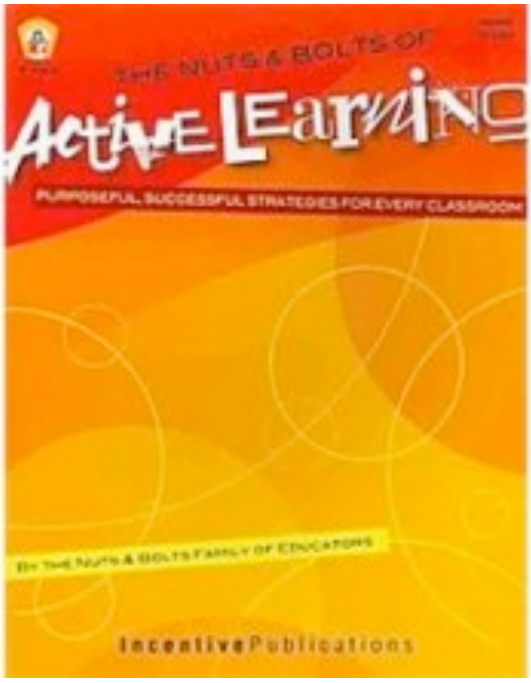
Mediterranean Association of International Schools



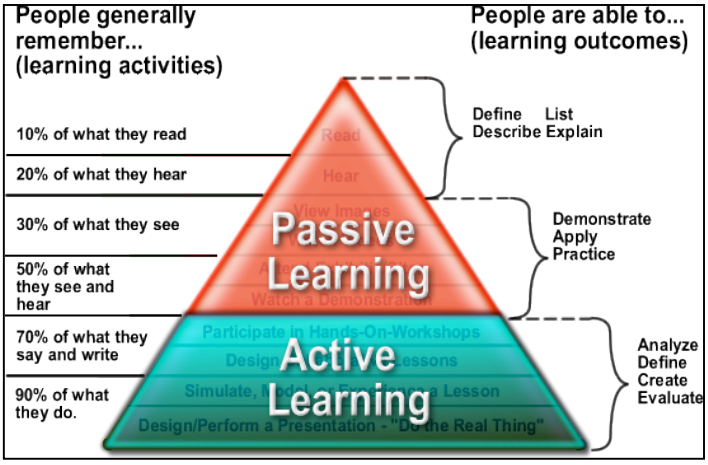
The Nuts & Bolts Of Active Learning:
Purposeful, Successful Strategies for Every Class

Presented by: Dr. Debbie Silver
www.debbiesilver.com

What Is Active Learning?

Active Learning:

- engages students cognitively and physically in the learning process.
- provides students opportunities to manipulate, apply, evaluate, and generally interact with concepts.
- encourages students to generate information rather than simply receive it.
- requires students to reflect on what they are doing – connecting course concepts with their experiences, generating and asking meaningful questions, searching for answers, interacting with new reading material.
- forces students to think about and comment on new learning.



What Does Active Learning Look Like?

Students are involved. They:

- act, move, think, write, discuss, read, and investigate.
- solve problems.
- ask questions.
- respond to ideas.
- engage in higher-order thinking tasks – analyzing, synthesizing, and evaluating information.
- collaborate and cooperate with others.
- explore their attitudes and values.
- self-reflect on ideas.
- reflect on ideas in discussion with others.

What Are the Benefits of Active Learning?

Research on active learning and brain-compatible learning shows us that students who actively engage with material:

- learn more
- are more likely to remember what they learn
- retain information longer
- attend to lessons better
- enjoy classes more
- have higher levels of motivation
- have better attitudes toward learning
- connect material to their real lives
- develop a deeper understanding of material
- demonstrate better thinking and writing skills
- take responsibility for their own learning
- become lifelong learners

In addition, active learning strategies serve students with a variety of learning styles, and offer teachers great flexibility to differentiate instruction and assessment.

When a human sits for longer than about 17 minutes, blood begins to pool in the hamstrings and calf muscles, pulling needed oxygen and glucose from the brain. Melatonin kicks in because the brain thinks it's at rest. The learner gets lethargic and sleepy and struggle to focus. Learning declines. Movement is the body's way of balancing itself physically, chemically, electrically, and emotionally.

Self-Efficacy

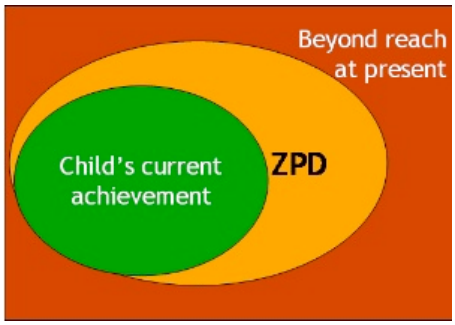
It influences:

- **The CHOICES We Make**
- **The EFFORT We Put Forth!**
- **How long We PERSIST When We Confront Obstacles (and in the face of failure)**
- **How quickly we are able to bounce back from obstacles or failure. Our RESILIENCY.**

Albert Bandura (1925 -) popularized the term *self-efficacy*. He defines it as the part of our "self system" that helps us to evaluate our performance. Perceived self-efficacy refers to one's impression of what one is capable of doing. This comes from a variety of sources, such as personal accomplishments and failures, seeing others who are similar to oneself, and verbal persuasion.

Verbal persuasion may temporarily convince people that they should try or avoid some task, but in the final analysis it is one's direct or vicarious experience with success or failure that will most strongly influence one's self-efficacy. For example, a teacher may "fire-up" her students before a standardized test by telling the kids how great they are, but the enthusiasm will be short-lived if the test is completely beyond their ability or their perceived beliefs that they can actually do well.

People with high-perceived self-efficacy try more, accomplish more, and persist longer at a task than people with low perceived self-efficacy. Bandura speculates that this is because people with high-perceived self-efficacy tend to feel they have more control over their environment and, therefore, experience less uncertainty.



Zone of Proximal Development…ZPD

Zone of Proximal Development, an idea developed by Lev Vygotsky over one hundred years ago, seeks to define the process through which students effectively learn in cooperation with a teacher.

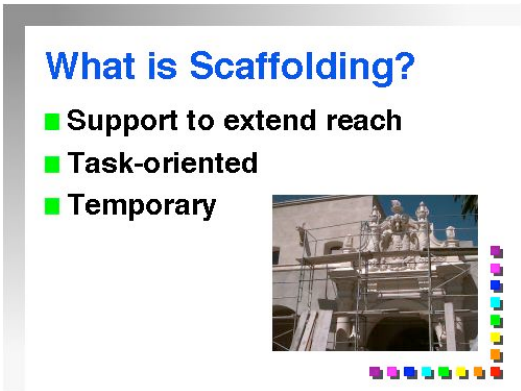
A student's Zone of Proximal Development, or ZPD, is defined as the student's range of ability with and without assistance from a teacher or a more capable peer. On one end of the range is the student's ability level without assistance. On the other end of the range is the student's ability level with assistance.

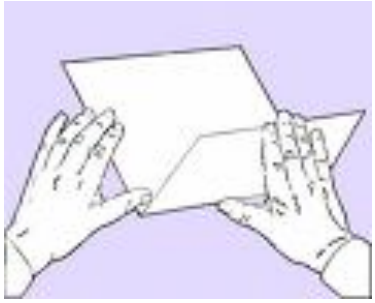
Adapted from: <http://www.wcer.wisc.edu/step/ep301/Spr2000/Jenna-B/zpd.html

Scaffolding Instruction Guidelines

Teachers can utilize many proven effective teaching strategies including:

1. Assessing accurately where the learner is in terms of knowledge and experience.
2. Relating content to what the learner already knows or can do.
3. Giving examples of the desired outcome and/or showing the learner what the task *is* as opposed to what it *is not*.
4. Breaking the larger outcome into smaller, achievable tasks with chances for feedback along the way.
5. Giving students a chance to orally elaborate ("think out loud") through their problem solving techniques.
6. Using appropriate verbal clues and prompts to assist students in accessing stored knowledge.
7. Recognizing specific vocabulary that emerges from the exploration of the unit (emphasizing its meaning within the context of the lesson).
8. Regularly asking students to hypothesize or predict what is going to happen next.
9. Giving students time and opportunity to explore deeper meanings and/or to relate the newly acquired knowledge to their own lives.
10. Providing time for students to "de-brief" their learning journey and review what worked best for them and what did not.





Hearing a Different Drummer

Objectives: To help participants observe how people's perceptions are not always alike

To initiate a discussion on how students learn in different ways

Time: 15 minutes

Materials: One sheet of copy paper for each participant

Process:

Pass out one sheet of copy paper to each participant and ask everyone to listen closely and follow your directions precisely.

Give these directions:

> "Hold your sheet of paper in front of you with both hands. Close your eyes, and do not open them again until I ask you to. Follow my exact directions, but ask no questions. Do not say anything until I ask you to open your eyes.
>
> Fold your paper in half. (Pause). Fold your paper in half again. Fold your paper in half again. (Pause). Tear off the right-hand corner. (Pause). Turn your sheet over. (Pause). Tear off the left-hand corner. (Pause). Unfold your sheet of paper, and hold it in front of you. (Pause). Open your eyes."

It will be immediately obvious that everyone does not have the same finished product. Discuss how individuals create understandings for themselves in different ways. Apply this to Individual differences in the classroom

--from *Because You Teach: A Dynamic Musical Resource for Innovative Staff Development* by Kathy Hunt-Ullock, Monte Selby, Debbie Silver, and Rick Wormeli, 2006. Incentive Publications: Nashville, TN.

Essential Eight

The purpose of this "get acquainted" activity is to start thinking about the different areas of intelligence. Participants are to mix freely and try to get seven different people to sign the blanks (each participant may sign her/his own sheet once). In order to record a name in the blank, the person signing must actually perform the task (not just say that she/he can do it).

Find Someone Who Can:

_____	**recite a poem from memory.**
_____	**finish this numerical sequence: 64, 1, 49, 4, 36, 9, 25, ____, and explain the logic behind it.**
_____	**within 20 seconds name 6 ways to sort rocks into categories.**
_____	**with hands on head stand on one foot with eyes closed for at least 7 seconds.**
_____	**recall at least one dream from the last 3 weeks.**
_____	**hum the first line of *Silent Night* on key.**
_____	**honestly say that he/she has more strengths than weaknesses and name 6 strengths in less than 15 seconds.**
_____	**name five very close friends in less than 8 seconds.**

Debbie Silver, 1998

Checklists for Assessing "How Students Are Smart"

Adapted by Debbie Silver
from Multiple Intelligences in the Classroom by Thomas Armstrong

Name of Student- _____

Check all the items that apply:

Linguistic Intelligence (Word Smart)

__1. Is a good reader.
__2. Enjoys word games.
__3. Is a good joke teller/ storyteller.
__4. Has a good vocabulary for age.
__5. Enjoys listening activities.
__6. Likes to write stories and/or poems
__7. Communicates with others in a highly verbal way.
__8. Appreciates rhymes, puns, and/or nonsense words.
__9. Has a good memory for words, stories, details.

Other linguistic strengths:

Logical-Mathematical Intelligence (Number Smart)

__1. Asks a lot of questions about how things work.
__2. Has a good sense of cause and effect.
__3. Finds math games interesting.
__4. Can see and repeat patterns easily.
__5. Enjoys working puzzles and brain teasers.
__6. Understands computer programming.
__7. Is a logical thinker.
__8. Can estimate things involving numbers with relative ease.
__9. Can work math concepts in head.

Other logical-mathematical strengths:

Visual-Spatial Intelligence (Picture Smart)

__1. Reports clear, visual images (or dreams).
__2. Can envision objects from more than one perspective.
__3. Daydreams more than peers.
__4. Likes to draw and/or create art projects.
__5. Has a good eye for detail and color.
__6. Is good at spatial games like chess and Tetris.
__7. Likes movies, slides, or other visual presentations.
__8. Can move between 2-dimensional and 3 dimensional representations with ease.
__9. Can read and/or create maps.

Other visual-spatial strengths:

Bodily-Kinesthetic Intelligence (Body Smart)

__1. Is very coordinated.
__2. Exceptionally mobile: moves, twitches, fidgets, taps when seated for long.
__3. Enjoys working with clay, fingerpaint, and other tactile media.
__4. Can mimic others' gestures, posture, and movements
__5. Must touch anything new or interesting.
__6. Loves to take things apart and put them back together.
__7. Uses dramatic body movements for self-expression.
__8. Enjoys running, hopping, climbing, wrestling, or similar activities.
__9. Exhibits fine motor control (crafts, painting, etc.).

Other bodily-kinesthetic strengths:

Musical Intelligence (Music Smart)

__1. Can detect music that is off-key, off-beat, or disturbing in some way.
__2. Remembers melodies of songs.
__3. Taps rhythmically as he/she works or plays.
__4. Sensitive to environmental noise (rain on the windows, etc.).
__5. Plays a musical instrument and/or sings in a choir.
__6. Has a good singing voice.

__7. Responds favorably when music is played.
__8. Sings songs that he/she has learned.
__9. Unconsciously hums much of the time.
Other musical strengths:

Interpersonal Communications Intelligence (People Smart)

__1. Establishes meaningful peer relationships.
__2. Seems to be a natural leader.
__3. Empathizes with others.
__4. Likes to play with others.
__5. Shows good teamwork skills.
__6. Others seek this student's company.
__7. Has two or more close friends.
__8. Frequently acts as a mediator and/or peace maker.
__9. Enjoys teaching others.
Other interpersonal communication strengths:

Intra-personal Awareness Intelligence (Self Smart)

__1. Displays a sense of strong will.
__2. Enjoys playing or working alone.
__3. Has high self-esteem.
__4. Has a good sense of self-direction.
__5. Does not mind being different from others.
__6. Has a realistic view of his/her strengths and weaknesses.
__7. Is able to deal effectively with successes and failures.
__8. Has an interest or talent that is not readily shared with others.
__9. Seems to "march to the beat of a different drummer."
Other intra-personal awareness strengths

Naturalistic Intelligence (Nature Smart)

__1. Likes to identify and classify living and nonliving things in nature.
__2. Cares for pets or animals.
__3. Understands repeating patterns in nature and the universe.

__4. Seems more “in tune with nature” than peers.

__5. Would rather be outside than inside.

__6. Has a demonstrated appreciation for a part of the natural world (i.e. dinosaurs, clouds, rocks, etc.)

__7. Likes to garden and/or appreciates plants.

__8. Understands and appreciates the environment.

__9. Loves to collect things from nature.

Other naturalistic strengths

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Hanimals

By Mario Mariotti

Green Tiger Press, La J olla, CA 92038

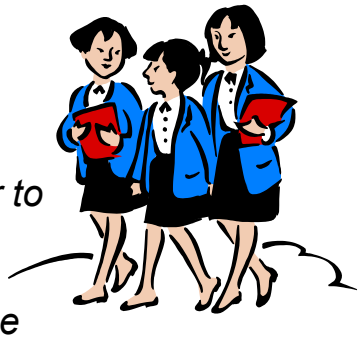
“The human hand is of great symbolic importance. With it we touch others, we bless, we pray, we speak, we greet, we nurture. Early men deliberately painted their hands on the walls of caves.”

DIRECTIONS:

-Use powdered tempra mixed with liquid starch (found at larger food stores and Wal Marts) and a squirt of liquid soap. Be sure to use enough paint to achieve a strong color). This is the foundation color for your animal. Apply with brush, cotton, or by immersion.

-Use acrylic paints for the details of your hanimals. Art brushes work well.

-Your creation’s eyes can be glued into place (I use eyelash adhesive sold in drug stores and at Wal Mart). Dolls eyes are useful as well as buttons, marbles, game pieces, clay, and ping pong balls. They can also be painted directly onto the hand.



Common Attributes

Once participants are arranged in groups, ask one member to be the recorder and write down each individual's name. A group leader should help the members discover 10 (hopefully unusual) common attributes. At the end of the ice breaker, one person from each group will introduce each group member and read their group's top 5 common attributes.

List each group members' name:

_____

_____

_____

_____

List your most unusual common attributes (they must be true and they must apply to ALL members of the group). When you are finished, put *stars* by your 5 favorite ones.

_____

_____

_____

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_____

What is Cooperative Learning?

Cooperative learning is an instructional strategy that uses small groups of students working together and helping one another on specific learning tasks with an emphasis on group members supporting one another.

It is characterized by activities that:

• **Require students to depend on one another for success**. Having students sit side by side working on something they could just as easily do by themselves in *not* cooperative learning. Students must be required to share materials, knowledge, time, talents, and effort (or any combination of these).

• **Provide for individual accountability**. Group members share jobs and make group presentations. Group members are tested individually and/or as a group to ensure that each person has mastered the required learning.

• **Utilizes face-to-face interaction among students**. For all group work students are arranged in close proximity of each other. They can be at tables, in desks or chairs pushed together, on the floor, or virtually anywhere they can do the task at hand separated from other groups.

• **Focus on interpersonal and group skills**. Tasks are designed to include components of positive interpersonal communication skills such as active listening, building consensus, sharing, supporting, restating, using appropriate eye contact and gestures, and encouraging. Teams learn to stay on task and check each other for understanding.

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Traditional Classroom	Cooperative Classroom
Learners are passive	Learners are active
Students work alone	Students work with 1 to 4 partners
Teacher directs work	Students direct work
Silence is valued	Learning noise is appropriate
Teacher initiates discussion	Students initiate discussion
Some students do not participate	All students participate
Individual accountability	Individual and group accountability
Independent learners	Interdependent learners
Affirmations come from teacher	Affirmations come from peers
Individual materials needed	Shared materials

Effective Use of Cooperative Learning Can:

1. Increase achievement (at all ability levels)
2. Empower students to take responsibility for their own learning
3. Improve retention
4. Generate more positive feelings towards the subject matter
5. Provide more active learning
6. Focus more time on learning
7. Lower frustration and anxiety among students
8. Enhance a sense of community among students
9. Promote inter-personal communication skills
10. Boost feelings of self-worth

Cooperative Learning For Secondary Learners

In working with secondary school learners it is important to remember that:

- Group members are responsible for the performance of each individual learner.
- Group members are individually accountable and must be able to report on or explain the team's results.
- The groups are to be assigned by the teacher. Their make-up should be heterogeneous with respect to sex, race, socioeconomic status, ability/learning styles, cliques, and other important factors.
- Leadership is shared on a rotating basis. Each team member has a job and responsibilities.
- The teacher is a resource; students are in charge of their own learning.
- Time must be allowed for group processing and self-evaluation.

The job assignments I use for traditional grouping are these:

Group Leader

1. Reads all directions to group
2. Leads the discussions
3. Checks the data sheet
4. Helps with clean-up
5. Is the only one who can ask a question of the teacher

Materials Manager

1. Is responsible for collecting and returning all materials & supplies to the appropriate place(s)
2. Is the only one who can get up for materials and supplies
3. Makes sure the everyone in the group has equal access to the materials and supplies
4. Checks the data sheet
5. Helps with clean-up

Time Keeper

1. Holds the team stopwatch (or watches the clock)
2. Keeps group on task and reminds them about time
3. Is responsible for getting the group to finish on time
4. Checks the data sheet
5. Helps with clean-up

Data Collector

1. Collects the data for the activity
2. Records data on the appropriate form or sheet
3. Returns data sheet to teacher and/or records group data on class data sheet
4. Makes sure all other team members check the data sheet
5. Helps with clean-up

Since this is not a perfect world, and all class populations are not divisible by four, I have a fifth job that can be assigned in a group:

Encourager

1. Monitors other team members to make sure they do their own job
2. Takes responsibility for praising and affirming jobs that are well done
3. Records comments and actions that show positive interpersonal communication
4. Reports recorded data to group at de-briefing session
5. Helps with clean-up

TIPS:

- If a group of four has one member absent, two of the jobs can be combined for that day.

- Part of the group's participation grade is based on how well each team member performs her/his job.
- Points are deducted if one team member does another team member's assigned responsibility.

Group Participation Number Line
Date: _____
Group Number: _____
Group Members Present: _____

_____

_____

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

Participation Points Earned: _____

Group Participation Number Line

Date: _____ **Group Number:** _____

Group Members Present:

_____

_____

+5 **+4** **+3** **+2** **+1**

Participation Points Earned: _____

There is nothing chaotic about cooperative learning that is well-planned and well-managed. Teachers should plan activities that are challenging and yet doable if the group members work together. Tasks should require the concentrated efforts of all team members doing their jobs and working with in the allotted time. Materials and supplies should be out and sorted before students arrive. During the cooperative learning activity it is the responsibility of the teacher to monitor the students and:

- Give immediate feedback and reinforcement for learning
- Re-teach certain concepts if necessary
- Clarify directions
- Encourage oral elaboration

- Affirm positive interactions and efforts
- Informally assess student learning and collaboration

Another way to ensure that the cooperative learning activity is organized and has a smooth closure is to allow time after clean up and whole group information sharing to ask the groups to evaluate how they interacted with one another. Either verbally or in their journals students can answer questions like these:

- Tell how involved each of your team members was in the decisions your group made.
- How do you feel about the work your group did today? Why?
- What would you would like to tell your teammates about how you felt during today's activity or the way you feel now?
- What could your team do to improve the way you get along and/or work together?
- What is your favorite thing about being on this team?

Teachers need to keep a close watch on the personal interactions going on within groups. Happy well-functioning groups matched with appropriate tasks and given adequate time constraints run smoothly.

Tips for Cooperative Learning in the Early Grades

- Think big, start small! Try short, easy activities at first.
- Children from three 1/2 to five years old work best in pairs. First and second graders work best in pairs.
- Third graders are usually ready to work in groups of four (if they work in "pairs within pairs"). Pairs can always work together for a while and then compare notes with another group.
- Partners may not change for several days or weeks in primary grades.
- Do not assign a cooperative learning activity that could just as easily(or more easily) be done alone. Be sure to create a *positive interdependence* in the way you structure the activity.

- Whole class group-building activities are used to build class morale, develop team spirit, and promote awareness of others in the class.
- Paired group-building activities are designed to bring students together in pairs to develop awareness of others, build communication skills, foster trust, and provide practice for interacting successfully with others.
- Participation can be encouraged by grouping reluctant students with more nurturing students.
- Competition between students should be discouraged because competition increases anxiety among some students and causes them to withdraw. Competition with last year's group or a previous personal performance may be appropriate.
- If the activity is fun, no other reward may be needed since intrinsic rewards are most fulfilling. However, teachers of young learners may choose to use:

  - verbal praise
  - food rewards
  - singing a favorite song
  - an art activity
  - game time
  - other suitable reinforcers
  - activities may be videotaped as a reward

Alternative Ways to Use Cooperative Learning

1. Within a lecture or presentation:

The teacher is discussing, modeling, or explaining something. S/he pauses to ask small groups to summarize, categorize, debate, describe,or otherwise react to the presented material.

2. With higher level questioning:

The teacher asks small groups to come up with a team consensus on something to do with analysis, synthesis, or evaluation of the concept being discussed.

3. **As practice reinforcement:**

The teacher asks students to get with their groups to practice, memorize, or review the given concepts.

4. **Decision-making/problem solving:**

The group is to reach a decision or solve a problem presented by the teacher. The teacher is leading a class discussion on the separation of church and state in the United States Constitution. She asks small groups to meet and decide whether or not to include the words, "Under God" in the Pledge of Allegiance. Groups are to figure out away for students to say the Pledge without violating the spirit of the law.

5. **As a review:**

The teacher asks a question. Team members put their heads together to discuss the answer. The teacher calls out a color, and the person who has that color dot will answer the question as the teacher whips through the groups.

6. **In a tournament or game format:**

There are several models for using cooperative learning in a tournament or game format. Student Teams-Achievement Divisions (STAD) and Teams-Games-Tournament (TGT) are two of the more popular ones.

7. **With peer editing:**

Team members proofread each other's work and offer suggestions for improvement. This practice helps both the "corrector" and the "correctee."

8. **As an assessment:**

A Gallery Walk (sometimes called Carousel Walk) is a way to assess students in groups. The teacher puts large pieces of newsprint around the room. On the top of each is a question for which there are several answers. Student groups are given different colored markers and asked to write one correct answer to each question. Answers cannot be repeated on a page. The teacher can informally assess student learning by listening to them as they "think out loud" in their groups (Slavin calls this *oral elaboration*). Or teachers can

more formally assess the answers by noting the flow of answers used by each colored group.

9. Research projects or group investigations:

Group work on projects can promote sharing of the load and commitment to a time line. Often times students who are procrastinators when it comes to doing their own work will get motivated by their peers to finish their part of the assignment.

10. Checking homework:

Even though homework is for independent practice, many teachers. Have limited time for checking and correcting it during a rushed day. Group members can check each other's work for accuracy.

For more information on the specific techniques mentioned in this chapter or for lessons designed around particular age groups and subject areas consult your local bookstore or the Internet. Cooperative learning strategies abound. Using small group interactions is a powerful teaching tool that can be used to enhance the learning cycle and most other effective teaching strategies. Different marchers hearing different songs still need to learn to work successfully in groups when the need arises. Learning interpersonal communication skills helps students to become better citizens. Working in groups helps students "get better together."

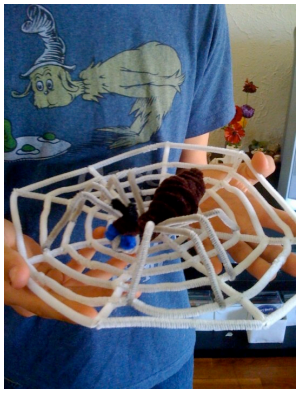
Recommended Reading List

Johnson, D.W., Johnson, R.T., & Holubec, E.J. (1994). The new circles of learning: Cooperation in the classroom and school. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

ACTIVITY:

Classification of Nuts and Bolts

(Can be used in any subject area)



From *The Nuts & Bolts of Active Learning,* Incentive Publications

Pipe Cleaner Structures

Students create three-dimensional pipe cleaner sculptures to how their knowledge of a particular topic.

What to Use:

- five to ten pipe cleaners of assorted colors per student (You may wish to buy packs of the long, fuzzy "chenille stems" and cut them in half.)

What to Do:

1. Tell the students that they are going to create a 3-D sculpture representing three important points they learned during the unit just completed. Show all of the colors of pipe cleaners that they will be choosing and explain the limit of ten cleaners for their sculpture.

2. The students should draw their ideas for their sculptures and make a list of the colors with quantities that they will be using. They should be given ten minutes to draw their designs.

3. After the planning time, identify groups of students to gather their pipe cleaners from a central location and begin creating. It is faster if the pipe cleaners are laid out in piles of like colors and if students are brought up to a central location in groups of around five students.

4. The creation phase of this project should be limited to 15 minutes. If, while in the creation stage, a student absolutely needs to use a few more pipe cleaners than the ten allowed, the student must present their dilemma and plead their case for additional pipe cleaners. (You may choose to allow up to a maximum of five more.)

5. Once the sculptures are completed, the student must WRITE a explanation paragraph stating why they chose the three important points. This written assignment will eventually be turned in to the teacher. The students should be given ten minutes to complete the writing assignment.

6. Finally, students share their masterpieces with the entire class and explain their rationale for the sculptures.

7. After all sculptures have been shared, challenge the class to come up with a creative way to display them in the classroom. (They may be hung as mobiles from the ceiling, stapled to colored paper and put on a bulletin board, or displayed on a large table.

****

Order, Please!

Wearing paper plate labels, students literally get themselves in order to show sequence, importance, size, or other concepts of order:

What to Use:

- plain paper plates
- hole punch
- heavy string or yarn
- thick marking pens

What to Do:

1. Prepare paper plates as signs to hang around necks. Punch two holes in each plate and tie string through the holes to make a "necklace." For older students, just ask them to hold their plates in front of them.

2. Identify ideas, terms, events, factors, or other components of a process or concept for students to review or demonstrate.

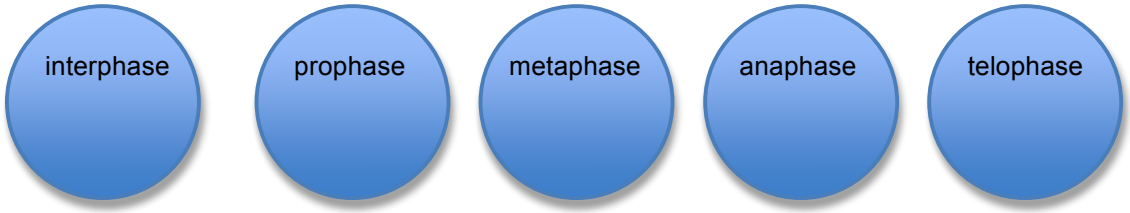
3. Write each of these components on a paper plate.

4. Give plates to a group of students.

5. Give the appropriate instruction for students to get in order. This might be in alphabetical order, in the order of an accurate math sentence, in sequential order, in order of importance, in order of difficulty, or in order of size.

6. At the arranged signal, students in the group examine the components and arrange themselves in order.

7. The rest of the class reviews the result and discusses the accuracy of the arrangement. Members in the arrangement can defend their choices.



From *The Nuts & Bolts of Active Learning,* Incentive Publications

"Can You Guess This?" Review

By Debbie Silver

Students use their logical/analytical sense to create a unique kind of review. Teams generate factual statements about the topic of study for others to solve. Each statement must combine numbers and words in an equation that accurately reflects the subject material.

Objective:
Students review basic subject matter facts as well as develop their analytical/logical sense of thinking. This review is unique and quite fun for most students.

Materials Needed:
Chart paper and markers, or
Overhead transparency sheets and pens, or
Paper, pen, and document camera, or
Board and chalk or marker

Step-by-step Procedure:

1. Students work in small teams to try and "stump" their peers by creating review facts written as equations:
   Examples:
   (Hint- N.O. usually stands for "Number Of")
   a. 46 = N O C in M H C (anatomy)
   b. 1 = N O of C in P (earth history)
   c. 2 = N O E S on an I T (math)
   d. 1 = N O V S in a D (language arts)
   e. 1500 = N O D P by E D (art)
   f. 6 = N O O in a B I (P.E.)

2. Each team creates as many "equations" about the selected topic as possible and writes them on chart paper, a transparency sheet, or on paper.

3. Representatives for each team take turns presenting one of their team's "equations." No duplications are allowed.

4. The challenged teams have 1 minute to try and guess the equation. One responder from each team will raise his/her hand when they have a solution. The presenting representative calls on the representatives in the order their hands were raised. The first team to guess the correct answer scores a point. If no one guesses the answer within one minute (or a pre-determined time), the presenting team receives 1

point (as long as the equation was written correctly about accurate subject matter).

5. Play continues until teams exhaust their equations or until time is called by the teacher. The team with the most points wins.

   Example answers:
   a. 46 = Number of Chromosomes in Most Human Cells
   b. 1 = Number of Continents in Pangea
   c. 2 = Number of Equal Sides on an Isosceles triangle
   d. 1 = Number of Vowel Sounds in a Diphthong
   e. 1500 = Number of Dancer Paintings by Edgar Degas
   f. 6 = Number of Outs in a Baseball Inning

Logical Analytical/Linguistic
Science Fact Sense

____ = Number of _____

a. 7 = Number of C in the R

b. 6 = Number of S of a SF

c. 3 = Number of B P on an I

d. 4 = Number of S in a Y

e. 8 = Number of L on a S

f. 3 = Number of S in the WC

In fact, sitting for more than ten minutes at a stretch "reduces our awareness of physical and emotional sensations and increases fatigue." This results in reduced concentration and, most likely, discipline problems.
-- Eric Jensen

BARFS/NOT BARFS

These Are Barfs:	These Are NOT Barfs:
Speedily	Spacious
Gracefully	Grapefruit
Twice	Quest
Finally	Comply

A Barf is - _____

Which of These Are Barfs?

Scholarly **Quickly** **Fly**

Often **Quite**

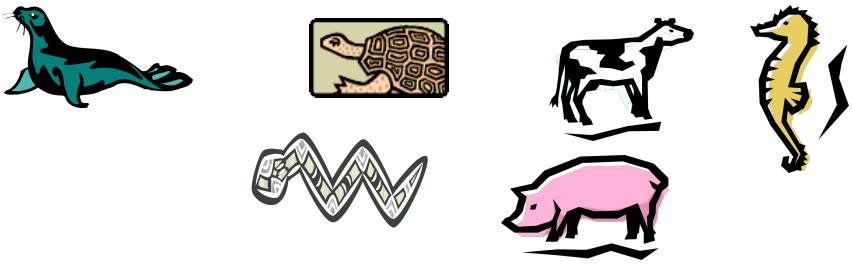
Really **Under** **Beautiful**

****

These Are Barfs:

These Are NOT Barfs:

Which of These Are Barfs?



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Naturalist

Project Learning Tree (PLT) is an award-winning environmental education program designed for teachers and other educators, parents, and community leaders working with youth from grades PK-12. PLT uses the forest as a "window" on the world to increase students' understanding of our environment; stimulate students' critical and creative thinking; develop students' ability to make informed decisions on environmental issues; and instill in students the commitment to take responsible action on behalf of the environment.
http://www.plt.org/

Project W.I.L.D./Aquatic Project WILD is an interdisciplinary, supplementary environmental and conservation education program for educators of grades K-12. The program emphasizes wildlife because of its intrinsic and ecological values, as well as its importance as a basis for teaching how ecosystems function.
http://www.projectwild.org/

Project W.E.T. Project WET (Water Education for Teachers) is a nonprofit water education program and publisher for educators and young people ages 5-18. The program facilitates and promotes awareness, appreciation, knowledge, and stewardship of water resources through the dissemination of classroom-ready teaching aids and establishment of internationally sponsored Project WET programs

http://www.projectwet.org/

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Active learning is a multi-directional learning experience in which occurs teacher-to-student, student-to-teacher, and student-to-student.

-- Mel Silberman

From *The Nuts & Bolts of Active Learning,* Incentive Publications

The Single Dot

By Debbie Silver

Students are challenged to use their imaginations and think of as many "right answers" as they can in regard to the meaning of a dot on the board.

Objective:
Students need to tap into their imaginative power. This exercise demonstrates often times there is more than one right answer to a problem.

Materials Needed:
A board or a projected slide containing a single dot.
Paper and pencils or pens

Step-by-step Procedure:

1. The teacher places a dot on the board or on slide projected on a screen. It should be in place before the students enter the room.

2. After everyone is settled the teacher asks, "What is that?"

3. Someone will usually reply with an answer like, "It's a dot on the board."

4. The teachers asks if it could be anything else. After the students muse a bit the teacher announces that this exercise was done with a group of kindergarten students, and they immediately thought of more than 50 things it could be. (a bug, the end of a straw, a hatch, a shadow of a round object, part of a musical note, etc.)

5. The teachers asks the students to list as many possible answers as they can within 4 minutes.

6. After time is called the teacher asks the students to share some of their responses. Help students appreciate very imaginative responses as well as those that are rather ordinary.

7. The teacher then explains that somewhere between kindergarten and middle school students seem to lose their ability to look for more than one right answer. Discuss the importance of new and novel thinking as well as the very real possibility that often there is more than one right answer to a problem.

8. Ask students to reflect on their experience by creating a journal entry page, a poem, an essay, a picture, a letter, a song, or any other creative means to communicate their meaning.

   (Optional)
   For further discussion read aloud or assign reading from:
   The Dot by Peter H. Reynolds. (2003). Boston, MA: Candlewick Press.
   ISBN-13: 978076361961
   ****

From *The Nuts & Bolts of Active Learning,* Incentive Publications

Creative Candle Demonstration

By Debbie Silver

Students are asked to write down observations and inferences about a common experience – watching a candle burn. However, there is a twist.

Objective:

Students gain insights into the differences between observations and inferences.

Materials Needed:

Raw potato, small knife, small candle holder, matches, almond sliver

Step-by-step Procedure:

1. Cut away all the peel of a small white potato. Trim the potato to look like a small votive candle or use a hollow pipe to create a “tapered” candle. Trim an almond sliver to fit inside the top of the “candle.” Burn the tip of the almond for a more realistic appearance.

2. After you have discussed "going outside the lines" thinking with your students, tell them you want them to observe a common phenomena and write down the most accurate description of what they actually see happening.

3. Stress that they are not to tell you what they expect the "right" answers to be. Simply make a list of observations (things they can know from their five senses).

4. Pull out a "candle" made of potato, apple, pear, or whatever you choose; its wick is made of some kind of nut sliver (the oil in it will burn just like a string wick).

5. Light it, turn out the classroom lights, and let it burn for about 3 minutes.

6. Have the children write down their observations, and then share them aloud with the class. (I always use cooperative groups for this.)

7. Accept all observations enthusiastically. Some will probably report seeing the wax melting, the sparks shooting out of the string, etc. Nod your head very attentively, thank them for their responses, then remind them that sometimes they need to think OUTSIDE the lines!

8. Begin eating the "candle" as you explain. Leave as the bell rings.

9. At the next class meeting ask students to “de-brief” about the activity. Ask them to re-think their “observations.” Stress the difference between observations and inferences.

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From *The Nuts & Bolts of Active Learning,* Incentive Publications

Gallery Walk

By Debbie Silver

Groups of students rotate among posters with questions and create a consensus response. This can be used for advisory or in any subject area.

Objective:
The **Gallery Walk** is an assessment that capitalizes on the "people smart" intelligence. It can be used as a diagnostic, formative, or summative assessment.

Materials Needed:
Large poster paper or chart paper
Tape
Markers

Step-by-step Procedure:

The teachers poses challenge questions for students to answer in small groups (2 to 5). Student groups rotate among the questions written on large pieces of newsprint or giant poster paper placed around the room.

Each group has a different colored felt-tip marker with which they give one answer per poster. Answers cannot be duplicated.

The teacher gives the groups a set amount of time to read the question, read the answers already written (after the first round), and generate a new answer that demonstrates their understanding of the concept.

After the rotations are finished, all posters are brought to the front of the room so that the answers can be discussed and evaluated.

Later the teacher can make a formative assessment of each group's contribution to the overall activity because each group responded with a different colored marker.

EXAMPLE:

The class has been studying adaptation in their science class. None of the following scenarios has been discussed explicitly, but the teacher wants the students to apply the essential ideas they learned to new and unique situations. These are some possible chart prompts.

Sample Prompts for Adaptation:

1. A nuclear holocaust has impacted the world. The only human survivors have been forced to live underground deep within the earth. They can never come out to the earth's surface again. What kind of structural adaptations in the population could you expect to find over time? Why?

2. Describe something structural about a zebra that would hinder its ability to survive at the North Pole. Tell why.

3. Describe a behavioral adaptation a cat might try in order to have a chance of successfully living with a pack of dogs.

4. Imagine that you are a bright orange butterfly. A predator that preys on bright orange butterflies moves into your habitat. What could you do so that the population of bright orange butterflies survives?

5. You are a fox who preys on the mice living on the island where you live. Suddenly the mice have developed the ability to swim, and you are having trouble catching enough food to survive. Describe a behavioral or structural adaptation that might help you solve your problem.

6. Describe a behavioral adaptation a 5th grader will need to make in order to "fit in" at the middle school next year.

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Considerations for Choosing the Best Hands-On Activities

(from "A Teacher's Guide to Choosing the Best Hands-on Activities." by Betsy Feldkamp-Price, Peter Rillero, and Erica Brownstein. (1994). *Science and Children*, pp 16-19.

1. **Does the activity provide meaningful accurate science learning?**
2. **Is the activity worth the time it takes?**
3. **Is the activity worth the money its costs?**
4. **How safe is the activity?**
5. **How difficult is the activity?**
6. **Does the activity work reliably?**

From *The Nuts & Bolts of Active Learning,* Incentive Publications

What I Like About You . . .

By Debbie Silver

Students trade papers and respond anonymously with written positive affirmations to other classmates.

Objective:
To help students learn to give and receive compliment appropriately. To build a sense of belonging among classmates.

Materials Needed:
Sheets of Paper

Step-by-step Procedure:

1. Begin with a discussion of appropriate and inappropriate compliments. Include issues of personal privacy, sexism, racism, "back-hand" compliments, and sarcasm.

2. Role-play appropriate ways to receive compliments. Explain that many people have great difficulty receiving positive affirmations from others.

3. Tell the students that they are going to get the chance to receive affirmations in a very non-threatening method.

4. Ask each student to put his or her name at the top of a sheet of paper.

5. Collect all the papers and give these directions:
    - "I am going to pass out the papers randomly. When you receive someone's paper think about that person and write something affirming to him or her. You must start your statement with the words 'I' or 'You.' You cannot use the words 'he' or 'she.' "

    - "When you finish with your message to the person listed at the top of the page, trade papers with someone. Make sure that you never give a paper to the person who's name is at the top. Trade with someone else if you need to."

    - "When you trade a paper read the other statement(s) written previously. Let me know if you have a question about the appropriateness of something written on the sheet. We want to make sure this is a positive experience for everyone involved."

- “Please write something different from the other responses on the page. You can affirm the same attribute, but you must phrase it in a different way or give a different example.”

- “Keep trading until I call time.”

6. Be sure to participate with the class on this activity. Put your sheet in there, too.

7. At the end of the activity collect all papers.

8. Ask students to express how it felt to write positive affirmations to others. Why was it easier to write to some than to others? (Speak only in a general sense; do not name anyone specifically.)

9. Pass the papers back to their owners and allow students to read what was written by their classmates. Either out loud or as a journal prompt allow students to react to what was said to them.

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From *The Nuts & Bolts of Active Learning,* Incentive Publications

Car Wash

(Adapted by) Debbie Silver

Students line up in parallel lines about 2 – 3 ft. apart. One or two students are sent down the middle to receive a “wash” of compliment and/or affirmations.

Objective:
To help students focus on positive aspects of others. To teach students how to give and receive compliments.

Materials Needed:
None

Step-by-step Procedure:

1. Discuss with students about giving and receiving compliments in an appropriate manner. It might be helpful to start with the “What I Like About You” activity.

2. Select one student at a time to be sent through the wash (between the lines) and in turn everyone touches him or her (optional) and says words of praise, affirmation, or encouragement. The pats on the back, hand-shaking, and verbal support produce a sparkling, shiny, happy "car" at the end of the wash!

3. You may want to select only a few “washers” and let the rest of the class be observers who can participate in the de-briefing at the end of the activity. (An option is to select the “car” and have him or her select his own washers.)

4. We usually run one or two people through the car wash at a time rather than everybody in one big clean-up. That insures that the responses of the washers are fresh, personal, and enthusiastic.

5. After the “wash” you can debrief both the “car” and the “washers” about how it felt to give and receive positive messages.

Ground rules:

- Compliments must be given directly to the “car” and said in first or second person using “I” or “You” to start the statement. (No “he,” “him,” “her,” or “she.”)
- The “car” must remain silent. He or she must simply receive the compliment without any comment whatsoever.
- Each “washer” must say something different about the “car.” No repeats.

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I Am Loveable and Capable!!

Objectives:

1. To help students understand the principles of *“Killer Statements.”*
2. To create an awareness of how others’ behavior (both overt and covert) affects student morale.

Time: 15 - 20 minutes

Materials: Poster Paper
Markers
A sign that says “IALAC”

Process:

Ask for volunteers to demonstrate the “IALAC” activity. One volunteer takes on the role of a typical student in your school. S/he holds a sign that has these large letters – I A L A C. The leader explains that the letters stand for the idea, “I Am Loveable and Capable.”

The leader asks the student to demonstrate when those feelings are diminished by ripping off a piece of the sign when s/he hears or feels something that destroys his/her feeling of being loveable and capable. (Just rip off a piece of paper and let it fall to the floor.)

The remaining volunteers are asked to be representative of people in the *student's* typical day. Roles can differ, but you might want to have a parent, a bus driver, an administrator, and a few teachers as well as peers with varying degrees of support. Each of those people says or does something to the *student* that conveys a negative feeling about her/him. The skit continues until there is nothing left of the sign.

The leader then asks the group to consider how the *student* is now feeling with all the paper strewn around her/his feet. Discuss how student learning can be impacted by such interactions with the other students and adults at school. Discuss what the group can do to help prevent this type of damaging behavior. Ask the students what individuals can do to protect themselves from being victimized by others' behavior.

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From *The Nuts & Bolts of Active Learning,* Incentive Publications

Twitter it!

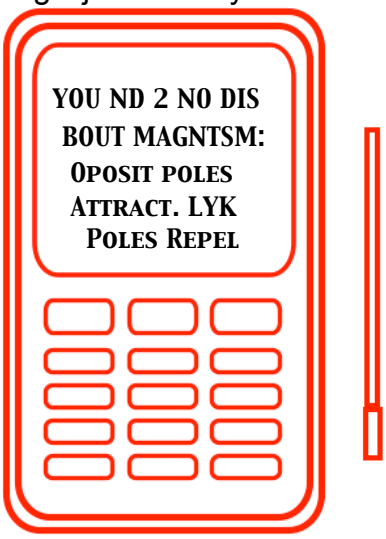
When you twitter, you must keep the message succinct. Students practice that skill by summarizing main ideas as it they were about to communicate them through twittering.

What to Use: Drawings of cell phones
Pencils

What to Do:

1. Create and reproduce a drawing of a cell phone.
2. Review the process of twittering with students: A message is prepared to type or text into a computer of cell phone. The message is limited to 140 characters. Text langauage is allowed.
3. Ask students to prepare a "tweet" that summarizes the main idea of something hey have heard, read, or otherwise learned.
4. Students write their messages onto the cell phone drawing—just as they would type them in for sending.

NOTE: Condensed spellings, symbols, other shortcuts, and the language of texting are acceptable, since the text messages must be kept as short as possible.



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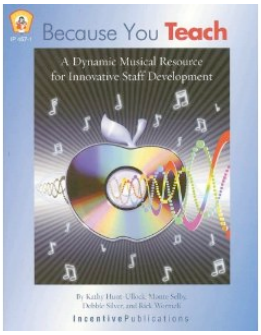

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