

Metacognition, Mindset and Motivation: Keys to Improving Student Learning!



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Metacognition

The ability to:

- think about your own thinking
- be consciously aware of your as a problem solver
- monitor, plan, and control your mental processing (e.g. “Am I *understanding* this material, or just *memorizing* it?”)
- accurately judge your level of learning
- know what you know and what you don’t know

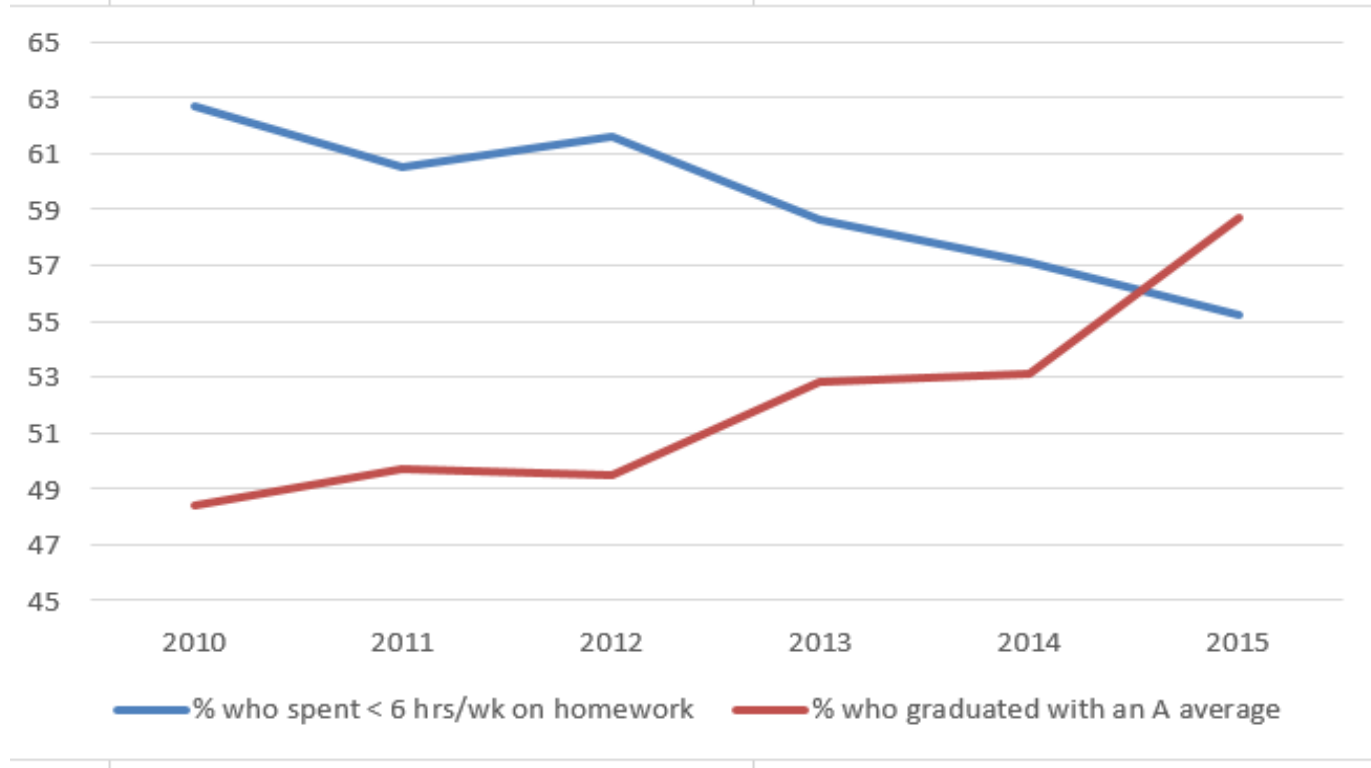
Why haven't most students developed these skills?



It wasn't necessary in high school

Data from UCLA Higher Education Research Institute (HERI) First Year Student Survey – 2010 - 2015

	% who spent < 6 hrs/wk on homework	% who graduated with an A average
2010	62.7	48.4
2011	60.5	49.7
2012	61.6	49.5
2013	58.6	52.8
2014	57.1	53.1
2015	55.2	58.7



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SAT



2013 SAT® Report on COLLEGE & CAREER READINESS



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 unchanged during the last five years, underscoring a need to dramatically increase

< [Report: Skills Gap Increasing in Higher Ed-to-Business Talent Pipelines](#)

[Report: Technology Purchases Driving up Back-to-School Shopping Budgets](#) >

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Research

ACT Alarmed by U.S. Student Test Results

By Dian Schaffhauser | 08/26/15

This year's **ACT** results show 31 percent of students still unready for college in English, math, reading or science — every subject tested by the assessment organization. That's a figure that has not changed since 2012, when it was slightly higher. Fewer than a fifth of those students can be expected to go on to earn a college degree within six years.



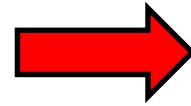
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Faculty AND Academic Staff Must *Help Students Make the Transition to College*

Help students identify and close “the gap”

current behavior



current grades



productive behavior



desired grades

Power of Metacognitive Learning Strategies

Sydney's Story: Intro and emails



- First encounter on September 23, 2013
- Email on October 14, 2013
- Email on January 9, 2014
- Email on January 20, 2014
- Email on May 7, 2014

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
-

To Ace Courses (and everything else!) Students Must:

- Stay in *learn* mode, not *study* mode
- Study as if they have to *teach* the material, not just make an A on the test

Power of Teaching to Master Learning

Clint's Story: Baby Groot and the Licensure Exam

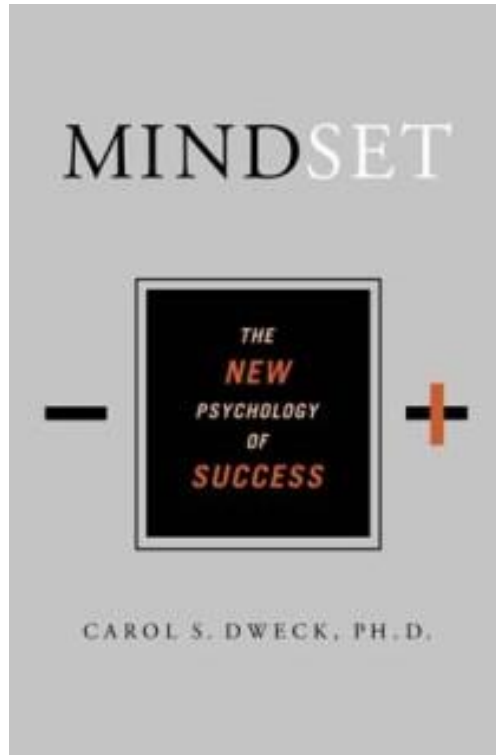


Guardians of the Galaxy

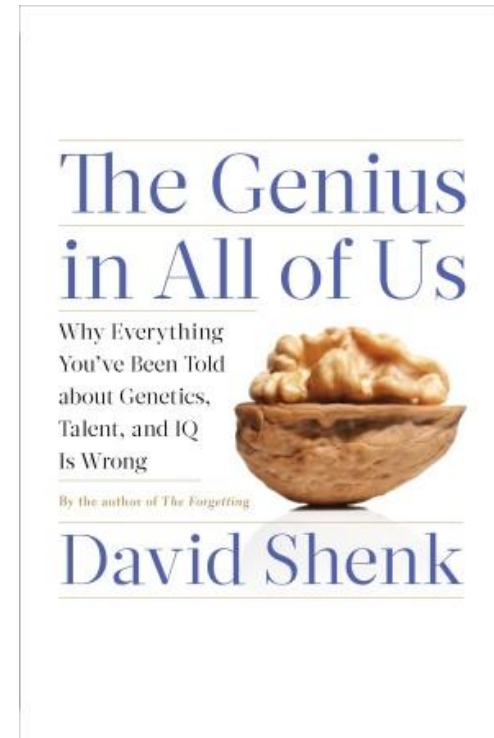
- First encounter on October 29, 2015
- Email on January 18, 2016
- Msg on April 14, 2016
- Msg on June 11, 2016

https://www.youtube.com/watch?v=BEPbXYzE5_Y

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

Responses to *Many* Situations are Based on Mindset

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

Which mindset about intelligence do you think *most students* have?

1. Fixed
2. Growth

Which mindset about intelligence do you think *most faculty* have?

1. Fixed
2. Growth

Which mindset about intelligence do you think *most STEM faculty* have?

1. Fixed
2. Growth

Email from a Spring 2011 Chemistry 1201 Student

“...Personally, I am not so good at chemistry and unfortunately, at this point my grade for that class is reflecting exactly that. I am emailing you inquiring about a possibility of you tutoring me.”

April 6, 2011

“I made a 68, 50, (50), **87, 87, and a 97 on my final**. I ended up earning a **90 (A) in the course, but I started with a 60 (D)**. I think what I did different was make sidenotes in each chapter and as I progressed onto the next chapter I was able to refer to these notes. ***I would say that in chemistry everything builds from the previous topic.***

May 13, 2011

Semester GPA: 3.8

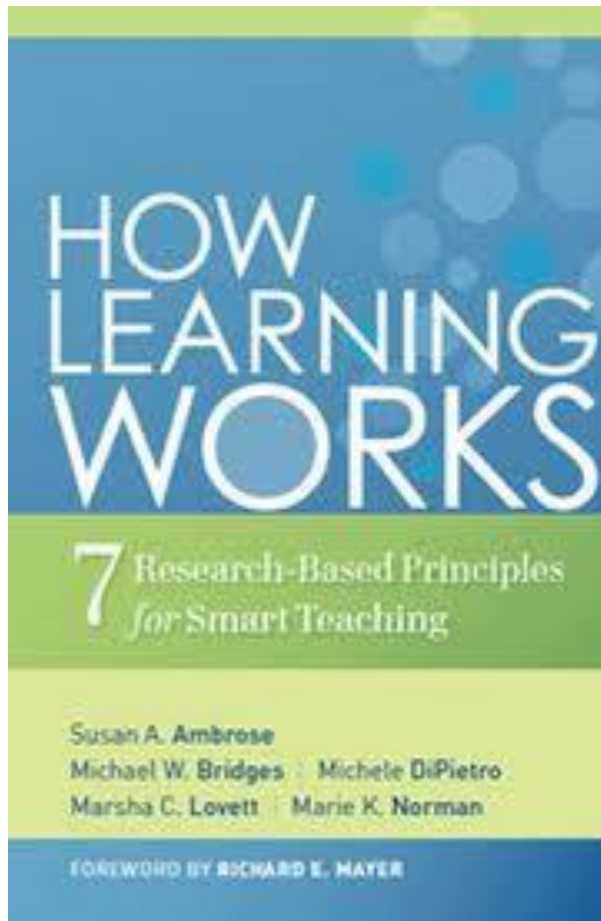
Motivation

“Motivation refers to the *personal investment* an individual has *in reaching a desired state or outcome*.

(Ambrose et. al, 68)

“In the academy, the term ‘motivating’ means *stimulating interest in a subject* and, therefore, the *desire to learn it*.”

(Nilson, 57)



Ambrose, S.A., Bridges, M.W., DiPietro, M., Lovett, M.C., Norman, M.K. (2010) *How Learning Works: Seven Research-Based Principles for Smart Teaching*. San Francisco, CA: Jossey Bass.

Three Important Levers that Influence Motivation

- ***Value*** – the importance of a goal (attainment, intrinsic, instrumental)
- ***Supportive Nature of the Environment*** – the instructor is approachable, support is available from peers and others
- ***Efficacy Expectancies*** – the belief that one is capable of identifying, organizing, initiating, and executing a course of action that will bring about a desired outcome

Ways to Create A Supportive Environment

- **Introduce engaging, fun activity if possible**
- **Show your human side – hobbies, past academic struggles, etc.**
- **Emphasize the importance of effort, rather than prior experiences, in performance**
- **Demonstrate confidence that every student *can* succeed!**

Learned Helplessness*

Based on prior experience, the feeling that no amount of effort will bring success

Destroys motivation to attempt a task



Sometimes the chains that prevent us from being free are more mental than physical

*Martin Seligman and Steven F. Maier

Solving Anagrams

<http://www.youtube.com/watch?v=MTqBP-x3yR0>

Five Bases of Intrinsic Motivation

- **Autonomy (Control One's Own Destiny)**
- **Competence (Do Things that Help One Feel Successful)**
- **Belonging (To Feel Part of a Group Effort)**
- **Self-Esteem (To Feel Good About Who They Are)**
- **Involvement and Enjoyment (To Find Pleasure in What They Do)**

James Raffini, Allyn and Bacon, 1995

**Sharing Strategies that
Have Worked for Others
Can Be Very Motivational**

Top 5 Reasons Students Made an F 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 Folks Made an A on Test 1:

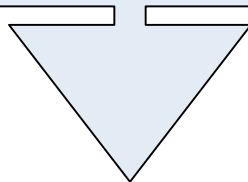
1. Did preview-review for every class
2. Did a little of the homework at a time
3. Used the book and did the suggested problems
4. Made flashcards of the information to be memorized
5. Practiced explaining the information to others

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

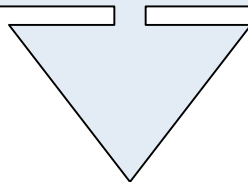


The one 50-min presentation on study and learning strategies was followed by an improvement of one full letter grade

***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

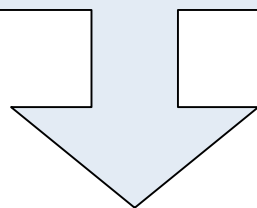
	Attended	Absent
Exam 1 Avg:	71.33%	69.27%
Homework Total:	169.8	119.1
Final course Avg*:	82.36%	67.71%
Final Course Grade:	B	D



The 50-min presentation on study and learning strategies was followed by an improvement of two letter grades

Performance in Gen Chem 1202 Sp 2015 Based on One Learning Strategies Session

	Attended	Absent
Exam 1, 2, 3 Avg:	68.14%	69.67%
Exam 4 Avg:	83.45%	75.91%
Final Exam Avg:	80.98%	75.24%
Final course Avg*:	84.90%	78.83%
Final Course Grade:	B	C



**The 50-min presentation on study and learning strategies
after exam 3 was followed by an improvement of one letter grade**

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 65.7% to 80.5%!***

(for students who took all three course exams)

Before and After

- Robert, freshman chemistry student
42, 100, 100, 100 A in course
- Michael, senior pre-med organic student
30, 28, 80, 91 B in course
- Miriam, freshman calculus student
37.5, 83, 93 B in course
- Ifeanyi, sophomore thermodynamics student
67, 54, 68, 95 B in course
- Terrence, junior Bio Engineering student
GPA 1.67 cum, 3.54 (F 03), 3.8 (S 04)

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.

Conclusion

We *can* significantly increase learning by...

- teaching students *how* to learn
- *not judging* student potential on initial performance
- encouraging students to *persist in the face of initial failure*
- *encouraging the use of metacognitive tools*



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Special Note

Please also 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.

Have fun teaching your students powerful metacognitive strategies that will lead to increased critical thinking and problem solving skills!

Saundra McGuire

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

Acknowledgments

- LSU Center for Academic Success
- Dr. Elzbieta Cook, LSU General Chem Instructor
- Vice President Isiah Warner and the Office of Strategic Initiatives
- Faculty collaborators at LSU and elsewhere
- All of the students who changed their attitudes and behaviors and showed me that this approach works!