Metacognition: The Key Ingredient on the Journey to Excellence!

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What are YOU likely to face as you climb the academic ladder?

Folks whose *miscalculations* tell *them* that *you* should not be able to fly!
The Transition of an HBCU Alumna from Freshman To Professional

1966-67  
Freshman at Southern Univ.

1968-69  
Junior at Univ. of CA, Berkeley

1983 - present  
Chem Prof and Learning Strategist
Presidential Recognition
White House Oval Office
November 16, 2007
Metacognition: The Key to Advancing on the Journey to Excellence

The ability to:

- think about your own thinking
- be consciously aware that you are 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

Reflection Questions

• What’s the difference 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
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

*Develop anticipatory set
Doing laundry

The procedure is actually quite simple. First you arrange items 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 process will then have to be repeated. However, that is a part of life.

Bransford, 1979; p. 134-135; original study by Bransford & Johnson, 1972
A Reading Strategy that Works: SQ5R

- **Survey** (look at intro, summary, bold print, italicized words, etc.)
- **Question** (devise questions survey 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)
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 Lewis, MS in Medical Physics, 2015
Univ of Texas Graduate School of Biomedical Sciences at Houston
Thesis research performed at UT MD Anderson Cancer Center

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

• Study information 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
Why the Fast and Dramatic Increase in Cognitive Skills?

It’s all about the *strategies*, and *engaging our brains*!
Counting Vowels in 45 seconds

How accurate are you?

Count all the vowels in the words on the next slide.
<table>
<thead>
<tr>
<th>Dollar Bill</th>
<th>Cat Lives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dice</td>
<td>Bowling Pins</td>
</tr>
<tr>
<td>Tricycle</td>
<td>Football Team</td>
</tr>
<tr>
<td>Four-leaf Clover</td>
<td>Dozen Eggs</td>
</tr>
<tr>
<td>Hand</td>
<td>Unlucky Friday</td>
</tr>
<tr>
<td>Six-Pack</td>
<td>Valentine’s Day</td>
</tr>
<tr>
<td>Seven-Up</td>
<td>Quarter Hour</td>
</tr>
<tr>
<td>Octopus</td>
<td></td>
</tr>
</tbody>
</table>
How many *words* or *phrases* do you remember?
Let’s look at the words again...

What are they arranged according to?
NOW, how many words or phrases do you remember?
What were two major differences between the two attempts?

1. We knew what the task was

2. We knew how the information was organized
**Bloom’s Taxonomy**

- **Remembering**
  - Retrieving, recognizing, and recalling relevant knowledge from long-term memory.

- **Understanding**
  - Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

- **Applying**
  - Carrying out or using a procedure through executing, or implementing.

- **Analyzing**
  - Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure.

- **Evaluating**
  - Making judgments based on criteria and standards through checking and critiquing.

- **Creating**
  - Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

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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/lilschult/blooms_taxonomy.htm](http://www.odu.edu/educ/lilschult/blooms_taxonomy.htm)
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
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 you move yourself higher on Bloom’s Taxonomy?

Use the Study Cycle*

*adapted from Frank Christ’s PLRS system
The Study Cycle

Preview

**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

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

Review

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

Study

**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

**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

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Set a Goal</td>
<td>1-2 min</td>
</tr>
<tr>
<td>2</td>
<td>Study with Focus</td>
<td>30-50 min</td>
</tr>
<tr>
<td>3</td>
<td>Reward Yourself</td>
<td>10-15 min</td>
</tr>
<tr>
<td>4</td>
<td>Review</td>
<td>5 min</td>
</tr>
</tbody>
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Decide what you want to accomplish in your study session

**Interact with material** - organize, concept map, summarize, process, re-read, fill-in notes, reflect, etc.

**Take a break** – call a friend, play a short game, get a snack

**Go over what you just studied**

Center for Academic Success
B-31 Coates Hall • 225.578.2872 • www.cas.lsu.edu
Recap of Effective Metacognitive Strategies

- Always solve homework 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”
- Spend time on every subject every day (even if it’s only 15 or 20 minutes)
- Use the Study Cycle with Intense Study Sessions
- Take advantage of academic assistance
- Aim for 100% mastery, not 90%!
An Awesome Resource: The Wayne State Academic Success Center

Welcome

The mission of the Academic Success Center (ASC) is to ensure that all Wayne State University students become self-determined, motivated and independent learners. We accomplish this through instruction and services that support students' development of skills to achieve academic excellence.

Contact Information:

Academic Success Center
David Adamany Undergraduate Library
Suite 1600
Detroit, MI 48202
And now meet the family that helped me along my journey...
My Dad, Robert E. Yancy, Jr.
My Mom,
Delsie Melba Moore Yancy
The Yancy Family

Robert, III
Saundra
Annette
Eric
Stephen McGuire, Ph.D.

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

Elected a fellow of the American Physical Society in 2008 “for his leadership in exploring new ways for research physicists, traditional educators and museum professionals to work together to engage students and the public, particularly under-represented groups, in the excitement of physics.”

Co-author of 2016 gravitational wave observation paper
Carla McGuire Davis, M.D.

Pediatrician and Pediatric Allergist and Immunologist, Clinical Assoc. Professor, Baylor College of Medicine

B.S., summa cum laude, Chem E, Howard Univ.
M.D., Duke University
Residency, Baylor College of Medicine
Research Fellowship, Baylor College of Medicine
Stephanie McGuire, D. Phil.
Neuroscience

M.M. Opera Performance

As herself in Stephanie McGuire: Mezzo Laid Bare, Marcellina in The Marriage of Figaro, and Dinah in Trouble in Tahiti

Mezzo Soprano in Berlin, Germany

S.B., Biology, Marshall Scholar, MIT
M.Sc., Neuroscience,
D.Phil., Psychoacoustics, The University of Oxford
M.Mus., Longy Conservatory

Has appeared with the Boston Pops, New York City Opera in Lincoln Center and at Carnegie Hall
LESSON ONE

If you can dream it, you can achieve it!
LESSON TWO

When you’re in the right place at the right time, good things happen!
(And the opposite is true too!)
LESSON THREE

Pursue Your Passion!
(You’ll never work a day in your life!)
Why the Bumblebee CAN fly...