CONTROL AND LEARNING

If a learner feels in control, more learning can occur. When the learner feels controlled, only rote learning occurs. Caine and Caine (1991) suggest that when the learner feels relaxed and in control, the cortex is fully functional, and higher-level, more meaningful learning is possible (creativity, analysis, synthesis, planning, problem solving, complex decisions).

When the learner feels out of control, he or she "downshifts" from cortical locale learning to the limbic system. When this occurs, the only learning possible involves rote memorization or learning of simple skills. The only creativity or problem solving possible is that which is based on habits, instincts or already learned routinized behavior.

(Caine, R.M. and Caine, G. (1991) Making Connections: Teaching and the Human Brain, ASCD, Alexandria, VA.

STRESS!!

"Stress may be defined as the emotion that results from the desire to terminate, escape from, or avoid a real or imagined, current or imminent, negatively reinforcing event."

Pierce Howard, (1994)

When stress occurs, our bodies mobilize for one of three F's--freeze, fight, or flee (fight or flight). This mobilization includes:

- dilation of the pupils, for maximum visual perception even in darkness
- constriction of the arteries, for maximum pressure to pump blood to the heart and other muscles (the heart goes from one to five gallons pumped per minute)
- activation of the adrenal gland, for pumping cortisol, which maintains pupil dilation and artery constriction
- enlargement of the vessels to the heart to facilitate the return flow of blood
- metabolism of fat and glucose for energy
- constriction of vessels to the skin, kidney and digestive tract, shutting down digestion and maximizing readiness for the fight or flight syndrome

If we decide that we have some degree of control and can limit or prevent stressors, the effects of stress can be minimized or even eliminated.

From: The Owner's Manual for the Brain, (1994), P. Howard

State Dependence

People recall information more readily when they can remember the state in which they learned that information.

In one research study, subjects memorized a list in the basement of a building and were tested. Then, they moved to one of the building's upper floors and were tested again. They scored poorly. When they were asked to visualize the basement where they learned the list, and then were tested, their scores improved. When they were returned to the basement where they had memorized the list, when tested, their scores improved even more!

Recall of learning can depend on the state or other situation that existed when the learning took place. This holds true for:

* place
* mood
* odors
* physical condition

Implications

* When you are having trouble remembering, focus on the place you were, the mood you were in or your physical condition when you learned it.
* Learn things under conditions that are easy to replicate when you need to remember.
* When teaching job-related skills, create a learning environment that approximates job conditions.

Source: The Owner's Manual For the Brain, p.250 by P. Howard. 1994.

Breaks

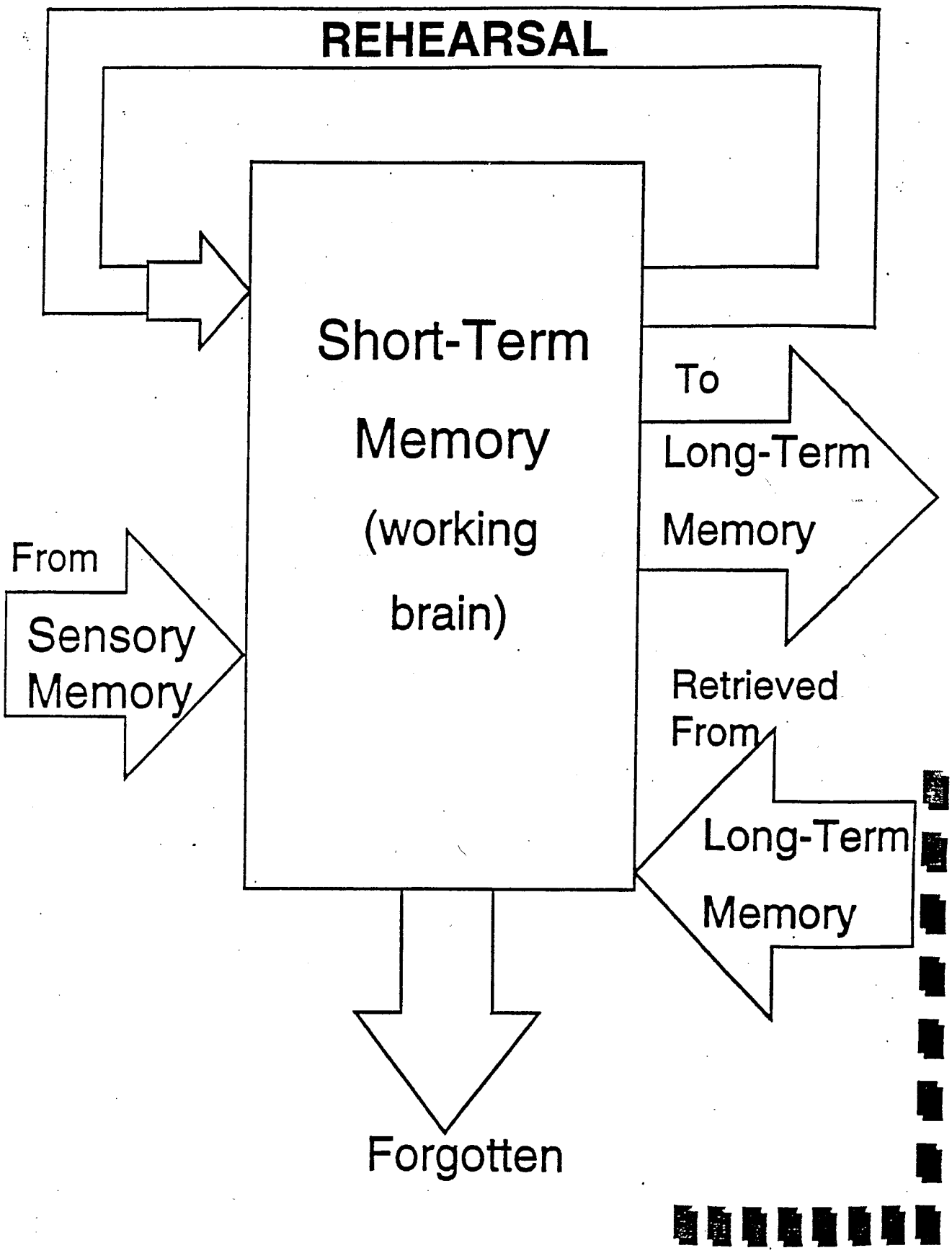
"Errors tend to increase as break time decreases."

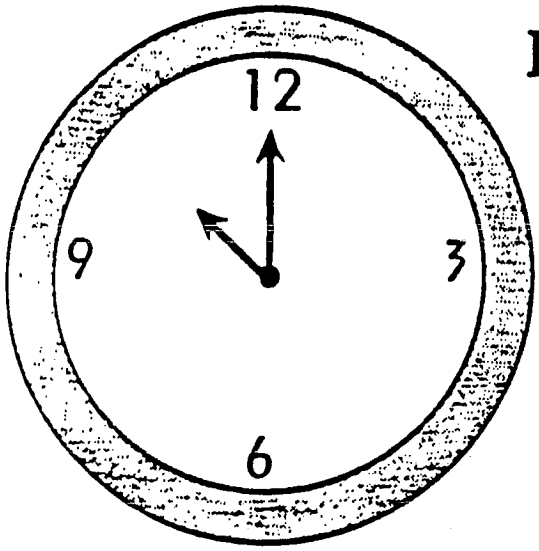
Research indicates two good reasons for taking breaks after each learning module.

- ❖ New neural connections formed by the learning need time to fix and strengthen themselves without competition from additional, novel stimuli.
- ❖ Fatigue sets in without breaks.

- ❖ Provide exercise opportunities immediately following a learning episode. (stand, walk, stretch ...)
- ❖ Schedule Talk Walks so participants can walk while reviewing content.
- ❖ The best time of day to take in new material is just before going to sleep. Material studied then tends to be remembered better. Sleep, in a sense, is another way to take a break!
- ❖ Allow for breaks after problem-definition activities before individuals are asked to generate ideas.
- ❖ Avoid simple carbohydrates and fats at breaks; these can cause sleepiness. Complex carbohydrates e.g. fruits, are preferable.

Source: The Owner's Manual For the Brain, p. 257 by P. Howard, 1994.

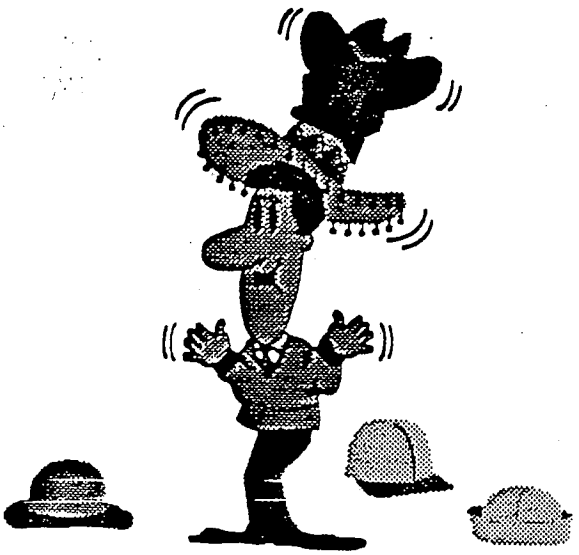

REHEARSAL
Short-Term
Memory
(working
brain)
From
Sensory
Memory
To
Long-Term
Memory
Retrieved
From
Long-Term
Memory
Forgotten



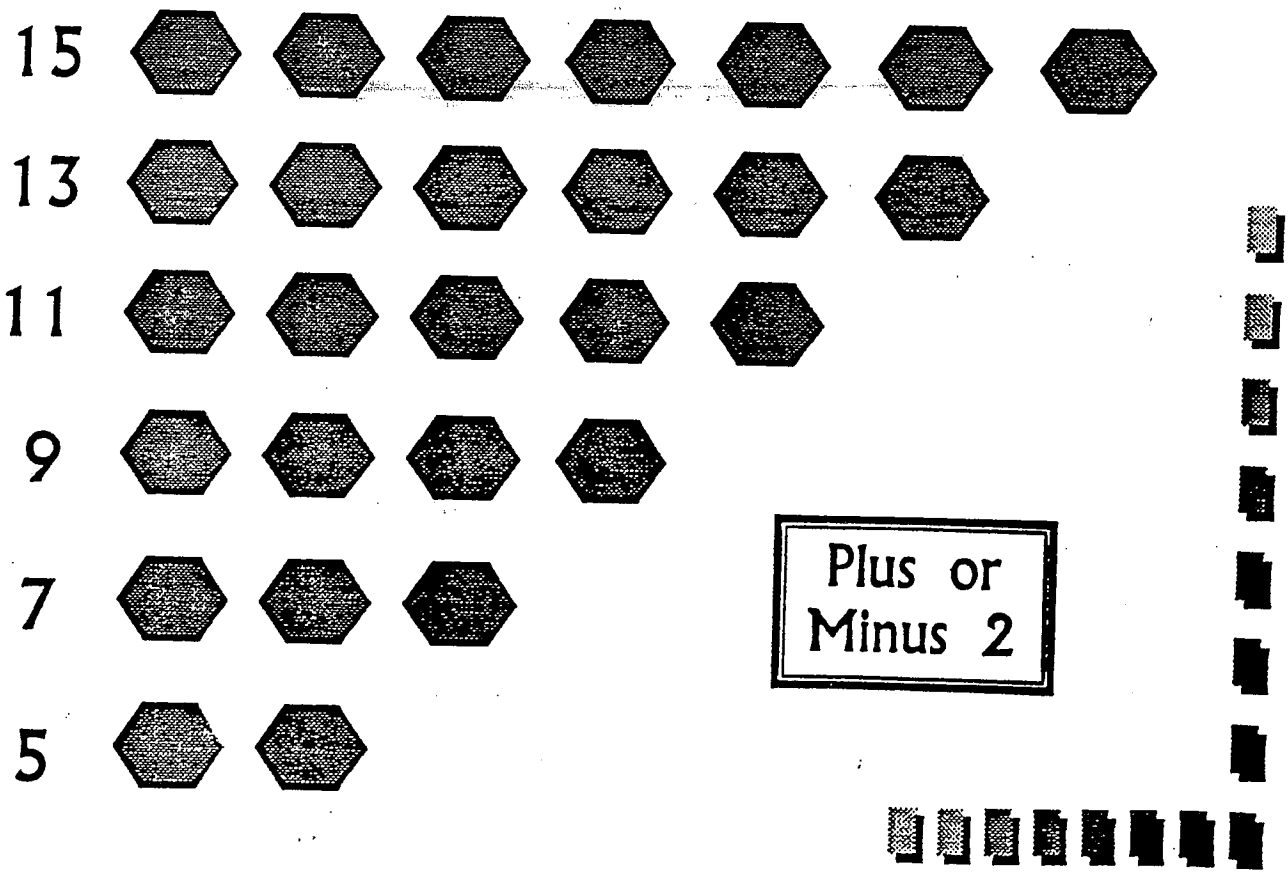
The short term memory retains information 3-18 seconds... 20 seconds at a maximum!!

What
are the implications
for the lecture method?

"M-Space"

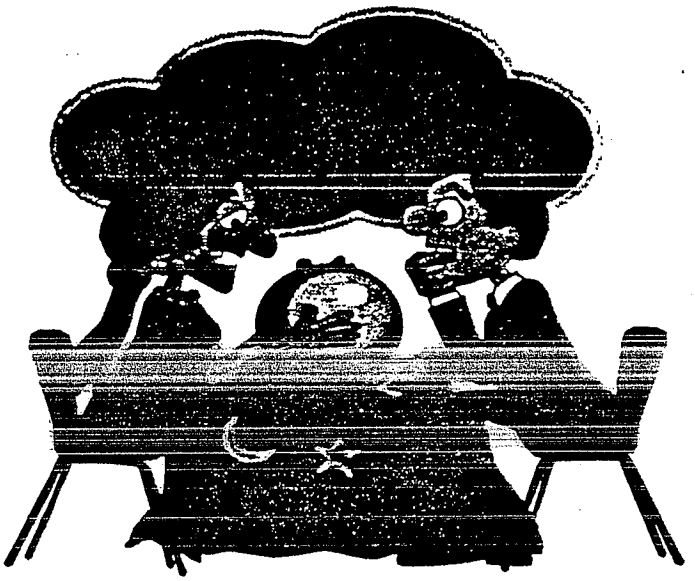


The capacity of short-term memory appears to develop with age. The number of spaces increases by one unit every other year beginning at age three. Juan-Pascual Leon, 1970



"Chunking"

A chunk is any coherent group of items of information that we can remember as if it were a single item. A word is a chunk of letters, remembered as easily as a single letter (but carrying much more information). When you first learned to read, what was in a chunk for you?



The difference between novices and experts in a field appears to be that experts tend -- because of a great deal of experience in a field -- to organize information into much larger chunks, while novices work with isolated bits of information.

Examples:

_____

_____

REHEARSAL

Rehearsal performs two functions:

1. Maintains information in short-term memory.

2. Mechanism by which we transfer information to long-term memory.

There are two types of rehearsal:

Rote Rehearsal -- deliberate, continuous repetition of material in the same form in which it entered short-term memory.

Elaborative Rehearsal -- elaborating or integrating information, giving it some kind of meaning -- creating chunks of reminders.

REHEARSAL STRATEGIES

- Visualization
- Creating a Story
- Mnemonics
- The Link System
- Acting Out a Process
- Role Play
- Create a Model
- Develop a Song, Rap, Poem, or Skit
- Interactive Notebooks
- Split-page Notetaking
- Quick Writes
- Create Questions
- Jigsaw Activities
- Think, Pair, Share
- Games
- Reciprocal Teaching
- Develop a Graphic
- Implementation with Trainer Feedback

Pam Robbins

Elaboration Rehearsal

Elaboration strategies may take many forms:

- visualizing
- acting out
- rhyming
- finding patterns
- making connections
- personalizing
- integrating
- inferring

Reflect upon how one might integrate multiple intelligences and/or modalities in developing elaborative rehearsal strategies.

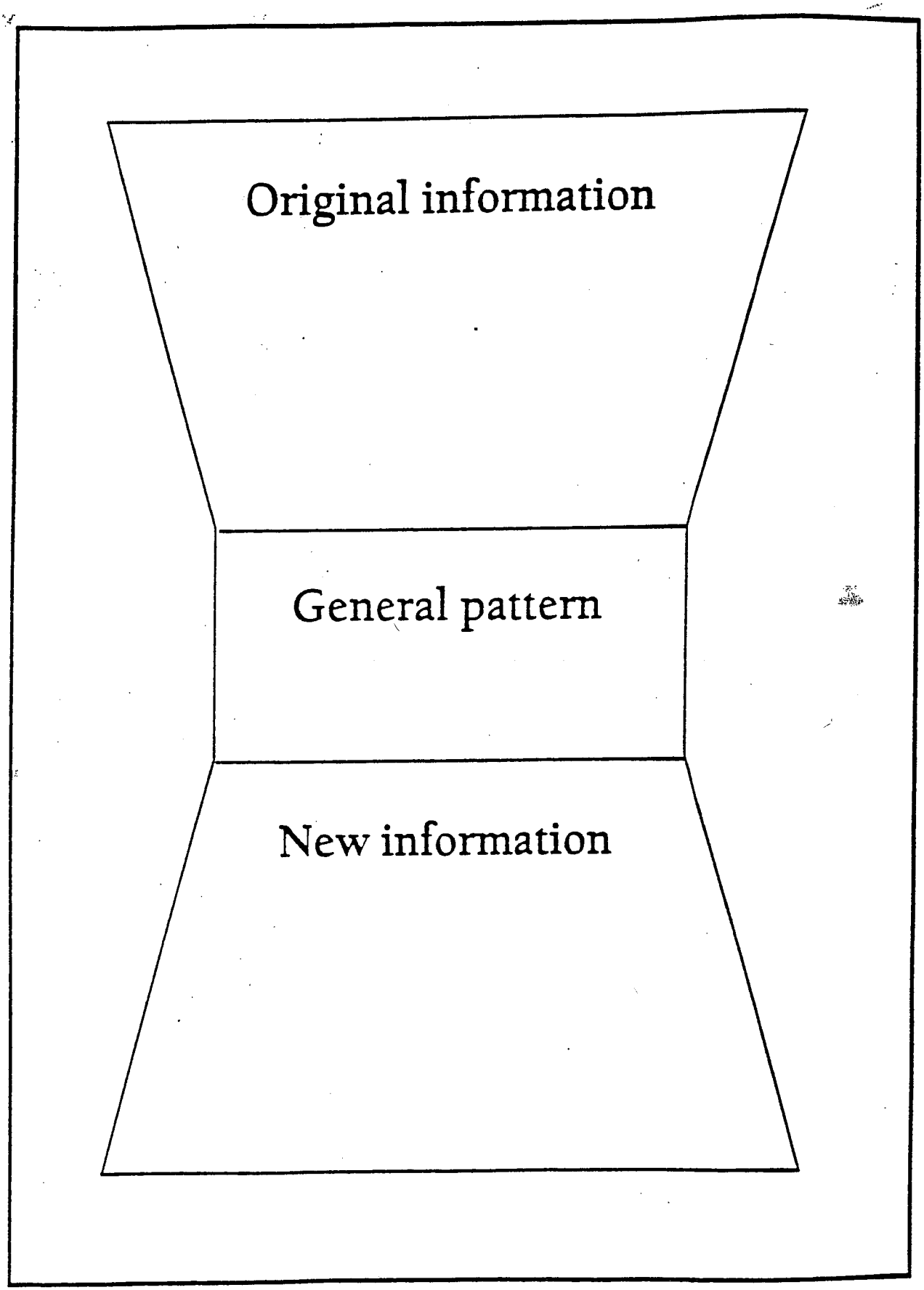
The more in-depth information is processed, the more likely it is to be stored in a variety of networks that can be accessed in new contexts.

When C. L. Sholes was inventing a typewriting machine in the the early 1870s, he found that the machine jammed if he typed too fast. So he deliberately arranged the positions of the letters in a way that forced typists to work slowly. Nevertheless, Sholes' typewriter design was still a great improvement over earlier models, and so it was soon in use all over the world.

Today, even though typewriters have been improved in many ways, nearly all of them have keyboards like the one Sholes devised in 1872. The letter arrangement is called QWERT, after the five left-hand keys in the top letter row. You can see QWERT keyboards on computer consoles as

QWERT arrangement slows typing, encourages errors, and causes greater fatigue than another arrangement devised by August Dvorak in 1930, which has proved in several tests to be much faster and more accurate than QWERT.

Millions of people have learned the QWERT keyboard, however, and it is being taught to students in schools right now. So it seems that we will continue to live with this 19th century mistake.



DIMENSIONS OF LEARNING 3-34

REMEMBERING NAMES

* Decide that you will remember.

* Focus on the name when you hear it spoken.

* Repeat the name to yourself or out loud in a sentence.

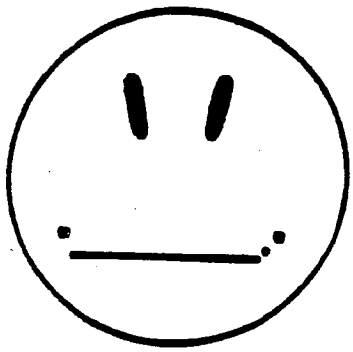
* Associate the name with something (an image, a rhyme, a saying . . . .)

* Rehearse the name after you have met the person. (Either in conversation with others e.g. "So, John, do you know Baldwin?" or say it to yourself.)

Pam Robbins

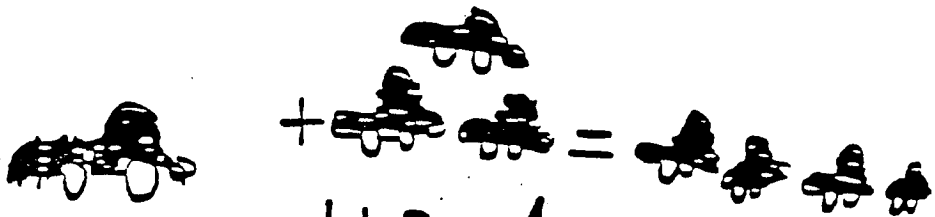
Using Visuals In The Classroom

* Illustrate grammatical concepts.



Alice Jackson
4th-grade Teacher

* Have students generate and illustrate math problems.



1 + 3 = 4

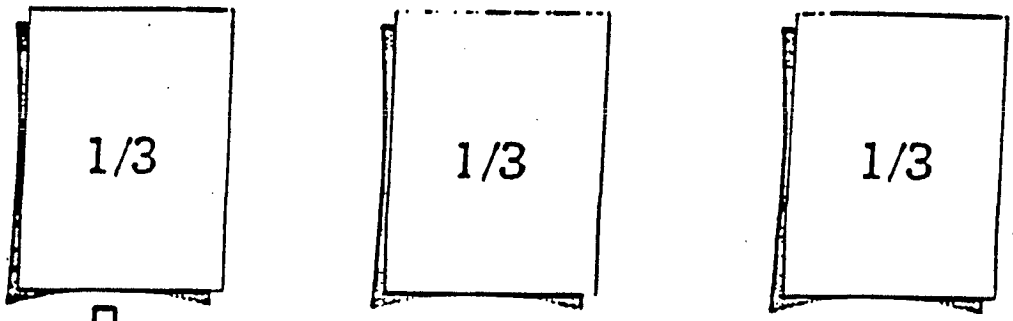
I had 1 car and my friend gave me three more. How many cars I have?

Understanding Multiplication of Fractions

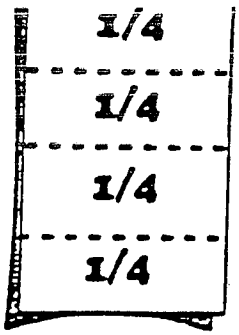
Problem: 1/4 x 1/3 =

(the same as)

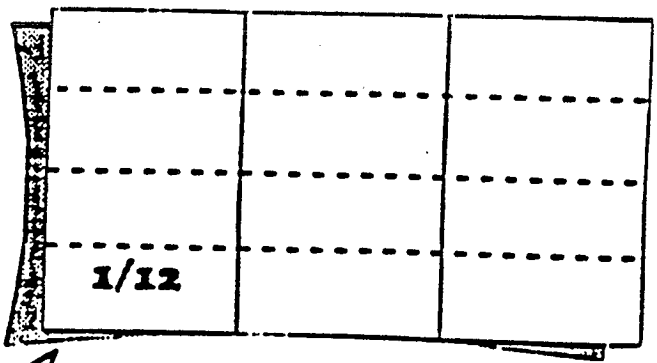
1/4 **x** 1/3 of a whole = 1/4 **of** 1/3 of a whole



(Fold one of the 1/3 sheets into 4 equal parts.)



How many 1/4's in the whole?



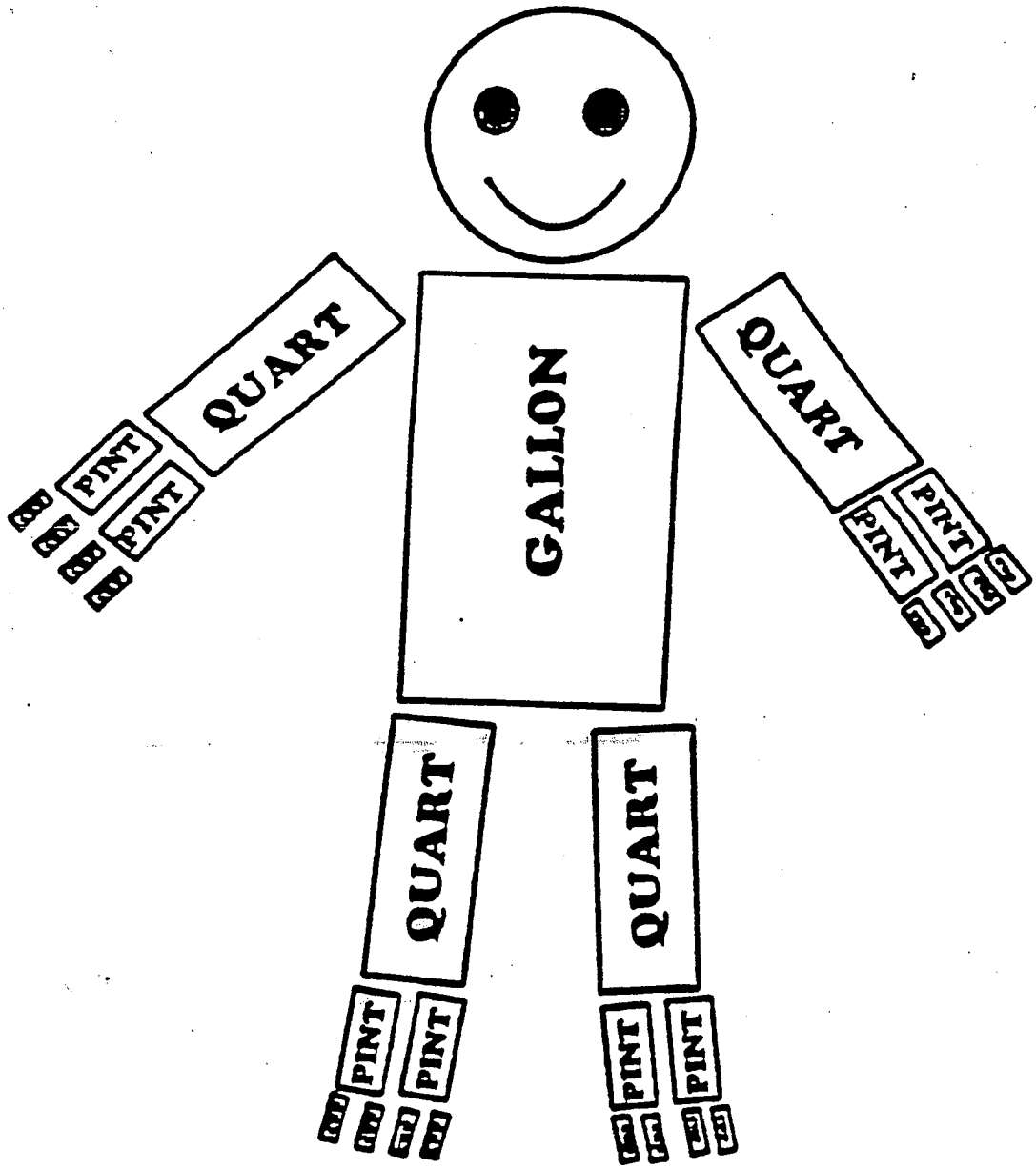
There are 12, so

1/4 x 1/3 = 1/12.

Shirley Heath, 5th-grade Teacher

Sorgen and Wolfe, 1993

Using Visuals In The Classroom



Thanks to Athens, TN
Elementary Teachers

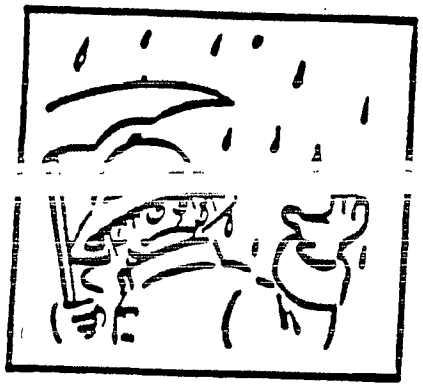
Sorgen and Wolfe, 1993

Using Visuals In The Classroom

* Increase understanding and retention of poetry by using illustrations.

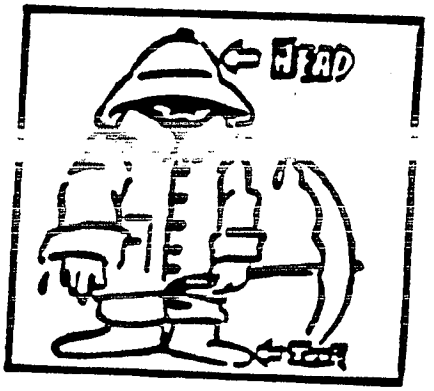
Either draw or have students draw an illustration of each line of a poem as a visual assist to memorizing.

Sara Brown, Teacher 2nd and 3rd-grade LD Class

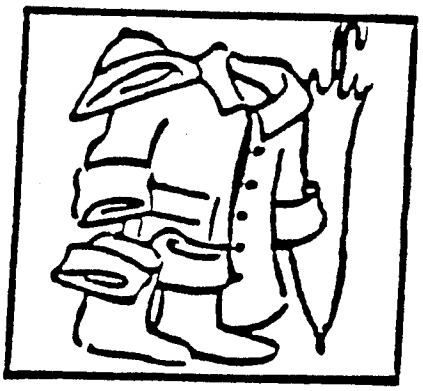


I do not like a rainy day.

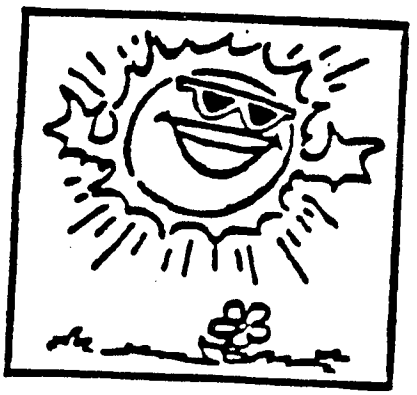
The road is wet, the sky is gray.



They dress me up from head to toes,



With lots and lots of rubber clothes.



I wish the sun would come and stay.

I do not like a rainy day.

Using Visuals In The Classroom

* Provide students with Advanced Organizers.

Often, students below the 6th-grade cannot adequately identify important information in prose. Advanced Organizers assist them in paying attention to the essential aspects of a passage.

The Endocrine System					
Gland	Location	Function	Hormones	Malfunction	
thyroid					
pituitary					

Donna Ogle, "Implementing Strategic Teaching" Educational Leadership, January, 1989

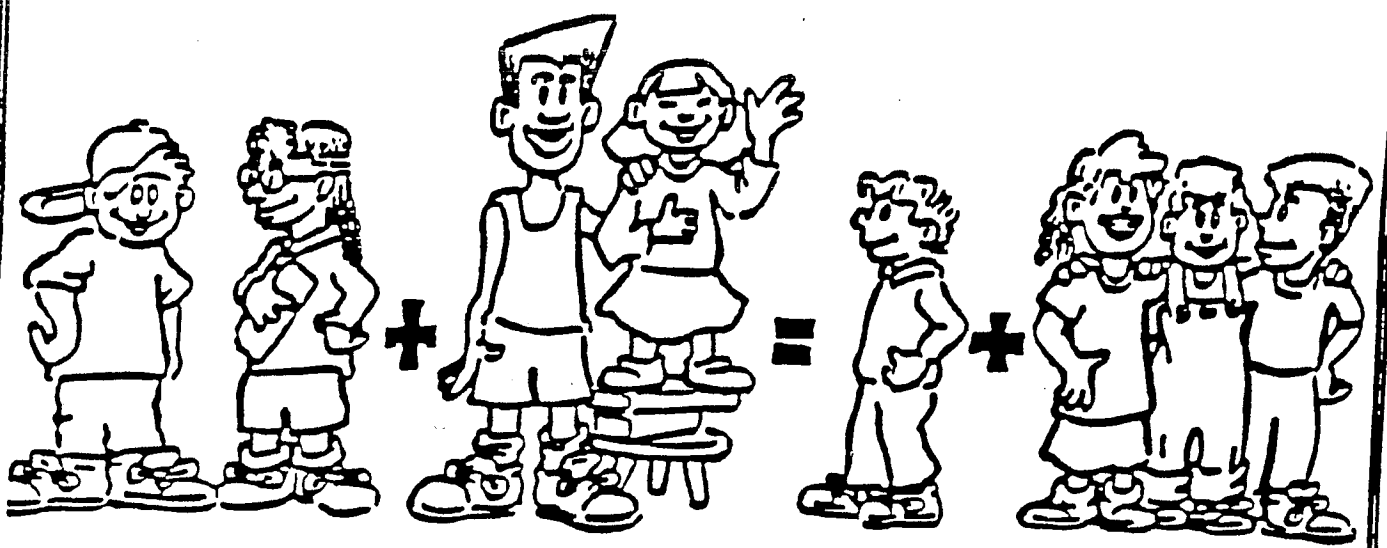
KINESTHETIC ACTIVITIES

The very act of physical movement creates an immense amount of activity in the brain. Communicating ideas and concepts through kinesthetic activity is a powerful way to take advantage of the "Mind-body" connection.

- Use the body to enhance original learning (and as a way for students to demonstrate their understanding of the skills and concepts they've been taught.)

Mathematics

Human Equations -- In teams, students draw a card with a particular equation written on it. They arrange themselves in a configuration that represents the equation. (The team [illegible] other students if they need more bodies.)



2 + 2 = 1 + 3

VISUALS/GRAPHICS

When trainees are taught to construct images that represent prose, their comprehension is increased.

To become an ACE at visualization, use:

A ACTION

C COLOR

E EXAGGERATION

Some trainees use visualization or imagery naturally. However, all trainees can be taught to become "high imagers".

VISUALS/GRAPHICS

"A picture is worth
a thousand words."

In one study, subjects were shown over 10,000 pictures. Later when shown some of these same pictures mixed with new ones, they were able to identify the ones they had seen before with 90% accuracy.

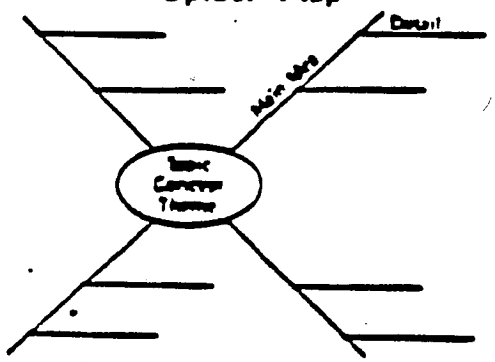
Standing, 1973

The brain has an amazing
ability to construct and
retain images.

USING VISUALS IN THE CLASSROOM

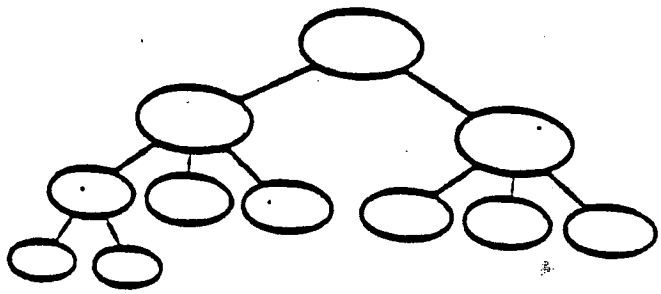
Additional types of graphic representations and their uses.

Spider Map



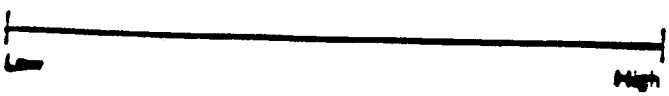
Used to describe a central idea, a thing (a geographic region), process (melodic), concept (altruism), or proposition with support (experimental drugs should be available to AIDS victims). Key frame questions: What is the central idea? What are its attributes? What are its function?

Network Tree



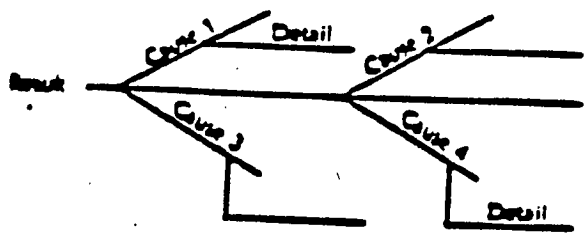
Used to show causal information (causes of poverty), a hierarchy (types of insects), or branching procedures (the circulatory system). Key frame questions: What is the superordinate category? What are the subordinate categories? How are they related? How many levels are there?

Continuum Scale



Used for time lines showing historical events or ages (grade levels in school), degrees of something (weight), shades of meaning (scales), or ratings scales (achievement in school). Key frame questions: What is being scaled? What are the end points?

Fishbone Map



Used to show the causal interaction of a complex event (an election, a nuclear explosion) or complex phenomenon (juvenile delinquency, learning disabilities). Key frame questions: What are the factors that cause X? How do they interrelate? Are the factors that cause X the same as those that cause X to persist?

Developed by North Central Regional Educational Library, 1988
From the Dec/Jan, 1989 issue of Educational Leadership

TEACHING GRAPHIC ORGANIZERS

1. Describe the concept by discussing:
   - the importance of organizing information
   - the various ways in which people organize information
   - the benefits of using a visual organizer

2. Introduce a specific graphic organizer by describing its:
   - purpose (a venn diagram for comparing)
   - form (overlapping circles)

3. Explain and demonstrate the use of the selected organizer with:
   - familiar information
   - new information

4. Let trainees apply the organizer to:
   - familiar material
   - relatively easy new material

5. Have trainees reflect on the use of the graphic organizer by:
   - sharing their examples
   - evaluating the effectiveness of the organizer

6. Provide multiple opportunities for trainees to practice using the graphic organizer

7. Encourage students to construct their own organizers.

Jay McTighe, Education Specialist

MNEMONICS

Mnemonics can be created for almost anything one wants to remember. There are also many forms of mnemonic strategies. Some of the most popular types are described below and on the following pages.

Acrostic Sentences

Every Good Boy Does Fine

Krakatoa Positively Casts Off Fumes; Generally Sulfurous Vapors

My Very Earnest Mother Just Served Us Nine Pickles

Never Eat Slimy Worms

Acronyms

- ROY G BIV
- FACE
- HOMES
- McHALES

Pat Wolfe

MNEMONICS

Pegword Method

In the pegword method, you begin by learning a set of pegwords (see below.) When you know the pegwords, new lists of items to be learned can be associated with these words through an image. [Remember to use Action - Color - Exaggeration to make your images really memorable].

two	➡	shoe
three	➡	tree
four	➡	door
five	➡	hive
six	➡	sticks
seven	➡	heaven
eight	➡	plate
nine	➡	line
ten	➡	hen

WRITING ACTIVITIES

Most people realize that writing something down helps them more easily recall that information later. This occurs not because they now have a written record to which they can refer, but because the act of writing causes the brain to process that information more indepth.

There is a strong link between writing and thinking. Writing serves as a learning tool for refining thinking. At the same time, complex, cognitive activity produces more articulate and expressive writing.

SPLIT PAGE NOTETAKING

GRAPHIC, CHART, DOODLE, PICTURE	NOTES

Pam Robbins

WRITING ACTIVITIES

Interactive Student Notebooks

Most student notebooks are filled with uninspired, unconnected and poorly understood ideas. Students generally do not know how to identify key ideas and concepts, nor are they encouraged to actively respond to the information they record. Interactive Student Notebooks are designed to remedy these problems. In these notebooks, students take class notes and reading notes on the right side of the notebook. On the left side, they process question, and wrestle with the information they encounter.

Suggestions for the left side of the page include:

1. Personal reaction, most significant information.
2. Illustrations, symbols, and graphics.
3. Diagrams, webs, clusters, and maps.
4. Venn Diagrams, matrices, and flow charts.
5. Cartoons or caricatures representing ideas.
6. One sentence/one paragraph summaries.

RAP This is a review or preview activity to help students make connections between what they have learned and what they will learn.	CLASS NOTES Students record key ideas from lectures and class discussions on the right side of the notebook.
WORKING IT OUT Students take difficult concepts or entire bodies of notes and "work out" their meanings on the left side of their notebooks.	READING NOTES Students record notes as they read textbooks, primary sources, periodicals, and literature.
PERSONAL RESPONSE Students clarify their opinions on issues and ask questions they think about during class or while reading.	HERE I STAND Allows students to state conclusions and personal positions on issues within a unit.

From The Teacher's Curriculum Institute Newsletter
Spring, 1992 (Technique developed by Lee Swenson)
Sorgen and Wolfe, 1993

SENGE'S LEFT-HAND-COLUMN METHOD

(Senge, 1990)

After a significant interchange with one or more people, try writing out the key statements you made in the right hand column, and what you were actually thinking on the left. This is a helpful process for examining assumptions and paradigms.

What I was thinking	What I said
"Courtesy will soften the blow."	"May I take your coat?"
"The bottom may fall out any day."	"Yes, I think we're right on target."

From: Senge, P. (1990), The Fifth Discipline

Pam Robbins

WRITING ACTIVITIES

"Leaded" and "Unleaded" Questions

After reading a selection, students generate two lists of questions. One list contains "unleaded" questions, ones that can be answered by a word or short phrase – sometimes called "recall" or "closed" questions. The second list contains "leaded" questions that require more critical thinking -- also called "open-ended" or "higher level" questions.

SKINNY QUESTIONS	FAT QUESTIONS
UNLEADED QUESTIONS	LEADED QUESTIONS
1. When was Abraham Lincoln born?	1. What was occurring in history at the beginning of Lincoln's life?
2. What was the name of his most famous address?	2. Why was Lincoln's Gettysburg Address an important speech?
3. Was life bad during the Civil War?	3. Compare life before and after the Civil War.

Adapted from "Seven Ways of Teaching" by
David Lazear, 1994
Sorgen and Wolfe, 1993

RHYME, RHYTHM, & MUSIC

Music and rhythm have a tremendous impact on the brain. They calm you when you're stressed and stimulate you when you're bored, but most important, they (along with rhyme) are extremely powerful hooks to memory.

"Blindness made me take up the writing of poetry again. Since rough drafts were denied me, I had to fall back on memory. It is obviously easier to remember verse than prose and to remember regular verse."

Jorge Luis Borges

What's the next line?

1. In 14 hundred and 92 ...
2. Pop, pop, fizz, fizz ...
3. I think that I shall never see ...

How many song/poems/rhymes do you think you could recite word for word?

ADDITIONAL ELABORATION STRATEGIES

Learning is not a spectator sport! Students need to be provided with structures that allow them to actively process information.

Double Check

Students are paired heterogeneously and are given a set amount of time -- usually 3 to 5 minutes -- to accomplish three tasks:

1. Both students silently read one paragraph.
2. One partner verbally summarizes the information (with book closed) while partner checks for content.
3. The partners alternately take turns generating or answering their partner's questions.

Alan Fisk-Williams, Science Teacher

Team Huddles

1. Place students in heterogeneous groups of four (They number off.)
2. Periodically during lecture or discussion, the instructor stops and asks a question.
3. Teams huddle for 30 seconds and gain consensus on the answer.
4. Instructor calls randomly on teams and a number to respond.

Sorgen and Wolfe, 1993

ADDITIONAL ELABORATION STRATEGIES

Reciprocal Teaching

The saying, "The best way to learn something is to teach it." contains more than a little truth. Teaching a concept or skill you've learned to someone else requires a fairly high level of understanding. The primary purpose of Reciprocal Teaching strategies is to provide an opportunity for trainees to engage in elaborative rehearsal, to process information more indepth.

[redacted] periodically during instruction, the teacher stops and has students pair up with one partner being "A" and the other "B." During the first round, A teaches B the content that has just been covered. Later the roles are reversed and B teaches A.

2. <u>THINK-PAIR-SHARE</u> -- This type of reciprocal teaching adds a reflection dimension to the process. When the teacher stops the lecture (discussion, reading, etc.) students are first asked to think about what they've just learned. They then choose a partner and share their learnings, reflections, thoughts, etc. with each other.

ALL RECIPROCAL TEACHING NEEDS TO BE CAREFULLY MONITORED BY THE TEACHER

Sorgen and Wolfe, 1993

STORIES AND METAPHORS

- Aid in visualization
- Assist retention
- Enhance understanding through analogy
- Give the learner something to hang on to
- Energize
- Build motivation

Pam Robbins

YOUR FIRST CELL MODEL

Grade Level: 3-5

Objective:

Students will build a model of a cell using jello, Dixie cups, and grapes.

Key points:

- Cells have parts. One important cell part is the nucleus.
- The nucleus tells the cell what to do. (If a the cell was a factory, the nucleus would be the factory boss.)

Materials:

Refrigerator, and hot plate or electric tea pot
Something on which to carry models to the refrigerator
2 pkgs. of yellow jello
One Dixie Cup for each student... Non-wax!!!
One grape for each student
One overhead or poster of cell parts (Fig. 4)

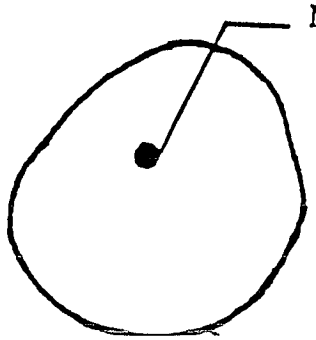


Fig. 4: Parts of a Cell

Set-Up:

1. Pre-mix the jello and have it ready at the materials station.

Procedure:

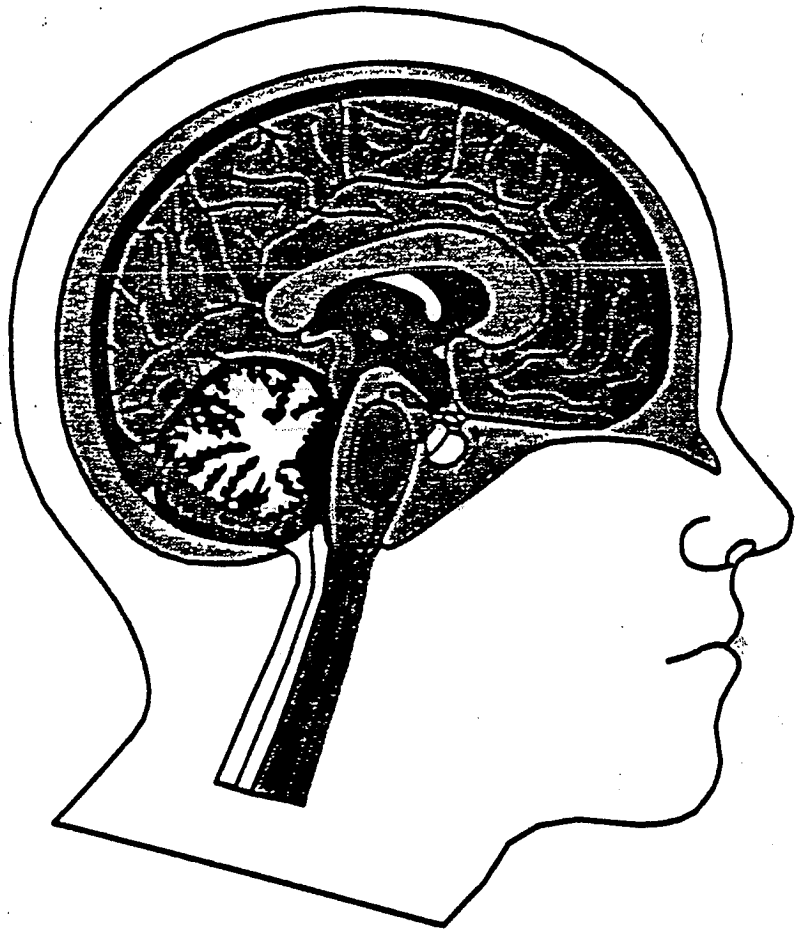
1. Ask students to brainstorm with a partner what they know about cells so far.
2. Have students share some of their ideas with the class. Record their ideas on a chalkboard or large piece of paper that can be added to.
3. Show overhead or poster of cell parts. Help students to pronounce the two major parts of the cell out loud:
   - the nucleus
   - the cell membrane
4. Re-emphasize the metaphor of the cell as a factory. Say something like:

   "The cell is like a factory. It produces the things the body needs to function. The nucleus of the cell is like the boss of the factory because it tells the factory what to do and make. The cell membrane is like the factory walls. It holds everything inside."

5. Tell students that they will be making models of a cell. Show them an example model by pouring jello into a cup (making sure to at least cover up the grape). The grape will represent the nucleus, and the cup will represent the cell membrane (the jello will represent the "insides" of the cell).
6. Ask students to review their group jobs. Have runners pick up the materials.
7. As you move around the room filling cups, ask students to draw a diagram of a cell on their Brain folder and label all the cell parts.
8. Store the cell models in a refrigerator until the jello has solidified.
9. When solid, students may tear away the cups to see the cell model and eat it!!

Processing:

1. Create a metaphor for the cell parts and justify your example. (A cell is like a...)
2. Record learnings. Have students draw a picture of the parts of the cell in their Brain Folder and label them.



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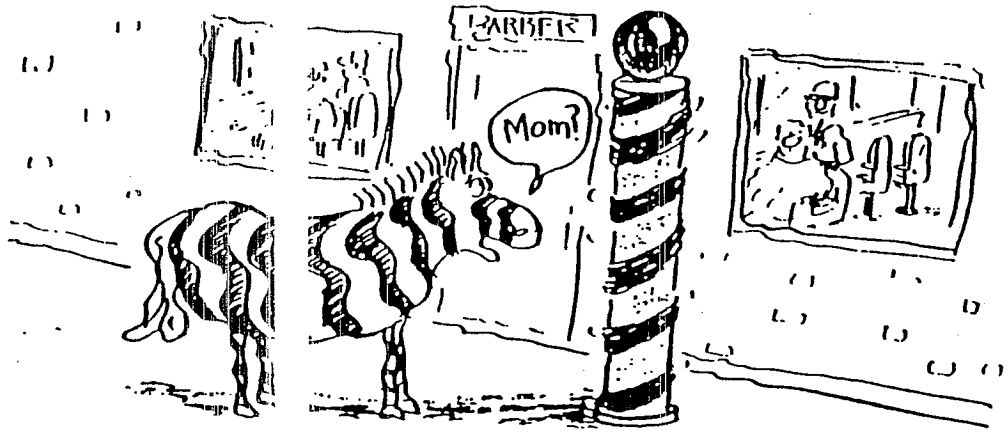
Constructivism

Key Concept: Students learn by actively constructing knowledge. If the teacher is the one who actively interacts with the knowledge, then the teacher's brain, not the student's will grow!

Constructivism invites students to:

- explore phenomena or ideas
- share hypotheses with one another
- predict and conjecture
- test their predictions/hypotheses
- revise their original thinking
- reflect upon what they've learned.

How Come?



By Kathy Wolla l • Illustrated by Debra Solomon

WORK N PUBLISHING, NEW YORK

Why do the Moon and the Sun seem to change colors?

Seen from space, as photographs taken by the astronauts show, our Moon is a gray-white ball, brilliantly lit by the Sun. And, glowing against the inky black of space, the Sun itself appears nearly white.

But when we look at the Moon from Earth, its color depends on where it is in the sky. When the Moon first peeks over the horizon, it may appear bright orange. Gradually, as the Earth turns and the Moon rises higher in the sky, its color steadily fades. The orange changes to yellow, then pales to a yellow-white, until finally, when it is directly overhead, the Moon is more nearly its true gray-white.

Similar tricks happen with the Sun. In the middle of the day, the Sun normally looks yellowish-white. But at sunrise and sunset, it may turn red or orange or pink. How come?

Our Moon and Sun are not really changing colors hour by hour, way out there in space. The clue is that the colors appear to change only when you look at either body through the Earth's atmosphere. Looking at the Moon or the Sun through air is like looking through a veil. Light, which has to pass through the air before it reaches our eyes, is changed by its trip.

Dust, smoke, and pollutants redden the light that reaches our eyes.

Nitrogen, oxygen, and other gases that make up our air, plus the tiny particles of dust, smoke, and pollutants that are always floating through, redden the light that reaches our eyes.

How does this work? The light that is produced inside the Sun is white. And moonlight, of course, is simply

FAST FACT

During forest fires, when smoke billows into the air for days, the rising Moon is often blood-red, and the sunsets and sunrises are spectacular.

reflected sunlight.

But, white light contains within it many colors—all the colors of the rainbow.

So sunlight is invisibly full of color as it zips through space at 186,000 miles a second. When it enters the Earth's atmosphere, some of the light slices cleanly through, reaching the ground without encountering a single air molecule—staying white.

But since the Earth's air is made of gas molecules, some of the light will run into these molecules on its way down. And when it does, light is scattered.

It is mostly bluer light that is scattered out of the beam of white light. (Why? See page 2.) So by the time sunlight reaches our eyes, the colors that are left in the beam are the warm ones. This makes the Sun look yellower to us than it actually is.

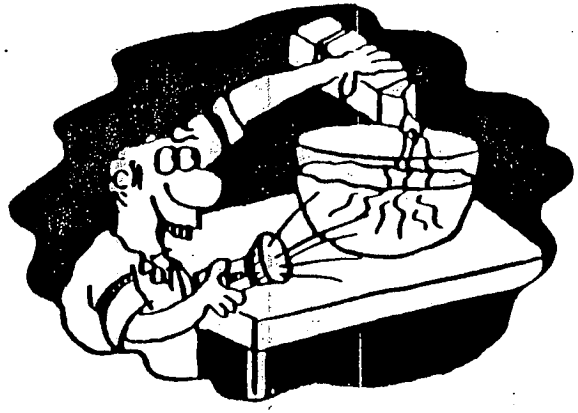
The Sun looks closest to its true color when it is overhead. Then, its light must pass through only the air above us—air that becomes thinner and thinner higher up. So much of the sunlight reaches our eyes unscathed.

But when the Sun is near the horizon, its color changes dramatically. Then, its light must pass through the heavy blanket of air near the ground that extends from us to the horizon. Encountering many more air molecules than usual, as well as more dust and pollutants, even more of the blue end of the spectrum is scattered out of the light beam. This leaves mostly orange and red light in the beam by the time it reaches our eyes. And so we see the Sun as a fiery orange ball at sunrise and sunset.

Make Your Own Harvest Moon

To see for yourself how the Moon or Sun changes color, try this. Fill a large, clear glass bowl, such as an empty fish bowl, with water. Now get a flashlight. Darken the room, switch on the flashlight, and shine it through the water. You should see the light as normal, nearly white.

Now pour a little milk into the water. Shine the light through. You should see the light redden through the swirling milk. Something similar happens when we see the Moon or the Sun through a layer of thick or polluted air.



The same thing happens with the Moon. This explains why we can go out early in the evening, when the Moon is near the horizon, and marvel at its bright-orange, harvest-moon color. Then, as the night wears on and the Moon climbs high in the sky, it pales to white. We are seeing more of the entire spectrum of moonlight—and that makes white.

The more polluted the air, the more spectacular the colors of the rising and setting Sun and Moon. (That's one advantage of living in a smoggy city, such as Los Angeles.)

JIGSAW

Introductory Comments

Jigsaw is a Cooperative Learning strategy developed by Aronson to enable learners to cover a large body of information by dividing the content into sections. In Jigsaw, each member of a team is responsible for a section of information that is unique and different from that of other team members. Participants meet together in expert groups to study material in depth, and then return to home teams to teach the information they have learned. At the end of the lesson, the team is responsible for knowing the entire content and is required to demonstrate this knowledge.

Steps

1. Teachers assign learners to teams.
2. Individual learners read topics assigned by teacher.
3. Expert groups meet to discuss the topic and decide on main points.
4. Learners regroup into home teams.
5. Experts take turns teaching content to home team members.
6. Learners are assessed on knowledge of total content.
7. Teacher and learner process Jigsaw activity.

Goals of Education

In the space provided, rank each of the following statements from 1 (most important) to 5 (least important) according to your personal priorities and belief system.

My priority ranking of the main purposes of education is as follows:

_____ 1. To develop students' ability to think clearly, to use intellectual reasoning to solve problems and to make rational decisions.

_____ 2. To nurture the individual child's unique potentials; to allow full development of their innate creativity and sensitivity, and to encourage personal integrity, love of learning, and self fulfillment.

_____ 3. To diagnose the learners' needs and abilities; to design instructional strategies which develop skills and competencies, and to produce trained people who are able to function efficiently in our ever changing and complex technological society.

_____ 4. To transmit to young people the basic knowledge, skills, traditions, academic concepts, and values necessary to interpret, participate in, and further the heritage and traditions of our country.

_____ 5. To create a future world condition of peace, harmony, equality and love; and to foster a new society with humans who can live together in balance with their environment and with each other.

Reference: Costa, Arthur and Garmston, Robert, The Art of Cognitive Coaching: Supervision for Intelligent Teaching, California State University, Sacramento, CA 95819, January 1985.

Curriculum for Social Reconstruction

Social reconstructionists see schooling as an agency of social change, and they demand that education be relevant both to the student's interests and to society's needs. Curriculum is conceived to be an active force having direct impact on the whole fabric of its human and social context. Social reform and responsibility to the future of society are primary.

The social view of schooling examines education and curriculum in terms of their relation to the social issues of the day. An approach in which social values, and often political positions, are clearly stated, social reconstructionism demands that schools recognize and respond to their role as a bridge between what is and what might be, between the real and the ideal. It is the traditional view of schooling as the bootstrap by which society can change itself.

The social reconstructionist foresees enormous changes in society and asks that curriculum provide the tools for individual survival in an unstable and changing world. The extreme reconstructionist view demands that individuals be better equipped to deal with change, and also that they be educated to intervene actively to shape the changes. While all sides of the social reconstruction orientation view curriculum as the means by which [illegible] to deal with social issues, one group tends to be more conservative, asking for survival tools, and the other group is more aggressively leadership conscious.

The social reconstructionist orientation to education is hardly new. The refrain runs through much of the history of educational reform, and it is a characteristic of Western society that schools, more than any other institution, are called upon to serve as an agent for social change.

Some of the names associated with social reconstructionism are Ivan Illich, Michael Scriven, Paulo Freire, and Alvin Toffler (Future Shock).

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

Curriculum as the Development of Cognitive Processes

The cognitive process orientation to curriculum seeks to develop a repertoire of cognitive skills that are applicable to a wide range of intellectual problems. In this view, subject matter, as typically defined, is considered instrumental to the development of intellectual abilities that can be used in areas other than those in which the processes were originally refined. For example, content in history or biology is considered less important than the development of the student's ability to infer, to speculate, to deduce, or to analyze. These abilities, it is argued, will endure long after the particular content or knowledge is forgotten or rendered obsolete by new knowledge.

This approach to curriculum is primarily concerned with the refinement of intellectual operations. It refers only rarely to curriculum content, focusing instead on the how rather than the what of education. Aiming to develop a sort of technology of the mind, it sees the central problem of curriculum as that of sharpening the intellectual processes and developing a set of cognitive skills that can be applied to learning virtually anything.

This approach is process oriented in two senses: it identifies the goals of schooling as providing a repertoire of essentially content-independent cognitive skills applicable to a variety of situations, and it is concerned with understanding the processes by which learning occurs in the classroom.

The cognitive processes approach does not deal with specific content. There is the belief that present-day education places too much emphasis on the learner's memorization of information. Those supporting this approach claim that the effect of the modern information explosion has been to outmode any type of education conceived on the basis of information needed to effectively master a single subject.

This orientation to curriculum focuses on the child and the learning processes, rather than on the broader social context. It aims to provide this student with a sort of intellectual autonomy that will enable him to make his own selections and interpretations of the situations encountered beyond the context of schooling.

Some names associated with this approach to learning are Maria Montessori, Jean Piaget, Hilda Taba, and Benjamin Bloom.

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

Curriculum for Self-Actualization

This orientation to education is strongly and deliberately value saturated. Schooling is seen as a means of personal fulfillment, and a context in which individuals discover and develop their unique identities. The function of curriculum is to provide personally satisfying experiences for each individual learner. This approach is child centered, autonomy and growth oriented, and education is seen as an enabling process that would provide the means to personal liberation and development.

This approach focuses sharply on content. Unlike the cognitive process or curriculum technology approaches, the concern is very much for what is taught in school. It conceptualizes education as a liberating force, a means of helping the individual discover things for himself or herself. Schooling is seen as a vital and potentially enriching experience in its own right, and content as present experience is a major focus of concern.

Unlike the more strictly process-oriented approaches, the self-actualizers assign to education a much grander task. They demand that schooling, through the curriculum, enter fully into the child's life. They assume that it can do so, their criticism being that it has always done so, but without acknowledging the responsibilities involved. They see education as a necessarily pervasive influence that has been handled inadequately and very stultifyingly. They demand that the curriculum become better orchestrated to fulfill its potential as a liberating process by providing integrated experience. As a stage in the life process, education would provide both content and tools for further self-discovery.

The self-actualizers share a passionate orientation to education. Their language is interwoven with the language of humanism, of existentialism, and of existential psychology. They make reference to "peak experiences" and "the whole child," "creativity," and "affect."

Some names commonly associated with the self-actualization movement in education are Abraham Maslow, Carl Rogers, and George Leonard.

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

Curriculum as Academic Rationalism

The major goal of academic rationalists as far as curriculum is concerned is to enable students to use and appreciate the ideas and works that constitute the various intellectual and artistic disciplines. Academic rationalists argue that ideas within the various disciplines have a distinctive structure and a distinctive set of contributions to make to the education of man. Indeed, acquisition of these structures is largely what education is about.

Academic rationalism is the most tradition-bound of the five orientations to the curriculum, and it also has the longest history. Those embracing this orientation tend to hold that, since schools cannot teach everything or even everything deemed worth knowing, their legitimate function is to cultivate the child's intellect by providing him with opportunities to acquire the most powerful products of man's intelligence. These products are found, for the most part, in the established disciplines.

To become educated means to be able to read and understand those works that the great disciplines have produced, a heritage that is at least as old as the beginnings of Greek civilization. The school's responsibility is to enable the young to share the intellectual fruits of those who have gone before, including not only the concepts, generalizations, and methods of the academic disciplines but also those works of art that have withstood the test of time.

To construct a curriculum that includes "practical" learning such as driver training, homemaking, and vocational education dilutes the quality of education and robs students of the opportunity to study those subjects that reflect man's enduring quest for meaning. The wise schoolmaster knows that not all subject matters are created equal, and he selects the content of his educational program with this principle in mind.

Academic rationalism is alive and well. Among its major proponents are Mortimer Adler (The Paideia Proposal) and Bill Honig.

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

Curriculum as Technology

The technological orientation to curriculum is concerned with the development of means to achieve prespecified ends. Those working from this orientation tend to view schooling as a complex system that can be analyzed into its constituent components. The problem for the educator or educational technologist is to bring the system under control so that the goals it seeks to attain can be achieved. This approach to schooling focuses on process. It is concerned with the how rather than the what of education.

The function of curriculum is essentially one of finding efficient means to a set of predefined, nonproblematic ends. As a process approach, curriculum technology differs from cognitive processes in its focus of attention. It is concerned not with the processes of knowing or learning, but with the technology by which knowledge is communicated and learning is facilitated. Making little or no reference to content, it is concerned with developing a technology of instruction. The focus is less on the learner or even on his relationship to material than on the more practical problem of efficiently packaging and presenting the material to him. A step removed both from the individuality of the learner and from the content which defines the curricular experience, the technologists claim to be developing a value-free system

Curriculum technologists see curriculum as an input to supply and demand systems. Their vocabulary is one of input, output, entry behavior, stimulus and reinforcement, and systems to "produce" learning.

The curriculum-technology approach rests on certain stable assumptions about the nature of learning: namely that learning does occur in certain systematic and predictable ways, and that it can be made more efficient if only a powerful method for controlling it can be perfected. The learner is seen neither as a problematic nor as a particularly dynamic element in the system. The real task of the educator arises in organizing the material sometime before the learner ever enters the classroom.

Some names commonly associated with this approach to learning are B. F. Skinner and Madeline Hunter.

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

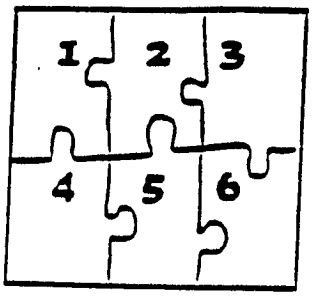
	Cognitive Processors	Self Actualizers	Technologies	Academic Rationalists	Social Reconstructionists
Sources of Goals	Intellectual skill Scientific method Problem solving	The self Individual student's needs Interests	Efficiency Maximum learning	Truths, classics Structure of the discipline	Problems of society now and future
View of the Learner	Problem solver Mind over matter	Within each person are potentials	Information processor Input-Output	Container/sponge to be filled	Social interacting
Educational Psychology	Cognitive Development Rationality	Humanistic Holistic Freudian	S/R Skinnerian Conditioning	Imitative	Egalitarianism Sociological
Organization of Materials	Problem focus Data sources	Multiple Individualized	Learning Activity Packages Modules	Basic texts Uniform	Newspapers Current events
Teaching Strategies	Inquiry Discovery	Self-directed learning Learning centers	Diagnosis/ Prescription Management System	Lecture Demonstration	Simulations Role playing Class meetings
Methods of Evaluation	Observation of performance in problem situation	Self-evaluation Autonomy	Entry/mastery level, pre and post testing	Content mastery Achievement Summative	Simulations Role playing Class meetings
Leaders in the Field	Suchman, Montessori, Piaget, Bloom, Taba, Bruner, Epstein, Feuerstein	Maslow, Combs, Leonard, Rogers, Samples, Shutes	Skinner, Tyler, Pavlov, Hull, Mager, Popham	Bestor, Rafferty, Rickover, Conant, M. Smith	Shaftel, Cremin, Hutchins, Toffler, Shane, Freiere, Whitehead, Ferguson
Vocabulary	Process Cognitive	Peak experience Whole Child Affective	IEP-MAR Mgt. by Objectives Technical Asst. Team	Conceptual theme Basics	21st Century Student Rights Survival/Consumer education

Adapted from Eisner and Vallance, Conflicting Conceptions of Curriculum. Berkeley: McCutchan Publishers, 1974.

JIGSAW

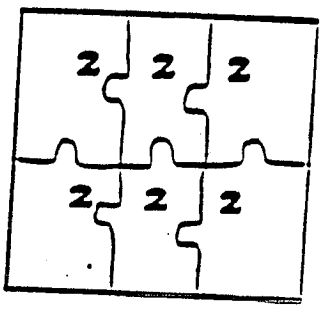
1. Articles to be read are selected according to topic of interest.

   Learners number off corresponding to the number of articles to be read. (If there are 5 articles, number 1 - 5.)



Home Group

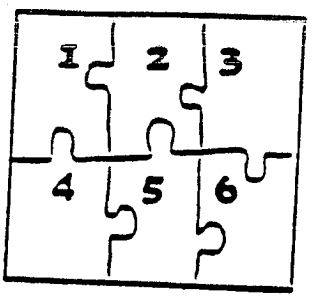
2. Learners who read the same article meet to discuss the article. They decide how to teach others what they have read.



Expert Group

3. Home groups reconvene. Each member teaches the others what he or she has read.

   Group members discuss the implications of the collective readings.



Home Group

Reflections on the Jigsaw:

SYNECTICS

Introductory Comments

Synectics is a model for teaching creativity developed by William Gordon and his associates. Gordon originally developed this teaching system to train engineers and scientists confronted with problems that did not respond well to conventional approaches. He later adapted this model to use in schools. Gordon uses metaphoric activity and analogy to cultivate emotional responses, break set, gain distance, and stimulate associations that are beyond the ordinary logical, problem solving processes.

In developing this model, Gordon made the following assumptions: (1) The process of creativity is not mysterious. You can identify the steps of creativity and teach them. (2) Creativity is necessary to many tasks and fields: science, engineering, the arts, writing, learning, and everyday life. (3) Group work and cooperation advances the acquisition and use of creative skills.

Steps

1. DESCRIPTION OF PRESENT CONDITION
   Teacher has students describe the situation as they see it now.
2. DIRECT ANALOGY
   Students generate direct analogies, and select to explore further.
3. PERSONAL ANALOGY
   Students become the analogy they selected in step 2.
4. COMPRESSED CONFLICT
   Students take descriptions from direct analogies and personal analogies, suggest several compressed conflicts, and choose one.
5. DIRECT ANALOGY
   Students generate and select another direct analogy, based on the compressed conflict.
6. REEXAMINATION OF THE ORIGINAL TASK
   Teacher has students reexamine the original situation or problem, using the entire synectics experience.

CONCEPT FORMATION

Introductory Comments

Concept formation is a teaching strategy developed by the late Hilda Taba. As a result of her research on student learning and thinking, Taba identified three inductive thinking tasks and then developed three teaching strategies corresponding to these tasks. These strategies are: (1) Concept Formation, (2) Interpretation of Data and Inference, and (3) Application of Principles.

Concept Formation requires students to collect and examine information, to organize it into concepts, and to learn to manipulate those concepts. The ability to form concepts is a fundamental thinking skill. Concept Formation is a particularly useful learning strategy in educating students since it helps them understand the nature of the concept. It is also beneficial to students who are required to learn and process large amounts of information.

Steps

1. Identify and label data.
2. Group the data according to some basic similarity.
3. Develop categories and labels for the groups.