Too Much Information: Navigating Cognitive Load

Robert S. Bledsoe, PhD
Deborah S. Richardson, PhD
Augusta University

Who Are We? Who Are You?
The Plan: Our objectives

• Review the role of the memory system in learning
• Introduce Cognitive Load Theory
• Identify sources of cognitive overload
• Propose the “prime directives”
• Consider teaching and design strategies to avoid cognitive overload
It’s all about what happens in working memory

Working Memory Is *Short*

20 seconds
Working Memory has Limited Capacity

7 plus or minus 2

Cognitive Load Theory
Germane Load

Extraneous Load

Intrinsic Load

Extraneous Load
Distraction and Design
Distractions can create extraneous load

Distractions during Online Lectures
(Blasiman et al., 2018)
Distracting Behaviors in the Classroom
(Frisby et al, 2018)

By students
- Participation
- Technology
- Physical
- Etiquette

By instructors
- Ineffective Lecturer
- Offensiveness,
- Antagonism
- Classroom Management

Instructional materials can create extraneous load
Importance of thinking about how we present materials to students
Imagine this...

The Memory System

1. Incoming Information
2. Sensory Memory
3. Working Memory
4. Long-Term Memory
5. Forgotten
6. Rehearsal
7. Forgotten
8. Encoding
9. Retrieval

Fig. 1: Numbers + explanatory text
Fig. 2: Integrated approach
Delivery can create extraneous load

Advantages and disadvantages of presenting information through multiple channels
How can *you* reduce extraneous load on your students?
How can you reduce extraneous load on your students?

Target
• Distractions
• Redundancy
• Split-Attention
• Modality
• Unnecessary stress

Course Design

In Class

Out of Class
Reducing extraneous load

1. How would you develop the overall design of the course?
   Consider learning outcomes, assessments, and assignments.

2. What can you do in class, as you deliver instruction?
   Consider both your behaviors and your students’.

3. How can you aid your students’ activities outside of class?
   Consider advice for studying, preparing, completing assignments.

Intrinsic Load

Complexity or difficulty of the material

Experience/expertise of the learner
Intrinsic overload occurs when learner is missing relevant, well-organized information to aid learning and recall.

- Complex material
- Limited experience
- Task difficulty
Experts (we) have schemas that allow them (us) to easily access LTM
Learning is a developmental process

Sprague and Stuart (2000)

How can you optimize intrinsic load to allow germane load to maximize learning?
Cognitive Effects

- Redundancy
- Split Attention
- Modality

- Worked Examples
- Completion Problems
- Variable Examples
- Expertise Reversal
- Guidance Fading

Course Design

In Class

Out of Class
Optimizing intrinsic and germane load

1. **How would you develop the overall design of the course?**
   Consider learning outcomes, assessments, and assignments.

2. **What can you do in class, as you deliver instruction?**
   Consider both your behaviors and your students’.

3. **How can you aid your students’ activities outside of class?**
   Consider advice for studying, preparing, completing assignments.

---

**The Prime Directives**

- Reduce extraneous load
- Optimize intrinsic load by considering experience/expertise of learner relative to complexity of the task.
- Maximize opportunity for germane load
Questions
or
Comments

THANK YOU
rbledsoe@augusta.edu
derichardson@augusta.edu