Welcome to the Durable Learning Seminar Series

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Director of Medical Education, Lecturio

Cardiothoracic surgeon, Maryland, U.S.

Meet our Learning Science Team

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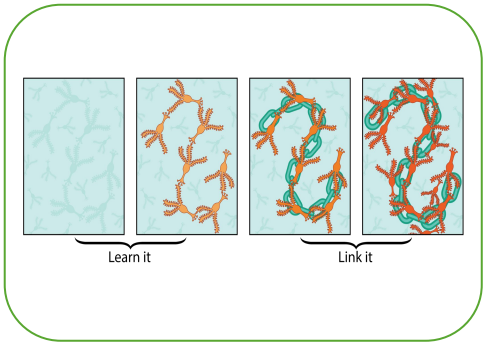
Meredith Ratliff, M.S., M.A.T.

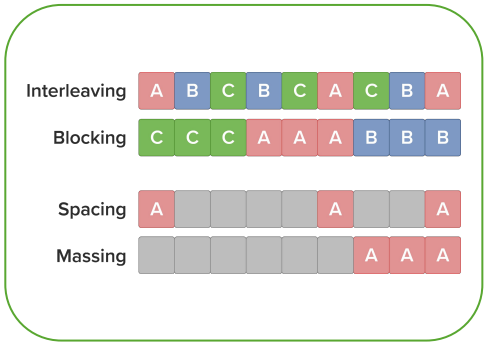
Sarah Haidar, M.Ed., T.D.

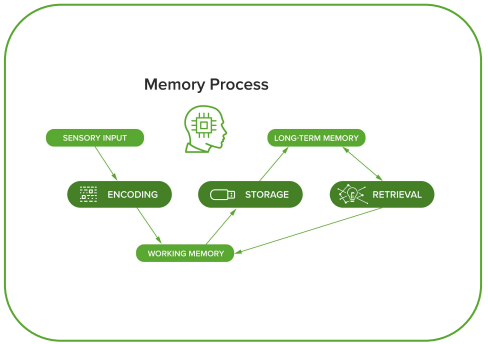
Sara Keeth, Ph.D, PMP

Seminar Topics and Applications of Learning Science

Cognitive Science & Neuroscience → **Effective & Engaging Presentations** → **Durable Learning**







Lecturio

Effective Presentations: Optimize the learning experience with evidence-based multimedia principles

August 2, 2022
Online Seminar

Learning Objectives:

1. **Identify** the cognitive foundations of multimedia principles
2. **Apply** Mayer's multimedia principles
3. **Apply** graphic design and universal design principles
4. **Apply** these principles to their courses

What do you think makes a presentation particularly effective?

Tell us in the chat!

QUESTION

What are effective presentations?

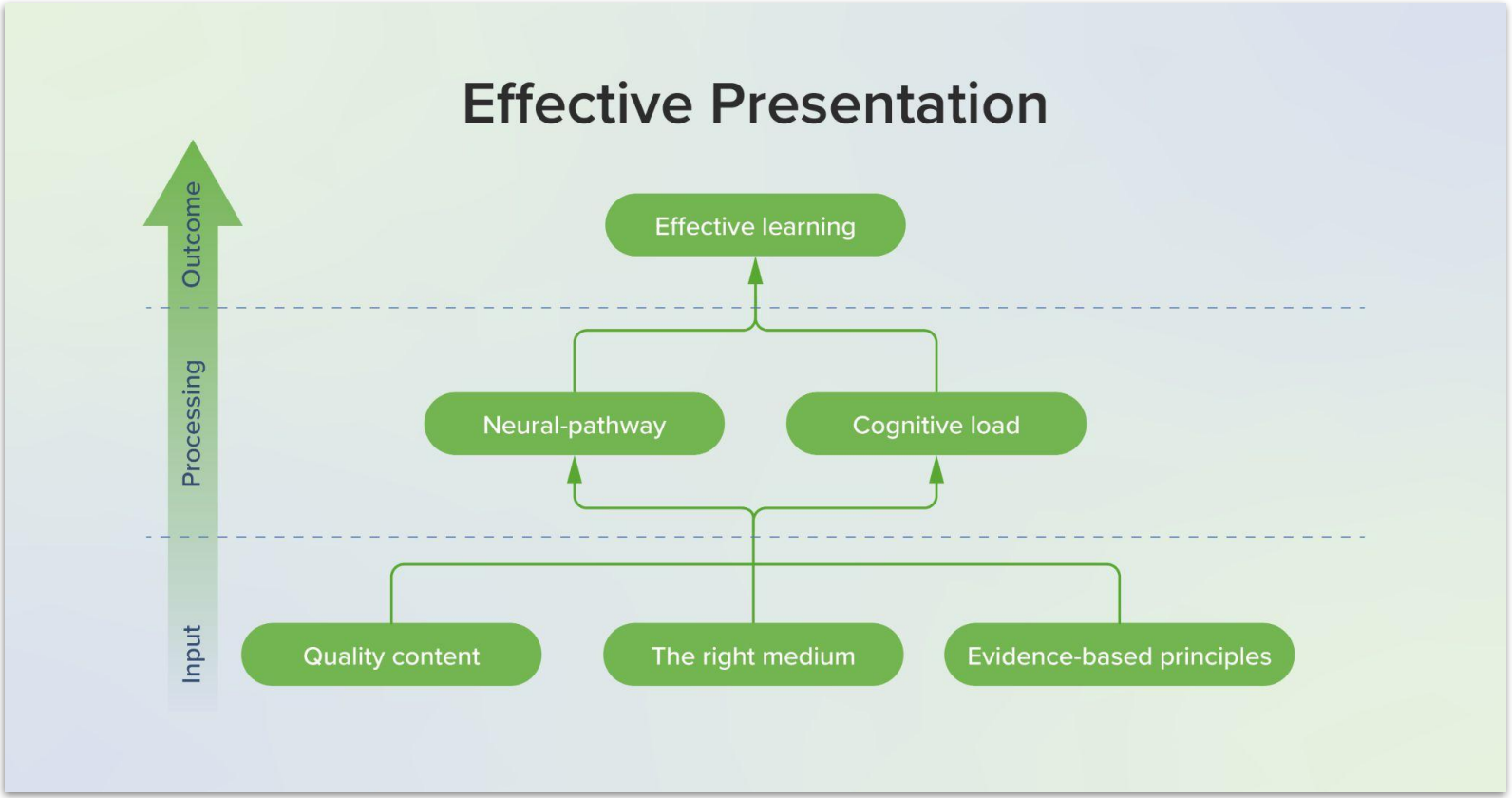
- **Appealing**
- **Engaging**
- **Informative**
- **Concise**

Convey information and ideas memorably.

Why effective presentations work

- Boost **cognitive processes**
- Function irrespective of **learning preferences**
- Augment **understanding**

How effective presentations promote effective learning



Mayer’s Multimedia Principles
&
Cognitive Science

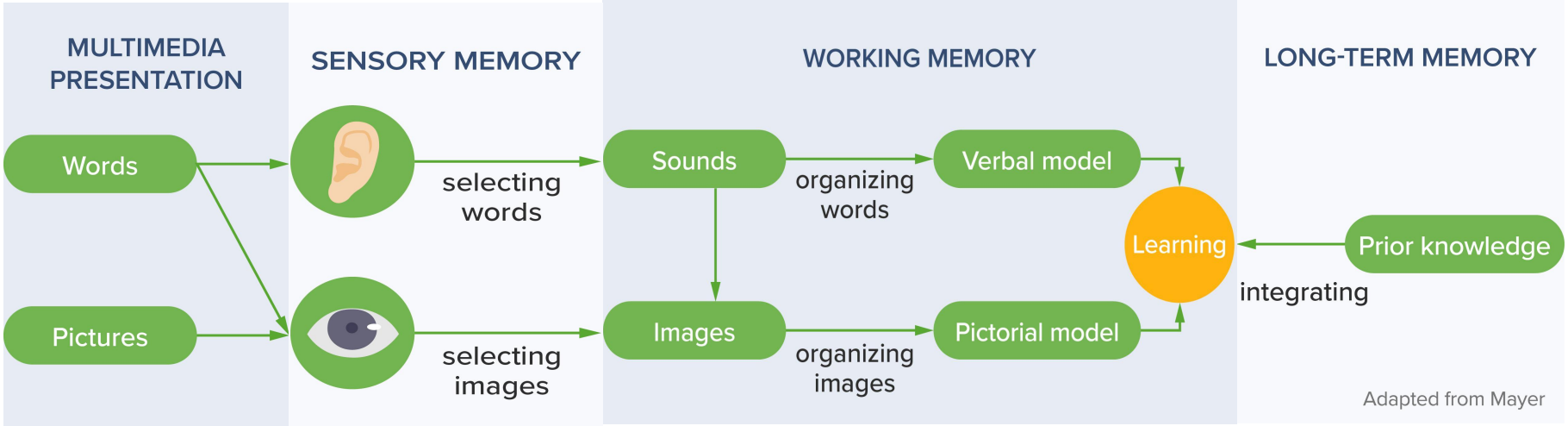
Mayer’s principles for effective multimedia learning

- The **dual channel principle**: learners process verbal and pictorial information via two separate channels.

- The **active processing principle**: deeper learning occurs when learners are actively engaged in cognitive processing.

- The **limited capacity principle**: processing limited amounts of information simultaneously due to limits in working memory.

Mayer's Cognitive Theory of Multimedia Learning



1. Mayer RE. Multimedia Learning. 3rd ed. Cambridge University Press; 2021. 450 p.

Cognitive Learning Theory and Memory

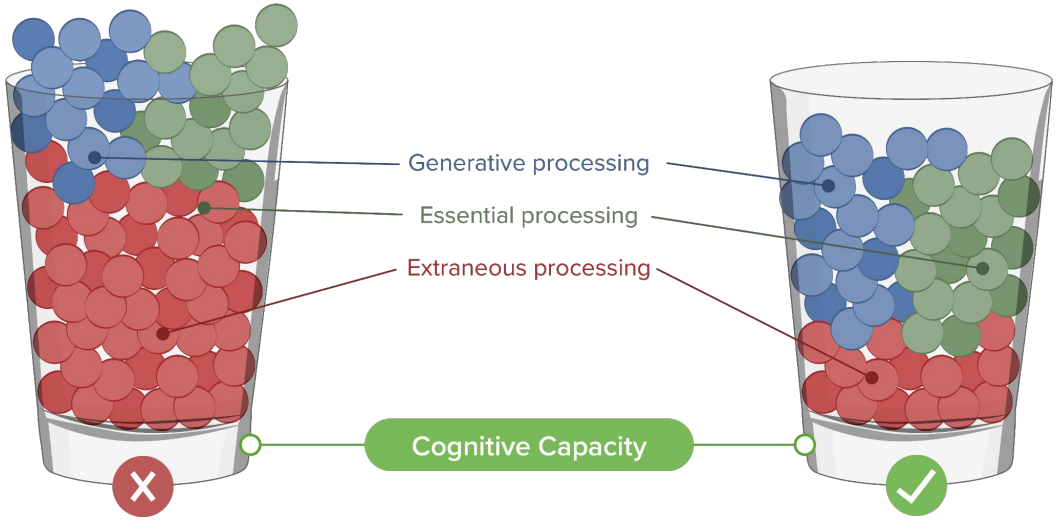
- Words and images are detected in the **sensory memory**
- Selected information moves into the **working memory** where it may be held for a **short period** of time

Organizing words & images ⟹ coherent cognitive representation **(schema)**

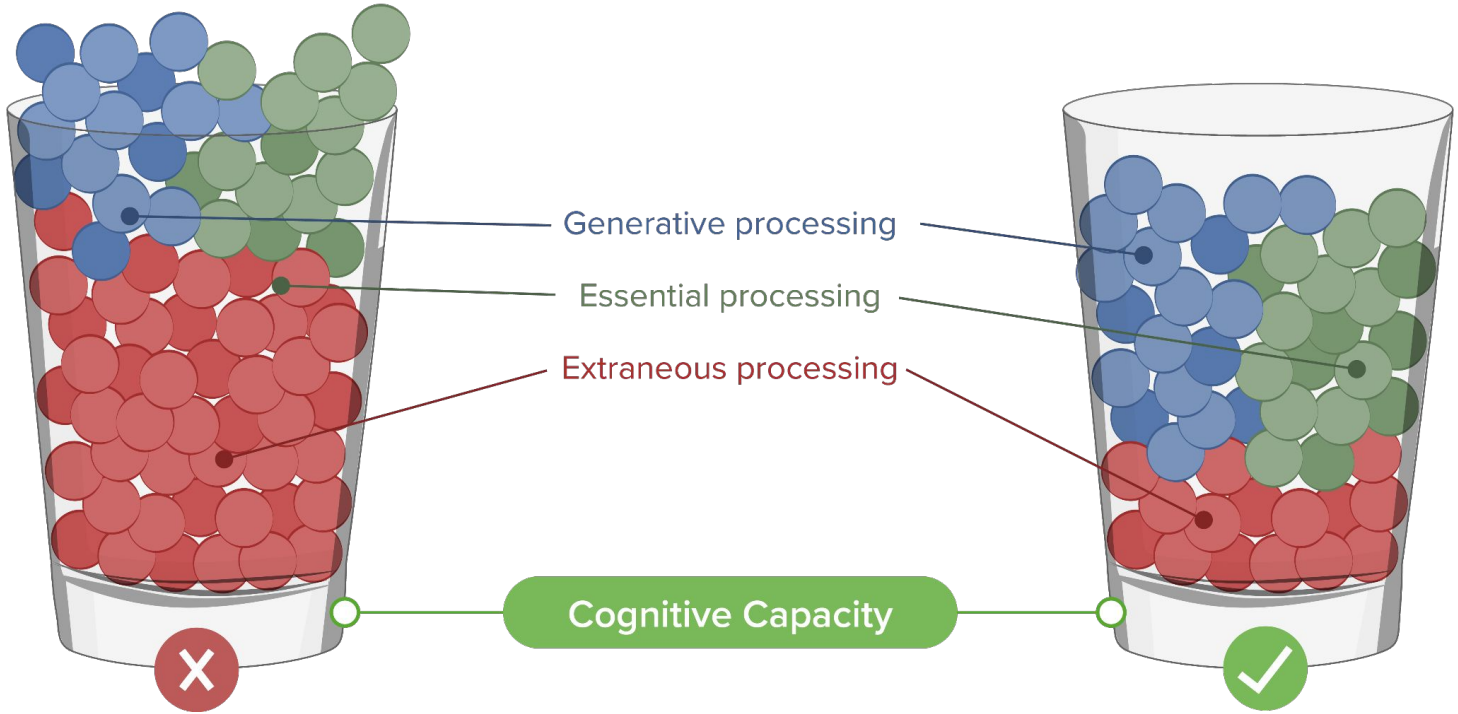
Integrating these bits of information with prior knowledge from l**ong term memory creates meaningful learning**

Cognitive Capacity Explained

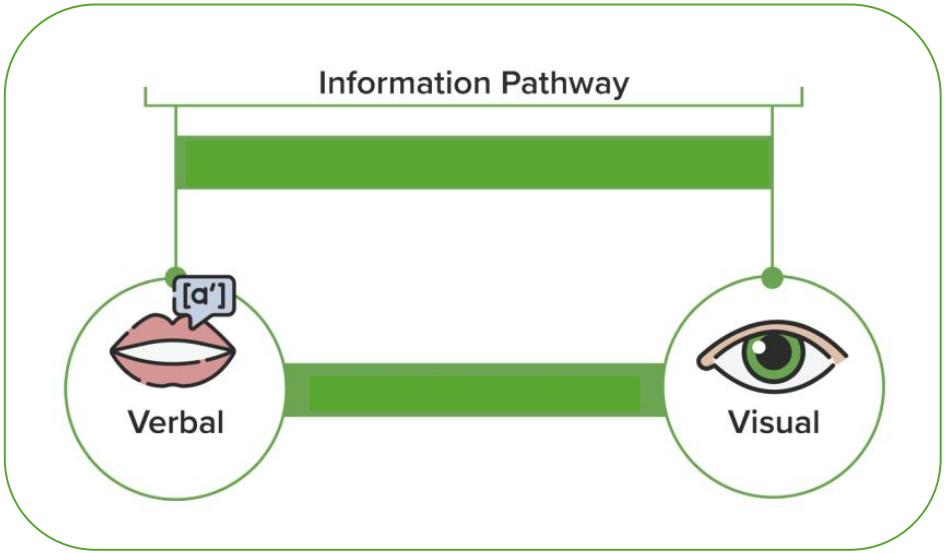
Cognitive Capacity



Cognitive Capacity



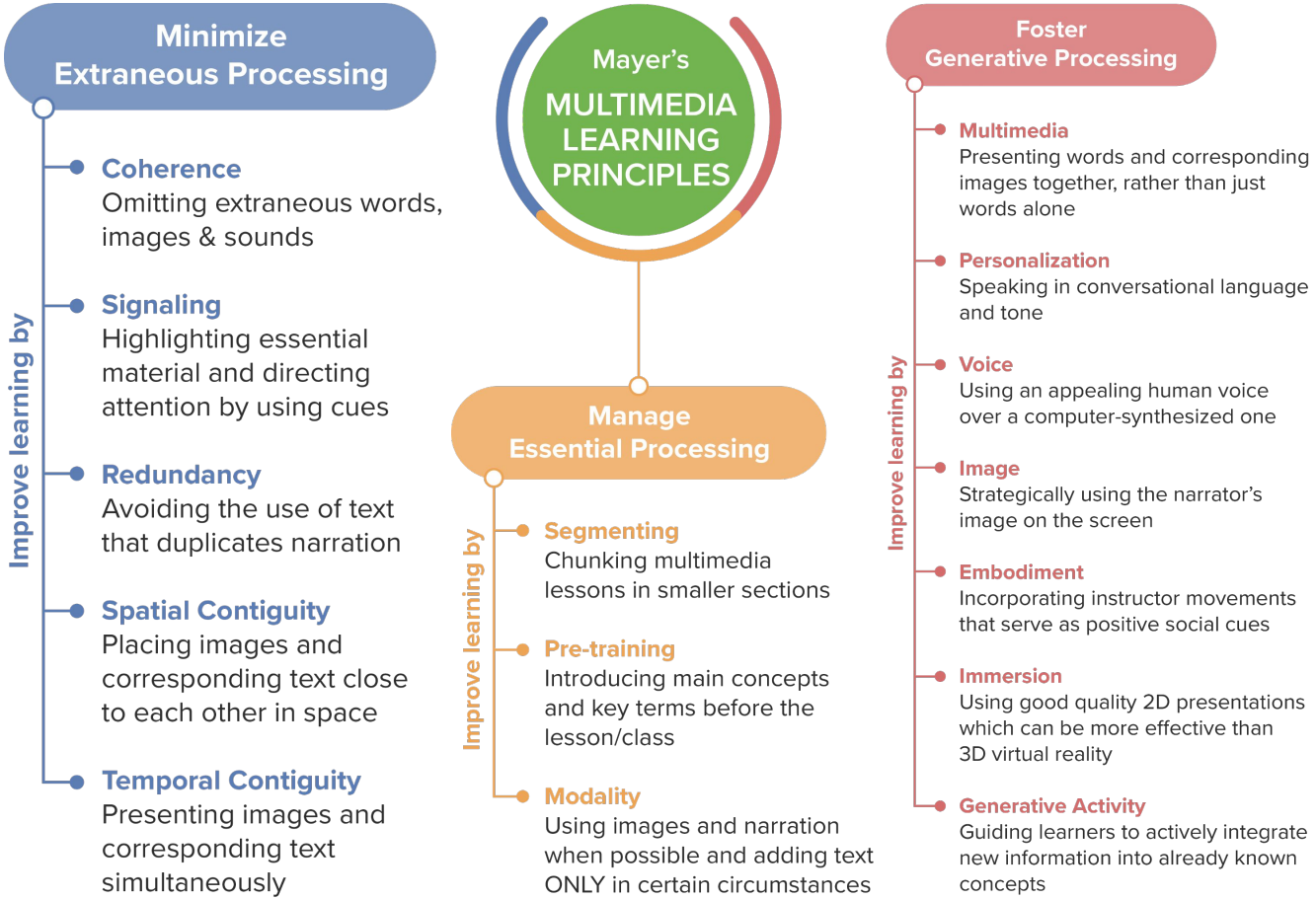
Foundations in neuroscience

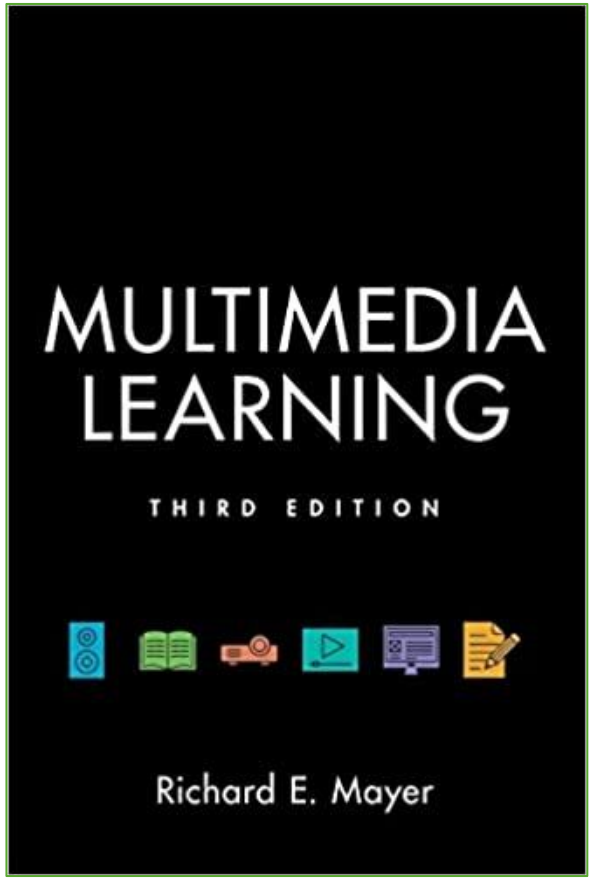


- **Verbal** and **pictorial** data is processed in different parts of the brain.
- fMRI scans showed increased **extraneous load** may impact **effective learning (1).**

1. Sörqvist P, Dahlström Ö, Karlsson T, Rönnberg J. Concentration: The Neural Underpinnings of How Cognitive Load Shields Against Distraction. Front Hum Neurosci [Internet]. 2016 [cited 2022 Jun 9];10. Available from: https://www.frontiersin.org/article/10.3389/fnhum.2016.00221

Evidence for effective presentations



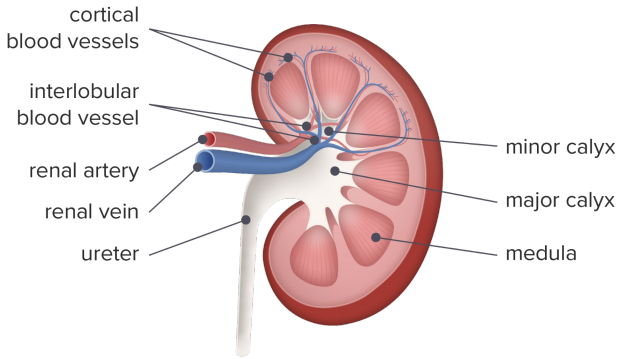

MULTIMEDIA
LEARNING
THIRD EDITION
Richard E. Mayer

Examples

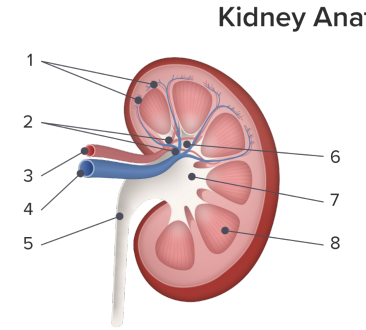
What do you think is the more effective option?

Example

1.1



(A)



Facts

Kidneys filter 120-150 quarts of blood daily.

Kidneys remove waste from the body

Kidneys maintain a constant amount of fluid in the body.

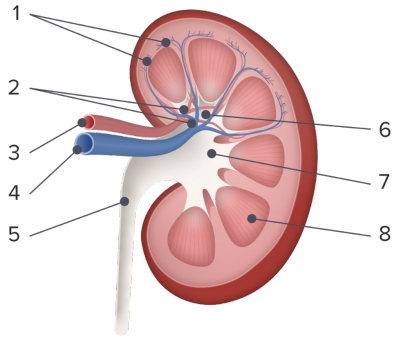
Kidneys maintain electrolyte levels.

(B)

Example #1

- Professor B's slide contains a lot of extra text
- He has extra facts without indicating what's important
- His labels are separated from the diagram

Kidney Anatomy



1. cortical blood vessels
2. interlobular blood vessel
3. renal artery
4. renal vein
5. ureter
6. minor calyx
7. major calyx
8. medula

Facts

Kidneys filter 120-150 quarts of blood daily.

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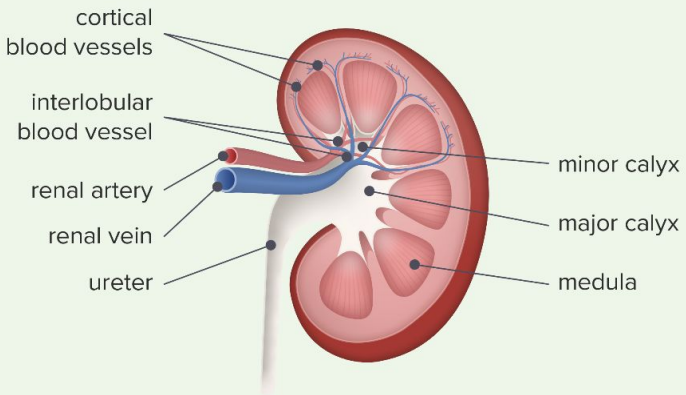
Example

1.2

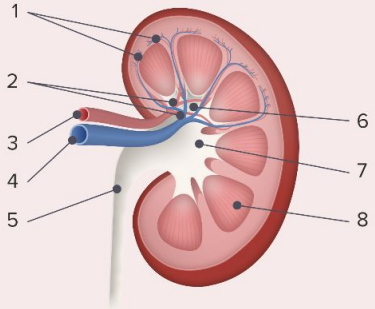
How do you think Professor B can improve his slides?

Use only essential material

Kidney Anatomy



Kidney Anatomy



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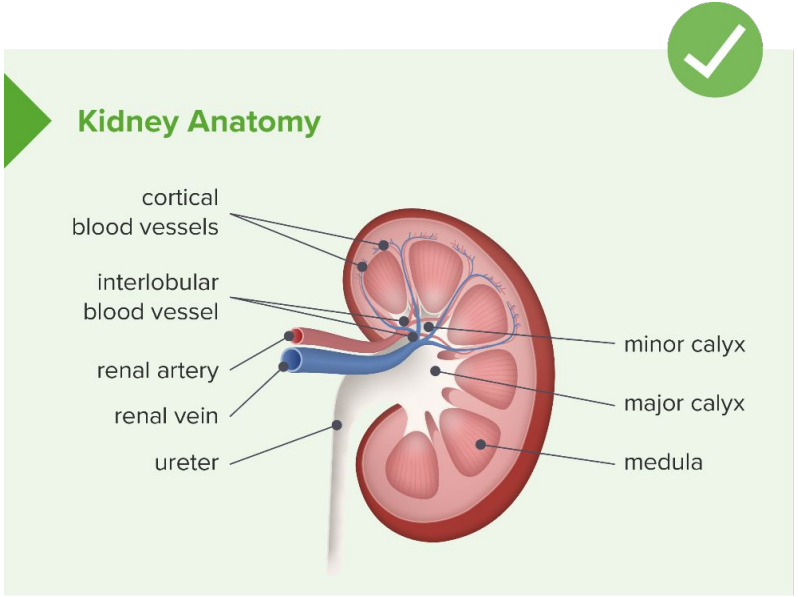
Principles for managing essential processing



- **Coherence principle:** eliminate extraneous material
- **Signaling principle:** feature essential material
- **Contiguity principle:** place printed words near corresponding graphics

Example #2

Module 2: Kidneys

(Scroll to the bottom of the page for key words and definitions.)

Taken from Encyclopedia Brittanica[1], "In humans the kidneys are about 10 centimetres long and are located beneath the diaphragm and behind the peritoneum. Each kidney contains 1,000,000–1,250,000 nephrons that filter the entire five-quart water content of the blood every 45 minutes—and equivalent of 160 quarts a day. Of this, only 1 1/2 quarts are excreted; the remainder is reabsorbed by the nephrons. Damaged kidneys secrete an enzyme called renin that stimulates constriction of the blood vessels. When the damage has been caused initially by high blood pressure, the increase in pressure from the constricted vessels causes more kidney damage." In fact, this was studied in...

Example

2

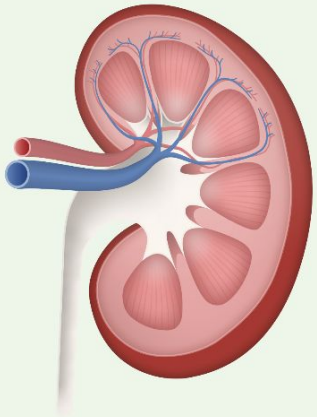
How do you think Professor B can improve his slide?

Break lesson into user-controlled segments

Module 2: Kidneys

2.1 Terms and definitions
2.2 Anatomy
2.3 Diseased States
2.4 Diagnostics
2.5 Case Study

MODULE OVERVIEW



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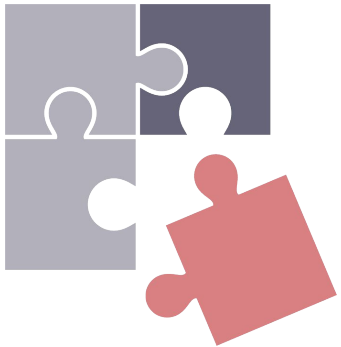
Principles for managing essential processing

- **Pre-training principle:** provide pre-training in names and characteristics of key concepts
- **Segmenting principle:** break lessons into learner-controlled segments
- **Modality principle:** present words in spoken form



Example #3

Patient facts

Severe abdominal pain
Blood pressure 135/85
Heart rate 70
Weight 240lbs
Height 5'11"
Temperature 99.1°
History of prior kidney stones

Example

3

How do you think Professor B can improve his slide?

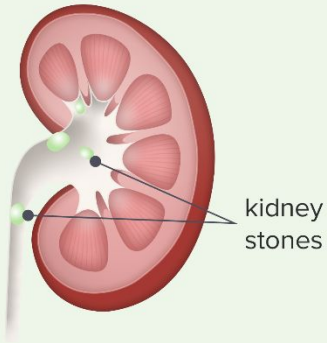
Present words and pictures

Case Study

Mr. Wen presents with severe abdominal pain. He says he has had kidney stones before.

FULL PATIENT HISTORY

NEXT STEP >



Patient facts

Severe abdominal pain
Blood pressure 135/85
Heart rate 70
Weight 240lbs
Height 5'11"
Temperature 99.1°
History of prior kidney stones

Principles for fostering generative processing

- **Multimedia principle:** present words and pictures rather than words alone
- **Personalization principle:** present words in conversational or polite style
- **Voice principle:** use a human voice rather than a machine voice

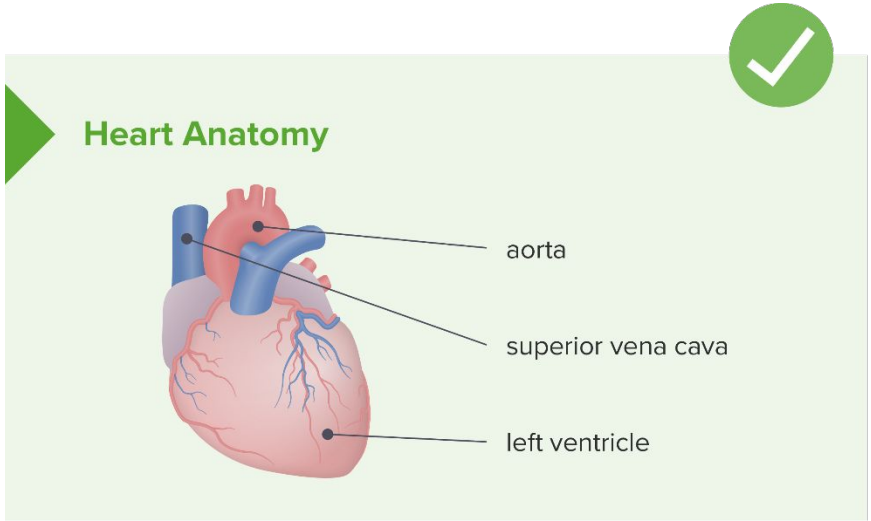
Graphic Design Principles

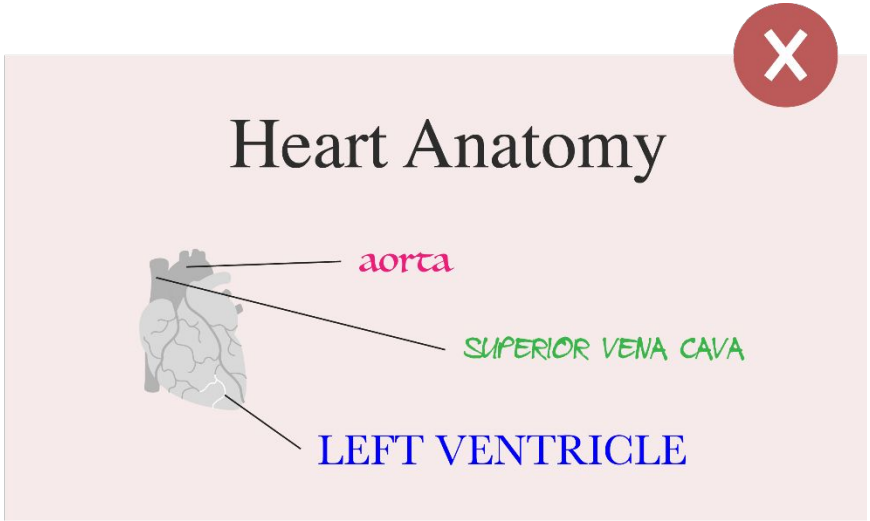
Graphic Design Principles

1. Consider the **font size**
2. Align and limit **font types**
3. Use consistent **color schemes**

1. Reynolds G. Presentation Zen: Simple Ideas on Presentation Design and Delivery. New Riders; 2011. 462 p.

Graphic design principles





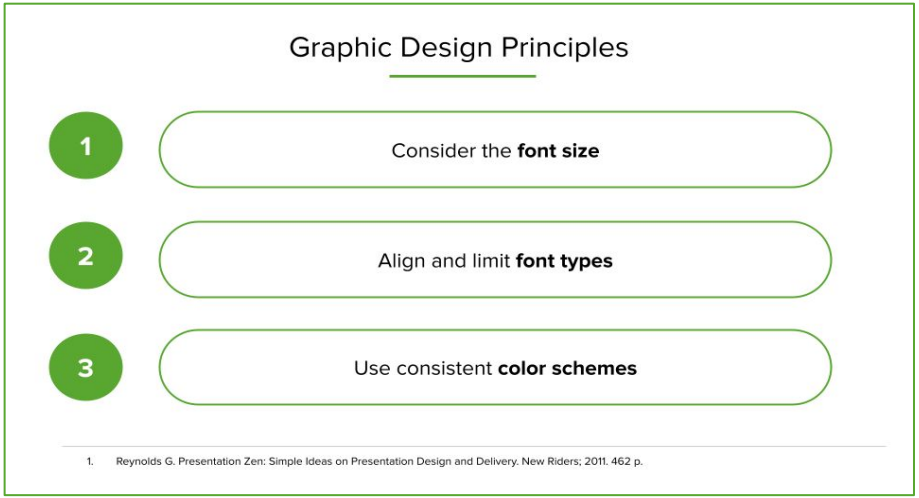
1. Elias T. Universal instructional design principles for mobile learning. Int Rev Res Open Distrib Learn [Internet]. 2011 Feb 28 [cited 2022 Jun 15];12(2):143. Available from: http://www.irrodl.org/index.php/irrodl/article/view/965

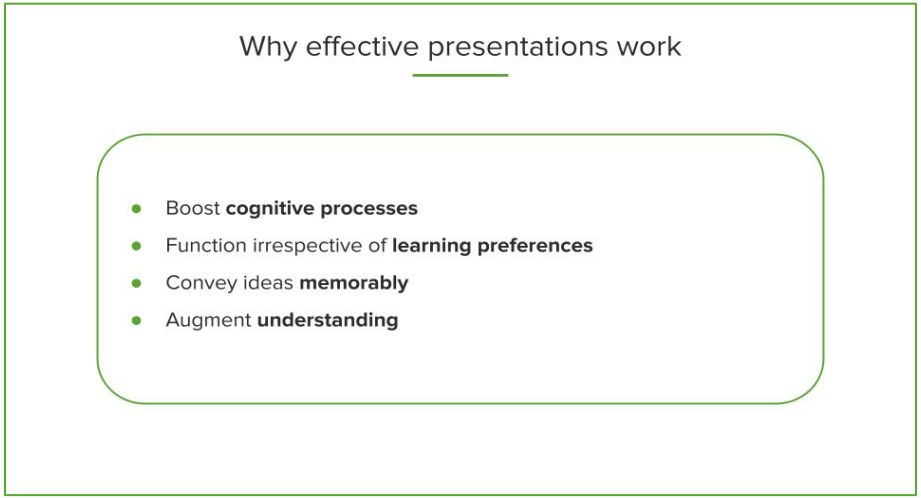
Universal Design Principles

1. Offer media in **multiple modes**
2. Offer videos with **captions/transcripts**
3. Offer photos and images with **captions**

1. Reynolds G. Presentation Zen: Simple Ideas on Presentation Design and Delivery. New Riders; 2011. 462 p.

The 5/5/5 rule in our slides(1)





1. Vogel WH, Viale PH. Presenting With Confidence. J Adv Pract Oncol [Internet]. 2018 [cited 2022 Jun 10];9(5):545–8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6505544/

Quiz

1

The coherence principle entails:

a. Eliminating extraneous material

b. Placing words near the corresponding graphic

c. Applying the 5/5/5 rule

Choose your answer in the “Poll” section.

Quiz

1

The coherence principle entails:

a. **Eliminating extraneous material**

b. Placing words near the corresponding graphic

c. Applying the 5/5/5 rule

Choose your answer in the “Poll” section.

Quiz

2

To maximize cognitive capacity:

a. Reduce generative processing

b. Reduce essential processing

c. Limit extraneous processing

Choose your answer in the “Poll” section.

Quiz

2

To maximize cognitive capacity:

a. Reduce generative processing

b. Reduce essential processing

c. Limit extraneous processing

Choose your answer in the “Poll” section.

Quiz

3

The 5/5/5 rule dictates:

a. Having no more than 5 slides per presentation

b. Representing information using images only

c. Having no more than 5 lines of text per slide

Choose your answer in the “Poll” section.

Quiz

3

The 5/5/5 rule dictates:

a. Having no more than 5 slides per presentation

b. Representing information using images only

c. Having no more than 5 lines of text per slide

Choose your answer in the “Poll” section.

Practical Implementations in the Classroom

Implementation in the classroom

- Consider the most effective **form of presentation** for the given information
- **Limit** the amount of information presented in one slide
- Use **2D** labels and graphics
- **Highlight** important concepts
- Refrain from just simply reading off the slides
- Videos should be **no longer than 6-10 minutes** to avoid losing students' attention (1,2)
- Apply **active learning** strategies
- Use **transition slides** to indicate pauses for activity or reflection or to cue students to changes in topic(3)

1. Guo P, Kim J, Rubin R. How video production affects student engagement: An empirical study of MOOC videos. 2014. 41 p.
2. Carmichael M, Reid AK, Karpicke JD. Assessing the Impact of Educational Video on Student Engagement, Critical Thinking and Learning: :24.
3. Lenz PH, McCallister JW, Luks AM, Le TT, Fessler HE. Practical Strategies for Effective Lectures. Ann Am Thorac Soc [Internet]. 2015 Apr [cited 2022 Jun 6];12(4):561–6. Available from: http://www.atsjournals.org/doi/10.1513/AnnalsATS.201501-024AR

Implementation online

- **Align video with learning objectives** and select videos that do not involve extraneous content to reduce cognitive load
- Include **interactive elements** to promote active learning by embedding questions, quizzes and discussions
- **Limit extraneous information**, graphics, and sounds that do not pertain to the learning goals(1)
- Ensure the source is **reliable** and the video is **high quality**

1. Brame CJ. Effective educational videos [Internet]. Vanderbilt University. [cited 2022 Jun 10]. Available from: https://cft.vanderbilt.edu/guides-sub-pages/effective-educational-videos/

- Effective presentations can **facilitate students' learning**
- Students are better **engaged** through presentations that respect multimedia principles
- Students of different **learning preferences** benefit from a variety of media
- **Universal design** supports learning and increases educational outcomes

Q&A Session

Leave your questions in the chat!

Takeaway Message:

Base Your Teaching and Your Learning
On Evidence-Based Principles!

Important Post-Event Information

- **Follow-Up:** We will share the Effective Presentations handout along with our follow-up survey, which we encourage you to complete.
- **Certificates:** An attendance certificate for the seminar can be requested on the survey form.
- **Summary Document:** A summary document of key strategies, including implementation tips and key points from the breakout sessions, will be sent to all participants next week.

Are You Interested in Our Future Events?

Save the date for our upcoming

Durable Learning Seminar

Learning Objectives and Assessments: Evidence-Based Recommendations for Optimal Efficacy

September 14, 2022, 9:00 PDT | 12:00 EDT | 18:00 CEST

Are you interested in contributing to learning science?

Join our Learning Science team's research endeavors!

Contact us: learning-science@lecturio.com

Lecturio's Implementation of Effective Presentations

Join our **regional demonstration sessions** to learn how you can use Lecturio to foster **effective presentation** development in your teaching.

To participate, please choose a breakout room for one of the following **regional sessions**:

- ➔ USA, Canada, and Caribbean
- ➔ Europe and Middle East
- ➔ Latin America
- ➔ Asia, Africa, NZ, Australia

If you are having trouble joining your preferred room, please let us know in the chat and we will transfer you to the correct session.

Contact us

Learning Science Team
learning-science@lecturio.com