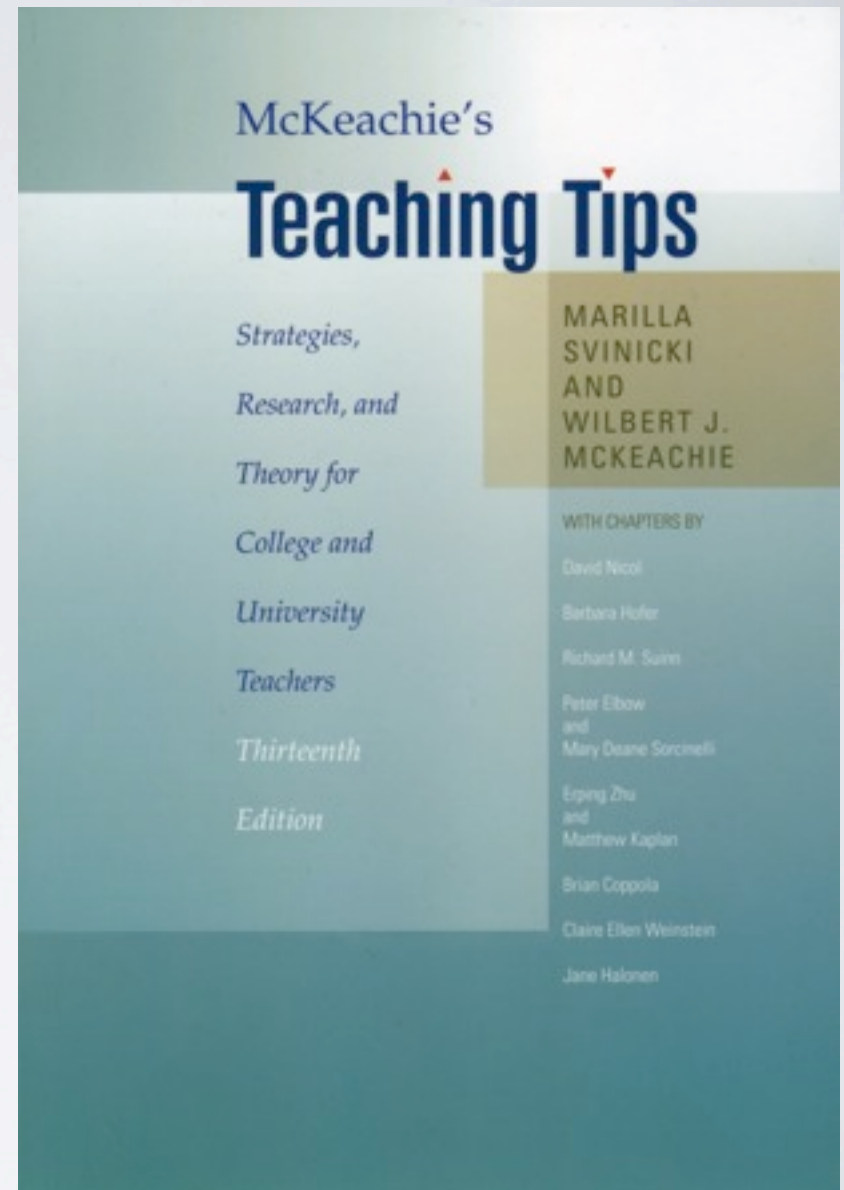


# PROBLEM SOLVING AND ACTIVE LEARNING

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# STEP I

Get a copy of McKeachie



# STEP 2: PLAN

- Not all students are the same (summary follows).
- All faculty are good at learning.
- What do you want to do?

# LEARNING STYLES I (FELDER)

## **Sensing Learners**

- Focus on external input
- Practical
- Observant (notice details of environment)
- Learn through repetition
- Methodical
- Like working with details
- Complaint about course: No apparent connection to real world
- Problem with exams: Run out of time

## **Intuitive Learners**

- Focus on internal input
- Imaginative
- Look for meanings (miss details)
- Likes variety, bored with repetition
- Quick
- Like working with concepts
- Complaint about course: Too much Plug & Chug
- Problem with exams: Careless mistakes

# LEARNING STYLES II

## **Visual Learners**

Show me:

- pictures
- diagrams
- sketches
- schematics
- flow charts
- plots

## **Verbal Learners**

Explain it to me

- spoken words
- written words
- symbols

# LEARNING STYLES III

## **Active Learners**

- Tend to process actively
- Think out loud
- “Let’s try it out and see how it goes”
- Tend to jump in prematurely
- Like group work

## **Reflective Learners**

- Tend to process reflectively
- Work introspectively
- “Let’s think it through and then try it”
- Tend to delay starting
- Like solo or pair work

# LEARNING STYLES IV

## **Sequential Learners**

- Build understanding in logical sequential steps
- Function with partial understanding of information
- Make steady progress
- Explain easily
- Good at analytical thinking

## **Global Learners**

- Absorb information randomly, then synthesize the Big Picture
- Need the Big Picture in order to function
- Large leaps in understanding with little progress
- Can't explain easily
- Synthesis

# LIMITS TO HUMAN LEARNING

- Attention Span
- Short and Long-term memory
- Communications shortcomings
- Distractions
- Taxonomy



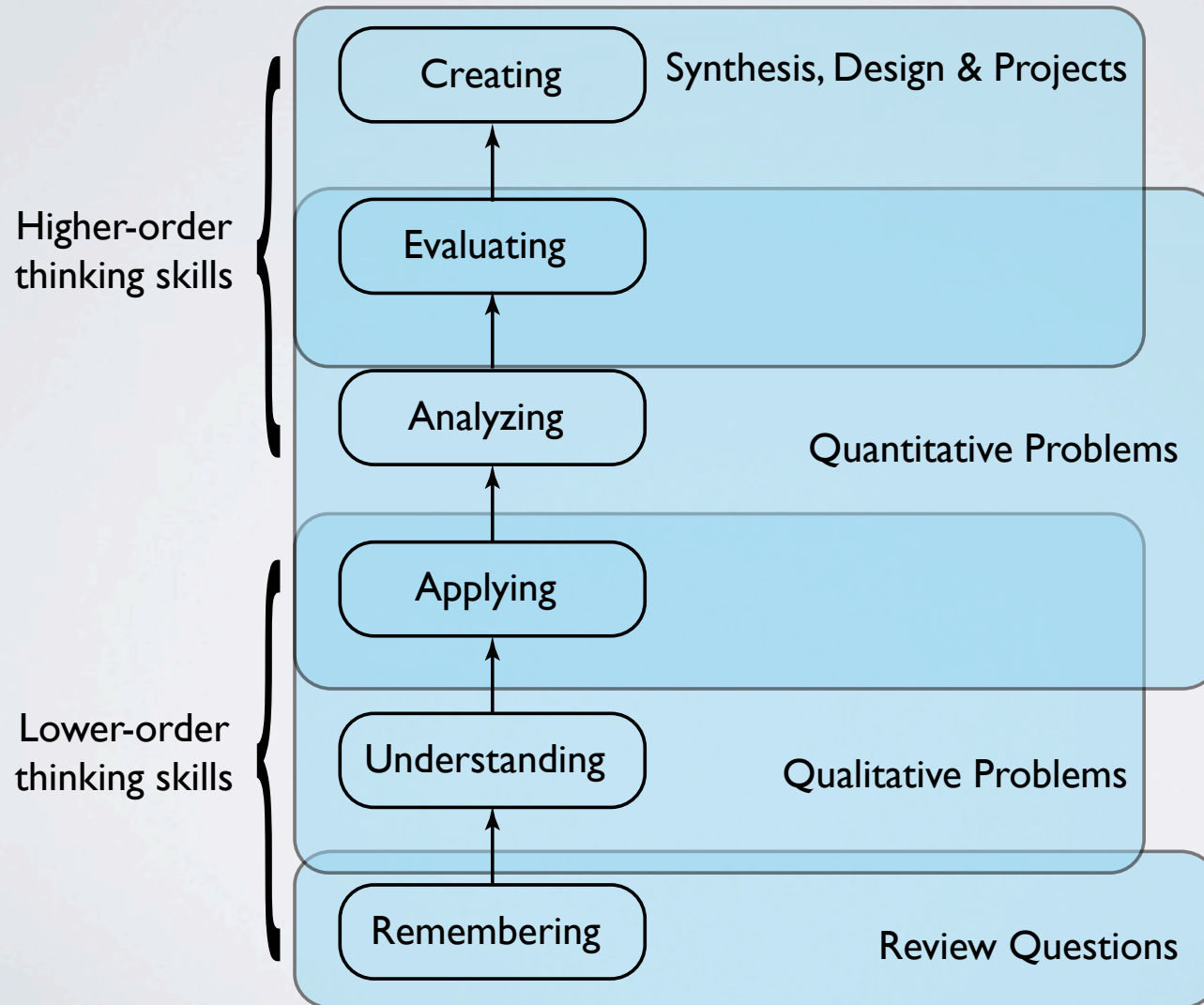
Ann Arbor  
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Cold Harbor  
Springfield  
Burlington  
Concord  
Hammond  
St. Paul

Rome  
Eau Claire  
Troy  
Gainesville  
Texarcana  
Flagstaff  
Tulsa  
Waterloo  
Provo  
Ely  
Monroeville  
Huntsville  
Clifton  
Little Rock  
Halifax

# ASSIGNMENT:

Write down as many city names from the list as you can remember.

# BLOOM'S TAXONOMY



# LECTURE FORMATS

## **Lecture**

Carefully prepared and organized notes are transcribed onto a board and carefully transcribed by students into notebooks.

## **Discussion**

The entire class focuses upon a topic moderated by instructor

## **Active Learning**

Students work in small groups on topics assigned by instructor

# BRAINSTORMING

## **Approach:**

1. Collect a group of people with varying backgrounds and interests
2. Encourage divergent thinking
3. Ask for as many solutions to a problem as is possible
4. No bad answers

## **Advantages:**

1. Many solutions are obtained quickly
2. Students are re-energized

## **Disadvantages:**

# BRAINSTORMING VARIANTS

## **Syndicate**

Groups are assigned problems, they investigate in lecture period and give a report to the entire class.

## **Jigsaw**

Instead of presenting to the class, groups are reassigned so that one person is taken from each group and located in a new group. Each student must teach the others what was learned.

## **Thinking Hats**

Moderated brainstorming

# DEBONO'S COLORED HATS



White: neutral and objective, no opinions, only present data. Usually this is the start of a discussion.



Green: abundance, fertile growth. The green hat suggests new, creative ideas are desired.



Red: anger, rage, emotion. Emotions should be expressed without disguising them or supporting them with logic.



Black: somber and serious, the devil's advocate approach. Must be supported by logic.



Yellow: Sunny and positive, optimistic and positive thinking.



Blue: Control and organization. Facilitator may always wear blue; end with blue to summarize and conclude

# WHITE HAT





# GREEN HAT



# RED HAT



# BLACK HAT



# YELLOW HAT



# BLUE HAT



# BRAIN WRITING (6-3-5)

## **Approach:**

1. Collect a group of 6 people
2. Each takes a sheet of paper and divides it into three columns
3. Pose the problem; a student works on a solution for five minutes.
4. The sheets are passed to the student's right.
5. The student can continue with the existing solutions, or start a new column as long as there is a free one.
6. Six or more iterations.

## **Advantages? Disadvantages?**

# WRITING ASSIGNMENTS

## **In Class:**

- Ask students to write what they know about a topic before you lecture on it.
- Stop after 10-15 minutes and ask students to summarize what you've said.
- Have students generate a list of applications for the lecture material.

## **In Lab:**

- Have students summarize their results on a sheet of paper before leaving.
- Have students reflect on the connection between lab activities and lectures.

# MINUTE PAPER

Stop the lecture with two minutes to go and ask the students to anonymously write:

1. The main points and
2. The least clear or muddiest points.

Collect the papers, look through them to check for understanding

Optional: Allow students to write their names on the paper so you can follow up with email.



# OTHER STRATEGIES

**Cooperative Note Taking.** Students form pairs to work together during the lecture. After a short lecture segment, one partner summarizes his or her notes to the other. The other partner adds information or corrections. The goal is to have everyone improve their notes.

**Pair programming.** Two students actively collaborate on a task that involves computer usage. The pilot does the keyboarding and the navigator identifies the problems and thinks strategically.

# CLIMBING BLOOM'S TAXONOMY

1. Assume that you are the instructor and need to prepare an exam question. Prepare one quantitative and one qualitative problem and provide the answer.
2. Assume that the textbook has no summary for this chapter. Prepare a list of important topics and write your own summary.
3. Summarize the importance of this subject matter as relates to actual objects or practices in your environment.
4. Book?

# CLOSING THOUGHTS

1. You are experts at research. How did you become experts? Do the same for teaching!
2. You learn material as an undergraduate, you learn it better in graduate school. You master it when you teach it. You become a grand master when you write the book. Why not write the book?
3. Have fun, be relaxed, enjoy the company.