

Demobank:  
a method of presenting  
just in time  
online learning

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AECT 2005 Orlando, FL

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Agenda

- Animated worked examples?
  - Demonstrate a Demobank
  - A quick “How to”
- studying worked examples versus means-ends analysis
- multimedia learning
- learning occurs given animated worked examples
- Implications for demobank design

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Animated Worked Examples?

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## Animated Worked Examples



Example Mammal

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## Animated Worked Examples

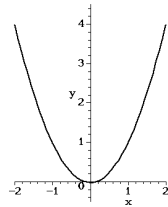
### Definition of a Parabola

You should be able to use the definition of a parabola as the set of points that are the same distance from a fixed point (the focus) and a line (the directrix).

**Example 1:** Use the definition of a parabola and the distance formula to find the equation of the parabola with focus (1, 4) and directrix  $y = -4$ .

**Solution:** It helps to draw a sketch. This parabola will open upwards, with vertex at (1, 0). Following the derivation on pages 733-734, let  $(x, y)$  be an arbitrary point on the parabola in question. The distance from  $(x, y)$  to (1, 4) is  $\sqrt{(x-1)^2 + (y-4)^2}$ , and the distance from  $(x, y)$  to the line  $y = -4$  is  $|y - (-4)|$  (the length of the vertical segment from  $(x, y)$  to  $(x, -4)$ ). Thus

$$\begin{aligned} \sqrt{(x-1)^2 + (y-4)^2} &= |y - (-4)| \\ \Rightarrow (x-1)^2 + (y-4)^2 &= (y+4)^2 \\ \Rightarrow x^2 - 2x + 1 + y^2 - 8y + 16 &= y^2 + 8y + 16 \\ \Rightarrow x^2 - 2x + 1 &= 16y \\ \Rightarrow y &= \frac{(x-1)^2}{16} \end{aligned}$$



"a problem statement and the appropriate steps to solution (Chandler and Sweller, 1992)"

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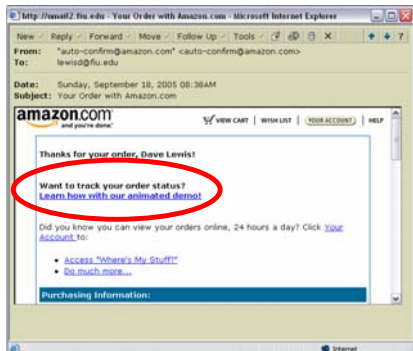
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## Animated Worked Examples A.K.A. Animated Demonstration




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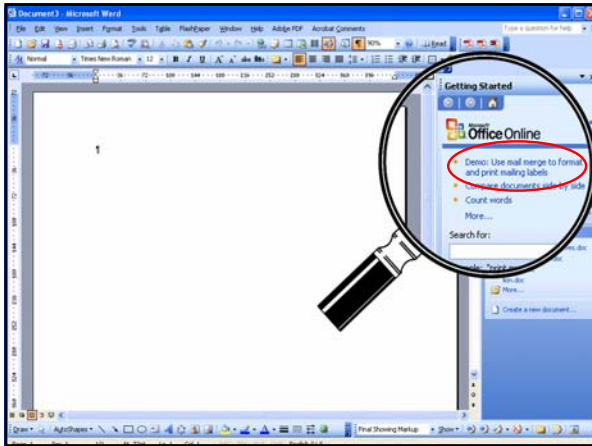
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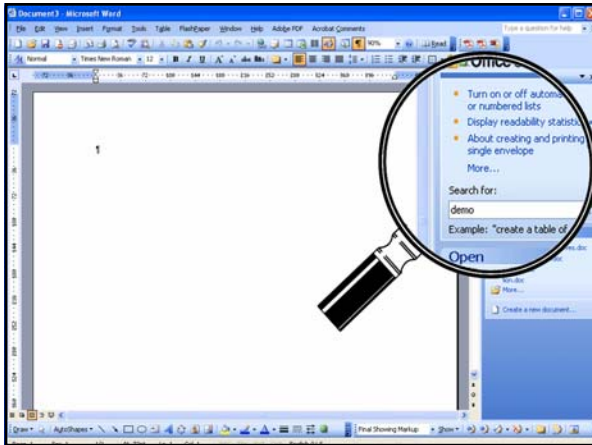
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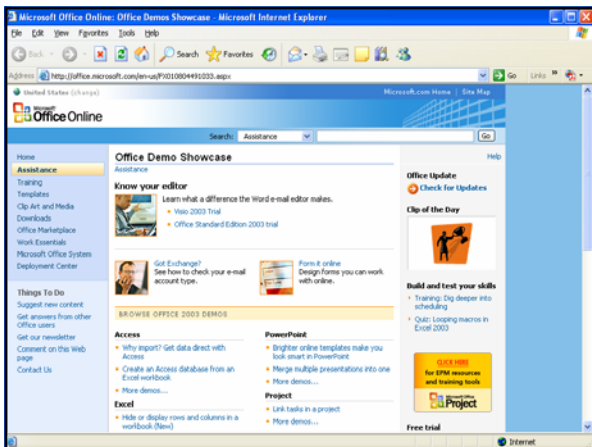
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Demobank?  
"PantherSoft Video tutorials"

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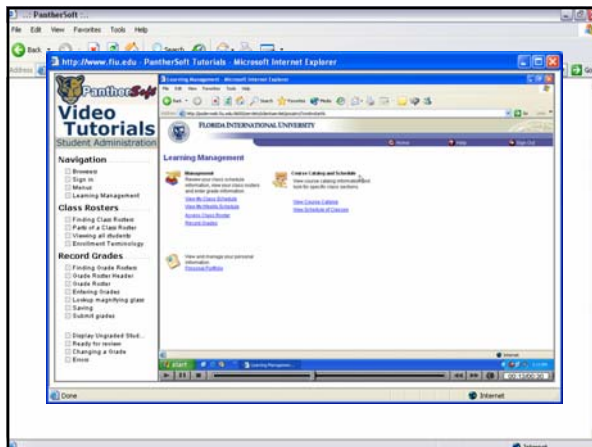
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# A quick “How to”

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## Start by writing a script



Page 1 4/20/05

**Student Administration Script (revision 3.0)**

**Navigation**

**Browsers and Buttons**

You should not use Netscape if you are using Firefox. Many functions will not work correctly using this browser. Therefore to use Firefox/IE you must use Internet Explorer. If you are a Mac user you should also use Internet Explorer. In addition the Firefox/IE team has announced that Safari browser for the Macintosh is also an option.

While in Firefox/IE, please do not use the navigation buttons at the top of the screen. This will cause errors. Because you have been working on a web page like your bank's web site and noticed you can't use the back button then. You may have noticed that if you click the back button you will receive an error that tells you that this page has expired. This is a type of error you will receive if you click the back button in Firefox/IE to navigate through Firefox/IE. Please only use the internet navigators like the browser at the top, or the buttons at the bottom of each page.

**Popup Blockers**

It is understandable why you may want to avoid popup windows. But if you have a popup blocker, you may cause your self problems while using Firefox/IE. This is because Firefox/IE uses popup windows. Some popup blockers like Google's (no-flash) can allow them to work even though they are not. It is better to use the original Firefox/IE.

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## Record Narration



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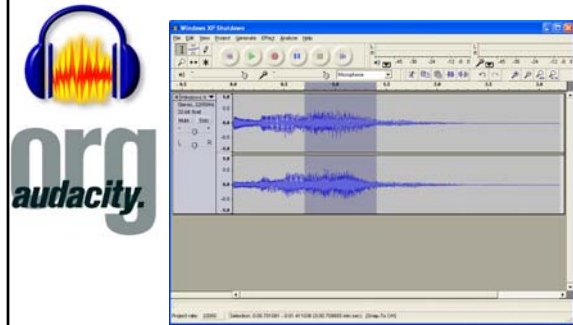
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## Edit Audio



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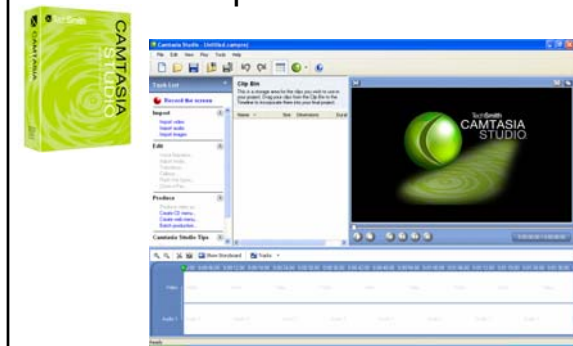
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## Capture Video



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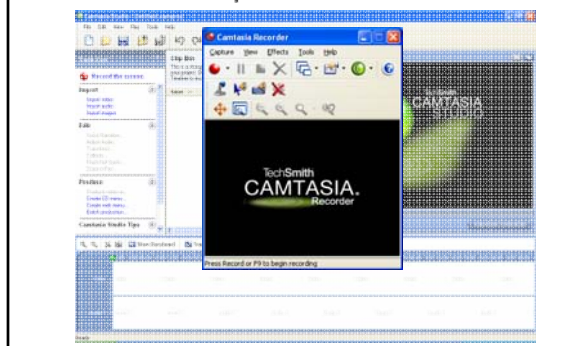
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## Capture Video



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## Edit Video + Audio



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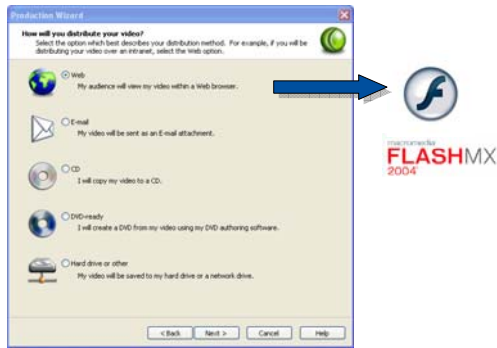
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## Output to a Web based format



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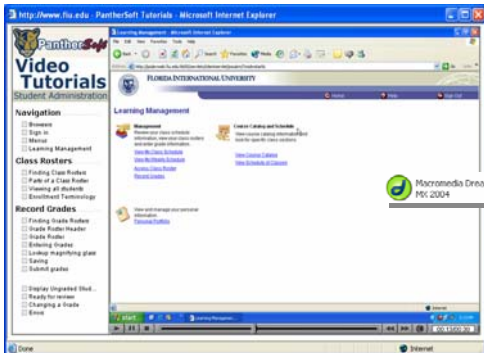
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## Develop the demobank website



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# Studying worked examples versus Traditional problem solving

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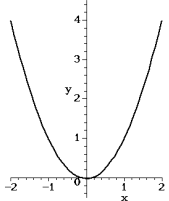
## Worked Examples

**Definition of a Parabola**

You should be able to use the definition of a parabola as the set of points that are the same distance from a fixed point (the focus) and a line (the directrix).

**Example 1:** Use the definition of a parabola and the distance formula to find the equation of the parabola with focus (1, 4) and directrix  $y = -4$ .

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## Math & Geometry

**Worked Examples**

Rule 1:  $x^a \cdot x^b = x^{a+b}$  Example:  $2^3 \cdot 2^2 = 2^{3+2} = 2^5 = 32$


Rule 2:  $(x^a)^b = x^{ab}$  Example:  $(2^3)^2 = 2^{3 \cdot 2} = 2^6 = 64$

Rule 3:  $(xy)^a = x^a \cdot y^a$  Example:  $(2y)^3 = 2^3 \cdot y^3 = 8y^3$

Rule 4:  $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$  Example:  $\left(\frac{x}{3}\right)^2 = \frac{x^2}{3^2} = \frac{x^2}{9}$

Rule 5:  $\frac{x^a}{x^b} = x^{a-b}$  Example:  $\frac{2^6}{2^3} = 2^{6-3} = 2^3 = 8$

**Problem Sets**



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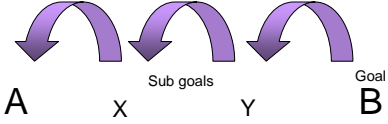
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## Traditional Problem Solving

Strategy = Means ends analysis

- Accomplish a goal by working backwards
- Attain a series of sub goals



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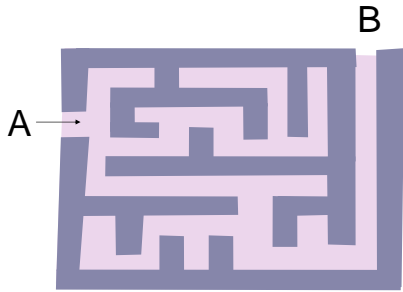
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## Means Ends Analysis



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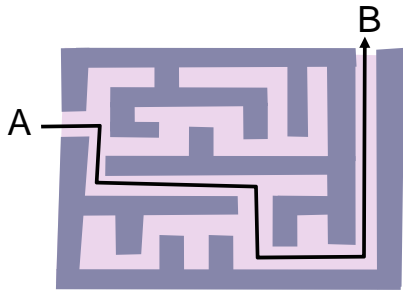
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## Worked Example



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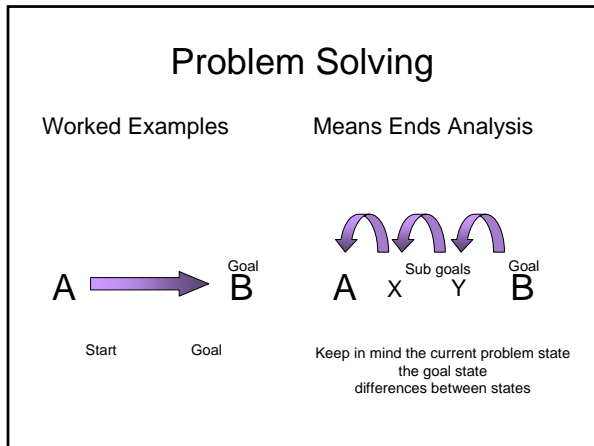
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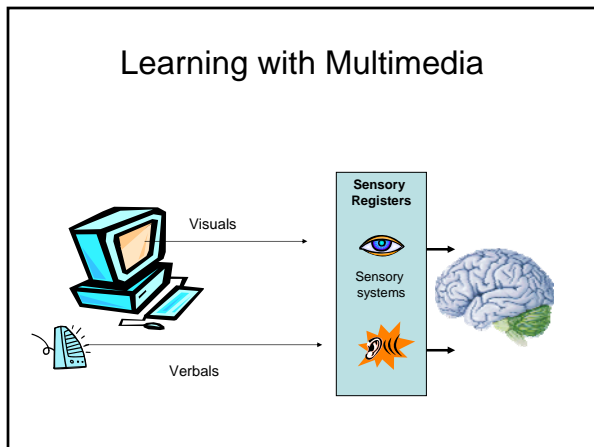
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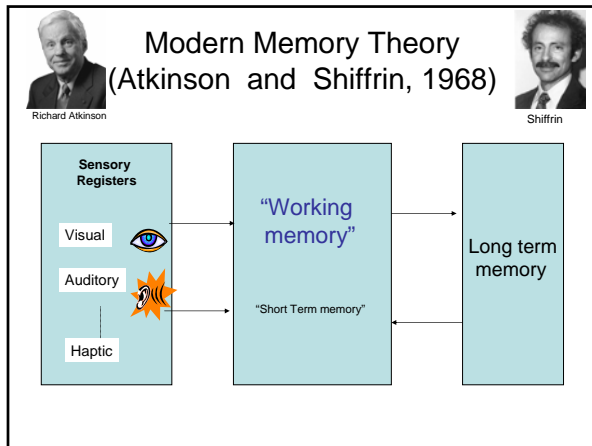
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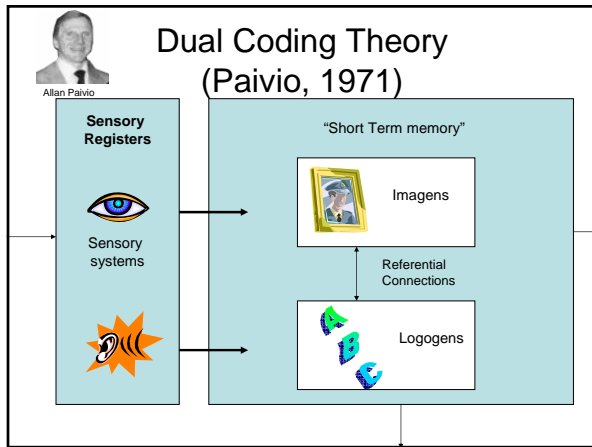
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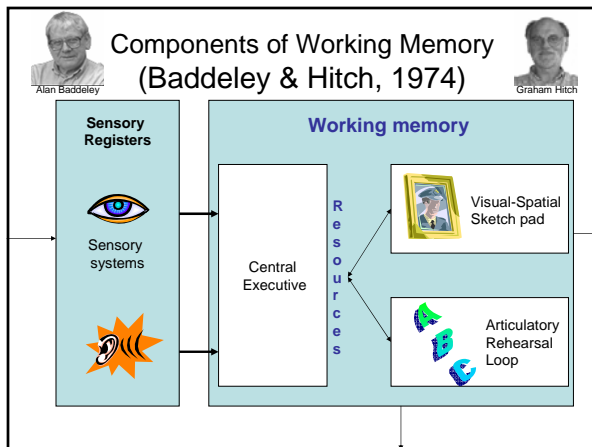
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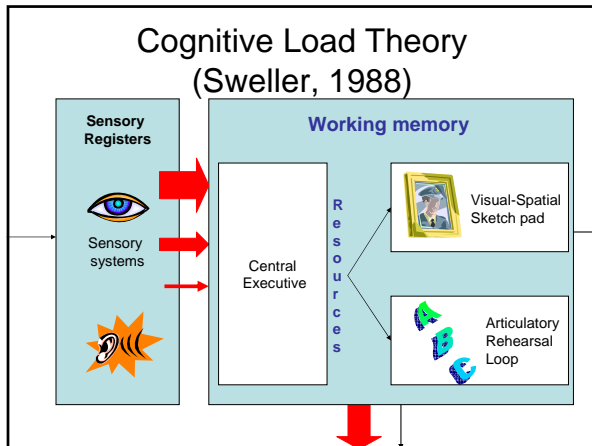
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### Animations need Narration (Mayer and Anderson, 1991)

with Audio

with Text

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### Split-Attention (Chandler and Sweller, 1992)

In the above figure, find a value for Angle DBE.

Solution:  
 Angle ABC = 180° - Angle BAC - Angle BCA (Internal angles of a triangle sum to 180°)  
 = 180° - 95° - 45°  
 = 40°  
 Angle DBE = Angle ABC (Vertically opposite angles are equal)  
 = 40°

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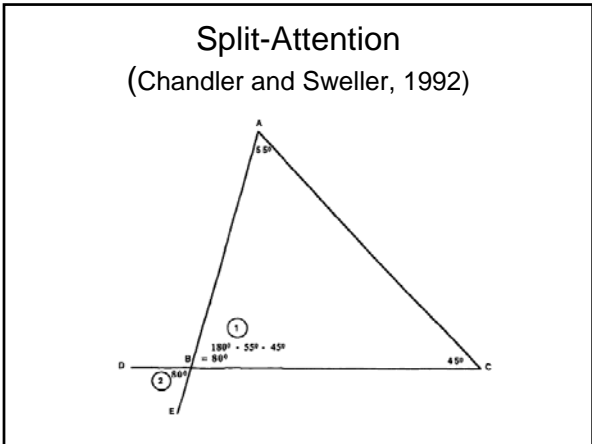
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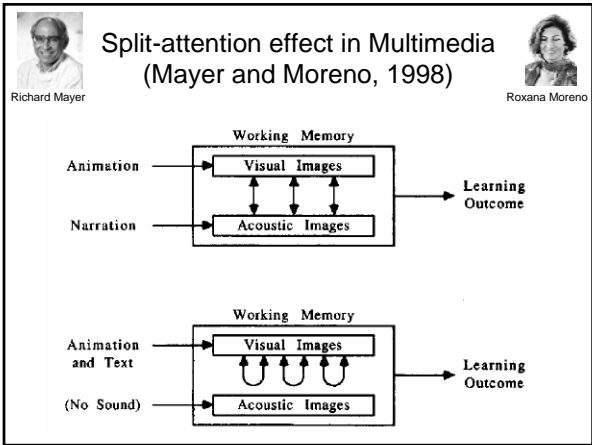
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learning given  
animated worked examples

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## Types of learning

- procedural learning
  - Knowing how
- declarative learning
  - Conceptual knowledge

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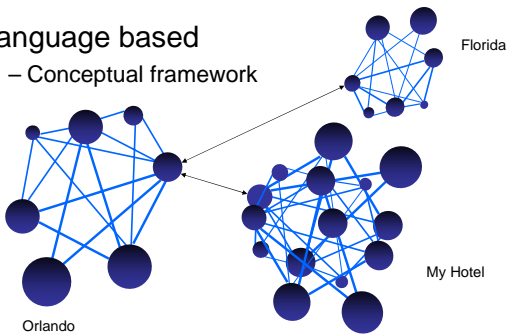
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## Declarative knowledge

Language based

– Conceptual framework



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## Procedural knowledge

“How to”

Change toner cartridge

1. Open Printer
2. Remove old cartridge
3. Pull strip from cartridge
4. insert new cartridge



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## Stages of skill acquisition (Anderson, 1983)



John Anderson

- Declarative stage
- Knowledge compilation stage
- Procedural stage

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## ACT (Anderson, 1976)



John Anderson

### Productions

IF the pages are too light  
THEN change the toner



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## Expertise (Chi et al., 1981)



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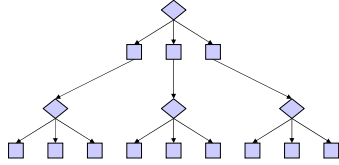
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## Schema based solutions (Chi et al.,1981)

Novices

Experts



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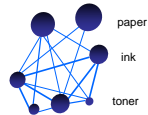
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## Schema Theory

Procedural Schema

1. Open Printer
2. Remove old cartridge
3. Pull strip from cartridge
4. Insert new cartridge

Declarative Schema



Schema=mental framework

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Summary:  
Implications for demobank design

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## Design Implications

- “a problem statement and the appropriate steps to solution (Chandler and Sweller, 1992)”
- work with experts to categorize problems
- best for schema-based procedural learning
- incorporate schema-based production rules
- use Multimedia
  - avoid Text = Split attention

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## References

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- Mayer, R. E. (2001). *Multimedia Learning*. New York: Cambridge University Press.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12, p 257-285

<http://www.coedu.usf.edu/agents/aect2005/>

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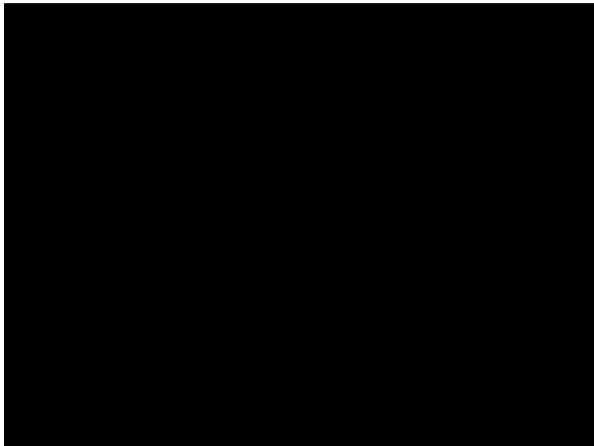
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