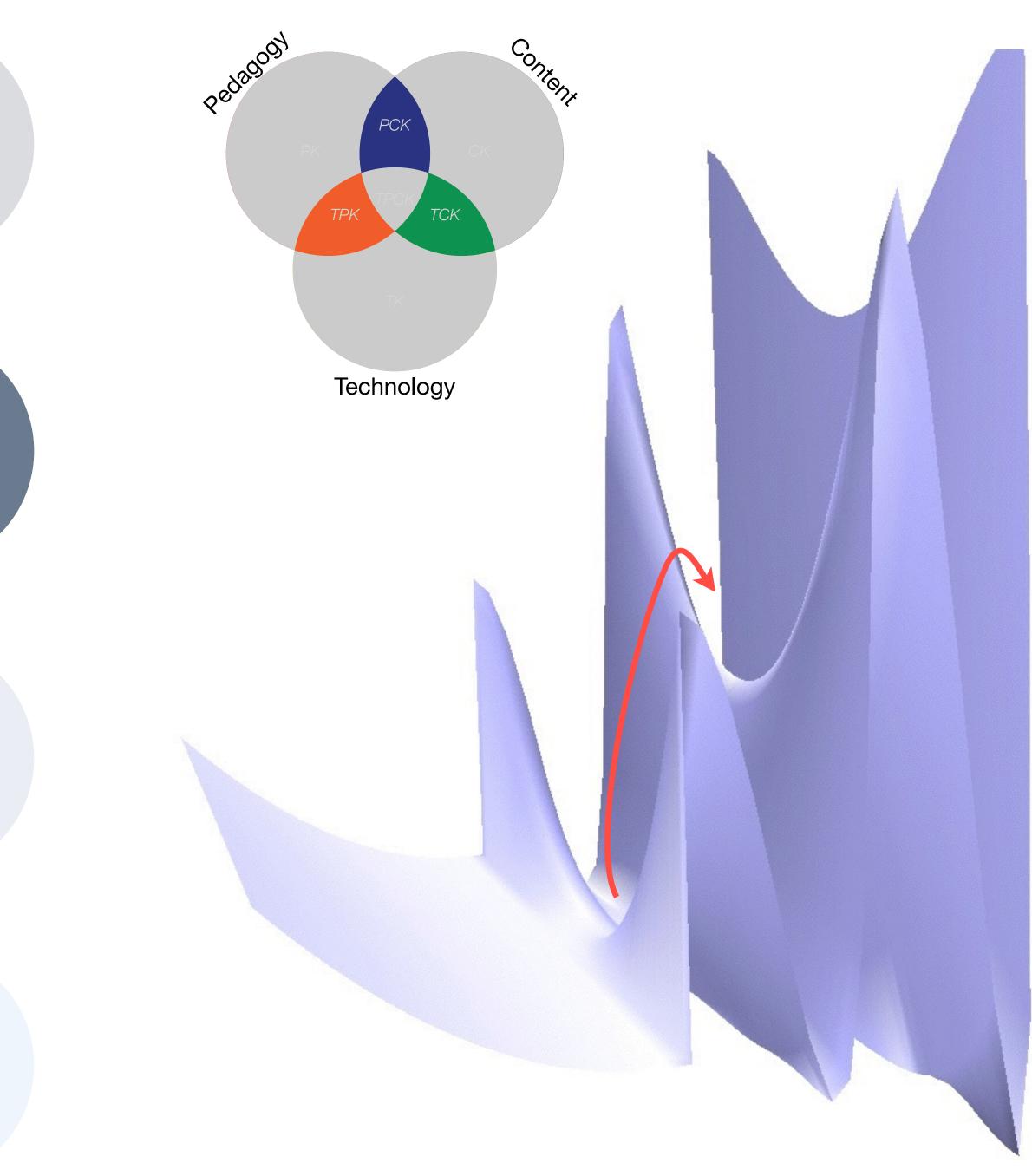
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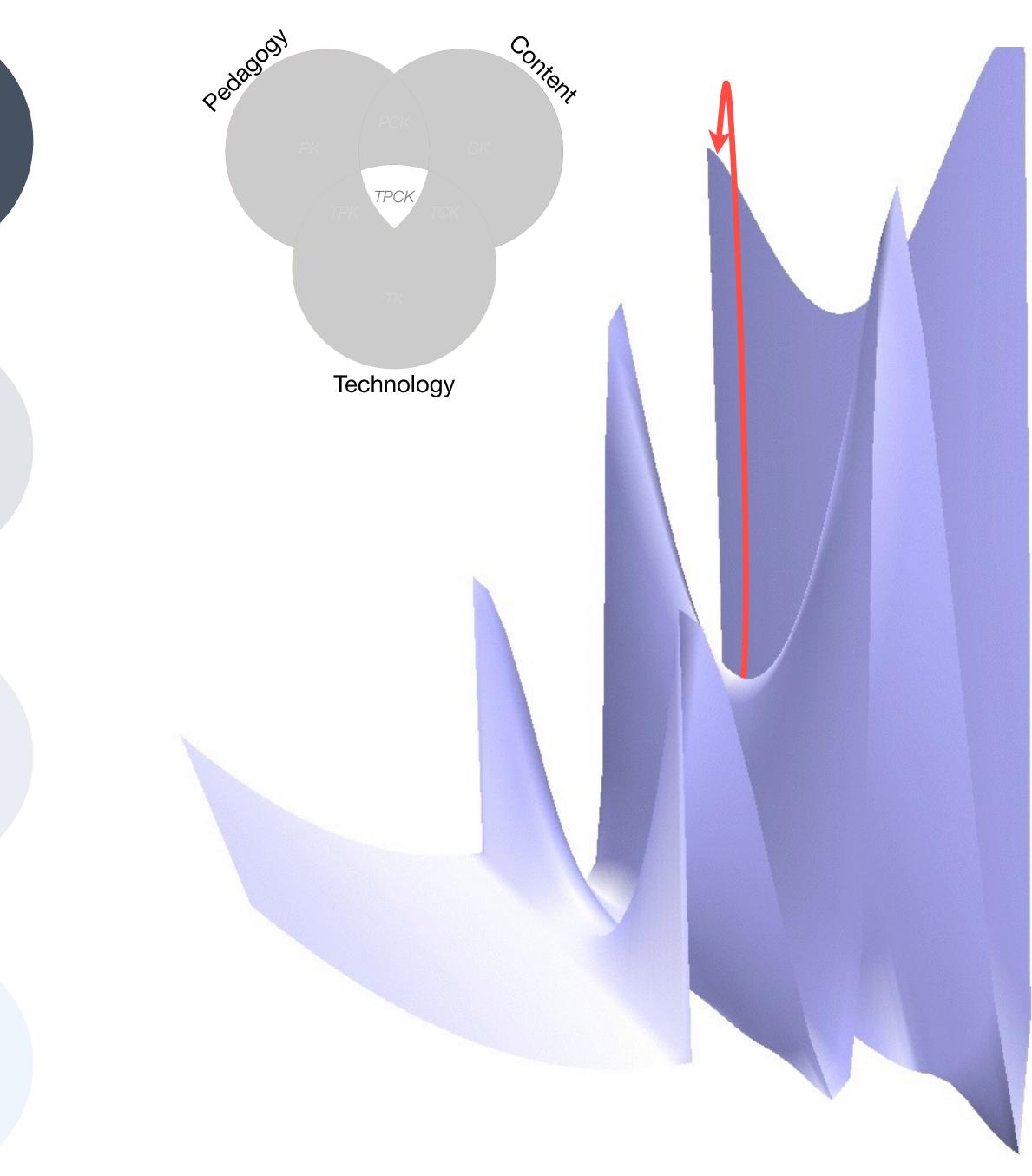
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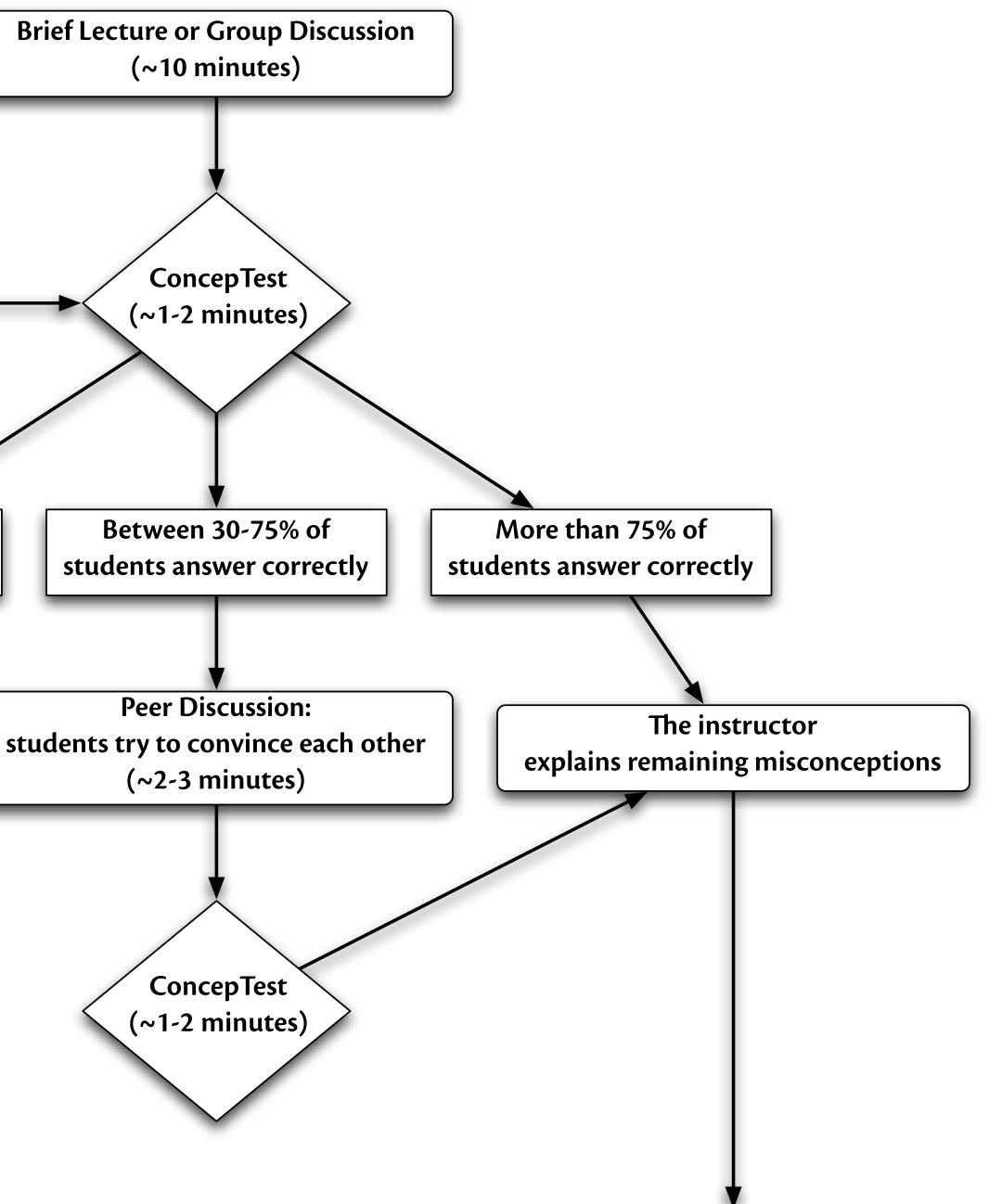
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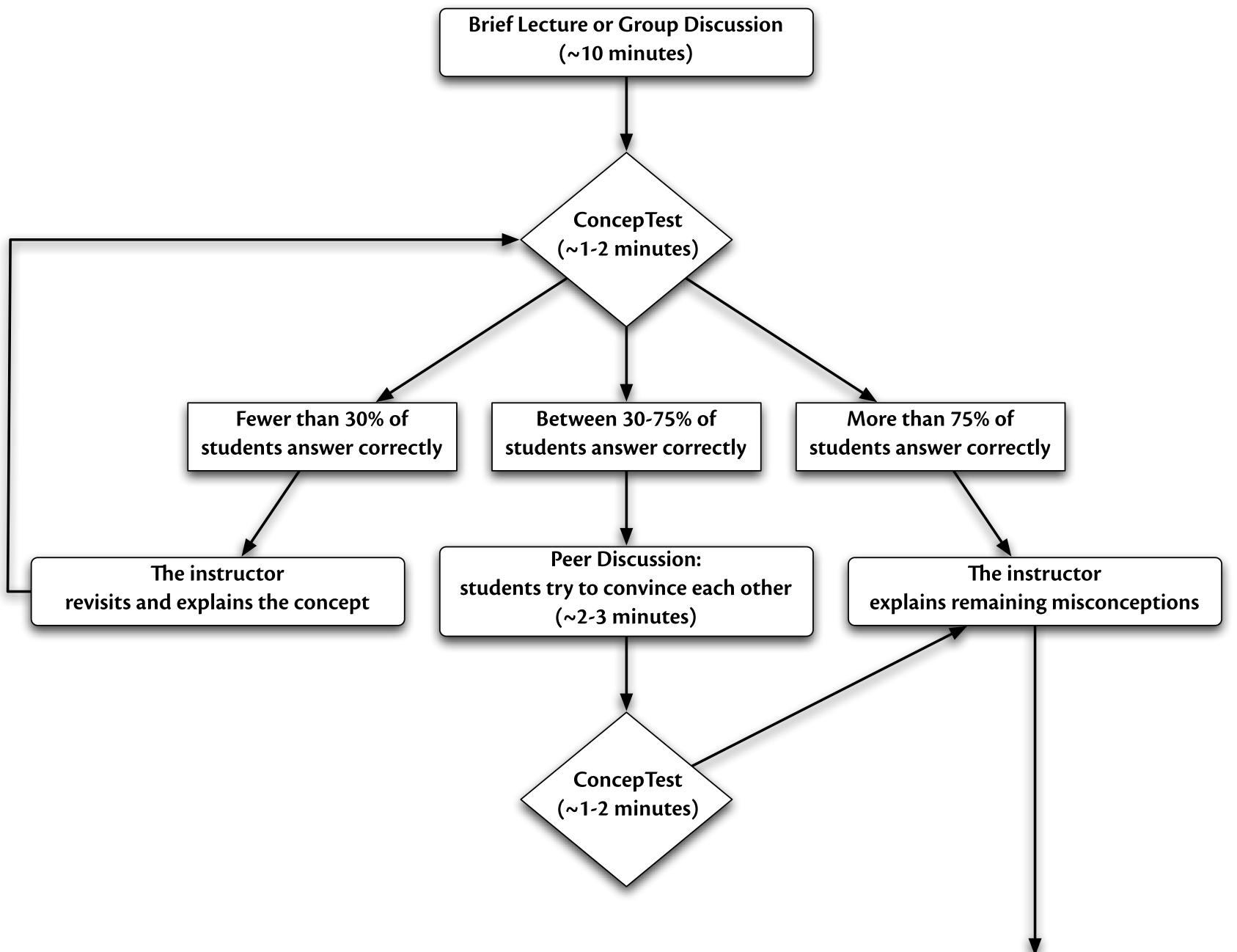
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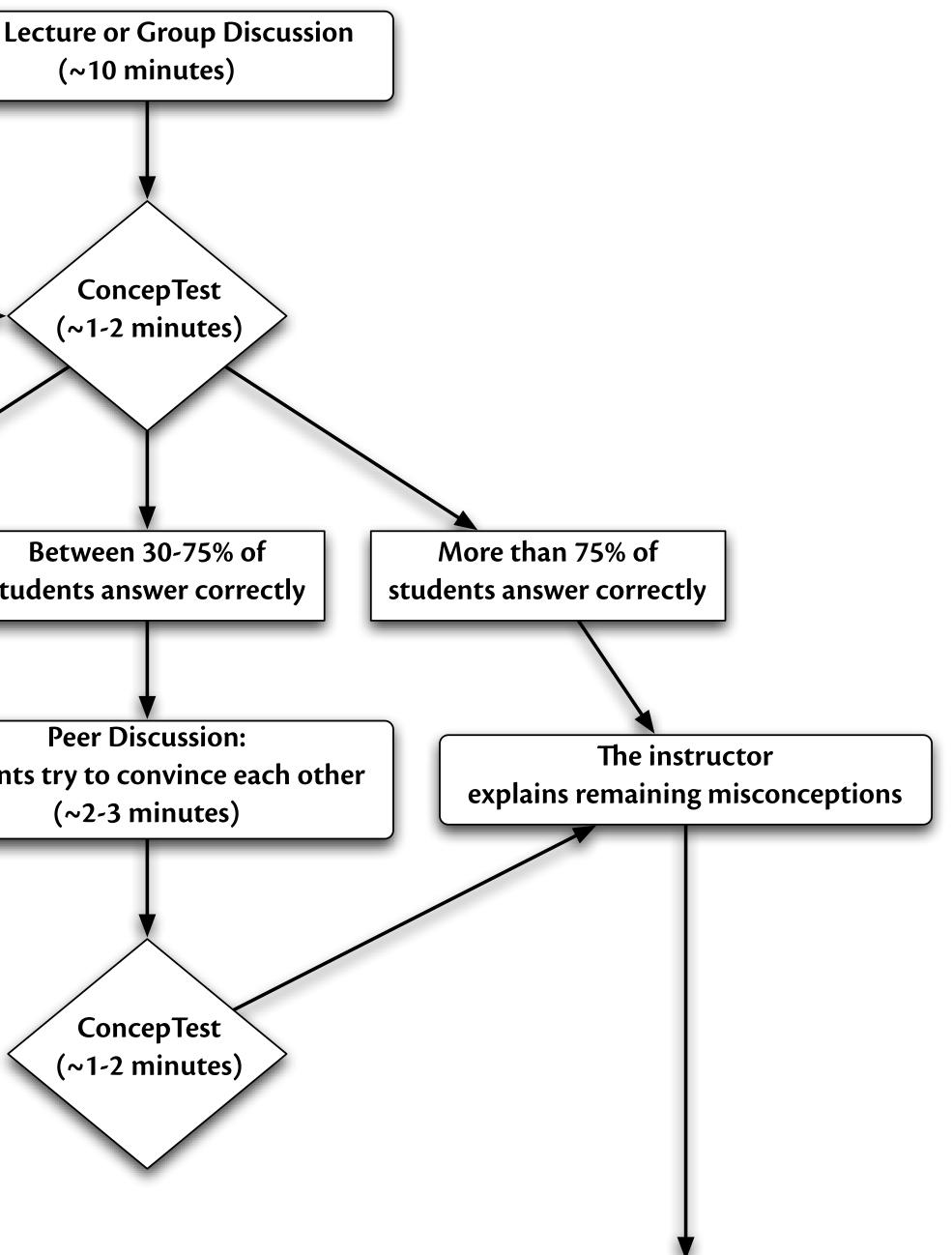
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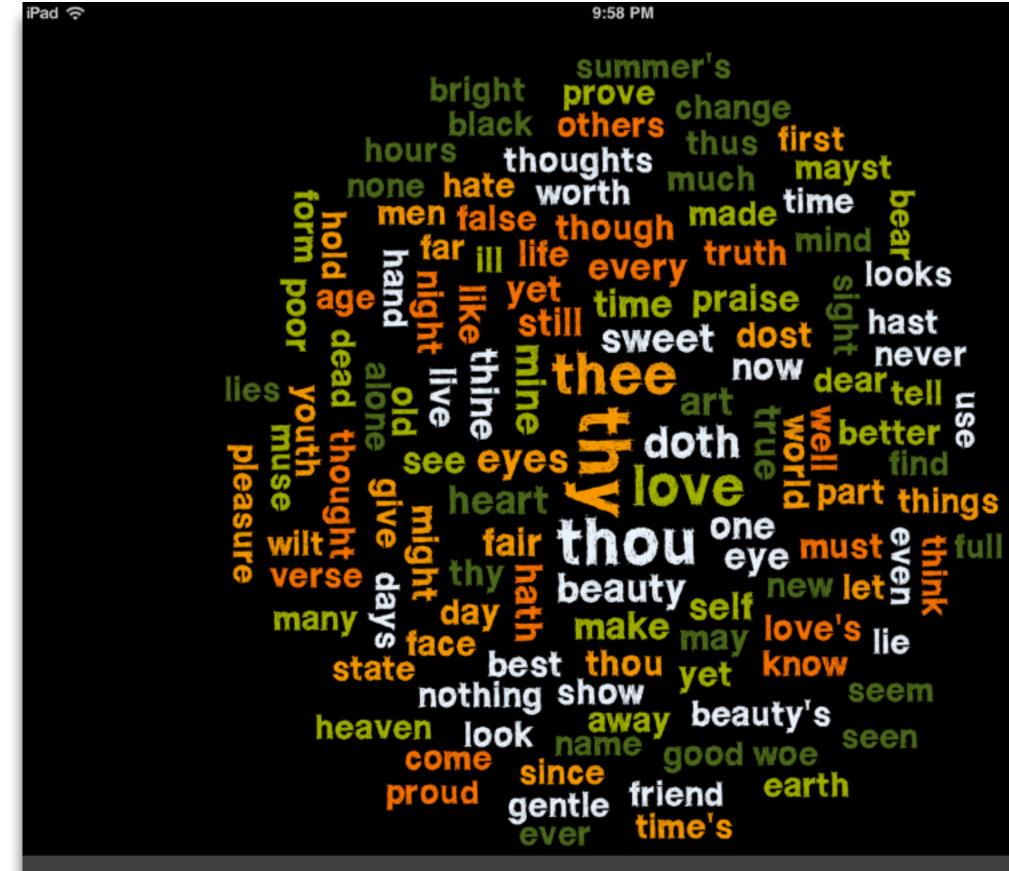
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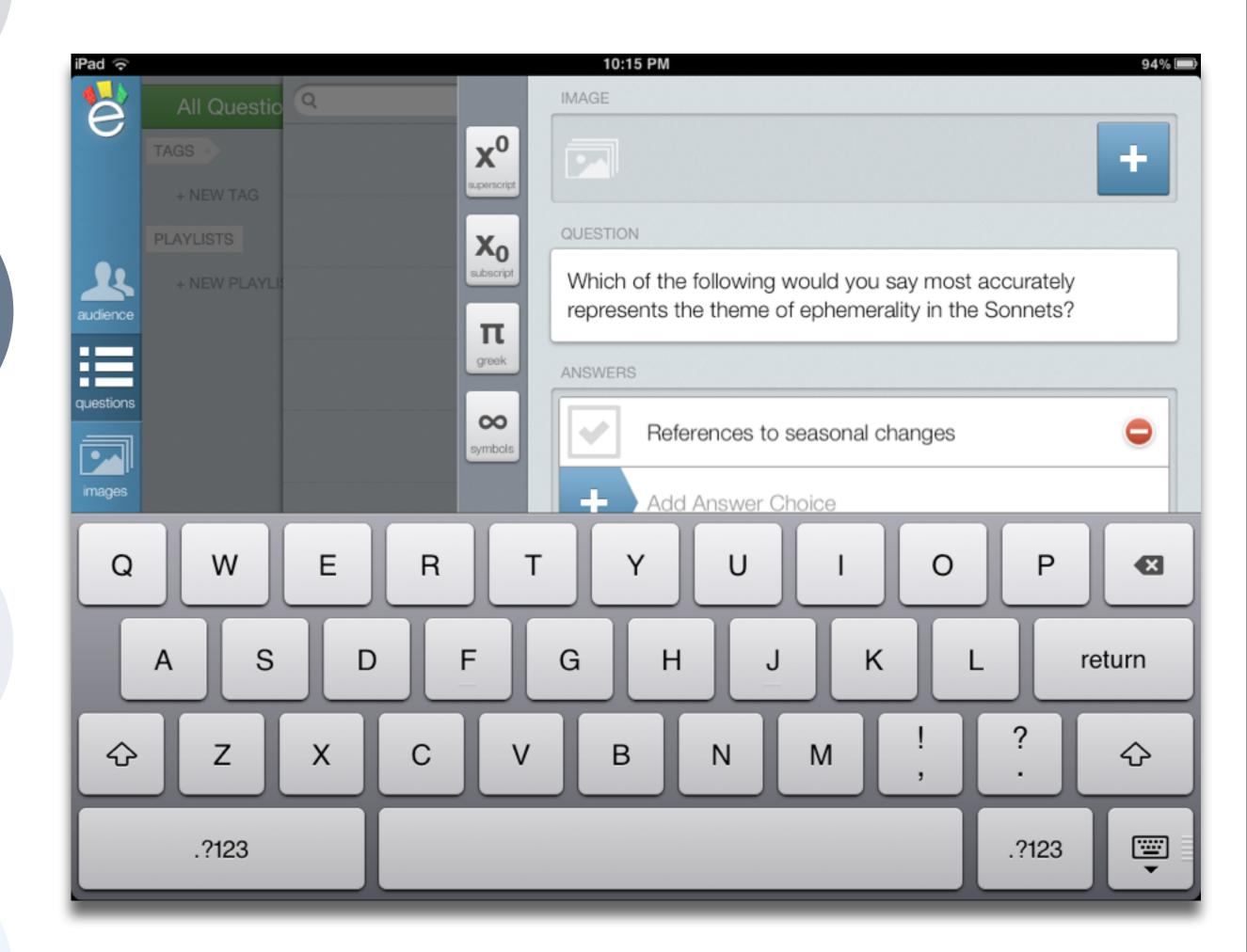
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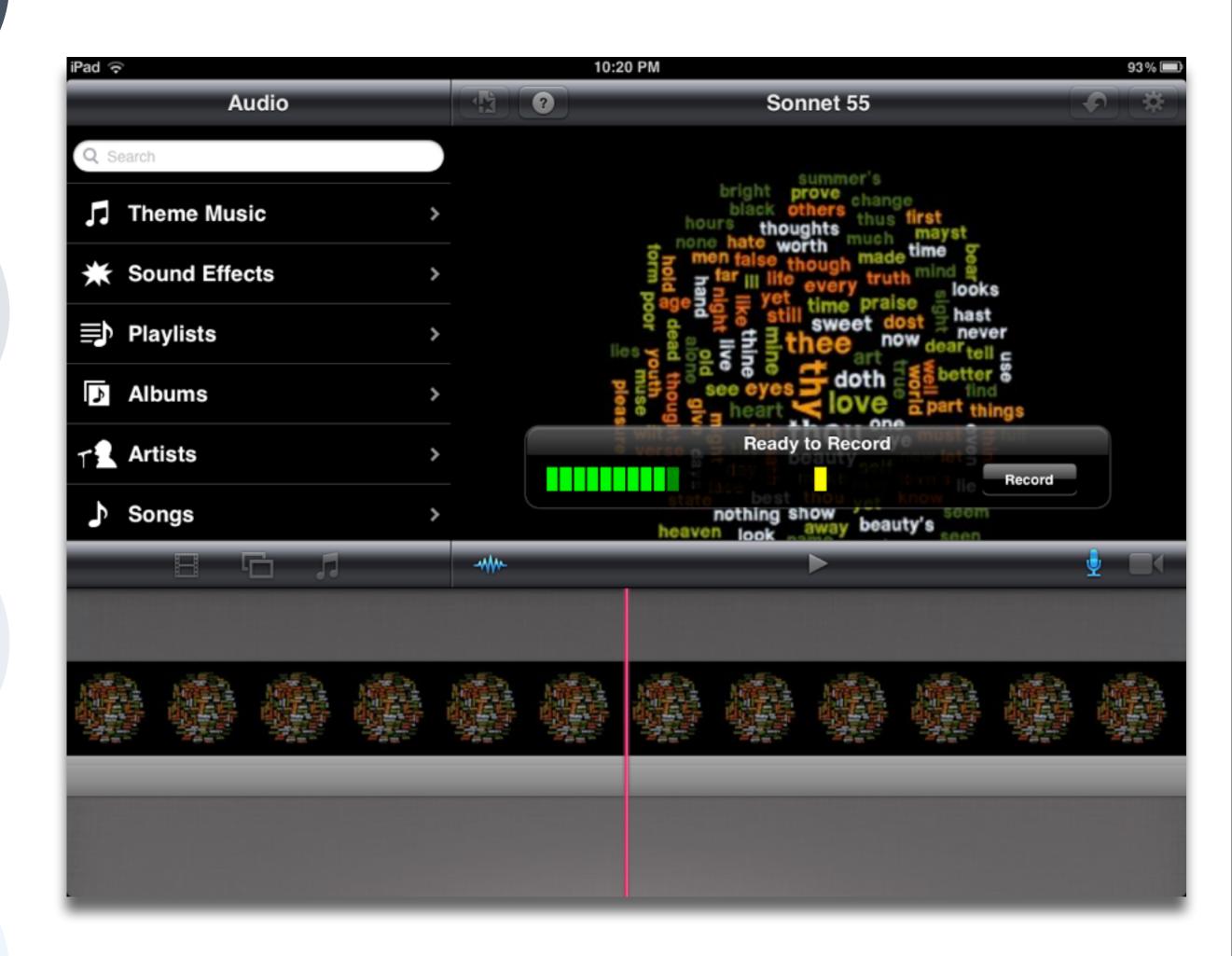
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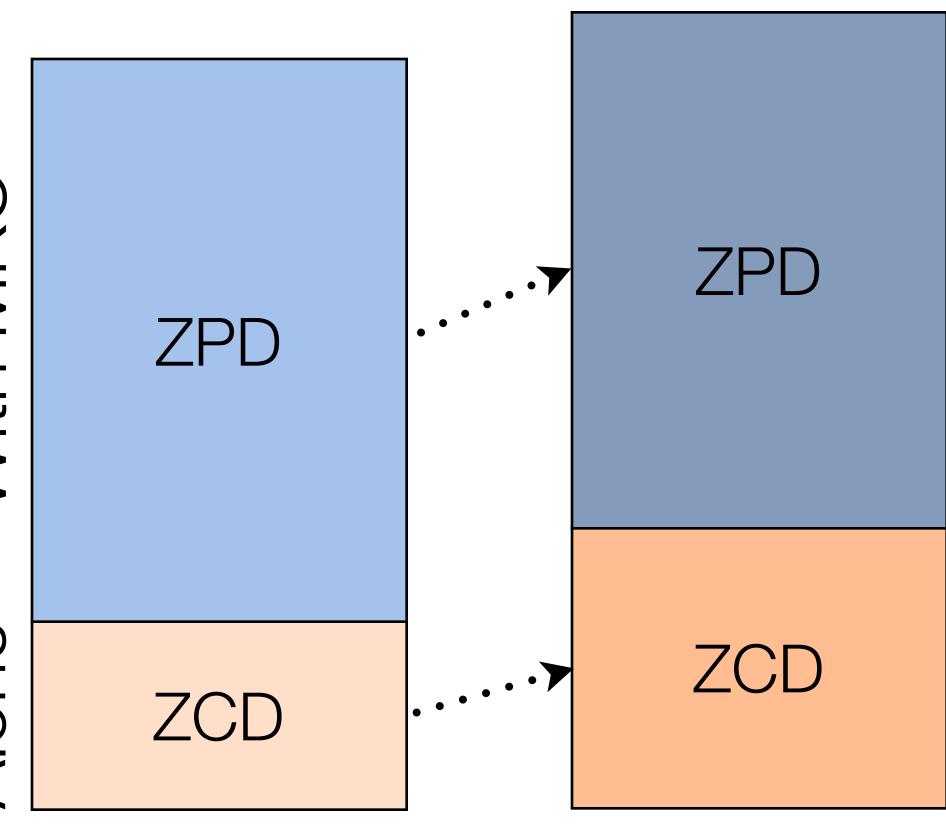
Substitution



2. Informing Design and Assessment



- With MKC Alone
- Zone of Proximal Development (ZPD):
 - Region between:
- This is an iterative process:
 - The ZCD and ZPD change over time;
 - Independent practice is required to close the loop.



• what a learner can accomplish independently (the Zone of Current Development, ZCD) • what they can accomplish with assistance from a "more knowledgeable other" (MKO) • "...what a child can do with assistance today she will be able to do by herself tomorrow."

Consolidating

Consolidating understanding refers to a solid, confident facility with a given concept or skill. A consolidating learner produces exemplary work to reflect her growth. She demonstrates consistent, independent success.

Formulating

Formulating understanding represents meaningful steps forward as a learner builds upon her basic grasp of a concept or skill. A formulating learner is achieving a greater degree of independent achievement than when her understanding was first emerging.

Emerging

Emerging understanding is a good beginning. It indicates a learner who is working to establish her basic grasp of the concept or skill being addressed. An emerging learner may be encountering an idea or skill that is relatively new to her.

Expanding

Expanding understanding indicates a learner who has consolidated her understanding, and in addition to this, also demonstrates a capacity to reach beyond by generating unique insights and original connections. An expanding learner demonstrates novel thinking and individual initiative in exploring and using complex, interrelated ideas.

Surveying Seymour Papert's Four Expectations

- Expectation 1: suitably designed formative/summative assessment rubrics will show improvement when compared to traditional instruction.
- 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.
- their community, and engagement with communities beyond their own.

• Expectation 2: students will show more instances of work at progressively higher levels of Bloom's Taxonomy.

• 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



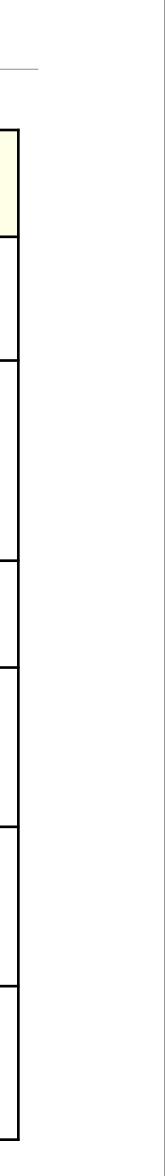
Black and Wiliam: Defining Formative Assessment

"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."

Jt

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 		



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

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 learr	

1. Clarifying, Sharing, and Understanding Learning Intentions and Criteria for Success

- Rubric Dichotomies:
 - Task-specific vs. generic rubrics
 - Product-focused vs. process-focused
 - Official vs. student-friendly Language
- Rubric Design:
 - Three key components in presenting learning intentions and success criteria to students:
 - WALT: we are learning to
 - WILF: what I'm looking for
 - TIB: this is because
 - Make explicit progressions within rubrics, and progressions across rubrics
- Students and Rubrics:
 - Have students look at samples of other students' work, then rank them by quality

 - Not a "somebody wins" exercise, but rather a quality exercise that engages students
 - Have students design test items, rubrics

• Students become better at seeing issues in their own work by recognizing them in others' work

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

- Asking questions in class:
 - Chosen to act as a discussion/thinking trigger
 - Should provide info for varying instruction on the fly and in the long term
 - Examples:
 - ConcepTest
 - POE (Predict-Observe-Explain)
 - TPS (Think-Pair-Share)
 - Virtual Whiteboard

3. Providing Feedback that Moves Learners Forward

- The feedback process must provide a recipe for future action
- Feedback should:

 - Be focused: less is more
 - Relate explicitly to goals/rubrics
- How:
 - Scores or praise alone do not provide this; comments do
 - 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

• Be more work for the recipient than the donor, i.e., not just right/wrong – make them think about what did not work

• Supplying minimal scaffolded responses (i.e., where the student got stuck) >> supplying a full response to the

4. Activating Students as Instructional Resources for One Another

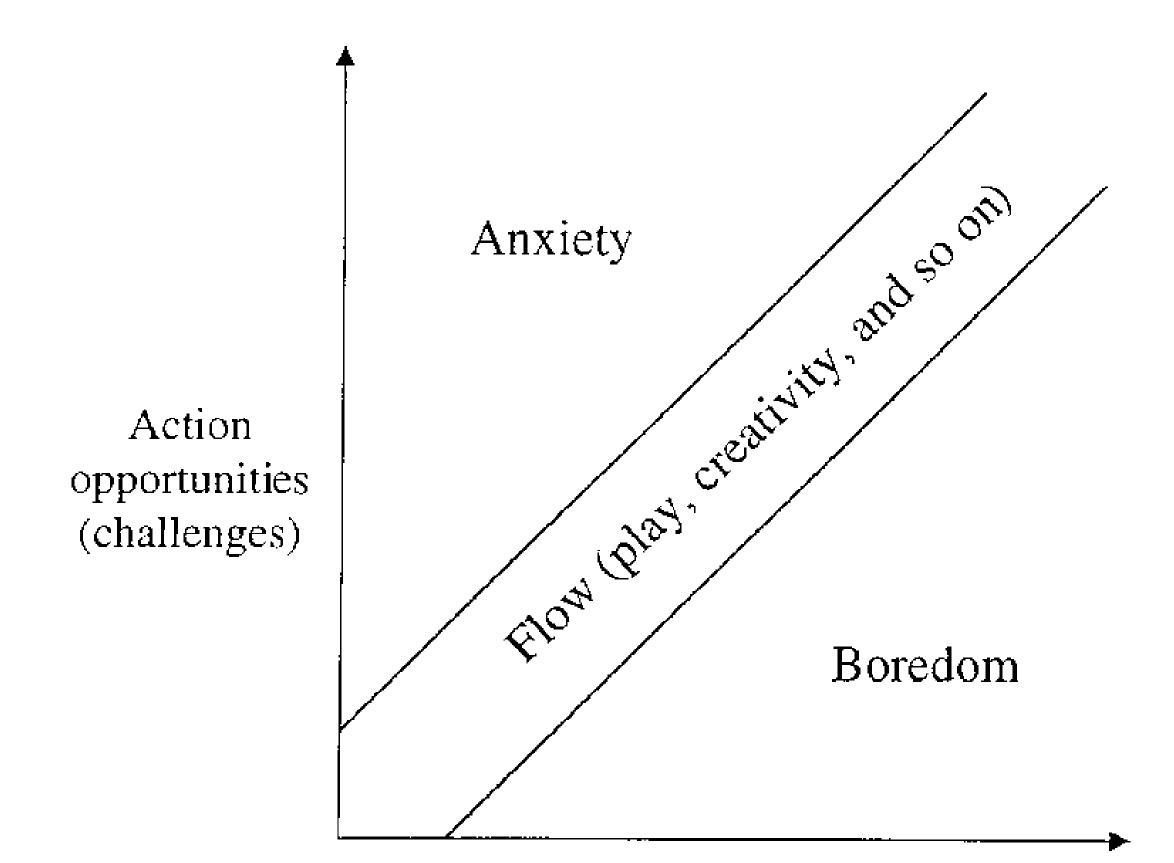
- Two key elements:
 - Group goals
 - Individual accountability
- Effectiveness due to (in order of importance):
 - Personalization
 - Cognitive Elaboration
 - Motivation
 - Social Cohesion
- Reciprocal help only works when it takes the form of elaborated explanations:
 - Not simple answers or procedures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

• Reciprocal help is more effective (by a factor of up to 4) if the product being assessed is the result of the

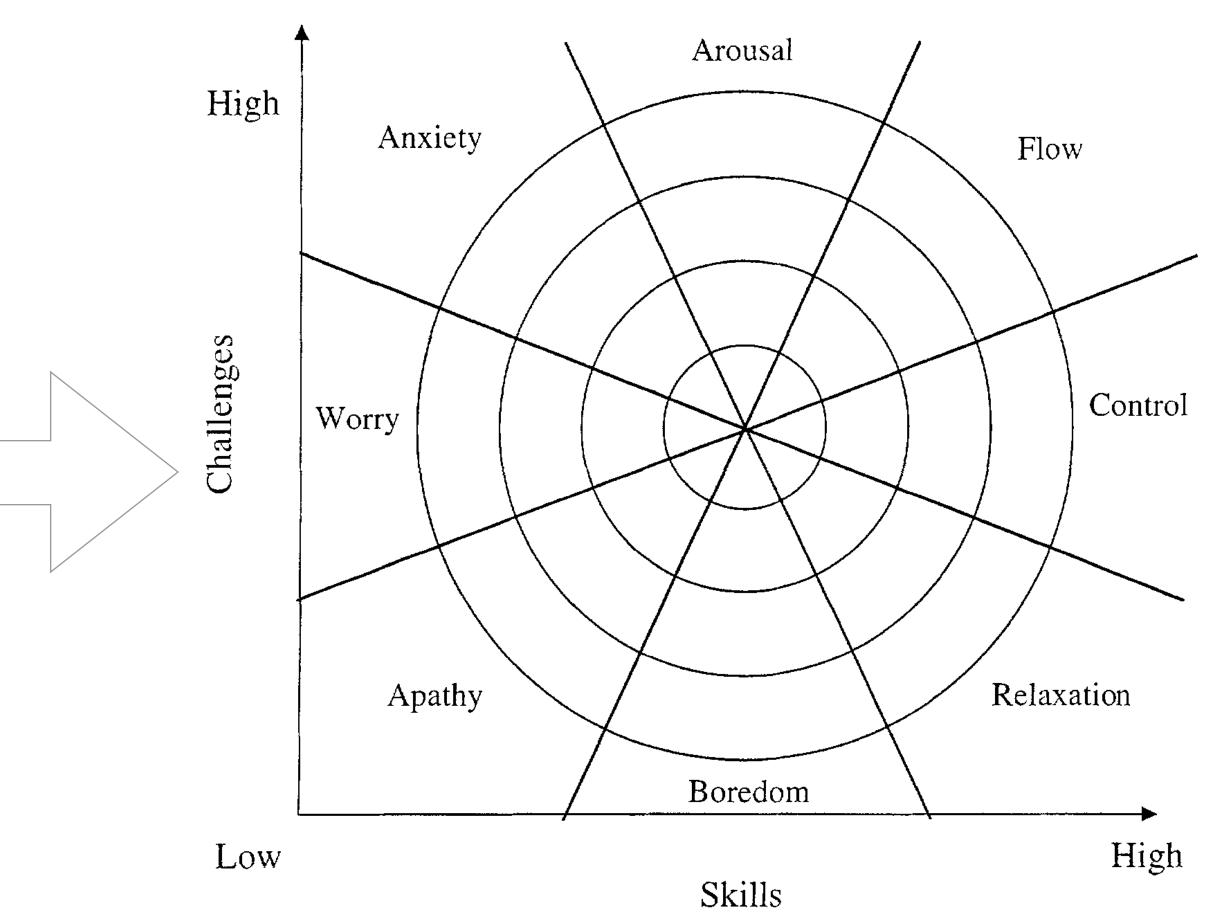
5. Activating Students as Owners of their Own Learning

- 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), but is better viewed as an outcome:
 - Flow (M. Csikszentmihalyi): the result of a match between capability and challenge
- Three 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
- Important Tools:
 - Learning logs and journals
 - Learning portfolios

• Students are motivated to reach goals that are specific, within reach, and offer some degree of challenge



Action capabilities (skills)



3. Starting Points

Choosing the First SAMR Ladder Project: Three Options

• Your Passion:

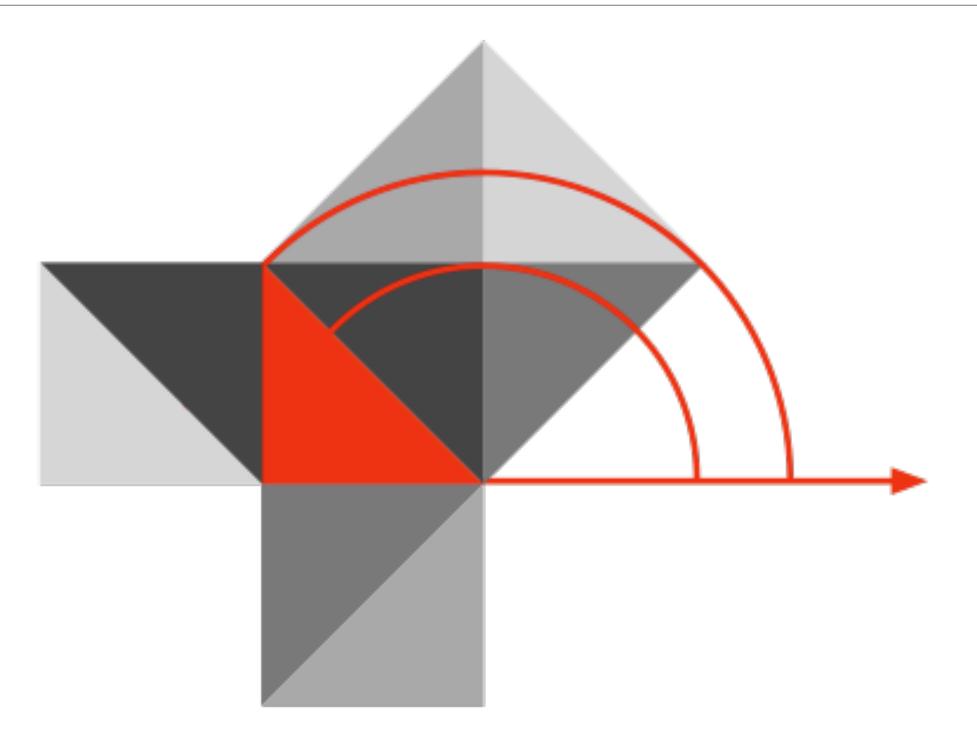
- subject you teach, what would it be?
- Barriers to Your Students' Progress:
 - beyond?
- What Students Will Do In the Future:
 - future studies or in their lives outside school?

• If you had to pick one topic from your class that best exemplifies why you became fascinated with the

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

• Which topic from your class would, if deeply understood, best serve the interests of your students in

Hippasus



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