Teaching Students *How* to Learn

Saundra Yancy McGuire, Ph.D.,
Director, Center for Academic Success
Adj. Professor, Dept. of Chemistry
Associate Dean, University College
Louisiana State University
Baton Rouge, LA

LOUISIANA STATE UNIVERSITY
Center for Academic Success
UNIVERSITY COLLEGE

2004-2005 National College Learning Center Association
Frank L. Christ Outstanding Learning Center Award

The Story of Three Students

- Travis, junior psychology student
  47, 52, 82, 86
- Robert, freshman chemistry student
  42, 100, 100, 100
- Maryam, freshman art student
  57, 87

Fall 2005

Chemistry 2001

	Class Average	Student 1	Student 2	Student 3	Student 4
Test 1	76	65	67	70	83
Test 2	52	67	65	46	55
Test 3	72	61	68	68	65
Final	**78**	**107**	**88**	**88**	**90**

Date of Final Exam: **December 14, 2005**
Meeting with Student No. 1: **December 12, 2005**
Meeting with Student Nos. 2 & 4: **December 2, 2005**
Meeting with Student No. 3: **December 8, 2005**

The final was worth 100 points with a 10 bonus question.

LSU Analytical Chemistry Graduate Student's Cumulative Exam Record

2004 – 2005			2005 – 2006	
9/04	Failed		10/05	Passed
10/04	Failed		11/05	Failed
11/04	Failed	Began work with CAS and the Writing Center in October 2005	12/05	Passed best in group
12/04	Failed		1/06	Passed
1/05	Passed		2/06	Passed
2/05	Failed		3/06	Failed
3/05	Failed		4/06	Passed last one!
4/05	Failed		5/06	N/A

Desired outcomes

- We will understand why students spend little time studying and do not know how to learn
- We will have concrete learning strategies that faculty can teach students to increase learning, and we will be committed to trying some of these strategies in our classes
- We will have more resources for our students
- We will view our students differently
- We will see positive changes in our students' performance and self-perception
- We will spend time reflecting on improving our teaching and our students' learning

Overview

- **Characteristics of today's learners**
- **Cognitive Science Research**
- **Types and levels of learning**
- **Effective Learning Strategies**
- **Wrap Up**

Reflection Questions

What is the difference, if any, between studying and learning?

Which, if either, is more enjoyable?

When did you learn the conceptual structure (relationships between basic concepts) of your discipline? When/why/how did you to learn this?

Characteristics of Many of Today's Students

- **Working more hours**
- **More diagnosed ADD/ADHD**
- **Interested in obtaining credentials**
- **Feel entitled to an A or B if they consistently attend class**
- **Few time management skills**
- **Few learning skills**

Counting Vowels in 30 seconds

How accurate are you?

Why don't students know how to learn or how to study?

- **It wasn't necessary in high school**
  - **66% of 2003 entering first year students spent less than six hours per week doing homework in 12th grade.**
  - **More than 46% of these students said they graduated from high school with an "A" average.**
- **Students' confidence level is high**
  - **70% believe their academic ability is above average or in the highest 10 percent among people their age**

Higher Education Research Institute Study

http://www.gseis.ucla.edu/heri/03_press_release.pdf

Additional Reasons

- High Stakes Testing in high school forces teachers to "teach to the test"
- Students think everything they need is on the web and can be looked up
- Technological advances make it easier to function with less knowledge
- Misconceptions that interfere with learning

Student Misconceptions

Who would have thought?!?

How do some faculty members further add to the problem?

- **By assigning homework and giving tests that require little, if any, higher order thinking**
- **By assessing learning too infrequently**
- **By providing limited feedback to students**
- **By putting notes on-line and advising students they don't need to purchase the textbook**
- **By having little ability to teach students concrete learning strategies**

Faculty Must Help Students Learn How to Learn!

- **Help them understand the learning *process***
- **Assess and provide feedback early and often**
- **Help them determine their learning style**
- **Teach them specific learning strategies**
- **Implement pedagogical strategies that make them use the learning strategies**

Turn Students into Expert Learners:

Learning Strategies are the Keys!

What IS an Expert Learner?

Expert learners:

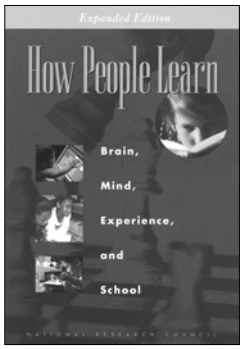
- Actively engage with the material
- Take responsibility for their own learning
- Motivate themselves and guide their own learning
- Know HOW to learn
- Attribute failures to correctable causes and success to personal competence
- Use learning strategies selectively and strategically, based on their learning style

http://vcs.ccc.cccd.edu/crs/star/educ120/intro2El.htm

Cognitive Science: The Science of the Mind

Questions

- How do humans process information?
- How do people increase their knowledge?
- What factors influence learning?
- What types of learning facilitate transfer of information learned to new settings?
- How can we change teaching to improve learning?



Bransford, J.D., Brown, A.L., Cocking, R.R. (Eds.), 2000. *How people learn: Brain, Mind, Experience, and School.* Washington, DC: National Academy Press.

Keys to Learning Based on Cognitive Science Findings

- Deep factual and procedural knowledge of a discipline is required to solve complex problems
- Learning is a continuous process; repetition is the key
- New knowledge must be tied to existing knowledge
- Learning should involve both sides of the brain and several learning styles

What we know about learning

- Active learning is more lasting than passive learning
- Thinking about thinking is important
  - Metacognition
- The level at which learning occurs is important
  - Bloom's Taxonomy

Metacognition

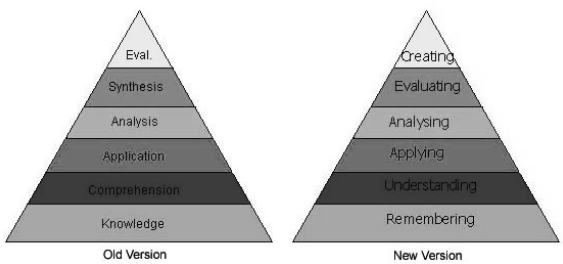
The ability to:

- **think about thinking**
- **be consciously aware of oneself as a problem solver**
- **monitor and control one's mental processing (e.g. "Am I understanding this material?")**
- **accurately judge one's level of learning**

Effective Metacognitive Strategies

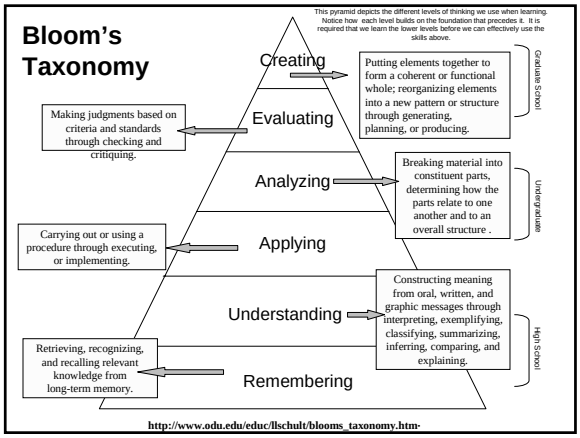
- **Always ask why, how, and what if**
- **Use SQ5R for reading assignments**
  (survey, question, read, recite, review, wRite, reflect)
- **Test understanding by giving "mini lectures" on concepts**
- **Move higher on Bloom's taxonomy**
- **Always solve problems without looking at an example or the solution**
- **Use the Study Cycle with Intense Study Sessions**

Bloom's Taxonomy



Anderson & Krathwohl, 2001

http://projects.coe.uga.edu/epltt/index.php?title=Bloom's_Taxonomy



Example

~ Bloom's Levels of Learning ~

Applied to Goldilocks and the Three Bears

Creating	**Write a story about Goldilocks and the Three Fish. How would it differ from Goldilocks and the Three Bears?**
Evaluating	**Judge whether Goldilocks was good or bad. Defend your opinion.**
Analyzing	**Compare this story to reality. What events could not really happen.**
Applying	**Demonstrate what Goldilocks would use if she came to your house.**
Understanding	**Explain why Goldilocks liked Baby Bear's chair the best.**
Remembering	**List the items used by Goldilocks while she was in the Bears' house.**

Adapted from http://www.kyrene.k12.az.us/schools/brisas/sunda/litpack/BloomsCriticalThinking_files/v3_document.htm

The Study Cycle

Phase 1: **Preview chapter(s) to be covered in class… before class.**

Phase 2: **GO TO CLASS! Listen actively, take notes, participate in class.**

Phase 3: **Review and process class notes as soon after class as possible.**

Phase 4: **Implement Intense Study Sessions.**

Repeat

Intense Study Sessions

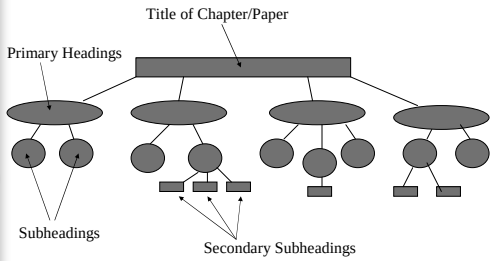
- 2-5 minutes: **Set Goals**
- 20-50 minutes: **STUDY** with **FOCUS** and **ACTION**
  (Read your text, create flash cards, create maps and/or outlines, work problems -without peeking at the answers, quiz yourself…)
  Achieve your goal!
- 5 minutes: Take a **break**
- 5 minutes: **Review** what you have just studied
- Repeat

Concept maps facilitate development of higher order thinking skills

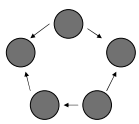
Concepts Maps

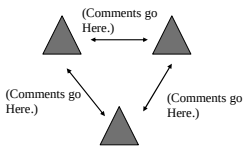
Can Have Many Forms

Chapter/Paper Map

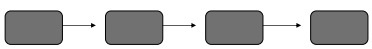


Ideas...

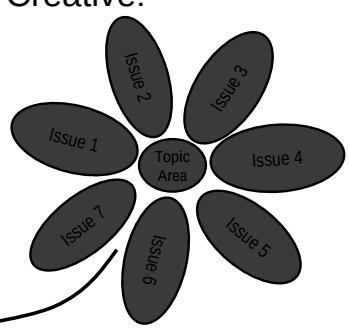




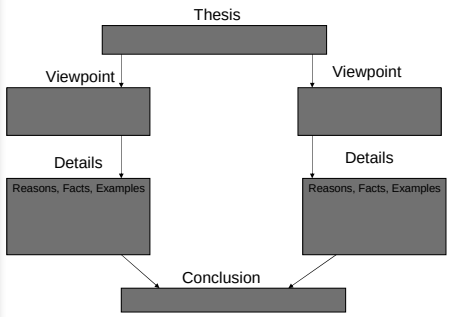
Cause and Effect:



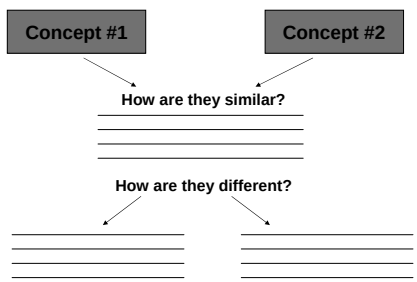
Get Creative!



Persuasive Writing



Compare and Contrast



Wrap Up Activity:

Using Cognitive Science Findings in Our Teaching

- **Select a course you are teaching (or have taught, or may teach in the future)**
- **Describe one strategy you can use to teach students *how* to learn the course material**
- **Describe a strategy that will encourage the use of learning strategies information by other faculty in your institution**

The 2004 LSU Dental School First Year Class:
An Amazing Success Story!

- Metacognition Discussion – August 13, 2004
- Histology Exam – August 23, 2004
- Previous class averages: 74 – 78
- Challenge to class on August 13: 84 average
- Reported average on August 24: 85!

Chem 1001 Results Spring 2007

	Test 1	Test 2	Final	Total points
Attended SYM Lecture on 3/2	156	109	214	801
Did not attend	154	93	153	563
Class average	153	100	176	662

*app. 80 attendees out of 200 students because session was on a Friday afternoon. Exam 1 was Wednesday, March 7.

The Impact of Teaching Learning Strategies
from a student perspective

"Without *(Chem)* 1200, I probably would have gotten a C *(in Chem 1201)* . You showed us the first week a way to get an A in the class and I knew that was going to be my only way to achieve that A. I was planning on just studying before the test. But when you stressed how important it was to preview and review and study 2 hours a day or so, I was in shock, but I followed the guideline and got myself an A. So, I would like to thank you, because without 1200, I probably would have done terribly in Chemistry *(1201)."*

Fall 2009 First semester chemistry student

… and from the faculty perspective

"What I found very useful from both your presentations … and the LSU website was the language of how to talk to students about these issues. I need the help because I've not read in this area of metacognition/learning and I certainly wasn't trained in graduate school to know how to think about these issues either. Your website is very generous because it's not password protected and you share presentation slides. I was able to incorporate some helpful slides in several of my class presentations. Feeding them a little at a time...."

University of MS Political Science Professor

Final Reflection Question

Who is ***primarily*** responsible for student learning?

a) the student
b) the instructor
c) the institution

We *can* significantly increase student learning!

- We must teach students the learning process and specific strategies
- We must not judge student potential on initial performance
- We must encourage students to persist in the face of initial failure
- We must encourage the use of metacognitive tools

Useful Websites

- www.cas.lsu.edu
- www.howtostudy.org
- www.vark-learn.com
- www.drearlbloch.com
- Searches on www.google.com

Special Note

Please visit the CAS website at www.cas.lsu.edu.

We have on-line workshops that will introduce you and your students to effective metacognitive strategies, including concept mapping. Please feel free to contact me at smcgui1@lsu.edu at any time. Have fun turning your students into expert learners!

Saundra McGuire

References

- Bruer, John T. , 2000. *Schools For Thought: A Science of Learning in the Classroom. MIT Press.*
- Bransford, J.D., Brown, A.L., Cocking, R.R. (Eds.), 2000. *How people learn: Brain, Mind, Experience, and School.* Washington, DC: National Academy Press.
- Cromley, Jennifer, 2000. *Learning to Think, Learning to Learn: What the Science of Thinking and Learning Has to Offer Adult Education*. Washington, DC: National Institute for Literacy.
- Ellis, David, 2006. *Becoming a Master Student*.* New York: Houghton-Mifflin.
- McGuire, Saundra, 2004. Teaching Your Students HOW to Learn Chemistry. In D. Bunce and C. Muzzi (Eds.), *Survival Handbook for the New Chemistry Instructor*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Nilson, Linda, 2004. *Teaching at It's Best: A Research-Based Resource for College Instructors.* Bolton, MA: Anker Publishing Company.
- Pierce, William, 2004. Metacognition: Study Strategies, Monitoring, and Motivation. *http://academic.pg.cc.md.us/~wpeirce/MCCCTR/metacognition.htm*

*Excellent student reference