

Improving Student Performance by Addressing Student and Teacher Misconceptions about Learning

Stephen L. Chew
Samford University
slchew@samford.edu

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Goals of the Presentation

- Discuss the level of college readiness of incoming freshmen
- Discuss the development of a presentation to help students become more effective learners based on cognitive principles
 - Correct misconceptions about learning
 - Provide a cognitive framework for effective study
- Discuss what faculty can do to help students learn more effectively

Teacher Beliefs about How People Learn

- Teaching requires a mental model of how people learn.
 - Most teachers cannot articulate their model of learning, but they have one.
- Determines which teaching methods are selected, how they are implemented and assessed, and how to adjust if there are problems.
- If the model is accurate, the teacher will be effective
- If it is flawed or simplistic, the teacher will be less effective

Student Beliefs about How People Learn

- Students also base their study behavior based on their models of how people (specifically themselves) learn.
- Determines whether or not they go to class, if and how well complete assignments, how they study material, and when material is mastered.
- The better the model, the better the student learns
- If the model is flawed or simplistic, it will undermine student learning

A typical college freshman is

- Inadequately prepared for college work
- Unaware of the fact because it is contrary to their high school experience
- Likely Overconfident in their preparation and abilities for college-level work
 - Few students enter college believing they will struggle

As a consequence

- Many students will struggle academically in their first year of college
 - Culture of access vs. culture of completion
- Overconfidence may be hinder their recognition and willingness to try to make the necessary changes
- Even when willing to change, they do not know what changes to make (or not make)
- Some percentage of these students will not succeed in college even though they have the ability to do so

Goals of the Freshman Presentation

- Give students a coherent, research-based framework that would allow them to become effective learners in any situation
 - More than disconnected study tips, e.g. space out learning; serial position; study in same place you will be tested
- Show them how to apply the framework to their study
- Make it obvious to students this was useful information they should care about
 - It is worth the investment of time

Challenges of the Presentation

- Overcome the negative preconceptions
 - “I want you to succeed, and I have information that will help you meet the academic challenge.”
- Overcome student misconceptions about learning, e.g. mistaken beliefs and “magic bullets”
- Present cognitive principles and research to help students become more effective learners
- Make the presentation engaging, accessible, and memorable
- Do it in 45 minutes

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

Metacognition

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

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

Levels of Processing

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

Learning Strategies

- Intention and motivation to learn are not important
- Attention and amount of study is necessary, but not sufficient for learning
- Deep level of processing is critical for learning
 - elaborative, distinctive, personal, appropriate
- Students have highly practiced poor learning strategies
- Consider your learning activities in terms of level of processing
 - Assignments, problem sets, questions, examples
 - Studying, note taking, reading, writing, listening

These findings are strongly counterintuitive

- The more I study, the more I learn
 - All study is effective, only amount and intensity matter
- The more motivated I am to learn, the more effective my study strategies
 - Motivation automatically improves study effectiveness
- Not all study is the same; some is useless
- Motivation is no guarantee of effective study skills
- Learning is hard work, but not all hard work leads to learning

Achieving Deep Processing while Studying

As you study, follow these principles:

- Elaboration: How does this concept relate to other concepts?
- 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 properties lead to development of connected understanding

Conclusions

- The presentation is interesting and effective at significantly altering student understanding of learning and their practice.
- The presentation is particularly effective at decreasing rote memorization and increasing deep processing strategies
- A significant portion of students still maintain misconceptions about learning and the positive impact may lessen with time.
- To address these issues, I created videotaped modules of the presentation for students to review when needed.

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

- 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?

Using the Videos Effectively

- Just assigning them is good, but especially for weaker students, need to ensure watching and engagement
- Probably need to be viewed multiple times.
 - Information dense
 - Need reminding
- Need to scaffold content
 - Huge discrepancy between video content and student beliefs
 - Ideas are counterintuitive and contrary to popular misconceptions discuss how to apply.
- It is a resource that will save teacher time, but will not replace the teacher.

Cognitive Load

- Mental effort is the amount of concentration that a person has available to devote to tasks
- Mental effort is always a limited resource
- Cognitive Load is the total amount of mental effort a task requires to complete it
- A person can do multiple tasks at once as long as the total cognitive load does not exceed available mental effort
- If cognitive load exceeds mental effort, then performance suffers

Cognitive Load Theory

Sweller, Paas, van Merriënboer

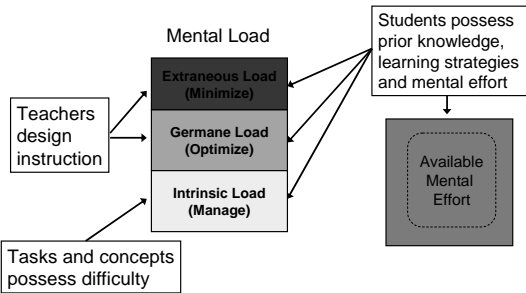
Cognitive Demands on Student

- **Intrinsic Mental Load:** Effort required for a student to understand a concept (elemental interactivity x prior knowledge).
- **Germane Mental Load:** Load due to instructional design relevant to schema formation
- **Extraneous Mental Load:** Load imposed by instructional design irrelevant to schema formation
 - Load imposed by inefficient or ineffective instructional design
 - Load imposed by other relevant activities, such as note taking, or irrelevant activities, such as text messaging.

Cognitive Resources Available to Student

- **Mental Effort:** A limited resource (attention and working memory).
- Capacity varies by effort and arousal level, but it is always a finite resource.

Student mental effort must meet the demands of instructional mental load



Depth of Processing vs. Cognitive Load

- Many teachers believe good teaching involves engagement and struggle, but neither is sufficient for learning
- Depth of processing and cognitive load are two critical elements of learning
- Cognitive load is negatively related to depth of processing
- The teacher must balance the depth and load, schema development and automaticity, as well as many other factors for effective teaching
