Integrate Metacognition to Increase Engagement
Group Activity
“Students Say”

1. What would come to mind if a student made this statement to you?

2. How would you advise this student?
Start with WHY

The Golden Circle

1. Why?

2. How?

3. What?

we enhance the learning and teaching experience by empowering individuals with effective, transferable strategies and resources

Why?

I made great grades in high school and now I am failing
Perfectly capable, motivated students take on the mentality of the failing student their first few semesters in college.

Gone
Phantom Failures
OK
Great

The Murky Middle

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Loss of Self-Efficacy

• Not about self-worth. (value)

• About believing you are capable of producing desired result (Bandura)
What We’ve Learned

• GPA Differential - #1 indicator of student attrition at LSU

• High School vs. 1st Year College GPA

Ed Shihadeh 2014
Graduation Rates by First-Year GPA

Obvious Risk Cases
13% of all students

The “Murky Middle”
43% of all students

In this often-overlooked population, small differences in academic performance correlate with meaningful graduation gains

Likely Graduates
44% of all students

Six-Year Graduation Rate

First-Year GPA

Data compiled by the Education Advisory Board -- Inside Higher Ed. Sept. 10, 2014
“I had fallen below the GPA requirement my scholarship demands, and I was sure there was no hope for me and maybe I just wasn’t cut out for it (college).

However, after IMPACT I really utilized all the tools I was given . . . With all these tools, I was able to discover that I do have time for other fun and important things, such as a social life and most importantly, sleep. I fully credit my success to CAS and wouldn’t be here without all their advice. I can now proudly say that after beginning college with a 2.79 GPA, I have just recently finished midterms week with a solid 4.0!!

Thank you so much, and please continue with programs like IMPACT and CAS!!”
Metacognition

• teaching students to analyze the task at hand and to utilize appropriate strategies to get the job done.
WHAT?: 5 Metacognitive Pillars

To expose students to learning best practices:

• Learning is a process
• Learning takes time and effort
• Learning can be enhanced
• Emotions affect learning
• Learners are unique

we enhance the learning and teaching experience by empowering individuals with effective, transferable strategies and resources.
Metacognitive Integration

**Students**

- Why it is needed?
- How does it work?
- What do I need to do?

**Faculty**

- Why is it needed?
- How does it work?
- What do I need to do?
I studied for hours but I failed the test

What do you think? How would you advise?

Potential Issues:

• Studying using methods that yield good results for memorization based testing

• Use methods of study needed for short term testing.
Opportunity:
Helping students understand the new expectations, and exposing students to learning processes or best practices students understand why they may no longer be getting the results they want
Understanding values, judging validity or quality of work.

Deep understanding of a discipline.

Forming a unique product, requires creativity and originality.

Identifying components, relationships between parts, making inferences and deductions.

Solving problems, making connections. Transferring abstract ideas to practical situations.

Restating in your own words; paraphrasing, summarizing, translating.

Memorizing information verbatim, but not necessarily understanding the material.

Bloom’s Taxonomy: Levels of Learning

- **Rote Memorization**: WHAT?
- **Remembering**: WHAT IF?
- **Applying**: WHY?
- **Analyzing**: HOW?
- **Evaluating**: WHAT?
How Your Brain Works

Information Input

Sensory Memory
(1 second duration)

Short Term/Working Memory
(1-30 second duration)
limited to 7+2 independent chunks

Long Term Memory
(Minutes to Lifetime Recall)
virtually unlimited

LEARN

Repetition, Processing & Thinking
Active Processes Improve Learning!

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Center for Academic Success
PREVIEW:  
Before class, skim the chapter, note headings and boldface words, review summaries and chapter objectives, and note questions you would like answered in class.

ATTEND:  
GO TO CLASS! Ask questions and take meaningful notes.

REVIEW:  
Within 24 hours, review notes, fill in gaps, and develop any questions that need answering.

STUDY:  
Repetition is the key. Ask questions such as ‘why’, ‘how’, and ‘what if’.

- **Focused Study Sessions**: 3-5 short study sessions per day
- **Weekend Review**: Read notes and material from the week to make connections

ASSESS:  
Periodically perform reality checks

- Am I using study methods that are effective?
- Do I understand the material enough to teach it to others?
- Am I thinking critically?

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The CAS Study Cycle for Learning (new version)

THE STUDY CYCLE
The Path to Improving Study Techniques

START

PREVIEW
- Before class, skim new material.
- Note big ideas. 5-15 minutes

CHECK
- Can I teach this material to someone?
- Are my study methods effective?

ATTEND
- Go to class!
- Take notes.
- Ask questions.

STUDY
Schedule several focused study sessions per class each week.
30-50 minutes

REVIEW
- Reread notes.
- Fill in gaps.
- Develop questions.
10-15 minutes

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Adapted from Frank Chris's PLRS system.

Co-Constructed Developmental Teaching Theory
FOCUSED STUDY SESSIONS
Focused study sessions (FSSs) are designed to work with the way your brain learns best: in short, focused increments. Schedule several focused study sessions per class each week.

PLAN
- Decide what you will accomplish in your study session and get started.
  (Suggested time: 1 - 2 minutes)

STUDY
- Interact with material: organize, concept map, summarize, process, re-read.
  (Suggested time: 30 - 50 minutes)

BREAK
- Step away from material to clear your head.
  (Suggested time: 5 - 10 minutes)

RECAP
- Go back over, summarize, wrap-up and check what you studied.
  (Suggested time: 5 minutes)

CHOOSE?
- Should I continue studying?
- Should I take a break?
- Should I change tasks or subject?

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## Expectations for Learning Behaviors

### After first test

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before Class</strong></td>
<td>Does not preview</td>
<td>Previews material before class</td>
</tr>
<tr>
<td><strong>In Class</strong></td>
<td>Does not regularly attend class or pay attention</td>
<td>Attends every class and pays attention</td>
</tr>
<tr>
<td><strong>Outside of Class</strong></td>
<td>Doesn’t review materials after class</td>
<td>Reviews material after class</td>
</tr>
<tr>
<td></td>
<td>Does minimal work outside of class</td>
<td>Does work needed for 100% mastery (approx. 2+ hrs. for every hr. in class)</td>
</tr>
<tr>
<td><strong>Homework</strong></td>
<td>Completes assignments only for credit</td>
<td>Uses assignments to better understand material</td>
</tr>
<tr>
<td><strong>Studying</strong></td>
<td>Studies mostly directly before the test and uses memorization techniques</td>
<td>Studies consistently throughout the semester and uses active learning and higher order thinking techniques</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Doesn’t utilize (text book, office hours, tutoring)</td>
<td>Utilizes regularly to help with mastery (text book, office hours, tutoring)</td>
</tr>
<tr>
<td><strong>Content Mastery</strong></td>
<td>Doesn’t test mastery before test. Cannot answer problems without aids.</td>
<td>Can teach material to someone else or can answer problems without aids.</td>
</tr>
</tbody>
</table>
I don’t have time for this class with work, my other classes, and activities

What do you think? How would you advise?

Potential Issues:

• poor concept of how they actually spend and need to spend their time
• study for several hours at a time a few days before the test.
• Multitasking during study/class time
Opportunity

- Time tools help students organize and allocate their study time
- Help implement realistic study patterns
- A minimum of 2 hours spent for every hour in class
- Encourage frequent Focused Study Sessions
Multitasking Activity

Statement: Multitasking is worse than a lie
#s - 123456789101112131415161718192021222324252627

1st Attempt (30 seconds) – Alternate rows
A) M
B) 1

2nd Attempt (30 seconds) – Write all at once
A) Multitasking is worse than a lie
B) 123456789101112131415161718192021222324252627

Why Multi-Tasking Is Worse Than Marijuana For Your IQ
# Semester Calendar

<table>
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<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
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<td>6</td>
<td>JANUARY</td>
<td>Week 1</td>
<td>7 8</td>
<td>Orientation</td>
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<td>11 12</td>
<td>13</td>
<td>Week 2</td>
<td>14</td>
<td>Classes Begin</td>
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<tr>
<td>20</td>
<td>Week 3</td>
<td>21</td>
<td>Martin Luther King Holiday</td>
<td>22</td>
<td>Classes resume</td>
<td>Final date for dropping without receiving a &quot;W&quot;</td>
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<tr>
<td>23 24</td>
<td>Final date for adding courses</td>
<td>25 26</td>
<td>Week 4</td>
<td>27</td>
<td>1 FEBRUARY</td>
<td>28 29 30 31</td>
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<tr>
<td>3 4</td>
<td>Week 5</td>
<td>5 6</td>
<td>Mardi Gras Holiday</td>
<td>7</td>
<td>Mardi Gras Holiday</td>
<td>8 9</td>
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<td>11 12 13 14 15 16</td>
<td>17</td>
<td>Week 7</td>
<td>18 19 20 21 22 23</td>
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<td>24 25</td>
<td>Week 8</td>
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<td>1 MARCH</td>
<td>27</td>
<td>3</td>
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<td>2 3</td>
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<td>Week 10</td>
<td>5 6</td>
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<td>7</td>
<td>Mardi Gras Holiday</td>
<td>8 9</td>
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<tr>
<td>10 11 12 13 14 15</td>
<td>Week 11</td>
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<td>Spring Break</td>
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<td>Spring Break</td>
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<tr>
<td>19 20</td>
<td>Week 12</td>
<td>21</td>
<td>Semester Resumes</td>
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<td>Spring Break</td>
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<td>25 26</td>
<td>27</td>
<td>1 APRIL</td>
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<td>29 30</td>
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<td>31</td>
<td>1</td>
<td>Week 13</td>
<td>2</td>
<td>Course scheduling for fall begins</td>
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<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8 9</td>
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<tr>
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<td>13</td>
<td>14 15 16 17 18 19</td>
<td>20</td>
<td>Week 14</td>
<td>21 22 23 24 25 26</td>
<td>Classes end</td>
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<td>27 28</td>
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<td>MAY</td>
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<td>14 15</td>
<td>16</td>
<td>Week 16</td>
<td>17</td>
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**Note:**
- Find at: www.lsu.edu/cas
- Love Purple LIVE GOLD
- LSU
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<tr>
<th>Week of Monday to Sunday</th>
<th>Math</th>
<th>English</th>
<th>Biology</th>
<th>French</th>
<th>Geog.</th>
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<td>Pgs. 35-50</td>
<td>Preview CH</td>
<td>Pgs. 27-40</td>
<td>Study Grp</td>
<td>CH 4-5 Review</td>
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<tr>
<td></td>
<td>Pgs. 51-68</td>
<td>Create outline</td>
<td>Pgs. 41-55</td>
<td>Chap. 4</td>
<td>Moodle Act.</td>
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<td>QUIZ</td>
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<td>Lab 45 min.</td>
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<td>Pgs. 74-82</td>
<td>HW Fri.</td>
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<tr>
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<td>Lab 45 min.</td>
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<td>SI Session</td>
<td>Pgs. 35-50</td>
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<td></td>
<td>Quiz Wed.</td>
<td></td>
<td>QUIZ Thurs.</td>
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</table>
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CHOOSE

- Should I continue studying?
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- Should I change tasks or subject?
<table>
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<th>Hours</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Sat.</th>
<th>Sun.</th>
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<td>Lunch</td>
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<td></td>
<td></td>
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<tr>
<td>1:00-1:30</td>
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<td></td>
<td>Work</td>
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</tbody>
</table>

- **FSS’s**
- **FSS**
#3 Learning Can be Enhanced

Opportunity:
Not all study methods are created equal

• Active Learning
• Critical Thinking
• Judgment of Learning
• Reflection
I am having trouble in my large lecture courses or with Professor X

What do you think? How would you advise?

Potential Issues:
- Utilizing passive learning techniques to study
- Visual-Kinesthetic Learners in a Read-Write course
- Not attending class

Tools:
- Concept Mapping
- Study Group Starter Kit
Interactive learning can explode long-term retention rates by up to 10x.

### Learning by Type

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Reading</th>
<th>Audio - Visual</th>
<th>Demonstration</th>
<th>Discussion Group</th>
<th>Practice by Doing</th>
<th>Teach Others/Immediate Use</th>
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</thead>
<tbody>
<tr>
<td>5%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
<td>75%</td>
<td>80%</td>
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</table>

**Average Retention of Learning**

Interactive learning can explode long-term retention rates by up to 10x.

---

*The Learning Pyramid, taken from "Corporate Universities" by Jeanne Meister*
Sensory Preference

VISUAL

READ/WRITE

AURAL

KINESTHETIC
Active Learning Out of Class

• Assigning projects
• Concept mapping
• Study groups
• Self-tests
• Teaching someone
• Tutoring
• Supplemental Instruction/Review sessions
Study Group Starter Kit

- Seven Steps to a Successful Study Group
- First Meeting Agenda
- Tips for Success
- Goals, Rules & Expectations Discussion Guide
- Group Roles and Responsibilities
- Study Group Session Guide
- Group Learning Resources
- Study Group Meeting Schedule and more...

CAS

CAS - B-31 Coates Hall - 225.578.2872 - www.cas.lsu.edu
Money’s Overtones in Determining Social Class

**How?** Birth used as a determinant. One must be born and socialized in an upper-class subculture to be in the upper class regardless of present income and assets. Most of the “new rich” are only marginal members of the upper classes during their lifetimes. Their children, however, have a better chance. Their grandchildren are often assured upper-class status. Their grandchildren usually have fully absorbed upper-class behavior.

**What?** Sources of money. The source of one’s money also determines status. Several sources are considered the “best.” First, inherited money as a source confers much status. It confers greater status than earned money because it shows family background. Second, income from investments confers status. It also suggests family background. Third, income from genteel professions confers status. It is better than income from wages. You could say that money from speculating on stocks is better than money from gambling on horses.

**How?** Previous money used in determining and keeping social class. Money one had is considered almost as good as current money for granting social status. The “real” aristocracy of the South, for example, no longer has great wealth. Yet the poor aristocrat can still retain upper-class status.

**Ans** To keep upper-class status, however, those with previous wealth must still have at least enough money to live in an upper-class pattern. In other words, they must be able to afford upper-class behavior and style.
I don’t GET this class/or I am lost

What do you think?
How do you advise?

Potential Issue:
• Not understanding the foundational principles of course
• Not sure how to approach material
• Not making connections
Reflection on Course Content

Opportunity:

– Asking why, how, what if
– Making connections with material using visual aids such as concept maps or information matrices.
– Asking critical thinking questions to foster better understanding of foundational concepts of the discipline.
Benefits

1. Previewing
2. Study Guides
3. Assist with Higher Order Thinking Tasks
4. Testing Retrieval

Chapter or Topic Map

Title of Chapter

Primary Headings

Subheadings

Secondary Subheadings
Concept Mapping

Concept #1
- How are they similar?
- How are they different?

Concept #2

Diagram:
- Topic
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6

Tree Map:
- Main Idea
  - Who
  - Did
  - When
  - What
  - Where
  - How
  - Why

Diagram:
- Title: Concept Mapping
- Diagram showing relationships between concepts.
- Tree map for organizing ideas.
# Information Matrices

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<tr>
<th>Understanding and approaching the market</th>
<th>Marketing research: an aid to decision making</th>
<th>Understanding buyer behavior</th>
<th>External considerations in marketing</th>
<th>Marketing in global markets</th>
<th>Managing the Product</th>
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<tbody>
<tr>
<td>Defining the market</td>
<td>nature and importance of marketing</td>
<td>Till death do us part</td>
<td>External factors that affect planning</td>
<td>Defining international marketing</td>
<td>Defining product</td>
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<tr>
<td>types of markets</td>
<td>What needs researching?</td>
<td>Buyer behavior and exchange</td>
<td>Standardization and customization</td>
<td>Classification of products</td>
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<td>Procedures and techniques</td>
<td>Buyer behavior as problem solving</td>
<td>Reasons for entering international market</td>
<td>Product planning and strategy formulation</td>
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<td>Organizational buyer behavior</td>
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<td>Reasons for entering international markets</td>
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<td>Value of marketing research</td>
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</tr>
</tbody>
</table>

Love Purple LIVE GOLD

LSU
Students need guided opportunities for critical thinking

- Instruction that enables students to see models of how experts organize and solve problems may be helpful.
- Understanding the foundational principles of a discipline can help students frame their thinking
- Flipped classrooms allow for critical thinking exercises during class time.
Teaching Students to Think Critically

Learning to Think Things Through
A Guide to Critical Thinking in the Curriculum

Gerald M. Nosich

Critical Thinking
Concepts & Tools

Richard Paul & Linda Elder

over one million in use

LSU

Love Purple LIVE GOLD
Critical Thinking is an **Active** Process...

**Question**
Stop. Ask Questions.

**Think**
Reason Through (to find the BEST answer)

**Check**
Check their thinking or depth of understanding

That Requires MORE than Memorizing!
The Critical Thinking Guide

Frame

Question  
Think  
Check

Use higher order thinking skills: Apply, Analyze, Evaluate, Create  

Adapted by the Center for Academic Success - from Gerald Nosich’s *Learning to Think Things Through*.  
Based on Richard Paul’s Theory of Critical Thinking
Create a Course Concept Map

To help students “frame” their thinking in the context of the course

<table>
<thead>
<tr>
<th>Understanding and approaching the market</th>
<th>Marketing research: an aid to decision making</th>
<th>Understanding buyer behavior</th>
<th>External considerations in marketing</th>
<th>Marketing in global markets</th>
<th>Managing the Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining the market</td>
<td>nature and importance of marketing</td>
<td>Till death do us part</td>
<td>External factors that affect planning</td>
<td>Defining international marketing</td>
<td>Defining product</td>
</tr>
<tr>
<td>types of markets</td>
<td>What needs researching?</td>
<td>Buyer behavior and exchange</td>
<td>Standardization and customization</td>
<td>Classification of products</td>
<td></td>
</tr>
<tr>
<td>Approaching the market</td>
<td>Procedures and techniques</td>
<td>Buyer behavior as problem solving</td>
<td>Reasons for entering international market</td>
<td>Product planning and strategy formulation</td>
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<tr>
<td>Conducting research</td>
<td>Organizational buyer behavior</td>
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<td>Reasons for entering international markets</td>
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<tr>
<td>Processing data</td>
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<td></td>
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<tr>
<td>Value of marketing research</td>
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</table>

LSU

Love Purple LIVE GOLD
Mathematics as a discipline
Potential Issues:

• Poor judgment of learning
• Not enough time spent on homework

What do you think? How would you advise?
Judgment of Learning

Informal Assessment

• Quick quizzes
• Self-tests
• One minute papers
• How to Approach Homework
Get the Most out of Homework

1. **Review Text and notes before starting homework**
   - Focus on “How” to work problems in class rather than the answer

2. **Work Examples from class and text first**

3. **Work Homework problems as a test to judge learning**

4. **Keep a Log of questions, answers and steps for working each problem**
Ground Water Contamination
- Falling water tables
- Seepage

Air pollution
- Dust from erosion
- Smoke from fires
- Chemicals from factories

Runoff
- Natural – herbicides, pesticides
  - Farms
  - Urban areas

Point source contamination
- Legal – sewage treated
- Illegal – Dumping, fault treatment
Some of the questions on the test came out of nowhere.

Potential Issues:
- Functioning at memorization levels
- Unable to synthesize information from several sources.
- Poor test wisdom

Tools:
- Bloom’s Taxonomy
- Post Test Review

What do you think? How do you advise?
Judgment of Learning

Formal Assessment

• Using the post test review
• Frequent testing
• Showing students the level of thinking required for test questions
"What caused me not to get a 100%?"

- Insufficient information
- Test anxiety
- Lack of test wisdom
- Lack of confidence
- Testing strategies and/or skills
- Focused on different information
- Simple testing mistakes
Learning Level Test Question Examples

**Level 5: Evaluating**

Global warming is caused by a build up of carbon dioxide in the air. How can adding more plants in the environment lessen the effects of global warming?

**Level 4: Analyzing**

Simplify the raw materials into input molecules and output molecules.

**Level 3: Applying**

If respiration is the reverse of photosynthesis, write the formula for respiration?

**Level 2: Understanding**

Summarize the process of photosynthesis.

**Level 1: Remembering**

Which of the following are the raw materials for photosynthesis?
Opportunity:
Encourage students to become more self-aware and reflect on their learning processes to better regulate their learning.
I am bad at Math /

What do you think? How would you advise?

Potential Issues:
• Poor self efficacy
• Fixed mindset
• Poor foundational skills

Tools:
• Khan Academy, etc.
• Fixed vs. Growth Mindset
• Expert vs. Novice Learners
Mindsets About Intelligence

## Novice vs. Expert Learners

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Expert</th>
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</thead>
<tbody>
<tr>
<td><strong>Questions</strong></td>
<td>Don’t ask</td>
<td>Pose useful “Wh” questions: why, how, what if</td>
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<tr>
<td>**Patterns &amp;</td>
<td>Don’t recognize</td>
<td>Look for and recognize</td>
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<tr>
<td>Connections**</td>
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<tr>
<td><strong>Knowledge</strong></td>
<td>Not organized (memorized separate facts)</td>
<td>Organized (by key concepts and principles)</td>
</tr>
<tr>
<td>**Regulation of</td>
<td>Haphazard</td>
<td>Self-regulation of time, effort, and mastery</td>
</tr>
<tr>
<td>learning**</td>
<td></td>
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<tr>
<td><strong>Motivation</strong></td>
<td>Is low for disliked tasks</td>
<td>Is created by using strategies and goals</td>
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<tr>
<td><strong>Thinking</strong></td>
<td>Difficulty adapting to new situations</td>
<td>Uses metacognition to adapt thinking to new situations</td>
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</table>
Start with WHY

The Golden Circle

1. Why?
   Student Transformation

2. How?
   Metacognition

3. What?
   Strategies/Tools

Why?
How can metacognition be used in a course to transform student learning?

Opportunities for:

- Exposure to **learning best practices**
- **Reflection** on content and on learning process
- Implementing a **routine or rhythm**
- **Judgment of Learning**
  (i.e., Assessment: informal and formal)
- **Active Learning** inside and outside classroom
- Guided **Critical Thinking**
### Rubric for Metacognitive Course Integration

<table>
<thead>
<tr>
<th>Rubric Item</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
<th>If yes, describe</th>
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<tbody>
<tr>
<td>Students are exposed to best learning practices or the process of learning based on cognitive science research</td>
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<tr>
<td>Syllabus follows the pattern of the Study Cycle or Co-Constructed Developmental Teaching Theory (CCDTT)</td>
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<td>Students are encouraged to utilize time tools to help them implement a realistic study pattern</td>
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<tr>
<td>Opportunities are provided for or students are encouraged to use metacognitive practices such as:</td>
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<tr>
<td>Reflecting on content</td>
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<tr>
<td>Reflecting on their learning processes</td>
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<tr>
<td>Judging their learning through informal/self assessment</td>
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<tr>
<td>Judging their learning through formal assessment</td>
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<tr>
<td>Participating in active learning in class</td>
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<tr>
<td>Participating in active learning out of class</td>
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<tr>
<td>Participating in guided critical thinking</td>
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<tr>
<td>Assessing their level of critical thinking</td>
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References

Center for Academic Success

For More Information:

www.lsu.edu/cas

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