



# Using the Scientific Method to Improve Mentoring

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## Protégé's Cumulative Exam Record Pursuing Ph.D. in Chemistry

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### 2004 – 2005

9/04 Failed

10/04 Failed

11/04 Failed

12/04 Failed

**1/05 Passed**

2/05 Failed

3/05 Failed

4/05 Failed

Began work  
with CAS and  
Writing  
Center in  
October 2005

### 2005 – 2006

**10/05 Passed**

11/05 Failed

**12/05 Passed** best in group

**1/06 Passed**

**2/06 Passed**

3/06 Failed

**4/06 Passed last one!**

5/06 N/A



## Desired outcomes

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- We will understand the importance of structured mentoring based on the scientific method
- We will understand the role of metacognition in mentoring
- We will know how to be more effective mentors
- Our protégés will persist and soar with the assistance of good mentoring



# Overview

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- The Scientific Method
- Definition of mentoring
- Role of metacognition in mentoring
- Learning and Time Management Strategies That Work
- Characteristics of Magical vs. Monstrous Mentors
- Q & A

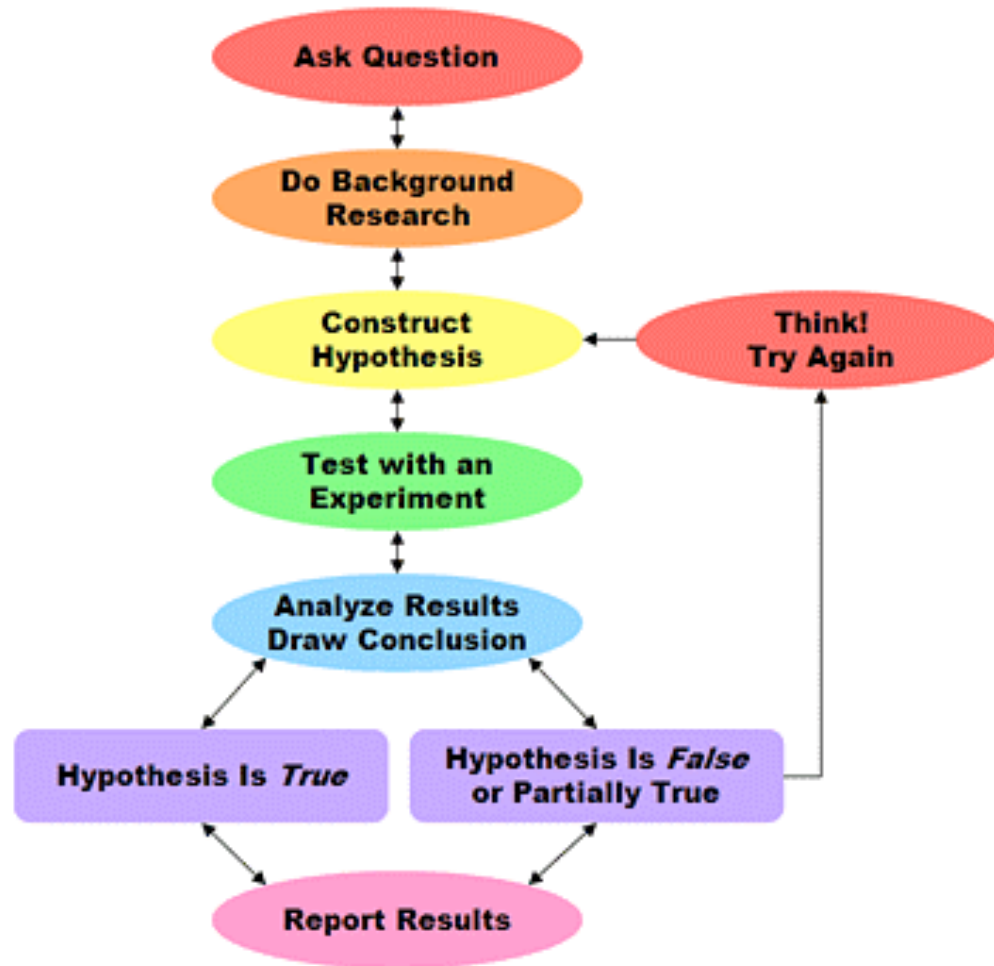


# Reflection Questions

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- Who has been the most important mentor in your academic/professional life to date?
- What characteristics made her/him an effective mentor?

# The Scientific Method





## What is a Mentor?

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An individual who takes an active interest in helping a protégé set and achieve goals in an academic, industrial, or other environment.



# **Applying the Scientific Method to Mentoring**



# What is the question?

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How can I be the most effective mentor to this particular protégé?



# Background Research

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- What are the characteristics of the protégé?
  - Learning style\*
  - Personality style\*
  - Modality preference\*
  - Cerebral Hemisphericity\*
  - Career interests
- What are the protégé's expectations of the mentoring experience?
- What is the protégé's cultural background?

\*[www.cas.lsu.edu](http://www.cas.lsu.edu)



# Construct Hypothesis

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- **Protégé needs academic strategies**
- Protégé needs personal strategies
- Protégé needs career search strategies
- Protégé needs confidence boosting
- Protégé needs independence
- Others?



# Test with Experiment

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- What happens if I provide protégé with specific learning strategies?



# What we know about learning

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



# What learning strategies can I teach?

- Metacognition
- Time Management
- Finding Additional Resources



# Metacognition

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The ability to:

- think about thinking
- plan and evaluate one's learning
- monitor and control one's mental processing (e.g. "Am I understanding this material?")
- accurately judge one's level of learning



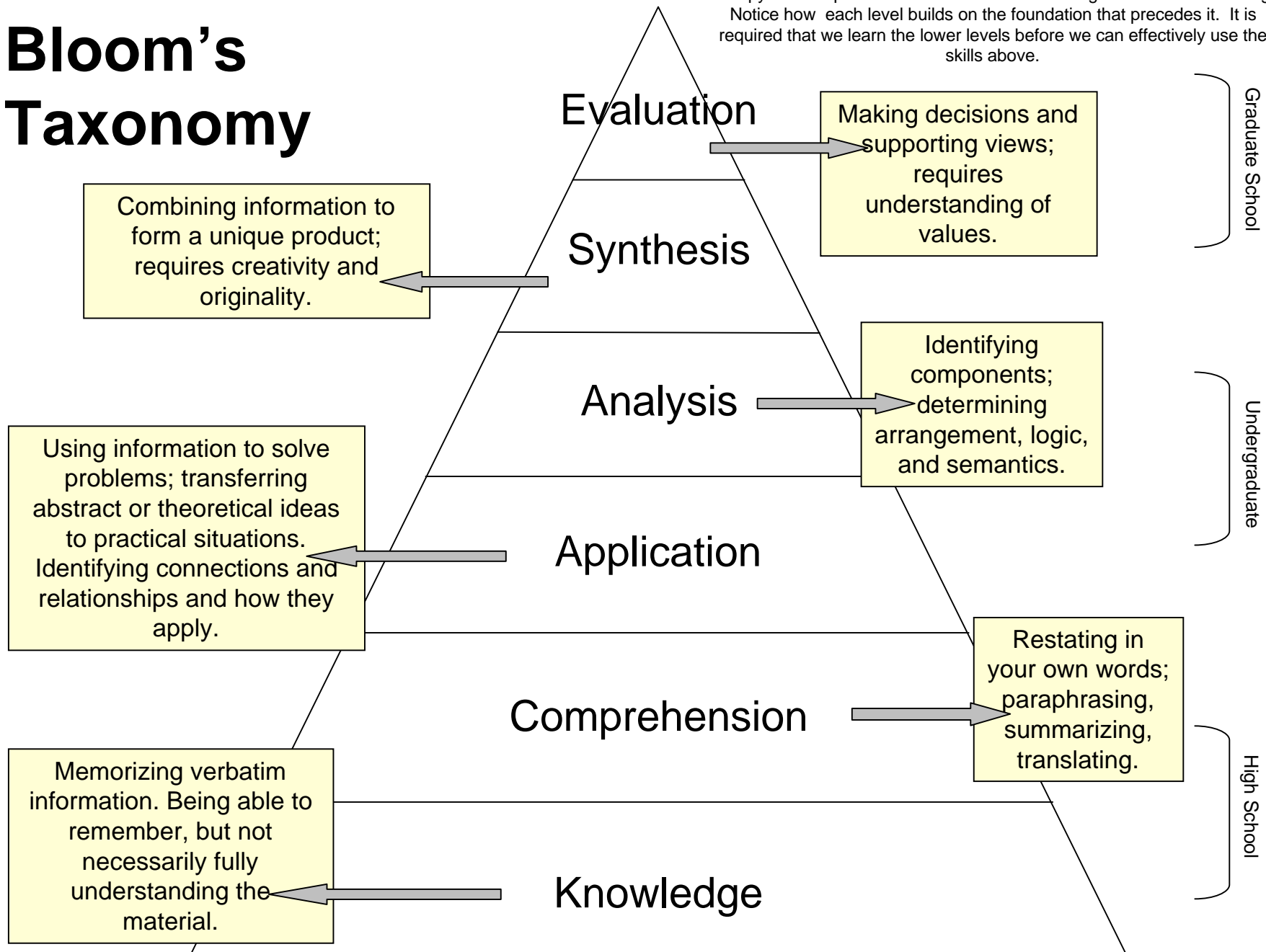
# Think/Pair/Share

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What is the difference, if any,  
between studying and learning?  
Which, if either, is more enjoyable?

# Bloom's Taxonomy

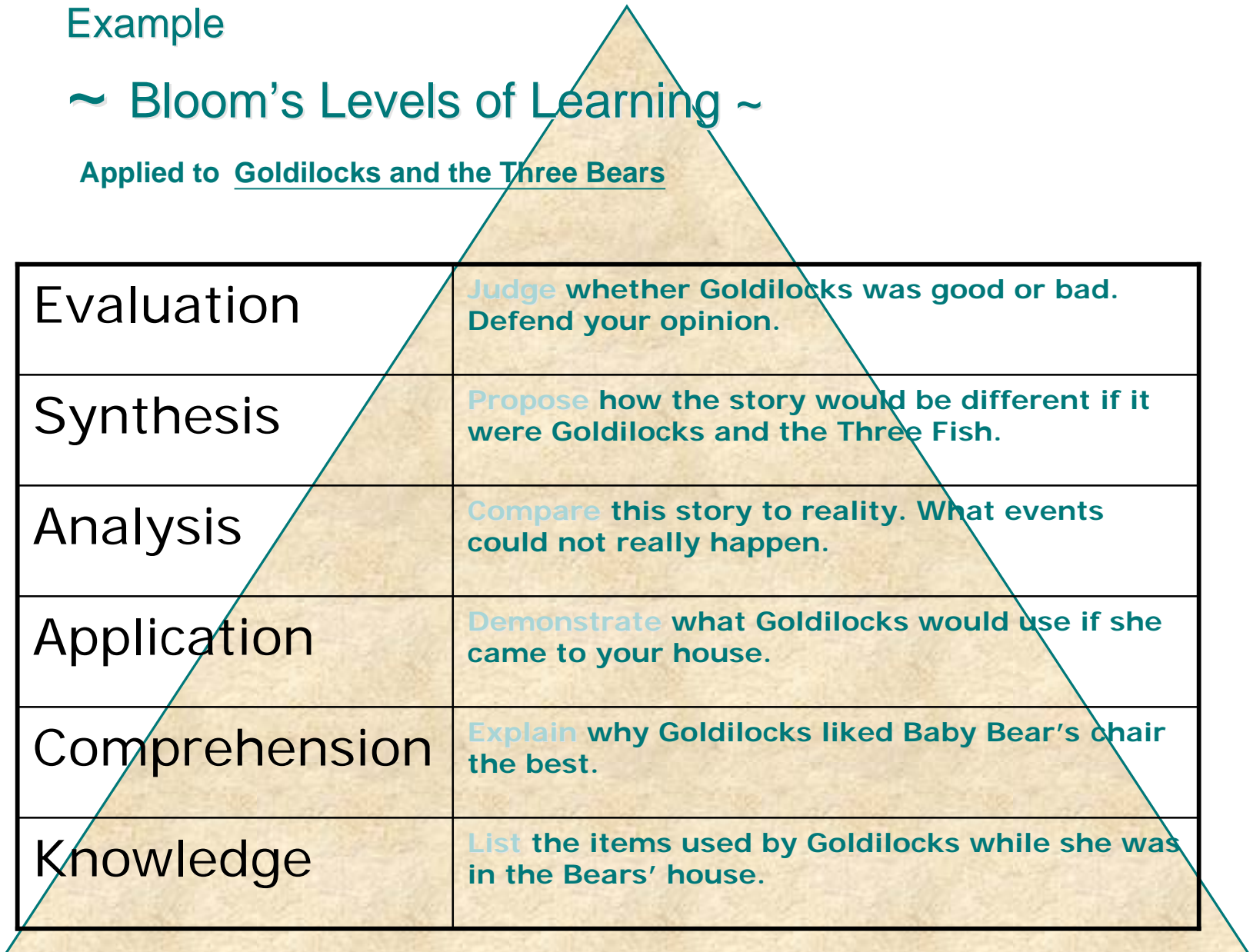
This pyramid depicts the different levels of thinking we use when learning. Notice how each level builds on the foundation that precedes it. It is required that we learn the lower levels before we can effectively use the skills above.



Example

## ~ Bloom's Levels of Learning ~

Applied to Goldilocks and the Three Bears



Evaluation	Judge whether Goldilocks was good or bad. Defend your opinion.
Synthesis	Propose how the story would be different if it were Goldilocks and the Three Fish.
Analysis	Compare this story to reality. What events could not really happen.
Application	Demonstrate what Goldilocks would use if she came to your house.
Comprehension	Explain why Goldilocks liked Baby Bear's chair the best.
Knowledge	List the items used by Goldilocks while she was in the Bears' house.



# The Study Cycle

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**Phase One:** Preview material to be covered in class... before class. (Create chapter maps)

**Phase Two:** **GO TO CLASS!** Listen actively, take notes, participate in class.



**Phase Three:** Review and process class notes as soon after class as possible.

**Phase Four:** Use Intense study sessions.

**Repeat**



# Intense Study Sessions

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- 2-5 minutes: Set goals for next 25 - 40 min.
- 25-40 minutes: Read text more selectively  
Make doodles/notes in margins  
Create mnemonics  
Create concept maps
- 5 minutes  
↓  
Review what you have just studied
- 10 minutes Take a break
- Repeat



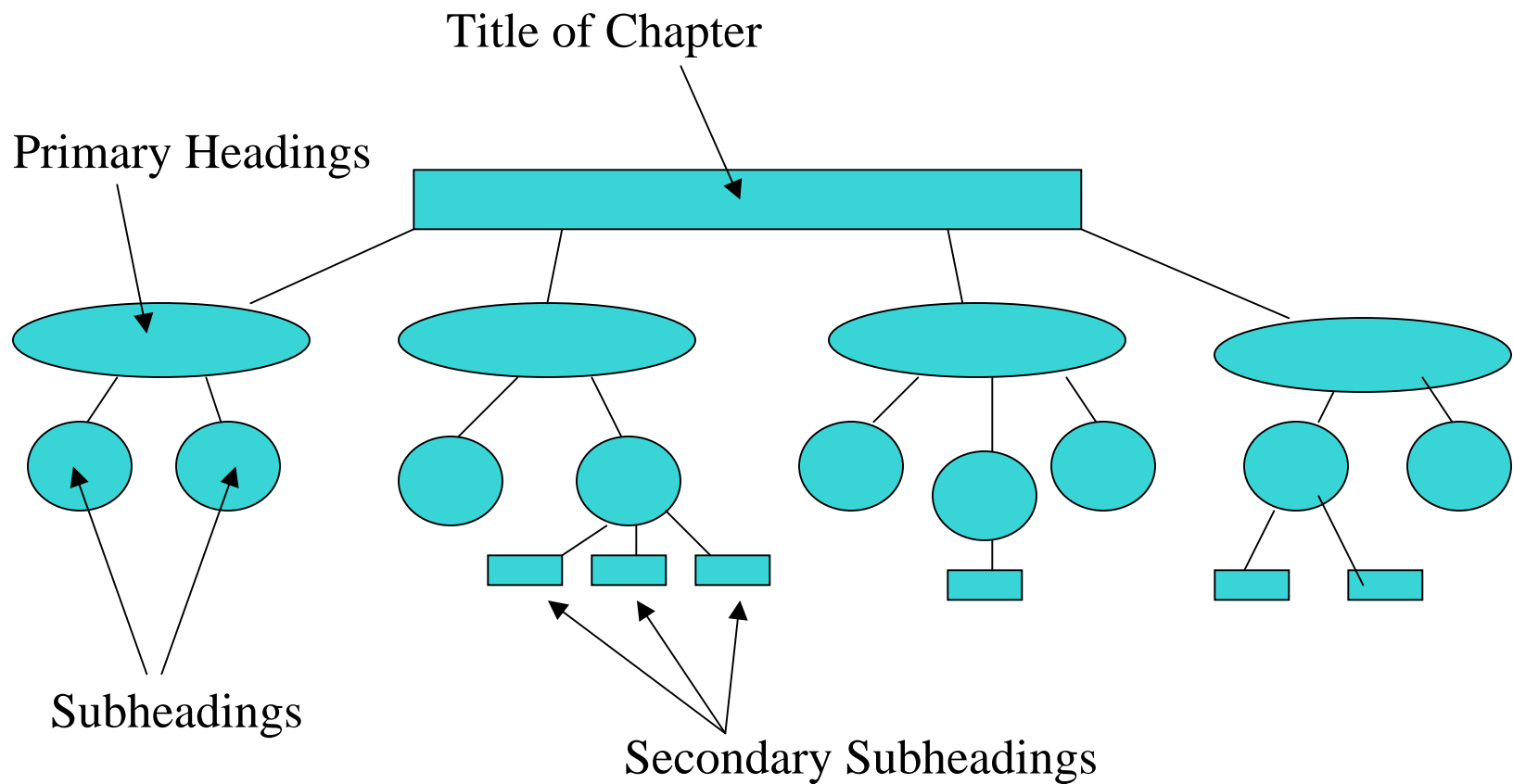
# Get the Most Out of Homework

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- Start the problems early--the day they are assigned
- **Do not flip back to see example problems; work them yourself!**
- Don't give up too soon (<15 min. on one problem)
- Don't spend too much time (>30 min. on one problem)

# Create a Chapter Map

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# Analyze Results

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- Hypothesis True
  - Encourage continued success
- Hypothesis False
  - Construct new hypothesis based on protégé observation and reflection  
e.g. time management strategies needed



# The Story of Four LSU Students 2003 - 2004

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- Travis, junior psychology student  
47, 52, 82, 86
- Robert, freshman chemistry student  
42, 100, 100, 100
- Michael, senior pre-medical organic student  
30, 28, 80, 91
- Terrence, junior Bio Engineering student  
GPA 1.67 cum, 3.54 (F 03), 3.8 (S 04)



# Report Results

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- To departmental colleagues
- At national meetings
- In newsletters
- Others?



Mentors Can Span the Gamut  
from Magical to Monstrous!

Protégés Can Cover the Spectrum  
from Perfect to Problematic!

# Behaviors of Magical Mentors



- Act as a source of information on the culture, norms, and expected behaviors
- Tutor specific skills, provide effective strategies
- Give feedback and provide coaching
- Serve as a confidante in personal crises and problems
- Demonstrate confidence in protégé's ability



## More magical mentor behaviors

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- Assist in plotting a career path
- Let protégé make own decisions
- Maintain integrity of the relationship between the protégé and the natural supervisor

Murray, Margo & Owen, Mara A. (1991). *Beyond the Myths of Mentoring*. San Francisco: Josey-Bass Publishers

# Characteristics of Monstrous Mentors

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- Controlling and Manipulative
- Self – Centered
- Legend in their own mind
- Lack respect for protégé's intelligence and ability
- Use personal information to undermine protégé
- Take credit for protégé's work
- Unwilling to remain on professional level



# What Mentors Should Know

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- Your protégé' is not you
- Listen > talk
- How to brainstorm solutions with protégé
- How to communicate high expectations
- How to help protégé deal with setbacks
- When to call in others



# Characteristics of Perfect Protégés

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- Interested in Receiving Advice
- Receptive to Constructive Criticism
- Responsive to Coaching
- Spend time preparing for mentoring session
- Unafraid of asking probing questions



# Characteristics of Problematic Protégés

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- Regularly miss appointments
- Fail to heed advice
- Refuse to take responsibility
- Generally unenthusiastic and negative
- Rarely, if ever, express appreciation
- Don't give credit to mentor for his/her contribution



# Start using the scientific method now to improve your mentoring

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- What's the right question?
- What background info do you need?
- What hypotheses can you generate?
- What experiments can you try?
- What will the results imply?
- To whom can you report the results?



# Useful Websites

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- [www.cas.lsu.edu](http://www.cas.lsu.edu)
- [www.howtostudy.org](http://www.howtostudy.org)
- [www.vark-learn.com](http://www.vark-learn.com)
- [www.drearlbloch.com](http://www.drearlbloch.com)



# References

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- Bruer, John T. , 2000. *Schools For Thought: A Science of Learning in the Classroom.* MIT Press.
- Bransford, J.D., Brown, A.L., Cocking, R.R. (Eds.), 2000. *How people learn: Brain, Mind, Experience, and School.* Washington, DC: National Academy Press.
- Halpern, D.F and Hakel, M.D. (Eds.), 2002. *Applying the Science of Learning to University Teaching and Beyond.* New York, NY: John Wiley and Sons, Inc.
- Nilson, Linda, 2004. *Teaching at It's Best: A Research-Based Resource for College Instructors.* Bolton, MA: Anker Publishing Company.



## References Continued

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- Murray, M. and Owen, M. (1991). *Beyond the Myths of Mentoring*. San Francisco, CA: Josey-Bass.
- Peddy, S. (2001). *The Art of Mentoring: Lead, Follow, and Get Out of the Way*. Houston, TX: Bullion Books.
- Taylor, S. (1999). Better learning through better thinking: Developing students' metacognitive abilities. *Journal of College Reading and Learning*, 30(1), 34ff. Retrieved November 9, 2002, from Expanded Academic Index ASAP.

<http://academic.pg.cc.md.us/~wpeirce/MCCC TR/metacognition.htm>

- Zull, James (2004). *The Art of Changing the Brain*. Sterling, VA: Stylus Publishing.