Learning Objects

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Outline

- What is a LO?
- LO Structure
- Creating LOs
- Designing and Developing LOs

What is a Learning Object (LO)?

- IEEE Defn: a learning object is defined as any entity, digital or non-digital, that may be used for learning, education or training.
- Wisconsin Online Resource Center: a LO is a new way of thinking about learning content
  - LOs are much smaller chunks of learning then courses, modules or units.
  - Interactive objects typically require 2 to 15 minutes for completion
  - LOs are self-contained, interactive reusable and able to aggregate.

LO Structure

1. **Learning objective** – each LO can address only one learning objective
    a) Task: What will the learner perform or complete?
    b) Conditions: Under which conditions should the learner achieve this objective?
    c) Criteria: To what degree should the learner achieve this objective?

LO Structure cont

2. **Content** – below are some considerations
   - Should be succinct and direct; to the point
   - May be in the form of text, audio, video, interactive media, or a combination of any of these
   - Organize and partition your content in one screen sections (maximum of 250 words per screen)
   - Text, video, audio, images and interactive media that convey the facts, concepts, processes, procedures and/or principles of the subject matter should be included.
   - Using a conversational tone writing style is appropriate
   - Include references to sources used in the content

LO Structure cont

3. **Practice** – an LO provides an opportunity for learners to review facts, key concepts and principles through:
   - Exercises, instructional games, simulations, problem solving and guided reflections, or
   - Quiz-type self tests (i.e., multiple choice, true-or-false, etc.)

4. **Assessment** – an LO should assess whether the learner has achieved the stated leaning objective. May use the following:
   - Traditional assessment methods such as quizzes (i.e., multiple choice, true-or-false, etc.), or
   - Non-traditional methods such as games and simulations

References

1. Koohang A. (2004). Creating learning objects in collaborative e-learning settings, “Issues in Information Systems”, V. 4, n. 2, pp. 584-590, http://www.iacis.org/iis/2004/Koohang.pdf

2. Ritzhaupt, A. D. (2010). Learning object systems and strategy: A description and discussion. Interdisciplinary Journal of E-Learning and Learning Objects, 6, 217-238. http://www.ijello.org/Volume6/IJELLOv6p217-238Ritzhaupt701.pdf

3. Smith, R. (2004). Guidelines for authors of learning objects. The New Consortium Multimedia. http://archive2.nmc.org/guidelines/NMC LO Guidelines.pdf

4. Thompson, K. & Yonekura, F. (2006). Practical guidelines for learning object granularity from one higher education setting. Interdisciplinary Journal of Knowledge and Learning Objects,1, 163-179. Available from http://ijklo.org/Volume1/v1p163-179Thompson.pdf

Designing and Developing Learning Objects

Slides: go.fiu.edu/DDLO

Slides from Matthew Acevedo
Presented by Peter Clarke

Objectives

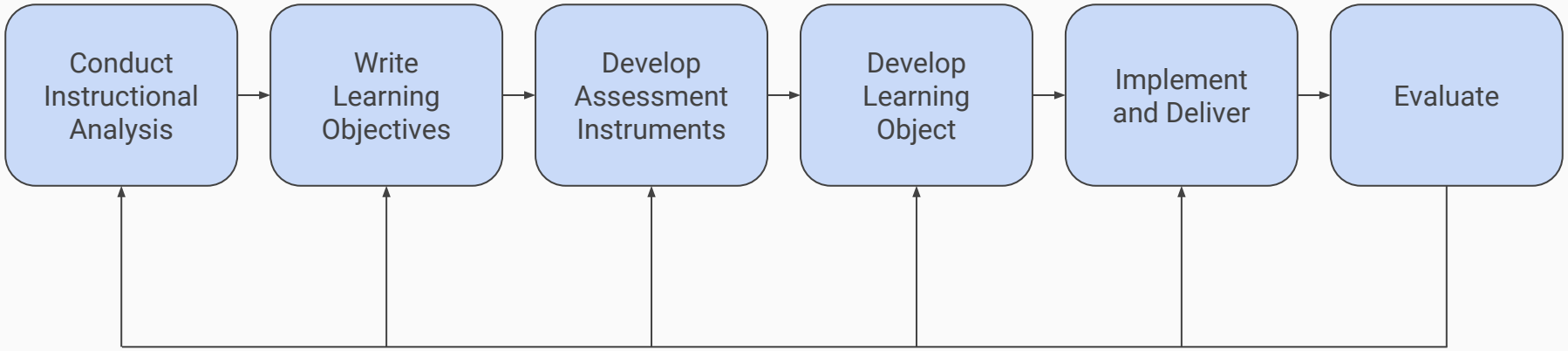
- Apply systematic instructional design principles to the creation of learning objects
- Develop multimedia-based instructional materials (learning objects) using research-based best practices

Part 1: Systematic Design

Systematic instructional design...

- is a structured, thought-out approach to creating instructional materials
- is iterative
- is focused on changing behaviors in a measurable way

Instructional Design for Learning Objects



Instructional Design for Learning Objects

1. Conduct instructional analysis
2. Write learning objectives
3. Develop assessment instruments
4. Develop learning object
5. Implement and deliver
6. Evaluate

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Conduct instructional analysis

- Analyze learners
- Analyze learning and performance contexts

Analyze learners

- Who are your students?
- Things that might be relevant:
  - Prior education
  - Level of expertise
  - Ability level
  - Attitudes toward content
  - Level of motivation

Analyze learning/performance contexts

- What are the learning and performance contexts?
- Things that might be relevant:
  - Face-to-face, online, blended/hybrid
  - Computer lab or lecture hall
  - Real-world application
  - Working with other people
  - Other constraints?

Go to workshsheet page 5 - 5 mins.

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Write learning objectives

- **Learning/instructional/performance objective:** An intent communicated by a statement describing a proposed change in a learner leading to a pattern of behavior that is observable and measurable
- **In English:** What can a learner DO after instruction that he/she couldn’t do before?
- Emphasis on do, not learn, know, understand, or feel

Why are measureable objectives so important?

- They form the basis of the remainder of the instructional design process
- We want to know if students are meeting the objectives

Levels of Cognitive Complexity

Bloom’s Taxonomy:

- **Knowledge**
- **Comprehension**
- **Application**
- **Analysis**
- **Synthesis**
- **Evaluation**

Bloom’s Taxonomy

- **Knowledge** - define, identify, list, locate
- **Comprehension** - explain, paraphrase, discuss, summarize
- **Application** - use, solve, apply, calculate
- **Analysis** - analyze, categorize, differentiate, prioritize
- **Synthesis** - create, design, formulate, implement
- **Evaluation** - evaluate, critique, test, determine

Learning Objective Format

- **A** - Audience
- **B** - Behavior
- **C** - Condition
- **D** - Degree

Learning Objective Format

- **A** - Audience: The targeted learners
- **B** - Behavior: What the learner is expected to do after instruction
- **C** - Condition: Setting or circumstance under which the behavior occurs
- **D** - Degree: The acceptable standard of performance of the behavior

Learning Objective Format Frame

Given condition ,
audience will be able to
behavior to degree .

Learning Objective Format

Given a right triangle with stated lengths of each leg, eighth-grade students will be able to use the Pythagorean Theorem to determine the length of the triangle’s hypotenuse with 90% accuracy.

Learning Objective Format

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audience

Learning Objective Format

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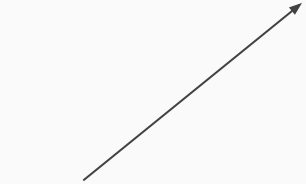

behavior

Learning Objective Format

condition

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Learning Objective Format

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degree

Critique These Objectives

Students will know how to use for loops

Students will learn about the efficiency of algorithms

Better?

Using C++, computer science students will be able to implement a for loop with 100% accuracy.

Given an algorithm, computer science students will be able to calculate its efficiency using Big O notation

Objectives and Objects, Objectively

- Consider limiting your learning objects to one or two learning objectives
- ABCD format is ideal, but always have at least the B
- Present (abbreviated) objectives to students

Go to worksheet page 9 - 5 mins

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Develop assessment instruments

- How will you know that learners have achieved the learning objectives?
- We haven’t developed instructional materials yet. Why talk about assessments now?

Developing assessment instruments

- Assessments should align to the learning objective
- The level of complexity should match (Bloom’s taxonomy)
- Shortcut: your objectives can be your assessment
- Multiple-choice quizzes: minimize the chance of guessing correctly
- Keep in mind the “degree” from your learning objectives when determining what level of performance counts as mastery

Objective:

Given an instantiated variable in a C++ program, beginning computer science students will use the increment operator to change the value of a variable with 100% accuracy.

Question:

Which of these is the increment operator?

A. --
B. ++
C. ==
D. !=

Objective:

Given an instantiated variable in a C++ program, beginning computer science students will use the increment operator to change the value of a variable with 100% accuracy.

Question:

What are the values of x and y after this code runs?

```
int y;
int x = 32;
y = ++x;
```

A. 31, 32
B. 32, 32
C. 32, 33
D. 33, 33

Go to worksheet page 11 - 5 mins

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Develop learning object

- Part 2: Developing Multimedia Instruction is after the break
- Will cover research-based best practices for presenting instructional content
- However, I won't be covering specifics in the learning object platform
- **Given your subject area expertise and your learning objectives, give some thought as to the best way to deliver content to students so that they can meet the objectives.**

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Implement and deliver

- Deliver instruction to students and obtain data about their learning through assessments

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Evaluate

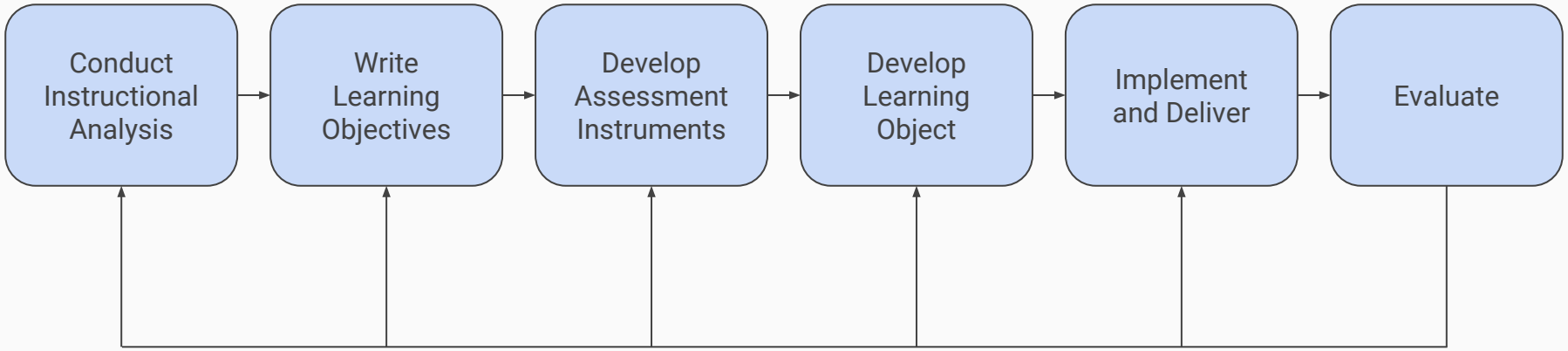
- Kirkpatrick’s Four Levels of Evaluation:
  - Level 1: Reaction - Did they like it?
  - Level 2: Learning - Did they learn anything?
  - Level 3: Application - Are they able to apply their learning?
  - Level 4: Results - Did their application affect anything?

Evaluate

- Evaluation is iterative
- Types of evaluation:
  - User (student) testing
  - Surveys
  - Assessment results
- Evaluation is useless without action

Go to worksheet page 14 - 5 mins

Instructional Design for Learning Objects



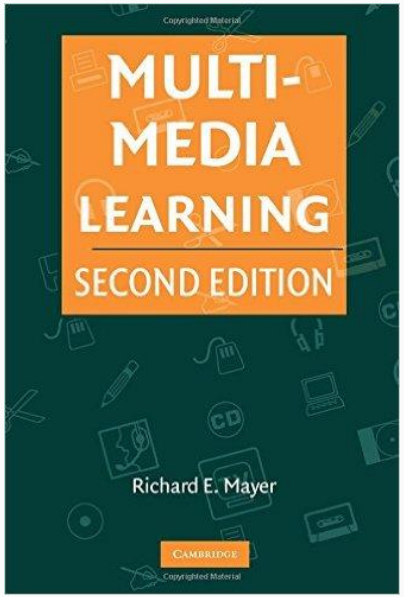
Q&A

Break

Part 2: Developing Multimedia Instruction

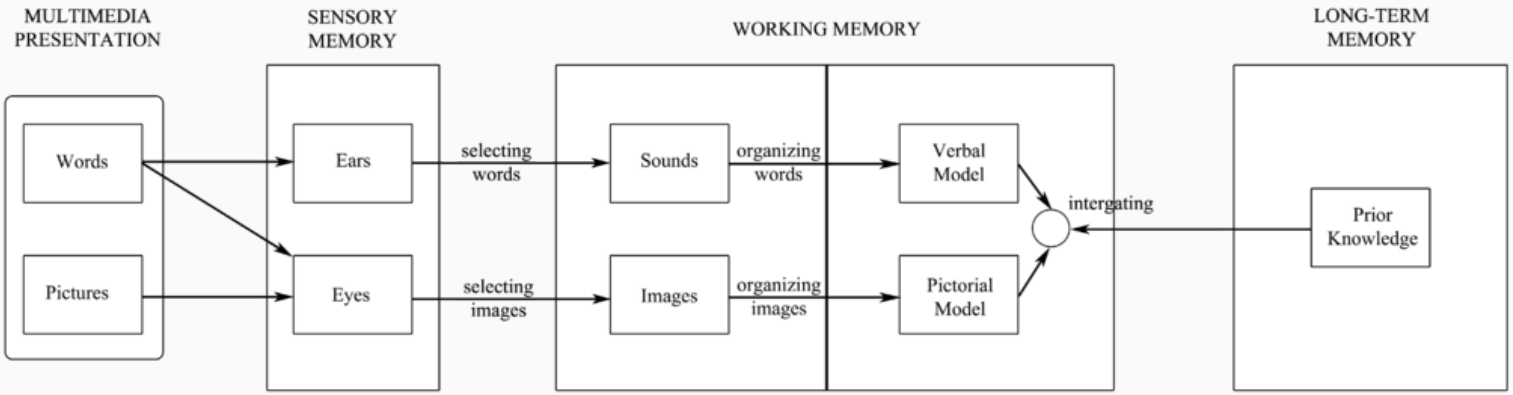
Multimedia Learning Principles

- Based on research by Richard Mayer (UCSB)
- How to effectively use multimedia in instruction
- Optimize cognitive load
- Applies to screen content, videos, presentations, etc.



Dual Channel Theory

- Two separate channels for processing information (auditory and visual)
- Channel capacity is limited
- Learning is an active process of filtering, selecting, organizing, and integrating information



Multimedia Learning Principles

- Multimedia Principle
- Coherence Principle
- Temporal Contiguity Principle
- Spatial Contiguity Principle
- Modality Principle
- Redundancy Principle
- Personalization Principle
- Voice Principle
- Image Principle
- Signaling Principle
- Segmenting Principle

Multimedia Principle

- People learn better from words and pictures than from words alone.

In geometry, a hypotenuse is the longest side of a right-angled triangle, the side opposite of the right angle. The length of the hypotenuse of a right triangle can be found using the Pythagorean theorem, which states that the square of the length of the hypotenuse equals the sum of the squares of the lengths of the other two sides.

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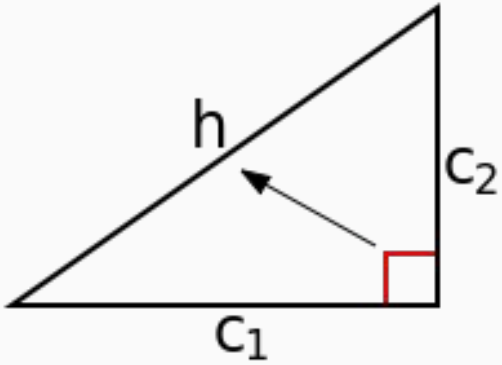

Coherence Principle

- People learn better when extraneous words, pictures and sounds are excluded rather than included.

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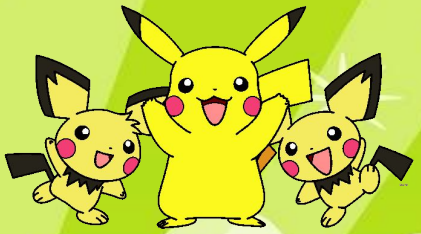

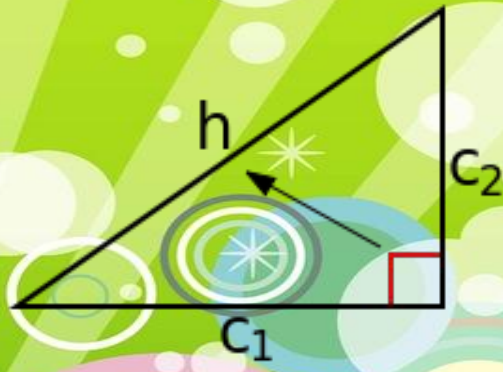

Temporal Contiguity Principle

- People learn better when corresponding words and pictures are presented simultaneously rather than successively.

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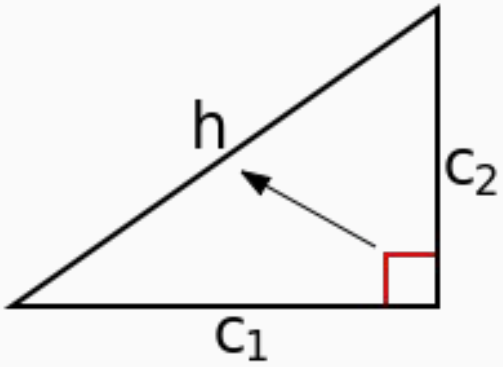
h
c_2
c_1

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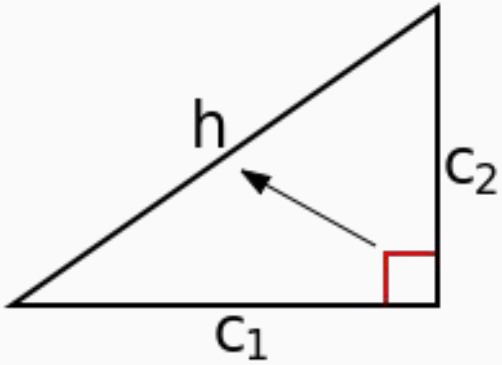
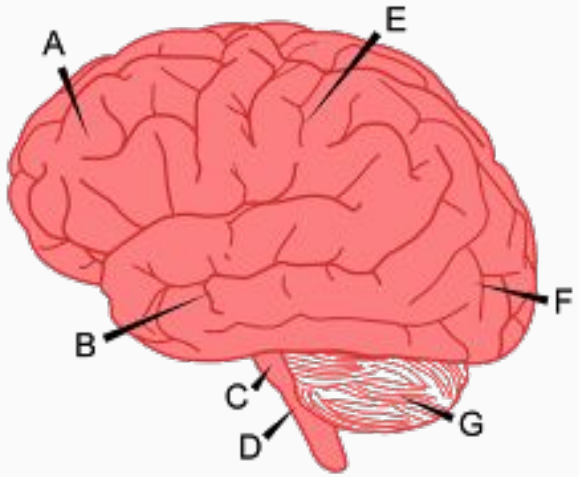


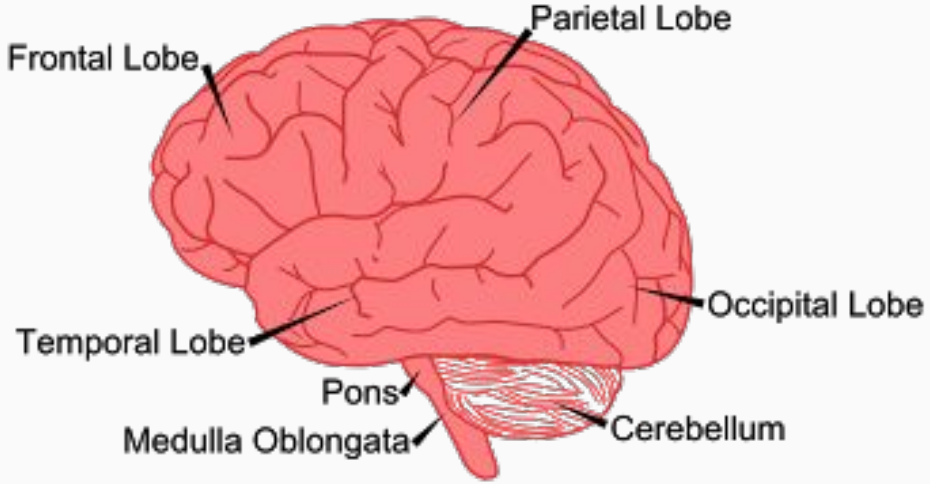
Spatial Contiguity Principle

- People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.



A - Frontal Lobe
B - Temporal Lobe
C - Pons
D - Medulla Oblongata

E - Parietal Lobe
F - Occipital Lobe
G - Cerebellum


Frontal Lobe
Parietal Lobe
Occipital Lobe
Temporal Lobe
Pons
Medulla Oblongata
Cerebellum

Modality Principle

- People learn better from graphics and narrations than from animation and on-screen text.

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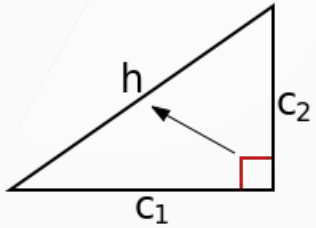

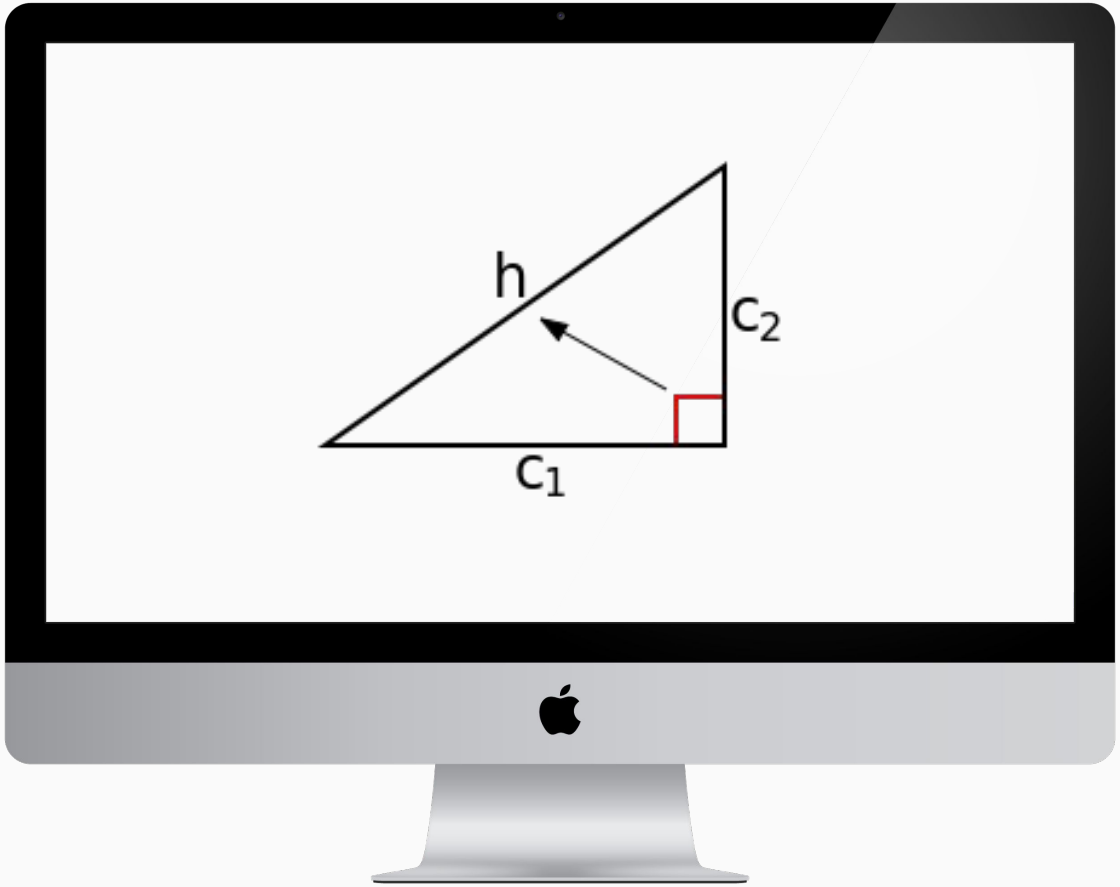

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Redundancy Principle

- People learn better from graphics and narration than from graphics, narration, and on-screen text.
- (If you have narration, don’t show the words on the screen.)

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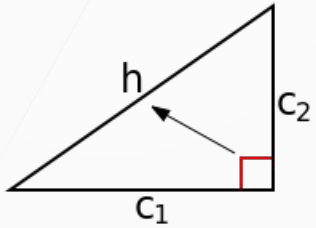

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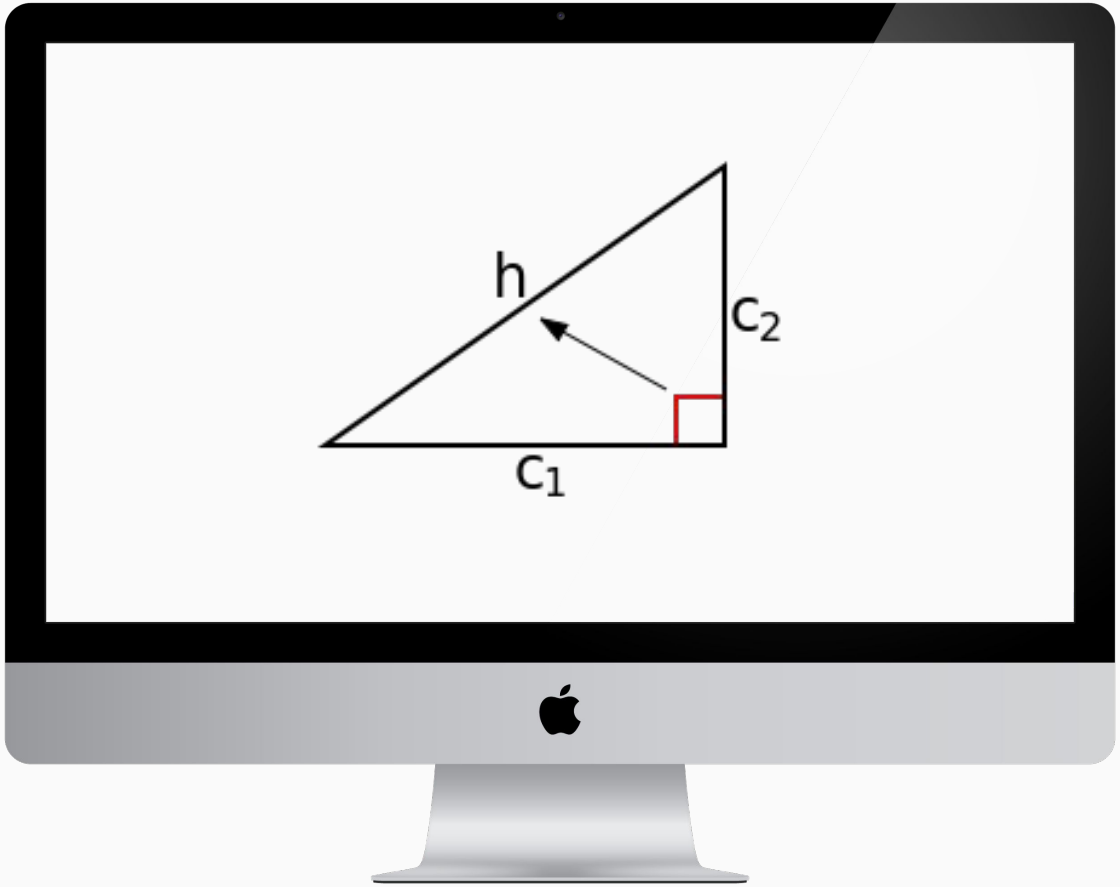

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Personalization Principle

- People learn better from multimedia lessons when words are in conversational style rather than formal style.

Voice Principle

- People learn better when the narration in multimedia lessons is spoken in a friendly human voice rather than a machine voice.

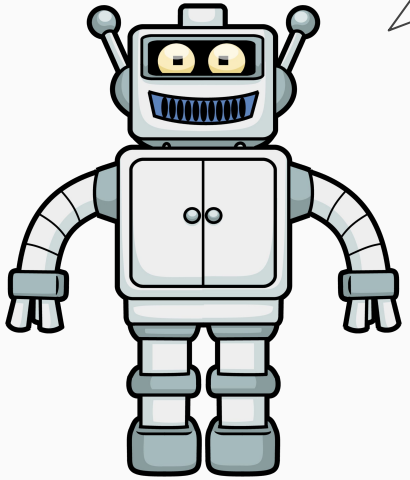

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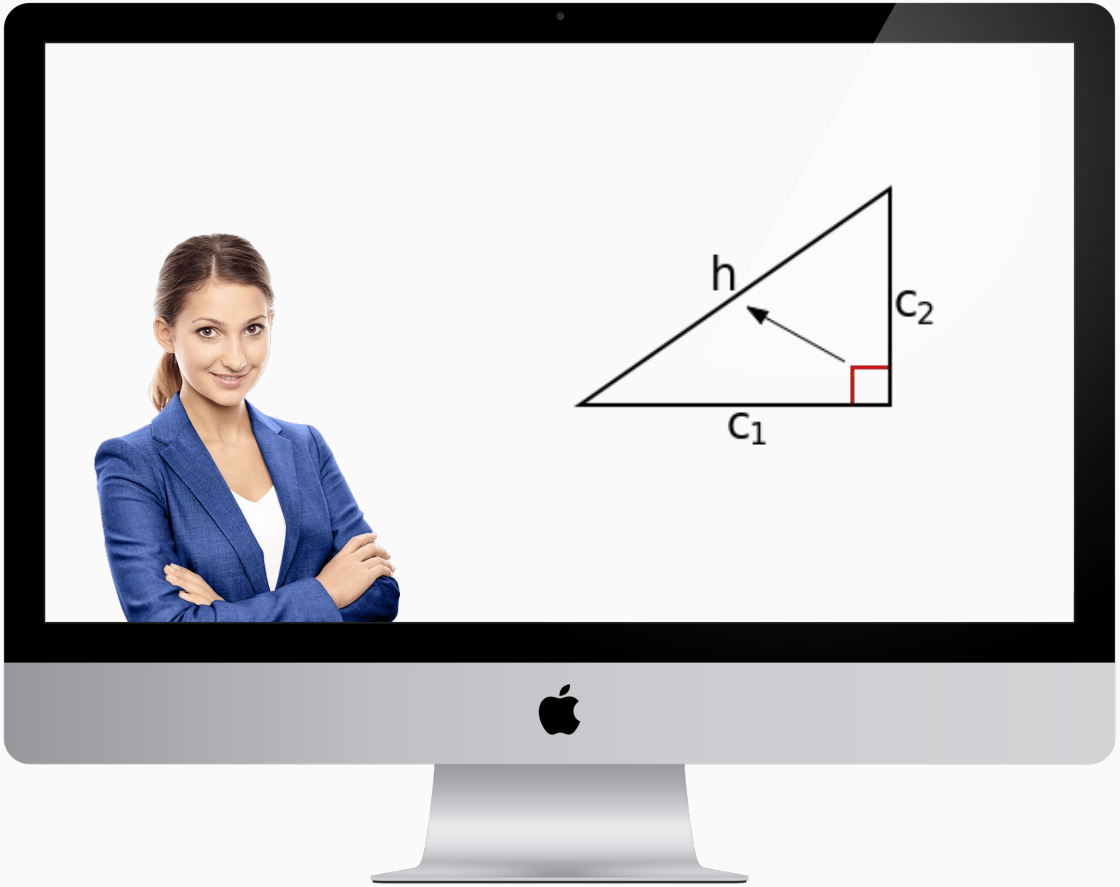
Image Principle

- People do not necessarily learn better from a multimedia lesson when the speaker’s image is added to the screen.



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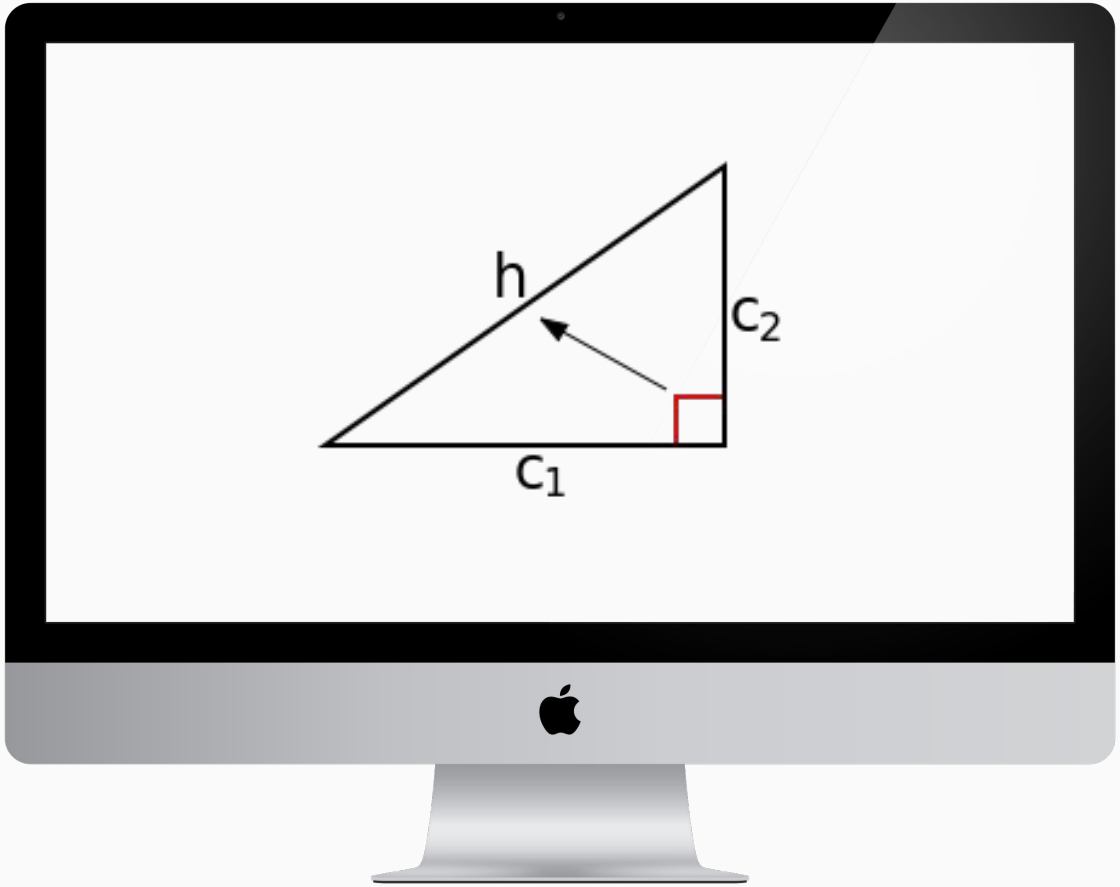

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Signaling Principle

- People learn better when cues that highlight the organization of the essential material are added.

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Segmenting Principle

- People learn better when a multimedia lesson is presented in user-paced segments rather than as a continuous unit.
- (Whenever possible, allow students to control the navigation and pacing.)

Multimedia Learning Principles

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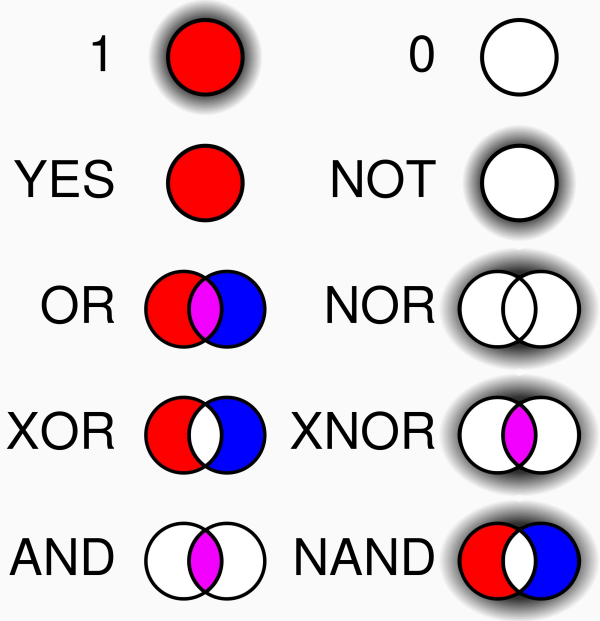
Ready-Made Multimedia Resources

- Wikimedia Commons: Google image search query: “[topic] site:commons.wikimedia.org”
- Freepik (freepik.com)
- Khan Academy (khanacademy.org)



Q&A

Matt Acevedo - mmaceve@fiu.edu