

The Brain-Friendly Classroom:

Practical Strategies for Student Success

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We Learn...

- 10% of what we READ
- 20% of what we HEAR
- 30% of what we SEE
- 50% of what we both SEE and HEAR
- 70% of what is DISCUSSED WITH OTHERS
- 80% of what we EXPERIENCE PERSONALLY
- 95% of what we TEACH someone else

Eldon Ekwall and William Glasser

Retention Rates

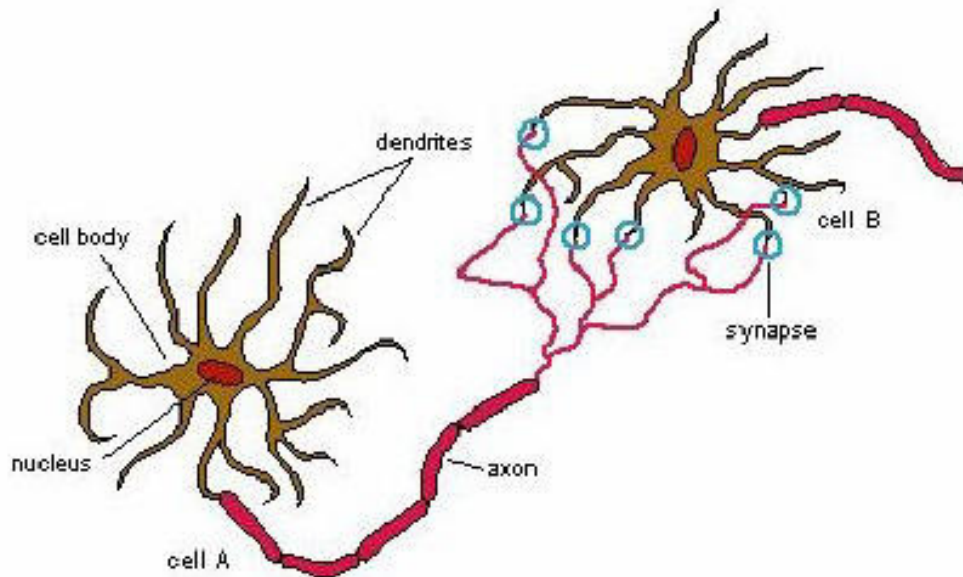
Lecture (5%) > Reading (10%) > Audio-Visual (20%) > Demonstration (30%) >
Discussion Groups (50%) > Practice by doing (75%) > Teach others/use immediately (90%)

The brain loves novelty.

Brain Basics

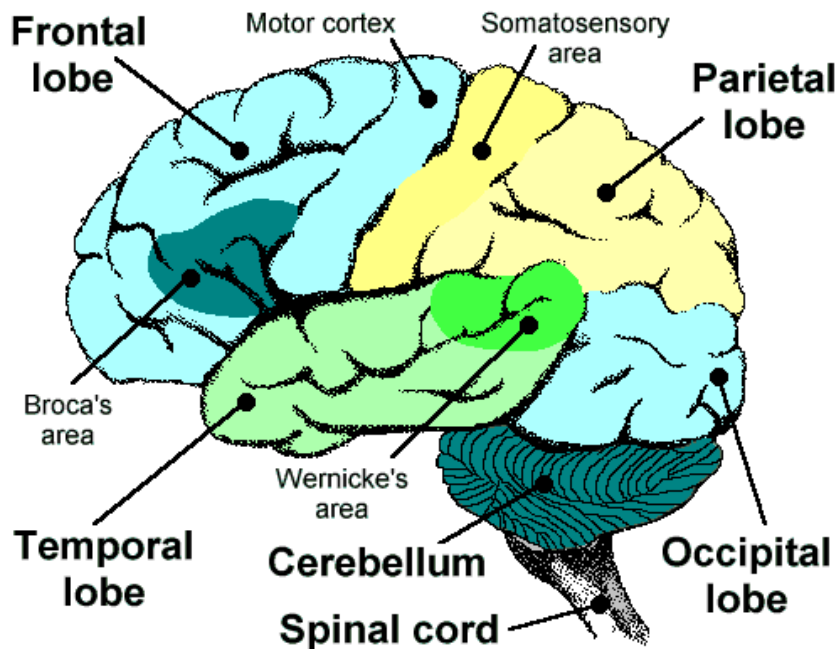
NEURONS

- Axons (impulses away or out) and Dendrites (receive stimulation)
- Neurotransmitters and synapses



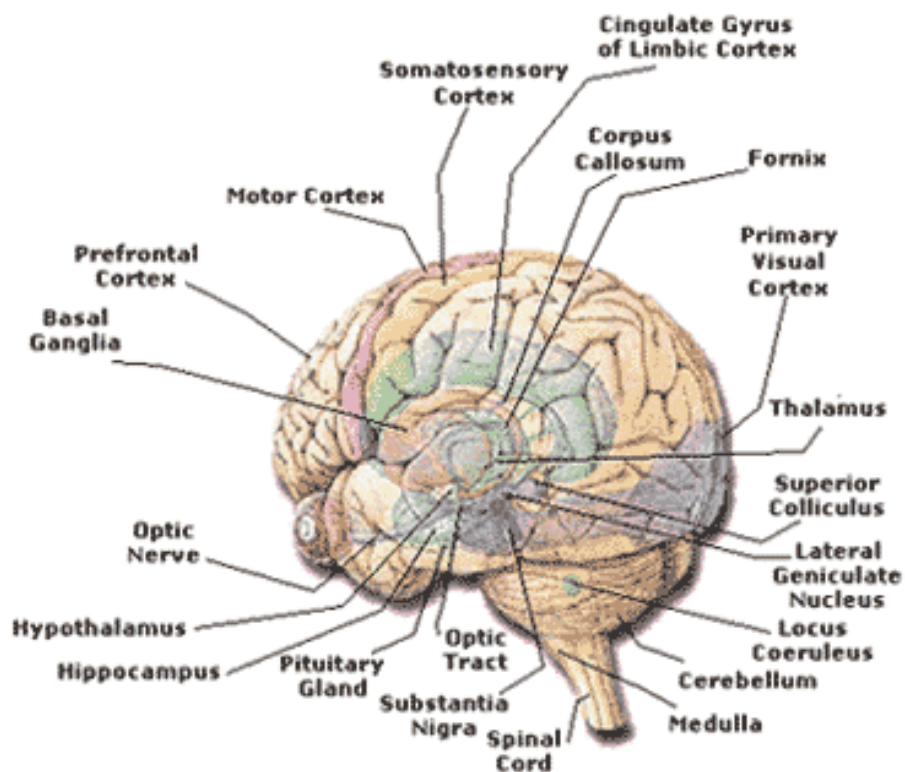
LOBES OF THE BRAIN

- Frontal (voluntary movement, verbal expression, problem solving, willpower, planning, impulse control)
- Parietal (receives sensory information, important for reading, writing, language, and calculation)
- Temporal (hearing, senses, language, learning, and memory storage)
- Occipital (vision)



OTHER IMPORTANT AREAS

- Amygdala (critical for senses, learning, cognition, and processing emotional memories)
- Basal Ganglia (motor, cognitive, and emotions)
- Cerebellum (balance, posture, coordination, muscle movements, cognition, novelty, and emotions)
- Cingulate gyrus (right-wrong, decision making, and emotions)
- Corpus callosum (connection between left and right hemispheres of brain)
- Hippocampus (strong involvement in learning and memories)
- Hypothalamus (hormonal interactions with brain)
- Thalamus (critical for daily consciousness, deep in brain, relay station for senses)



DEVELOPMENTAL FACTORS THAT AFFECT FUTURE AND CURRENT LEARNING

- Emotions (stability and reliability of emotional environment at home)
- Sensory Motor Development (Vestibular System)

Sensory and motor experiences are closely intertwined, often called “sensory motor systems”. These involve visual, motor, and auditory input. **The vestibular system** in the inner ear controls our sense of movement and balance, and it influences other sensory systems. A lack of stimulation to the vestibular system is linked to many learning problems and disabilities. This can be prevented by allowing children to swing, rock, crawl, spin, roll, etc. This is why there are programs such as **BrainGym** (<http://www.braingym.org/>) and **Bal-A-Vis-X** (<http://www.bal-a-vis-x.com/>). You can find these activities in books, attend a workshop, or look online. Try some with your students and with yourself!
- Auditory and Visual Stimulation (talking, reading, singing, seeing objects close and far, indoors and outdoors instead of on TV)
- Nutrition (protein, carbs, and good fats)
- Social skills (teaching children expected school behaviors)
- Sleep (most children do not get enough. They need this “settling” time in order for their brains to create new connections and absorb new information. Many behavior and learning disorders are connected to sleep deprivation.)

Watch “**Inside the Teenage Brain**” (pbs.org) Very good insights into high school students.

What experiences and factors have influenced your students before they come to your classroom?

Can we use it as an excuse or an opportunity?

危机

How Do We Learn?

Teaching with the Brain in Mind, 2nd Ed., Eric Jensen

How the Brain Learns, 2nd Ed., David Sousa

2006 and 2011 Midwest Brain and Learning Institute at Hope College, Holland. MI

I. ENGAGING STUDENTS TO LEARN (the first hurdle in teaching!)

A. Direct Instruction Time Limits (5 to 8 minutes for K-2, 8 to 12 minutes for Grades 3-5, and 12 to 15 minutes for Grades 6-12.) Make your input brief.

B. Reinforce the input with compelling tasks (set goals and emotional rewards as in video games)
Strategies: Have students compare and contrast new info, group and regroup new terms, Critique and analyze new concepts, resequence a process (teach mitosis, break it up, and have them sequence it), use graphic organizers, have students summarize and retell, cooperative learning activities work great here (more on that later)

C. After reinforcing, regain their attention using a variety of techniques. Variety is key because the brain will desensitize its response after too many repetitions...

Strategies: Have a hand signal, a bell or tone, windchimes, clapping or stomping, change your location or emotional level when teaching different concepts, surprise them, change their location when they learn different concepts.

D. If they need a boost before more input, activate their amines, the “uppers” or fuel for brains
Strategies: change or novelty, movement, small risks, artificial urgency, excitement, stand, do an energizer, go outside, walk with a partner, stretch or march in small or large groups.

E. Depending on how long your class periods are, you could do 2 to 3 input cycles during a class.

F. To Grab Attention at any point in a lesson, use:

Novelty, relevance, curiosity, emotion, story, question, problem, video, drama, anecdote, guessing game, quotation

II. FACTORS THAT AFFECT THE QUALITY OF RETENTION

A. Repetition

- 24 repetitions are necessary for 80% of the information to be retained long-term
- Repetition does not need to be tedious
- You can pre-expose, prime, and preview information as a way to repeat it.

Strategies: Formally introduce one new vocab word each day or use them in discussions or post them in the room. Show a video, go on a field trip, mention things as an aside, display a poster, do pre and post quizzes. Have students make fill in the blank sentences and share them with each other. Ask questions and have students do a choral response.

- Review information as a form of repetition.

Strategies: Have students generate quiz questions, summarize their learning and share in pairs, student-created graphic organizers, student created rhyming review couplets.

- **To Rehearse and Elaborate** (Need 24 rehearsals for 80% retention of information!)

Strategies: Rote, elaborative, mnemonics, graphic organizer, role play, simulations, centers/projects, multiple intelligence, problems/inquiry, exhibitions, rap, entrance and exit slips (what did you learn, what do you need to learn)

- **The brain loves novelty. Let students...**

Strategies: Partner up and discuss, chunk and chew, take short breaks to consolidate information, talk. Involve as many areas of the brain as you can (art, music, verbal, writing, visual, auditory) and use variety.

Allow students to answer questions as a pair. It is less threatening.

Do not teach your 1st hour the same way you teach the rest of the day. They are still asleep and need more engaging learning environments. Use stories, movement, humor, teamwork, perseverance, competition. Use poems and music to tap emotion.

- **Pairing Up/Partnering Up Students** is critical for many of these strategies. Here are some simple ways to do so...

Strategies: Clock Partners (Find a 3 o'clock partner, a 6 o'clock, a 9 o'clock, and a 12 o'clock. Write them down and put it in your notebook.)

Baseball partners (1st, 2nd, 3rd, Home base partners – May be tricky to use with HS students ☺)

Fitness partners (Baseball, soccer, basketball, football, golf, etc.)

Season partners (Spring, Summer, Winter, Fall)

Use smell. Put cotton balls in film canisters with different smells: perfume, vanilla, cinnamon, garlic, etc.

This way no one is always stuck with the same kid. You can use the same partners all year or change each semester.

B. Coherence/Organization of the Information

A well-organized lesson by you does not necessarily equal well-organized information in your students' brains. You are competing with their prior knowledge. **New information MUST be connected to prior knowledge in order for it to be retained long-term.** The brain will not allow inconsistency. In the absence of true connections, the brain "confabulates" information to make it make sense.

How many times have you experienced the same event and later disagreed on the details with another person?

We MUST tap prior knowledge and know what it is before we teach new concepts.

Strategies: Students can write in journals or share with a partner. Then, you can solicit responses from as many students as possible. Try to require students to question their PK and how it fits into their understanding of the new concept. Let them discuss their current understanding. Even if they have "seen it" or "done it" before, make them explain it formally. It can reveal important misconceptions. Link new learning to the students' PK. Show them how to organize the new and old info. Use analogies. Students learn better by doing. Allow time for students to build models or write/draw their understanding in mind maps. Once the new and old information concur, provide opportunities for the students to practice, practice, practice.

Use Graphic/Advanced Organizers when giving notes. It helps their brains operate differently and absorb more information. http://www.edhelper.com/teachers/graphic_organizers.htm

C. Input Quantity



"Mr. Osborne, may I be excused? My brain is full."

- The hippocampus is the “surge protector” of the brain.
- The first neural connections for newly learned information are made within 15 minutes.
- The new info is transferred to the hippocampus within 60 minutes. Over a period of 24 to 72 hours, the hippocampus transfers the information to the proper areas of the cortex, particularly during SLEEP. Within 3 to 30 days, if the new information is rehearsed often enough, it will be retained long-term.

Strategies: The best way to learn is to receive input, discuss it, and then take a walk!

Settling time is critical. Give students classroom chores, recess, a walk, pair time, lunch, quiet music or quiet choice time. Even 5 to 10 minutes is good. You don’t have to teach to the bell every day!

III. EMOTIONS AND EMOTIONAL STATES

A. Students remember learning experiences more vibrantly when emotion is involved.

What is your most memorable experience (best or worst) as a student? Chances are that it involved strong emotion.

Strategies: Use compelling questions; have students put themselves in the shoes of someone making a decision based on scientific concepts. Create controversy. **Role model a LOVE for learning and enthusiasm for your content.** Build suspense (exploding coffee can). SMILE. Tell a true, emotional story about yourself. Get the students involved in class-related community service. Let students know what excites you. Have celebrations (parties, high fives, food, music, fun). Use HUMOR. Integrate

physical activity into your class. Use more standing than sitting, more walking than standing, more organized physical movements. Have purposeful physical rituals for arrivals, departures, getting started (clapping patterns, cheers, chants, movements). Change them often to keep their brains at attention. Get personal by having the students write in journals, discuss, and share with each other. Make students feel SAFE and HAPPY. Respect their dignity and individuality. Give them ownership.

B. Emotional States

- Three main neurotransmitters that affect emotion in our students: cortisol, norepinephrine, and dopamine.
- Cortisol is related to stress, good and bad. Too much is bad! It is increased by adding risk to your lessons.
Strategies: public speaking, pair-sharing, role-playing, meeting new people (assign lab partners!)
- Norepinephrine is related to excitement and urgency. The same experience will be perceived differently by your students. Some will find an activity fun, exciting, scary, or boring, so again, variety is key.
Strategies: public performances, science fairs, debates, field trips, relay races. Provide worthy goals, necessary resources, and reasonable deadlines. **Don't allow too much time. You should always start with too little and add bonus time.**
- Dopamine is the pleasure NT. You can increase it by
Strategies: giving less HW than expected, finishing on time or ahead of time, letting students take home a project or creation from class, allowing them to sit with friends on occasion, various other privileges.

IV. MOVEMENT

The brain needs OXYGEN and GLUCOSE to work effectively, also water. Let students drink water in class, which may cause more bathroom breaks. Be flexible!! Get them up and moving with activators and energizers. Also try group energizers/encouragers. These can be found on the internet or in books. Classroom Activators by Evanski is a good one to try.

Strategies: Pair up and clarify goals for day, how to achieve them, and why(reward)
Have students do role plays, charades, commercials.

Use energizers to increase blood pressure and epinephrine, decrease restlessness, and reinforce content.
Have students play Simon Says with content. "Simon Says to fold your hands if water is an element."
"Stand where we learned about..."

Use games: ball toss for reviews, vocabulary, stories, explanations.

Have students rewrite lyrics to a popular song using content and perform.

Do cross-lateral activities to increase communication in brain: pat head and rub belly, march and pat opposite knee, touch opposite elbows or heels.

Do stretching to increase oxygen. Allow more mobility. Give the students classroom errands.

Demand more PE and Recess time.

V. TIMING

A. Body clocks

- All students have different body clocks and hormones that affect their attentiveness and skill levels. Certain tasks, spatial and verbal, are actually affected by high or low testosterone and estrogen levels.
- At any given time, half of your students will have high or low energy and varying skill levels.

Strategies: Be tolerant. Expect varied skills and frustration. Shift activity times for certain tasks. Rotate classes. (On Mondays, have math 1st period, Tuesdays 2nd period, etc.) Use movement to increase energy and cross-laterals to increase skill levels. With trimester or block schedules, include short breaks and nutrition breaks. With assessment, use a variety and provide alternatives for students who may never test well at the time of day they are in your class.

VI. ERROR CORRECTION

Feedback needs to be corrective, positive, and timely in order for new learning to be retained. *Students can correct their own errors in new learning by interacting with each other.*

Strategies: peer editing, gallery walk, pair share, student presentations with audience feedback, computer games, videotape, audiotape, or rehearse in a mirror, provide checklists and rubrics.

VII. BALANCE LEARNING STYLES

Balance learning between

- Active learning (discussing, pair-share, building, drawing, performing),
- Passive learning (listening, watching, generalizing, direct instruction), and
- Settling time (walking, reflecting, sleeping, eating, breaks)

VIII. PHYSICAL ENVIRONMENTS

Strategies:

- Let students stand, sit on floor, walk around the room, sit on an exercise ball.
- Keep your room at a comfortable temp by using fans, open doors or windows, blow fan across a tray of water, keep windows shaded, use cool colors. Allow students to drink water.
- Keep lighting bright. Don't turn the overhead on everyday!!! Try to expose your students to as much natural light as possible. Go outside on nice days
- Check noise levels in your room and add absorbing material if it is too noisy. Use music and white noise when appropriate. Be particularly mindful during testing.
- Post student work and interesting, rich displays. Preview new information, encourage, and inform.
- Be flexible with seating.
- Make sure your room smells nice or neutral.
- Use warm colors to stimulate and cool colors to calm.
- Be sensitive to special needs.

IX. SOCIAL ISSUES AND MOTIVATION

Strategies:

- Teach social skills and use cooperative learning.
- Use rewards carefully. Make them low-cost, concrete rewards or abstract rewards. Phase them out gradually and encourage intrinsic motivation. Don't make rewards or receiving them predictable.
- Make your classroom a "safe" place for students. Do anonymous surveys about what makes students uncomfortable.
- Let students have some choice in daily goals and homework.
- Be a positive role model, a Charismatic Adult
- Teach students how to manage their emotions.

- Make your lesson relevant to their lives and well-organized.
- Provide feedback or set up a system for students to do so themselves.

SOME MORE FUN FACTS...

The Frontal Lobe which helps us inhibit improper behaviors and is necessary for good judgement is not fully developed in some people until they are 30 years old!!!

Kids really do stupid things for a reason. ☺ “What were you thinking?” They aren’t!

Strategies: Give directions one at a time and be VERY straight forward. Use concrete, hands-on models when possible. Allow time for students to think through explanations. Coach students through options that are available to them. They really may not be able to see all of their options or make a good decision. Young people are not good at identifying emotions. Be understanding and tactful. Emphasize the critical stage of brain development they are at and how harmful substance abuse is to their future abilities. Encourage sleep.

Dr. Stuart Brown presented at the 2011 MBLI and discussed the importance of play in brain development and brain health. It is never too late to start! For more information, go to <http://nifplay.org/index.html>

Dr. Cheryl Charles, co-founder of the Children & Nature Network, presented information on the beneficial effects of spending more time in nature. Go to <http://www.childrenandnature.org/> for more information.

We also spent a day at the Outdoor Discovery Center Macatawa Greenway in Holland, MI. The naturalists and educators that run the center are incredibly talented at addressing curriculum needs for all levels of education. To explore the opportunities, go to <http://www.outdoordiscoverycenter.org/odcofwu/site/default.asp>

Check out <http://amenclinics.com/> Very interesting ideas. Brain trauma, stress, and environmental factors can damage our students’ brains and adversely affect their learning and social skills.

Dr. Robert Brooks presented at the 2006 MBLI and was inspiring. He discusses the importance of nurturing our students to get them in the best state possible for learning. He has written many books. Check out www.drrobertbrooks.com

Gayle Gregory also spoke at 2006 MBLI and addressed cooperative learning. She has a vast number of resources and creative ways to engage students. Check out <http://gaylehgregory.com/index.php?pid=1>

Can I go to the Midwest Brain and Learning Institute at Hope College?

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

The MBLI is held the 3rd week of June each year. Registration begins in January.

COOPERATIVE LEARNING:

The one teaching method that is most strongly supported by research as the most successful way to help students learn and retain information.

BASIC ELEMENTS

There are five basic principles fundamental to cooperative learning.

1. Face-to-Face Promotive Interaction

By using face-to-face promotive interaction, learning becomes active rather than passive. Teams encourage discussion of ideas and oral summarization. Peer assistance clarifies concepts for both helper and the student being helped. Cooperative teams help students learn to value individual differences and promote more elaborate thinking.

2. Positive Interdependence Students must feel that they need each other in order to complete the group's task, that is, they "sink or swim together." Positive interdependence can be built into the task by jigsawing information, by limiting materials, by having a single team product, through team roles (recorder, reporter), or by randomly selecting one student to answer for the team. It can be built into a reward structure by assigning team points based on team averages, on members reaching a predetermined criterion, or on team improvement rather than outright grades.

3. Individual Accountability/ Personal Responsibility

Students must feel that they are each accountable for helping to complete a task and for mastering material. They must know that a "chauffeur/hitchhiker" situation will not be productive. Ways to build in individual accountability include: students take individual quizzes; each student is responsible for a specific portion of a task; each must be able to summarize another's ideas; any student may be called on at random to answer for the team.

4. Interpersonal and Collaborative Skills

These include skills for working together effectively (staying on task, summarizing, recording ideas) as well as group maintenance skills (encouraging each other). Ways to foster skill development include teacher modeling, brainstorming characteristics of "good" skills, direct practice, process observing, and reflection. Skill practice can be "tacked on" to academic lessons through games (e.g., Talking Chips) or by making social skills a separate objective to be practiced and observed.

5. Reflection/Group Processing of Interaction

Processing means giving students the time and procedures to analyze how well their groups are functioning and how well they are using the necessary collaborative skills. Processing can be individual, team-wide, or at the whole collaborative class level. Examples include: How well did I listen? Did we take turns and include everyone? How could we have coached each other better? How can the class function more smoothly?

TEAM FORMATION ISSUES

Size

The smallest group is two. The largest recommended is six. Generally, in smaller groups each member participates more, fewer social skills are required, and groups can work more quickly. Larger groups generate more ideas, deal better with complex ideas, and create fewer group reports to process. Remember, it's hard to get left out of a pair; triads tend to surface issues and are good for process observing; teams of four allow multiple ways to pair.

Formation

With a few exceptions, research favors groups which are heterogeneous with regard to academic achievement, gender, ethnicity, task orientation, ability, and learning style. Heterogeneous groups promote more elaborate thinking and explanations, and provide opportunities for students to develop feelings of mutual concern. Student self-selection of groups is generally not successful, although students may provide input for teachers to consider in assigning groups. Random assignment promotes the idea that everyone is expected to work with everyone else at some point. Random assignment can result in teams that are not heterogeneous or equal in ability, so are best used if the task is of short duration.

Duration

If the task is of some duration, the makeup of groups must be seen as "fair," so the groups should be carefully structured. Groups that stay together for longer periods (4-6 weeks) form stronger bonds, develop more complex collaborative skills, and can tackle more complex tasks. Groups should remain together long enough to feel successful, but not so long that bonds become counter-productive. It is usually a mistake to break groups up because they are having trouble functioning since members will feel unsuccessful in groups and transfer that feeling to the next group. Try to establish some success first!

MANAGEMENT TIPS

- **Noise**
Develop and practice a Quiet or Zero-Noise signal. The closer students are seated, the quieter their voices can be. Practice "12-inch voices." Use structures such as Circle of Knowledge or Roundtable that have quiet time built-in. Remember that if only one student in a group is speaking at a time, larger groups should result in fewer voices, therefore less noise. Have students brainstorm solutions to noise.
- **Deadlining and Task Structure**
Give students specific tasks to finish within a predetermined time limit, e.g., "You have one minute to agree as a group on 3 reasons." Use a timer.
- **Instructions**
Show, don't tell, instructions (have a group model the steps). Have students tell each other the instructions to make sure they understand prior to starting the task.
- **Questions**
Answer team questions only. Individual questions should be dealt with in the team. Teach students to use the "Three Before Me" technique.
- **Circulate**
Use proximity. Monitor discussions to check for understanding and to be aware of collaborative skills that may need to be addressed.
- **Roles**
Structure tasks through roles. Have runners, checkers, recorders, reporters, timekeepers, etc.

Using Role Cards

While working in cooperative learning groups it is necessary for each member of the group to be assigned a task and be given a role. Once a decision has been made as to the number of groups and the roles that will be needed to perform the task, a set of role cards, similar to the ones below, should be constructed for each team member. Before roles are assigned, teachers should explain and model the task and the individual roles for students so that they know and understand how his/her individual task and role will contribute to the success of the group. Roles should be rotated on a regular basis so that all students become proficient in each task.

Role Card # 1



Facilitator:

Makes certain that everyone contributes and keeps the group on task.

Role Card # 2



Recorder:

Keeps notes on important thoughts expressed in the group. Writes final summary.

Role Card # 3



Reporter:

Shares summary of group with large group. Speaks for the group, not just a personal view

Role Card # 4



Materials Manager:

Picks up, distributes, collects, turns in, or puts away materials. Manages materials in the group during group work.

Role Card # 5



Time Keeper:

Keeps track of time and reminds groups how much time is left.

Role Card # 6



Checker:

Checks for accuracy and clarity of thinking during discussions. May also check written work and keeps track of group point scores.

SPECIFIC COOPERATIVE LEARNING STRATEGIES

Academic Controversy

The controversy procedure consists of five steps (Johnson & Johnson, 1995).

1. **Organizing Information And Deriving Conclusions:** Students research a position, learn the relevant information, and prepare a persuasive "best case possible" for the position.
2. **Presenting And Advocating Positions:** Students present in a persuasive and convincing way the "best case possible" for their position.
3. **Uncertainty Created By Being Challenged By Opposing Views:** Students engage in an open discussion in which they argue forcefully for their position, refute the opposing position, and rebut attacks on their position.
4. **Epistemic Curiosity And Perspective Taking:** Students reverse perspectives and present the opposing position as accurately, completely, persuasively, and forcefully as they can.
5. **Reconceptualizing, Synthesizing, and Integrating:** Students drop all advocacy, create a synthesis or integration of the opposing positions, and reach a consensus on the best reasoned judgment that may be made about the issue.

Carousel/Graffiti Brainstorming

Each small group has a poster with a title related to the topic of the lesson. Each group uses a different colored marker to write 4 to 5 strategies/activities that relate to their topic. Students rotate to all the other posters, reading them and adding 2 to 3 more strategies. Students discuss the results.

Circle the Sage - First the teacher polls the class to see which students have a special knowledge to share. For example the teacher may ask who in the class was able to solve a difficult math homework question, who had visited Mexico, who knows the chemical reactions involved in how salting the streets help dissipate snow. Those students (the sages) stand and spread out in the room. The teacher then has the rest of the classmates each surround a sage, with no two members of the same team going to the same sage. The sage explains what they know while the classmates listen, ask questions, and take notes. All students then return to their teams. Each in turn, explains what they learned. Because each one has gone to a different sage, they compare notes. If there is disagreement, they stand up as a team. Finally, the disagreements are aired and resolved.

4 Corners

1. Preparation.
 - Create four large signs with the following phrases - STRONGLY AGREE, AGREE, DISAGREE, STRONGLY DISAGREE.
 - Place the signs in the four corners of the classroom.
 - Clear the corners and sides of the room by moving chairs and tables to the center.
 - Prepare position statement(s) on an overhead to be used during the group activity.
 - The position statements should be expressed in such a way that they will be easily understood by the students. For example, one position statement might read "The legal drinking age in Ohio should be lowered to 18." An example of a content-related position statement for a sociology class on social deviance might read "The new address of a violent sex offender should be made available to neighbors upon the offender's release from prison."
2. Present the position statements.
 - Present the first statement using the overhead projector.
 - Give the students time to read the statement.
 - Verbally repeat the question.

3. Take a position.
 - Ask the students to move to the corner that best describes their feelings on the statement.
 - Tell the students they may change corners at any time.
4. Justification.
 - Once all the students have selected their corners, randomly call on students one at a time to give simple, one sentence statements supporting their opinions on the position statement.
5. Repeat or follow up.
 - After an appropriate number of students have given their statements, such that a diversity of opinions have been expressed, the instructor may present a new position statement and begin the process again, or the instructor may follow up with a critical thinking activity.
 - A critical-thinking activity involves breaking the class into four groups (corresponding to the four positions) and asking each group to prepare a short summary of the issue and their opinions; the summaries may be written or presented orally to the rest of the class.

Steps:

- 1) Teacher announces corners
- 2) Students think and write
- 3) Students go to corners
- 4) Pairs discuss

Tips:

- Have students write down the number of their choice without discussion among themselves.
- Post a title of visual in each corner of the room.
- If only one student chooses a corner, validate their choice, but ask them to choose their second favorite group.
- Give equal time to share in pairs.

Find-Someone-Who

Students receive a worksheet. The worksheet asks them to "Find someone who..." The student has to have the person who knows the answer for their question to write it along with their name on the worksheet. Students can find only one answer from each person. When students finish they become helpers by sitting down and becoming a resource for others who can ask them any question. Students who originally knew none of the answers, after filling in one or two of the answers become a resource for others because they have become "someone who knows."

Steps:

- 1) Students mix and pair
- 2) Student questions partner
- 3) Partner checks
- 4) Reverse roles

Tips:

- Have students raise one hand as they walk until they find a partner. This makes it easier to spot those looking for a partner.
- Prior to doing the activity, have students turn in one little known fact or idea that they would like everyone to know to use for the form.
- Remind students that they can get only one answer from a partner and then must circulate to find another partner.

Formations

The teacher presents the class with something to form. Students then make the formation by coordinating their efforts, deciding where each student should stand or what they should do. More advanced models may include sound and movement.

- If possible, use an open space.
- Show students a picture of the shape they are to form.
- The formation must involve all students
- Model how students may interact to make the formation.

Give one Take/Get one

- Students listen while the teacher poses a question or a brainstorming task.
- Students are given quiet time to consider what they know about the topic and record a number of possible responses. This may be a simple list of words and phrases or a series of complete sentences.
- Students draw a line after their final idea to clearly delineate their own ideas from those that they are going to gather from classmates.
- Students are given a set amount of time (about 8–10 minutes) to get out of their seats and share ideas with classmates. After finding a partner, the two students exchange papers and quietly read each other's ideas. They comment upon anything of particular interest on their partner's list or ask for clarification about anything confusing. Students then select one idea from their partner's list and add it to their own, making sure to understand and accurately copy the idea alongside the partner's name, because they may be called upon to share one new idea during the follow-up debriefing session. When one exchange has been completed, students move on to interact with a new partner.
- At the end of the "Give One and Get One" exchange period, the teacher facilitates a unified-class debriefing of ideas. The teacher calls on a volunteer who shares one new idea acquired from a conversation partner, utilizing language for classroom reporting (e.g., "I found out from Alex that..."; "Sylvia mentioned that ..."). The student whose idea has just been reported shares the next idea, gleaned from a different conversation partner. This highly structured debriefing encourages active listening as students are eager to see when their name and idea will be mentioned. Students should strive to share an idea from a classmate who has not yet been acknowledged.
- The teacher records the successive contributions on the board, making sure to write the name of the student next to his/her idea. This relatively random listing can subsequently be restructured in a graphic organizer and used as a springboard to an independent reading or writing task.

Guess the Fib

Each student writes down three statements. Two are true and one is false. One student at a time reads their statement to the class. Teams huddle to discuss the statements, trying to "guess the fib."

- 1) Students write three statements.
- 2) One student reads statements.
- 3) Teammates discuss statements.
- 4) Teammates guess.

Tips:

- Have teams reach consensus before guessing.
- Make sure students correct the fib so students remember the correct information.
- Give the role of "consensus seeker" to one student.

Jigsaw

Using this structure, students are responsible for teaching each other material. A unit of work, often a reading, is divided into 4 expert areas, and each student on a team is assigned one area. Experts from different teams meet together at tables to discuss their expert areas. Students then return to their teams and take turns teaching. A quiz may be given at this time. Jigsawing materials refers to any strategy in which each student on a team receives only a piece of the material that is to be learned so that students must rely on the other members of their team to learn all of the material. (Slavin)

Line-Ups

The teacher announces a dimension on which students may vary. The dimension may be a characteristic or a value. Students then line up according to where they stand relative to their classmates on the characteristic or issue.

Steps:

- 1) Teacher describes the line.
- 2) Students line up.
- 3) Fold the line so that the individual on the very end of the line is facing the person at the opposite end.
- 4) Pairs discuss.

Tips:

- One variation of this exercise is to give students slips of paper or index cards with one part of a process written on it and have students arrange themselves so that the overall process is in correct order.

Matching

Prepare a container with cards with a word on each card or have each student write a word of a particular category (noun, verb, process) on a subject/topic on a card and place in a container. Objects related to a topic could also be used. Have a student draw two cards/objects from the container and tell how the words/objects are alike/different/etc. (_____ is like _____ because they both _____.) Could be used with numbered heads review and have groups arrive at answer before calling a group and number. Know your students well - choose a very dry subject - or be prepared for some "interesting" answers.

Numbered Heads Together

This structure is useful for quickly reviewing objective material in a fun way. The students in each team are numbered (each team might have 4 students numbered 1, 2, 3, 4). Students coach each other on material to be mastered. Teachers pose a question and call a number. Only the students with that number are eligible to answer and earn points for their team, building both individual accountability and positive interdependence. This may be done with only one student in the class responding (sequential form), or with all the numbers, 3's for instance, responding using an Every Pupil Response technique such as cards or hand signals (simultaneous form). (Kagan)

Ask students to number off in their teams from one to four. Announce a question and a time limit. Students put their heads together to come up with an answer. Call a number and ask all students with that number to stand and answer the question. Recognize correct responses and elaborate through rich discussions.

Pairs Check

This is a way to structure pair work on mastery-oriented worksheets. Students work in teams of four with two sets of partners. The worksheet is set up with problems presented in pairs. The first person in each partnership does the first problem with the pair partner serving as coach, and offering exaggerated praise. After the first problem is done, partners change roles. After each pair of problems, teams of four check each others' work and, if they agree, give a team cheer or handshake. In this way students stay on task, working together toward mastery. (Kagan)

Paraphrase passport

Students correctly paraphrase the ideas/information given by the student who has just spoken and then add their own ideas/information.

Partners - The class is divided into teams of four. Partners move to one side of the room. Half of each team is given an assignment to master to be able to teach the other half. Partners work to learn and can consult with other partners working on the same material. Teams go back together with each set of partners teaching the other set. Partners quiz and tutor teammates. Team reviews how well they learned and taught and how they might improve the process.

People Search: Make a list of phrases/concepts students should know. Tell them to go around the room and find someone who knows about that phrase. That person should explain it and then sign under the phrase and move on. You can put it in a 3 X 3 grid. Use it as an intro/pre-assessment, rehearsal, or review for test.

Roundtable

Roundtable can be used for brainstorming, reviewing, or practicing while also serving as a teambuilder. Sequential form: Students sit in teams of 3 or more, with one piece of paper and one pencil. The teacher asks a question which has multiple answers. Students take turns writing one answer on the paper, then passing the paper and pencil clockwise to the next person. When time is called, teams with the most correct answers are recognized. Teams reflect on their strategies and consider ways they could improve. Simultaneous form: Each student starts a piece of paper, writes one answer, and passes it, so several papers are moving at once. (Kagan)

Round Robin

Present a category (such as "Names of Mammals") for discussion. Have students take turns going around the group and naming items that fit the category. A question is posed by the teacher with many possible answers and students are given time to think about answers. After the "think time," members of the team share responses with one another round robin style. The recorder writes down all the answers of the group members. The person next to (clockwise) the recorder gives their answer and the recorder writes it down then the each person in the group in order (clockwise) gives an answer until time is called. This strategy is very similar to round table. The main difference is that in round robin one student does all the recording for all members of his/her group.

Send a Problem

Each student on a team writes a review problem on a flash card. Teams reach consensus on answers and write them on the backs of the cards. Each group's stack of questions passes to another group, which attempts to answer them and checks to see if they agree with the sending group. If not, they write their answer as an alternative. Stacks of cards can be sent to a third and fourth group. Stacks of cards are finally returned to the senders, who may discuss the alternative answers. (Kagan)

Tea Party

Students form two concentric circles or two lines facing each other. You ask a question (on any content) and students discuss the answer with the student facing them. After one minute, the outside circle or one line moves to the right so that students have new partners. Then pose a second question for them to discuss. Continue with five or more questions. For a little variation, students can write questions on cards to review for a test through this "Tea Party" method.

Steps:

- 1) Students form circles.
- 2) Student shares with partner.
- 3) Reverse roles.
- 4) Students rotate.

- If the weather is nice, this is fun to do outside.
- Vary the number of positions rotated and occasionally switch directions.

Tips:

Team Pair Solo - Students do problems first as a team, then with a partner, and finally on their own. It is designed to motivate students to tackle and succeed at problems which initially are beyond their ability. It is based on a simple notion of mediated learning. Students can do more things with help (mediation) than they can do alone. By allowing them to work on problems they could not do alone, first as a team and then with a partner, they progress to a point they can do alone that which at first they could do only with help.

Think-Pair-Share

This is a four-step discussion strategy that incorporates wait time and aspects of cooperative learning. Students (and teachers) learn to LISTEN while a question is posed, THINK (without raising hands) of a response, PAIR with a neighbor to discuss responses, and SHARE their responses with the whole class. Time limits and transition cues help discussion move smoothly. Students are able to rehearse responses mentally and verbally, and all students have an opportunity to talk. Both students and teachers have increased opportunities to think and become involved in group discussion. (Lyman) In the last step, the pairs share their responses with other pairs, other teams, or the entire group.

Think-Pair-Square or Simple Square

Similar to the Think- Pair- Share structure, Think- Pair - Square asks students, once they have completed their assigned pair task, to join with another pair to compare their conclusions. The instructions to the newly formed "squares" may be to reach a consensus within their groups or to explain their conclusions to the other pair who has joined them.

Three-Step Interview

This involves structured group activity with students. Using interviews/listening techniques that have been modeled, one student interviews another about an announced topic. When time is up, students switch roles as interviewer and interviewee. Pairs then join to form groups of four. Students take turns introducing their pair partners and sharing what the pair partners had to say. This structure can be used as a teambuilder, and also for opinion questions, predicting, evaluation, sharing book reports, etc. (Kagan)

Three-minute review - Teachers stop any time during a lecture or discussion and give teams three minutes to review what has been said, ask clarifying questions or answer questions.

3-2-1 (3 things you liked/learned, 2 things you did not like, frustrated you, 1 thing that interests you are you wonder about). You can do ANYTHING with 3-2-1.

Walkabout

Walk About is a strategy patterned on cross-pollination. After the class has worked in groups on a strategy such as Place Mat or Graffiti, one member from each group moves on to another group, carrying ideas from the first group with him or her.

Writearound

For creative writing or summarization, give a sentence starter (for example: If you give an elephant a cookie, he's going to ask for...). Ask all students in each team to finish that sentence. Then, they pass their paper to the right, read the one they received, and add a sentence to that one. After a few rounds, four great stories or summaries emerge. Give children time to add a conclusion and/or edit their favorite one to share with the class.

Additional Notes on Cooperative Learning

Cooperative Learning is NOT

- having students sit side-by-side at the same table to talk with each other as they do their individual assignments
- assigning a report to a group of students where one student does all the work and the others put their names on the product.
-

Cooperative Learning IS

- positive interdependence - students must perceive that by working together they can learn/achieve more by sharing goals, labor, materials, resources, information
- face-to-face interaction - interaction patterns and verbal interchange promoted by positive interdependence affect educational outcomes
- individual accountability for mastering the assigned material.
- appropriate use of interpersonal skills with students taught to use the skills and to analyze how well the group is functioning
- One simple way to achieve this is to have students work in groups to master work, evaluate each student individually, and, if all students in a group achieve a predetermined level on the evaluation, award all members of that group a predetermined number of bonus points. (NOTE: Do not penalize groups not achieving by deducting points.)

In cooperative learning groups:

- membership is typically heterogeneous
- all members share responsibility for performing leadership actions
- responsibility for learning is shared with group members expected to provide help and encouragement to each other
- good working relationships are maintained
- interpersonal skills necessary to work together are directly taught/modeled
- the teacher observes and analyzes not only how well the students are learning but how well the groups are working together
- Cooperative learning strategies can work well and enhance learning for all students; however, the language interactions they produce make them especially effective for limited English proficient students. The strategies allow and encourage students to use language for interaction to solve real problems, thus speeding up the acquisition of the English language.

Some other techniques that are helpful for ELL students, especially when the subject is abstract and has high cognitive demand, include:

- Repeat
- Paraphrase
- Slow down
- Explain
- Demonstrate
- Use visuals, real, rich context
- Provide for meaningful practice
- Use a variety of techniques and materials
- Use all modalities