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Evidence of success

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

	Attended	Absent
Exam 1 Avg.:	71.65%	70.45%
class presentation on learning strategies		
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

Teaching Assistant - helping undergraduate students learn chemistry

- helped them understand the logic of the discipline
- introduced them to a systematic way to approach the material
- express confidence in their abilities
- everyone is capable of learning
- realized she needed to use these same strategies herself

Which mode have you been in?
1. Study mode
2. Learn mode

For which task would you work harder?
1. Make an A on the test
2. Teach the material

Why Students Do Not Know How to Learn
- They did not need to learn in order to make As and Bs in high school.
- They believe they are in at least the top half of students their age, unaware that they can become smarter.

Using Metacognition to Become an Expert Learner

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?
      or just memorizing it?")
- accurately judge one's level of learning

Evaluate how you learn
- Not doing well… need to learn a different way
- Your score on the first test is NOT an indication of how smart you are. It's a reflection of your behaviors and the way your prepared for the test.
- You CAN succeed

Creating

Evaluating

Analysis

Application

Comprehension

Knowledge
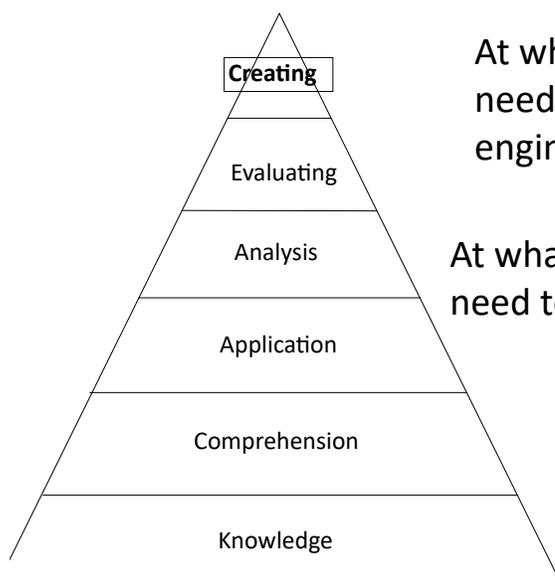
At what level of Bloom's do you think you'll need to be as a successful scientist or engineer?

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

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

Effective Metacognitive Strategies

☑ Always solve problems without looking at an example or the solution

☑ Memorize everything you're told to memorize

☑ Always ask why, how, and what if questions

☑ Test understanding by giving "mini-lectures" on concepts

☑ Spend time on physics every day

☑ Use the Study Cycle with Intense Study Sessions

☑ Aim for 100% mastery, not 90%!

When do you start homework assignments?

- git-er-done mode: starting the night before its due
  not enough time to figure out the problems
  or learn the material
  just getting the answers
- Start HW for each chapter as soon as you start the chapter in lecture.
- Each day try to do a few problems.
- Commit to 20-25 hours of study time each week

Which one strategy are you most likely to implement for the next test?

1. Do preview review
2. Do homework differently
3. Use the textbook more
4. Do more problems
5. Practice teaching the material
6. None of the above

Robin Rehagen's homework changes

- no longer using online Mastering Physics
- students using a real book (.. or pdf?)
- students choose their own problems, some from each section
- students check their own work (answers are in back of book)
- Vary the difficulty level, start easy and work their way up to harder problems.

Earning credit

- homework journal
- homework log - indicated which problems they did
    - checkboxes "Solved without help"
    - "solved without calculator",
    - reflect on their level of success
- Homework quizzes - every day!
- Scoring, 1 pt per completed problem with work shown. (20pts/chapter)

Name:		Chapter:	Score: /20

Journal Entry	Textbook Section	Textbook Problem Number	Notes	Solved without help?	Solved without calculator?
1					
2					
3					
4					
5					
6					

Name:				Chapter:		Score: /20

Journal Entry	Textbook Section	Textbook Problem Number	Notes		Solved without help?	Solved without calculator?
1						
15	37.8	37.30	needed some help starting at part (a)		X	
16	37.8	37.35	pretty simple, needed to find Kinetic energy & rest energy		X	X
17	P	37.40	felt easy, involved time dilation		X	X
18	P	37.42	Accidentally wrote wrong formula for γ		X	
19	P	37.49	needed help in setting up the problem			
20	P	37.54	✓		X	
21	P	37.58	✓		X	
22	P	37.60	needed help for part c, - Lorentz transformation			
(22 DOWN) 20	37.8	37.31	NO STRUGGLE		X	
HERE BELOW ARE PROBLEMS 21 ↓	37.8	37.34	REMEMBER WORK=ΔΘ			
22	PROBLEM 37.41	37.41	GOT LITTLE CONFUSED ABOUT WHERE L GOES BUT SOLVED IT		X	
23	37.43	37.43	CONFUSED ABOUT LIGHT YEARS			
24	37.45	37.45	DIDN'T KNOW HOW TO FIND MASS. MASS TRAVELING FASTER HAS γ (MOMENTUM)			
25	37.49	37.49	GOT CONFUSED ABOUT WHAT THE PROBLEM WAS ASKING			

Chapter Reflection:

26 37.61 37.61 STRUGGLED BUT FOUND THAT $\frac{\Delta P}{\Delta t} = P\frac{\Delta \Theta}{\Delta t} = \omega P$

27 37.63 37.63 FOUND EASY NO PROBLEM

28 37.67 37.67 EASY JUST LOTS OF ALGEBRA

29 37.69 37.69 HARD TO UNDERSTAND

37.68 37.68
30 ~~37.61~~ ~~37.61~~ DIFFICULT DON'T UNDERSTAND WHICH FREQUENCY TO USE

31 37.64 37.64 HAD TO REMEMBER FROM IB

32 37.59 37.59 OKAY JUST HAD TO REMEMBER LOW VELOCITY FORMULAS FOR DOPPLER EFFECT

~CHAPTER IS OKAY, NEED TO WORK ON UNDERSTANDING WHAT THE PROBLEM IS ASKING FOR