

# Active Learning and the Environment to Foster it



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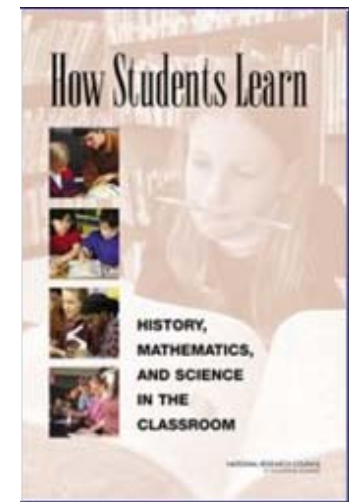
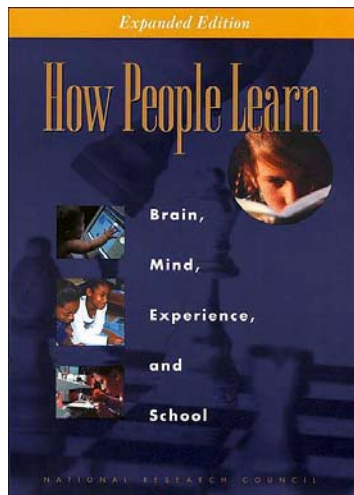
# Based on:

## ❖ Active Learning Article

<http://www.calstatela.edu/dept/chem/chem2/Active/>

## ❖ Books:

- How People Learn (2000). National Academy Press
- How Students Learn: History, Mathematics, and Science in the Classroom (2005). National Academy Press



# What is active learning?

- ❖ **Make a focused list together with your partner of what active learning is.**



- ❖ **Compare your list with a neighboring pair.**

# What is active learning?



- ❖ **Instructional strategies that involve students doing and thinking about what they are doing.**
  - Activities in which students do more than sit and listen passively to a lecture.
  - Strategies that range from interactive lectures to exercises in which the students apply the material to real life situations or to new problems.
  - Strategies that are effective across disciplines.

# What is active learning?

## ❖ Cooperative learning

- Active learning activities that students do together in groups of three or more.



## ❖ Collaborative learning

- Strategies in which the teacher and the students share responsibility for the goals of the class, the design of learning activities, what assignments to do, what texts to use and presentation of class material.

# Cooperative learning

Advantages or benefits	Disadvantages or concerns	Possible solutions

# Implications for teaching



**the lefthand partner listen to the answer of the righthand partner,  
summarize the answer, and report out to the whole group**

- ❖ In what kinds of classes could use collaborative learning?
- ❖ How would you do it?

# Active learning strategies for the classroom

- ❖ **Individual Exercises - Provide the instructor with information about how well each student has understood and remembered the material**



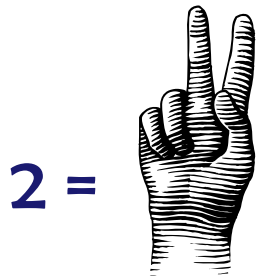


# Multiple Choice Questions

## Which of the following is correct?

- 1) Students that believe intelligence is fixed are more likely to enjoy challenge to test themselves.
- 2) Neurons stop growing and developing in early childhood.
- 3) Teachers (and professors) that believe that intelligence can be modified have a better chance of providing their students with challenging experiences.

(Carol Dweck. 2006. *Mindset: The New Psychology of Success*. Random House.)



# Individual Exercises:

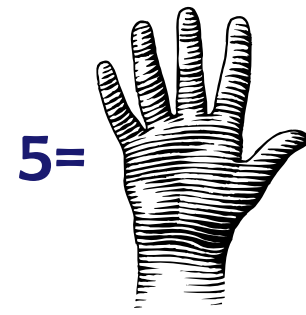
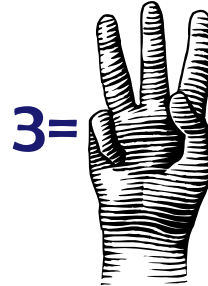
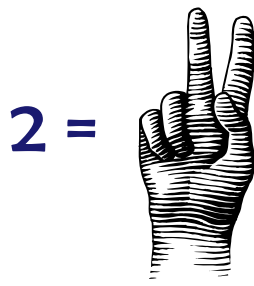
## Immediate Feedback

### ❖ Flash Cards

- Students respond to questions on Flash Cards using finger signals or electronic response devices.

### ❖ Finger Signals

- Students hold up the appropriate number of fingers to respond to multiple choice questions.



# Individual Exercises:

## Immediate Feedback

### ❖ Mini-Whiteboards

- Students write a short answer or make a drawing on individual whiteboards and show their answer to the instructor

### ❖ Quotations

- Give the students a quotation and ask them to match the author with a studied theory or viewpoint.



## One Minute Paper

Very effective means of benchmarking student understanding levels and reaction to the material

- On one sheet of paper the students write in one minute (no more than two) their answer to a specific or an open question about the material covered

What was the main point of today's class?

What is the difference between cooperative learning and collaborative learning?

# Active Learning Strategies

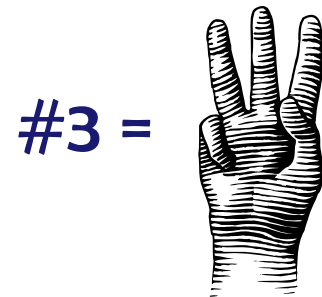
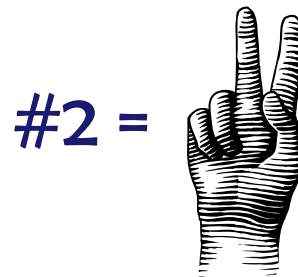
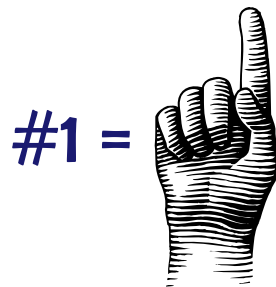
## for the classroom

Principle #1 – Previous Knowledge

Principle #2 – Connect to Knowledge Framework

Principle #3 - Metacognition

What Principle is Addressed?



# Individual Exercises:

## Muddiest (or Clearest) Point

- Variation on the One Minute Paper
- More time

What (concept) presented in class today did you least understand?

What topic from today's class would you like to know more about?

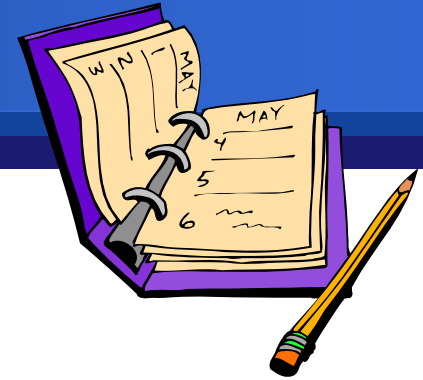
# Individual Exercises:

## Affective Response

- ❖ Ask the student to report his personal reaction and opinion about the concept or material presented
- ❖ Useful for topics that have a significant ethical or moral context
- ❖ Allows the student to view the material in context and explore his or her values and beliefs

**Example?**

# Individual Exercises:



## Daily Journal

### o Daily Journal

- Allows for an in depth discussion or reaction to course material
- Can be written during specified class time or assigned to do outside of class
- Disadvantage?
  - o Feedback is not immediate



# Individual Exercises:



## Reflexive Response

- ❖ **Response to a demonstration or other teacher-centered activity**
  - **Ask the students to write a paragraph that starts with: “I was surprised that ...” or “I learned that ...” or “I wonder if ...”**
    - **Allows the students to reflect on what they actually got out of the class demonstration.**
    - **Helps the students realize that the demonstration or activity wasn’t just for their amusement.**

# Individual Exercises:

## Clarification Pauses

- ❖ **Promote active listening**
- ❖ **After presenting an important point or defining a key concept, stop, let it sink in and then (after waiting at least 10 to 15 seconds) ask if anyone would like the point clarified.**

# Exercise

What is the difference between a reflective response  
and the one minute paper?



- ❖ No talking ! - 10 seconds to think about the question

# Individual Exercises:

## Questions and Answers

- ❖ One student summarizes the answer of another student
  - Promotes active listening
  - Ask a student to summarize an answer given by another student
  - Promotes active participation and reinforces the idea that learning is a shared experience

# Individual Exercises:

## Questions and Answers

### ❖ “Socratic Method”

- Choose a particular student and ask him or her a question expecting an answer in short order.
- If the student cannot answer, the teacher chooses another student until one gives the expected answer.
- Disadvantages?

# Individual Exercises

## Questions and Answers

### ○ Wait Time

#### ■ Variation on the “Socratic Method”

- The instructor waits at least 15 seconds before choosing a student to answer the question
- Gets more of the students to think about the question and not depend passively on others who can answer more quickly
- When the wait time is up, the instructor chooses a student at random to answer the question.



# Any questions so far?

- ❖ Use the index card to write any questions that have about the material or how to implement it.
- ❖ Fold it and drop it in the container.

# Individual Exercises:



## Questions and Answers

### ❖ “The Fish Bowl”

- Students write a question about the class material on an index card
- The question is directed at clarifying some aspect of the material that he or she did not fully understand or an application in another context
- The students put their cards with questions in a “Fish Bowl”
  - At the end of the same class or at the beginning of the next class if assigned
- At the beginning of the next class the instructor selects one or more questions from the “Fish Bowl” and asks some student to answer.



# Individual Exercises:



## High level cognitive and meta-cognitive questions and answers

- ❖ Ask students to make questions for quizzes and tests (with answers)
  - Helps the students think deeply about the class material
  - Promotes development of higher-level thinking skills
  - Good questions can be used for review or for actual tests

# Individual Exercises:

## Critical Thinking Motivators

### ❖ Pre-Theory Intuition Quiz

- Before starting new material the instructor gives a quiz directed at getting the students to identify and evaluate their views (opinions) about the topic.
- After answering individually, students compare their answers in pairs or small groups discussing the answers that they do not all agree with.

# Active Learning Strategies

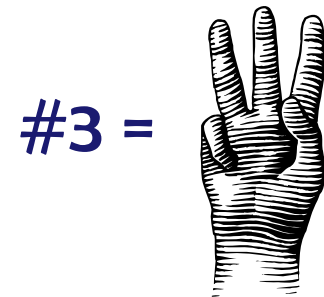
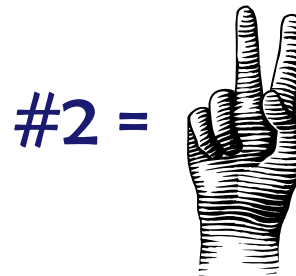
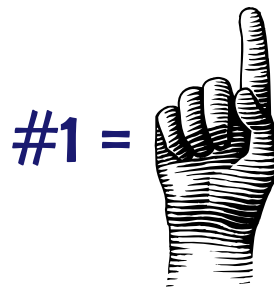
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What Principle is Addressed?



# Use true false cards

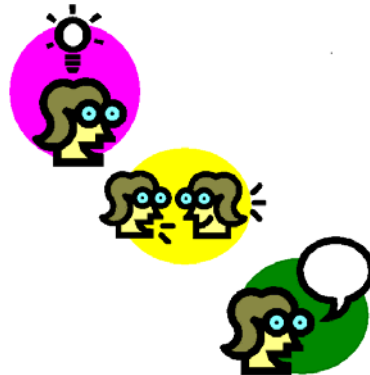
	True	False
1. <i>"Let's try it to see how it works"</i> is a phrase typical of an active learner; <i>"Let's stop and think about this first"</i> is reflective learner's reaction.		
2. Reflective learners tend to like working in groups more than active learners.		
3. To sit motionless and listen to lectures doing nothing but taking notes is difficult for both learning styles, but is especially difficult for active learners.		
4. Everyone is active at times and reflexive at times.		

# Share / Pair :

## Discussion

*think / pair / share*

- Organize the students in pairs and ask them to take turns answering or to answer as pairs.
- Give explicit instructions, such as, “Tell each other why you chose the answer you did.”



# Active Learning Strategies

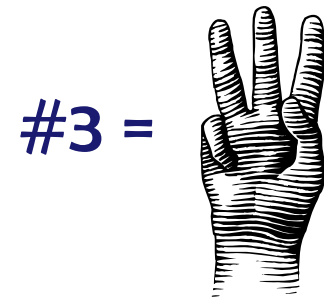
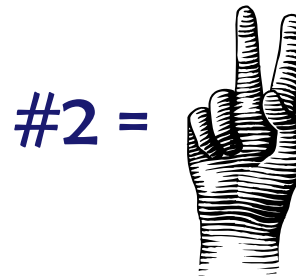
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## Note Comparison/Sharing

### ❖ Compare/share notes

- Ask the students to share and compare notes
- Immediately after presenting a critical concept the instructor asks the students to read each others' notes and compare with their own.
- Helps the students develop effective note-taking skills.
  - Are the notes understandable? Is something critical missing that will make them useless later?



# Share / Pair :

## Evaluation of another Student's Work

### ❖ Evaluation of another student's work

- Students are asked to submit copies of assigned homework to the instructor and to their partner.
- Students must provide feedback on their partner's assignment, correct mistakes in problem-solving or grammar.

### ❖ Newman Error Analysis





# Roadblocks

- ❖ Make a list of potential roadblocks to incorporating active learning strategies in your teaching.



# Roadblocks



1. The influence of traditional education
2. The self-perception of professors regarding their own competence and ability to utilize active learning strategies
3. The discomfort, anxiety, and natural resistance to change of professors and students
4. Limited incentives and resources for promoting change among professors

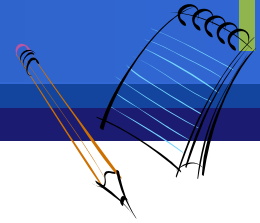
# Roadblocks



5. Risk that students refuse to participate or do not use higher level thinking skills or fail to learn the material
6. Fear on the part of the professor of losing control of the class and not covering the material
7. Fear of criticism for using non-traditional means of teaching

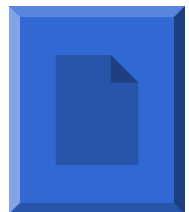
**iAll the obstacles, fears, barriers, and risks can be overcome through careful planning!**

# Recommendations



- ❖ Select strategies that promote active learning that you feel most comfortable trying out.
  - Short term, low risk, structured, and planned activities.
  - Focus on content that is neither very abstract nor controversial, familiar to the instructor and the students.

**WHAT OTHER IDEAS DO YOU HAVE ABOUT TRYING ACTIVE LEARNING TECHNIQUES IN YOUR CLASSROOM?**



# Tools available on the web

## Graphic Organizers:

<http://www.ncrel.org/sdrs/areas/issues/students/learning/lr2grap.htm>

<http://www.freeology.com/graphicorgs/index.php>

## Rubrics:

<http://rubistar.4teachers.org/index.php>

## Rubrics in Spanish:

<http://www.eduteka.org/MatrizValoracion.php3>

# Other Resources

## URL

IDEAL –  
Assessment Artes  
& Sciences RUM

<http://www.uprm.edu/ideal/avaluo/id24.htm>

CAT examples

<http://www.siue.edu/~deder/assess/catmain.html>

FLAG (sciences &  
math)

<http://www.flaguide.org/>

