TECHNOLOGY-ENHANCED LEARNING

ENGAGE ♦ DEVELOP ♦ GROW ♦ EMPOWER

E.D.G.E.

"Learning happens when students apply computer programming concepts in solving problems. Students watch my videos before class and this frees up classroom time for more practice exercises. They are also able to review concepts by watching the videos again."

Jiang Jing
Associate Professor of Information Systems
School of Information Systems

- -

Designing Effective Videos for Blended Learning

In this issue of E.D.G.E., CTE caught up with Associate Professor Jing to find out how she designs and incorporates videos in her lessons to reinforce students' understanding of key concepts.

Consider
Classroom Context

In the Information Systems Software Foundation course, an introductory module to computer programming, most of Jing's students do not have background knowledge in programming. To bring these students up to speed on programming, Jing introduces a blended approach to learning.

Jing's students are required to watch the lecture videos as part of their pre-class activity. These lecture videos give autonomy to students; they can learn at their own pace, re-watch the videos or do their own research to build upon their understanding of the topic. This results in students being more prepared to work on their individual assignments in class by applying what they have learnt online. This approach also frees up time in the classroom for students to clarify their doubts when Jing goes through the solutions in class.

The two challenges facing Jing are designing videos that can help her students learn effectively, and motivating students to watch the videos before coming to class.

In this e-bulletin, Jing shares tips and strategies on overcoming her two challenges:
1. Using Principles of Multimedia learning to design effective videos for learning
2. Integrating assessments in videos to motivate students to watch them before coming to class

<u>E</u>xplore
<u>Tips, Techniques and Tools</u>

1. Principles of Multimedia Learning

There are seven principles of Multimedia Learning that help shape the design and organisation of videos.

- Multimedia Principle: Using text and graphics rather than text alone

- Contiguity Principle: Aligning printed and spoken words to corresponding graphics

- Segmenting Principle: Managing the complexity of a concept by breaking it down into parts

- Modality Principle: Presenting words as audio narration rather than on-screen text

- Redundancy Principle: Explaining visuals with words in either audio or text

- Coherence Principle: Adding interesting materials could instead distract and affect learning

- Personalisation Principle: Using a conversational style

We focus on three of the above principles that Jing applies in designing her videos:
(a) Multimedia (b) Contiguity and (c) Segmenting principles.To read more about the other principles, please refer to the book,[1] "E-Learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning (3rd Ed.)".

(a) Multimedia Principle: Using text and graphics rather than text alone

Jing uses graphics such as directional arrows in her slides to trace the development of a process flowchart. She observes that students understand concepts better when they view a combination of text and graphics rather than text alone. This approach aids students in mentally making connections between the pictorial and verbal representations. To illustrate this point, a comparison between a negative (describing the water cycle using text only) and a positive (describing the water cycle using both graphics and text) example of the multimedia principle is shown in **Figure 1** .
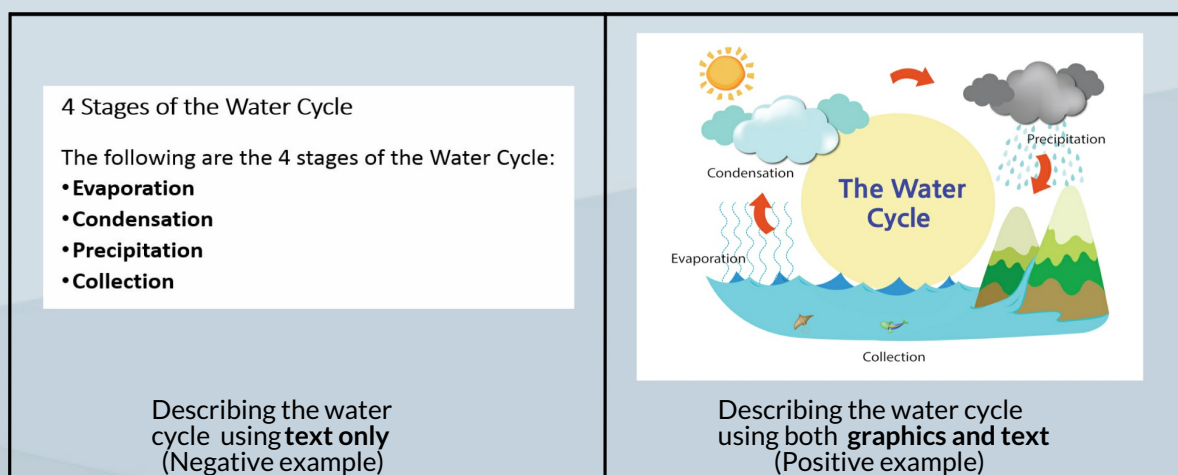

Figure 1

[1]The e-book can be accessed from the SMU Library database and a hardcopy is also available in the Li Ka Shing Library: Clark, R., & Mayer, R. (2011). E-Learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning (3rd Ed.). Chichester: Wiley.

☑ **Tips and Techniques:**

➔ Select visuals that support relationships between graphics and text to enhance the impact of your video, e.g. a pie chart with corresponding numbers.

➔ Select visuals that illustrate changes over time or in space, e.g. an animated sequence of a process flowchart.

➔ When using text in videos, keep the font size readable, e.g. font size 24.

(b) Contiguity Principle: Aligning printed and spoken words to corresponding graphics

When Jing records her lecture slides, she places printed words near the corresponding graphics. This allows students to make an instant connection and draw direct relevance between the graphics and text. To illustrate this point, a comparison is shown in **Figure 2**. In the negative example, the labels are separated from the image of the brain; whereas in the positive example, the labels are placed near to the parts of the brain to which they correspond.
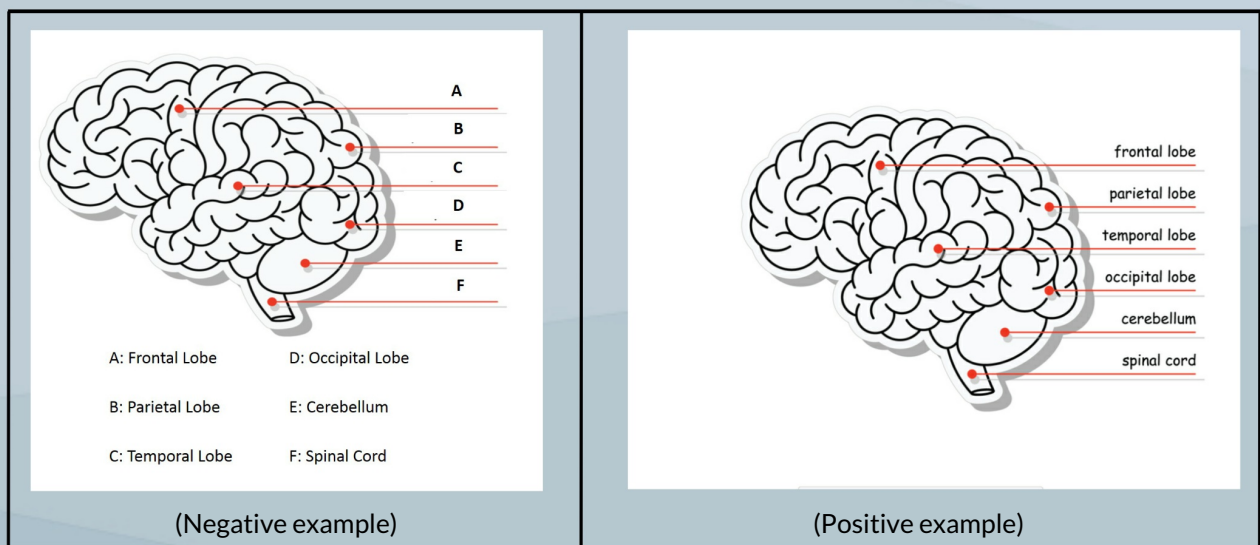

(Negative example)   (Positive example)

Figure 2

When there is narration to describe a process, Jing also ensures that the spoken words are synchronised with the timing of the graphics. This cuts down on the need for students to mentally organise and coordinate two or more sources of information.

For future recordings, Jing is considering seeking support from a teaching assistant to help her to add subtitles and labels to the various sections of the videos.

☑ **Tips and Techniques:**

➔ To reduce the amount of text on the screen, use pop-up boxes or labels to identify an action depicted in the illustration.

➔ To minimise the need for students to go back to a previous screen, provide a link to the information.

(c) Segmenting Principle: Managing complexity by breaking down the concepts into parts

To ensure that students are able to process and absorb the amount of information in her videos, Jing keeps the length of her videos short by reducing the complexity of the materials and the cognitive load.[2]

☑Tips and Techniques:

➔ Present materials in videos in manageable segments of about 10 to 15 minutes each.

➔ Allow students to control the pace of their learning by including "click forward" pauses within a video.

➔ Define and exemplify technical terms.

➔ Name and define the key concepts before presenting their processes or procedures.

2. Integrating Assessments in Videos

Jing encourages pre-class participation by embedding quizzes in the videos. These quizzes marks are added to the students' class participation grades. Jing also uses students' performance in these quizzes as a form of feedback to adjust her teaching strategies and to identify concepts that her students are still weak in.

☑Tips and Techniques:

➔ Embed assessment questions in a variety of formats (e.g. multiple-choice or short essay) within a video.

➔ Include checkpoint questions at various points in the video to assess students' understanding before they progress to the next concept.

🖥 Technology Tools

There are a number of technical tools available for recording and uploading of videos. These include Echo360 and Mediacast. The latter, Mediacast can be used to embed quizzes in videos.

For more information, please contact IITS' Learning Systems and Technologies team at elearn@smu.edu.sg.

---

[2] Cognitive Load: The amount of mental resource in working memory required.

Bibliography

● Brame, C.J. (2015). Effective educational videos. Retrieved 05 May 2017, from http://cft.vanderbilt.edu/guides-sub-pages/effective-educational-videos/.

● Clark, R., & Mayer, R. (2011). E-Learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning (3rd ed.). Chichester: Wiley. (Also available online as an e-book in SMU Library)

● Mayer, R. E. (2009). Multimedia learning (2nd ed.). New York: Cambridge University Press.

● Pedagogical benefits of video for teaching and learning. (n.d.). Retrieved 17 May 2017, from http://www.uq.edu.au/teach/video-teach-learn/ped-benefits.html

● Research-based best practices for teaching online: recorded lectures. (n.d.). Retrieved 17 May 2017, from https://delta.ncsu.edu/knowledgebase/research-based-best-practices-for-teaching-online-recorded-lectures/

● Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. Learning and instruction, 4(4), 295-312.

- -