Enhancing and Assessing Student Learning

Stephen L. Chew, PhD

Department of Psychology

Samford University

slchew@samford.edu Twitter: @SChewPsych

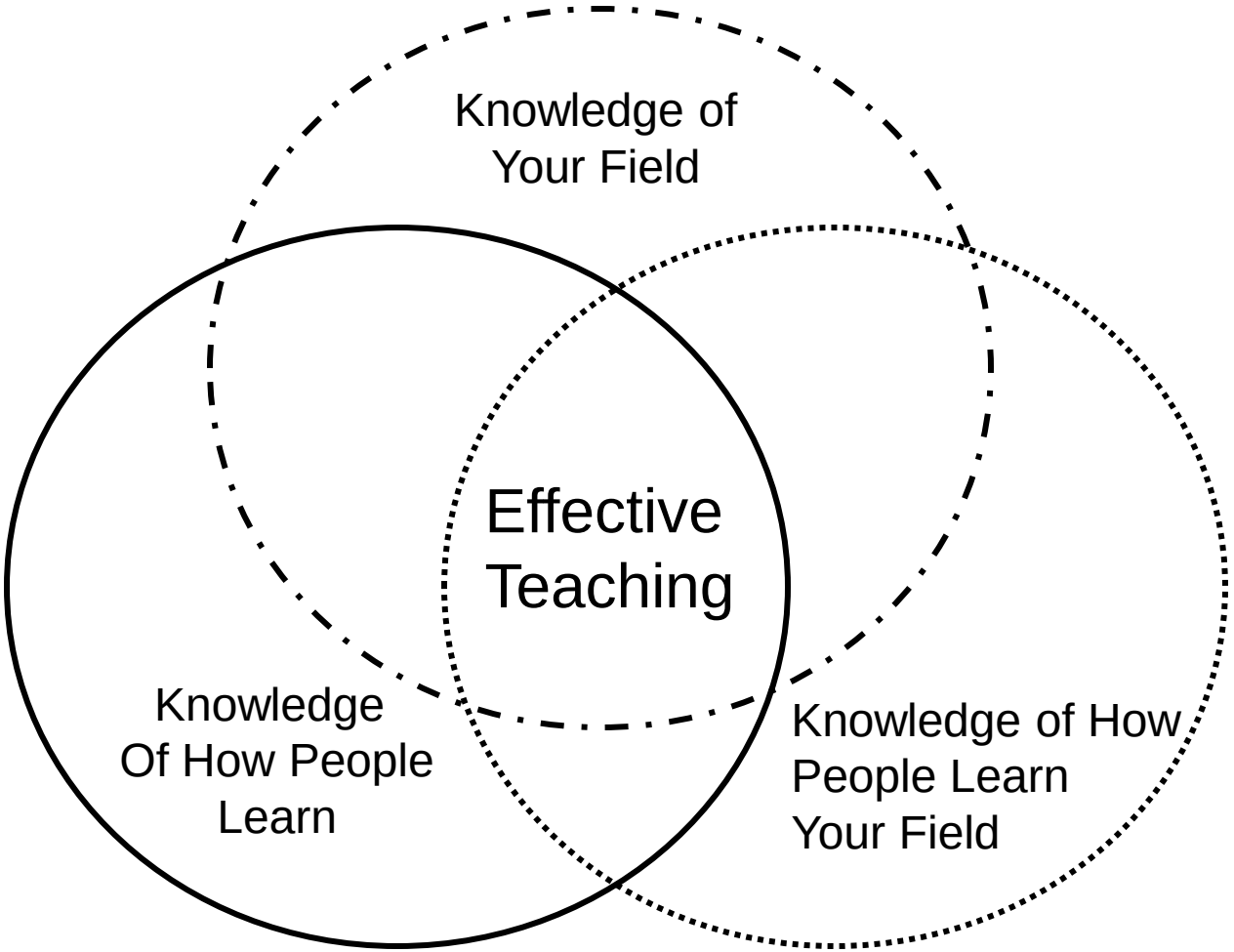
Radford University

August 22, 2016

Goals for this Presentation

1) Discuss common teacher and student misconceptions about learning
2) Discuss cognitive principles of learning students and teachers need to understand to make students more effective learners.
3) Discuss ways of assessing learning that can enhance learning
4) Discuss low effort ways to integrate assessment into classes

Three Kinds of Knowledge for Effective Teaching



Teacher Beliefs about How People Learn

- Teaching requires a mental model of how people learn
- Determines which teaching methods are selected, how they are implemented and assessed, and how to adjust if there are problems
- Most teachers base their pedagogy on untested assumptions, faulty intuitions, and misconceptions

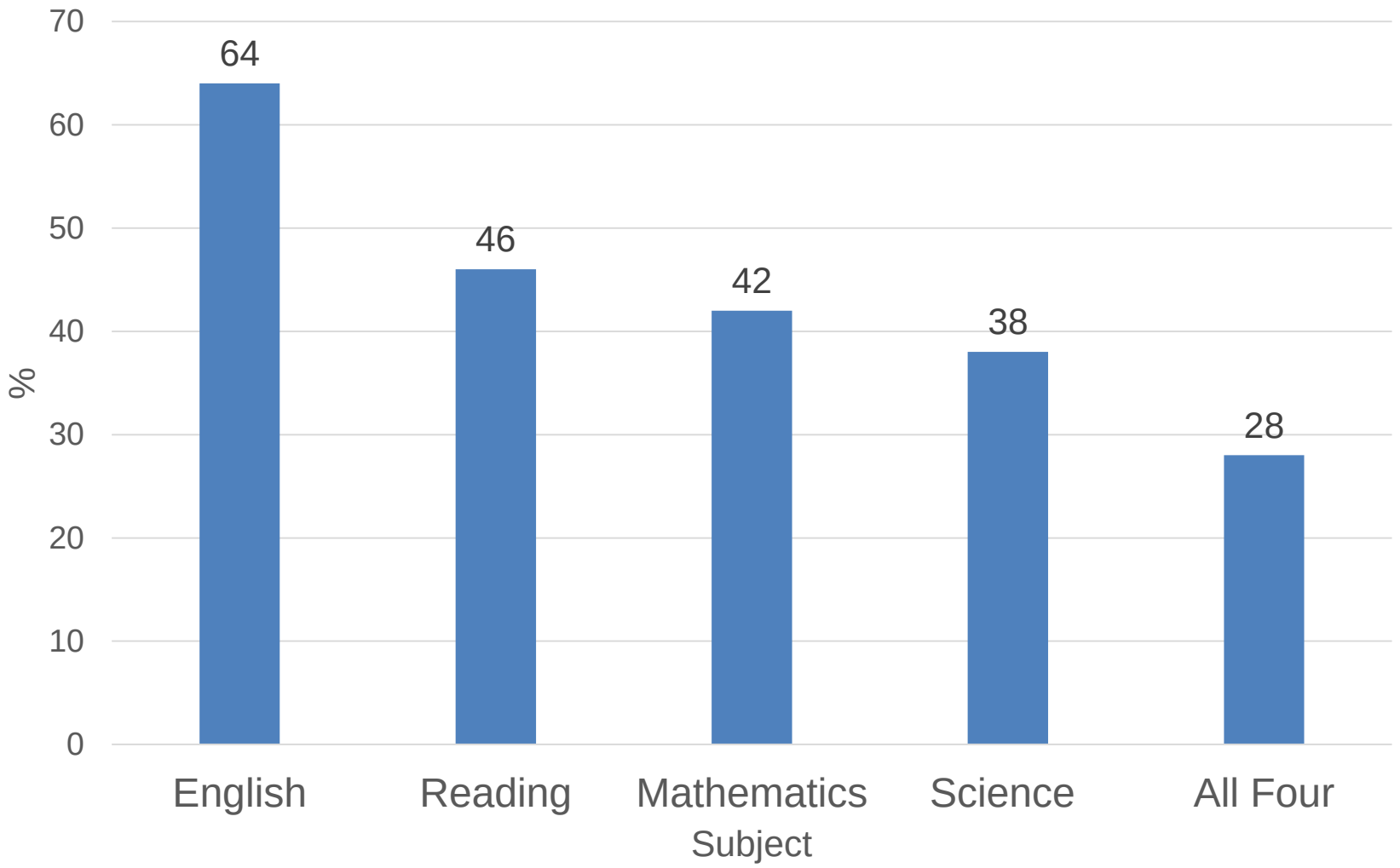
Student Beliefs about How People Learn

- Students also base their study behavior based on their models of how people (specifically themselves) learn.
- It determines their learning effectiveness, achievement, and success
- Most students base their learning strategies on untested assumptions, faulty intuitions, and misconceptions

A typical incoming college student…

- Has graduated from high school with an average GPA of 3.00 (NAEP, 2009)
- Has probably passed a high school exit or graduation exam
- Has been tested for scholastic achievement or aptitude many times
- Probably taken an entrance exam and was admitted to college

% Meeting ACT College Readiness Benchmark



A typical entering college student is

- Inadequately prepared for college level work
- Unaware of this fact
- Overconfident in their preparation and abilities

Typical Student Messages

- “I came into the test really confident that I knew the material but it didn't show that on the test.”
- “The reason I have stuck with the course this long is because I believe I have put a lot of effort towards studying for the exams is just I haven't tested well.”
- “I felt prepared going in to the first two exams but scored much lower than I wanted to (and much lower than the class). To be completely honest, I have not wanted to come to class because I do not feel it is worth it if I am not going to do well anyways.”

The Primary Goal of Teaching

Either

- To present information that students are solely responsible for learning
  - Assessment reflects student effort and motivation

Or

- To develop a sophisticated, useful, and generative level of student understanding
  - Learning is a partnership
  - Assessment reflects the combined efforts of student and teacher

How to help students make a successful transition to college

- Remediation
- Tutoring and study tips
- Teach them how to be more effective learners by correcting misconceptions and teaching them cognitive principles of learning

Video Series: How to Get the Most Out of Studying

http://www.samford.edu/how-to-study/

How to Get the Most Out of Studying

Webpage: http://www.samford.edu/how-to-study/

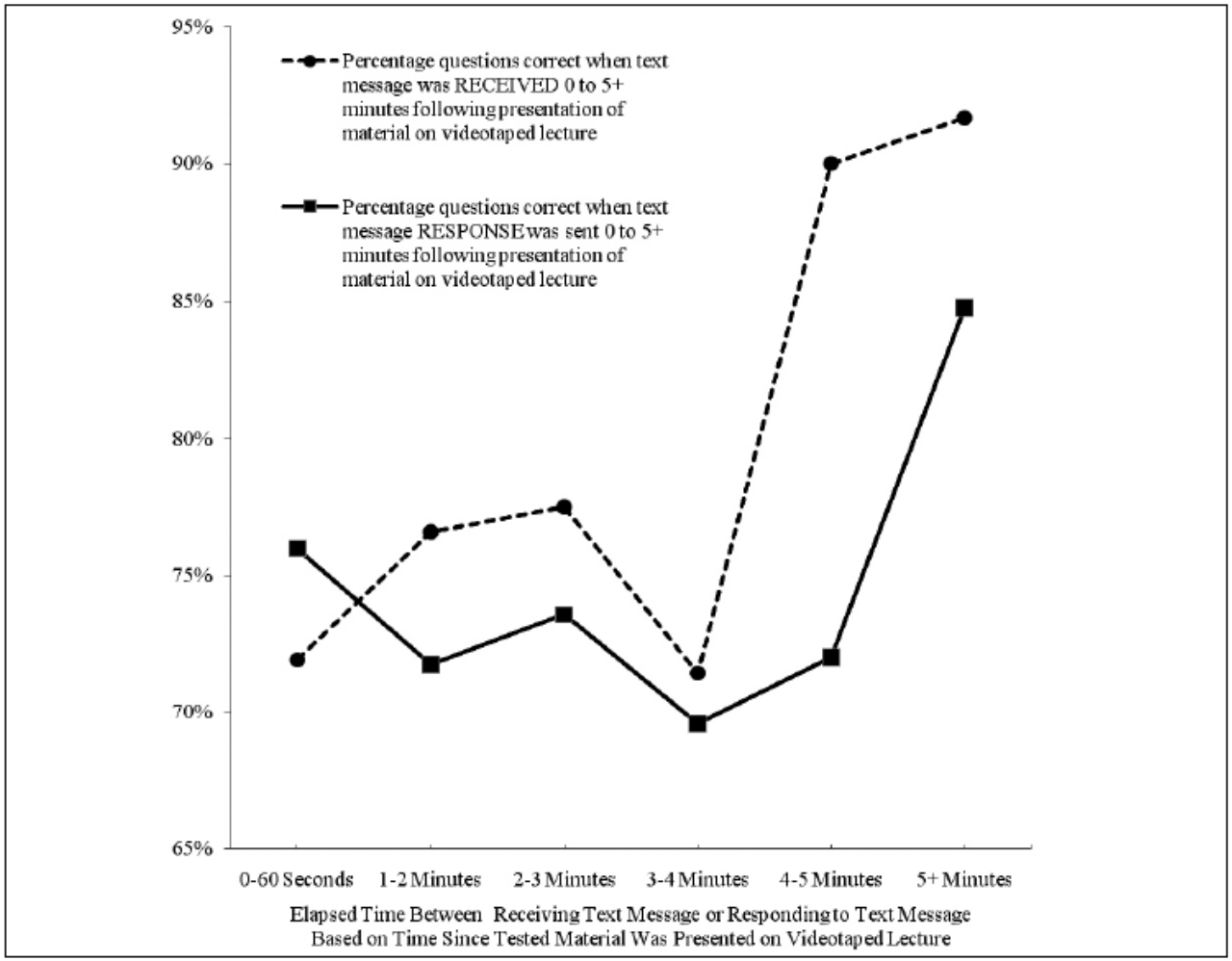
- **Introductory Video:** Developing a Mindset for Successful Learning
- **Video 1:** Beliefs That Make You Fail…Or Succeed
- **Video 2:** What Students Should Understand About How People Learn
- **Video 3:** Cognitive Principles for Optimizing Learning
- **Video 4:** Putting the Principles for Optimizing Learning into Practice
- **Video 5:** I Blew the Exam, Now What?

Beliefs about Learning that Make You Stupid

- Learning is fast
- Being good at a subject is a matter of inborn talent rather than hard work,
- Knowledge is composed of isolated facts
- I’m really good at multi-tasking, especially during class or studying

Attentional Blink

Figure 1. Percentage correct on memory recall posttest by the time a text message was received or by the time a text message response was sent as a function of the time information for the most recent posttest question appeared on the videotaped lecture



Inattentional Blindness

We miss most anything outside our focus of attention, and we are unaware that we missed anything

Inattentional Blindness

The Importance of ***Undivided*** Attention

- There is ***NO*** evidence that multi-tasking is as effective as concentrating on one task at a time
- Good study strategies are effortful, and require full concentration
- Even small distractions significantly reduce learning
  - Resisting temptation is a distraction
- There is no such thing as a ***momentary*** distraction

Metacognition

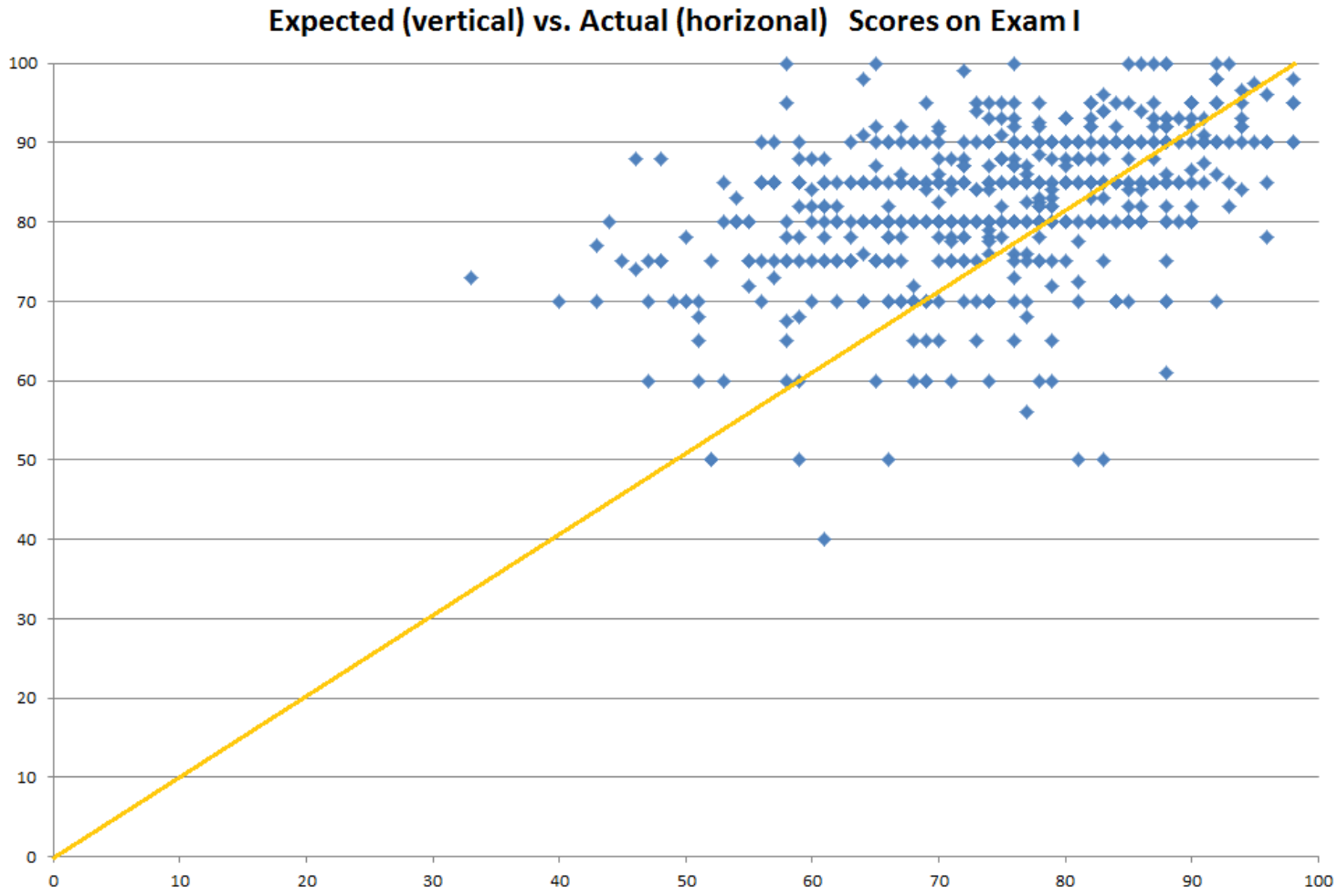
- A student's awareness of his or her level of understanding of a topic
  - Distinguishes between stronger and weaker students
- One of the major tasks for a freshman is developing good metacognition
  - In high school, students spent years developing a metacognitive sense that is likely inadequate or even counterproductive for college.

Assessing Metacognitive Awareness

What is your best, most accurate judgment of the percentage of questions that you answered correctly on this exam? Your answer may range from 0 to 100%

_____% correct

Estimated and Actual Grades for 800 Students: Econ 101



The irony of poor metacognition

- Students with the poorest metacognition have no clue how weak their understanding of a concept is.
  - Part of being incompetent is not understanding just how incompetent you are.
- So the students who ***most*** need to improve study strategies are the ones who ***don't believe they need to.***
- (The same holds true for teachers)

So how accurate are *your* beliefs about how people learn?

Which of the following is the MOST important ingredient for successful learning?

1. The intention and desire to learn
2. Paying close attention to the material as you study
3. Learning in a way that matches your personal Learning Style?
4. The time you spend studying
5. What you think about while studying

Read the instructions for the demonstration to yourselves and do your best to follow them.

Levels of Processing

- Shallow processing focuses on spelling, appearance and sound.
  - Rote memorization of facts
  - Flashcards with isolated facts
- Deep processing focuses on subjective meaning.
  - Relating new information to prior knowledge or other information
  - Making information personally meaningful

Rate each word

- Does the word contain an E or G?

Shallow processing: You are focusing on spelling.

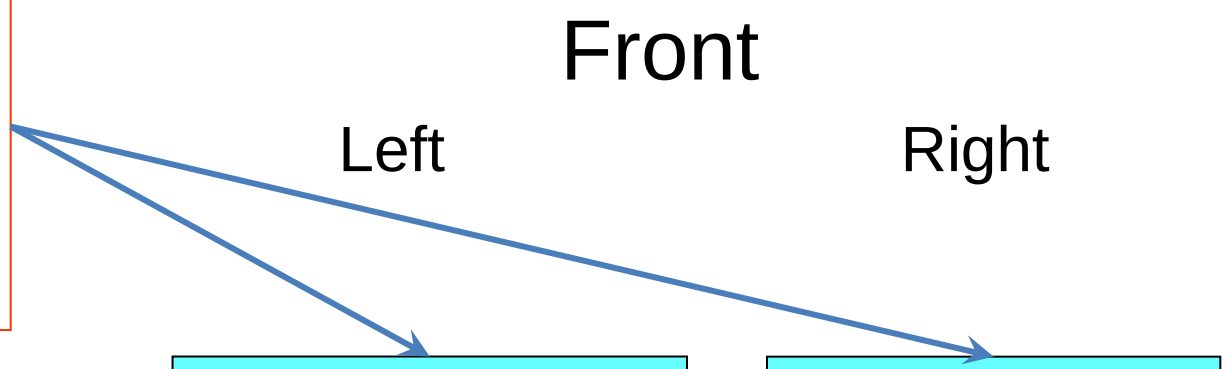
- Do you find the word Pleasant?

Deep processing: You are relating the words to your own meaningful experiences.

These are ***orienting tasks*** that cause you to think in deep or shallow ways, regardless of your intention

Four different conditions

Be forewarned you will be asked to recall all the words



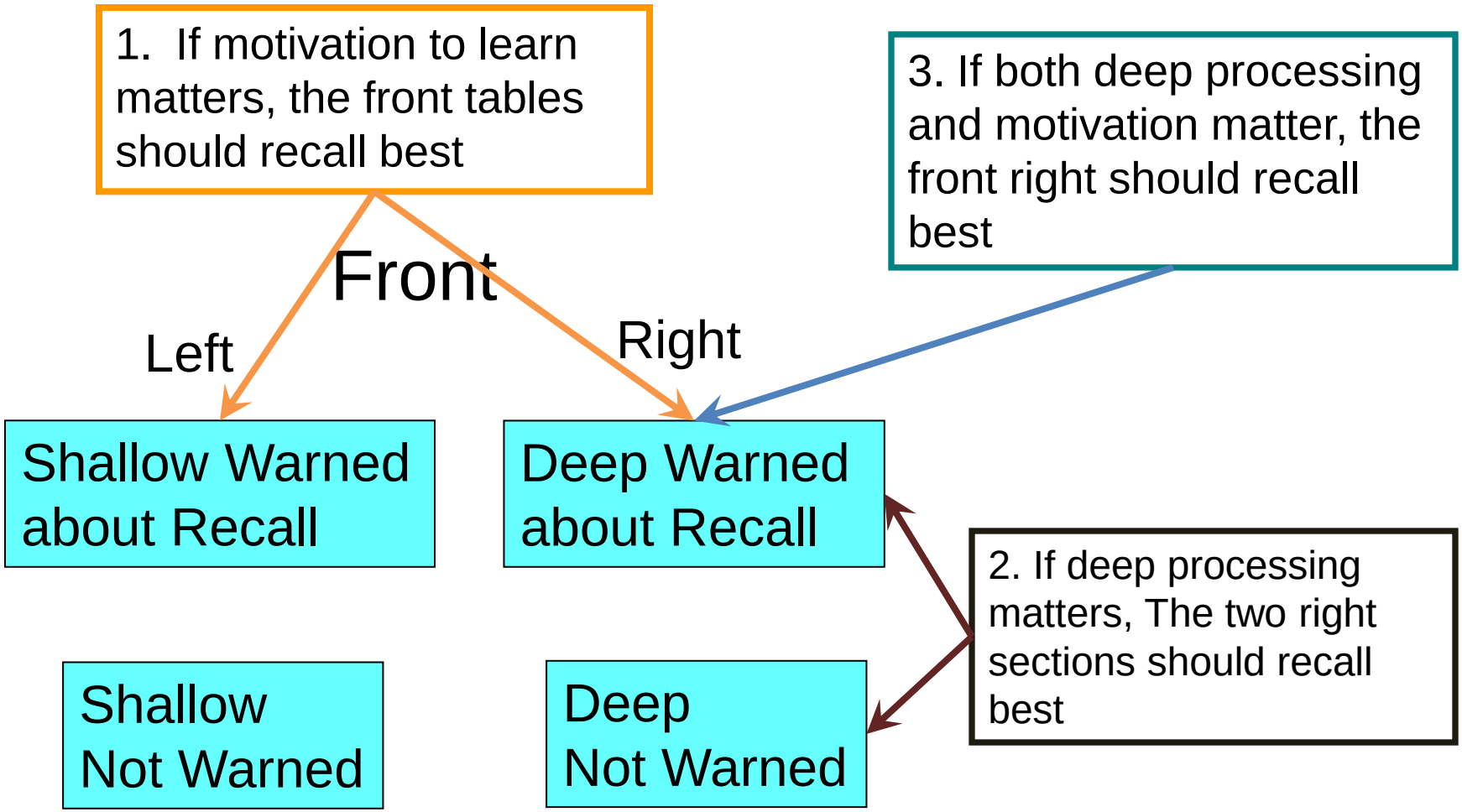
Shallow Warned about Recall

Deep Warned about Recall

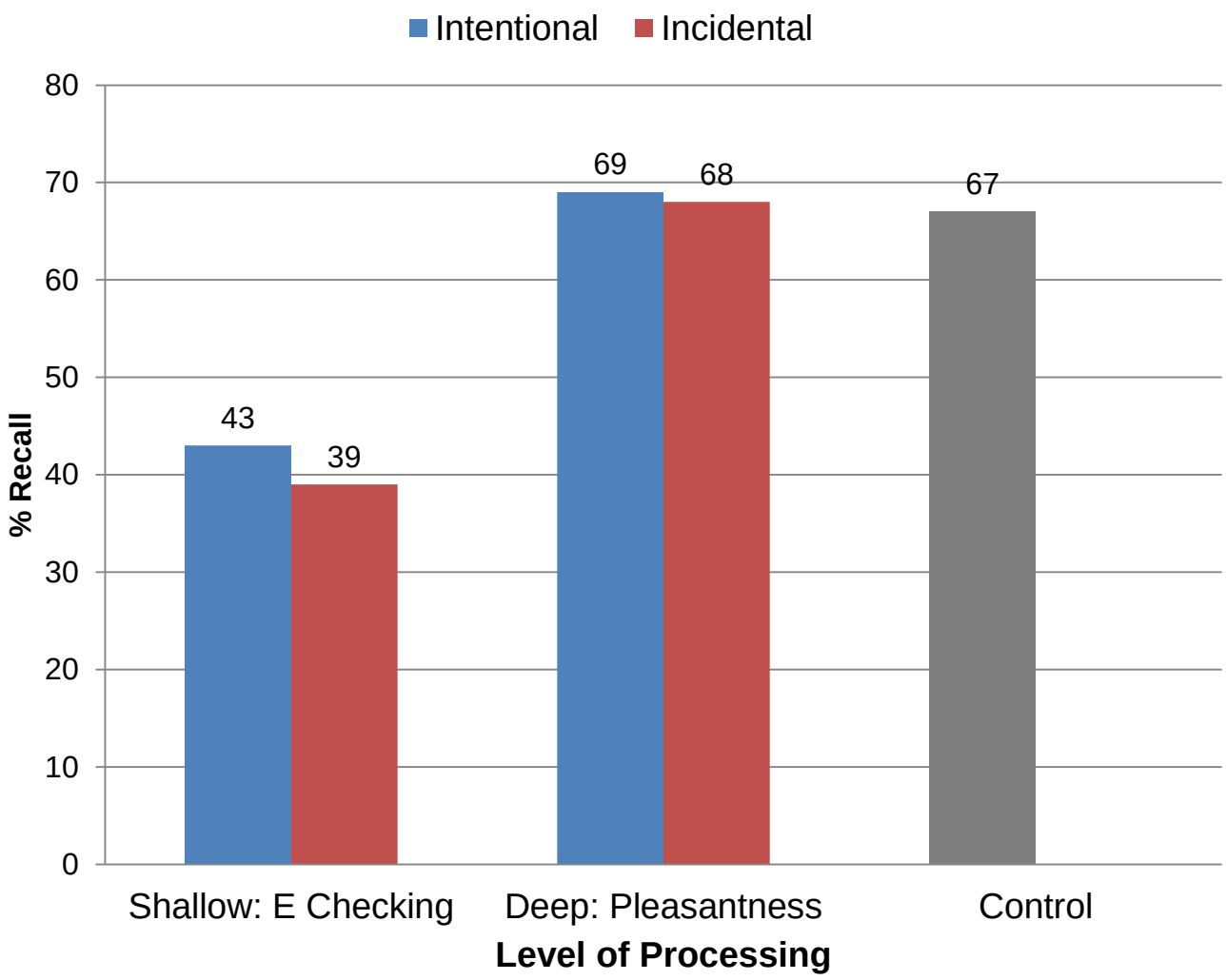
Shallow Not Warned

Deep Not Warned

Study Conditions



Intention vs. Level of Processing



Which of the following is the MOST important ingredient for successful learning?

1. The intention and desire to learn
2. Paying close attention to the material as you study
3. Learning in a way that matches your personal Learning Style?
4. The time you spend studying
5. What you think about while studying

Implications for Learning

- Learning strategy has a huge impact on learning
- Intention and motivation to learn are not sufficient
  - Good intentions cannot overcome bad study strategies
- Attention and amount of study is necessary, but not sufficient

Implications for Students

- Effective studying depends on BOTH quality and amount
  - Students find this counterintuitive and undesirable
- Many students have highly practiced poor learning strategies
- They need to change beliefs, unlearn highly practiced bad strategies and develop new, more effective ones

Implications for Teachers

- Pedagogy and teaching skill influence learning greatly (for better or worse)
- Consider pedagogy in terms of orienting tasks and level of processing
- Teach students learning skills as well as content

Achieving Deep Processing while Studying

As you study, follow these principles:

- **Elaboration**: How does this concept relate to other concepts? Can I make a story?
- **Distinctiveness**: How is this concept different from other concepts?
- **Personal**: How can I relate this information to my personal experience?
- **Appropriate to Retrieval and Application**: How am I expected to use or apply this concept?

These are principles for deep processing, but not a recipe

- There is no set recipe for effective studying or effective teaching
- What constitutes effective study will depend on the student, the subject, and the assessment
- What constitutes effective teaching will depend on the teacher, the students, their mindset, the subject, and the learning goal

Cognitive Principles of Effective Teaching

Playlist: http://bit.ly/1LDovLp

Cognitive Principles of Effective Teaching

1) Beliefs about Teaching
2) The Cognitive Challenges of Teaching: Mindset, Metacognition, and Trust
3) Prior Knowledge, Misconceptions, Ineffective Learning Strategies, and Transfer
4) Constraints of Selective Attention, Mental Effort, and Working Memory
5) Teachable Moments, Formative Assessment, and Conceptual Change

How do we know if our teaching is effective?

- The measure of effective teaching is student learning
  - Not how much you know, the pedagogy you use, or the technology you employ
- The critical role of assessment

Effective Assessment

- Assessment makes learning visible so that it can be measured
  - Provides evidence of student learning
  - Provides feedback on student learning for both faculty and student
  - Quantitative or qualitative
- Ideally, assessment results can be used to improve teacher pedagogy and student learning

Formative Assessment

- Brief, low stakes assessments that give students (and teachers) feedback BEFORE exams/high stake grades

  Angelo, T. A. and K. P. Cross (1993). *Classroom Assessment Techniques: A Handbook for College Teachers,* Jossey-Bass.

  e.g. Minute papers, muddiest point, think-pair-share

  – Brief
  – Low stakes
  – Provide feedback to teacher and student
  – Used for monitoring

Summative Assessment

- Formal, comprehensive assessment of knowledge used for evaluation and consequential judgments about student achievement

  e.g. Midterm exams, term papers, lab reports

  - High stakes
  - Comprehensive and in-depth
  - Used for evaluation and decision making
  - Must be aligned with learning goals and cannot be arbitrary

Roles of Formative and Summative Assessments

- Without assessment, you are guessing at student learning.
- When done properly, assessments can improve pedagogy and enhance student learning
- Formative Assessments should happen before summative assessments

A Common Scenario

- A student studies hard for an exam and feels confident taking it. But the results are much worse than the student expected, leaving the student to grumble, “That sneaky instructor always asks tricky questions.”
- The instructor has delivered a brilliant set of lectures and is confident that the students have mastered the knowledge. But student performance on the exam reflects a poor understanding of the concepts, leaving the instructor to grumble, “Those lazy students just don’t pay attention.”
- Poor metacognition for both student and teacher; both are overconfident

Formative Assessments

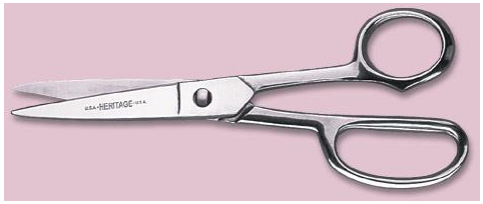
- Improve metacognition for students and teachers
- Address tenacious student misconceptions
- Illustrate desired level of understanding of knowledge for students
  - Preview exam type of questions/ reduce whining
- Promote student learning and understanding
  - Engagement, deep processing, recall practice, transfer and application of knowledge, peer learning
- Promote rapport and trust
- Model thinking for understanding

Logic of Formative Assessment

A Test of Critical Thinking

In the box, draw a picture of what the dressmaker used to cut the fabric

Obviously Wrong Answers



And the Correct Answer is:

The dressmaker used the scissors
to cut the cloth for the dress.

How did critical thinking fail?

- Content was not enough
- What could you do to ensure critical thinking?

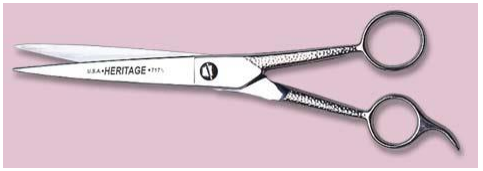
Formative Assessment

Which of the following is most suited for dress making?

A.

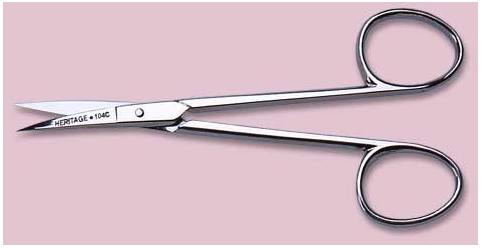
B.

C.



D.

E.



If students don’t know what critical thinking looks like, they can’t accomplish it, even if they are capable of it

Formative assessment can help

Peer Instruction: Eric Mazur

- Mazur, E. (1997). Peer instruction: A user's manual. Prentice Hall.
- Crouch, Catherine H. and Mazur, Eric (2001) Peer Instruction: Ten Years of Experience and Results. *American Journal of Physics, 69*, 970-977.

Properties of Conceptests
(Mazur, 1997)

- Focus on a single concept
- Require conceptual understanding to solve
- Have adequate response alternatives
  - Ideally the incorrect answer choices should reflect the student's most common misconceptions
- Be unambiguously worded
- Be neither too easy nor too difficult

The ConcepTest General Format

1. Present ConcepTest to class – 1 minute
2. Students given time to think – 1 minute
3. On a given signal, students indicate their answer by number of fingers.
4. Have the students pick someone around them, preferably with a different answer, to discuss their choices – 1- 2 minutes
5. Repeat step three to see how choices have changed
6. Explain and discuss the answer as a class – 2+ minutes

Newborn infants develop a powerful emotional bond…

1. Almost immediately after birth to both parents
2. Almost immediately after birth to the mother, but attachment to fathers often does not occur until the child reaches 1 or 2 years of age
3. Almost immediately after birth to caregivers who satisfy the baby's physical needs, such as hunger.
4. To caregivers after about 6 to 8 months

Newborn infants develop a powerful emotional bond…

1. Almost immediately after birth to both parents
2. Almost immediately after birth to the mother, but attachment to fathers often does not occur until the child reaches 1 or 2 years of age
3. Almost immediately after birth to caregivers who satisfy the baby's physical needs, such as hunger.
4. To caregivers after about 6 to 8 months

Advantages of *ConcepTests*

- They give feedback to both the student and teacher about the level of student understanding
- They are highly engaging.
- They take little preparation or class time.
- They can be used with any size class.
- They stimulate class discussion.
- Students learn from each other as well as the teacher.
- They make students aware of intuitive but incorrect beliefs they hold about psychology.
- They give a preview to the class about the kinds of questions they can expect on an exam.

Summative Assessments

- Exams must be tied to course learning goals
- Exams can be used to improve student learning
  - Exam Wrappers

Assessment for Accreditation

- Standardized, external assessments allow cross school comparisons, but they often do not indicate how to improve pedagogy
- Authentic or embedded assessments are assignments you would normally give
  - To assess writing skills, use a paper assignment for that purpose as well as a course grade
  - Locally valid

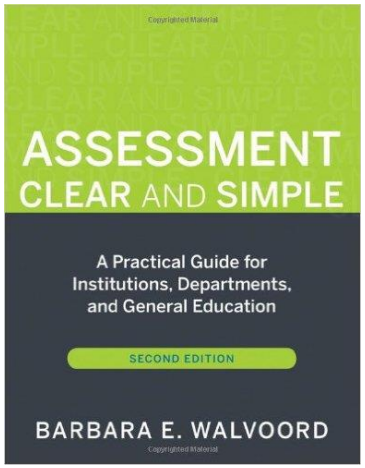
Less Laborious Local Assessment Methods

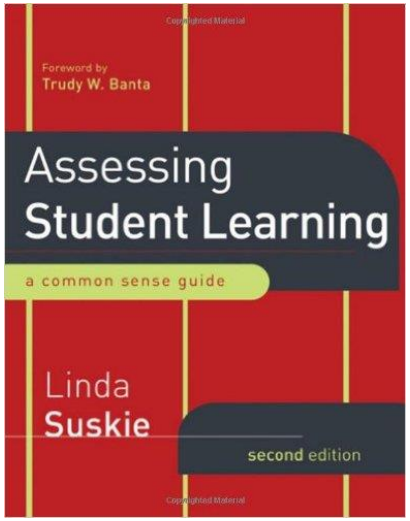
- Probe for understanding
- Common problem or question set (across years or class sections)
- Common class problem (across years or class sections)
- Common assignment and rubric (across years or class sections)

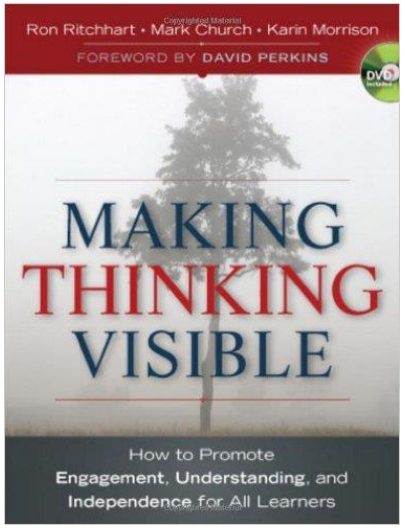
About Assessment

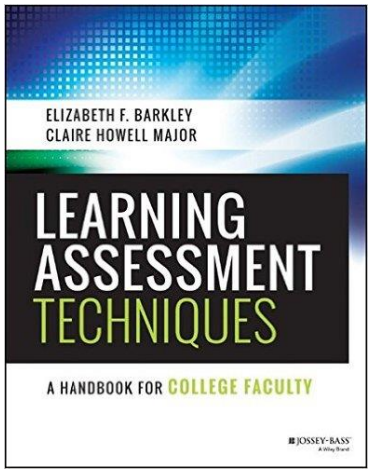
- Assessment need not be burdensome for faculty or students
- Many regular routine activities can be adapted for assessment
- It can be used to assess and improve pedagogy
- It can improve student learning

Assessment Resources









Department & College Level

Individual Class Level

Take Home Message

- Students and faculty have misconceptions that undermine student learning and teaching effectiveness
- Presented a more sophisticated understanding of how people learn to inform your teaching and help students learn
- Presented two resources that you can use to correct misconceptions and improve student learning
- Discussed formative and summative assessments and how they can improve as well as measure student learning
- Discussed authentic and embedded assessment to reduce assessment burden

Thank You!
Questions?

Stephen L. Chew

slchew@samford.edu