

Teaching Students How to Learn: Metacognition is the Key!

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Paradigm Shift in Higher Education

Teaching
Centered
Institutions



Learning Centered
Institutions



Barr, R.B., and Tagg, J. "From Teaching to Learning - A New Paradigm for Undergraduate Education." *Change*, Nov-Dec. 1995, pp 13-25

Barriers to Making the Shift

- Most faculty don't know how to move from *teaching* emphasis to *learning* emphasis
- Faculty professional development generally focuses on *teaching* strategies
- Most faculty are not prepared to teach students *how* to learn
- Most students do not understand that learning is a *process*

How To Remove the Barriers

- Teach students **how** to learn



- Teach faculty how to **explain** effective learning strategies to students

Metacognition

The ability to:

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

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp.231-236). Hillsdale, NJ: Erlbaum

Faculty Must Help Students Make the Transition to *Learning*

Help students identify and close "the gap"

current behavior → **current grades**



efficacious behavior → **desired grades**

Reflection Questions

- What's the difference, if any, between *studying* and *learning*?
- For which task would you study more?
 - A. Make an A on the test
 - B. Teach the material to the class

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



According to data from the entering class of 2010...*

- ***It wasn't necessary in high school***
 - 63% of 2010 entering first year students spent less than six hours per week doing homework in 12th grade.
 - More than 48% of these students said they graduated from high school with an "A" average.*
- ***Students' confidence level is high***
 - 71.2 % believe their academic ability is above average or in the highest 10 percent among people their age

How do you think most students would answer the following?

- What did most of your teachers in high school do the *day before the test*?
- What did they *do* during this activity?
- What grade would you have made on the test if you had gone to class *only* on the day before the test?

Turn Students into Expert Learners:

Teach Them Metacognitive Learning Strategies!



The Story of Two Students

- **Travis**, *junior psychology student*
47, 52, 82, 86 B in course
- **Dana**, *first year physics student*
80, 54, 91, 97, 90 (final) A in course

And One More...

Fall 2010

- Morayo, junior organic student on special exchange/research program
61, 73, 99



How'd They Do It?

- They used *metacognitive strategies*
- They began *thinking about their thinking*
- They focused on *learning instead of grades*

Travis, junior psychology student
47, 52, 82, 86



Problem: Reading Comprehension

Solution: Preview text before reading
Develop questions
Read one paragraph at a time
and paraphrase information

Dana, first year physics student
80, 54, 91, 97, 90 (final)



Problem: Memorizing formulas and using
www.cramster.com

Solution: Solve problems with no external
aids and test mastery of concepts



Why the Fast and Dramatic Increase?

It's all about the **strategies!**



Counting Vowels in 45 seconds



How accurate are you?

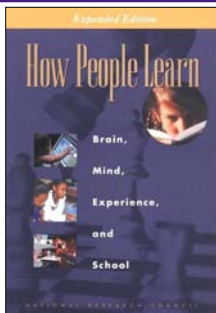
*Count all the vowels
in the words on the next slide.*

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?

An Excellent Introduction

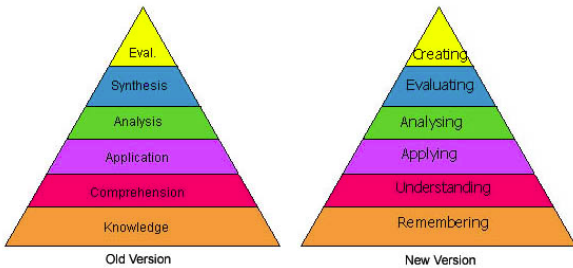


Bransford, J.D., Brown, A.L., Cocking, R.R. (Eds.), 2000. *How people learn: Brain, Mind, Experience, and School*. Washington, DC: National Academy Press.

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**

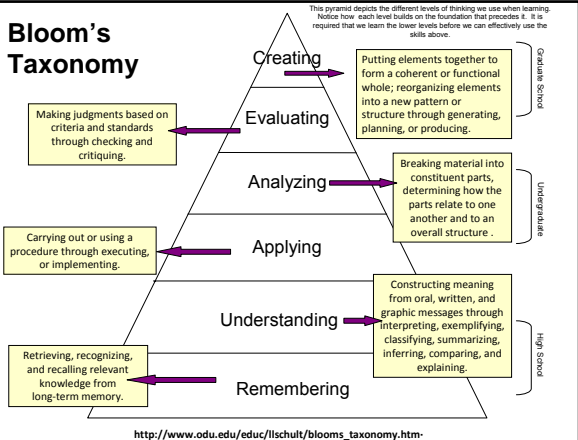
Bloom's Taxonomy



Anderson & Krathwohl, 2001

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

Bloom's Taxonomy



When we teach students about Bloom's Taxonomy...

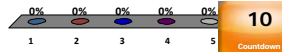
They GET it!



How do you think students answered?

At what level of Bloom's did you have to operate to make A's or B's in high school?

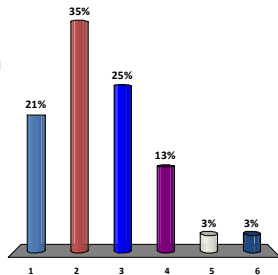
1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation



How students answered

At what level of Bloom's did you have to operate to make A's or B's in high school?

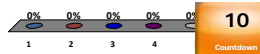
1. Knowledge
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How do you think students answered?

At what level of Bloom's do you think you'll need to be to make an A in Chem 1201?

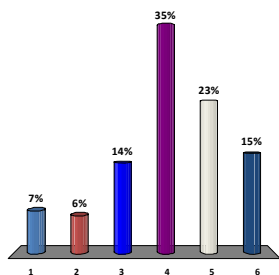
1. Knowledge
2. Comprehension
3. Application
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6. Evaluation



How students answered

At what level of Bloom's do you think you'll need to be to make an A in Chem 1201?

1. Knowledge
2. Comprehension
3. Application
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6. Evaluation



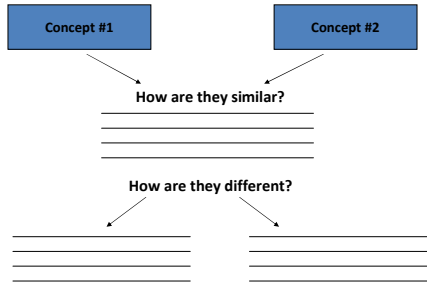
How do we teach students to move higher on Bloom's Taxonomy?

Teach them the Study Cycle*



**adapted from Frank Christ's PLRS system*

Compare and Contrast



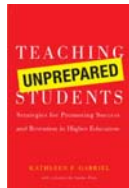
LSU

Center for Academic Success
Transform Learning. Maximize Performance.

Effective Metacognitive Strategies

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

Another Valuable Reference



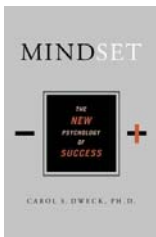
Gabriel, Kathleen F. (2008) *Teaching Unprepared Students*.
Sterling, VA: Stylus Publishing

Effective Strategies for Teaching Unprepared Students*

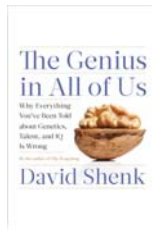
- Establish High Expectations
- Emphasize Consistent Contact
- Determine Students' Learning Styles
- Define Student Success
- Clarify Student Responsibility
- Establish a Learning Community of Scholars
- Meet Students Where They Are
- Interweave Assessment and Teaching

*Gabriel, Kathleen F. (2008) *Teaching Unprepared Students*. Sterling, VA: Stylus Publishing

Help Students Develop the Right Mindset



Dweck, Carol, 2006. *Mindset: The New Psychology of Success*. New York: Random House Publishing



Shenk, David, 2010. *The Genius in All of Us: Why Everything You've Been Told About Genetics, Talent, and IQ Is Wrong*. New York: Doubleday

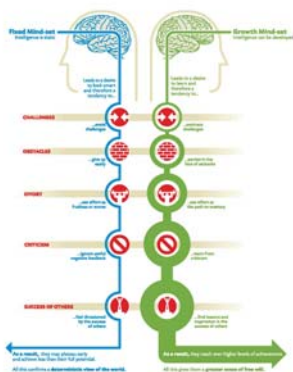
Mindset* is Important!

- **Fixed Intelligence Mindset**
Intelligence is static
You have a certain amount of it
- **Growth Intelligence Mindset**
Intelligence can be developed
You can grow it with actions

Dweck, Carol (2006) *Mindset: The New Psychology of Success*. New York: Random House Publishing

Mindset determines reactions to

- **Challenges** – avoid vs. embrace
- **Obstacles** – give up easily vs. persist
- **Tasks requiring effort** – fruitless vs. path to mastery
- **Criticism** – ignore vs. learn from
- **Success of Others** – feel threatened by vs. find lessons and inspiration in



The Impact of Using Metacognitive Strategies

“Without these strategies, I probably would have gotten a C in chemistry. 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 these strategies, I probably would have done terribly in Chemistry.”

Fall 2009 First semester chemistry student

Chem 1001 Results Spring 2007

	Test 1	Test 2	Final	Total points
Attended metacog 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.

LSU Analytical Chemistry Graduate Student's Cumulative Exam Record

<u>2004 – 2005</u>		<u>2005 – 2006</u>	
9/04	Failed	10/05	Passed
10/04	Failed	11/05	Failed
11/04	Failed	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

Began work with CAS and the Writing Center in October 2005



Dr. Algernon Kelley, December 2009

... and from the perspective of a faculty member who learned metacognitive strategies as a student

“...I am happy to report to you that **many of my students are using the study cycle** and all of the outcomes are positive.

In summary, students who were failing all of their classes, including my course and in their final semester before being removed from the university are **now the top students in their respective classes**.

I am so proud of these students. Many of the students stated to me that they will continue to use the study cycle.....”

October 15, 2010

Algernon Kelley, Xavier University Chemistry Instructor

... and from the perspective of a QEP director

“Faculty started thinking about **designing assignments and assessment in terms of metacognitive skills** as well as standard outcomes.”

“Faculty agree that **investing time up front on teaching metacognitive strategies** and raising self-awareness allows the instructor to move students into course-content more easily because expectations are clarified.”

May 19,

2011

We can significantly increase student learning!

- We must teach students the learning process and provide 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

Faculty Must Help Students Make the Transition to *Learning*

Help students identify and close “the gap”

current *behavior* → current *grades*



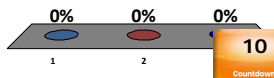
efficacious *behavior* → desired *grades*

Reflection Questions

- What’s the difference, if any, between *studying* and *learning*?
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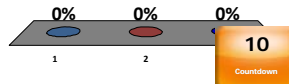
Final Reflection Question:
Who is *primarily* responsible for student learning?

1. The student
2. The professor
3. The institution



Who do *students* say is *primarily* responsible for student learning?

1. The student
2. The professor
3. The institution



The reality is that...

when **all three** of these entities take **full responsibility** for student learning, we will experience a **significant increase** in student learning, retention, and graduation rates!



Useful Websites

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

Additional 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.

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Hoffman, Roald and Saundra Y. McGuire. (2010). Learning and Teaching Strategies. *American Scientist* , vol. 98, pp. 378-382.

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



QUESTIONS?