Applying the Cognitive Theory of Multimedia Learning to Educational Animations and Explainer Videos in CME-CPD

Jayzona Alberto, EdD, MS | Stanford School of Medicine

INTRODUCTION

The field of continuing medical education (CME)/continuing professional development (CPD) has evolved considerably over the years to promote learner centric educational formats. However, the COVID-19 pandemic accelerated the trajectory of continuing medical education, CME-CPD professionals to deliberate on innovative approaches in their delivery of education that is timely and relevant to physicians. The popularity of educational technologies has motivated companies to develop and improve user friendly tools that create high quality multimedia educational products. With the help of these tools, medical educators, instructional designers, and CME-CPD professionals can create and produce educational animations and explainer videos that cover a variety of topics from clinical subjects and patient care to communication and leadership.

This poster summarizes the best practices for creating educational animations and explainer videos, including storyboard and script development, an overview of technology tools and resources such as collaboration platforms, artificial intelligence voice overs, and more, and the application of Mayer's *Cognitive Theory of Multimedia Learning*. Participants will recognize the impact educational animations and explainer videos can have with a global audience of physician learners.

12 Principles of Multimedia Learning

1. *Coherence principle* – Remove extraneous information
2. *Signaling principle* – Highlight important text
3. *Redundancy principle* – Apply narration and graphics/text
4. *Spatial Contiguity principle* – Keep relevant text and graphics close together
5. *Temporal Contiguity principle* – Present corresponding words and visuals together
6. *Segmenting principle* – Chunk information
7. *Pre-training principle* – Assume foundational knowledge
8. *Modality principle* – Visuals and voice overs are more effective than visuals and text
9. *Multimedia principle* – Display words and graphics rather than words alone
10. *Personalization principle* – Integrate casual, conversational voice overs
11. *Human voice principle* – When possible, record a human voice for narration
12. *Image principle* – Avoid including speaker video

Figure 1. Educational animation can be used for faculty development on diversity via case-based scenes.

EDUCATIONAL THEORY

With a knowledge of Mayer's *Cognitive Theory of Multimedia Learning* (CTML, 2009) as well its 12 principles, developers can produce online educational videos in a cost effective and swift fashion.

Applying this theory, CME-CPD professionals, clinical educators, and instructional designers must then guide learners by carefully select and combine the words, pictures, and audio to produce mental representations. And do so in a way that is not overloading the sensory channels. The *Cognitive Theory of Multimedia Learning* can be used in a variety of ways in online continuing medical education. Practitioners may be applying CTML principles to online didactic lectures without even being aware of its scholarly term. But the true challenge for medical educators is to explore innovative ways to apply these principles in continuing medical education.

METHODS

The Stanford Center for Continuing Medical Education (Stanford CME) began developing educational animations and explainer videos in-house since the onset of the pandemic in March 2020. A high-level overview of our process is as follows: Consultation → Pre-Design (project charter and learning objectives) → Design (storyboard and script) → Production (mockups and revisions) → Implementation (user testing) → Launch (publication and marketing). In 2022, Stanford CME launched four educational animations and explainer videos applying the 12 CTML principles. We continue to monitor and track learner completion and analyze evaluation data to better understand learner preferences, satisfaction, and educational impact.

STRATEGIES

Stanford CME strives to continuously refine its methods for designing and producing online educational videos. We identified strategies and best practices that have enhanced our process over the years.

> When developing the storyboard and script, work with subject matter experts to capture all the scene and character details for development.
- *Style* – Character style, branding, and mood
- *Dialogue* – Narrator, characters, and sound effects
- *Scenes* – Character/prop placement and backgrounds
- *Actions* – Character movement and facial expressions

> Custom animations and videos can be easily and quickly created using a variety of technology tools.
- *Storyboarding* – Plot, Miro, Canva, Google Docs
- *Video development* – Vyond, Powtoon, Canva
- *Voice overs* – Well Said Labs, Typecast, Fiverr
- *Collaboration* – Google Drive, Frame.io, Vimeo

> Implementing some basic digital accessibility concepts can help improve content clarity and accessibility.
- Optional captions
- Sufficient contrasting colors
- Logical organization
- Digestible pieces
- Alt text to describe image content

> Effective storytelling entails communicating experiences for each scene or the entire video to create relatable, mental constructs for learners.
- Character development
- Case studies
- Clinical vignettes
- Emotionally sensitive patient stories

> Utilize strategies to reinforce the content presented and check understanding via assessment.
- Pre-/post-test
- Knowledge checks
- Reflection questions

Figure 2. Explainer videos are used to explained concepts in bedside communication.

OUTCOMES

Though many factors differentiate the four educational animations/explainer videos Stanford CME launched this year to date, some assumptions can be made when viewing the table below. Based on the unique difference between the courses, the *Personalization principle* may appeal to more clinicians, which may explain the difference in learner completion compared to the other three courses. However, it is important to note that learner completion may be influenced by content type, target audience, marketing, and other factors.

	Course 1	Course 2	Course 3	Course 4
Published	January	January	May	June
Length	15 mins	15 mins	60 mins	10 mins
Coherence	x	x	x	X
Signaling	x	X	x	X
Redundancy	x	x	x	X
Spatial	X	x	x	x
Temporal	x	x	x	x
Segmenting	x	x	x	x
Pre-training		x		x
Modality	x	x	x	x
Multimedia	x	x	x	x
Personalization			x	
Human voice	x	x	x	
Image	x	x		x
# Learners	151	219	642	149

Table 1. Comparison of published online educational videos, CTML principles applied, and learner completion.

CONCLUSIONS

As an educational format, there are benefits to producing animations and explainer videos for CME-CPD. Posting the video publicly makes it more accessible for a global audience to consume anytime, anywhere. Further, with a combination of the subject matter experts and instructional designers as well as affordable technology tools, online videos can be cost effective and turned around quickly. As online CME-CPD continues to gain momentum, professionals should refer to *Cognitive Theory of Multimedia Learning* for any online courses.

REFERENCES

Mayer, R. (Ed.). (2005). The Cambridge Handbook of Multimedia Learning (Cambridge Handbooks in Psychology). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511816819