



My Mom,

Delsie Melba Moore Yancy



The Yancy Family

Robert, III
Saundra
Annette
Eric



*Stephen
C.
McGuire,
Ph.D.*

James and
Ruth Smith
Professor
of Physics,
Emeritus
Southern
University
and A&M
College



Professor and past chair (1999 – 2009) of the department of physics at Southern University.

Elected a Fellow of the American Physical Society in 2008

Co-author of 2016 gravitational wave observation paper

Detection of gravitational waves at the Laser Interferometer Gravitational Wave Observatory (LIGO) won the **2017 Nobel Prize in Physics and the 2016 Breakthrough Prize in Fundamental Physics**



EXPERIMENTAL PSYCHOLOGY
ZOOLOGY

The Grandkids Who Reverse Mentor Me



Joshua, Daniel, Ruth, and Joseph Davis

2022
FACULTY SYMPOSIUM
PART 1: TEACHING AND
LEARNING IN THE 21ST CENTURY

Student Success:
Metacognition + Classroom
Climate + Hope

JANUARY 12, 2022

8 - 12:30 pm

AMU, 163

Offered in hyflex modality

Are you familiar with my work?

- A. I've attended an in-person workshop
- B. I've participated in a webinar
- C. I've read the book
- D. I've read the book and attended a workshop or webinar
- E. None of the above

How much do you know about metacognition?

- A. Almost nothing
- B. A little bit
- C. Quite a lot
- D. More than I care to know



BE THE DIFFERENCE.

Mission Statement

Our mission, therefore, is the search for truth, the discovery and sharing of knowledge, **the fostering of personal and professional excellence**, the promotion of a life of faith, and the development of leadership expressed in service to others.

Marquette University

Retention and Graduation Rates

Marquette Has One of the Best Freshman Retention Rates in the Country

With 87.0% of students staying on for a second year, Marquette University is one of the best in the country when it comes to freshman retention.

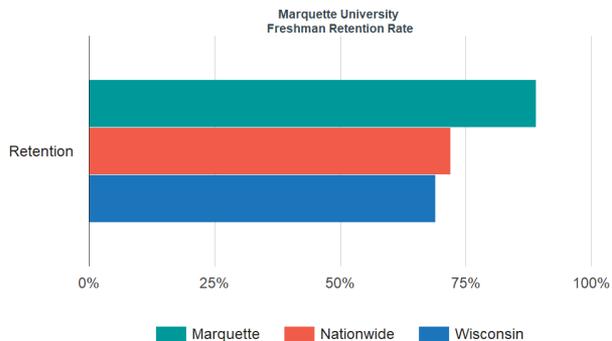
Nationwide, the average first year to second year retention rate is 69.0% . When looking at just colleges and universities in Wisconsin , the average is 69.0% .

Marquette Freshmen Retention Rate Rankings

Nationwide Ranking (406 out of 3,392)



Wisconsin Ranking (2 out of 57)



collegefactual.com

Overall, 79.1% of Marquette Undergrads Finish Within Six Years

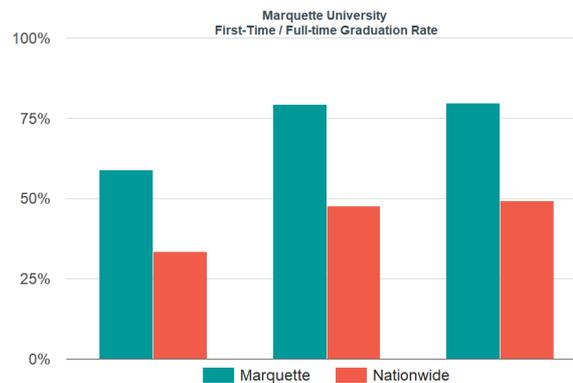
At Marquette , there were 2,337 bachelors degree candidates in the class of 2015 . By 2017 , six years after beginning their degree, 79.1% of these students had graduated. After an additional two years, 79.4% of this class eventually completed their degree.

We consider the "on-time" graduation rate for a bachelor's degree to be four years, but colleges typically report their graduation rates after six or even eight years.

Overall Marquette Six Year Graduation Rate (79.1%)



Overall Marquette Eight Year Graduation Rate (79.4%)



collegefactual.com

Marquette Retention Rate is **87.0%***
 National Average is 69.0%
 Milwaukee Average is 69.0%

Marquette Six-Year Graduation Rate is **79.1%****
 National Average is 46.4%
Expected Six-Year Graduation Rate is 74.9*

How Can Marquette University Improve These Rates?

- Teach Students *How* to Learn
- Help Students Develop the Right Mindset
- Motivate Students to Implement Effective Learning Strategies

Metacognition

The ability to:

- think about your own thinking
- be consciously aware of yourself as a problem solver
- plan, monitor, evaluate, 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

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 haven't many students developed metacognitive learning strategies?



It wasn't necessary before

Data from UCLA Higher Education Research Institute (HERI) First Year Student Survey – 2010 - 2019

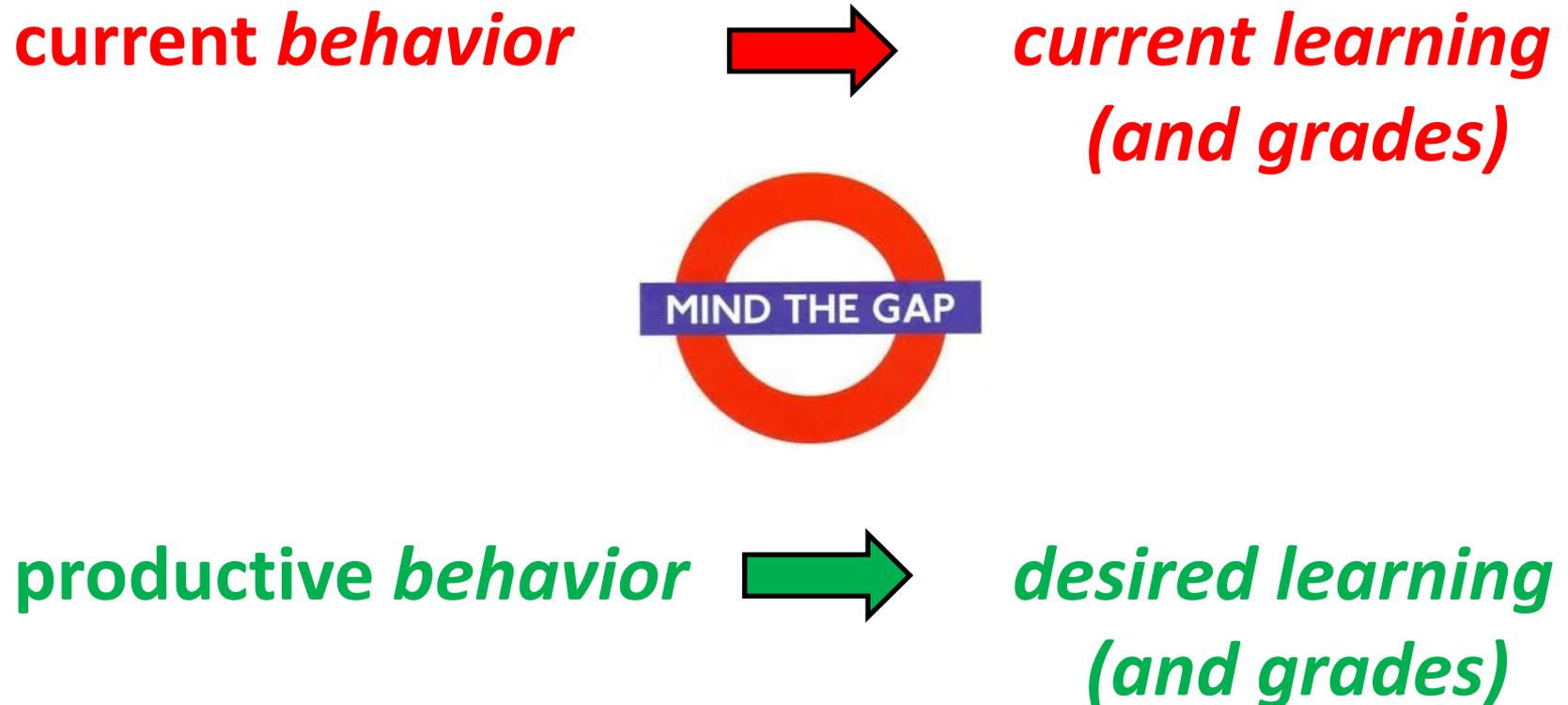
	% spending at least 6 hrs/wk on homework	% with an A average
2010	37.3	48.4
2011	39.5	49.7
2012	38.4	49.5
2013	41.4	52.8
2014	42.9	53.1
2015	44.8	58.7
2016	44.0	55.1
2017	44.1	51.5
2018	42.3	57.6
2019	43.3	59.3

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 Radically Change Their View of Learning

Help students identify and close “the gap”



Metacognition Changed Dana's View of How to Learn Physics



Dana, *first year physics student*

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

Before Metacognition: Memorizing formulas and using online homework programs

After Metacognition: Solving problems with no external aids and testing mastery of concepts

Dana Lewis, MS in Medical Physics, 2015

Univ of Texas Graduate School

of Biomedical Sciences at Houston

Thesis research at UT MD Anderson Cancer Center



Practicing Medical Physicist as of 8/28/2016
when she completed her residency!

Effective Homework Strategy

- **Study material first**, before looking at the problems/questions
- **Work example problems** (without looking at the solutions) until you get to the answer
- **Check** to see if **answer** is correct
- If answer is not correct, **figure out where mistake was made**, without consulting solution
- **Work homework** problems/answer questions as if taking a test

Is this "resource" the culprit?

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Overall **4.4/5**

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- Conciseness 5/5
- Grammar and spelling 4/5

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This problem has been solved:

Problem 3PP Chapter CH1 Problem 3PP

Step-by-step solution

👍 92% (13 ratings) for this solution

Step 1 of 5

A chemical is a substance that always contains same composition and properties wherever it is found.

Step 2 of 5

Chapter 1, Problem 3PP is solved.

[View this answer](#)

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COVID-19 **Live Updates**

Colleges Resume In-Person Classes Bomb Threats at Black Colleges

Advertise Hire Faculty & Staff

Chegg Accused of Cheating Investors

Lawsuit alleges Chegg misled investors and that the company's growth was largely attributable to the pandemic and "the facilitation of cheating." Chegg says the suit is without merit.

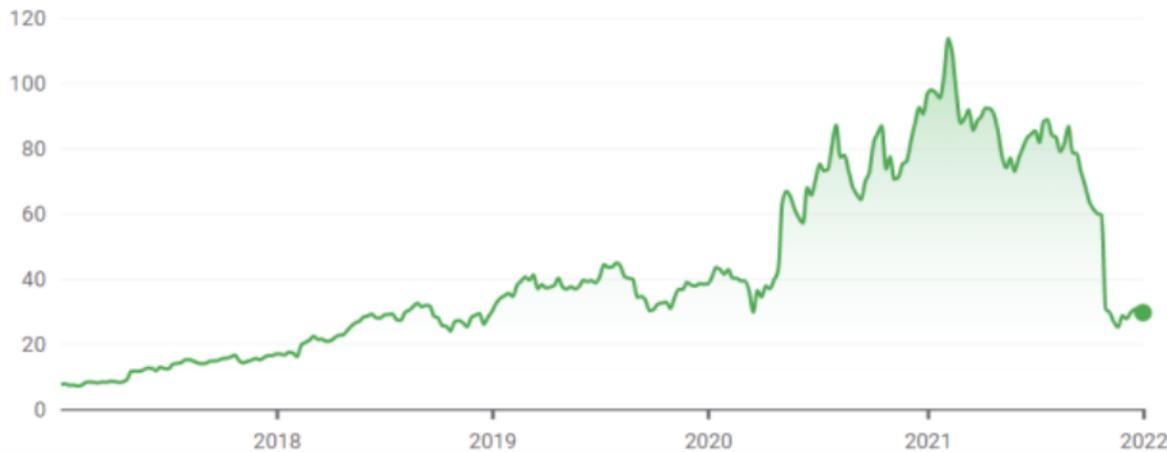
By [Elizabeth Redden](#) // January 5, 2022

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Jan 4, 2:09:48 PM UTC-5 · USD · NYSE · Disclaimer

1D 5D 1M 6M YTD 1Y 5Y MAX



Metacognition Changed Travis's View of Reading



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

* Developing an anticipatory set

A Reading Strategy that Works: SQ5R

- **Survey** (look at intro, summary, bold print, italicized words, etc.)
- **Question** (devise questions that you think the reading will answer)
- **Read** (one paragraph at a time)
- **Recite** (summarize in your own words)
- **Record or wRite** (annotate in margins)
- **Review** (summarize the information in your words)
- **Reflect** (other views, remaining questions)

Flying a Kite

A newspaper is better than a magazine/ A seashore is a better place than the street/ At first it is better to run than walk/ You may have to try several times/ It takes some skill, but it is easy to learn/ Even young children can enjoy it/ Once successful, complications are minimal/ Birds seldom get too close/ Rain, however, soaks in very fast/ Too many people doing the same thing can also cause problems/ One needs lots of room/ If there are no complications, it can be very peaceful/ A rock will serve as an anchor/ If things break loose from it, however, you will not get a second chance/

Bransford, J.D. and Johnson, M. K. Contextual Prerequisites for Understanding: Some Investigations of Comprehension and Recall, *Journal of Verbal Behavior*, (1971), 11, 717-726, 1972.

<http://www.cogsci.umn.edu/docs/pdfs/Bransford1972-JVLVB.pdf>

Impact of Learning Metacognitive Reading Strategy on High School Biology Student

Email from participant in Univ of the District of Columbia CC workshop about reading strategies discussed on 4/17/2021

Excerpt of email received on Monday, April 19, 2021, 4:34 PM

*...During your presentation, I disconnected my headsets in order for my son to hear your suggestions on effective reading strategies. My son, Darien, currently attends Dematha HS with a GPA of 4.2. **Three weeks ago, my son received a 72 on his test for Honors Biology.** Yesterday, I told him **to follow your strategy on his next test which is scheduled for today. Darien received an 86 on his test today!!!** He was so relieved and grateful for the **advice...Thank you so much!!***

Reflection Questions Are Key to Developing Students' Metacognitive Skills

- 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 Power of Teaching to Learn: What Happened When Ty Taught His Betta Fish



- First encounter on September 17, 2018
- Email on October 25, 2018

Bio Exam Grades: 66, 98, 90; Final Grade B

Chem Exam Grades: 62, 83; Final Grade B

Impact of Teaching to Learn

Ty, LSU First Year Student

Email Received on October 26, 2018

I attended more of the Supplemental Instruction (SI) sessions and the exam reviews. Before the exam reviews and SI Sessions I would try to answer as many of the questions as possible to see about where I was in terms of grasping the information, then at the exam reviews/SI sessions I would know what I needed to understand. Next after the reviews/SI sessions **I would go to my room and “teach” the materials to my betta fish. The material I couldn’t explain, I would study more. I would continue that cycle until I could explain everything in my notes....**

Betta fish purchased on September 21, 2019 by Howard University Bison STEM Scholars

Sat, Sep 21, 12:34 PM

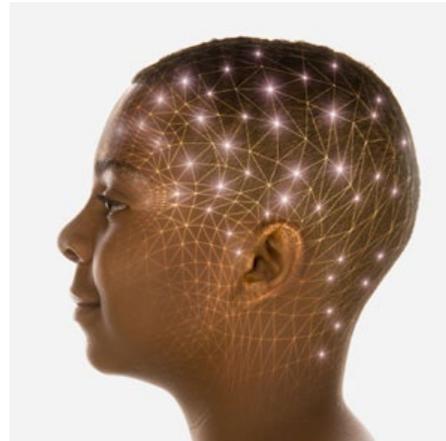


Look what you inspired!!

March 6, 2021 Update:
Sully is still alive and living with Makayla!

Why Is Fast and Dramatic Improvement Possible?

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



Finding Numbers in Sequential Order



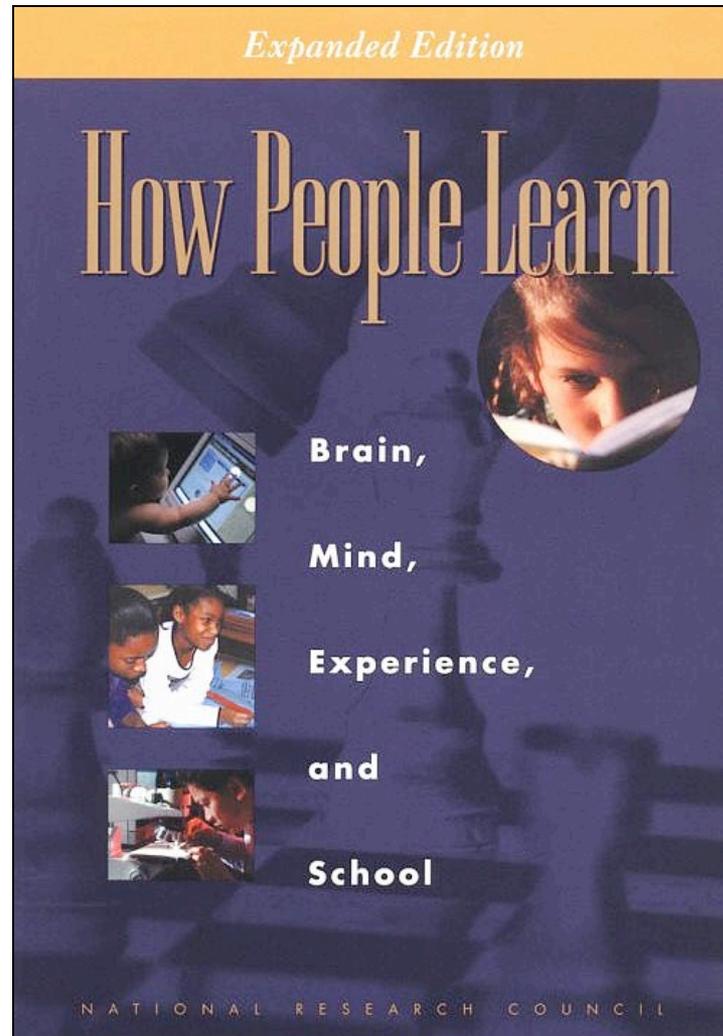
**How many can you find in
15 seconds?**

76	4	48	28	64	5	77	33	53	45
56	32	16	44	72	17	37	69	29	1
20	36	8	24	52	21	61	13	57	49
68	60	12	80	40	9	41	65	25	73
3	67	47	79	23	70	22	38	14	54
19	31	55	51	71	6	62	2	46	50
59	7	63	27	39	74	10	42	66	26
35	75	15	43	11	78	18	34	30	58

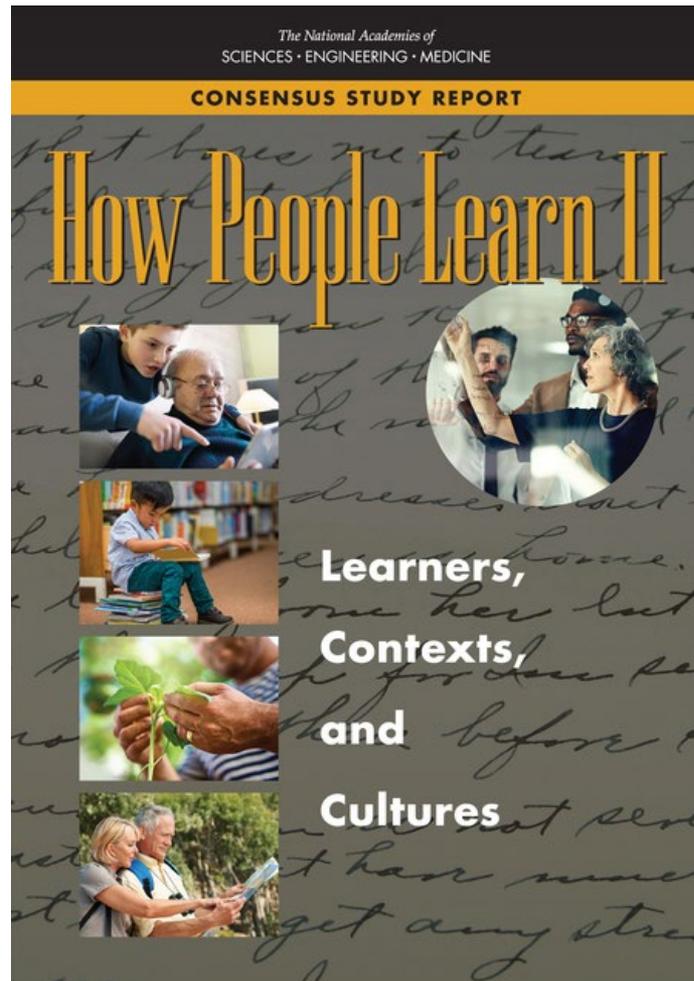
**What was the major difference
between the first attempt
and the second attempt?**

**We knew how the information
was organized**





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



**National Academies of Sciences, Engineering, and Medicine.
2018. *How People Learn II: Learners, Contexts, and Cultures*.
Washington, DC: The National Academies Press.
<https://doi.org/10.17226/24783>**

What we know about learning

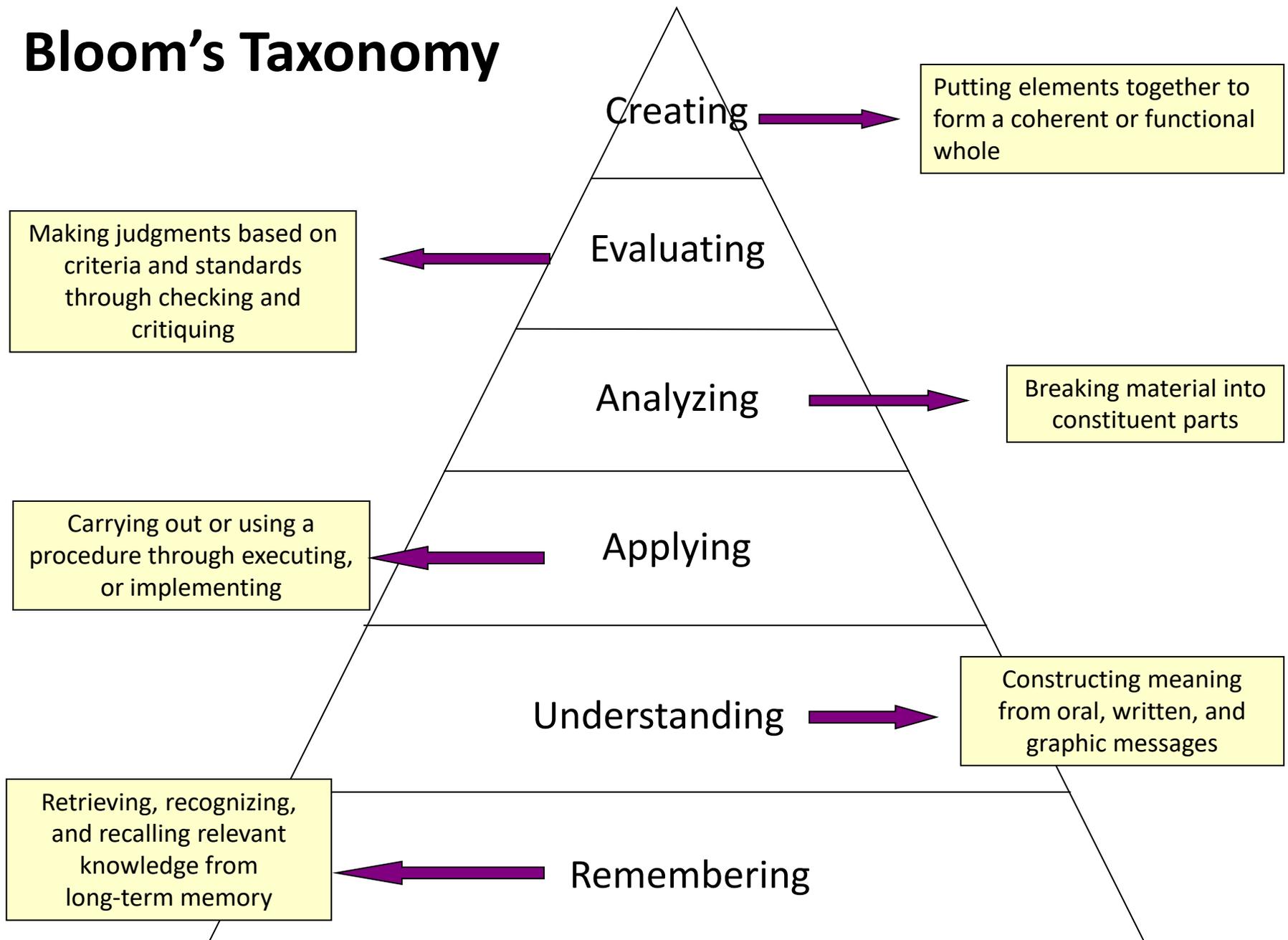
- Active learning is more lasting than passive learning
 - Passive learning is an oxymoron*
- Thinking about thinking is important
 - Metacognition**
- The level at which learning occurs is important
 - Bloom's Taxonomy***

*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



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

How do you think students answered?

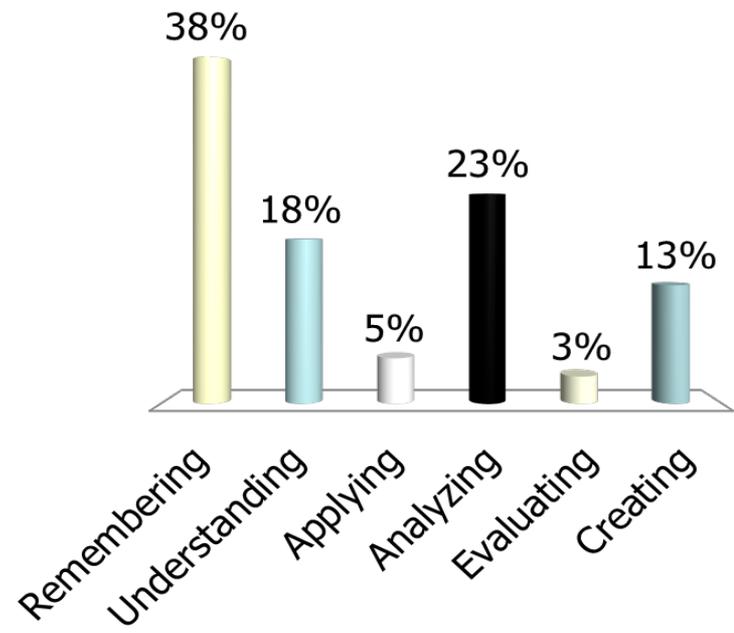
At what level of Bloom's do you think you'll need to operate to make A's in college courses?

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

How students answered (in 2018)

At what level of Bloom's do you think you'll need to operate to make A's and B's in high school?

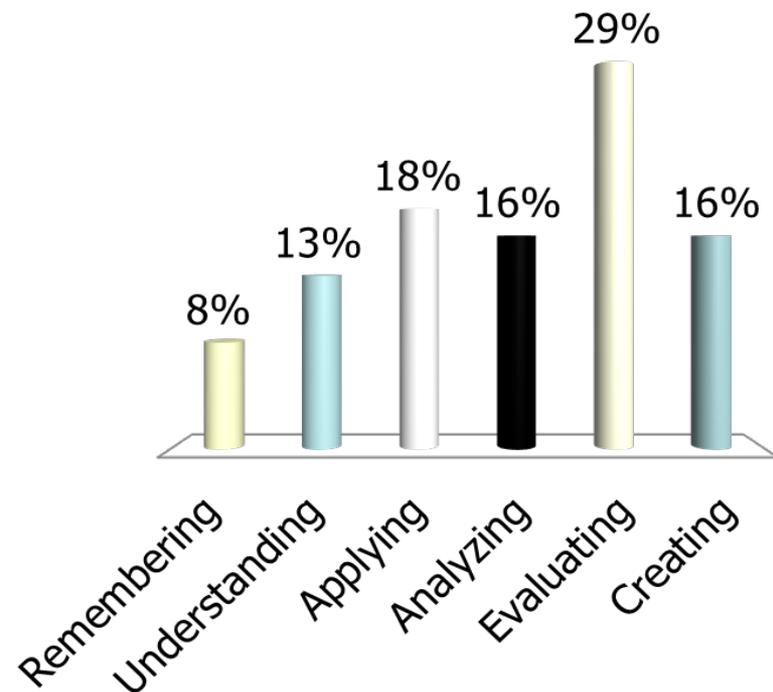
1. Remembering
2. Understanding
3. Applying
4. Analyzing
5. Evaluating
6. Creating



How students answered (in 2018)

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?

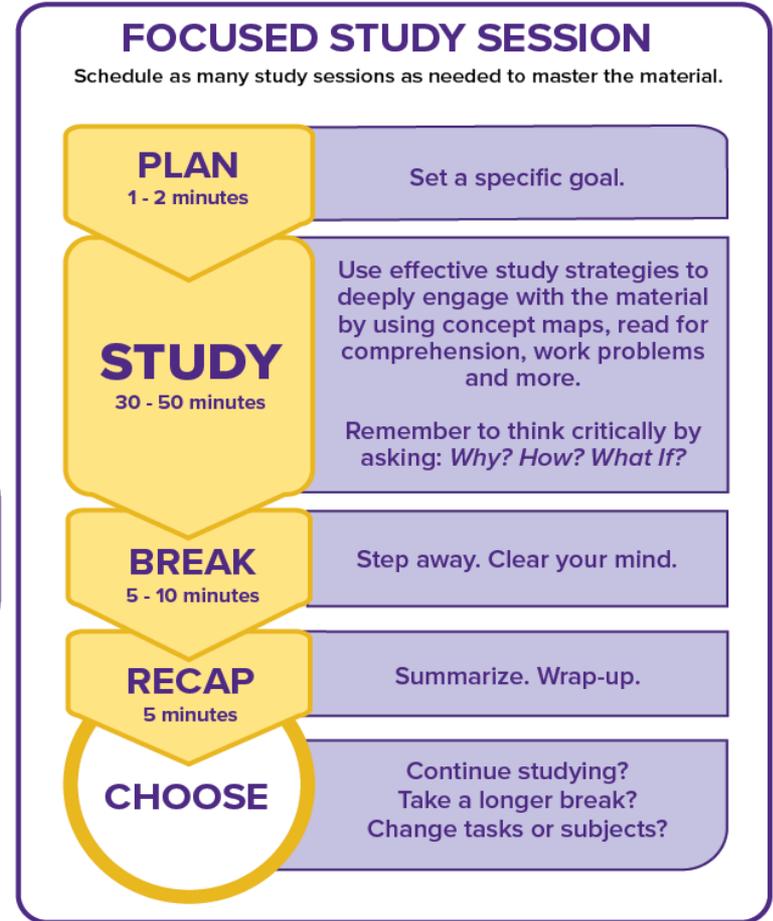
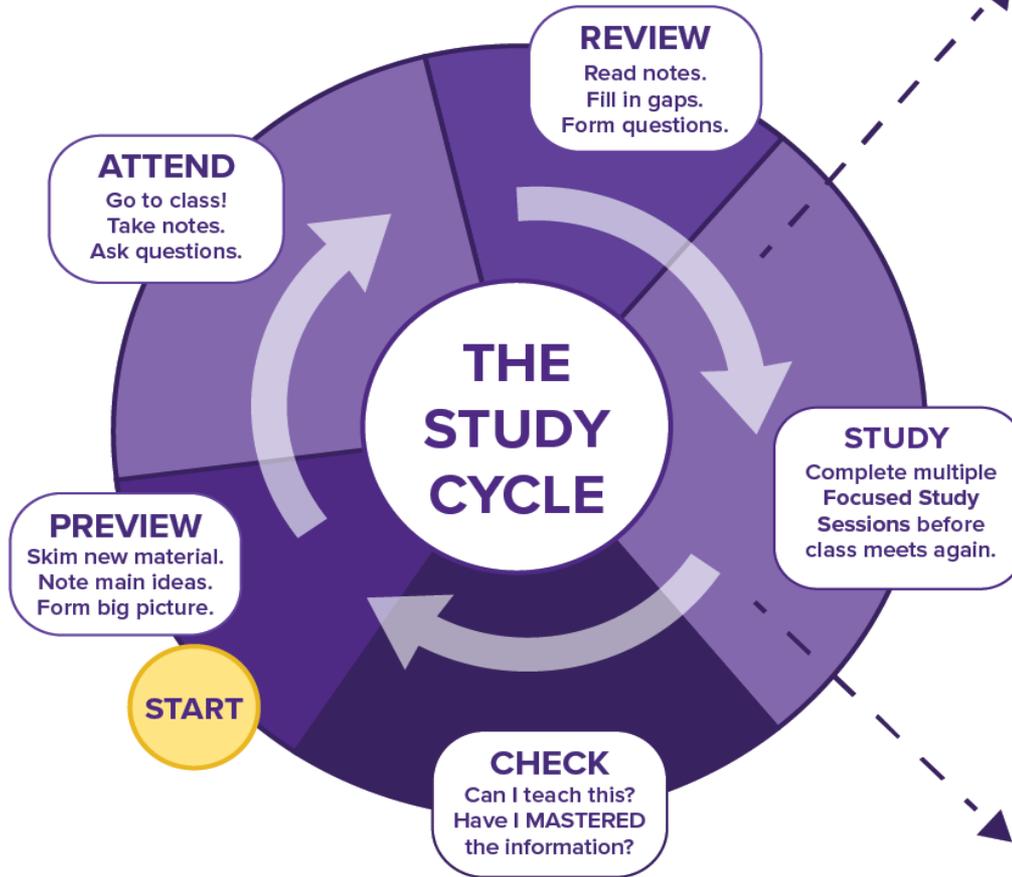


Teach them the Study Cycle*

**adapted from Frank Christ's PLRS system*

THE STUDY CYCLE

Use the Study Cycle to get the most out of in-class time and structure your out-of-class time.



Adapted from Frank Christ's PLRS system.

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Brea Manuel, BS in Chemistry, 2018*

*Entered PhD Program at
Emory University on Full Fellowship in Fall 2018
Became a PhD Candidate Spring 2020!*



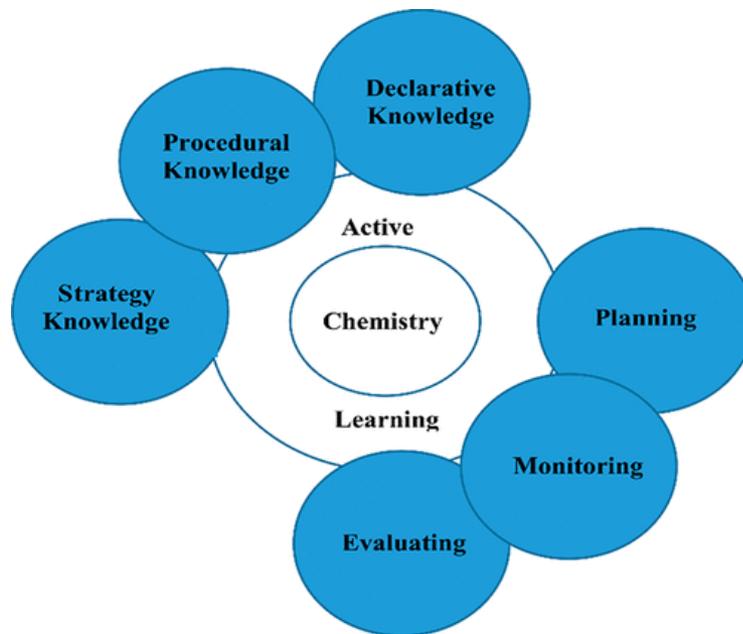
The focused study sessions helped me most. I actually got A+ on 3 out of 4 of my finals using that method of studying. It's important to use it everyday before finals week, and I think it would really benefit students during finals week.

*Manuel, B.A., Karloff, D.B. Recruit and retain a diverse workforce. Nat Rev Chem (2020). <https://doi.org/10.1038/s41570-020-0214-z>

Metacognition Enhances Efficacy of Active Learning

Metacognition and Active Learning Combination Reveals Better Performance on Cognitively Demanding General Chemistry Concepts than Active Learning Alone

Jacinta M. Mutambuki*, Mwarumba Mwavita, Caroline Z. Muteti, Brooke I. Jacob, and Smita Mohanty



J. Chem. Educ. 2020, 97, 7, 1832–1840, Publication Date: June 25, 2020
<https://doi.org/10.1021/acs.jchemed.0c00254>

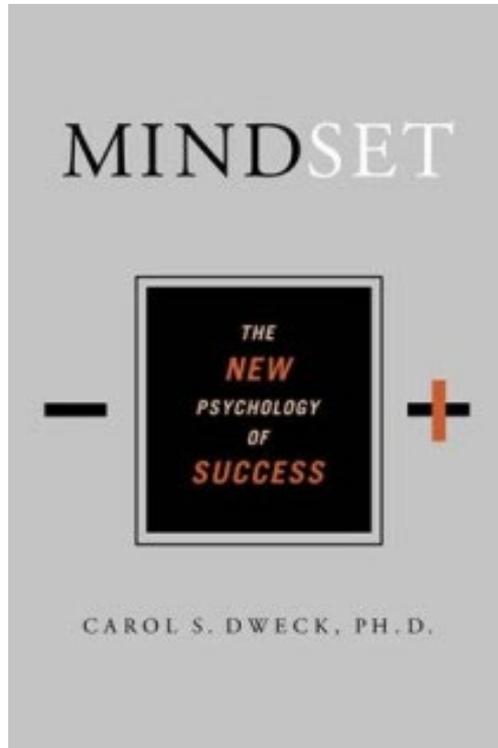
“Strategies to prevent cognitive overload: A team-based approach to improving student success and persistence in a gateway introductory chemistry course”*



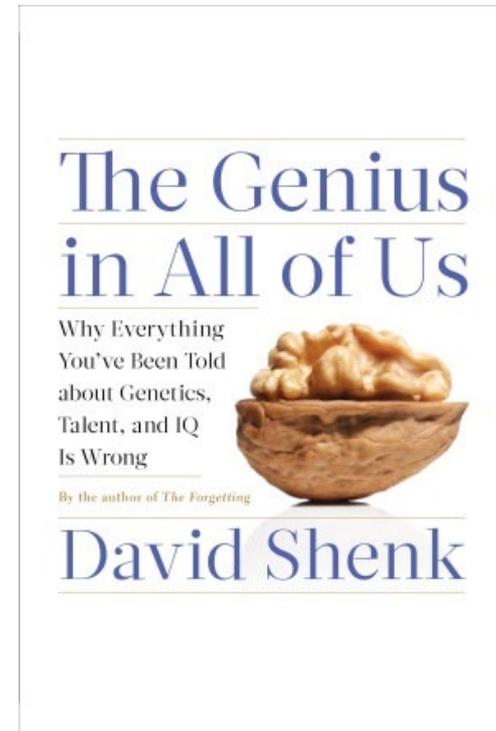
Until Fall 2013, the student success rate of a large introductory chemistry class...was **50%**. ...We then **implemented a face-to-face class format based on The Study Cycle concepts** presented by Dr. Sandra McGuire in her book *Teach Students How to Learn*. Curriculum revisions enabled faculty to deliver well-focused lectures, with access to supporting practice problems and labs that connected clearly with each week’s learning objective... Starting in Fall 2016, some sections introduced active and cooperative learning, which led to a steady improvement in the overall success rate, ending at **75%** in Fall of 2018.

M. H. Benko, K. M. Vogelsang, K. A. Johnson, A. R. Babij, “Strategies to Prevent Cognitive Overload: A Team-based Approach to Improving Student Success and Persistence in a Gateway Introductory Chemistry Course” in *Enhancing Student Retention in Introductory Chemistry Courses: Practical Strategies*, American Chemical Society: Washington, DC: Fall 2019

Mindset Matters!



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

Two Different Mindsets About Intelligence

- **Fixed Mindset**

Intelligence is static

You have a certain amount of it

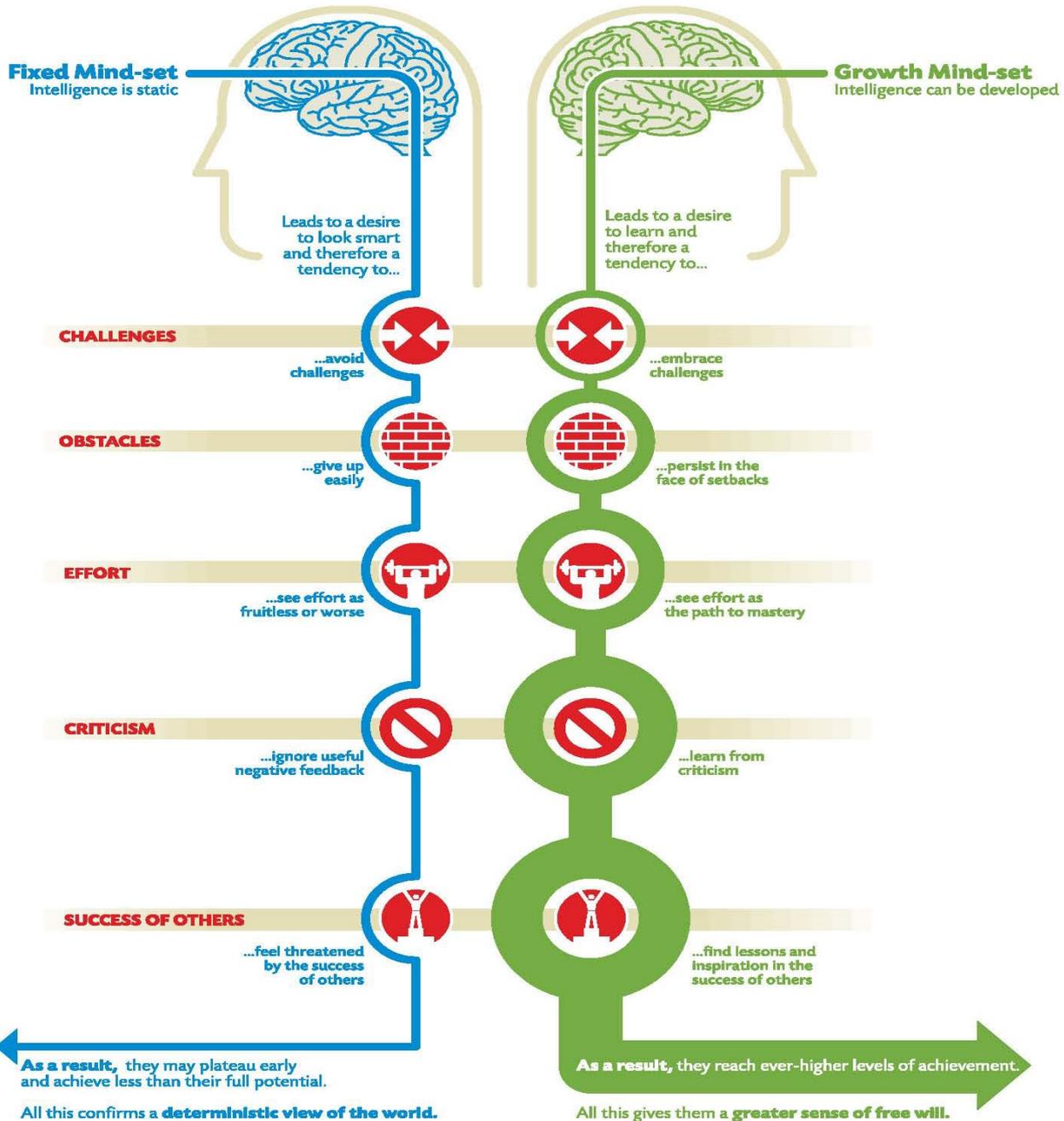
- **Growth Mindset**

Intelligence can be developed

You can grow it with actions

Responses to *Many* Situations are Based on Mindset

	Fixed Mindset Response	Growth 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?**

A. Fixed

B. Growth

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

A. Fixed

B. Growth

*Email from a General Chemistry Student
with a Fixed Mindset*

“...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

Study links faculty attitudes on intelligence to student success in STEM, with large impact on minority student success

Submitted by Scott Jaschik on February 18, 2019 - 3:00am

A new study suggests that faculty members' attitudes about intelligence can have a major impact on the success of students in science, mathematics and technology courses. Students see more achievement when their instructors believe in a "growth mind-set" about intelligence than they do learning from those who believe intelligence is fixed. The impact was found across all student groups but was most pronounced among minority students.

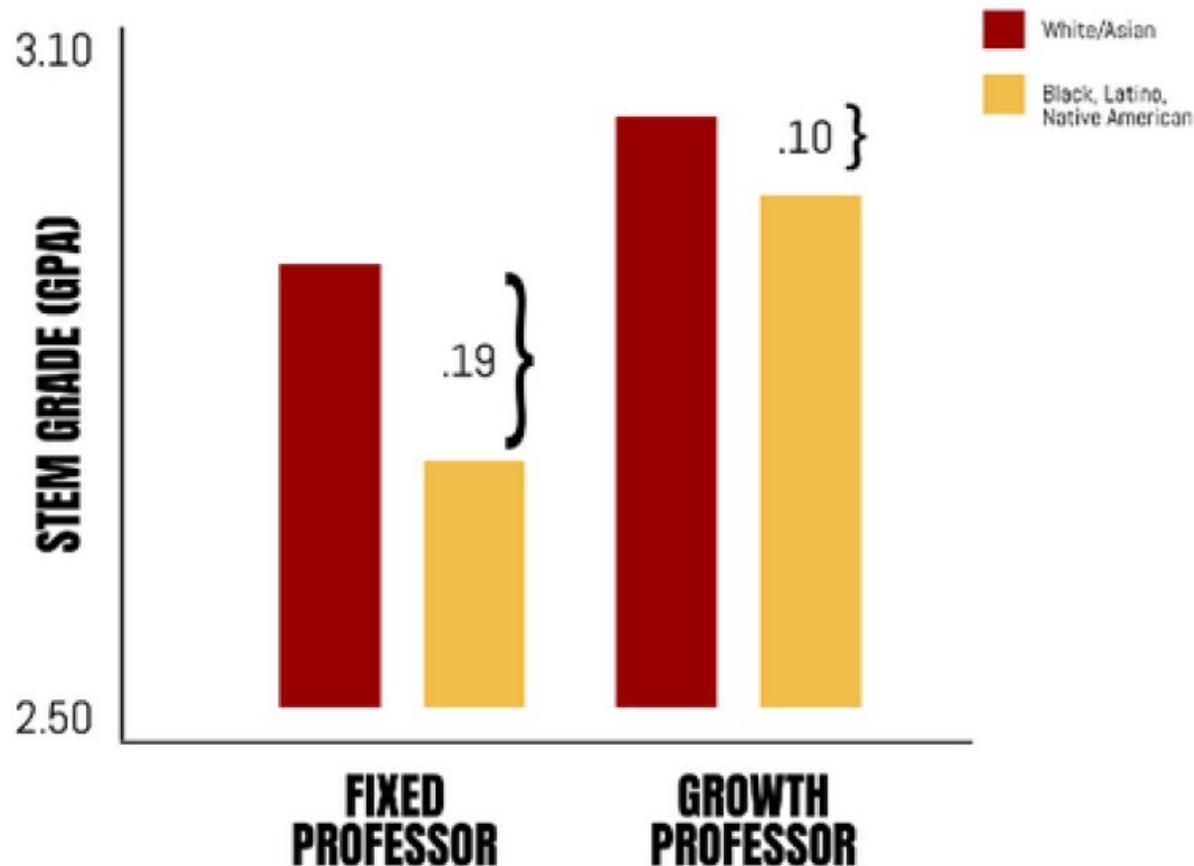
The study -- by brain science scholars at [Indiana University at Bloomington](#) [1] -- was published in the journal *Science Advances* [2] and presented last week at the annual meeting of the American Association for the Advancement of Science.

The researchers collected data on 150 faculty members in a range of STEM disciplines and 15,000 students over two years at a large public research university that is not identified. Faculty members were asked to respond to a general statement about intelligence along the lines of "To be honest, students have a certain amount of intelligence, and they really can't do much to change it."

The study then looked at student performance in courses taught by those who agreed with that perspective and those who did not.

The findings:

While all students perform better when STEM professors endorse a growth mindset belief, the racial achievement gap is almost halved when professors endorse a growth-mindset belief.



Interview with 2021 Princeton neuroscience graduate

conducted on 6/8/2021

I came from a public high school, and I **struggled a lot freshman year getting used to Princeton's culture and academics.** I and my friends used to say we're from public high schools; that's why we're like this. People from private high schools are in a better position because they had opportunities that we didn't have. The growth mindset chapter in the book was so, so important because before that I thought if you're smart, you're smart; if you came from a private high school you're set; if you're from a public high school you can't even grow. Now I know that you have challenges that you have to overcome, but you can do better.

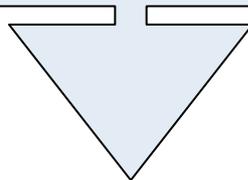
When I got a C in my first neuro class, the professor asked "why are you even majoring in neuro, you have a C in my class" ... I got an A+ on my senior thesis... **That's one example of going from literally getting C's my freshman year and thinking I shouldn't be at Princeton and majoring in neuroscience to getting all A's while taking all neuroscience courses my senior year...** if it wasn't for the growth mindset I wouldn't be here. **I now know that just because you're from a public high school doesn't mean you can't thrive at Princeton.**

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

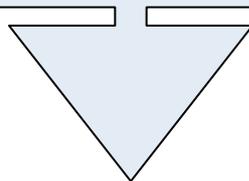


The one 50-min presentation on study and learning strategies was followed by an improvement of one full letter grade

***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

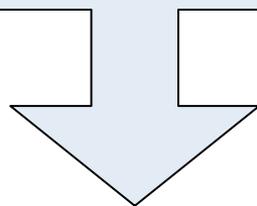
	Attended	Absent
Exam 1 Avg:	71.33%	69.27%
Homework Total:	169.8	119.1
Final course Avg*:	82.36%	67.71%
Final Course Grade:	B	D



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**

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	Began work with CAS and the Writing Center in	12/05	Passed best in group
12/04	Failed	October 2005	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



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.

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 an **increase** in academic capability, confidence, retention, and graduation rates!



Conclusion

We *can* radically change students' view of learning by...

- teaching students *how* to learn
- making learning *visible*
- *not judging* student potential on initial performance
- encouraging students to *persist in the face of initial failure*
- encouraging the *use of metacognitive tools for deep and integrative learning*



Implementation

What one or two strategies did you find most interesting and “doable” that you’re willing to try with your students?

What research project could you design to test the efficacy of any of the strategies presented?

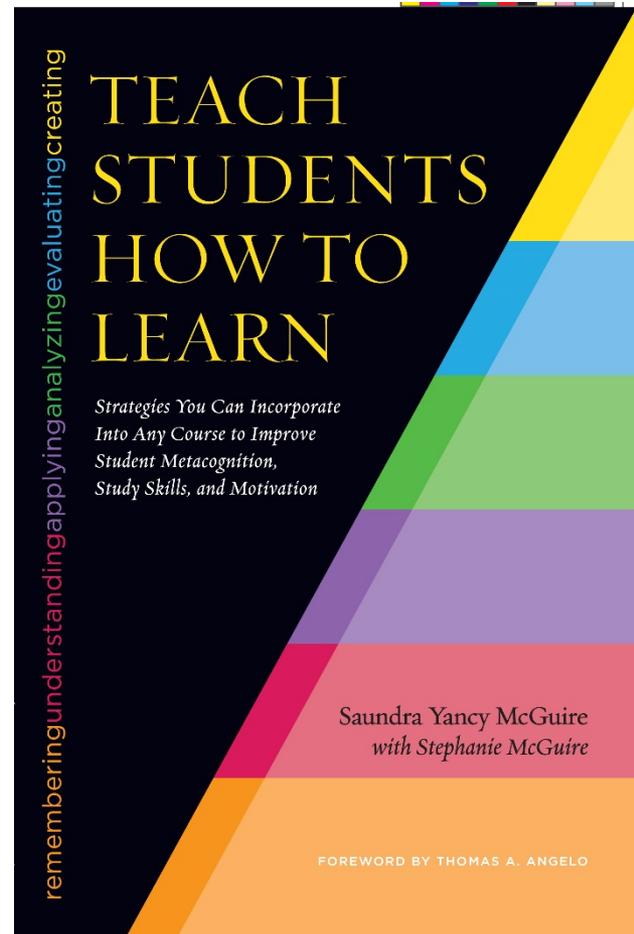
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Acknowledgments

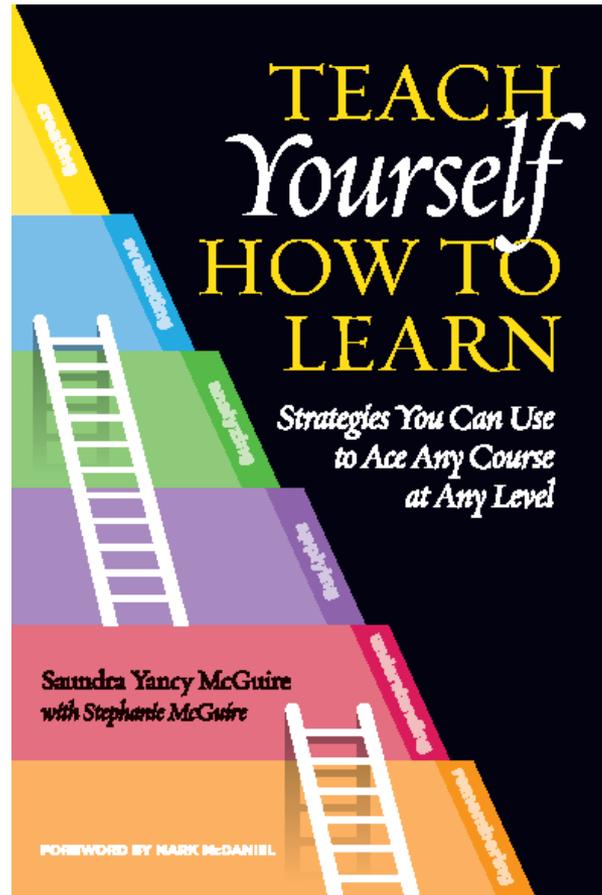
- **LSU Center for Academic Success colleagues (especially Sarah Baird)**
- **Colleagues in the International Learning Support Community**
- **The thousands of students who changed their attitudes and behaviors and taught ME that students CAN learn how to learn!**

A Faculty Resource



McGuire, S.Y. (2015). *Teach Students How to Learn: Strategies You Can Incorporate into Any Course to Improve Student Metacognition, Study Skills, and Motivation*. Sterling, VA: Stylus

The Book for Students



McGuire, S.Y. (2018). *Teach Yourself How to Learn: Strategies You Can Use to Ace Any Course at Any Level*. Sterling, VA: Stylus

David Hall, BA in Psychology, May 2019

Westmont College, Santa Barbara, CA

Final Semester GPA: 4.00

(2.70 cum before using strategies; ≥ 3.20 each semester after using strategies; 3.05 final cum GPA)



Has accepted position as a substance abuse counselor

Currently applying to graduate school to pursue

Master's degree in philosophy/theology

Teach Yourself How to Learn vs Success Course

Email received from David Hall on May 11, 2019

...more than anything your **book gave me a structured way to approach studying strategically** while that class ...didn't really resonate with me. It wasn't a very difficult class and it was easy to pass with a good grade, but I didn't leave that class with any tools that really gave me the structure and insight that I needed to actually put study strategies into practice. Your book and the examples you laid out gave a **very clear and concise methodology** that I was able to "plug in to," whereas that class **didn't impress upon me my own ability** to be able to study well. Your book and the examples you used and case studies you presented **inspired me to believe that if it were possible for them, it was possible for me too!!!**