

Teach Students How to Learn: Metacognition is the Key!

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Innovative Educators Webinar
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LOUISIANA STATE UNIVERSITY

Center for Academic Success

UNIVERSITY COLLEGE

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

N C L C A



Desired outcomes

- We will understand why some students spend very little time studying and do not know how to learn
- We will have concrete learning strategies that we can teach students in order to increase learning, and we will be committed to trying some of these strategies in our classes and our talks with students
- 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

Overview

- Impact of using metacognitive strategies
- Characteristics of many of today's learners
- Turning students into expert learners
- Cognitive Science Research
- Types and levels of learning
- Effective learning strategies
- Wrap Up

The Story of Four Students

- Travis, junior psychology student
47, 52, 82, 86
- Robert, freshman chemistry student
42, 100, 100, 100
- Maryam, freshman art student
57, 87
- Dana, first year physics student
80, 54, 91, 97, 90 (final)

How'd They Do It?

They became expert learners
by using *metacognition!*

They learned to think about their own thinking,
and they studied to LEARN,
not just to make the grade!

Metacognition*

The ability to:

- think about one's own 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

*term coined by Flavell in 1976

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

What is the task described here?

*"The procedure is actually quite simple. First, you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step. Otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important but complications can easily arise. A mistake can be expensive as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one can never tell. After the procedure is completed, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually, they will be used once more, and the whole procedure will then have to be repeated. However, that is part of life."

Unknown Task Source

Bransford, J.D.& Johnson, M.K. “Contextual Prerequisites for Understanding: Some Investigations of Comprehension and Recall,” *Journal of Verbal Learning and Verbal Behavior*, 2:7, 1972.

Robert, freshman chemistry student

42, 100, 100, 100



Problem: Using examples to do homework problems

Solution: Study information *before* trying homework problem

Use example to test skill

Do homework problems as if doing a test or quiz (no looking at solution manual or examples!)

Maryam, freshman art student

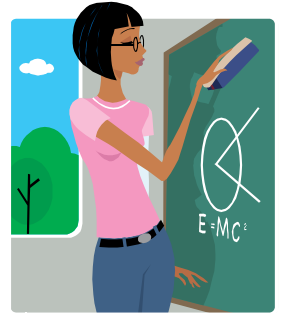
57, 87



Problem: Not seeing the underlying structure of different types of art

Solution: Focus on characteristics of different artists' work in order to indentify the painter of an unfamiliar piece of art

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

Dana's Spring 2010 Grades

<u>Course</u>	<u>Grade</u>	<u>Hrs Carried</u>	<u>Hrs Earned</u>	<u>Quality Pts</u>
Biology	A	3.00	3.00	12.00
Comp Sci	A	3.00	3.00	12.00
Math	A	4.00	4.00	16.00
Med. Phys	A	3.00	3.00	12.00
Mechanics	A	3.00	3.00	12.00

Current Cumulative GPA: 3.88

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 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



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





It wasn't necessary in high school

And why not?

How do you think most students would answer the following questions?

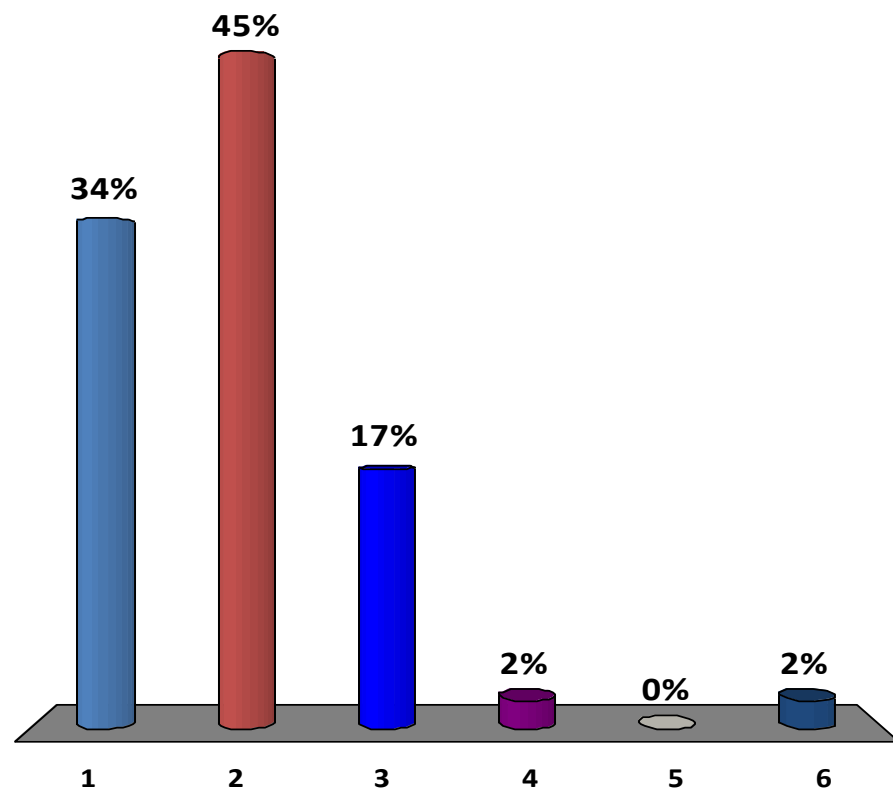
What did most of your teachers in high school do the day before the test?

What did they *do* during this activity?

What grade would you have made on the test if you went to class *only* on the day before the test?

What grade did you get in high school chemistry?*

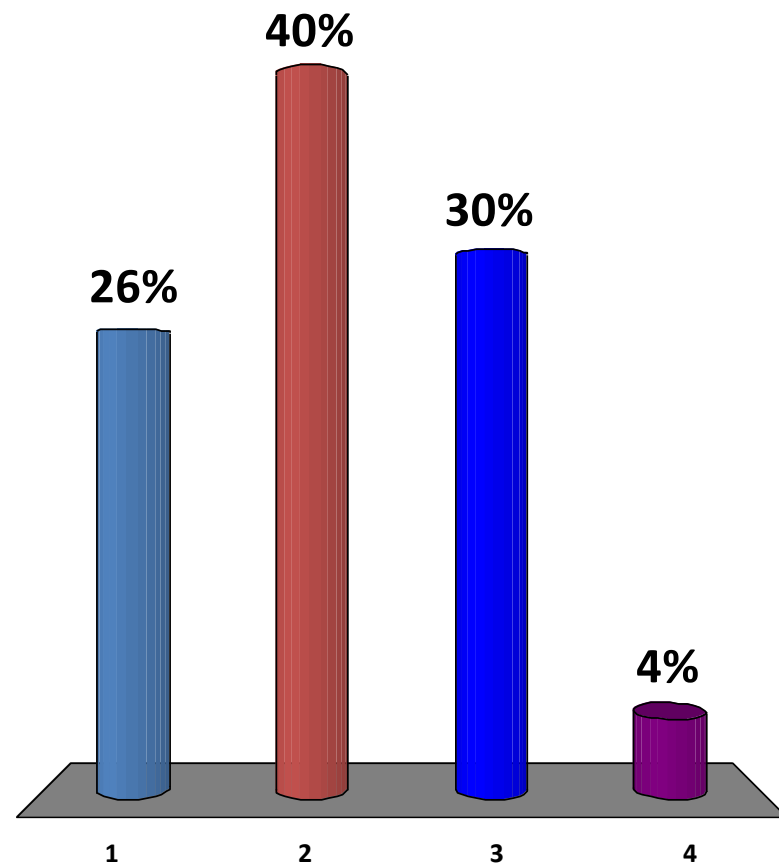
1. A
2. B
3. C
4. D
5. F
6. I didn't take high school chemistry



*234 Students in a Supplemental General Chemistry Course, Fall 2009

How confident are you that you will make an A or B in Chem 1201

1. Extremely
2. Very
3. A little
4. Not at all



We 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

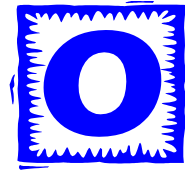
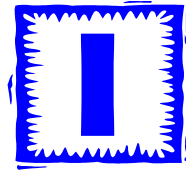


Turn Students into Expert Learners:

Learning Strategies are the Keys!



Counting Vowels in 45 seconds



How accurate are you?

Dollar Bill

Dice

Tricycle

Four-leaf Clover

Hand

Six-Pack

Seven-Up

Octopus

Cat Lives

Bowling Pins

Football Team

Dozen Eggs

Unlucky Friday

Valentine's Day

Quarter Hour

How many *words or phrases* do you remember?

- a. 2 or less
- b. 3 – 5
- c. 6 – 8
- d. 9 – 12
- e. 13 or more

Let's look at the words again...

What are they arranged according to?

Dollar Bill

Dice

Tricycle

Four-leaf Clover

Hand

Six-Pack

Seven-Up

Octopus

Cat Lives

Bowling Pins

Football Team

Dozen Eggs

Unlucky Friday

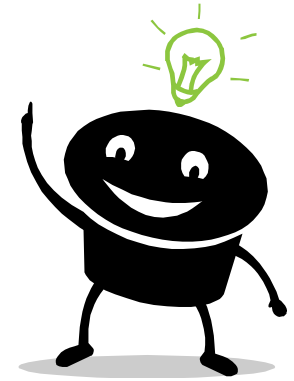
Valentine's Day

Quarter Hour

NOW, how many words or phrases
do you remember?

- a. 2 or less
- b. 3 - 5
- c. 6 - 8
- d. 9 - 12
- e. 13 or more

What were two major differences
between the first attempt
and the second attempt?

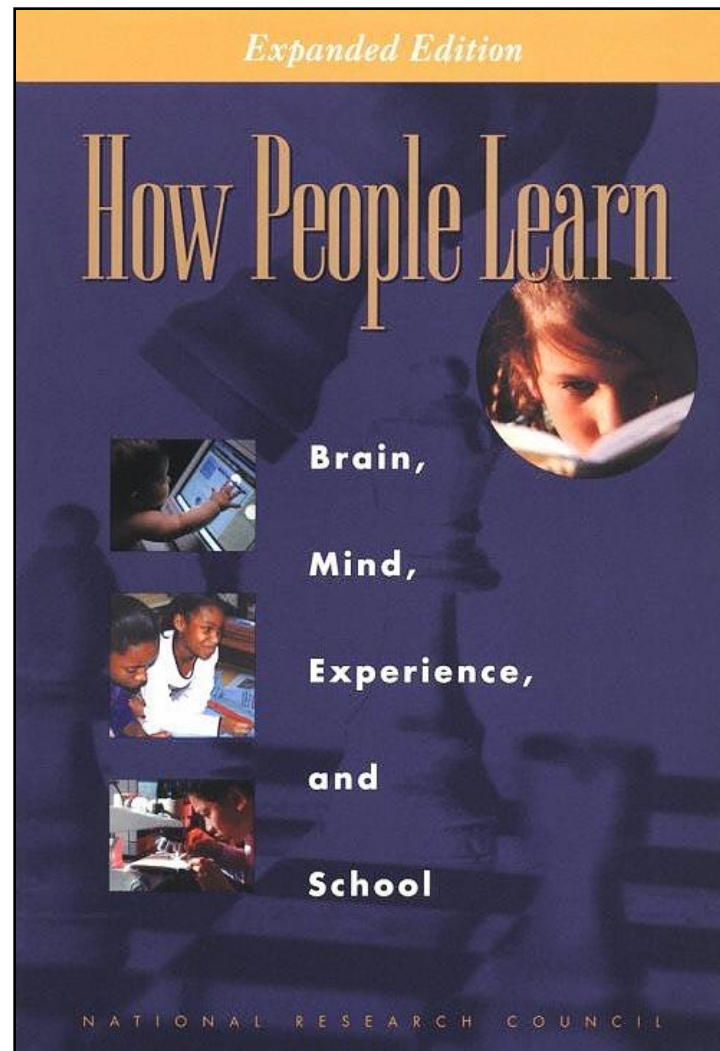


1. We knew what the task was
2. We knew how the information was organized

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

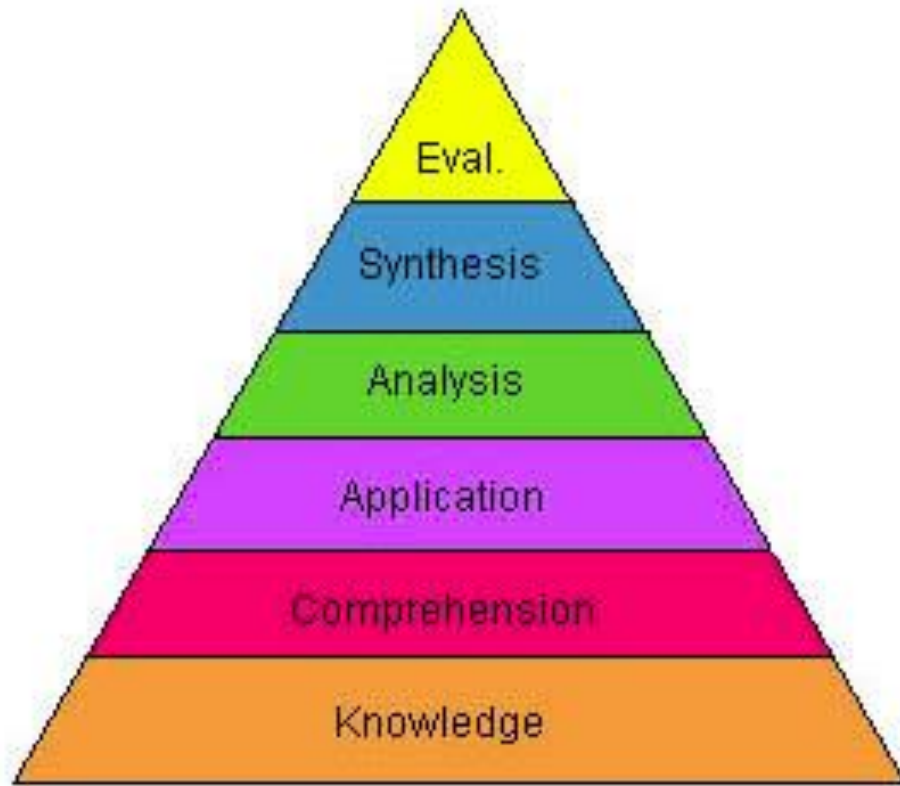
What we know about learning

- 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

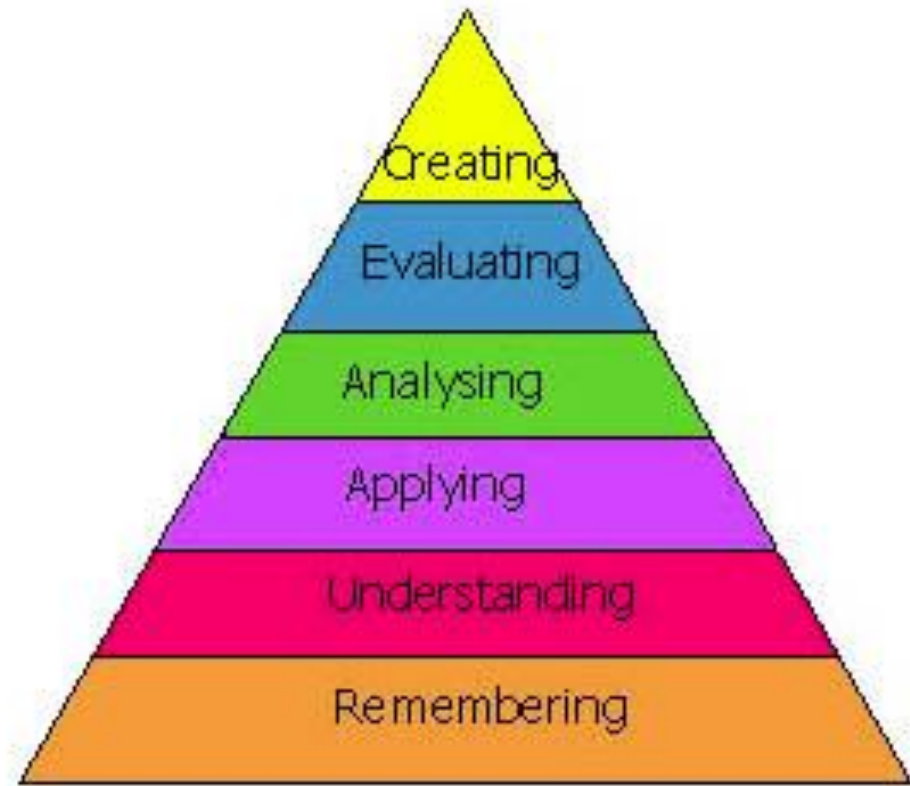
Effective Metacognitive Strategies

- 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



Old Version



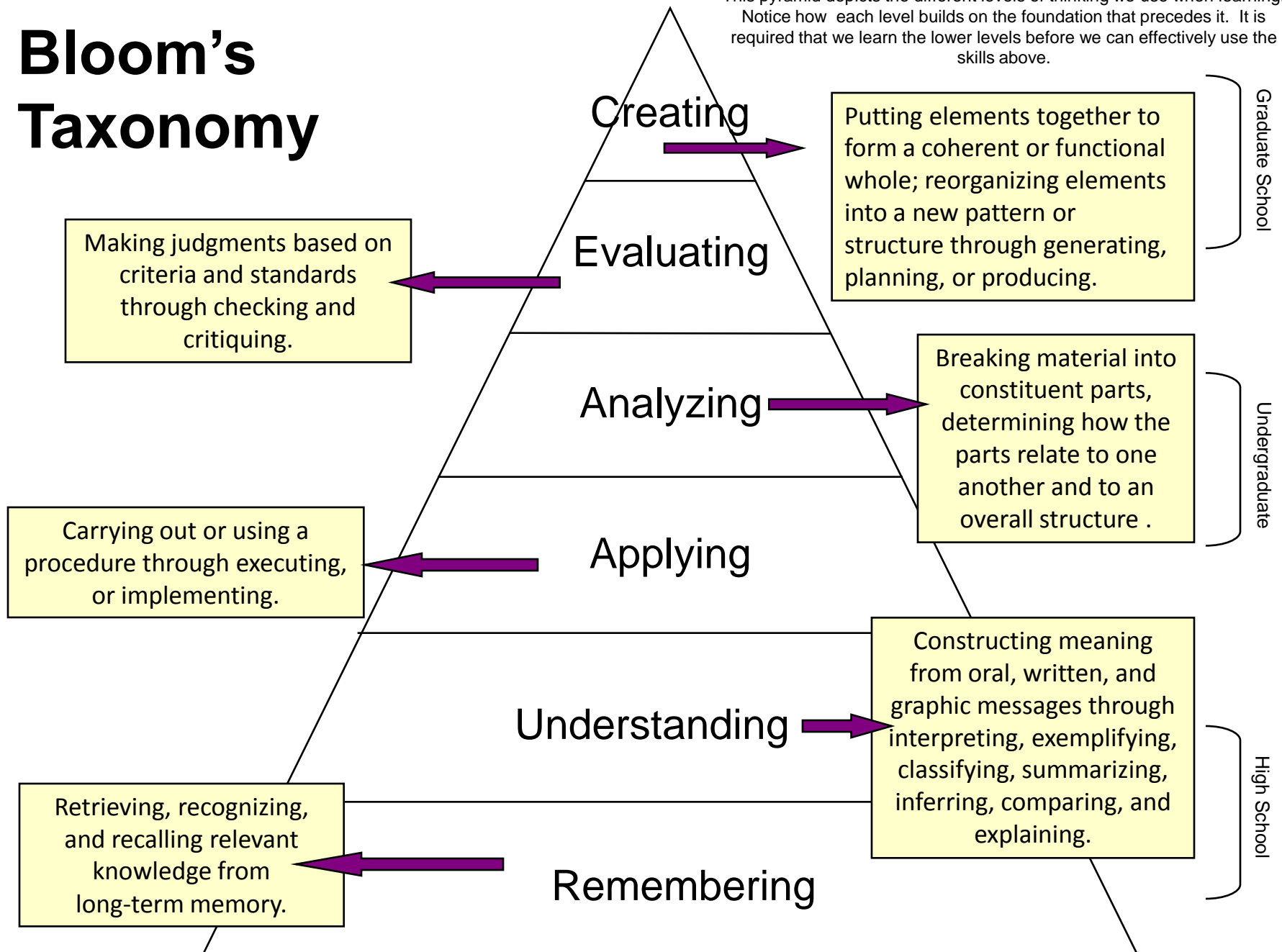
New Version

Anderson & Krathwohl, 2001

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

Bloom's Taxonomy

This pyramid depicts the different levels of thinking we use when learning. Notice how each level builds on the foundation that precedes it. It is required that we learn the lower levels before we can effectively use the skills above.



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.

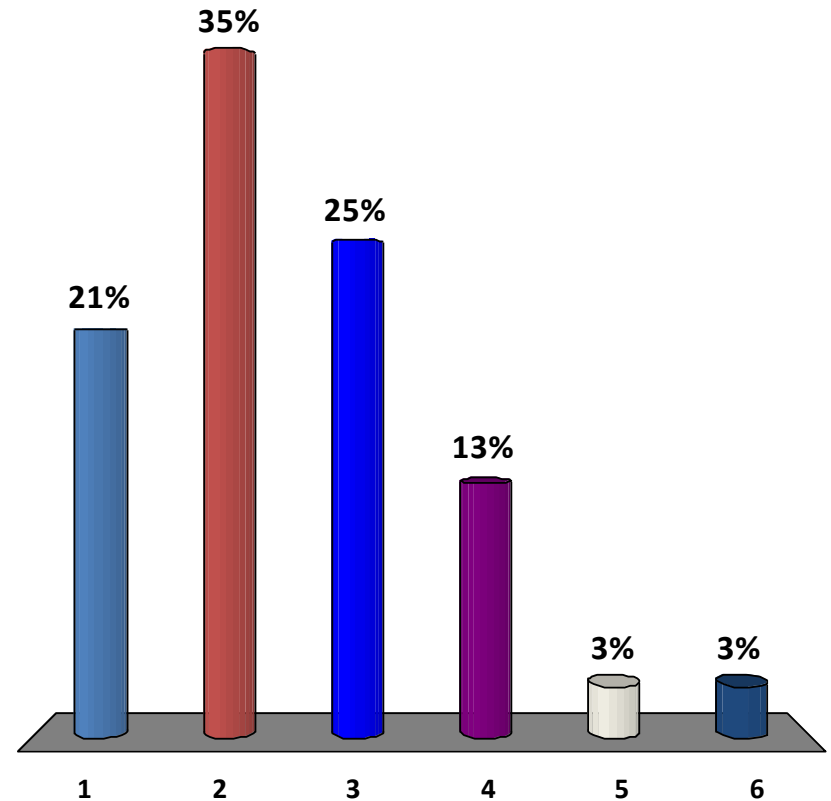
When we teach students about Bloom's Taxonomy...

They GET it!



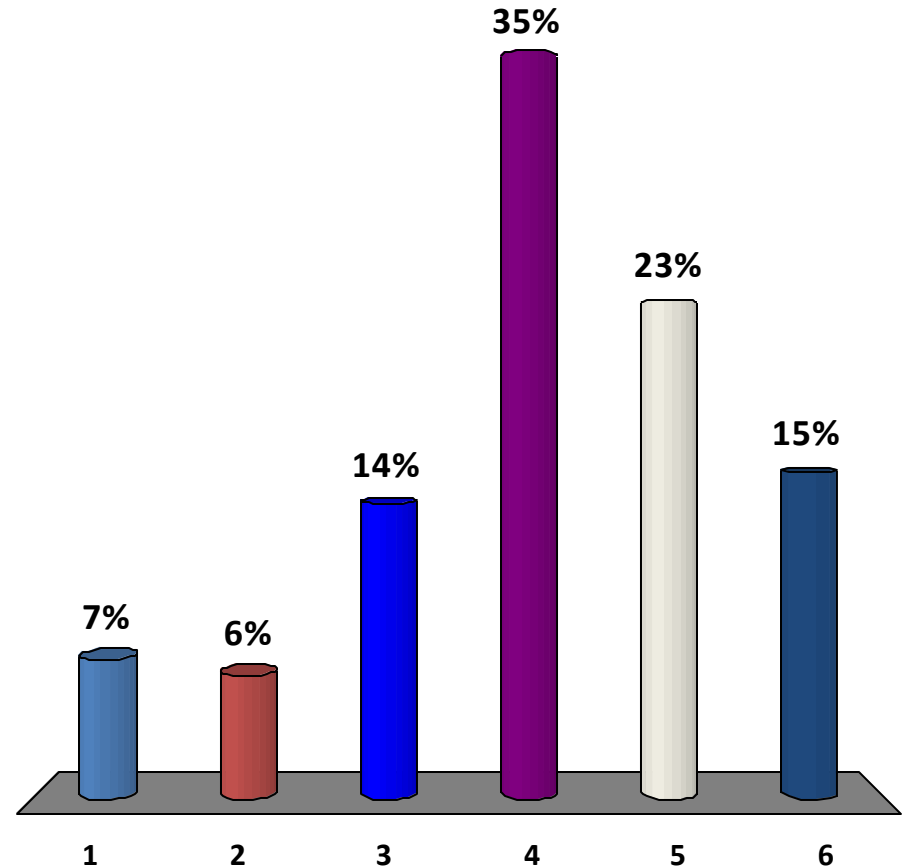
At what level of Bloom's did you have to operate to make A's or B's in high school?

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



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

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



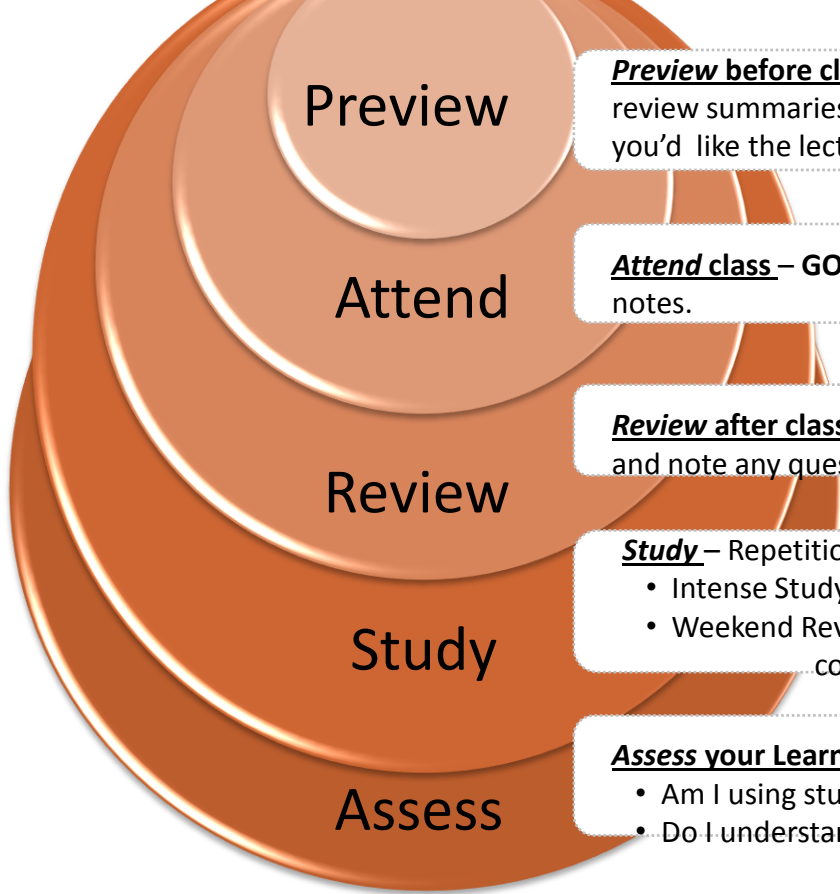
How do we teach students to move
higher on Bloom's Taxonomy?

Teach them the Study Cycle*



**adapted from Frank Christ's PLRS system*

The Study Cycle



Preview before class – Skim the chapter, note headings and boldface words, review summaries and chapter objectives, and come up with questions you’d like the lecture to answer for you.

Attend class – **GO TO CLASS!** Answer and ask questions and take meaningful notes.

Review after class – As soon after class as possible, read notes, fill in gaps and note any questions.

Study – Repetition is the key. Ask questions such as ‘why’, ‘how’, and ‘what if’.

- Intense Study Sessions* - 3-5 short study sessions per day
- Weekend Review – Read notes and material from the week to make connections

Assess your Learning – Periodically perform reality checks

- Am I using study methods that are effective?
- Do I understand the material enough to teach it to others?

*Intense Study Sessions

1	Set a Goal	(1-2 min)	Decide what you want to accomplish in your study session
2	Study with Focus	(30-50 min)	Interact with material- organize, concept map, summarize, process, re-read, fill-in notes, reflect, etc.
3	Reward Yourself	(10-15 min)	Take a break – call a friend, play a short game, get a snack
4	Review	(5 min)	Go over what you just studied

Study Cycle Book Marks

Available from the TLT Group at
<http://tlt.gs/bkmrkPreviewClass>



Here is just enough to help you begin. *Even better when supplemented by brief instruction, conversation, Web resources, etc. See Side B.*

Preview for Class - Applied Metacognition

Help more students prepare more often and more effectively for class.

Encourage students to PREVIEW (instead of READ) assignments before coming to class.

Use online poll, forum, etc.

Encourage each student to generate and submit one question in advance of class about the assignment - and review others.

Side A



The TLT Group

Teaching, Learning, and Technology

A Non-Profit Corporation

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- Brief Hybrid Workshops

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Frugal Innovation for Better Online Teaching - Soon

Moving toward online teaching soon?
 Here's a little help.

Purpose of this resource: Enable

[TLT Group Events](#)

Flashlight Online 101 (11 Nov 2010)

[Register here for ALL TLT Group offerings.](#) [Individual Membership](#) as well as other TLT Group offerings, including **FridayLive!**

FASTPASS for Fall now available

Challenge of Frugal Innovation: Continue to improve teaching and learning with technology in colleges and universities when money and time are

Teaching Online Book Marks

Available from the TLT Group

<http://tlt.gs/TeachingOnlineBkmrk>



Here is just enough to help you begin. *Even better when supplemented by brief instruction, conversation, Web resources, etc. See Side B.*

Moving toward online teaching soon? Already too busy?

Worried about providing your online students with enough effective guidance, feedback, and interaction? Especially in online "discussions"?

See: **Brief Hybrid Workshops on Teaching Well Online**

Ray Purdom & Jane Harris of University of North Carolina, Greensboro et al.

<http://bit.ly/TLTG-FRLV-BHW-TWO>

Side A

Helpful Resources for First Steps

- Brief Hybrid Workshops about Teaching Well Online
<http://www.uncg.edu/tlc/hybrid/>
- Convert PPT Slides to Online Presentations
<http://bit.ly/TLTGpptONLINE>

Use, Adapt, Improve, Share

Please take, adapt, print, duplicate enough of these paper bookmarks to give a few copies each to some colleagues to share further. Editable, printable versions available at:
<http://bit.ly/TLTG-FRLV-BHW-TWO>
A few rights reserved. See: <http://bit.ly/TLTGshareforward>

The TLT Group, A Non-Profit Organization
301 270 8312 www.tltgroup.org

Side B

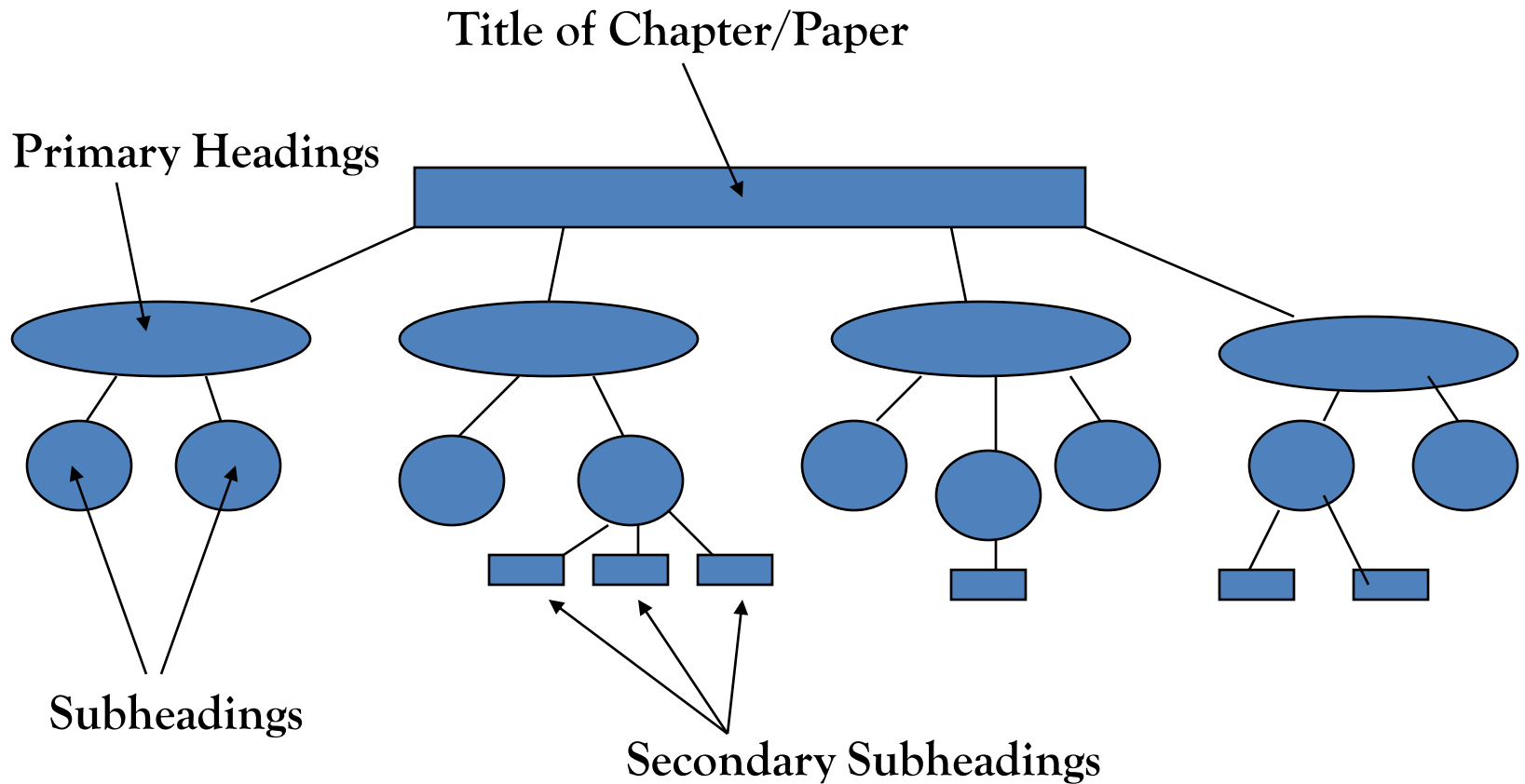
Concept maps* facilitate development of higher order thinking skills



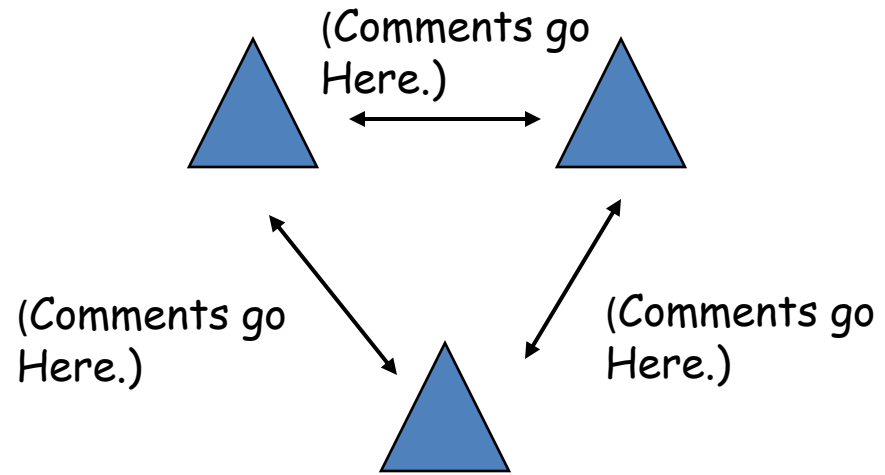
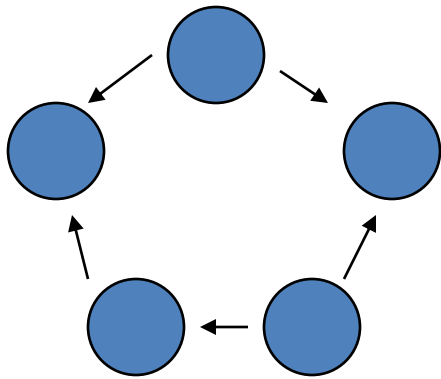
And there are many different
forms of concept maps

***developed by Joseph Novak in 1972**

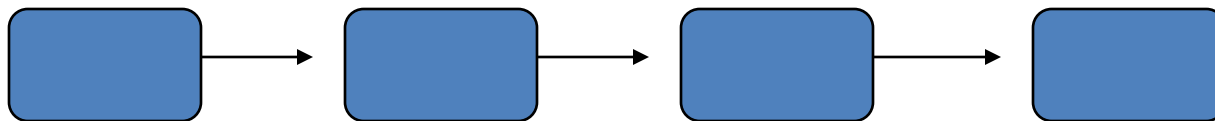
Chapter/Paper Map



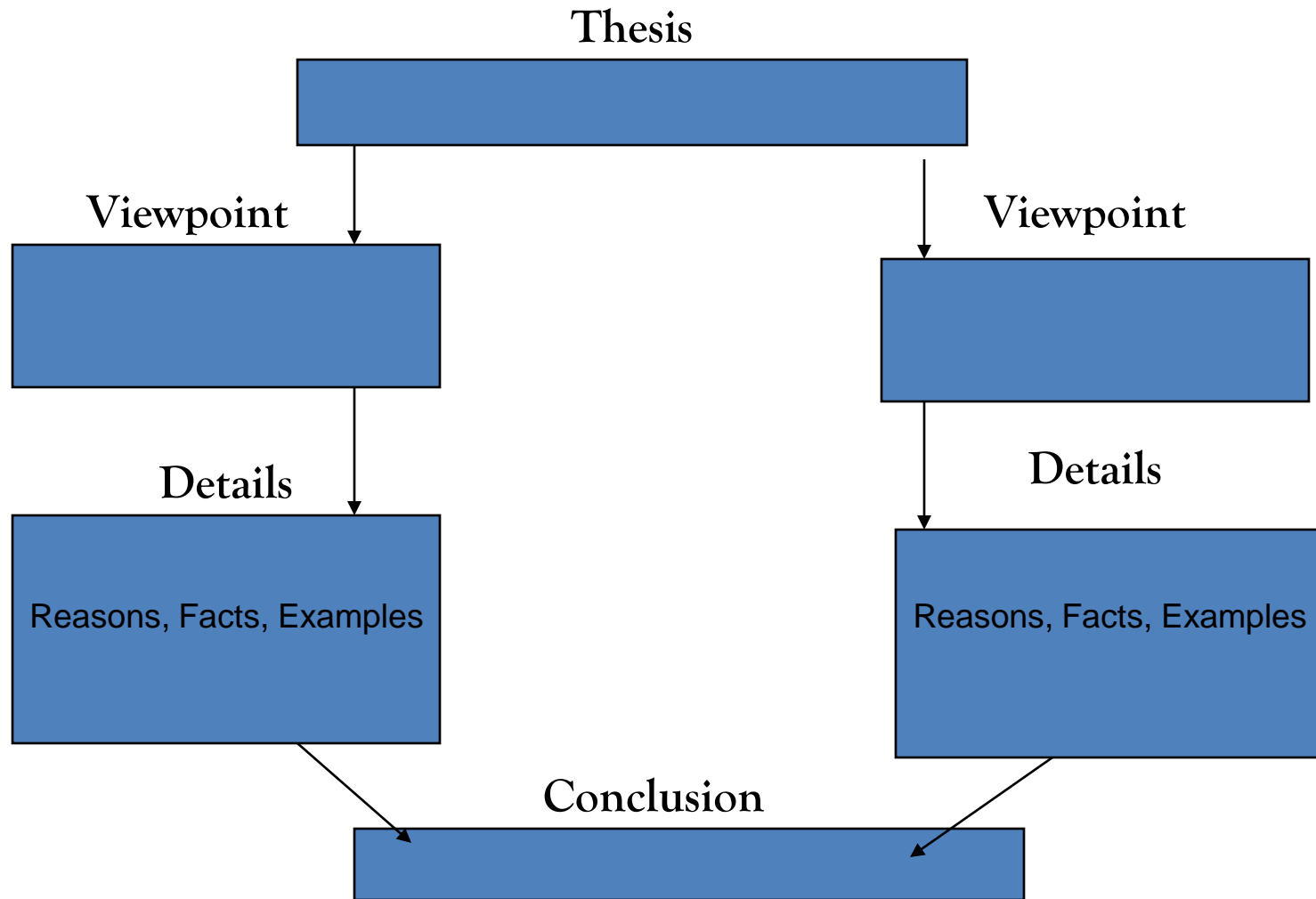
Ideas...



Cause and Effect:



Persuasive Writing



Compare and Contrast

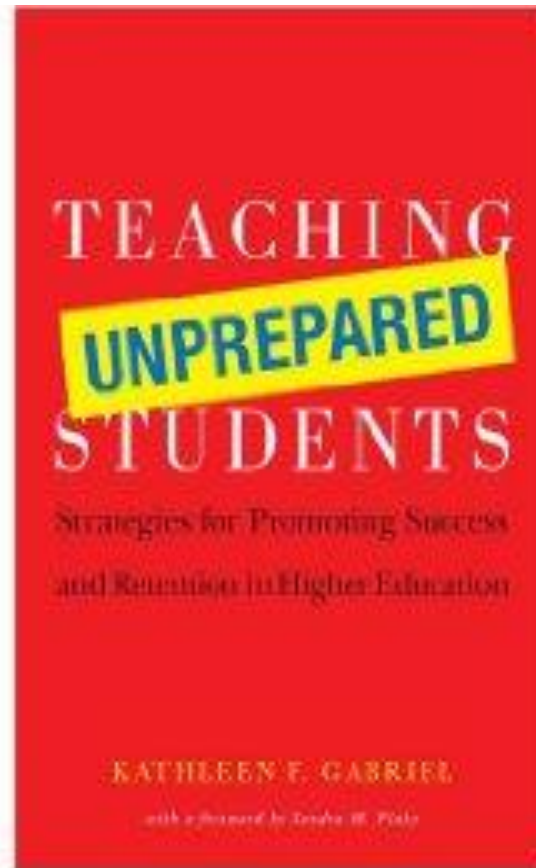
Concept #1

Concept #2

How are they similar?

How are they different?

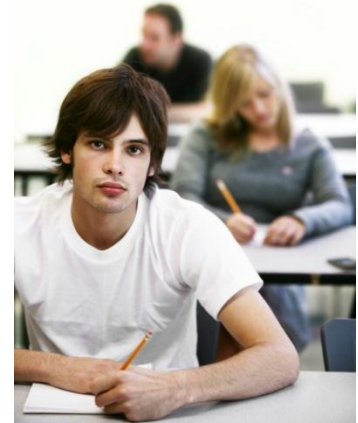
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Gabriel, Kathleen F. (2008) *Teaching Unprepared Students*. Sterling, VA: Stylus Publishing

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



*Kathleen Gabriel, Stylus Publishing, 2008

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

... 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

Center for Academic Success Website

www.cas.lsu.edu

LOG IN TO PAWS > Baton Rouge, Louisiana | Tuesday, October 19, 2010 Search Isu.edu

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SUCCESS STORIES

“I got a 4.0 this semester! Thanks so much for all of your help...I really appreciate it!!!”

-- Sophomore Student [MORE...](#)

SHARE MY SUCCESS >
Tell us what has worked for you. [Share Now >](#)

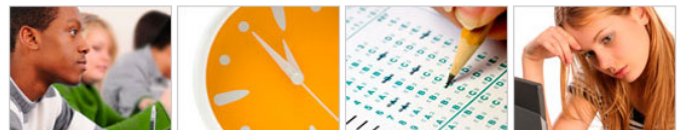
MAKE THE MOST OF CAS >

Search the CAS

I want to attend/utilize:

CAS NEWS >
International S.I. Conference Presentations

CREATE MY PLAN FOR SUCCESS >



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.

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!

LSU Analytical Chemistry Graduate Student's Cumulative Exam Record

2004 – 2005

9/04 Failed

10/04 Failed

11/04 Failed

12/04 Failed

1/05 Passed

2/05 Failed

3/05 Failed

4/05 Failed

Began work
with CAS and
the Writing
Center in
October 2005

2005 – 2006

10/05 Passed

11/05 Failed

12/05 Passed best in group

1/06 Passed

2/06 Passed

3/06 Failed

4/06 Passed last one!

5/06 N/A



Dr. Algernon Kelley, December 2009

LSU

Center for Academic Success
Transform Learning. Maximize Performance.

... 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

February 7, 2010 Chronicle of Higher Education
How Students Can Improve by Studying Themselves

Researchers at CUNY's Graduate Center push 'self-regulated learning'



Grazyna Niezgoda, a math instructor at New York City College of Technology, says most students eventually appreciate the new methods.

Learning and Teaching Strategies

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²Center for Academic Success and Department of Chemistry, Louisiana State University, Baton Rouge, LA 70803, USA.

Useful Websites

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

Additional Resources

- The National College Learning Center Association
www.nclca.org
- The College Reading and Learning Association
www.crla.net
- The Professional and Organizational Development Network (POD) www.podnetwork.org
- The Teaching, Learning and Technology Group
www.tlt.org
- www.howtostudy.org
- www.vark-learn.com
- www.drearlbloch.com
- Searches on www.google.com

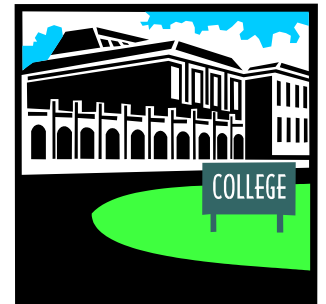


Final Reflection Question

Who is *primarily* responsible for student learning?

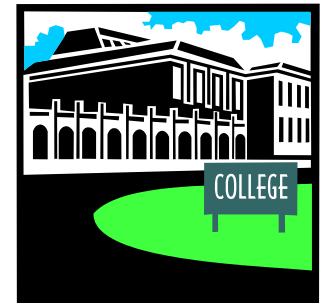


- a) the student
- b) the instructor
- c) the institution



Whom do you think students say is *primarily* responsible for student learning?

- a) the student
- b) the instructor
- c) 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 performance!



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

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<http://academic.pg.cc.md.us/~wpeirce/MCCCTR/metacognition.htm>

Acknowledgements

- Colleagues at LSU, especially the Center for Academic Success, the Division of Student Life and Enrollment Services, and the Department of Chemistry
- Sarah Baird, former CAS learning strategist
- National College Learning Center Association (NCLCA)
- College Reading and Learning Association (CRLA)
- Dr. Frank Christ
- Innovative Educators
- The Teaching, Learning, and Technology Group (TLT)
- My many students who have proven to me that metacognitive strategies really do work!