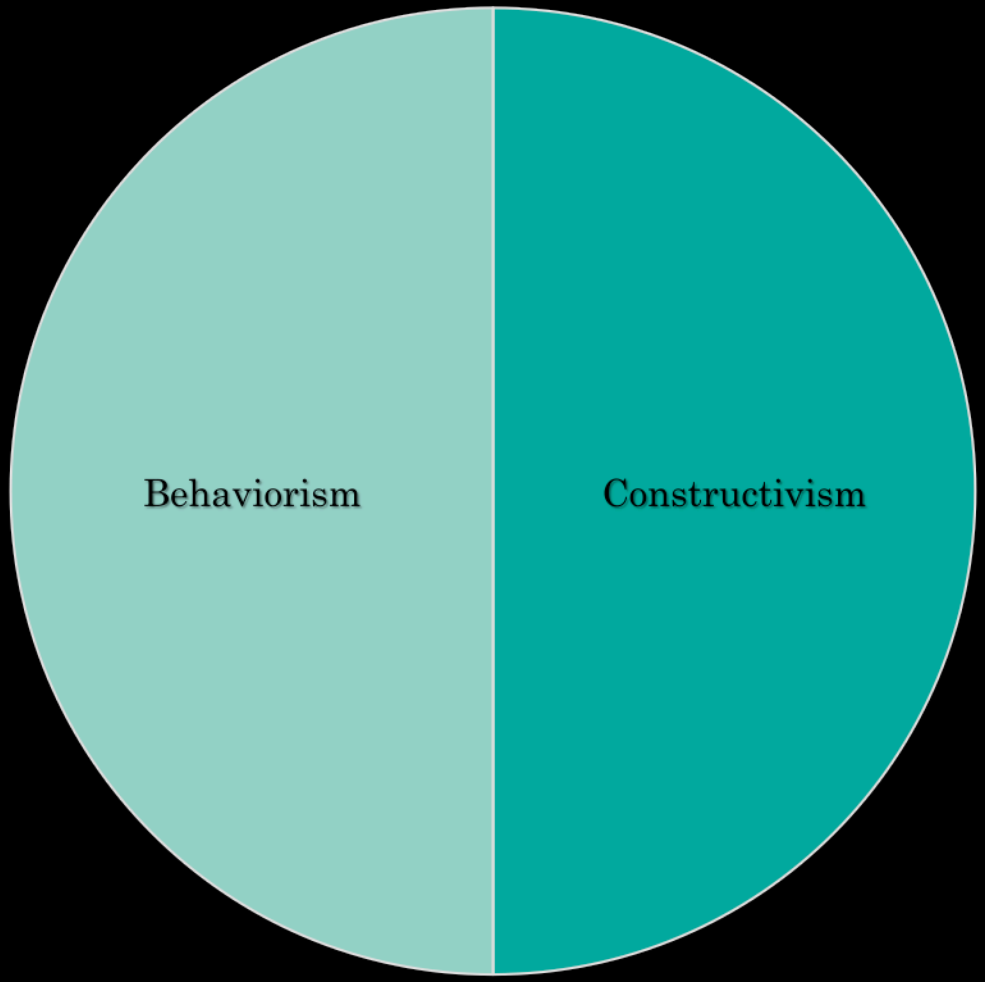
INFORMATION LITERACY AND COGNITIVE SCIENCE

What can we apply from the science of learning?

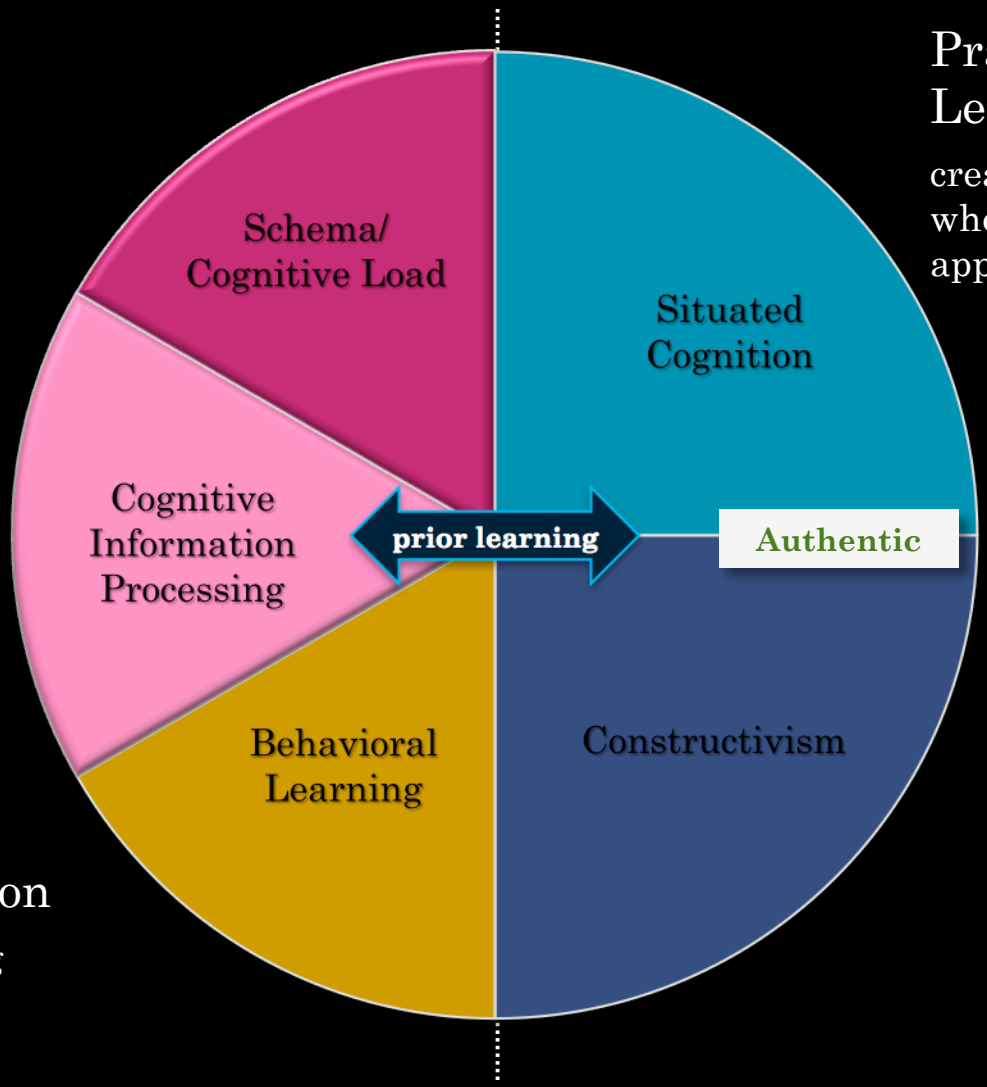
Colleen Bell, University of the Fraser Valley • BC Library Conference • April 17, 2009

LEARNING THEORY…

LEARNING THEORIES



LEARNING THEORIES (EXPANDED)



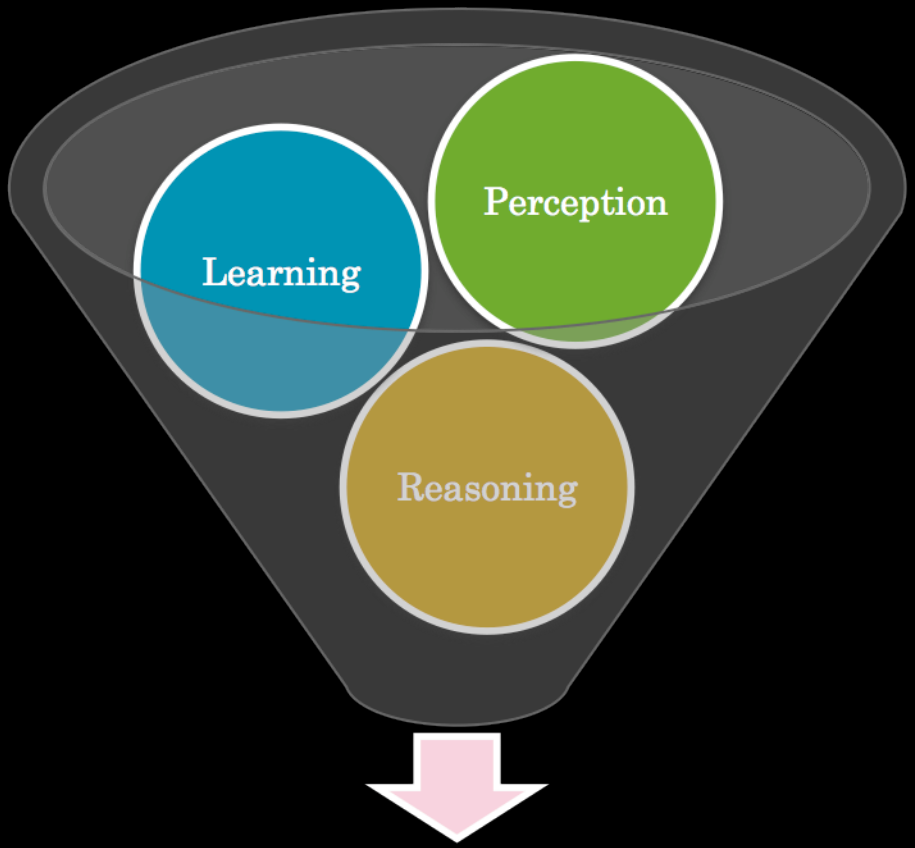
Practice-based Learning

creates activities where learners can apply content

Instructional Communication

supports learning about content

COGNITION = KNOWLEDGE

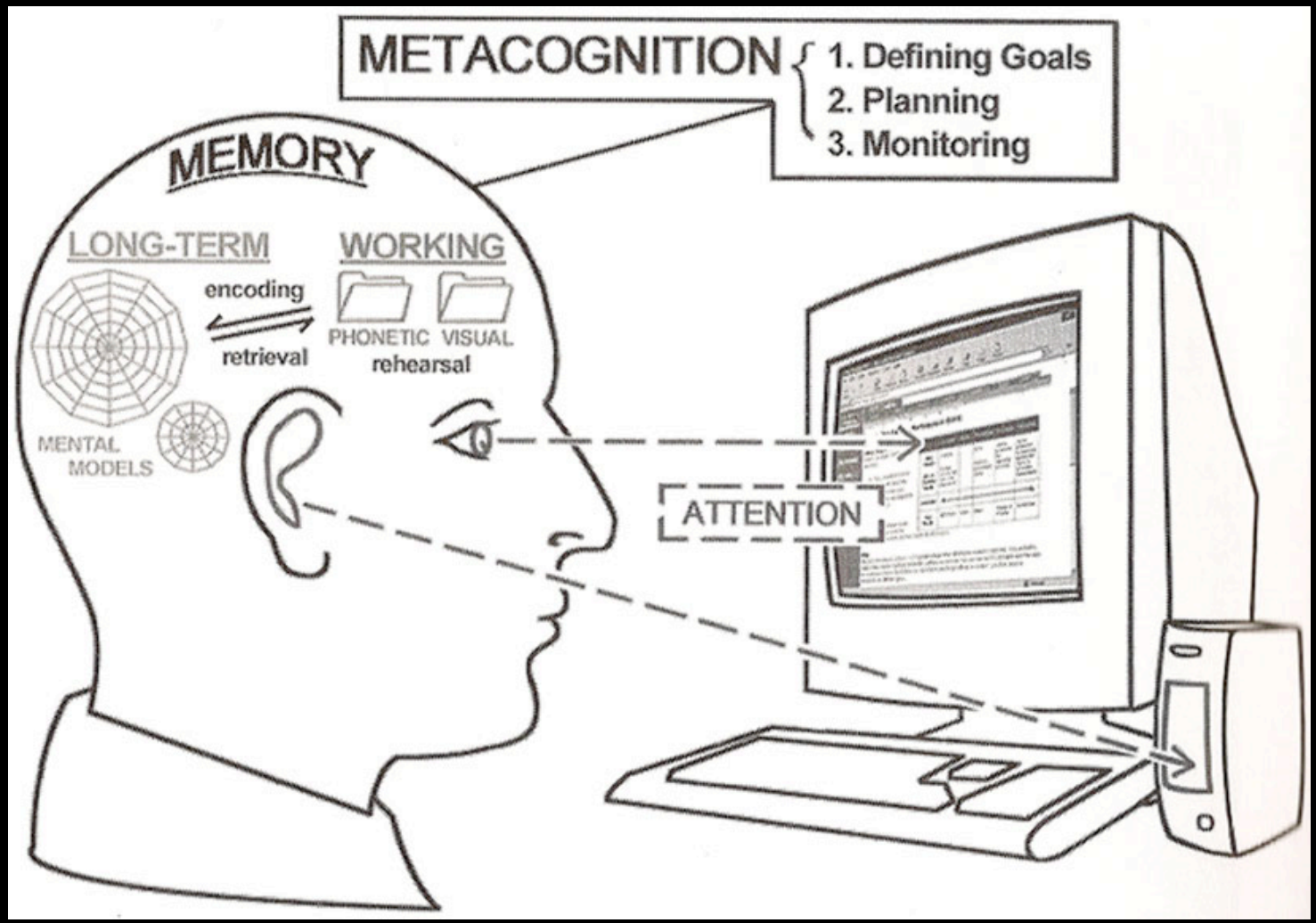


Source: WordNet (Princeton University), http://wordnetweb.princeton.edu/perl/webwn?s=cognition

COGNITION = MENTAL PROCESSES

Source: Wikipedia, http://en.wikipedia.org/wiki/Cognition

COGNITIVE LEARNING THEORY



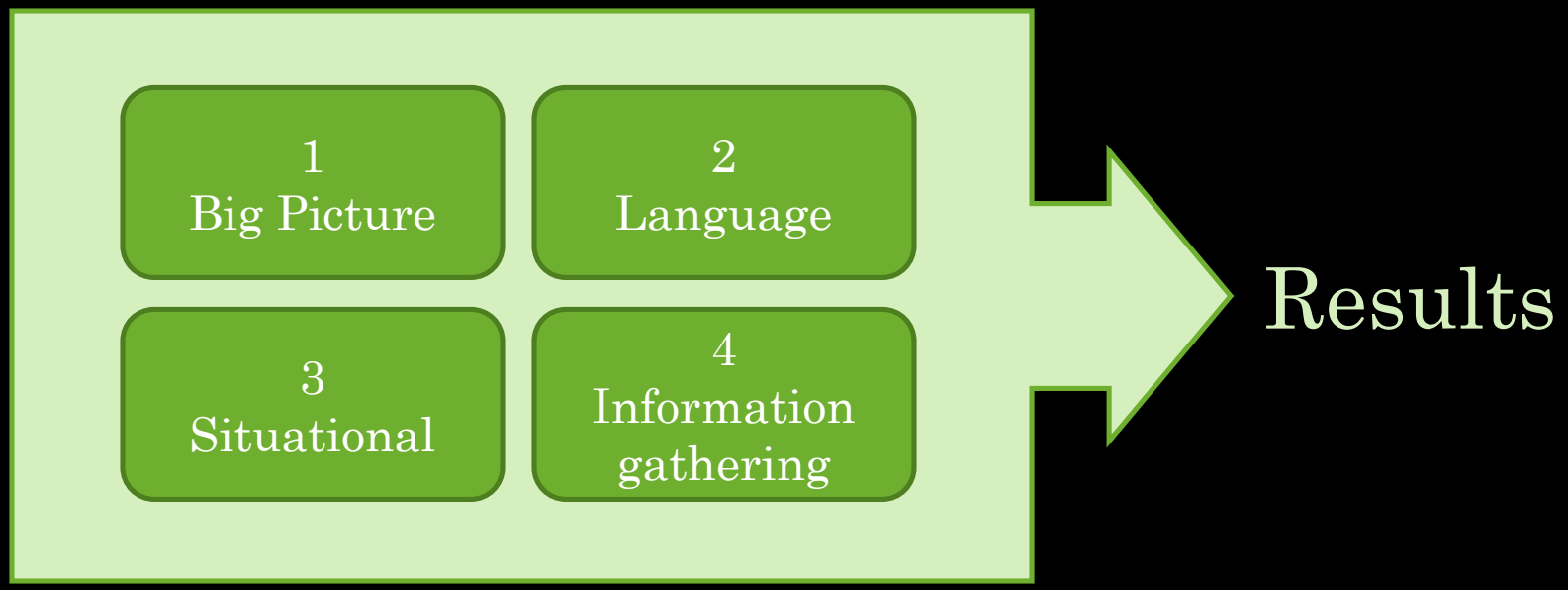
Source: Clark, R. C., & Lyons, C. (2004). *Graphics for learning* (p. 57). San Francisco: Jossey Bass Pfeiffer.

RESEARCH IN THE DIGITAL AGE

- "Research seems to be far more difficult to conduct in the digital age than it did in previous times." (p. 2)
- "…a large majority of students reported spending three hours on research and another two hours on writing – one or two days before a 5-7 page course-related research paper was due." (p. 7) (video)
- "Wikipedia is my presearch tool." (p. 12)

Source: Head, A. J., & Eisenberg, M. B. (2009, February 4). Finding context: What today's college students say about conducting research in the digital age. http://projectinfolit.org/progress/

MENTAL MODELS: PROJECT IL



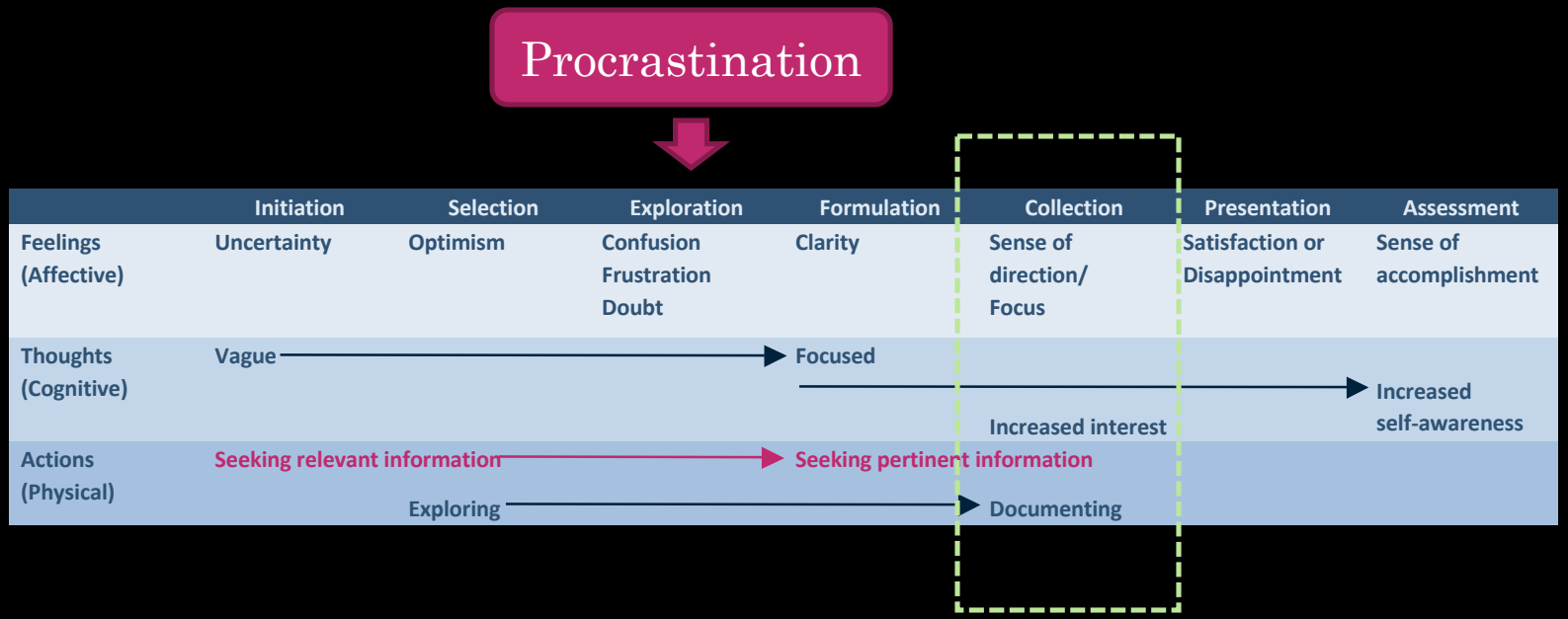
Source: Head, A. J., & Eisenberg, M. B. (2009, February 4). Finding context: What today's college students say about conducting research in the digital age, p. 6. http://projectinfolit.org/progress/

WHAT ONE WORD SUMS UP HOW YOU FEEL AT THE MOMENT YOU RECEIVE AN ASSIGNMENT?

- angst
- tired
- dread
- fear
- anxious
- annoyed
- stressed
- disgusted
- intrigued
- excited
- confused
- overwhelmed

Source: Head, A. J., & Eisenberg, M. B. (2009, February 4). Finding context: What today's college students say about conducting research in the digital age, p. 8. http://projectinfolit.org/progress/

MENTAL MODELS: KUHLTHAU



Source: Kuhlthau, C. C. (2008, December 1). Information search process. http://www.scils.rutgers.edu/~kuhlthau/information_search_process.htm

STRATEGIES FOR HANDOUTS

- Use **boldface** and *italic* print in text to highlight key concepts, terms
- Use boxes and shading to bring out important blocks of text
- Use colour in diagrams to point out important features
- Use graphical diagrams and imagery strategies (concepts maps, Venn diagrams) to help learners make meaningful connections

STRATEGIES FOR HANDOUTS, CONT'D.

- Provide many different kinds of examples or problems in different contexts to aid in application, retention, and transfer
- Integrate explanations with diagrams to avoid splitting attention between two sources of visual input)
- Leave certain pieces of diagrams and text out so that learner has opportunity to complete it (partially completed problems)

STRATEGIES FOR ONLINE RESOURCES

In addition to the strategies for handouts…

- Use worked examples to demonstrate how experts would do research or solve a problem
  - Example
- Narrate animations or diagrams, rather than using online text (avoid "attention splitting")
- In animated tutorials, use cues to draw learner's attention to the next mouse click

STRATEGIES FOR ASSIGNMENTS

- Build in opportunities for students to reflect on their learning or justify their choices
  - How is this source relevant to your topic?
  - Reflect briefly (75-100 words) on your research strategy for this exercise. What did you do that you hadn't done before? What worked well? What didn't work well? Would you do anything differently next time? If so, what?

STRATEGIES FOR ASSIGNMENTS, CONT'D.

- Require students to interact with the sources and relate them to prior or new learning
  - Does this article follow scientific method? Why or why not?
  - Why would it be important for researchers to acknowledge their source of funding?
- Provide individual feedback, offering constructive ways for students to expand or revise their strategies
- Provide group feedback, as appropriate (e.g., clarifying misconceptions or additional explanations from in class)

STRATEGIES FOR INSTRUCTION: GAGNÉ

Nine instructional events:

1. Gaining attention
2. Informing the learner of the objective
3. Stimulating recall of prior learning
4. Presenting the stimulus
5. Providing learner guidance
6. Eliciting performance
7. Providing feedback
8. Assessing performance
9. Enhancing retention and transfer

STRATEGIES FOR INSTRUCTION

- Plan lessons/sessions around no more than 5-7 discrete concepts
- Divide lesson into mini-lessons, structured around Gagné's events (scaffolded)
- Draw diagrams on the whiteboard as you explain concepts (stick people are OK)
- Use analogies and metaphors that students will understand to help them link to prior learning
- Start from where students are, and move them beyond that point … then tell them how to get the support they need

Thank You…
The End