SAMR: A Pragmatic Approach

Ruben R. Puentedura, Ph.D.

Basics

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

Ruben R. Puentedura, As We May Teach: Educational Technology, From Theory Into Practice. (2009)

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Sir Arthur Conan Doyle

dead, shall be safe with us."

"Farewell, then," said the old man solemnly. "Your own deathbeds, when they come, will be the easier for the thought of the peace which you have given to mine." Tottering and shaking in all his giant frame, he stumbled slowly from the room.

"God help us!" said Holmes after a long silence. "Why does fate play such tricks with poor, helpless worms? I never hear of such a case as this that I do not think of Baxter's words, and say, 'There, but for the grace of God, goes Sherlock Holmes.' "

James McCarthy was acquitted at the Assizes on the strength of a number of objections which had been drawn out by Holmes and submitted to the defending counsel. Old Turner lived for seven months after our interview, but he is now dead; and there is every prospect that the son and daughter may come to live happily together in ignorance of the black cloud which rests upon their past.

ADVENTURE V. THE FIVE OR-ANGE PIPS

The Adventures of Sherlock Holmes

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When I glance over my notes and records of the Sherlock Holmes cases between the years

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in so mgn a degree, a. . which it is the object of these papers to illustrate. Some, too, have baffled his analytical skill, and would be, as narratives, beginnings without an ending, while others have been but partially cleared up, and have their explanations founded rather upon conjecture and surmise than on that absolute logical proof which was so dear to him. There is, however, one of these last which was so remarkable in its details and so



Library

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Watson's First Case: The Game Is Afoot

Based on characters created by Sir A.C. Doyle

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Sherlock Holmes stands here. He fixes you in his gaze, saying "Dr. Watson, I presume? You come at the right time. As a medical man, I could make use of your knowledge. A man was found unconscious yesterday in Frying Pan Alley. Some locals think he worked at a cement kiln, others at the local brewery. I've just mixed some residue from his clothes with phenolphthalein, and it turned pink. Dr. Watson, do you realize what this means?" You reply: He's a cement worker

He's a brewer

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Checklists

Determining SAMR Level: Questions and Transitions

Substitution:

- What is gained by replacing the older technology with the new technology?
- Substitution to Augmentation:
 - technology at a fundamental level?
 - How does this feature contribute to the 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 the design?
- Modification to Redefinition:
 - What is the new task?
 - Is any portion of the original task retained?
 - How is the new task uniquely made possible by the new technology?
 - How does it contribute to the design?

Has an improvement been added to the task process that could not be accomplished with the older

Connections



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Bootstrapping

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 		



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Understand

Remember





Modification

Augmentation

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Apply

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Understand

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Evaluate

Analyze

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Evaluate

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Outcomes

	Number of		Mean	
Meta-analysis	studies	ES type	ES	SE
Bangert-Drowns (1993)	19	Missing	0.27	0.11
Bayraktar (2000)	42	Cohen's d	0.27	0.05
Blok, Oostdam, Otter, and Overmaat (2002)	25	Hedges's g	0.25	0.06
Christmann and Badgett (2000)	16	Missing	0.13	0.05
Fletcher-Flinn and Gravatt (1995)	120	Glass's ∆	0.24	0.05
Goldberg, Rus- sell, and Cook (2003)	15	Hedges's g	0.41	0.07
Hsu (2003)	25	Hedges's g	0.43	0.03
Koufogiannakis and Wiebe (2006)	8	Hedges's g	-0.09	0.19
Kuchler (1998)	65	Hedges's g	0.44	0.05
Kulik and Kulik (1991)	239	Glass's ∆	0.30	0.03
Y. C. Liao (1998)	31	Glass's ∆	0.48	0.05
YI. Liao and Chen (2005)	21	Glass's Δ	0.52	0.05
Y. K. C. Liao (2007)	52	Glass's Δ	0.55	0.05

	Number			
Meta-analysis	of studies	ES type	Mean ES	SE
Michko (2007)	45	Hedges's a	0.43	0.07
Onucha (2007)	35	Cohen's d	0.45	0.07
Dearson Ferdia	20	Hedges's a	0.20	0.04
Blomeyer, and Moran (2005)	20	fieuges s g	0.49	0.11
Roblyer, Castine, and King (1988)	35	Hedges's g	0.31	0.05
Rosen and Salo- mon (2007)	31	Hedges's g	0.46	0.05
Schenker (2007)	46	Cohen's d	0.24	0.02
Soe, Koki, and Chang (2000)	17	Hedges's g and Pearson's r ^a	0.26ª	0.05
Timmerman and Kruepke (2006)	114	Pearson's r ^a	0.24	0.03
Torgerson and Elbourne (2002)	5	Cohen's d	0.37	0.16
Waxman, Lin, and Michko (2003)	42	Glass's ∆	0.45	0.14
Yaakub (1998)	20	Glass's Δ and g	0.35	0.05
Zhao (2003)	9	Hedges's g	1.12	0.26

a. Converted to Cohen's d.



Study	SAMR Level	Description	Effect Size
Ligas (2002)	S	CAI system used to support direct instruction approach for at-risk students.	0.029 (50th perc. → 51st perc.)
Xin & Reith (2001)	A	Multimedia resources provided to contextualize learning of word meanings and concepts.	0.264 (50th perc. → 60th perc.)
Higgins & Raskind (2005)	Μ	Software/hardware used for text-to-speech, definitions, pronunciation guide for children with reading disabilities.	0.600 (50th perc. → 73rd perc.)
Salomon, Globerson & Guterman (1989)	R	Software presents students with reading principles and metacognitive questions as part of the reading process.	1.563 (50th perc. → 94th perc.)





Pearson, P.D., Ferdig, R.E., Blomeyer Jr, R.L., & Moran, J. "The Effects of Technology on Reading Performance in the Middle-School Grades: A Meta-Analysis With Recommendations for Policy." Learning Point Associates/North Central Regional Educational Laboratory (NCREL) (2005).

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A - 4 Studies	× M - 8 Studies	× R - 3 Stu

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Study	SAMR Classification	Description	Effect Size
Algebra I <i>Effectiveness of Cognitive</i> <i>Tutor Algebra I at Scale</i> , by John F. Pane, Beth Ann Griffin, Daniel F. McCaffrey, Rita Karam	S to A	 S: Computerized algebra drills, some tied to real-world scenarios A: Tools for basic visualization; adaptive response to student progress 	≈ 0.2 50th perc. → 58th perc.
Earth Science Using Laptops to Facilitate Middle School Science Learning: The Results of Hard Fun, by Alexis M. Berry, Sarah E. Wintle	A to M	 A: Interactive tools for concept exploration and visualization M: Narrated animation as final project 	≈ 0.6 50th perc. → 73rd perc. (≈ 1.4 a month later) (50th perc. → 92nd perc.)

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