SAMR - Beyond Augmentation: Methods For Reaching Modification and Redefinition

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
<image/>				

















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SAMR: Framing Goals for Transformation

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







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Modification

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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:
 - 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?

Have I added an improvement to the task process that could not be accomplished with the older

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100 mart 100 m 100 m	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-
And the second s	Green Monster at Fenway Part 2 Solving the problem to determine the minimum veloc	$\ \vec{v}_{i}\ = v_{i} \qquad v_{i} \otimes v_{i} \otimes$
	Unit Vector Notation Expressing a vector as the scaled sum of unit vectors	Clearing the Green Monster at Fenway
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2: [3] [] 3. 5. (403. [17]] 5: 17. 4] [17] 11.45]	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
100 100 100 100 100 100 100 100 100 100	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
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Vector Algebra	6		
do vector computations	4		
vector (1,3,-1) + (-2,1,6)	2		
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The PCK Question





Lee S. Shulman, "Those Who Understand: Knowledge Growth in Teaching." Educational Researcher, Vol. 15, No. 2 (Feb., 1986)

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

Phil Gersmehl. Teaching Geography. The Guilford Press. (2005)

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Design From Expectations

Seymour Papert: Four Expectations

- the experiment.
- class, but learned it in a more articulate, richer, more integrated way.
- and problem-solving.
- etc...

• 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

• Expectation 2: observers will agree that the student in the experiment not only learned more than in a traditional

• 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

• 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,





Measuring the 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."

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

	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 inst ano	ructional resources for one ther
Learner	Understanding learning intentions and criteria for success	5 Activating students as the c	owners of their own learning

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

Bloom's Taxonomy: Cognitive Processes

Anderson & Krathwohl (2001)	Characterist	ic Processes
Remember	 Recalling memorized knowledge Recognizing correspondences between mer 	morized 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 	t typed task
Analyze	 Distinguishing relevant/irrelevant or important Integrating heterogeneous elements into a statistical structure Attributing intent in materials 	
Evaluate	 Testing for consistency, appropriateness, an Critiquing the consistency, appropriateness, procedures, basing the critique upon appropri 	and effectiveness of principles and
Create	 Generating multiple hypotheses based on gi Designing a procedure to accomplish an untiple Inventing a product to accomplish an untype 	typed 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)



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

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

Marzano: Six Steps to Effective Vocabulary Instruction

- Step 1: The Teacher Provides a Description, Explanation, or Example of the New Term
- Step 2: Students Restate the Explanation of the New Term in Their Own Words
- Step 3: Students Create a Nonlinguistic Representation of the Term
- Step 4: Students Periodically Do Activities That Help Them Add to Their Knowledge of Vocabulary Terms
- Step 5: Periodically Students Are Asked to Discuss the Terms with One Another
- Step 6: Periodically Students Are Involved in Games That Allow Them to Play with the Terms

R.J. Marzano. Building Background Knowledge for Academic Achievement: Research on What Works in Schools. Alexandria, VA: ASCD, 2004

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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
- Online at: http://www.youtube.com/watch?v=NemBarqD6qA
- (2006) Online at: 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)
- 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

• Ruben R. Puentedura, "Technology In Education: The First 200,000 Years" The NMC Perspective Series: Ideas that Matter. NMC Summer Conference. (2012)

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

• Punya Mishra and Kristen Kereluik, "What is 21st Century Learning? A review and synthesis." Paper submitted to the SITE2011 Conference. (2011) Online at:

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