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ANIMATING EXPLANATIONS: IS IT FUNNING UP OR DUMBLING DOWN?

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Synopsis:

Understanding and retaining information are the two cornerstones of learning. The mode of presentation affects understanding. In particular, animated explanations can reduce cognitive load and help students understand new material. In addition, students enjoy watching animated explanations on the Internet. The question we address is whether animations support or detract from retaining material over time. We also introduce a novel methodology for gathering data and conducting interviews online.

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Although traditional instructional materials often include static graphics, the use of computers to support learning has opened up our ability to incorporate dynamic images or animations into the explanations. Since the Internet is replete with videos that are viewed thousands, if not tens of thousands, of times, this possibility holds great promise for providing student-friendly content in a learning environment. Furthermore, we know that animated instructional materials can, in some cases, be effective for helping students process and follow new content and information, and this opens up an exciting venue for incorporating art in online STEM curricula. In particular, cognitive load theory has been used to explain what features of animations contribute to successful information processing. Learner control and segmentation (Mayer & Chandler, 2001), annotations (Wallen, Plass, & Brunken, 2005), cueing (Harp & Mayer, 1998), and attention guidance (Betrancourt, 2005) are some factors that contribute to the effectiveness of animated instructional materials by reducing extraneous cognitive load so that information can be processed by working memory. Other features of animations, however, can distract the learner and reduce information processing. In particular, the coherence principle for how to design multimedia instruction asserts that people learn more deeply when extraneous material is excluded from a multimedia message. For instance, students scored better on a transfer test after viewing a narrated animation on lightning formation that did not include video clips depicting lightning strikes (Mayer, Heiser, & Lonn, 2001). Including extraneous material that students find interesting can further increase its negative impact on learning (Rey, 2012).

Our research addresses how students learn from artistic animated presentations of STEM content by exploring the effect of humorous details on retention and transfer. Other studies have focused on the supplementary use of cartoons in textbooks (Bryant, Brown, Silberberg, & Elliott, 1981) and on the application of humor in college courses (Garner, 2012; Kaplan & Pascoe, 1977). In particular, the use of humorous examples in lectures can enhance the recall of related information and concepts (Kaplan & Pascoe, 1977). We look at what artistic aspects of a brief (about 2 minutes long) animated instructional explanation are remembered by asking students to recreate a storyboard by selecting images from the video and then use the storyboard to recall the video content. After the retention test, students were asked to complete three transfer items. In order to recreate the storyboard, students chose from four types of images for three video scenes that differ by conceptual and detail accuracy: correct images taken from the video, images that are conceptually analogous with those in the video but differ by surface features, images that are conceptually incorrect but mirror details from the video, and images that are incorrect both conceptually and according to the details. Figure 1 depicts the images for one scene. The question we report on was whether including humor in this context assists in retention and transfer by supporting a storyline that can be more easily remembered or whether it focuses attention away from the information and concepts conveyed by the artistic narrative. The video described Simpson's Paradox, a statistic phenomenon in which a trend appears in several different groups of data but disappears or reverses when these groups are combined.

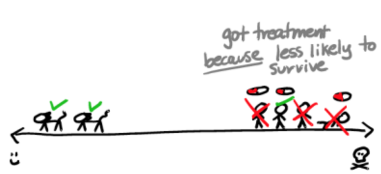
		Details	
		Accurate	Inaccurate
Concept	Accurate		
	Inaccurate		

Figure 1. Example of images differing by conceptual and detail accuracy from which students chose and used to recall storyline.

Finally, we report on how computers can support research. Despite the popular use of computers to support education, qualitative educational research remains largely dependent on the physical presence of students. We addressed this issue by conducting all of our interviews online, thereby introducing a way in which computers can be used to efficiently collect large, rich data sets. Through conferencing and screen-sharing software, we were able to acquire a wealth of both quantitative and qualitative data that can be used to investigate knowledge acquisition and retention without the hassle of having students physically attend experimental sessions. We believe that this work speaks to the creation of student-friendly instructional material that can lead to more effective and enjoyable learning, as well as to modern methods of research methodology.

References

Betrancourt, M. (2005). *The animation and interactivity principles in multimedia learning.* In R. E. Mayer (Ed.), The Cambridge handbook of multimedia learning (pp. 287–296). New York: Cambridge University Press.

Bryant, J., Brown D., Silberberg, A. R., & Elliott, S. M. (1981). Effects of humorous illustrations in college textbooks. *Human Communication Research, 8(1),* 43–57.

Garner, R. L. (2006). Humor in pedagogy: How ha-ha can lead to aha! *College Teaching, 54(1),* 177-180.

Harp, S. F., & Mayer, R. E. (1998). How seductive details do their damage: A theory of cognitive interest in science learning. *Journal of Educational Psychology, 90(3),* 414–434.

Kaplan, R. M., & Pascoe, G. C. (1977). Humorous lectures and humorous examples: Some effects upon comprehension and retention. *Journal of Educational Psychology, 69*(1), 61–65.

Mayer, R. E., & Chandler, P. (2001). When learning is just a click away: Does simple user interaction foster deeper understanding of multimedia messages? *Journal of Educational Psychology, 93*(2), 390–397.

Mayer, R. E., Heiser, J., & Lonn, S. (2001). Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology, 93(1),* 187-198.

Rey, G. D. (2012). A review of research and a meta-analysis of the seductive detail effect. *Educational Research Review, 7(3),* 216–237.

Wallen, E., Plass, J., Bruenken, R. (2005). The function of annotations in the comprehension of scientific texts: Cognitive load effects and the impact of verbal ability. *Educational Technology Research and Development. 53.* 59–71.