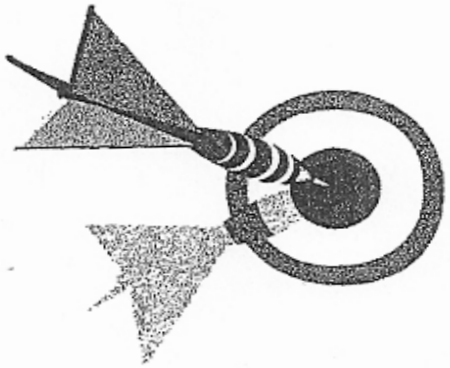
Instructional Strategies That Work:
A Tool Kit for Educators

#5:
GENERATING NONLINGUISTIC REPRESENTATIONS



Based on the research and materials of
Dr. Robert Marzano and Dr. Debra Pickering
of the Mid-continent Research for Education and Learning (McREL) Institute
and other sources as noted

Compiled, edited, and expanded by the following Cherry Creek Schools'
S.T.A.R. Mentors: Don Biery, Dina Davis, Roberta Ford, Connie Hirz,
Nan Holt, Valerie James, and Carrie Weinberger.
2002-2003

NONLINGUISTIC REPRESENTATIONS

Let's celebrate! The field of education is at a turning point; the "art" of teaching is rapidly becoming the "science" of teaching. This is a relatively new phenomenon as reported by Robert Marzano and Debra Pickering in the ASCD publication, *Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement.*

After examining decades of research findings to distill the results, Marzano's team at McRel had defined nine broad K-12 teaching Strategies that have positive effects on student learning:

- Identifying similarities and differences
- Summarizing and note taking
- Reinforcing effort and providing recognition
- Homework and Practice
- Nonlinguistic representations
- Cooperative learning
- Setting objectives and providing feedback
- Generating and testing hypotheses
- Questions, cues, and advance organizers

The instructional strategy of nonlinguistic representation has proven in the research to show a percentile gain of 27. Generalizations from the research about nonlinguistic representation include the following:

- Creating graphic representations, making physical models, generating mental pictures, drawing pictures and pictographs, and engaging in kinesthetic activities are the activities that produce nonlinguistic presentations.

- Nonlinguistic representations should elaborate on knowledge. (Marzano, Pickering and Pollock, 2001, pp. 61-64)

The intent of the nonlinguistic representation packet is to give teachers easy access to classroom strategies and models that easily can be adapted into lessons at all grade levels and in all content areas.

This packet includes:

- Definitions of terminology: nonlinguistic representations, graphic organizers, mental pictures, kinesthetic activities, physical models, pictographs, and elaboration of knowledge.
- Steps to the thinking process
- Key points to consider when teaching the processes/concepts.
- Models and ideas of nonlinguistic representations
- Teacher-structured and student-structured tasks
- Bibliography

	ES	P Gain	N	SD
Identifying similarities and differences	**1.61**	**45**	**31**	**.31**
Summarising, note taking	**1.00**	**34**	**179**	**.50**
Reinforcing effort and providing recognition	**.80**	**29**	**21**	**.35**
Assigning homework and practice	**.77**	**28**	**134**	**.36**
Generating nonlinguistic representations	**.75**	**27**	**246**	**.40**
Using cooperative learning	**.73**	**27**	**122**	**.40**
Setting objectives and providing feedback	**.61**	**23**	**408**	**.28**
Generating and testing hypotheses	**.61**	**25**	**63**	**.79**
Providing cues, questions, and advanced Organizers	**.59**	**22**	**1,251**	**.26**

ES = average effect size.
P Gain = percentile gain (the maximum percentile gains possible for students currently at the 50^{th} percentile).
N = number of effect sizes.
SD = standard deviation (the measure of the variability of scores around the mean).

When conducting a meta-analysis, a researcher translates the results of a given study into a unit of measurement referred to as an effect size. An effect size expresses in standard deviations the difference between the increased or decreased achievement of the experimental group with that of the control group. One of the more useful aspects of an effect size is that it can be easily translated into percentile gains. Being able to translate effect sizes into percentile gains can lead to dramatic interpretations of the possible benefits of a given instructional strategy.

Robert Marzano
from *What Works In Classroom Instruction*, McRel, 2000

NONLINGUISTIC REPRESENTATIONS

I. Definitions of terminology

Nonlinguistic Representations is referred to as the imagery mode. Research has shown that when students are engaging in the creation of nonlinguistic representations that this mode stimulates and increases activity in the brain. Nonlinguistic Representations is the most underused instructional strategy; yet, it has been shown to help students understand content in a whole new way. Each of these activities enhances student learning.

A. Graphic Organizers

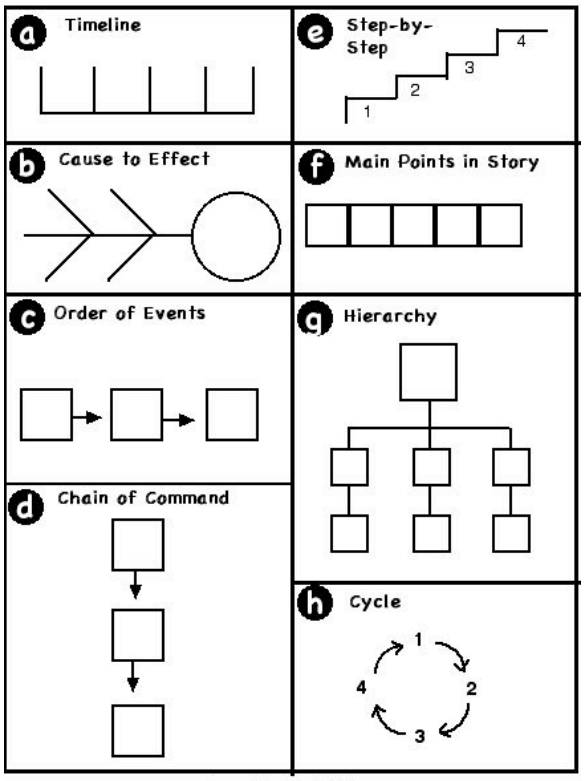
Definition- any graphic that shows someone how to organize an idea, solves a problem, or performs a series of operations. It combines the linguistic mode (using words and phrases) with the nonlinguistic mode that uses symbols and arrows to represent relationships.

TYPES of Graphic Organizers

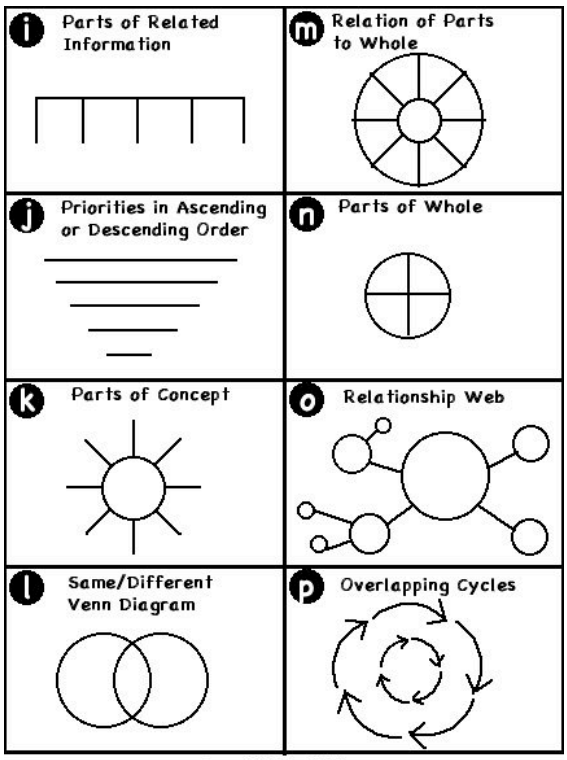
- *Descriptive Patterns*
  Patterns used to represent facts about specific persons, places, things, and events. It is not necessary to arrange these patterns in any particular order.
  Example: Describing the 4th of July
- *Time-Sequence Patterns*
  Patterns used to organize events in a specific chronological order.
  Example: World War II
- *Process/Cause-Effect Patterns*
  Patterns used to organize information into a causal network leading to a specific outcome or into a sequence of steps leading to a specific product.
  Example: Factors that lead to heart disease
- *Episode Patterns*
  Patterns used to organize information about specific events, including (1) setting (time &place), (2) specific people, (3) a specific duration, (4) a specific sequence of events, and (5) a particular cause and effect.
  Example: French Revolution
- *Generalization/Principle Patterns*
  Patterns used to organize information into general statements with supporting examples.
  Example: Math relationships
  Concept Patterns
  Patterns used to organize information around a word or phrase that represents entire classes or categories of persons, places, things, and events. Example: organize fables ((Marzano, Pickering and Pollock).

SAMPLE GRAPHIC ORGANIZERS

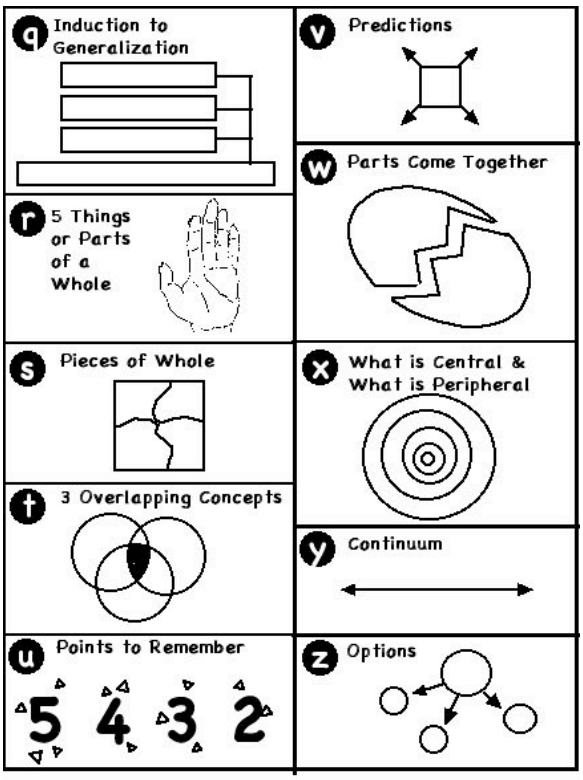
Auditory Plus Visual: Graphic Organizer



Hasenstab, Flaherty & Brown

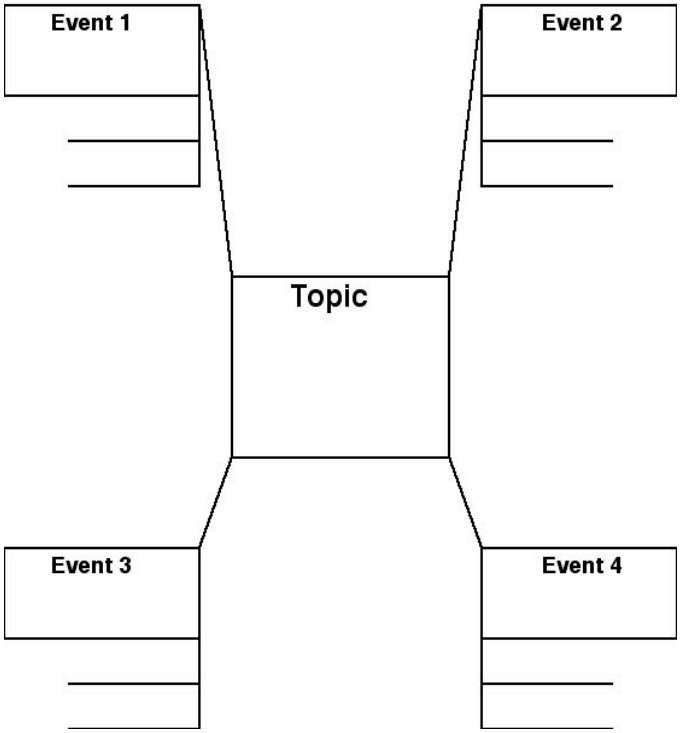


Hasenstab, Flaherty & Brown



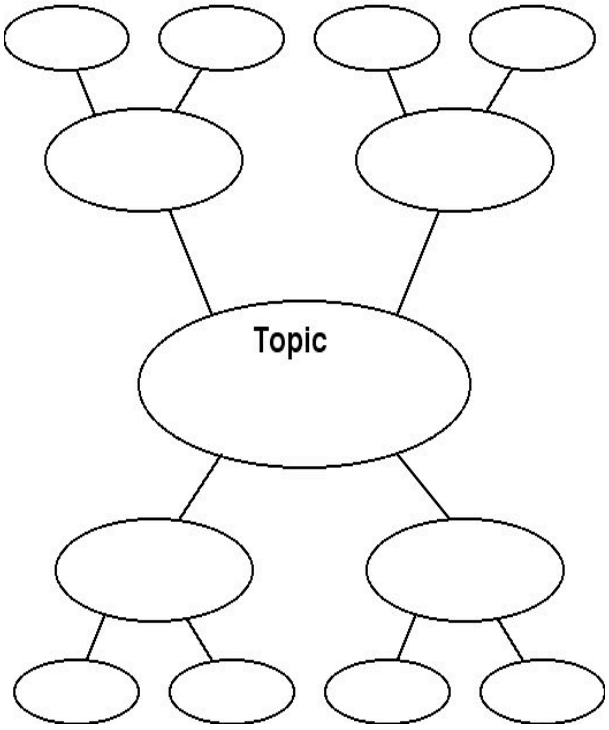
Hasenstab, Flaherty & Brown

Time-Order Chart



Descriptive Patterns--Patterns used to represent facts about specific persons, places, things, and events. It is not necessary to arrange these patterns in any particular order.

Cluster/Word Web 1

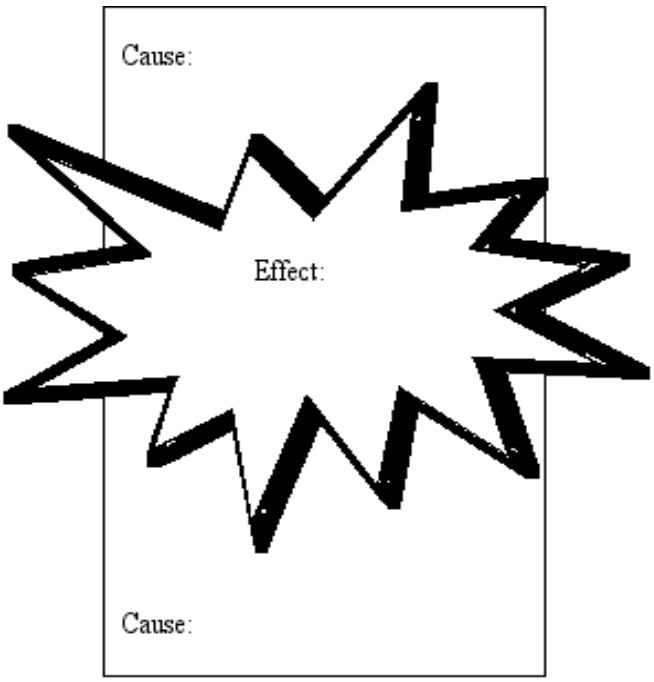


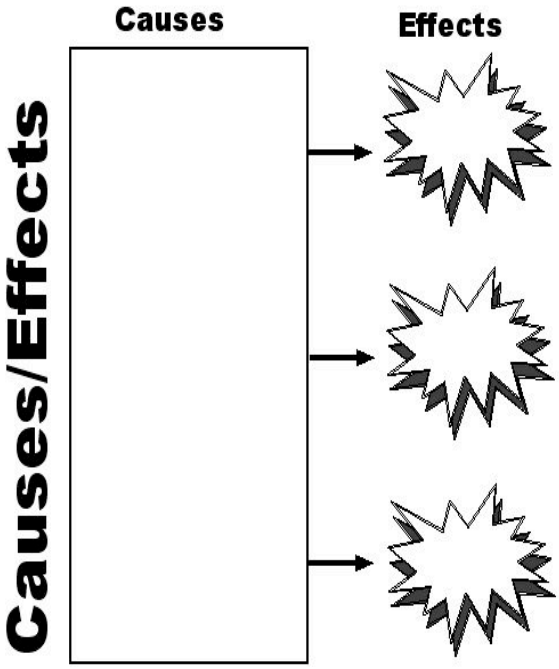
Step-by Step Chart
Write each step in order. Add details.

Materials:	
Steps	**Details**
Step 1:	
Step 2:	
Step 3:	
Step 4:	
Step 5:	

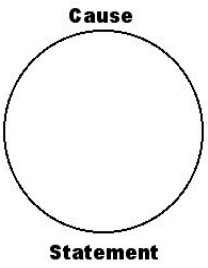
Time-Sequence Patterns--Patterns used to organize events in a specific chronological order.

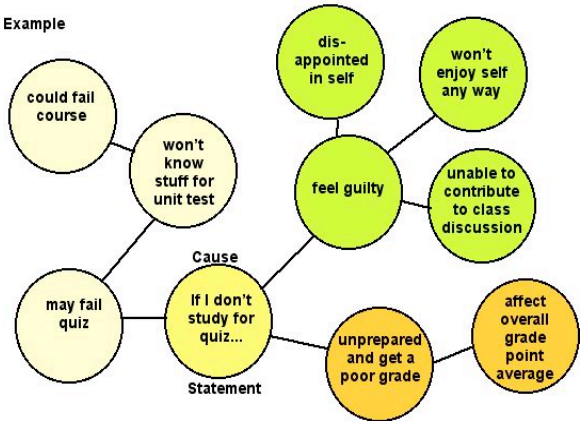
Process/Cause-Effect Patterns--Patterns used t organize information into a causal network leading to a specific outcome or into a sequence of steps leading to a specific product.





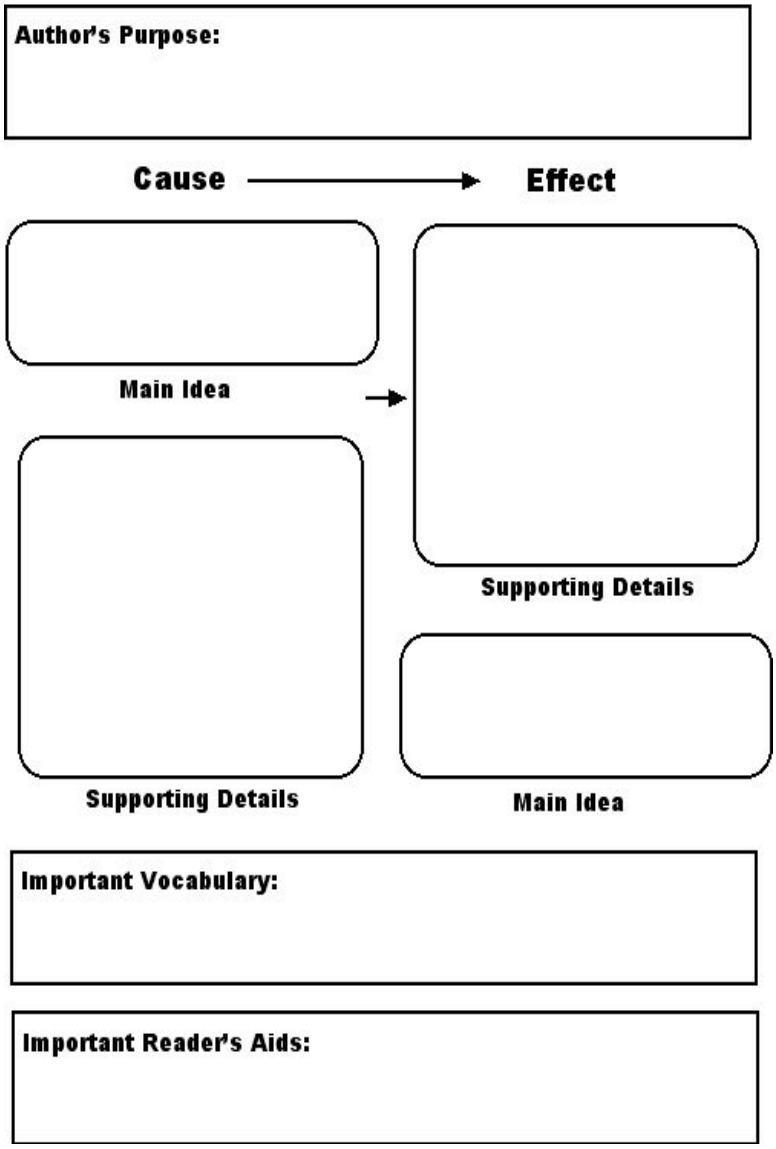
Cause and Effect Circles





Graphs from:
McREL
2550 S. Parker Road, Suite 500
Aurora, CO 80014
303-337-0990

Cause/Effect



Episode Patterns--Patterns used to organize information about specific events, including (1) setting (time &place), (2) specific people, (3) a specific duration, (4) a specific sequence of events, and (5) a particular cause and effect.

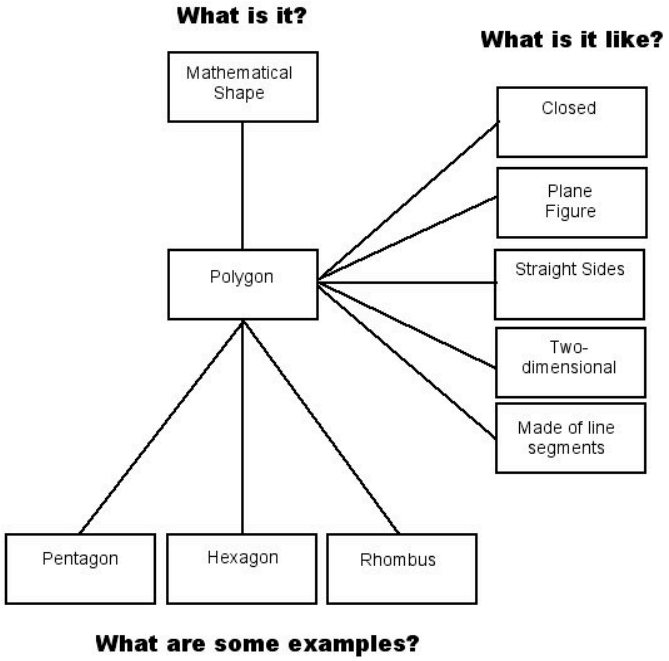
Four-Column Chart

Write heading for each column. Add details to each column.

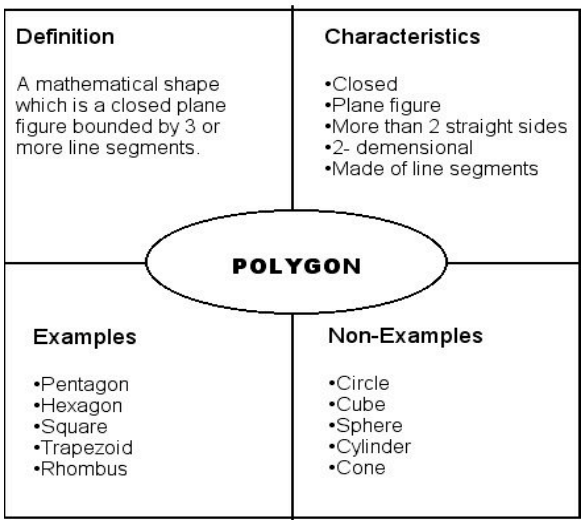
Topic			

Generalization/Principle Patterns--Patterns used to organize information into general statements with supporting examples.

Concept Definition Mapping



Frayer Model



Concept Patterns--Patterns used to organize information around a word or phrase that represents entire classes or categories of persons, places, things, and events.

NONLINGUISTIC REPRESENTATIONS

B. Making Physical Models

Definition-concrete representations of the knowledge that is to be learned. Creating these representations establishes an "image" of the knowledge in the students' minds. (Marzano, Pickering and Pollock)

EXAMPLES of Physical Models

- *Manipulatives*
  Physical items used to illustrate a concept
  Example: In math, plastic rods, balls, etc. might be used to represent numbers or groups of numbers.
- *Dioramas*
  A three-dimensional scene, of any size, which represents an historical event, nature, or a portion of a story.
  Example: placing miniature civil war figures in battlefield position inside a shoebox, which is turned on its side
- *Relief Maps*
  Maps constructed of materials, which will demonstrate the topography of the land.
  Example: Maps constructed of salt paste, play dough, paper mache' or other materials which show mountain ranges, valleys, etc.
- *Mobiles*
  Sculptures that are suspended in air and are balanced. They are constructed of rods and string or wire and other materials and are designed so that each part moves independently.
  Example: Mobiles of the solar system, cell, DNA
- *Anatomy Models*
  Three-dimensional models of parts of the body that help students see the relationship of one part of the body to another.
  Example: A life size plastic skull or skeleton
- *Food*
  Food which represents a culture being studied and the process of making it.
  Example: Students research food and recipes of a region and make a recipe for the class

NONLINGUISTIC REPRESENTATIONS

C. Generating Mental Pictures (Visualizing)

Definition- To construct a mental picture of knowledge to be learned. For abstract content the mental pictures may be highly symbolic. (Marzano, Pickering and Pollock)

Visualizing requires the learner to activate the motion picture in his/her mind, which enhances and personalizes understanding of text and material to be remembered. When verbalization is used, teachers and students will be able to clarify and enhance the image in the student's mind. (Lindamood-Bell)

STEPS used to teach visualization

1. To teach visualizing as a group activity, have one student verbalize what he saw as he read a selected paragraph from a text or reading. Have him give all the detail that he can remember. (With younger students a teacher may want to start with a sentence at a time.)

2. Then have another student describe what she visualized in a subsequent paragraph and so on. Choose as many students as the teacher sees fit.

3. While the students are describing, the rest of the class should be monitoring the descriptions so that they accurately represent what was stated in the text.

4. After the visualizing is complete, choose a student to summarize what he heard.

5. Then have another student explain why he thought all of this happened (inference).

6. The next student is to predict what he thinks will happen next.

7. Finally, have a student agree or disagree (evaluate) with the prediction. (Lindamood-Bell, n.p.)

CLOSE SENTENCES used in teaching visualizations

- Use visualizing when learning vocabulary**.**
  " When I heard this word it makes me think of _____.
  _____sounds like or rhymes with **_____.**

- Use visualizing to keep track of the sequence of events.
  " The first picture in my mind is _____, the next picture is _____ and the final pictures is _____. Now I will run it through my head like a single frame of a movie."

- Use visualizing when discussing setting, characterization, etc.
  " I imagine that this country setting looks like _____. What I see is _____"

- Use visualizing when reading abstract /difficult material. Students can go back to sentence to sentence imaging if necessary to activate or formulate background knowledge to help them understand complex material.
  "This term makes me think of _____ and I can relate this idea to _____" (Lindamood-Bell)

Structure words such as size, color, number, where, etc. can be used to give students a framework when they are trying to visualize (*Visualization & Verbalization* by Lindamood-Bell).

Einstein said:

"IF I CAN'T PICTURE IT, I CAN'T UNDERSTAND IT."

Visual imaging is one of the most effective modalities for comprehending information.

Visualizing requires readers to activate the motion picture in the mind which enhances and personalizes understanding of the text.

It enables students to better recall what they have read.

It makes reading more interesting. (Boord)

STRATEGIES TO THINK OF AND PRACTICE

S.T.O.P.

SCHEMA AND VISUALIZING

STOP I have a text to _____ connection.

I thought of this because, _____

_____

_____

STOP I can see _____

I can hear _____

I can smell _____

I can taste _____

I can feel _____

STOP I have a text to _____ connection.

I thought of this because, _____

_____

_____

STOP I can see _____

I can hear _____

I can smell _____

I can taste _____

I can feel _____

(Boord, n.p.)

NONLINGUISTIC REPRESENTATIONS

D. Drawing Pictures and Pictographs

Definition-pictures, or a series of pictures, created by students to generate nonlinguistic representations in their minds.

- *Drawing*-the process of illustrating a concept
  Example: Drawing an atom
- *Pictograph-a* series of drawings that includes one picture for every step of the process.
  Example: Drawing the steps necessary for condensation to occur.

STEPS to creating a pictograph

Dr. Fred Jones, author of *Tools for Teaching*, refers to a lesson plan with good graphics as a "Visual Instruction Plan (VIP)**."** A VIP is nothing more than a string of visual prompts. It is simple, clear and permanent. The student can refer to it at any time in order to answer the question, "What do I do next?" Pictures are most useful for tasks that involve computation or physical performance. (Jones)

Example: Each step of a division problem is illustrated.

NONLINGUISTIC REPRESENTATIONS

E. Engaging in Kinesthetic Activity

Definition-physical movement associated with specific knowledge generates a mental image of the knowledge in the mind of the learner.

IDEAS for Engaging in Kinesthetic Ideas

Try exercises that activate the brain before, during and after a class does a learning activity.

- An example is the calf pump. Each student stands and supports himself with his hands on a wall or on the back of a chair. He places one leg behind him and leans forward, bending the knee of the forward leg. His straight leg and his back are on the same plane. In the initial position, the heel at the back is off the floor and the weight is on the forward leg. In the secondary position, weight is shifted to the back leg as the heel is pressed to the floor. Exhale while pressing the heel down, releasing with inhalation. Repeat 3 or more times. This activates the brain for back brain-front brain integration. It helps with expressive speech and language activity. (Cohen, Goldsmith, Dennison, and Dennison)

- Get a clear shower curtain put over butcher-block paper. Make a hopscotch pattern on the butcher-block paper. In the blocks, write math facts, letters, sight words, etc. A student on the side says the words (set, sat, cat, etc or 3+4=, 2+3=, 6+2=). The other students have to hop on those words or math products in order to complete the hopscotch. Playing the game of Twister using the same ideas as the shower curtain hopscotch. (Sterlace, n.p.)

- When teaching a class, a teacher should vary activities so those students can move. Use a gallery walk for a class to walk around and see other people's idea or to view an artistic representation of a story. Teachers can make places on the poster papers for students to write comments, or just ask them to see if they agree with the representations, or ask students to rate the best ideas.

- Fred Jones in *Tools for Teaching* suggests "Say, See, Do" so that students are better able to attach new learning into their long-term memory. He maintains that a lesson should be interactive. The teacher gives a short explanation to what is going to be learned first. (*Say*) The teacher models what the step looks like or sounds like. (*See*) The students practice what the correct performance feels like. (*Do*) Fred Jones recommends that the new learning take the process of "Say, See, Do" for *each* step involved in the learning process (Jones). Example: Students learning cursive writing.

- Learn vocabulary by having student's act out a word or by having the students put on a skit to represent the concept of what they want to learn.

Nonlinguistic representations should elaborate (add to) knowledge. When a student generates a nonlinguistic representation of knowledge that is essentially elaboration of knowledge learned. When the linguistic mode is used to ask students to explain and justify their nonlinguistic representations. Both modes enhance learning and greatly aid in short term and long term recall.

NONLINGUISTIC TEACHER CUES

I. Definition of Term

Critical to the implementation of the previously discussed information is the role of the teacher in providing non linguistic cues during instruction. In the book, *Quantum Teaching*, authors Bobbi DePorter, Mark Reardon, and Sarah Singer-Nourie have noted that: "Everything from your classroom environment to your body language, from the handouts you distribute to the design of your lesson; everything is sending a message about learning." *Inviting School Success* authors, William Purkey and John Novak refer to this concept as "invitational education."

EXAMPLES of Nonlinguistic teacher cues

- *Eye contact*
  Definition-looking directly into the students' eyes rather than over their heads. Looking longer than there seconds at a particular person often is interpreted as "the stare." Eye contact establishes rapport and interest with a student.
  Example: Look directly at a student, smile and nod the head in agreement when the student expresses himself in a positive way.
- *Facial Expressions*
  Definition—Non verbal messages sent through manipulating the face with raised eyebrows, nodding, wrinkling the forehead, smiling, etc.
  Example: Nodding and smiling as a student explains a concept correctly
- *Gestures*
  Definition—natural and purposeful hand, arm and body movements which accentuate your message, punctuate key statements and capture the kinesthetic learners by providing animation to your voice.
  Example: Hold up three fingers and say, "There are three main points to this conflict."
- *Posture*
  Definition-the position or carriage of the body
  Example: Delivering information with erect posture as opposed to slouching against the wall or slumping at the desk will create much more interest for the students.
- *Presentation Package*
  Definition: Ways of delivering information that create curiosity, excitement and a sense of discovery.
  (DePorter et al.)
  Examples:
  - •Stand lightly on your feet.
  - •Lean slightly forward.
  - •Move laterally across the front of the room.
  - •Maintain an air of discovery and fascination.
  - •Use visual, auditory and kinesthetic predicates.

  (DePorter et al.)

- *Anchoring*
  Definition: an associated response to a given stimulus
  Example: Reading groups are held in one location where students understand the expected behaviors.
- *Inviting Personal Behaviors*
  Definition: Actions by the teacher that encourage students to participate in learning.
  Examples: Smiling, listening, holding a door
- *Inviting Physical Environment*
  Definition: A classroom that appears ready for students.
  Examples: Designated places for supplies, attractive bulletin boards, an identified seating arrangement, orderly atmosphere, appropriate colors, etc.

Bibliography

Boord, C. (n.d.). *Strategy builders* [pamphlet].

DePorter, B., Reardon, M. & Singer-Nourie, S. (date*).* *Quantum teaching.* City: Publisher.

Education Place: A Houghton Mifflin Company (2002). *Graphic organizers.* Retrieved March 26, 2003, from http://www.eduplace.com/graphicorganizer/

Hasenstab, J.K., Flaherty, G.M. & Brown, B.E. (1994). *Teaching through learning channels participant manual.* Nevada City, CA: Perfomance Learning Systems.

Jones, F. H. (2000). *Tools for teaching.* Hong Kong: Frederic H. Jones & Associates, Inc.

Marzano, R.J., Norford, J.S., Paynter, D.E., Pickering, D.J. & Gaddy, B.B. (2001). *handbook for classroom instruction that works.* Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R.J., Pickering, D.J., & Pollock, J.E. (2001). *Classroom instruction that works Research based strategies for increasing student achievement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Purkey, W. & Novak, J. (date). *Inviting school success.* City: Publisher.

Wong, H. & Wong, R. (1998). *The first days of school: How to be an effective teacher.* Mountain View, CA: Harry K. Wong Publications.

(*Visualization & Verbalization* by Lindamood-Bell).

(Sterlace, n.p.)

(Cohen, Goldsmith, Dennison, and Dennison)