Get Students to Focus on Learning Instead of Grades: Metacognition is the Key!

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DELTA STATE UNIVERSITY

Mission

Emphasis is placed on excellence in instruction…the University encourages significant student-faculty interactions… Students from different cultural, socioeconomic, and ethnic backgrounds will develop the ability… to **develop, assess, and express their own thoughts effectively**; and to use the techniques of research and performance associated with their disciplines.

Vision

Students … **will learn and grow** in an environment that fosters discovery and creativity.

Desired outcomes

- We will understand why many 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 them
- 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

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

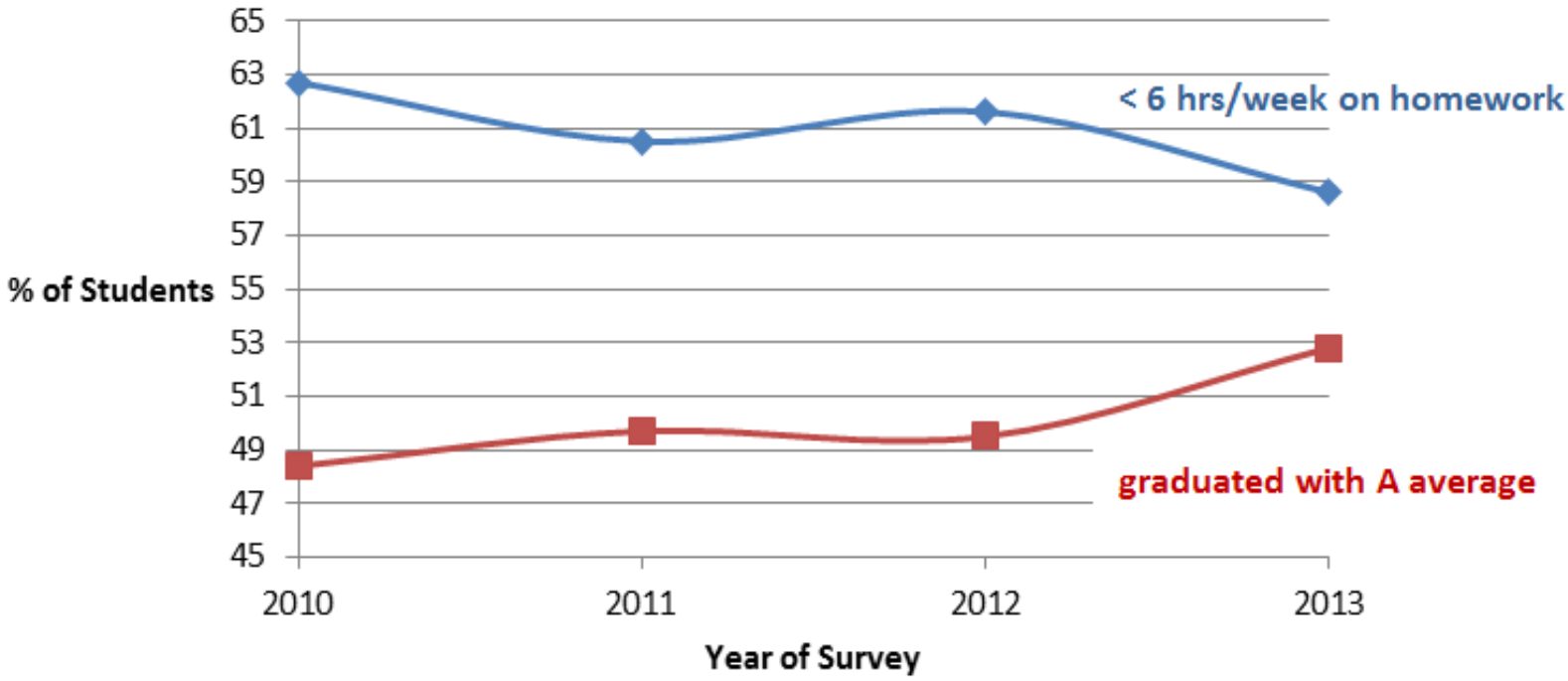
Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), The nature of intelligence (pp.231-236). Hillsdale, NJ: Erlbaum

Why don’t many students know how to learn or how to study?

It wasn’t necessary in high school

Data from UCLA Higher Education Research Insitute (HERI)
First Year Student Survey - 2010 - 2013

	% who spent < 6 hours/wk on homework	% who graduated from HS with an A average
2010	62.7	48.4
2011	60.5	49.7
2012	61.6	49.5
2013	58.6	52.8



http://www.heri.ucla.edu/

achieve more®

SAT®

2013 SAT® Report on COLLEGE & CAREER READINESS

EXECUTIVE SUMMARY

The College Board's *2013 SAT® Report on College & Career Readiness* reveals that fewer than half of all SAT takers in the class of 2013 graduated from high school academically prepared for the rigors of college-level course work. This number has remained virtually

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?

Faculty Must *Help Students Make the Transition to College*

Help students identify and **close "the gap"**

current *behavior* → ***current grades***

productive *behavior* → ***desired grades***

Reflection Questions

- What's the difference, if any, between *studying* and *learning*?

- For which task would you work harder?
  A. Make an A on the test
  B. Teach the material to the class

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

Let's Revisit Travis

47, 52, 82, 86

Problem: Reading Comprehension

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

*Develop anticipatory set

Voyage of Christopher Columbus

WITH HOCKED GEMS FINANCING HIM/ OUR HERO BRAVELY DEFIED ALL SCORNFUL LAUGHTER/ THAT TRIED TO PREVENT HIS SCHEME/ YOUR EYES DECEIVE/ HE HAD SAID/ AN EGG/ NOT A TABLE/ CORRECTLY TYPIFIES THIS UNEXPLORED PLANET/ NOW THREE STURDY SISTERS SOUGHT PROOF/ FORGING ALONG SOMETIMES THROUGH CALM VASTNESS/ YET MORE OFTEN OVER TURBULENT PEAKS AND VALLEYS/ DAYS BECAME WEEKS/ AS MANY DOUBTERS SPREAD FEARFUL RUMORS ABOUT THE EDGE/ AT LAST/ FROM NOWHERE/ WELCOME WINGED CREATURES APPEARED/ SIGNIFYING MOMENTOUS SUCCESS

Dooling, J.D. and Lachman, R. Effects of Comprehension on Retention of Prose, *Journal of Experimental Psychology,* (1971), Vol. 88, No. 2, 216-222

Anticipatory set CAN interfere!

Let's look at the car on the next slide…

Is this a 2-door or 4-door car?

Revisiting Dana

Dana, *first year physics student*

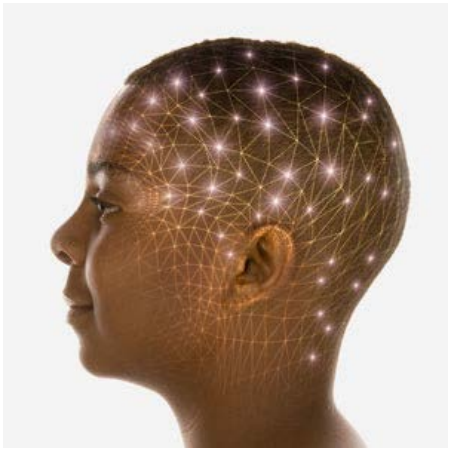
80, 54, 91, 97, 90 (final)

Problem: Memorizing formulas and using on-line solutions help for problems

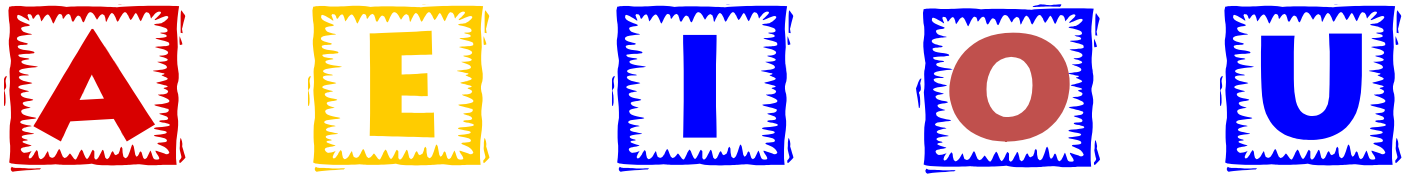
Solution: Solve problems with no external aids and test mastery of concepts

Why the Fast and Dramatic Increase?

It's all about the ***strategies***, and getting ***them*** to ***engage their brains***!



Counting Vowels in 45 seconds



How accurate are you?

Count the vowels
in the words on the next slide.

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* from the list do you remember?

Let’s look at the words again…

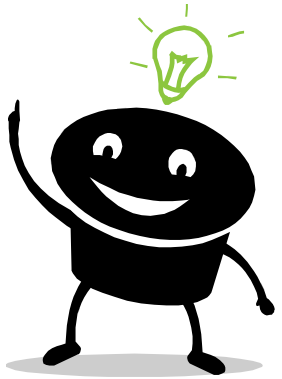
What are they arranged according to?

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* from the list do you remember?

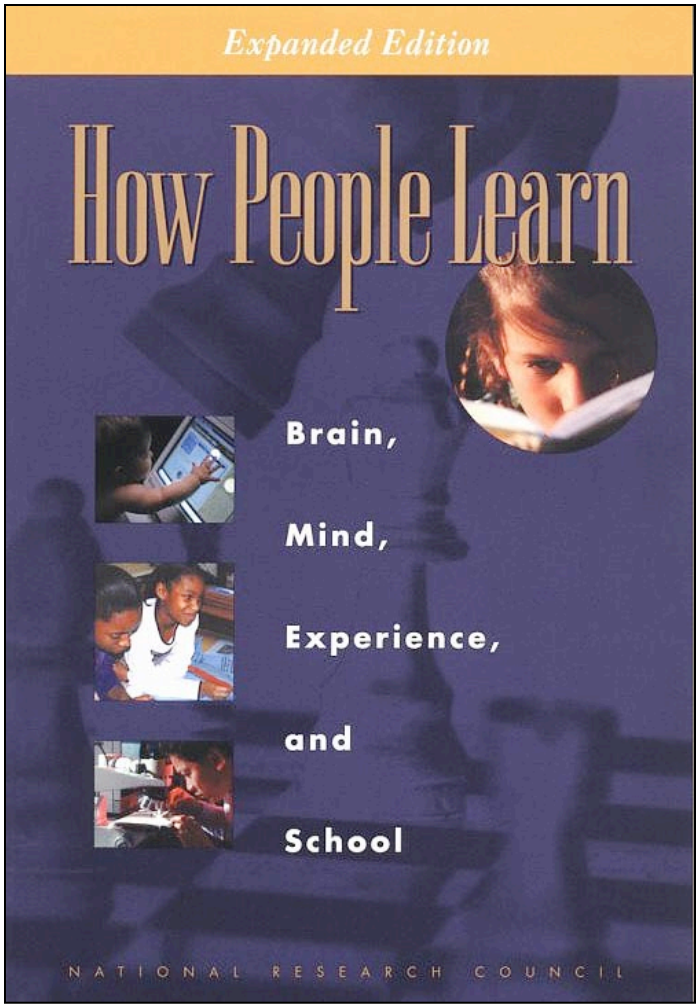
What were two major ***differences*** between the 1st and 2nd attempts?



1. We knew what the task was

2. We knew how the information was organized

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
  -- Passive learning is an oxymoron*

- Thinking about thinking is important
  – Metacognition**

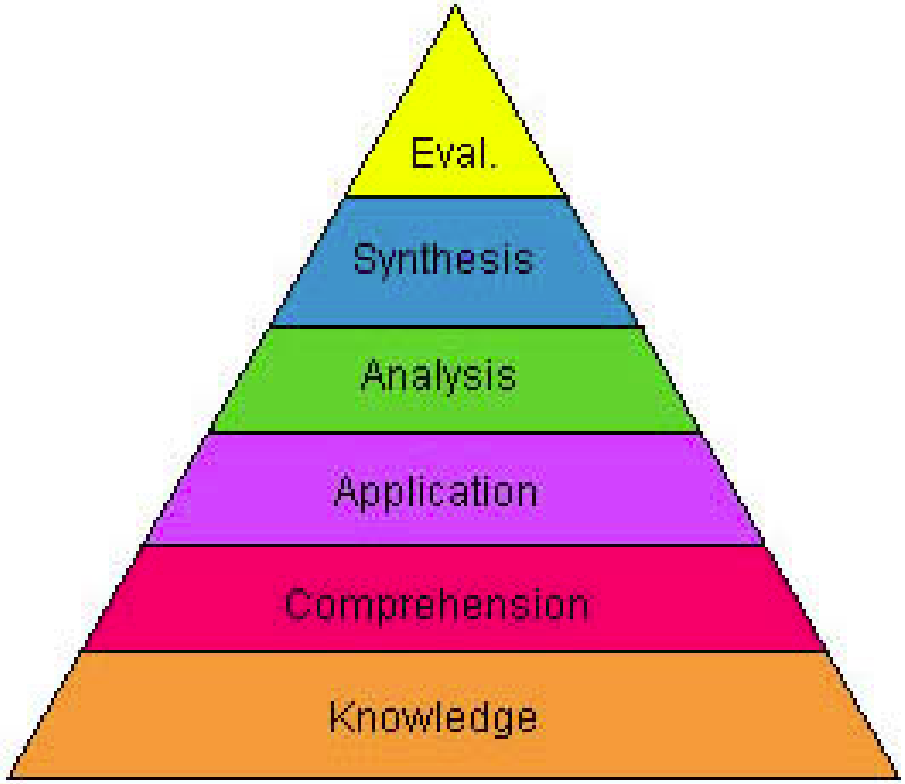
- The level at which learning occurs is important
  – Bloom's Taxonomy***

*Cross, Patricia, "Opening Windows on Learning" League for Innovation in the Community College, June 1998, p. 21.

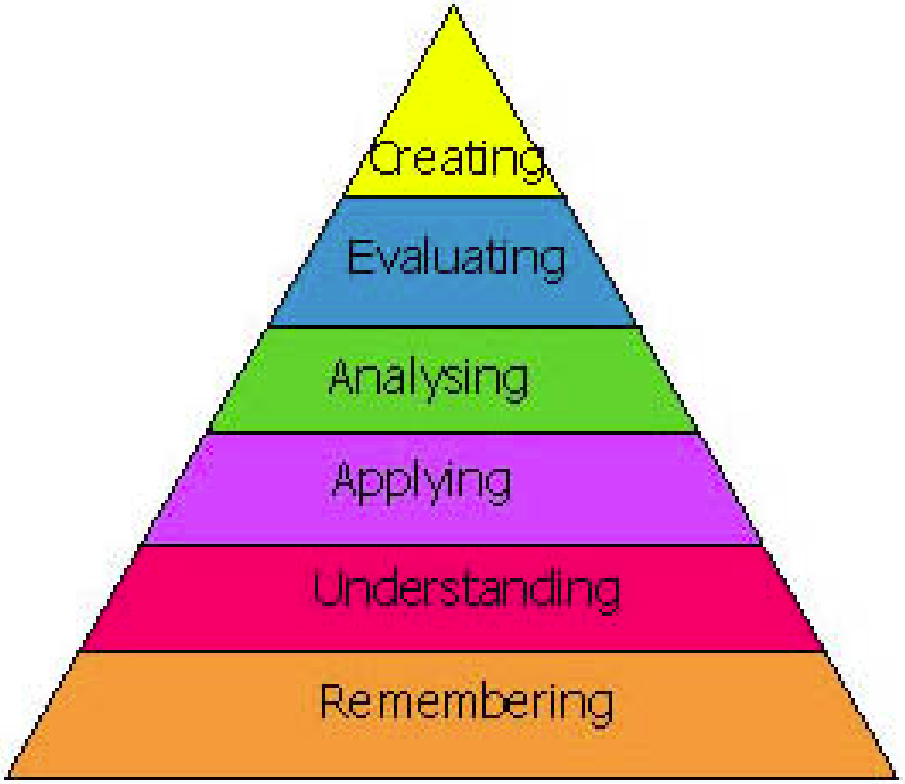
** Flavell, John, "Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry." *American Psychologist*, Vol 34(10), Oct 1979, 906-911.

*** Bloom Benjamin. S. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain.* New York: David McKay Co Inc.

Bloom's Taxonomy



Old Version



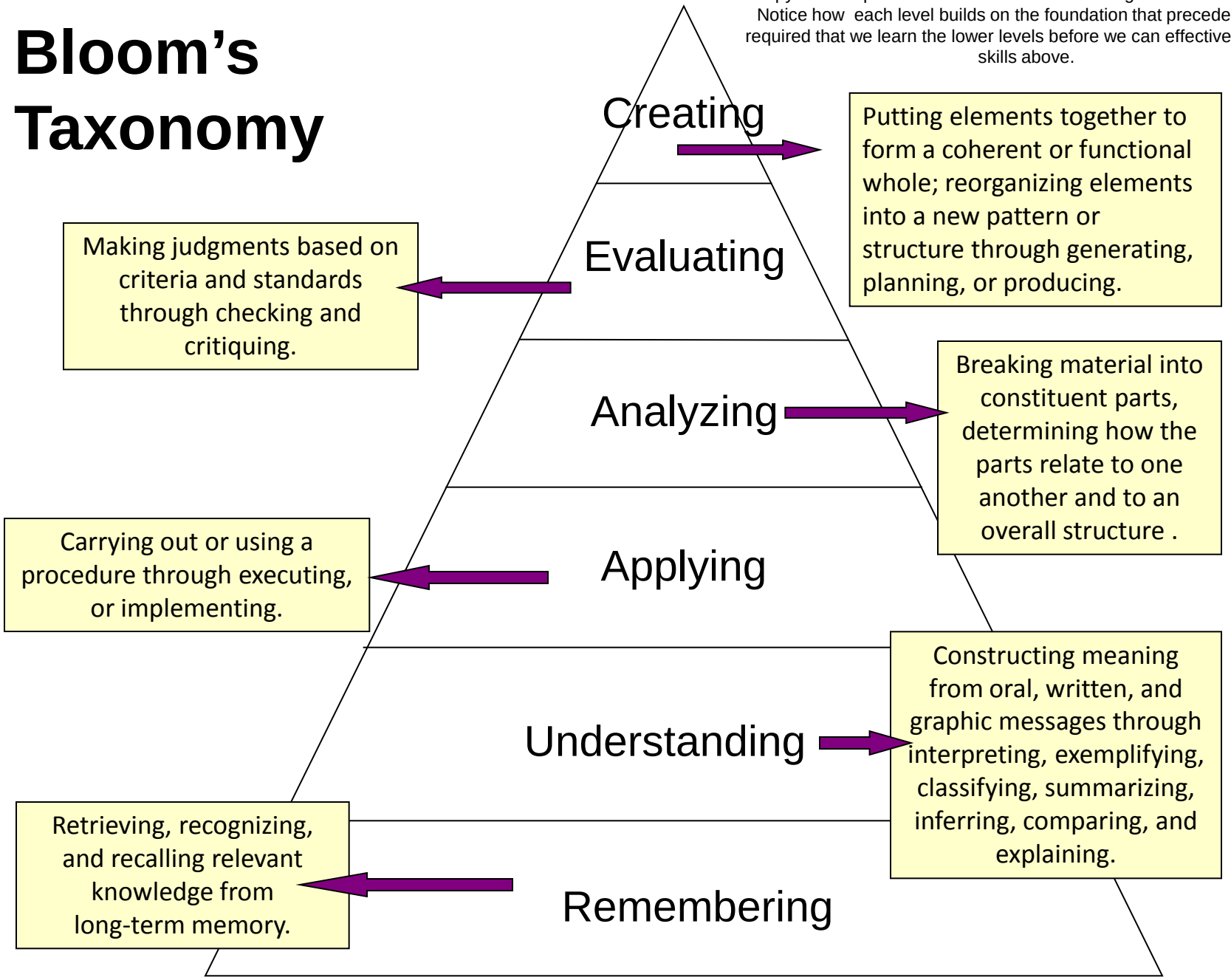
New Version

Anderson & Krathwohl, 2001

http://ww2.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

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.



http://www.odu.edu/educ/llschult/blooms_taxonomy.htm·

When we teach students about Bloom's Taxonomy…

They GET it!

How do you think students answered?

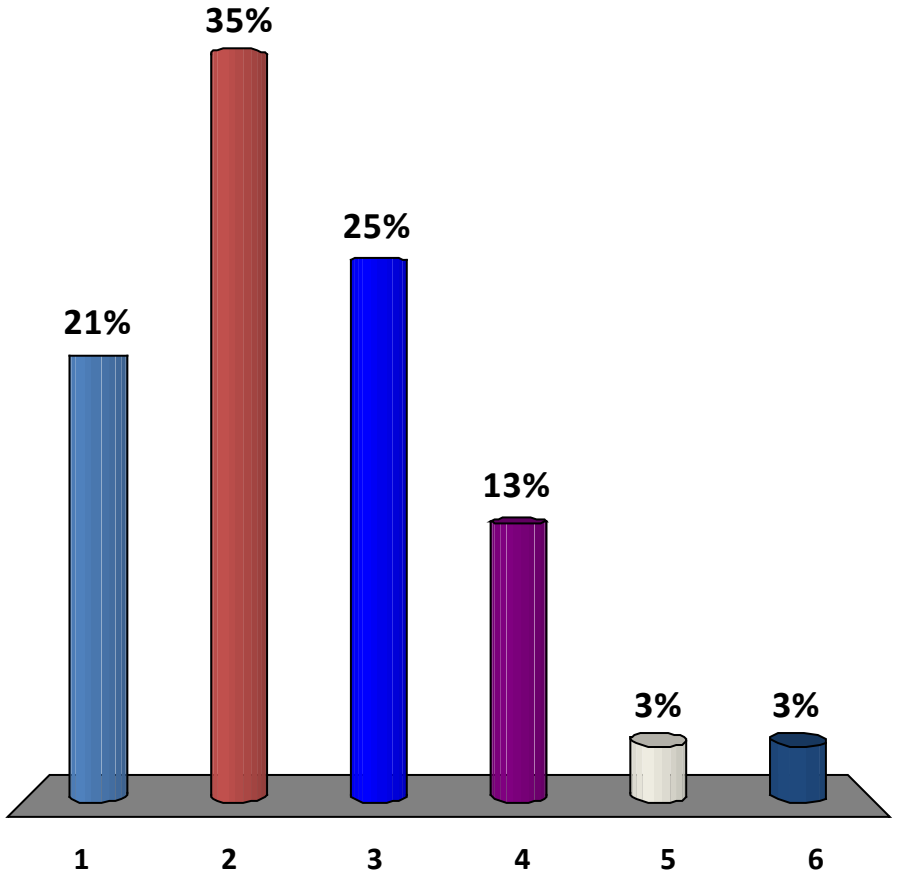
At what level of Bloom's did you have to operate to make A's or B's in high school?

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating

How students answered (2008)

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

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How students answered (2013)

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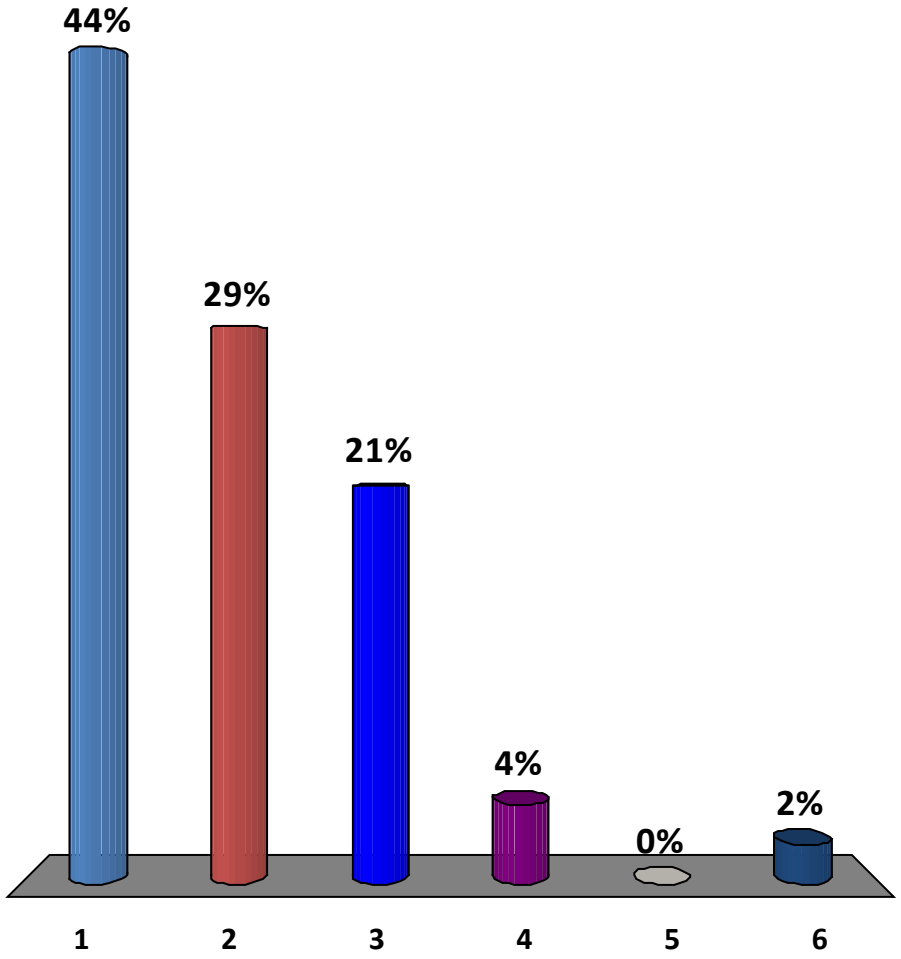
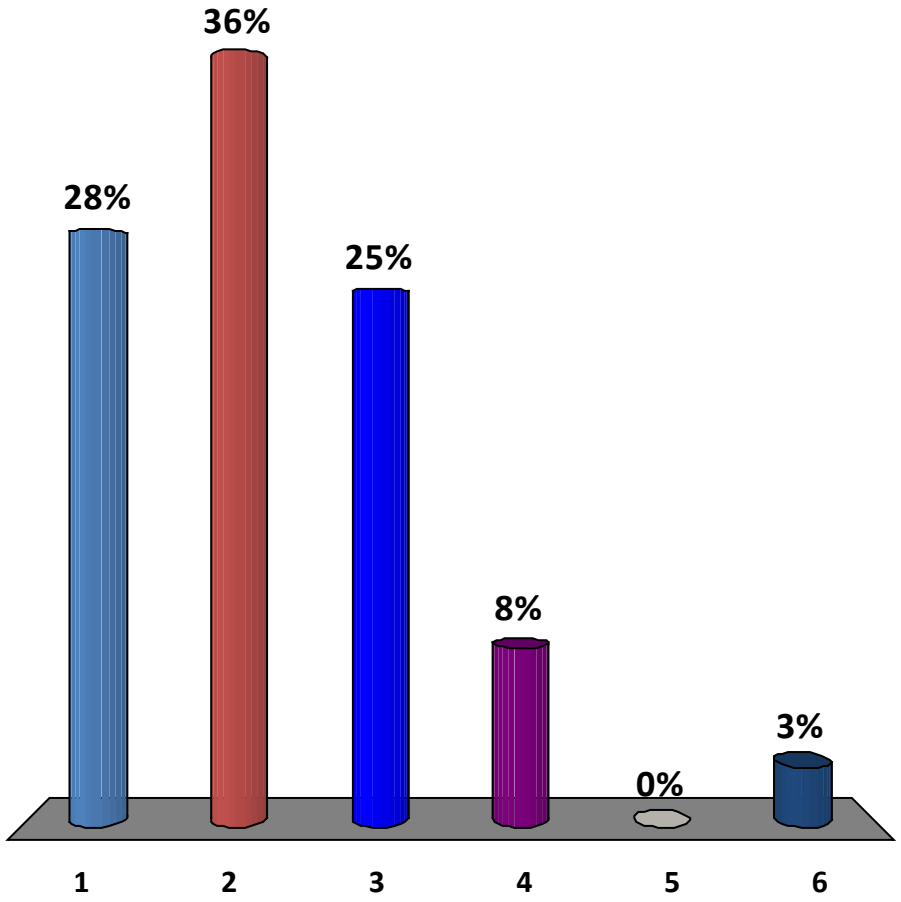
1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How students answered (2014)

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

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How do you think students answered?

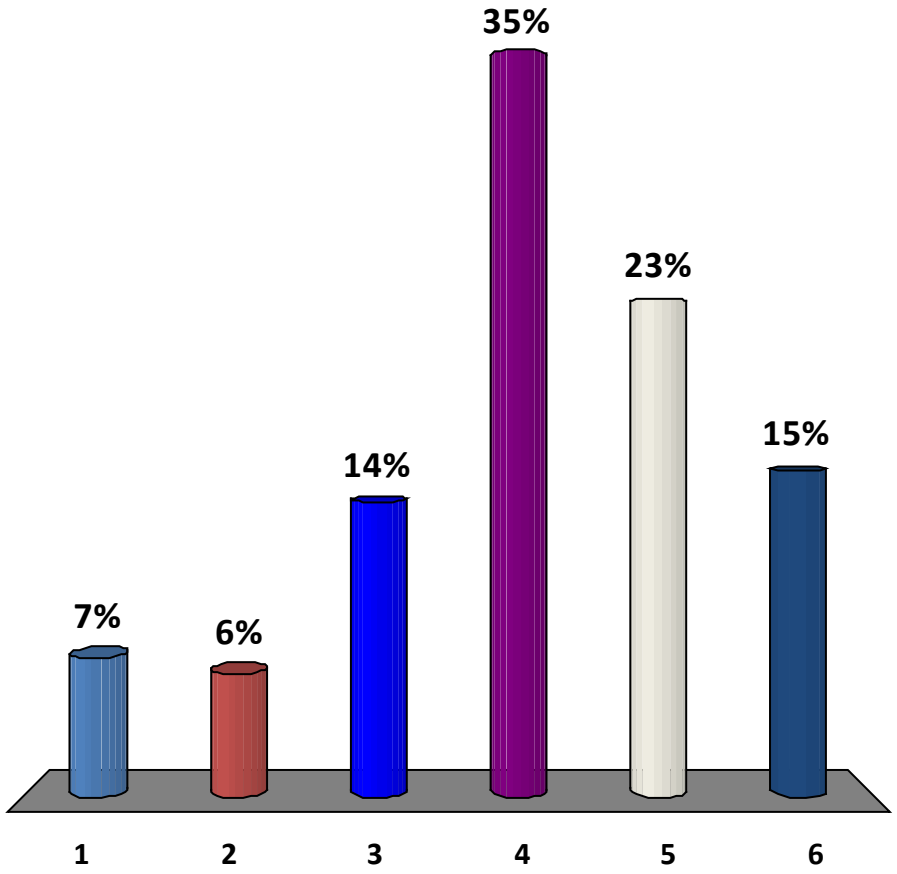
At what level of Bloom's do you think you'll need to operate to make A's in college courses?

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating

How students answered (in 2008)

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

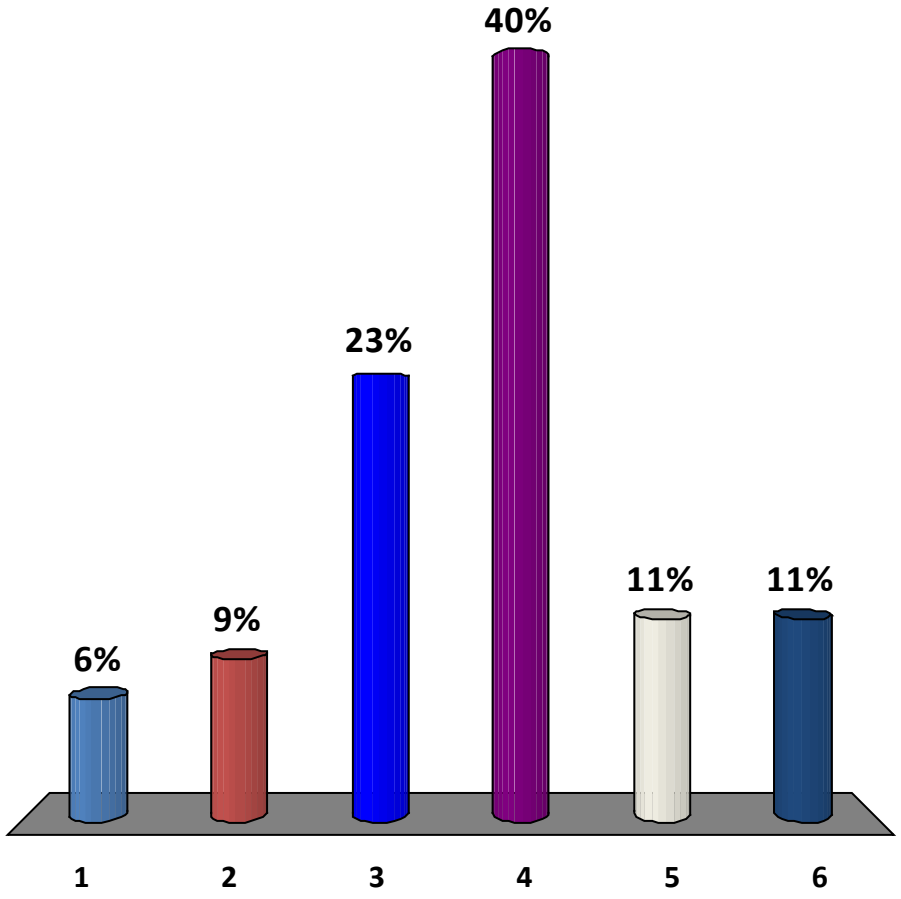
1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How students answered (in 2013)

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

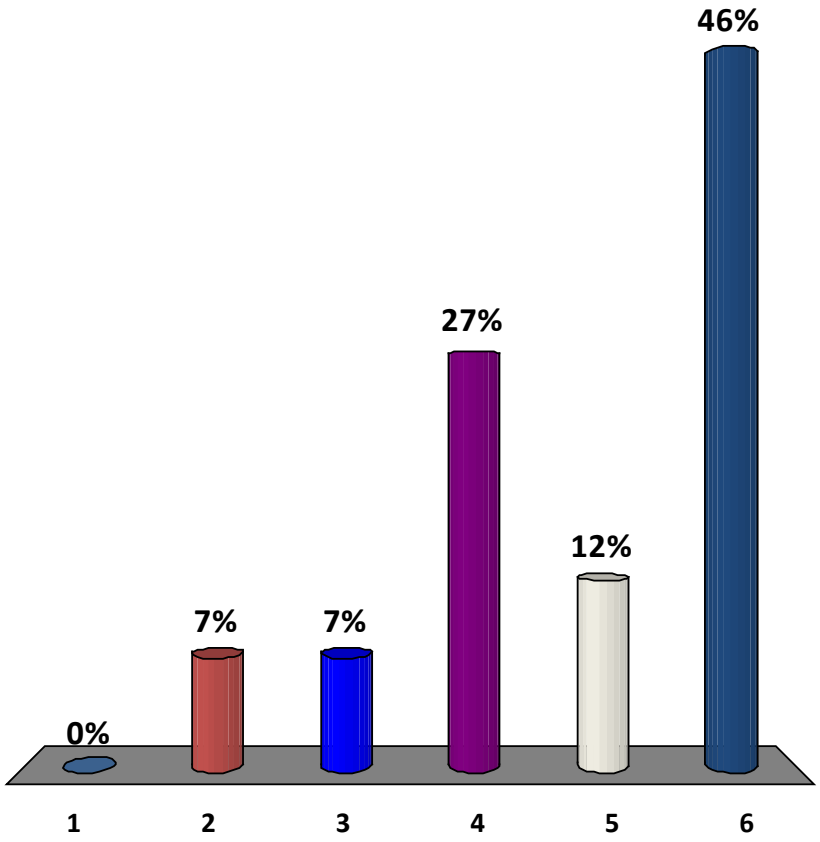
1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How students answered (in 2014)

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

1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating

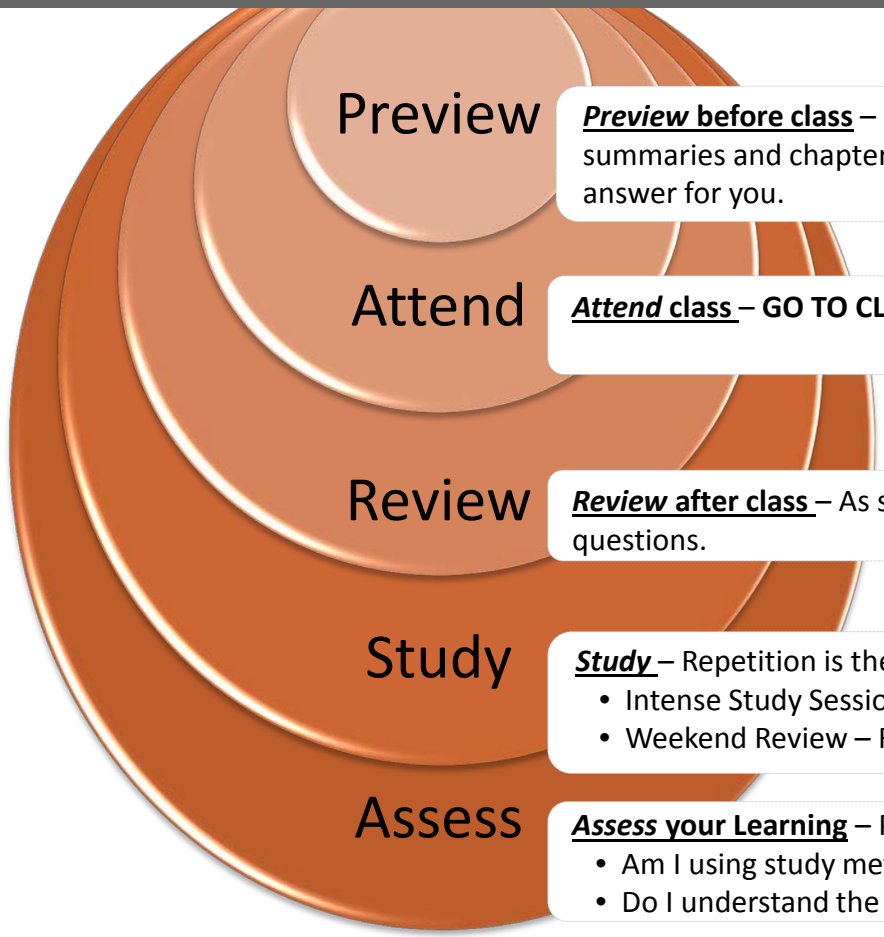


How do we teach students to move higher on Bloom's Taxonomy?

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**

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What happens when we **teach metacognitive learning strategies**, Bloom's Taxonomy, and the Study Cycle **to an entire class**, not just individuals?

Performance in Gen Chem I in 2011 Based on One Learning Strategies Session*

	Attended	Absent
Exam 1 Avg.:	71.65%	70.45%
Exam 2 Avg.:	77.18%	68.90%
Final course Avg*.:	81.60%	70.43%
Final Course Grade:	**B**	**C**

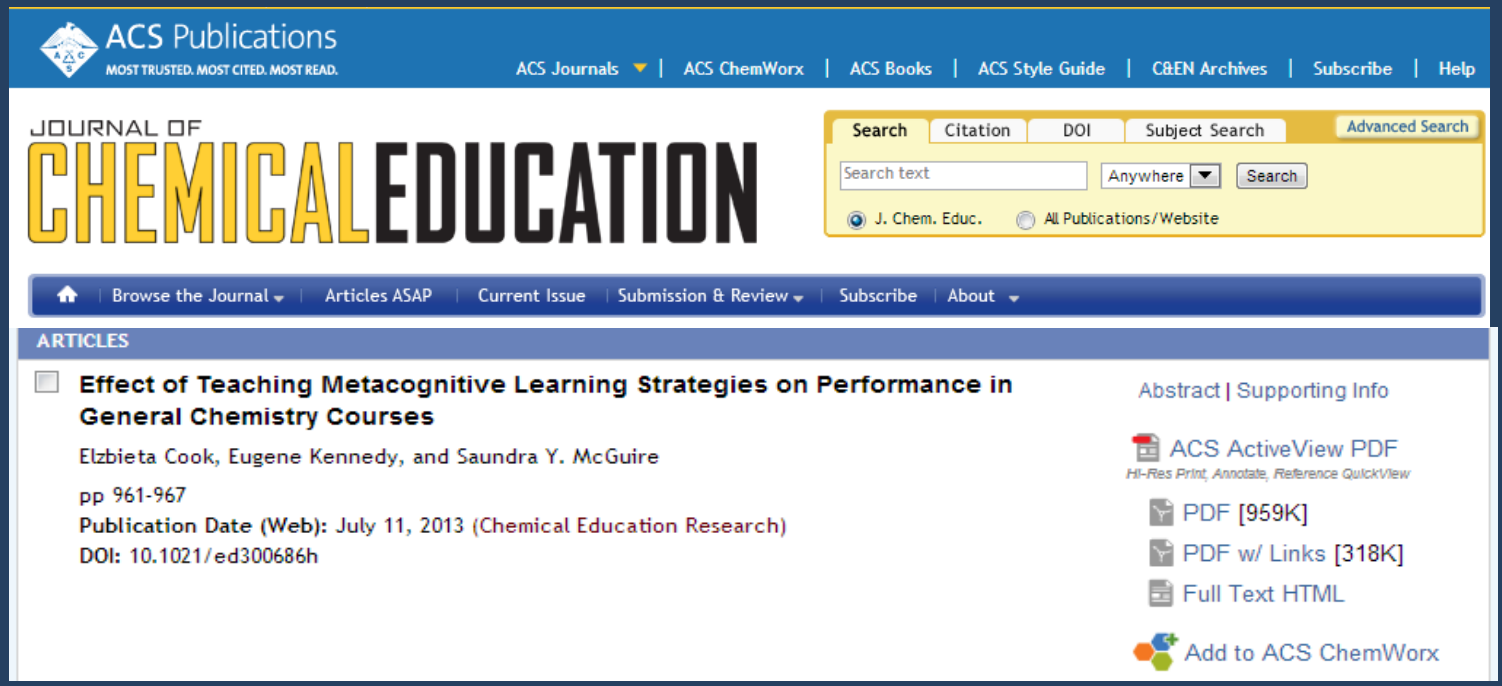
The one 50-min presentation on study and learning strategies resulted in an improvement of one full letter grade!

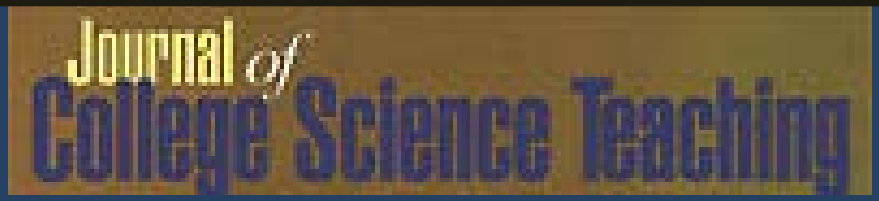
***Cook, E.; Kennedy, E.; McGuire, S. Y. *J. Chem. Educ.*, 2013, 90 (8), 961–967**

Performance in Gen Chem 1202 Sp 2013 Based on One Learning Strategies Session

	Attended	Absent
Exam 1 Avg.:	71.33%	69.27%
Homework Total	169.8	119.1
Final course Avg*.:	82.36%	67.71%
Final Course Grade:	**B**	**D**

The 50-min presentation on study and learning strategies resulted in an improvement of *two* letter grades!





Metacognition: An Effective Tool to Promote Success in College Science Learning*

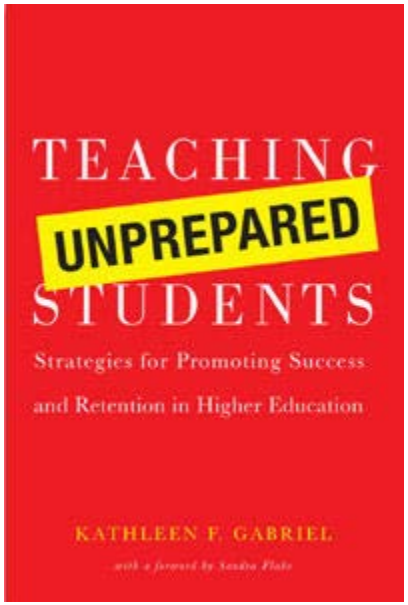
Ningfeng Zhao[1], Jeffrey Wardeska[1], Saundra McGuire[2], Elzbieta Cook[2]

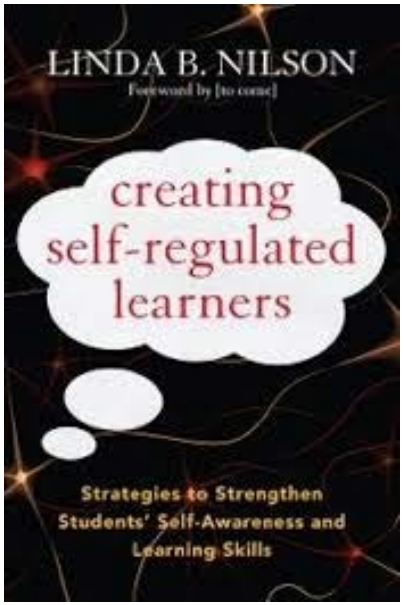
[1]Department of Chemistry, East Tennessee State University

[2]Department of Chemistry, Louisiana State University

*March/April 2014 issue of JCST, Vol. 43, No. 4, pages 48-54

Two Valuable References





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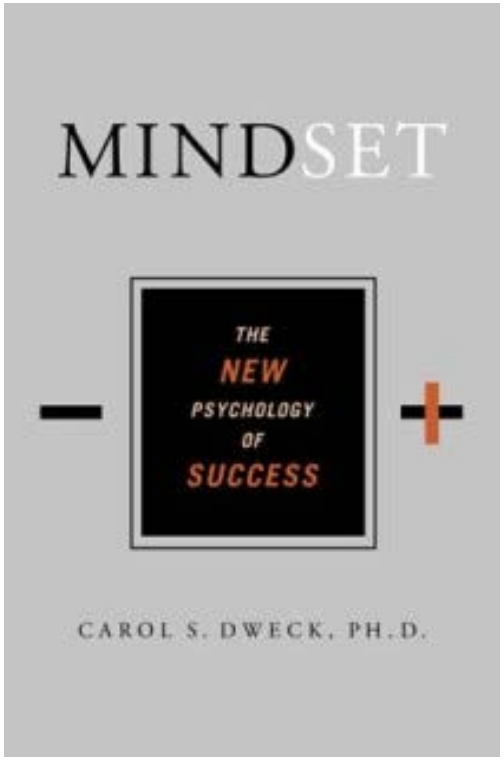
Mindset Matters!



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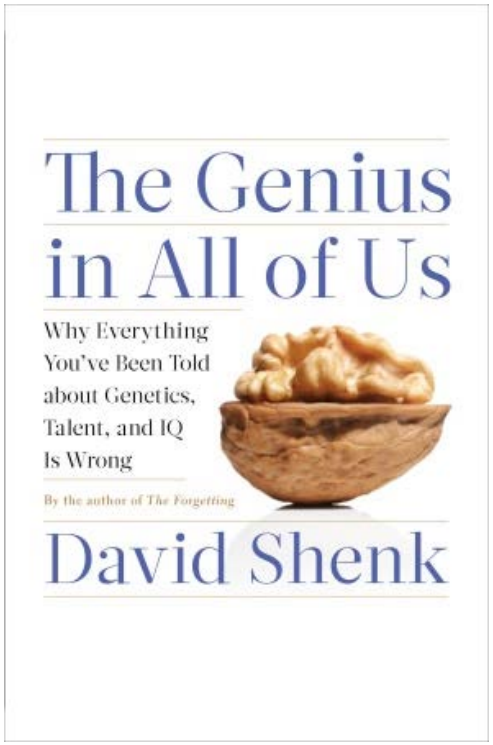

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*Mindset** is Important!

- **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

Responses to *Many* Situations are Based on Mindset

	Fixed Mindset Response	Growth Mindset Response
Challenges	*Avoid*	*Embrace*
Obstacles	*Give up easily*	*Persist*
Tasks requiring effort	*Fruitless to Try*	*Path to mastery*
Criticism	*Ignore it*	*Learn from it*
Success of Others	*Threatening*	*Inspirational*

Sharing Strategies that Have Worked for Others Can Be Very Motivational

Top 5 Reasons Students Did Poorly on Test 1 in General Chemistry

1. Didn't spend enough time on the material
2. Started the homework too late
3. Didn't memorize the information I needed to memorize
4. **Did not use the book**
5. Assumed I understood information that I had read and re-read, but had not applied

Top 5 Reasons Students Made an A on Test 1:

1. Did preview-review for every class
2. Did a little of the homework at a time
3. Used the book and did the suggested problems
4. Made flashcards of the information to be memorized
5. Practiced explaining the information to others

Email from ENG Professor at New Mexico State Univ. Received on 10/22/2013

At the end of a 60 minute learning strategies presentation by the professor, students were given a survey to determine their self-assessment of whether they were using or not using the strategies. The average scores of the different groups on the first two exams are shown below.

Self-Reported Use of Strategies	Exam 1	Exam 2
Did not use the strategies	58	54
Used metacognitive strategies	95	80

Comments from Engineering Students about what they changed for Test 3*

- I changed my study habits by **doing the homework early**. I also **started reading some of the material before going to the class.** The most effective was **spending more time** on the material.
- I **started studying for the exam sooner**. I also took more time to do the homework. I **reviewed/rewrote my notes from class**.
- **I studied for the class as close to everyday** as possible
- **I got together with other classmates** and helped them with their weakness and of course they helped me with mine as well.

class average increased from 61% to 77%!

Changes Faculty Have Made that *Improved* Learning and Performance

- **Provide learning strategies information to students after Test 1, and tell them about mindset**

  (Psychology Professor at Southern Crescent Technical College, 2013)
- **Increase the frequency of tests from three per semester to biweekly** *(Mathematics Professor at Miles College, 2013)*
- **Have students determine their learning style and write reflection on how they will use the information** *(Entomology Professor at LSU, 2009)*
- **Present one 50 minute session on metacognition, Bloom's Taxonomy, and the Study Cycle** *(Chemistry Professor at Middle Tennessee State University, 2012)*
- **Partner with the learning center to teach metacognitive strategies** *(Faculty at many institutions)*

Experience of Miles College Professor

Beliefs I had to change:

- Math is a gatekeeper course
- You MUST get through ALL the material
- I was skeptical about metacognition

What changes I made:

- I began to teach Bloom's Taxonomy in class
- I implemented office hour appointments with each and every student early in the semester and in regular intervals
- I would set aside class time so that the metacognition lab director could give workshops on studying

Experience of Miles College Professor cont'd

What changes I made cont'd:

- I now **incorporate study skills into classroom instruction**
- I gave **repeated reminders of**, and briefly practiced, **The Study Cycle**
- I started **stripping course material** down
- I gave **smaller tests and more frequently**
- I used the **test as a teaching device**. Students who chose can get make up points by resubmitting missed questions on tests along with written solutions with correct procedures

Results: Increased student learning and satisfaction

C. N. Morris, personal communication, January 9, 2015

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

From a Xavier University student to Dr. Kelley in Fall 2011

Oct. 17, 2011

Hello Dr. Kelley. **… I am struggling at Xavier and I REALLY want to succeed, but everything I've tried seems to end with a "decent" grade. I'm not the type of person that settles for decent. What you preached during the time you were in Dr. Privett's class last week is still ringing in my head. I really want to know how you were able to do really well even despite your circumstances growing up. I was hoping you could mentor me and guide me down the path that will help me realize my true potential while here at Xavier. Honestly I want to do what you did, but I seriously can't find a way how to. Can I please set up a meeting with you as soon as you're available so I can learn how to get a handle grades and classes?**

Oct. 24, 2011

Hey Dr. Kelley, **I made an 84 on my chemistry exam (compared to the 56 on my first one) using your method for 2 days (without prior intense studying). Thanks for pointing me in the right direction. I'll come by your office Friday and talk to you about the test.**

Nov 3, 2011

Hey Dr. Kelley! **I have increased my Bio exam grade from a 76% to a 91.5% using your system. Ever since I started your study cycle program, my grades have significantly improved. I have honestly gained a sense of hope and confidence here at Xavier. My family and I are really grateful that you have taken time to get me back on track.**

Email from Weber University Student received on September 15, 2014

…I am a **junior at Weber State**. I was present on Thursday for your presentation on meta cognition. Before I share the effect it is already having I would like to tell you about myself. I am a high school drop out, "class" of 06', I started college in 2011...

…I have tried the suggestions you gave in your presentation, and it was like magic, seriously. When I was studying my chemistry this past week, even if I have to reference my outline multiple times to stay on track, **organizing my information differently some how has made what I was study at the time stick so much better.**

…not only **do I feel *I am learning more efficiently and I feel like my self esteem is going up*.** But it is also allowing me the much needed little bit of extra time to spend with my wife and kids because ***I am understanding concepts quicker and better***. Thank you again so much. ***These methods are changing my life, making me a better student, and using these concepts in everyday life is making me a better person.***

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Center for Academic Success

UNIVERSITY COLLEGE

NCLCA

National College Learning Center Association

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

Delta State University Academic Resources

We *can* significantly increase student learning!

- We must teach students the **learning process**, provide **specific** strategies and **motivate students** to use the 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**

Final Reflection Questions

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

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

Who 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 learning, retention, graduation rates!

Useful Websites

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

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*Excellent student reference