DOCUMENT RESUME

ED 380 651 CE 068 604

AUTHOR Diller, Janelle; Moore, Rita
TITLE Learning to Learn. What's Your Working Style?
INSTITUTION Colorado State Community Coll. and Occupational Education System, Denver.; Pikes Peak Community Coll., Colorado Springs.
SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, DC. National Workplace Literacy Program.
PUB DATE 94
NOTE 155p.; For related documents, see CE 068 598-610.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Adult Basic Education; Behavioral Objectives; *Cognitive Style; Community Colleges; High School Equivalency Programs; Job Skills; Learning Activities; Learning Modules; *Learning Processes; *Literacy Education; Mathematical Applications; Metacognition; Problem Solving; Two Year Colleges
IDENTIFIERS *Workplace Literacy

ABSTRACT

This learning module is designed to enable participants from any workplace setting to identify their own learning styles and to raise awareness of how to work with other employees who have different learning styles. The module includes units for six class sessions. Each unit includes the following materials: rationale, learning objectives, curriculum notes and references for the instructor, course outline, introduction, evaluations, information sheets, problems to solve, transparency masters and pretests and posttests. The six sessions cover these topics: different learning styles, student assessment, problem solving through teamwork, methods of solving mathematical problems, reading and writing, and memory-building strategies. (KC)

LEARNING TO LEARN
What's your working style?

The Learning to Learn class is designed to enable participants from any workplace setting to identify their own learning styles and to raise awareness of how to work with other employees who have different learning styles.

Project Leader: Rita Moore

Lead Instructor: Janelle Diller

Administrative Assistant III: Cindy Blasingame

Authors: Janelle Diller and Rita Moore

Teachers: Janelle Diller, Janet Budzyna, Renee McLean, Lisa Travis

Colorado Community College and Occupational Education System
United States Department of Education
Corporate, Workforce, & Economic Development, a division of
Pikes Peak Community College
Current, Inc.

INTRODUCTION

The Workplace Classroom is a set of 11 curriculum modules created by workplace educators from Pikes Peak Community College in collaboration and partnership with employees of Current, Inc., a large greeting card company in Colorado Springs, Colorado. The partnership was formed through an 18-month federal workplace research and development grant from the United States Department of Education awarded to the Colorado Community College and Occupational Education System. Teachers in the project designed, developed and field-tested curricula and materials for the 11 basic skills courses through the process of identifying and understanding the culture of the workplace and the learning needs of the individuals working within it.

The Pikes Peak staff chose not to rely on ready-made materials or programmed texts with which to teach classes. Instead, teachers and curriculum specialists interviewed employees, created job profiles, developed customized assessments, and invited student participation in the development of class content. The result is a unique set of curriculum modules in learning to learn, reading, writing, communication, problem solving, English as a second language, math and algebra that reflect learning needs of real people in a large printing/manufacturing environment. These modules were designed as six week, two hour classes, but the learning rationale and intentions could easily be modified to accommodate longer or shorter sessions.

The idea of following a design process involving the active and continuous commitment and participation of the employee and the employer provides a fresh look at the development of curricula and instruction. The goal of this process is to develop a curriculum product that enhances the basic literacy skills of adults and increases critical thinking and problem solving skills that are easily transferred to occupational improvement. The Pikes Peak staff felt that the best way to reach this goal was to involve employees and employers in the many levels of curriculum development and design.

We believe that these curriculum products are genuine reflections of sound adult learning theory that says adults must have relevant learning experiences that build on prior knowledge and in some way advance positive change in their daily work lives. These modules were built through the active participation and assessment of the adult students for whom they were designed. Those of us who developed these products encourage other workplace educators to use them in part or as complete modules, keeping in mind that their very design welcomes the change and diversity that other workplace environments are sure to lend to them. We feel that the authenticity of our curricula will provide ideas and incentive to other teachers and curriculum specialists who are beginning new programs or are looking for ways of improving existing curricula.

Best of luck with any or all of the Workplace Literacy Modules.

Rita Moore

Rita Moore, Project Leader
Workplace Literacy Grant Pikes Peak Community College

"This course showed me that there are many ways to learn and that I can incorporate other learning styles into my own style".

--Learning to Learn Student

LEARNING TO LEARN: What's your working style?

Rationale:

Many times, people in workplace classes have been away from the formal classroom for a long time. In addition, they may also have a history of failure in their traditional learning experiences. They often lack not only basic skills, but learning strategies for improving those skills. Consequently, they venture back with a great deal of anxiety. Because of their poor learning experiences and their lack of basic skills, they lack the confidence and self-esteem they need to revisit the learning process. The Learning to Learn class offers them a chance to discover their learning potential, to build on their strengths, and improve their weaknesses. Central to the success of this class is a comfortable, non-threatening environment that offers opportunities for genuine success.

Rita Moore
Project Leader

Janelle Diller and Rita Moore
Author

LEARNING TO LEARN: What's your working style? SESSION I

"This class helped me to prepare for my return to school by giving me more confidence in my reading and writing skills."

— Learning to Learn Student

Rationale:

The first session lays the groundwork for recognizing different learning styles. The Learning Style Inventory (LSI) by David Kolb provides a fast and fairly reliable method of determining individual needs and styles. Students will quickly see that even those whose learning styles are similar to theirs will have different strengths and weaknesses. Ultimately, students should be encouraged to develop a more well-rounded style of learning, one that includes all four areas.

Learning Intentions:

- Participants will identify their personal learning styles.
- Participants will recognize strengths and weaknesses of various learning styles.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Administrative details (15 minutes)

A. Attendance and class roster
B. Participant data sheet
C. 4x6 cards
   - work extension
   - department name and number
   - work days and hours
   - home phone (optional)
   - personal information
D. Participant learner packet
E. Portfolio

II. Introduction (30 minutes)

A. Describe something you learned to do easily. Why was it easy to learn?

or

Describe something that you had difficulty learning. What made it difficult?

B. Participants introduce themselves by briefly sharing one of the above events.

C. Discuss the variety of learning experiences shared by the class, relating them to learning styles.

D. Use highlighters to identify visual, auditory, and kinesthetic characteristics that are typical of their learning needs and styles.

III. Learning-Style Inventory (LSI) (80 minutes)

A. OVERHEAD:
"Half of being smart is knowing what you're dumb at."
Explain the procedure and pass out inventory

- Take the LSI and score
- Discuss results, using flip-chart
- Divide into groups. Each group creates a toy using assorted pieces. Participants observe each other and how their learning styles affect how they work. Follow with discussion.

B. WRITE:
Describe your individual profile and respond to the accuracy of the results. In addition, describe a personal experience that supports or contradicts the findings.

IV. Evaluation (5 minutes)

A. DAILY JOURNAL:
Students record comments about the class, what they've learned and how they can use their new skills on the jobs.

CURRICULUM NOTES:

(The following notes are designed to elaborate on activities in the course outline).

I. **Administrative Details**

Pre-Evaluation: Every program will have some kind of record-keeping process. The procedures we've listed have worked for us. Daily attendance sheets and class rosters are kept. Students who complete four out of the six classes receive a certificate of completion at the end of the course. Participant data sheets are federal forms that information that provides a profile of the company. Four by six cards are used by instructors to collect information that will enable them to get in touch with a student outside of class or work if necessary. The participant learner packet contains a summary brochure about the program; who they may call if they have a question about scheduling, class content, etc., an explanation of the process for claiming classtime as work hours; a copy of an individual education plan, and a sample of the certificate they may receive upon class completion.

The portfolio is a folder with paper for journaling; daily evaluation sheets; and a place for students to collect their work for their own assessment and for the instructor's assessment of their work progress.

The pre-evaluation is really a form of self-assessment. Students are asked to list goals related to the course and assign numerical weight to them. At the end of the class the cards are re-examined for progress and students again assign numerical weights to their progress. (Please see attached assessment activity explanation). Students may also take a pre/post test. Administrative details at the end of the session.

Post evaluation is linked to the goal setting and assessment activity above and/or pre and post-evaluation instruments designed by teachers. The course evaluation (attached) and instructor evaluation (attached) are designed to guide the instructional team in making curriculum modifications as well as changes in teaching strategies.

II. **B and C. Introduction**

For the best discussion, encourage participants to think of a wide variety of their past learning experiences. Ideally, participants will share anecdotes from school, play, hobbies, work, athletics, parenting, and so on. As participants share their learning experiences, help them identify elements that are typical of the different learning styles. In addition, note other factors that affected their ease or difficulty of learning. For instance, how much were they affected by preconceived ideas, stress, teacher or peer attitudes, or desire to learn? By raising their awareness of how they and others have learned in the past, they'll be more receptive to the concept of different learning styles.

III. **A. Learning-Style Inventory**

To improve reliability of the LSI results, encourage participants to think of a typical learning experience. If they were to learn a new job or a new game, how would they like the information to come to them? Also, they shouldn't spend too much time thinking about or analyzing any of the statements, or they'll find all of them to be true. It's helpful to find the one most typical of their learning style, then the one that's least typical. The two middle ones should be easier to determine this way.

To make the LSI more understandable, we suggest using the following terms for the various categories:

Accommodator--Doer
Diverger--Observer
Assimilator--Thinker
Converger--Tinkerer

The toy activity works best if the groups have 4-6 people in each. Use toys like Legos, Tinker Toys, or a wide variety of materials that could be put together in a creative way. Hand out the "List of Characteristics" first and assign each person to casually observe another person as they create a toy. After the toy is built, participants should check off characteristics that apply to the observed person, highlighting the three or four characteristics that were most typical. Next, hand out the "Separated List of Characteristics." Participants should check the three or four characteristics that they identified from the first list. Does a pattern emerge? Does the pattern follow their identified learning style? Generally, participants are accurately identified in this activity. When the results indicate a different learning style than the LSI, it's helpful to explore as a group why this might have happened. Because it's something to play with, this activity sometimes gets the observers and thinkers more actively involved than they might ordinarily. Also, if a group doesn't have a good balance of learning styles (i.e., no Doers) other people take on the necessary roles. It's also worth discussing whether people responded in the way they were expected to respond. For instance, do the Observers feel like they have permission to sit back and watch the process, or do the Doers feel obligated to take charge and run the activity?

REFERENCES:

Kolb, David, and Donna M. Smith. *User's Guide for the Learning-style Inventory*. McBer & Company, 1986.

Class: _____

Date: _____

Instructor: _____

	Name	Dept. Number	S. S. Number
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			
31.			

SKILLS FOR A COMPETITIVE WORKFORCE
PARTICIPANT DATA SHEET

Please fill out the following information. Print or write clearly. This information will be used for demographic and statistical purposes only.

SECTION I (Identification)

Name:_____ Social Security Number: ___ - ___ - ____
Last Name, First Name Middle Initial

Street Address:_____ City:_____ Zip Code:_____

Phone Number: (___) ___ - ____

Department: _____ Position:_____

SECTION II (demographic information)

1. Yrs. with company (circle one): a. unemployed b. 0-5 c. 6-10 d. 11-15 e. over 16

2. Age: __ 3. Sex: M F

4. Ethnicity (circle one): a. White b. Black c. Hispanic d. American Indian/Alaska Native e. Asian/Pacific Islander f. Other

5. Single: Y N
Head of Household: Y N

6. Is English your second language? Y N

7. Participating in (circle one or more):
   a. Basic Skills Program
   b. GED Program
   c. ESL Program

SECTION III (outcome information)

Assesment Planning:

8. Course Title:_____ (check one: ___ Basic Skills, ___ GED, ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
9.	Test Higher on Basic Skills: _____				Y N
10.	Improved Communication Skills:				Y N
11.	Increased Productivity:				Y N
12.	Improved Work Attendance:				Y N
13.	Increased Self-Esteem:				Y N

14. Contact Hours: ___ ___ ___ ___

15. Course Title:_____ (check one: ___ Basic Skills, ___ GED, ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
16.	Test Higher on Basic Skills: _____				Y N
17.	Improved Communication Skills:				Y N
18.	Increased Productivity:				Y N
19.	Improved Work Attendance:				Y N
20.	Increased Self-Esteem:				Y N

21. Contact Hours: ___ ___ ___ ___

22. Course Title:_____ (check one: ___ Basic Skills, ___ GED, ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
23.	Test Higher on Basic Skills: _____				Y N
24.	Improved Communication Skills:				Y N
25.	Increased Productivity:				Y N
26.	Improved Work Attendance:				Y N
27.	Increased Self-Esteem:				Y N

28. Contact Hours: ___ ___ ___ ___

29. Course Title:_____ (check one: ___ Basic Skills, ___ GED, ___ ESL)

	Goals	Assessment Tool	Pre-Asses Results	Post-Asses Results	Improved
30.	Test Higher on Basic Skills: _____				Y N
31.	Improved Communication Skills:				Y N
32.	Increased Productivity:				Y N
33.	Improved Work Attendance:				Y N
34.	Increased Self-Esteem:				Y N

35. Contact Hours: ___ ___ ___ ___

EVALUATION

STUDENT DAILY LOG

NAME:

DATE:

CLASS:

1. What did you learn today? What did you find useful about the lesson? How was it interesting?

2. What did you find not necessarily useful, and what could have been done to improve the effectiveness of the lesson?

3. What other reactions do you have to the class, materials, discussion, etc.?

4. Are you comfortable with the material? Why or why not?

5. How have you used any of the information learned in previous classes?

STUDENT EVALUATION

Pre-Evaluation

Name: _____ **Date:** _____

Course: _____ **Instructor:** _____

GOALS	1 20%	2 40%	3 60%	4 80%	5 100%
I need to improve my communication skills.					
I need to improve my productivity.					
I need to improve my work attendance.					
I need to improve my self-esteem.					

List 4 goals related to the following that you want to improve in:

Communications: _____

_____

Reading: _____

_____

Writing: _____

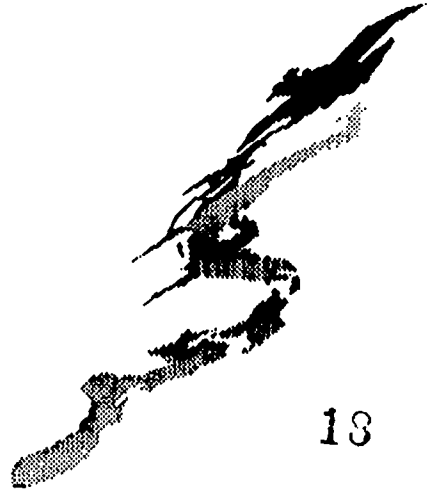
_____

Math: _____

_____

Rate yourself on a scale of 1-5 as to where you are with these goals. 1 would be the lowest and 5 would be the highest.

Half of being smart
is knowing
what you're dumb at.



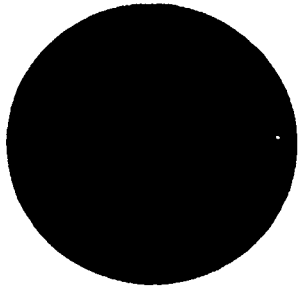
WRITE:

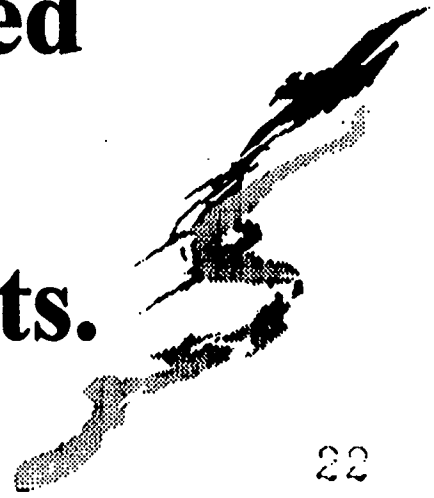
Describe something you learned to do easily. Why was it easy to learn?

<u>or</u>

Describe something you had difficulty learning. What made it difficult?

In times of change,
it is the learners
who will inherit the earth
while the learned
will find themselves
beautifully equipped
for a world
that no longer exists.





Characteristics of Learning Styles

People use their senses as they learn. Most people prefer to learn by watching or reading, listening, or touching. We refer to these three ways of learning--visual, auditory, and kinesthetic--as "Learning Modalities." Learning efficiency improves when all three are used together. To help you determine your own learning style, highlight the following characteristics that describe how you most like to learn.

Visual	Auditory	Kinesthetic
prefers to watch first, then do	prefers to have instructions given verbally	prefers to learn by doing
stays focused on the task	easily distracted	likes to be in motion
notices details	enjoys listening to books on tape	uses hands while talking
careful about appearance	hums or sings, often without realizing it	dresses for comfort
good speller	poor speller	poor speller
remembers faces	sometimes has trouble with written instruction	touches people when talking
quiet by nature	outgoing by nature	outgoing, often very expressive emotionally
good handwriting	enjoys talking	likes to try new things
organized, likes things neat	distracted by noises	touches people while talking
good at puzzles	likes rhythm	enjoys dramas
enjoys reading	likes to be read to	low interest in reading
memorizes by seeing	memorizes by hearing	memorizes by doing

LEARNING TO LEARN: What's your working style? SESSION II

"This course has helped encourage me to try to learn in every situation. How important it is to always listen."

--Learning to Learn Student

Rationale:

The assessment is a necessary process for determining skill levels. This is what allows accurate placement of participants into the various class levels. Without it, students may be placed into a level too difficult or too easy for them. Likewise, this prevents the instructor from having to bridge skill levels that are widely spread. It's important for participants to understand that the assessment is given primarily to help the program effectively meet individual needs, not to permanently identify students as incapable in a given area.

By using a Learning to Learn segment as an assessment time, participation is usually very good. Students often feel more comfortable taking the assessment as an ongoing class instead of a stand-alone session. This is due, at least in part, because they're able to ask questions and address anxieties in this setting better than if they've never met the instructor and are unclear about the purpose of the assessment.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Distribute Customized Assessments

Curriculum Notes:

Assessment design and delivery will vary with every program. The following are general observations about the assessment process that we've found to be helpful.

1. We strongly encourage, but do not require, participants to take all of the assessments. Some may know they're very strong in algebra and don't need or want another math class. Others may truly benefit from such a class personally, but their jobs don't require any math. If these individuals don't want a math class, our philosophy is that we won't require that they take it.

   Some people have serious test anxiety, so it's really important to stress to them that the assessment is for **our** benefit in placing them in the right class. We don't want to put them in Math I when they belong in Algebra. We will be using these scores only as an indicator; they won't show up in anyone's file and come back to haunt them later. Outside of the test-taker, the scorer, and the instructors, no one will have access to the scores.

2. Within the week, we follow the assessments with individual conference times that last about 15 minutes. We use the scores from the assessment to suggest appropriate classes for each participant. In addition to the assessment scores, we ask participants what their areas of need are. Often, participants already clearly know their areas of weakness, and they tend to self-select into the classes. The assessments allow us to raise the issue with them in a more focused way.

Sample Problems

1. The night shift is short-handed one week. As a way to stretch the personnel, they leave the most difficult job sheets for the day shift to do. The day shift begins to do the same thing for the night shift. Even when the night shift is fully staffed again, both shifts continue to leave the difficult jobs for the other shift. The leads for each shift have met several times to resolve this problem, but it keeps happening.

2. A co-worker always seems to be trying to butter up the supervisor, and it seems to be working. He gets away with longer breaks and easier tasks. Plus, the new vacation schedule just came out and, once again, he obviously had first choice.

3. Employees are having trouble filling out the production forms accurately. Most of the errors are simple arithmetic mistakes. To try to improve the accuracy, everyone was asked to take a math test and then a math class. Unfortunately, the problem continues.

4. A particular department seems to run short of materials and at the same time has a higher percentage of waste than it should.

5. An employee is taking computer classes at the local community college, even though the new skills don't directly affect his job. Other employees are annoyed because they're afraid he'll have an edge for keeping his job in the spring when there may be seasonal layoffs.

6. A customer service rep gives refunds to a high percentage of her callers. What other options does she have, and how can you help her think through those quickly on the phone?

7. Employees are having a hard time reading the job sheets. They spend a lot of time looking for the information, and they sometimes still don't get it right.

LEARNING TO LEARN: What's your working style? SESSION III

"I was challenged to rethink why I do things and why I need to try new things."

-- Learning to Learn Student

Rationale:

The session on problem solving provides a mini-overview of one successful problem solving strategy. Students begin with an exercise that nicely illustrates the benefits--and sometimes the pitfalls--of using teamwork to solve problems.

Learning Intentions:

- Participants will recognize the importance of teamwork in problem solving.
- Participants will be able to identify and use a problem solving strategy.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Review

A. OVERHEAD:
- "As people get older, they get hardening of the categories."
  --J. P. Guilford
- Briefly review terms and information from previous day.

B. WRITE:
- What strengths and weaknesses do you observe in your personal learning style? What can you do to compensate for the weaknesses? Capitalize on the strengths?

II. Teamwork and Problem Solving

A. OVERHEAD:

- "For every problem there is one solution which is simple, neat, and wrong."

--H.L. Mencken

B. Hand out NASA exercise. Do and discuss.

III. Explore a Problem Solving Strategy: Ready, Set, Go --But Don't Look Back.

A. READY: Identify and define the problem

- OVERHEAD
- Sometimes easy--Lost Ball problem

B. DISCUSS:

- What are some possible solutions? (Flood the ball out, use a nail on the end of a stick, etc.)
- Sometimes hard--Customer service calls are extra high this week.
- Why?

- OVERHEAD:
  - STEP 1: THINK
  - STEP 2: Brainstorm all of the problems, difficulties you can think of regarding the situation

- OVERHEAD:
  - Ask questions; just make sure they're the right questions

- Divide into groups and work through the following steps:

- OVERHEAD:
  - STEP 3: Determine what other information is needed
    Draw on prior knowledge
    Build new knowledge
    Observe, discuss, read

C. SET: Generate and explore solutions

- STEP 4:
  Look for patterns & relationships
  Use teamwork: share, challenge, & support each other's ideas and points of view
  Determine your goals in solving the problem

C. SET: Generate and explore solutions Continued:
What must you (or the company) have to be satisfied?
What could you live with?

- STEP 5: Select possible solutions

- OVERHEAD:
  - Select criteria to judge
  - Consider possible consequences

D. GO: Choose and implement the plan
- OVERHEAD
- STEP 6: Implement the plan and monitor progress

E. DON'T FORGET TO LOOK BACK: Review the process and outco me
- OVERHEAD:
- STEP 7:
  - Review your steps
  - Think about how you worked through the process to generalize and make it easier to reapply the process next time (METACOGNITION)

IV. Evaluation

A. Daily Journal

CURRICULUM NOTES:

(The following notes are designed to elaborate on the course outline).

II. **B. Teamwork and Problem Solving**

The NASA exercise beautifully illustrates the value of teamwork in problem solving. Begin by handing out the individual exercises and having participants complete them. Suggest that they find the most important item first, then the least important, then the second most important, then the second least important, and so on. This tends to be an easier way to rank items. Do not give participants any additional information about the moon; encourage them to work individually. When they've completed their worksheets, divide them into groups and have them work as a group to rank the 15 items. When they're done, give them the scoring sheet. Generally, group scores are better (sometimes considerably) than individual scores. On the rare occasions that individuals score much better than the group, it's good to have a follow-up discussion. Why did this happen? (Sometimes the person with the good score doesn't feel confident enough, or sometimes others in the group aren't good listeners. Sometimes a score is thrown off by one or two items that are way off, even though most of the answers are fairly close.)

III. **A. Explore a Problem Solving Strategy**

Many problems can be avoided altogether by thinking first, then acting. An example my students love is one told to me by a friend who worked in production at a heavy equipment manufacturing plant. One night, a bored co-worker was playing with a pneumatic drill that had a nut on the end of it. He looked for a place to screw the bolt onto and finally came up his finger. If he would have thought about this for even a minute, he probably would have recognized the foolishness of this. However, he didn't, and so now he had a nut stuck on his finger, which was now red and slightly swollen. This was bad enough, but to make matters worse, he panicked, and once again, he didn't think. Instead, he put the drill in reverse and unscrewed the nut. This time he shredded his finger.

III. **B. Discuss**

Too often in trying to solve problems, we tend to ask the wrong questions. To illustrate this, I like to use examples of patents that didn't succeed. *Absolutely Mad Inventions* by A.E. Brown and H. A. Jeffcott, Jr., has some marvelous examples. One particular one has a rather bizarre hat holder in the form of a metal frame that rests on the wearer's shoulders and holds the weight of the hat. The inventer certainly asked questions before he put this together. Unfortunately, he asked the wrong questions. Instead of asking how to hold up a heavy hat, the inventer should have been asking how he could invent a

III. **B. Discuss**

lighter hat or why women are expected to wear heavy hats. In addition, this particular solution actually creates even more serious problems: the wearer looks foolish, and she can't turn her head.

Real life examples are also helpful to use as illustrations. Most participants remember Michael Nesmith of the Monkees. His mother, a single parent who worked as a clerk, invented whiteout. We can assume she asked all the typical questions first: "How can I improve my typing; how can I make fewer mistakes." Finally, she thought to ask, "How can I fix my mistakes faster." She died with a multimillion dollar estate and probably never did bother to improve her typing.

When forming small groups, hand out sample problems appropriate to each group. Have each group choose a problem to work on, either from the list or one of their own choosing. After explaining each step, have the group practice, using the chosen problem.

III. **C. SET**

The solution grid nicely illustrates that not all solutions are created equal. Some of the solutions that appear best on the surface may be too costly, too slow, or too difficult to measure. By determining what criteria are most important, the best solution is often more easily determined. This is especially important in problem solving because it's tempting to choose pet solutions instead of the best solutions.

To use the solution-finding grid effectively, first select the five best solutions. Next, choose the five most important criteria. Rank order each solution with each criterion. Total the numbers in the last column. Theoretically, the best solution will emerge. Sometimes, it's important to give added weight to one criterion. For instance, if cost is by far the most important factor, that column's numbers could be doubled to reflect the impact of a solution's expense.

III. **E. Don't Forget to Look Back**

Metacognition (the process of thinking about how you think or do or know something) is an essential part of the problem solving process or any kind of learning. Encourage participants to think about what they did well, what they need to improve, or what they would do different next time.

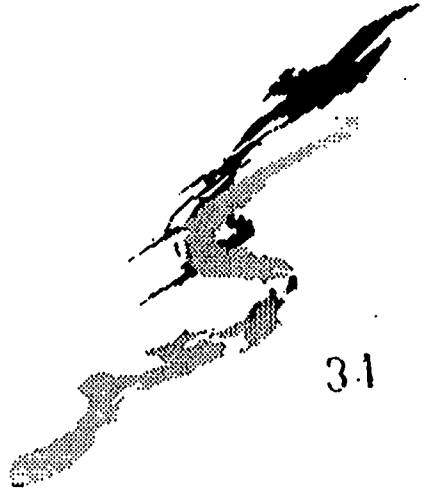
REFERENCES

Brown, A.E., and H.A. Jeffcott, Jr. *Absolutely Mad Inventions.* New York: Dover Publications, 1960.

Flack, Jerry D. *Inventing, Inventions, and Inventors.* Englewood: Teacher Ideas Press, 1989.

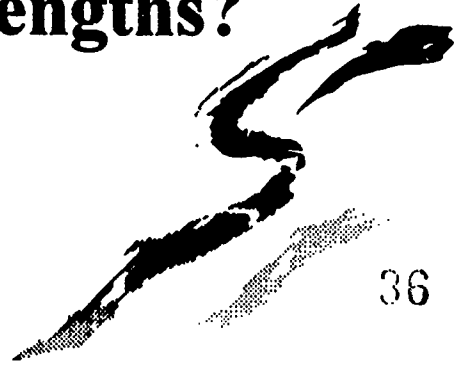
Kroehnert, Gary. *100 Training Games.* Sydney: McGraw-Hill, 1991.

As people get older, they get hardening of the categories.

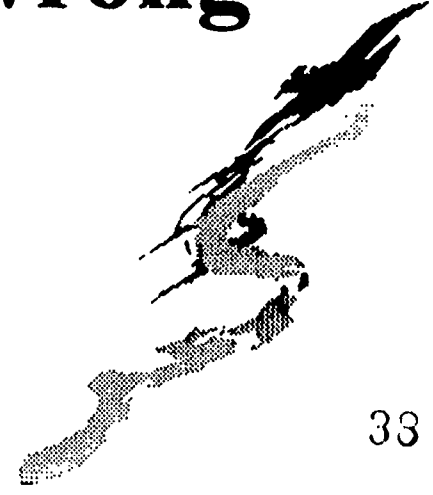


Write:

- What strengths and weaknesses do you observe in your personal learning style?
- How do these affect how you learn new tasks or work with others who are learning new tasks?
- What can you do to compensate for your weaknesses? Capitalize on your strengths?



For every problem
there is one solution
which is
simple, neat, and wrong



NASA EXERCISE INDIVIDUAL WORKSHEET

Instructions:

You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During landing, much of the equipment aboard was damaged, and, since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200-mile trip. Below are listed the fifteen items left intact and undamaged after landing. Your task is to rank order them in terms of their importance to your crew in allowing them to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important, and so on, through number 15, the least important.

_____Box of matches

_____Food Concentrate

_____50 feet of nylon rope

_____Parachute silk

_____Portable heating unit

_____Two .45 calibre pistols

_____One case dehydrated Pet milk

_____Two 100-lb. tanks of oxygen

_____Stellar map of the moon's constellation

_____Life raft

_____Magnetic compass

_____5 gallons of water

_____Signal flares

_____First-aid kit containing injection needles

_____Solar-powered FM receiver-transmitter

NASA EXERCISE GROUP WORKSHEET

Instructions:

This is an exercise in group decision making. Your group is to employ group consensus in reaching its decision. This means that the prediction for each of the fifteen survival items *must* be agreed upon by each group member before it becomes a part of the group decision. Consensus is difficult to reach. Therefore, not every ranking will meet with everyone's complete approval. Try, as a group, to make each ranking one with which all group members can at least partially agree. Here are some guides to use in reaching consensus:

1) Avoid arguing for your own individual judgments. Approach the task on the basis of logic.

2) Avoid changing your mind only in order to reach agreement and avoid conflict. Support only solutions with which you are able to agree somewhat, at least.

3) Avoid "conflict-reducing" techniques such as majority vote, averaging, or trading in reaching your decision.

4) View differences of opinion as helpful rather than as a hindrance in decision-making.

_____Box of matches

_____Food Concentrate

_____50 feet of nylon rope

_____Parachute silk

_____Portable heating unit

_____Two .45 calibre pistols

_____One case dehydrated Pet milk

_____Two 100-lb. tanks of oxygen

_____Stellar map of the moon's constellation

_____Life raft

_____Magnetic compass

_____5 gallons of water

_____Signal flares

_____First-aid kit containing injection needles

_____Solar-powered FM receiver-transmitter

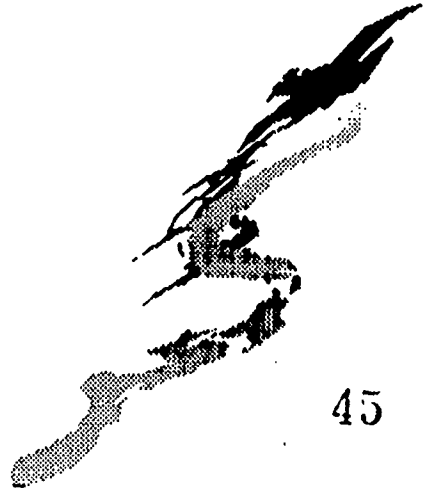
NASA EXERCISE ANSWER SHEET

Rationale:	*Correct Number:*	
No oxygen	15	Box of matches
Can live for some time without food	4	Food concentrate
For travel over rough terrain	6	50 feet of nylon rope
Carrying	5	Parachute silk
Lighted side of moon is hot	13	Portable heating unit
Some use for propulsion	11	Two .45 calibre pistols
Needs water to work	12	One case dehydrated Pet milk
No air on moon	1	Two 100-lb. tanks of oxygen
Needed for navigation	3	Stellar map (of moon's constellation)
Some value for shelter or carrying	9	Life raft
Moon's magnetic field is different from earth's	14	Magnetic compass
You can't live long without this	2	5 gallons of water
No oxygen	10	Signal flares
First-aid kit might be needed	7	First-aid kit containing injection needles
Communication but needles are useless	5	Solar-powered FM receiver-transmitter

READY:

IDENTIFY
AND
DEFINE
THE PROBLEM

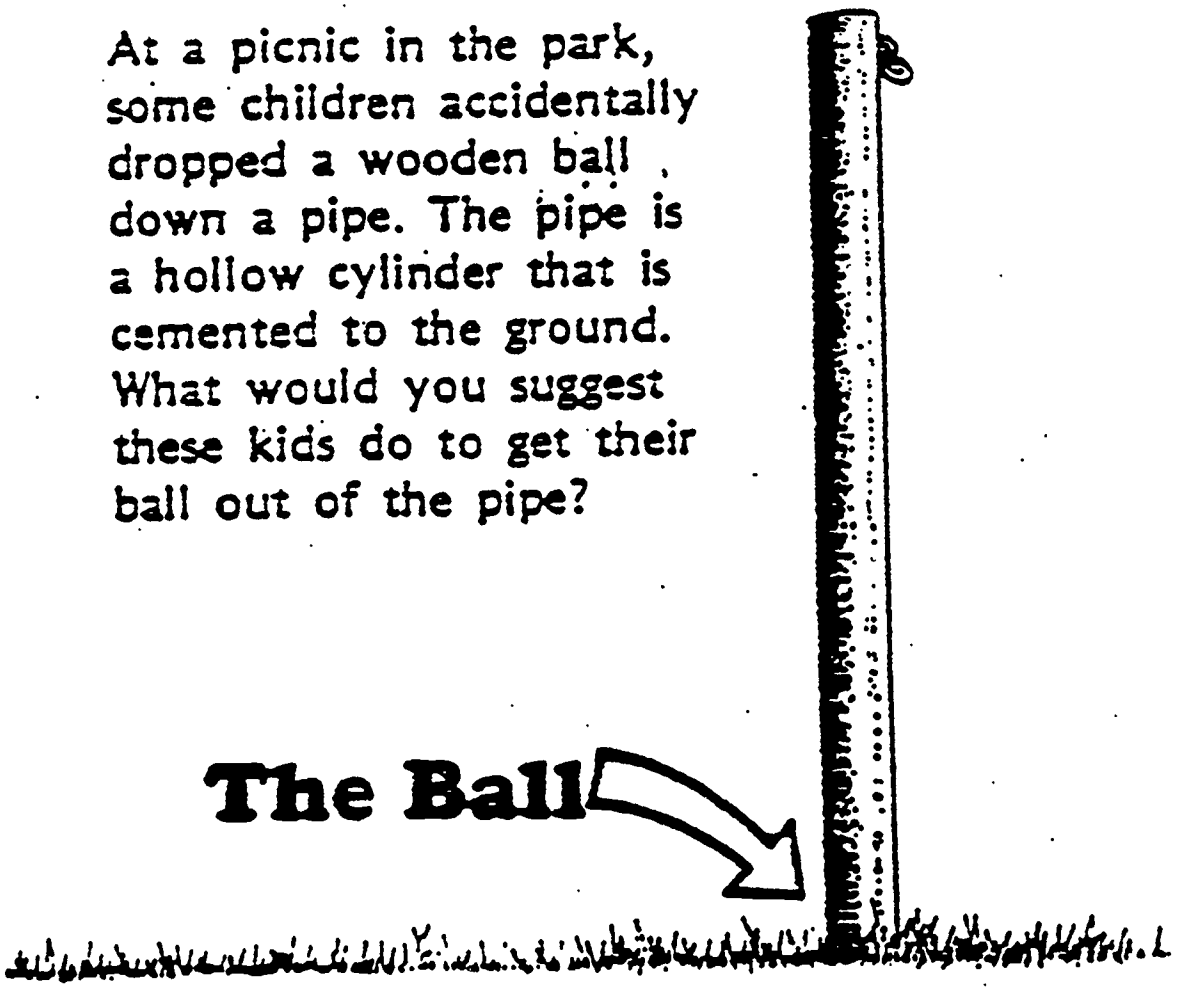
THINK



BRAINSTORM ALL OF THE PROBLEMS OR DIFFICULTIES YOU CAN THINK OF; ASK QUESTIONS!

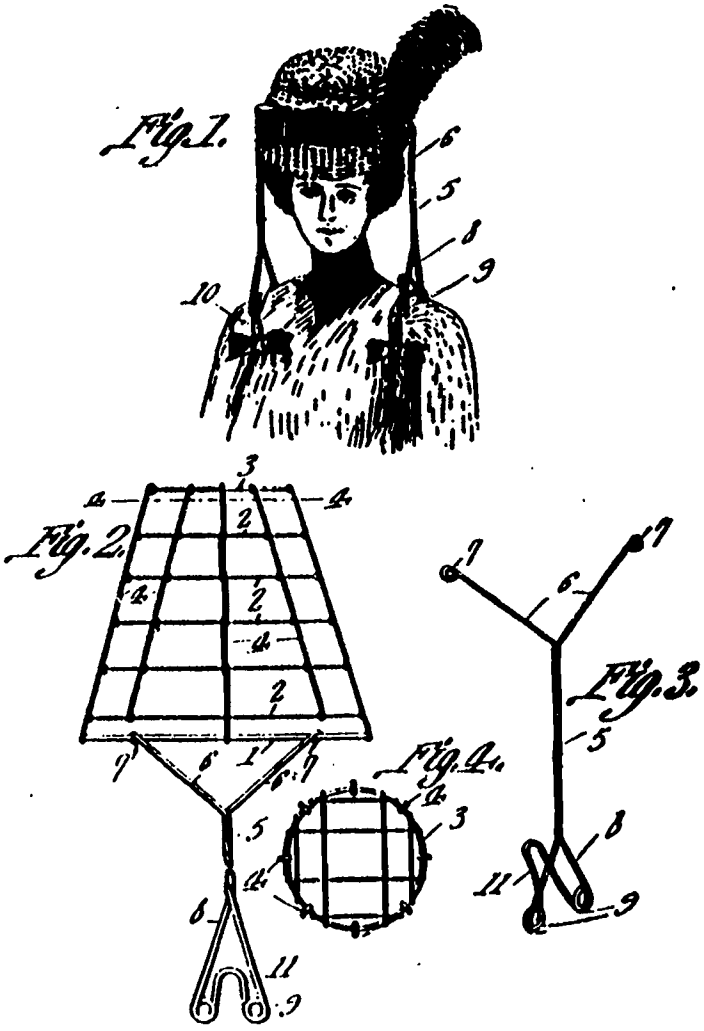
Lost Ball Problem

At a picnic in the park, some children accidentally dropped a wooden ball down a pipe. The pipe is a hollow cylinder that is cemented to the ground. What would you suggest these kids do to get their ball out of the pipe?



HAT.
APPLICATION FILED MAY 10, 1911.

1,045,060. Patented Nov. 19, 1912.



Hat without Headaches

UNITED STATES PATENT OFFICE

HAT

1,045,060 Specification of Letters Patent Patented Nov. 19, 1912
Application filed May 10, 1911. Serial No. 626,282

. . . The objects of the invention are, to provide a hat which will permit of free circulation of air entirely around and over the head of the wearer, thus to prevent headaches caused by the weight and close fitting of the ordinary hat; to allow free movements of the head of the wearer independently of the hat; to afford unobstructed exhibition of the ornamentation and trimming of the wearer's hair and of the hat; to remove all weight from the head and transfer it to the shoulders of the user; to render it possible to employ a hat of such size as to avoid the use of a parasol or umbrella, and yet not in any way inconvenience the user by an added weight of material; to adapt a hat to be constructed of any material desired, such, for instance, as waterproof fabric, whereby to extend the range of its usefulness; to construct the article in such manner as to render it at once light, cheap and durable; and in general, to furnish a novel and thoroughly practical article of head-wear. . . .

For storm use, a rubber bag or covering may be employed, which may be placed over the exterior of the hat, or the frame itself may be covered with a waterproof material and thus provide an effective shield against moisture. . . .

Fig. 5.3. From *Absolutely Mad Inventions* by A. E. Brown and H. A. Jeffcott, Jr., © 1970. Reprinted with permission from the publisher, Dover Publications, Mineola, N.Y.

What's the problem?

What is the *key* problem?

What's wrong?

Who is affected by this problem?

Where does it occur?

When does it happen?

How does it happen?

Why does it happen?

What happens as a result of this problem?

Why is that?

What could do that?

What are some possible causes of this problem?

What do you know already?

What's unknown?

Describe the problem

Give an example

Say it another way

Have you ever seen this problem before?

Is it similar to another problem you or a member of your team has already found a solution to?

What other information do you need?

- Draw on prior knowledge
- Build new knowledge
- Observe, discuss, read

SET:

GENERATE AND EXPLORE SOLUTIONS

SOLUTION FINDING

Brainstorm again

Look for patterns and relationships

Can you break the problem into smaller parts?

Do you have a clear picture of the outcome you're looking for?

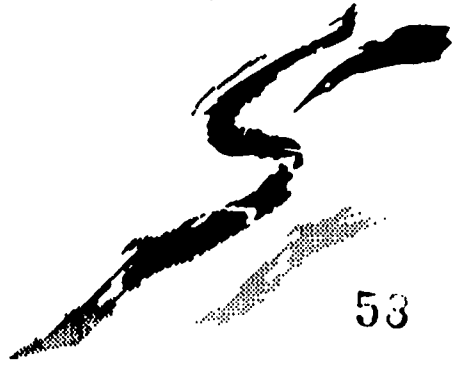
Can you work backwards from that goal--breaking the problem into parts and asking yourself questions along the way--to find a solution?

Go for quantity of ideas as well as quality

Piggyback ideas--let one idea trigger another

GO:

CHOOSE AND IMPLEMENT THE PLAN



POSSIBLE CRITERIA

Which proposed solution will be easiest to implement?

Which one will be the most economical to implement?

Which one will be the most popular with the personnel or constituency directly involved?

Which one is the most ethical?

Which one will be the most rapidly implemented?

Which one will be the most likely to work?

Which one will management like best?

Which one makes the best business sense?

Which one is the best use of money? Of time?

Will the solution work?

SOLUTION-FINDING GRID

Select the five possible solutions that you think are the most promising. List them on the left side of the grid. Then, rank each of the solutions according to each criterion. Do one criterion at a time, and when you have ranked each possible solution accordingly, move onto the next criterion. The top ranking possible solution should get a 5, the lowest a 1. After you have ranked each solution according to all the criteria, go back and add up the numbers for each possible solution. Record the sum in the column marked TOTAL. Use this information to decide upon your best solution.

POSSIBLE SOLUTIONS:	CRITERIA 1	2	3	4	5	TOTAL
1						
2						
3						
4						
5						

CRITERIA:

1. _____

2. _____

3. _____

4. _____

5. _____

IMPLEMENTING THE PLAN

Who will implement the plan?

When will it be implemented?

How will it be implemented?

Where will it be done?

Can you check to see if the solution is working while it's being implemented?

When the plan is in place, can you check its effectiveness?

Does it solve the problems it was intended to solve?

Does it create new problems that have to be addressed?

DON'T FORGET TO LOOK BACK

REVIEW
THE PROCESS
AND OUTCOME

METACOGNITION

What part of the process was most productive?

What part was least productive?

What should you do differently next time?

How did the solution finally come to you?

Can you apply part of this solution to another problem?

LEARNING TO LEARN: What's your working style? SESSION IV

"This course helped me when I changed positions in the company. I was able to learn quicker and remember more by knowing my learning style."

--Learning to Learn Student

Rationale:

Math tends to strike terror in the hearts of many students in workplace education programs. The purpose of this class is to reduce math anxiety by analyzing why students are afraid of it and to create awareness of how students use math successfully in their every day lives. In addition, students are taught a variety of simple techniques for speeding up their arithmetic. The basis for the structure of the entire lesson is that there is no one best way to do something mathematically, even though that is not what we were taught. This can lead to all kinds of discussion about experiences and things we learned as children that we now take for granted as gospel and have never shed new light on them or looked on the thinking in a new way. It is refreshing for instructor and student alike.

Learning Intentions:

- Participants will identify experiences that have contributed to their attitudes towards math.
- Participants will use math manipulatives to help them understand mathematical concepts.
- Participants will practice shortcuts for simple arithmetic.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. **REVIEW**

"All the really good ideas I ever had came to me while I was milking a cow."
--Grant Wood

DISCUSS: How did you apply problem solving this week?

II. INTRODUCTION TO MATH

A. WRITE and DISCUSS:
- Describe a time when math made no sense or was difficult.
- Share experiences

B. DISCUSS: Why do people have math anxiety?
- poorly taught
- to learn, you have to make lots of mistakes
- how were mistakes treated?
- anxiety often transferred from instructor
- creativity is discouraged
- math is taught to the thinker, not to the doer, tinkerer, or observer
- concrete learner is at a disadvantage (esp. doers)
- why do I need to know this?

People have a lot of reasons for fearing math.
Most of the time the problem was in the delivery, not the product.

III. MATH MANIPULATIVES

A. APPLICATION ACTIVITY: Hand out Cuisenairre Rods
- define 10
- create 10 in other ways

B. DISCUSS: How are these organized: What kinds of patterns do you use?
- sequentially
- randomly
- by color

Math is usually sequentially. What does this mean for people who prefer not to learn sequentially?

This goes back to your learning style. How do you like information to come to you?
- In steps?
- Do you want to know the end result first?
- How do you train someone?

C. APPLICATION ACTIVITY: Look at number patterns with the rods:
1 + 2 + 3 + 4 = ?
2 + 4 + 6 + 8 = ?
6 + 7 + 8 + 9 = ?

III. MATH MANIPULATIVES CONTINUED

D. DISCUSS:

- How are you thinking about this?
- Looking for patterns? Abstract ideas
- Using rods? Concrete, practical experience

E. APPLICATION ACTIVITY: Model writing:

5(2) = ? [5 2's]

2(3) + 2(2) = ?

- This is especially confusing because some math is written vertically, some horizontally.

F. APPLICATION ACTIVITY: Create numbers using rods:

14 Add 10's; add 1's; keep separate

<u>+23</u>

17 + 14 = trade in the 1's for a 10

- This can be confusing because of the language we use. We talk about *carrying* and *borrowing*, when in fact we're *trading*.

G. EXAMPLES:

26	14	25
<u>+ 14</u>	<u>+18</u>	<u>+19</u>

H. APPLICATION ACTIVITY:

- Handout worksheets for finding area in different ways
  Use the Cuisenairre rods to fill in the worksheet.

IV. MENTAL ARITHMETIC

DISCUSS: People bring a lot of experience to math that you didn't have in junior high.

- How do you count your money? (biggest denominations first)

APPLICATION ACTIVITY: Try adding in the same way. (left to right)

25	43	41	126	123	21
11	<u>36</u>	<u>35</u>	202	234	<u>73</u>
<u>32</u>	79	76	<u>131</u>	<u>412</u>	94
68 (60+8)			459	769	

IV. MENTAL ARITHMETIC Continued

APPLICATION ACTIVITY: Look for number patterns.

1	10	2	20	6	60
2	20	4	40	7	70
3	30	6	60	8	80
4	40	8	80	9	90
10	100	20	200	30	300

APPLICATION ACTIVITY: Use mental arithmetic with patterns

11	32	16	21	66	241
21	41	17	41	77	462
31	23	18	61	88	823
41	14	19	81	99	684
100	100	40	200	300	2000
4	10	30	4	30	200
104	110	70	204	330	10
				2210	

V. EVALUATION

A. Daily journal

Students record comments about the class and how they can use their new skills on the job.

CURRICULUM NOTES

II. INTRODUCTION TO MATH

Many adults approach math with anxiety and perhaps some distaste as a result of past failures and frustrations. It's possible that people have been taught a rote method of calculation because their elementary school teachers themselves had a lot of math anxiety and so were afraid to allow students to play with numbers and math concepts. Some of the concepts (fractions and division in particular) are presented too early for some people when they're not yet ready for the type of thinking required.

Whatever the reasons, many adults perform computation in a habituated and rote way, and these habits, even for people with excellent computational skills, are ones that they have long since thought about. People still may have foggy notions about place value as adults and may experience frustration with subtraction. Indeed, checkbooks may be the only form of mathematics some adults experience, and if this is an experience full of errors, coming to a math class at this point will feel immensely intimidating. Some people will expect "more of the same" in terms of methodology (practice with pencil and paper) since this is their only experience.

III. MATH MANIPULATIVES

In this lesson, addition is looked at in two new ways. Addition from left to right and modeling number theory using a manipulative called Cuisenairre rods are excellent corrective experiences for the math anxious and stimulating for the experts. These are used to teach concepts such as number magnitude, ration and proportion, addition and subtraction, and algebra.

The rods are used to model quality and can be tied in with the learning styles of the class. The tinkerers will jump right in and do the activity while the observers will watch them for awhile and the thinkers will ponder it a bit. Modeling addition with these is a wonderful low key reintroduction to the world of mathematics, and the instructor can make connections to algebra and to fractions if appropriate. The problem solving handout uses number facts and reasoning; it's interesting to have students see that there is no one right way to do this problem and that it will have several solutions.

IV. MENTAL ARITHMETIC

It's fun and important to surprise people with a new approach to the simplest of concepts, addition. Though an easy, new approach to addition, many of these past negative experiences can be neutralized and the learner can hopefully experience the excitement of understanding the old stuff for the first time.

IV. **MENTAL ARITHMETIC Continued:**

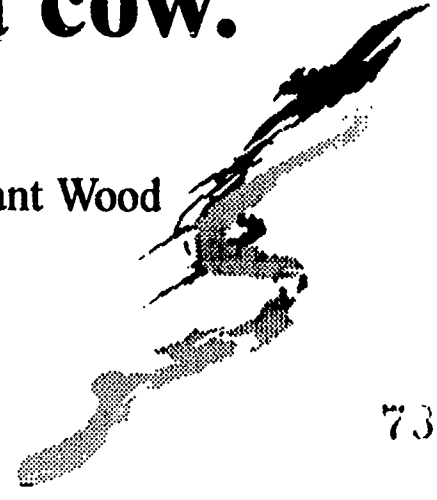
When adding from left to right, the learner must make place value foremost in thought or the technique has no meaning. This builds on the adult experience with money (we count the large bills first) and leads to an easy application to estimation. It encourages the student to refer to the digits by their correct names. A two in the hundred's place is not a two, it is a two hundred. Tied into the addition of special sums (1+2+3+4 and the others) computation can be done mentally and quickly. This may be the first real success a student experiences. It is empowering.

REFERENCES

Davidson, Patricia, and Robert Wilcutt. *From Here to There with Cuisenairre Rods: Area, Perimeter, and Volume*. New Rochelle: Cuisenairre Company of America, 1981.

All the really good ideas
I ever had
came to me
while I was milking a cow.

--Grant Wood

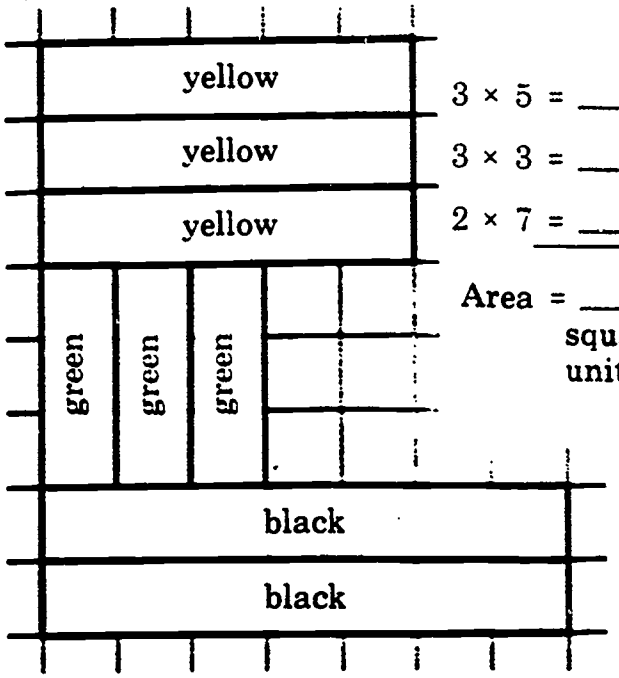


Describe a time when math made no sense or was difficult.

Finding Area in Different Ways

This design can be covered with rods in different ways. Place rods as shown below and compute the area. Check that you get the same value for the area of the design.
(Let ☐ = 1 square unit.)

1)



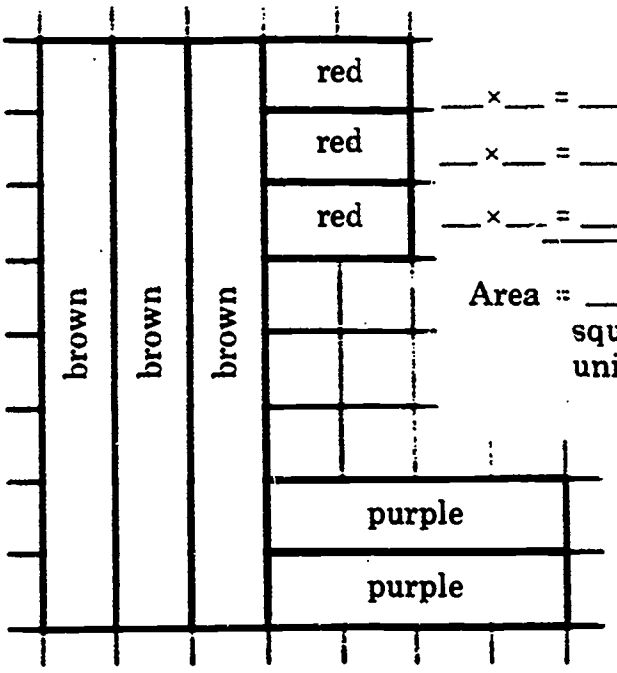
3 × 5 = ____

3 × 3 = ____

2 × 7 = ____

Area = ____ square units

2)



___ × ___ = ____

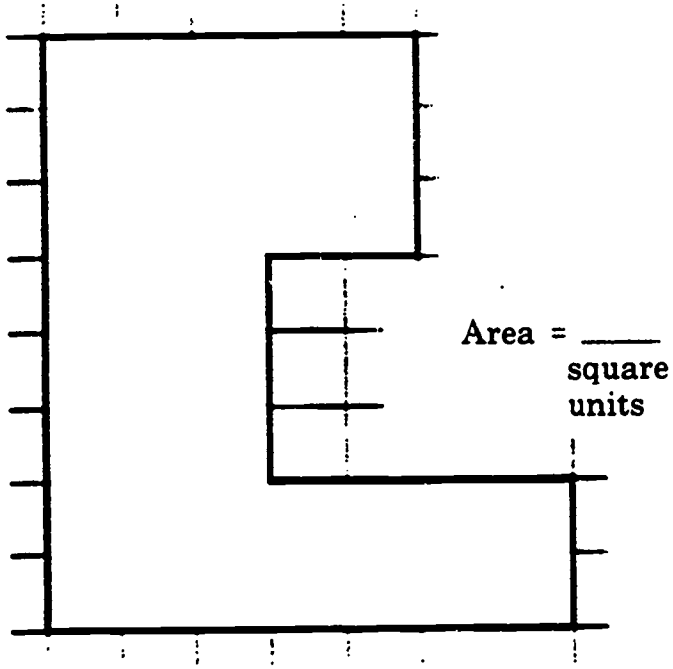
___ × ___ = ____

___ × ___ = ____

Area = ____ square units

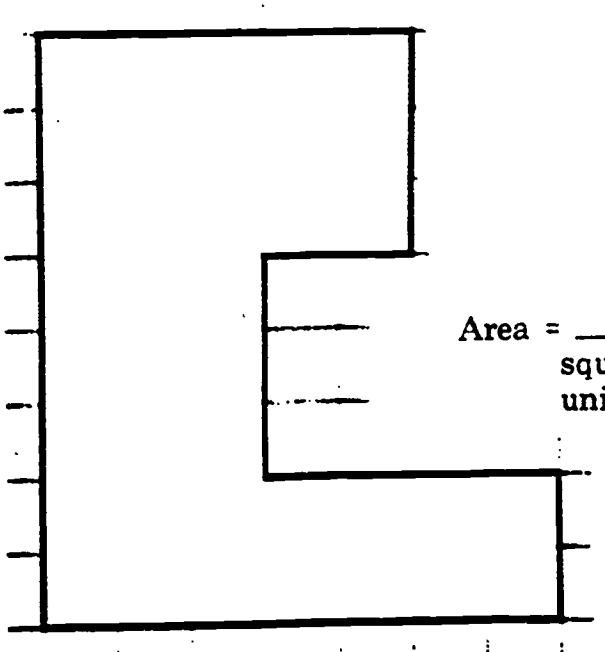
Now cover the design with rods in your own ways. Record the color names to show how you placed the rods on each design. Then compute the area.

3)



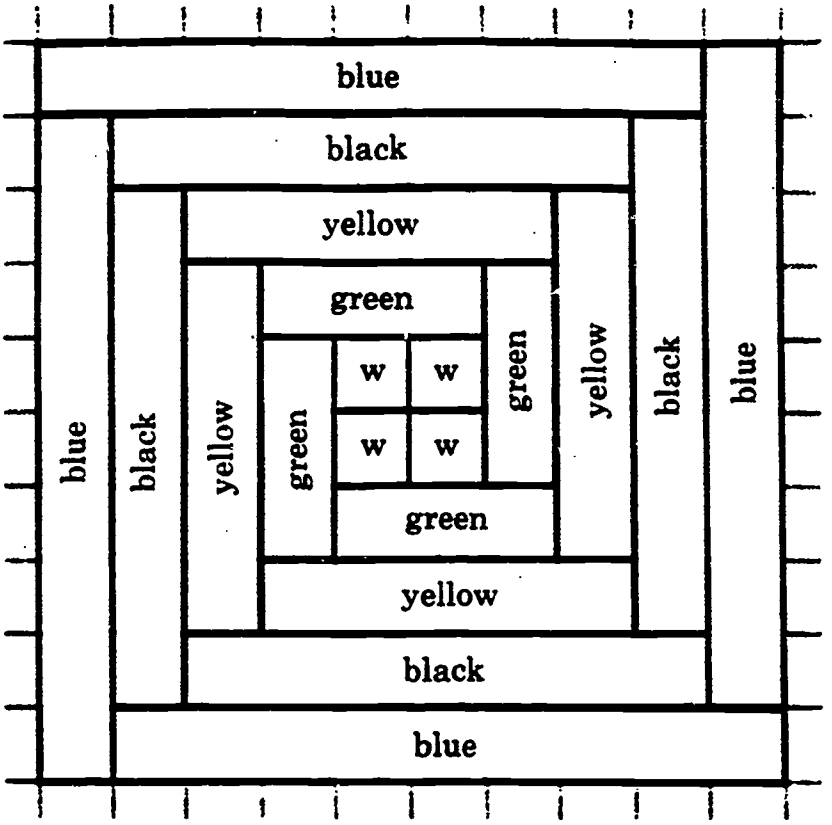
Area = ____ square units

4)



Area = ____ square units

Finding Area in Different Ways



1) Place rods as shown to form the square. Compute the area. (Let ☐ = 1 square unit.)

4 × 9 = ____

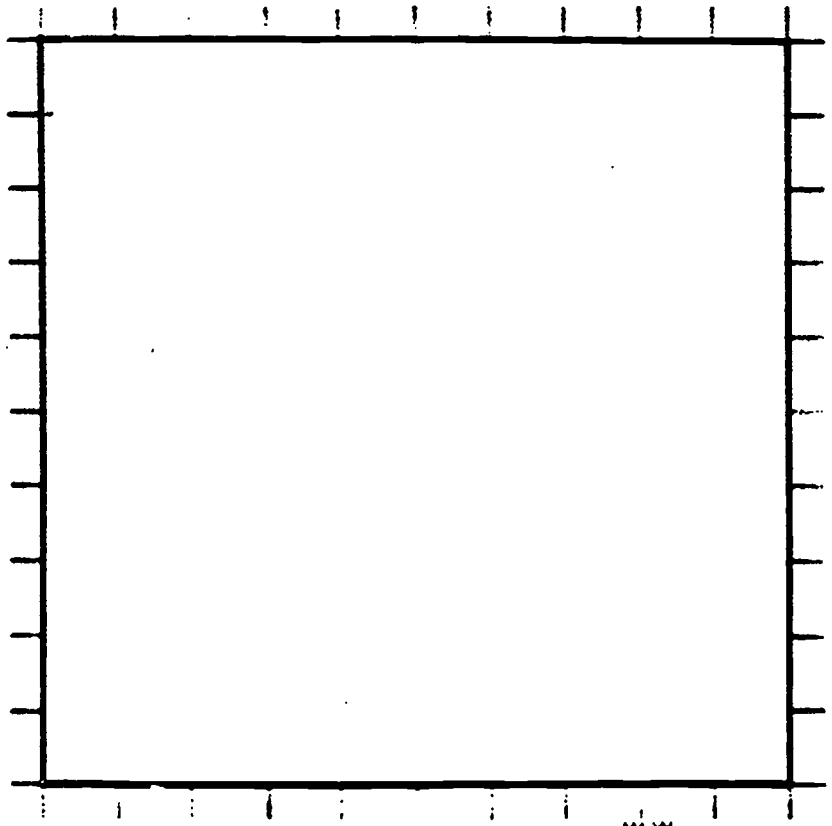
4 × 7 = ____

4 × ___ = ____

___ × ___ = ____

___ × ___ = ____

Area = ____
square units



2) Now cover the square with rods in your own way. Show your computation for the area.

___ × ___ = ____

___ × ___ = ____

___ × ___ = ____

___ × ___ = ____

___ × ___ = ____

Area = ____
square units

Check with your classmates that all the different ways result in the same value for the area.

ADDITION

25	43	41
11	34	35
32	12	22
68	89	98

126	123	211
202	234	342
131	412	105
459	769	658

ADDITION

44	32	24	38
35	61	74	41
79	93	98	79
438	116	342	213
201	241	321	421
160	132	214	314
799	489	877	948
730	142	634	161
140	703	222	103
129	153	133	121
999	998	989	385
234	323	320	206
121	241	321	171
322	114	342	311
677	678	983	688
412	524	121	114
211	343	141	223
316	121	212	431
939	988	474	768

NUMBER PATTERNS

1	10	100
2	20	200
3	30	300
4	40	400
10	100	1000

2	20	200
4	40	400
6	60	600
8	80	800
20	200	2000

6	60	600
7	70	700
8	80	800
9	90	900
30	300	3000

MENTAL ARITHMETIC WITH PATTERNS

11	32	16
21	41	17
31	23	18
41	14	19
100	100	40
4	10	30
104	110	70

21	66	241
41	77	462
61	88	823
81	99	684
200	300	2000
4	30	200
204	330	10
		2210

MENTAL ARITHMETIC

11	21	62	87
12	42	74	98
13	63	86	76
14	84	98	69
50	210	320	330

641	172	222	419
821	296	433	317
931	184	611	118
711	168	844	216
3104	500	2000	1000
	300	100	40
	20	10	30
	----	-----	-----
	820	2110	1070

697	244	414	168
878	426	346	429
769	668	132	346
986	882	228	287
3330	2220	1120	1000
			200
			30

			1230

LEARNING TO LEARN: What's your working style? SESSION V

"This class has made me more open-minded, ready to experiment, and less afraid of change."

---Learning to Learn Student

Rationale:

Recognizing the interconnectedness of reading and writing strengthens both areas. Good readers often take their skills for granted. Poor readers tend to assume the problems are always theirs, rather than understand that sometimes things are poorly written. By breaking down the process, students begin to understand how to improve their reading comprehension. They also are then able to recognize the importance of writng clearly for the reader.

Learning Intentions:

- Participants will recognize the importance of writing for the reader.
- Participants will be able to identify and explain schema and metacognition.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Review

A. DISCUSS:
- What did you learn from the math session?
- If you could choose a single word to describe how you felt about math before last week, what would it be? After last week's session?
- What is one thing you've already used?

II. Introduction to Reading and Writing

A. OVERHEAD:
One cannot foresee the world in which the child we educate will live."
--- John Dewey

II. Introduction to Reading and Writing Continued

B. WRITE and DISCUSS:
- How has the workplace changed from when your parents (or grandparents) were your age? In what ways might it change for your children or grandchildren?

C. BASIC SKILLS AND THE WORKFORCE OVERHEAD:
- 1990 survey of 1600 major companies indicate sthat:
  - 10% of the workforce has low-level skills or is non-literate
  - 30 % of the workforce is reading at a 4th or 5th grade level
  - 70% of the reading material in jobs nationally is written between 9th and 12th grade level

III. Dialectical Writing

A. Have students take notes--let them respond to their own notes as they write

IV. Building the Connection Between Reading and Writing

A. OVERHEAD:
- "Language is not just a single-purpose tool; it is an instrument that lets uses in many different ways--as both microscope and telescope, X-ray and radar."

--Ann Berthoff

B. OVERHEAD:
- Reading is a conversation between the writer and the reader
- It might be a simple conversation in which reading the words is enough to communicate the message:

C. OVERHEAD:
- I am the mother of two boys
- Or it might be a more complicated conversation in which the message may be confused or lost:

D. OVERHEADS:
- How we get to where we don't know we're going determines where we end up

D. OVERHEADS Continued:

- The classroom of tomorrow might focus more on drawing out existing abilities than on precisely measuring a student's success with imposed skills; encourage the personal construction of categories rather than impose existing categorical systems; and emphasize the individual, personal solutions of an environmental challenge--even if inefficient--more than the efficient group manipulation of symbols that merely represent the solution.

  --Educational Leadership

- Reading and writing are interwoven just like the warp (horizontal) and woof (vertical) of a fabric. If horizontal threads are missing, the fabric won't be as strong, and visa versa. If you understand that reading and writing are equally dependent on each other, then it follows that improving your reading skills improves your writing skills.

V. How do good readers read?

A. OVERHEAD:

- Reading is the easier place to begin because most of us are less afraid of it than of writing.
- The reader must expect the print to make sense

B. OVERHEAD:

- Atmospheric deposition of anthropogenetically delivered acidic substances devastates arborescence. (Acid rain kills trees)
  - concentrate (you can't attend to two things at once)
  - learn skills to level of automaticity

C. OVERHEADS:

- After everyone ate Tom and Mary cut the cake
  - good readers have to go back and start over.
  - appropriate punctuation would prevent this
- Good readers read what they think is is there, not what necessarily is there.

D. STUDY STRATEGY (overhead and handout)

- Before reading: Highlight Schema
- Worksheet 1: Interpret what you read (political cartoons)
- While reading: Explain Metacognition
  - hand out a sample article for participants to read
  - have participants briefly go through the "Before Reading" steps.
  - what do they predict the piece to be about?
  - what is their purpose for reading it?
  - what schema do they bring to the material?

D. STUDY STRATEGY Continued:

- As they read, participants should write in the margins as they predict, picture, relate, monitor and self-evaluate, and fix up
- After reading:
  - what would you do if you needed to remember the information? (Writing to Learn)
  - --- Web
  - --- List
  - --- Recall diagram (Handout)

VI. What must the writer remember to do for the reader?

A. Now that you have a sense about what a reader must do to understand the writer, what must a writer do to make the reader's job easier?

- have a clear purpose
- know who your audience is
- tie in to prior knowledge (good introduction)
- give visual clues (bullets, bold type, size, italics)
- organize your information so the reader can logically follow what you're saying
- create clear word pictures for the reader
- continue to relate the information to what the reader already knows
- write clearly and concisely, avoid jargon and unnecessarily complicated sentences

VII. Participants should go back to their notes and respond to questions they have about the reading process.

VIII. Evaluation

A. DAILY JOURNALS:

- Students record comments about the class, what they've learned and how they can use their new skills on the job.

CURRICULUM NOTES:

(The following notes are designed to elaborate on activities in the course outline).

I. Review

A t-review works well for a quick review. On the left side of the t, list the words participants use to describe how they felt about math before the previous session. On the right side, list the words they use to describe math after the session. This is an easy way to find out how the previous lesson impacted them and what questions they may still have.

III. Dialectical writing

Have participants take notes in the left hand column. When class is nearly over, have them go back and interact with the notes. (VII) What questions do they still have about material? What additional insights do they bring to their notes? What parts are most important?

Participants may want to take notes in a traditional way, or they may want to use mind-mapping, an example as illustrated by one participant is included.

IV. A. Overhead

The reader must expect print to make sense.

- If the material doesn't make sense, good readers go back and reread to try and make sense of it. When it gets too tough, readers tend to assume it's their fault, not the fault of the writer.

The reader must concentrate.

- Even when the reading is fairly simple, the reader has to give full attention to it. Even the comics require attention. A reader can watch TV and read at the same time, but will have to shift attention back and forth between the two, or won't remember or fully understand the reading material.

- This is the point where the reading process breaks down for most people. All readers, no matter how proficient, will sometimes "read" an entire page of print only to realize they can't remember a thing they've read. For more often, this reflects their level of concentration and not their ability to decode words.

The reader must learn skills to level of automaticity

- Beginning readers need to learn to automatically recognize letters, then words. Proficient readers need to automatically look for meaning. Without meaning, the reader is only "calling" the words, not understanding.

V. C. Overheads

Schema is the information the reader already knows. The greater the schema, the easier it is to read the material. This is true regardless of whether the reading material is a newspaper editorial, a textbook, or a magazine article. Activities such as the cartoon exercise illustrate this well. At the time this activity was being used, most participants could remember events surround the first and third cartoon. Many had difficulty understanding the middle one because they didn't have enough schema to bring to it.

V. D. Study Strategy

Metacognition is an important part of all learning, not just reading. In brief, meta means thinking. Cognition also means thinking, or knowing. Together they create the concept of thinking about how you think, or know, or do something. This process of analysis is important to improving anything you do. A good example of metacognition is driving. When first learning to drive, the novice has to consciously think of every detail--where the mirrors should be placed, how sensitive the accelerator and brake are, how weather affects the movement of the car. After driving many years and miles, however, the driver gets into the car and his or her mind goes on automatic pilot. It's only when a snow storm hits that the driver shifts back into a metacognitive awareness of driving. The same thing happens to good readers. As long as they're reading the comics or the Reader's Digest, they don't have to think about what they're doing. However, when they switch to technical materials or textbooks, they have to shift back to a metacognitive awareness of how to make better sense of what their reading. A brief explanation of these steps follows.

COGNITION:

Predict: Prediction takes place on many levels. It happens at the single word level. For instance, "Johnny fell into the l___." The reader can predict the word based on the fact that the story is about Johnny fishing in a lake. The reader is also predicting what may happen to Johnny based on the reader's prediction as to whether the story is funny, sad, or scary.

Picture: The reader needs to be making mental pictures of what he or she is reading. This is true for all types of material; the more difficult or technical, the more important it is to picture what is being read.

Relate: This is an additional part of activating schema. What does the reader already know about this subject? How can the reader connect to what the writer is saying?

V. D. **Study Strategy** Continued:

Monitor: Readers must be aware of whether or not what they are reading makes sense. For instance, using the first example, if readers are predicting "Johnny fell into the lake," and they read "Johnny fell into the lard," they should catch the mistake. Perhaps they read it wrong, but it's also possible their prediction needs to change. Maybe Johnny brought a tub of lard to the lake.

Fix-up: When readers catch their mistakes, they need to go back and fix them. They may need to simply reread the word. Or they may need to go back and reread the sentence or paragraph. Sometimes they need to continue reading in order to readjust their predictions as in the example above.

META:
Awareness: Readers need to understand that different material requires different speeds and levels of concentration. Simply being aware of the different steps will improve the application of these steps.

Understanding: Readers who have trouble reading must build skills where needed.

Regulating the Process: As the reading material becomes more difficult, the reader needs to concentrate on the part of the reading process that will help the most.

It's somewhat of a challenge to choose an appropriate article or essay for participants to read. It needs to be a high interest piece that will not be too difficult or too easy for the majority of the participants. Ideally, it should be typical of what participants might read at work. Realistically, though, this might not be interesting enough. Try newspaper editorials or articles, company newsletter items, memos, or short essays.

I show participants an example of what my work looks like after I've read the material. I stress that theirs will look very different from mine because my schema of the material is different from theirs.

VI. **What Must the Writer Remember to Do for the Reader?**
Once the participants better understand the reader's job, they can begin to understand how important the writer's job is. As much as possible, I try to get them to think of the things the writer needs to do to make it easier for the reader. I fill in whatever gaps are left in the class discussion.

REFERENCES:

Smith, Brenda D. *Bridging the Gap*. New York: HarperCollins College

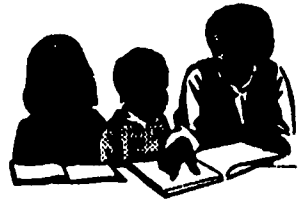
Date:

Reading:

Notes:

Comments:

One cannot foresee the world in which the child we educate will live.

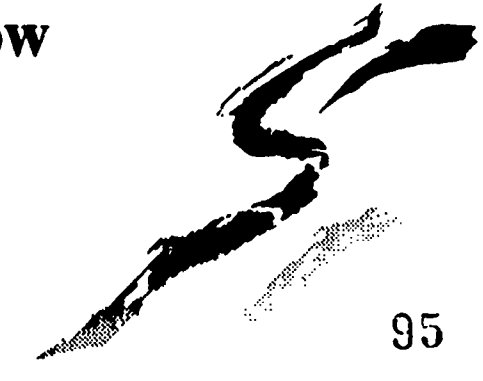


WRITE:

How has the work place changed from when your parents were your age?

In what ways might it change for your children or grandchildren?

(Think about skills needed and tools used. What kind of facility did/will they work in? How did/will they relate to their peers and supervisors? What kinds of decisions were/will be made, and how were/will they be made?)



Basic Skills and the Workforce

- One out of five (27 million) American adults cannot read well enough to function in everyday life or in the workplace.

- Another 30% (45 million) of the adults in America are only marginally competent in their basic skills.

- A 1990 survey of 1600 major companies indicate that:
  - 10% of the workforce has low-level skills or is non-literate
  - 30% of the workforce is reading at a 4th or 5th grade level
  - 70% of the reading material in jobs nationally is written between a 9th and 12th grade level

- Estimates of literacy among the unemployed indicate that 3/4ths are functionally illiterate

- The labor pool is increasingly characterized by workers whose first language is not English

Language is not just a single-purpose tool; it is an instrument that lets us see in many different ways-- as both microscope and telescope, X-ray and radar.

--Ann Berthoff

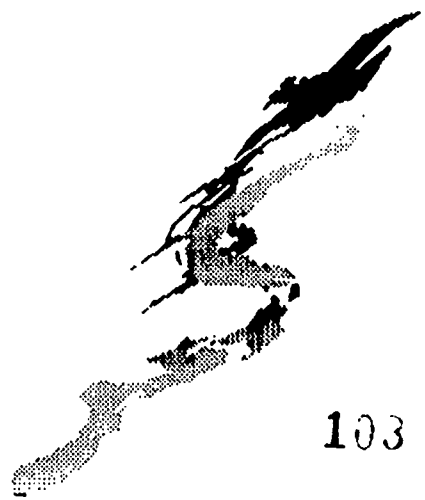
READING _____ WRITING

The reader asks, "What do I need to know?"

The writer asks, "What do I want the reader to learn?"

I am the mother of two boys.

How we get to where we don't know we're going determines where we end up.



The classroom of tomorrow might focus more on drawing out existing abilities than on precisely measuring a student's success with imposed skills; encourage the personal construction of categories rather than impose existing categorical systems; and emphasize the individual, personal solutions of an environmental challenge--even if inefficient--more than the efficient group manipulation of symbols that merely represent the solution.

--Educational Leadership

THE READER MUST

1. EXPECT THE PRINT TO MAKE SENSE

2. CONCENTRATE: YOU CAN'T ATTEND TO TWO THINGS AT THE SAME TIME
   - A. EXTERNAL DISTRACTIONS
   - B. INTERNAL DISTRACTIONS

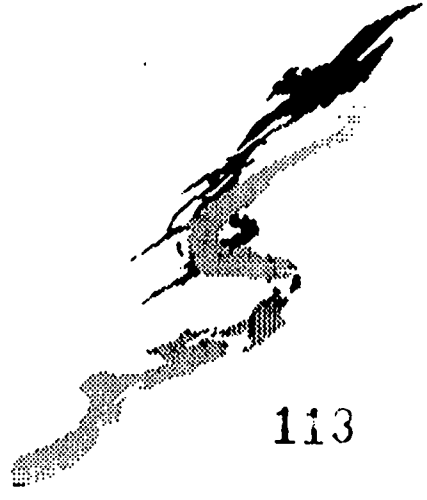
3. LEARN SKILLS TO LEVEL OF AUTOMATICITY

Atmospheric deposition of anthropogenetically delivered acidic substances devastates arborescence.

(Acid rain kills trees.)

While we were eating rattlesnakes crawled into our tent.

Good readers read
what they think is
is there, not necessarily
what <u>is</u> there.



STUDY STRATEGY

BEFORE READING

STAGE 1
PREVIEW

- Predict
- Question
- Establish Purpose
- Activate Schema

WHILE READING

STAGE 2
INTEGRATE KNOWLEDGE

- Predict
- Picture
- Relate
- Monitor and Self-Test
- Fix Up

AFTER READING

STAGE 3
RECALL

- Review
- Select
- Relate
- Recite
- Organize
- Repeat
- Test

BEFORE READING:

What do you already know?
What do you need to know?
How do you go about finding it out?

PREDICT:
Scan the material for an overview of the information.
Look at the title, introductory material, subheadings, italics, boldface print, numbers, and conclusion.
What do you expect this to be about?
How detailed will the information be?
How is the information organized?

ESTABLISH THE PURPOSE:
Why are you reading this?
What do you need to learn?

ACTIVATE YOUR SCHEMA:
What do you already know about this topic or a realted topic?

QUESTION:
Write a question based on your overview.
Write questions from headings, sub-headings, and illustrations.
Guess at answers to your questions.

INTERPRET WHAT YOU READ

Political cartoonists rely on a reader's prior knowledge of current news events to understand the main ideas in their cartoons. As you study the words, pictures, and symbols in a cartoon, you should interpret the cartoonist's message, incorporating your prior knowledge.

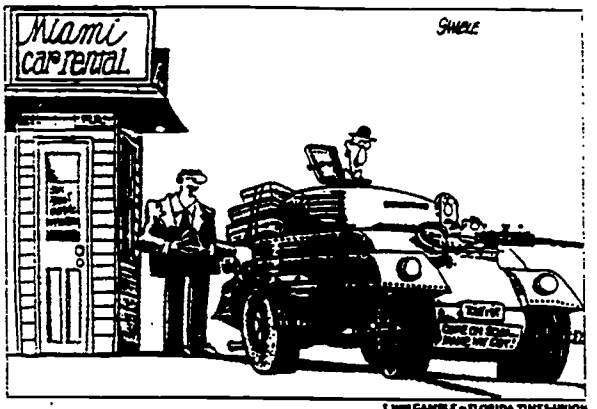
Study the following *Newsweek* cartoons. Answer these questions as you interpret each one:

1. **What prior knowledge must you recall in order to understand the cartoonist's message?**
2. **What is the main idea of the cartoon?**
3. **What other information is triggered by the cartoon?**

CARTOON A

1. Tourists have been murdered in Miami; they've been recognized as easy marks because they're driving rental cars.
2. It's not safe to go to Miami on vacation.
3. My own memories of being a tourist in Florida; times when I've been a tourist in other places and haven't been safe; Colorado Springs is a tourist town; what would happen if safety became an issue here?

Sept. 27, 1993



'Forget about the gas mileage and think about the safety!'

CARTOON B

1.

2.

3.

October 11, 1993

CARTOON C

1.

2.

3.

October 11, 1993

You have to expect some cutbacks with the climate...

WHILE READING:

PREDICT:

Develop hypotheses about the material.
Is this what you thought the material would be about?
What will the next section be about?

PICTURE:

Create a picture in your mind of what you're reading.
Does it fit with what the text is saying and you have predicted?

RELATE:

How does this new information relate to what I already know about this subject?

MONITOR AND SELF-EVALUATION:

Read for answers; underline key words and phrases of these answers.
Revise your questions if your reading shows that you need to make changes.
Talk out a confusing point.
Clarify points.

FIX UP:

Correct your lagging comprehension.

- Reread
- Read further ahead to see if it makes more sense.
- Change your predictions
- Use the dictionary for words you don't understand

METACOGNITION

COGNITION:

- PREDICT
- PICTURE
- RELATE
- MONITOR
- FIX UP

META:

- AWARENESS
- UNDERSTANDING
- REGULATING THE PROCESS

AFTER READING:

REVIEW:

Review material periodically to keep it fresh.
Make sure you really understand the material.

SELECT:

Select only the most important things to review and remember.

RELATE:

Connect what you've learned into your schema.
Keep adding and expanding your schema.

RECITE:

Do this either in your head or on paper.
Make a list of the main points and specific details you need to remember.
How are they connected?
Again, what do you already know that's related to this?

ORGANIZE:

Use a recall diagram.

REPEAT:

Repeat the steps above as needed until the information is firmly connected to your schema.

RECALL DIAGRAM

(Topic)_____

(Significant Details) _____

_____

_____

(related idea) _____

A scrupulous writer,
in every sentence that he writes,
will ask himself at least four questions, thus:

- ✓ **What am I trying to say?**
- ✓ **What words will express it?**
- ✓ **What image or idiom will make it clearer?**
- ✓ **Is this image fresh enough to have an effect?**

And he will probably ask himself two more:

- ✓ **Could I put it more shortly?**
- ✓ **Have I said anything that is avoidably ugly?**

--George Orwell

LEARNING TO LEARN: What's your working style? SESSION VI

"I can transfer many of these skills to help my 14 year-old son with his school work."
--- Learn to Learn Student

Rationale:

Most people feel frustrated that they can't remember things, often equating a poor memory with an inability to learn. By looking at what causes a poor memory as well as learning several memory strategies, students gain ways to improve their ability to learn and remember new skills and information.

Learning Intentions:

- Participants will be able to identify elements that lead to a poor memory.
- Participants will be able to use the Locus Memory System and the Chaining Memory System.
- Participants will be able to use a neurolinguistic method to improve their spelling.

Curriculum Notes:

- Curriculum notes and references follow course outline.

Course Outline:

I. Review

A. Hand out review sheet for students to complete.

II. How does memory work?

A. WRITE: How do you remember the following things:
- How to get to work?
- What the word "work" means?
- How to do your job?
- What your social security number is?
- What the name of your supervisor is?
- Where you parked your car?

III. Improving memory

A. OVERHEAD:
- "There is no such thing as a poor memory! There are only trained and untrained memories." Harry Lorayne

B. OVERHEAD:
- First, look at the factors that influence forgetting:

C. OVERHEAD
- Disuse (foreign languages, multiplication tables, much of what we learned in school)
- Interference
  - Retroactive Inhibition (new learning interferes with material previously learned) most evident with 4-5 year olds
  - Proactive Inhibition ("wrong" previously learned material interferes with new learning) Driving habits, names, misspelled words
- Repression/ Overlooking or forgetting things we do not like
  - We tend to forget things that do not fit our own personal expectations or experiences (That's why Democrats and Republicans can come from the same family.)
  - We tend to forget unpleasant things or those we feel negative about (thankgoodness!)
  - We often "edit" out or forget things that are not acceptable to us (Two versions of the same argument or accident.).

D. Under learning/Forgetting because of inadequate learning.
- From studying passively rather than actively (Don't just read the material, interact with it)
- From failing to find meaning in the material (You have to understand it to efficiently memorize it!)
- From poor concentration

- Overheads on overlearning

IV. MEMORY STRATEGIES

A. OVERHEAD
- "When you put a large roast in the oven, put a small one in at the same time; when you smell the small one burning, you'll be reminded that the large one is ready."

--Gracie Allen

IV. MEMORY STRATEGIES Continued:

A. OVERHEAD Continued:

- All of the above memory items (in the WRITE exercise) must be fit into a schema. Sometimes the schema must change every day (where you parked your car); sometimes it changes gradually (how to do your job); and sometimes it never -- or rarely -- changes (What your social security number is).

- Something is easier to memorize if you can put it into a meaningful framework:
  ropes, lights, canvas, bell
  (Think of items in a boxing ring.)

  - Do the four lists of letters

B. Mnemonic devices (i before e except after c; Brad is older than Brian)

C. Write to learn (Example of lists; reading/writing segment)

D. Locus Memory System

E. Chaining Memory System

V. Memory Tips

A. OVERHEAD

VI. Memorizing New Vocabulary

A. Look for new words as you read and listen. Try to determine their meaning from context rather than run for a dictionary. To memorize the word:

- Associate words in phrases--never in isolation, e.g. one meaning of jib means an animal that stops short, balks, or shies

  "The tired horse suddenly jibbed when the rattlesnake slithered onto the trail."

B. Associate words in images as in the example above

C. Associate words in families:
prefixes, roots, and suffixes: omni means all--omnivore is an animal that eats vegetables and animals.
So what do omnipotent, omnidirectional, and omnipresence mean?

VI. Memorizing New Vocabulary Continued

D. Seek reinforcement--look and listen for your new words; you'll be amazed at all the places you find them.

VII. Improving Spelling

A. Use neurolinguistic spelling to teach a commonly misspelled word.

VIII. Evaluation

A. DAILY JOURNALS:
- Students record comments about the class, what they've learned and how they can use their new skills on the job.

IV. Administrative Details

A. Post-evaluation
B. Course Evaluation
C. Instructor Evaluation
D. Certificates

CURRICULUM NOTES:

(The following notes elaborate on the activities in the course outline).

IV. A. Do the four lists of letters

Put List 1 on the overhead and allow participants 20-30 seconds to memorize the letters. A few will remember as many as 3 sets. A rare individual may remember 4. Most, however, won't be able to remember more than 1 set. Put the following lists on the overhead one at a time, allowing the same amount for each. As students study them, it will become clearer and clearer how helpful it is to put material into a meaningful framework to learn and memorize.

IV. E. Locus Memory System

Use one of the lists of 12 words provided.

The Locus (or Loci) memory system works best with vivid, distinct items to remember. Obviously, nouns like petunia, cigar, and pizza are much easier to remember than a list of relative pronouns such as that, which, and those.

To teach this effectively, have participants practice this without writing any of the words down. Writing would further improve the system, but participants need to believe first they can memorize a list of disconnected words. Announce or write each word on the board, leaving about fifteen to twenty seconds between each item for them to develop a vivid image. When the full list has been given, erase the list and ask them to write as many as they can remember. A surprising number will remember the full list, nearly everyone will be able to recall at least 75%. To improve their chances, encourage them to picture the items in really bizarre places. For instance, petunia is more easily remembered if thousands of them are pictured wildly entwined in the couch, loveseat, and drapes in the living room, than if one is pictured in a flower pot by the front door. The more senses that can be involved, the more likely the image will be remembered. What would the fried chicken smell like, especially if it's knee-deep in the dining room?

I.V. F. Chaining Memory System

Use the second list of 12 words.

The Chaining System works much like the Locus system except that items are chained, or linked, together instead put somewhere. Again, the more vivid the image, the more likely they'll be remembered. For instance, a pizza with a robin pecking at the cheese and surrounded by still smoking cigar butts is graphic enough to be remembered.

You'll probably find that participants do better with one system than the other.

VII. Improving Spelling

Choose a word that's commonly misspelled such as accommodate, embarrass, rhythm, or thesaurus. Make sure they know what the word means before teaching them to spell it. After you've gone through the process with them on the board or overhead, give the handout. For more information about neurolinguistic spelling read pp175-178 in *Diagnosis and Correction of Reading Difficuluties* by Barbara E.R. Swaby.

REFERENCES

Swaby, Barbara E. R. *Diagnosis and Correction of Reading Difficulties*. Boston: Allyn and Bacon, 1989.

WORKPLACE LEARNING PROGRAM
PARTICIPANT EVALUATION
CURRENT AND PIKES PEAK COMMUNITY COLLEGE

Please answer the questions which follow. Your responses will help us in making improvements in the course.

1. How would you rate the content of this course?

Too Difficult		Just Right		Too Easy
5	4	3	2	1

2. How would you rate the quality of the instruction materials?

Very Interesting		Somewhat Interesting		Uninteresting
5	4	3	2	1

3. How useful was the course in helping you on the job?

Very Useful		Somewhat Useful		Not Useful
5	4	3	2	1

4. Overall, how satisfied were you with the course?

Very Satisfied		Somewhat Satisfied		Very Dissatisfied
5	4	3	2	1

5. What did you like the best about this course?_____

6. What could have been done to improve the effectiveness of the course?_____

7. How would you rate the quality of the instructional materials?

8. Would you like additional time spent on this subject? Yes_____ No_____ If yes, what specific subjects?_____

9. In what specific ways has this course helped you to do your job better?_____

10. How has this course helped meet goals you set before taking it?

11. Would you recommend this course to a co-worker? Yes_____No_____
Why or Why not?_____

12. Do you feel more confident about your learning abilities because of this class?_____

13. Will what you learned in class make a positive, noticeable difference in your outside interests?_____

WORKPLACE LEARNING PROGRAM
INSTRUCTOR EVALUATION
CURRENT AND PIKES PEAK COMMUNITY COLLEGE

Please check one response to each question.	Excellent	Very Good	Satisfactory	Needs Improvement	Poor
1. The instructor is organized in his/her teaching of this class.					
2. The instructor projects warmth, friendliness and enthusiasm in his/her presentation.					
3. The instructor returns tests and assignments within one class session.					
4. The instructor encourages student participation in class.					
5. The instructor reacts in a positive manner to students' questions and responses.					
6. The instructor is willing to give individual help when you request it.					
7. The instructor clearly communicates how the course is related to your learning needs.					
8. The instructor is skilled and knowledgeable in the material.					
9. You feel comfortable with asking your instructor to teach what you feel is important to your learning needs.					
10. By reviewing your portfolio, you are familiar with the changes in your own learning.					

What comments do you have that will help in the design of future courses?_____

_____

_____

_____

_____

STUDENT EVALUATION

Post-Evaluation

Name:_____ **Date:**_____

Course:_____ **Instructor:**_____

GOALS	1 20%	2 40%	3 60%	4 80%	5 100%
I improved my goal in communication.					
I improved my goal in productivity.					
I improved my goal to increase my work attendance.					
I improved my goal to increase my self-esteem.					

REVIEW

1. Explain what metacognition means.

2. Give an example of when you've used metacognition (other than in reading or driving).

3. Identify three things a good reader does while reading
   a.
   b.
   c.

4. Identify three things a good writer must do to make his or her writing clearer for the reader.
   a.
   b.
   c.

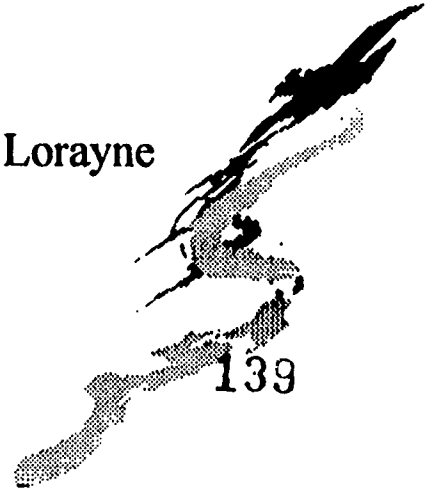
WRITE:

How do you remember the following things:

- **How to get to work?**
- **What the word "work" means?**
- **How to do your job?**
- **What your social security number is?**
- **What the name of your supervisor is?**
- **Where you parked your car?**

There is no such thing as a poor memory! There are only trained and untrained memories.

--Harry Lorayne



IMPROVING MEMORY

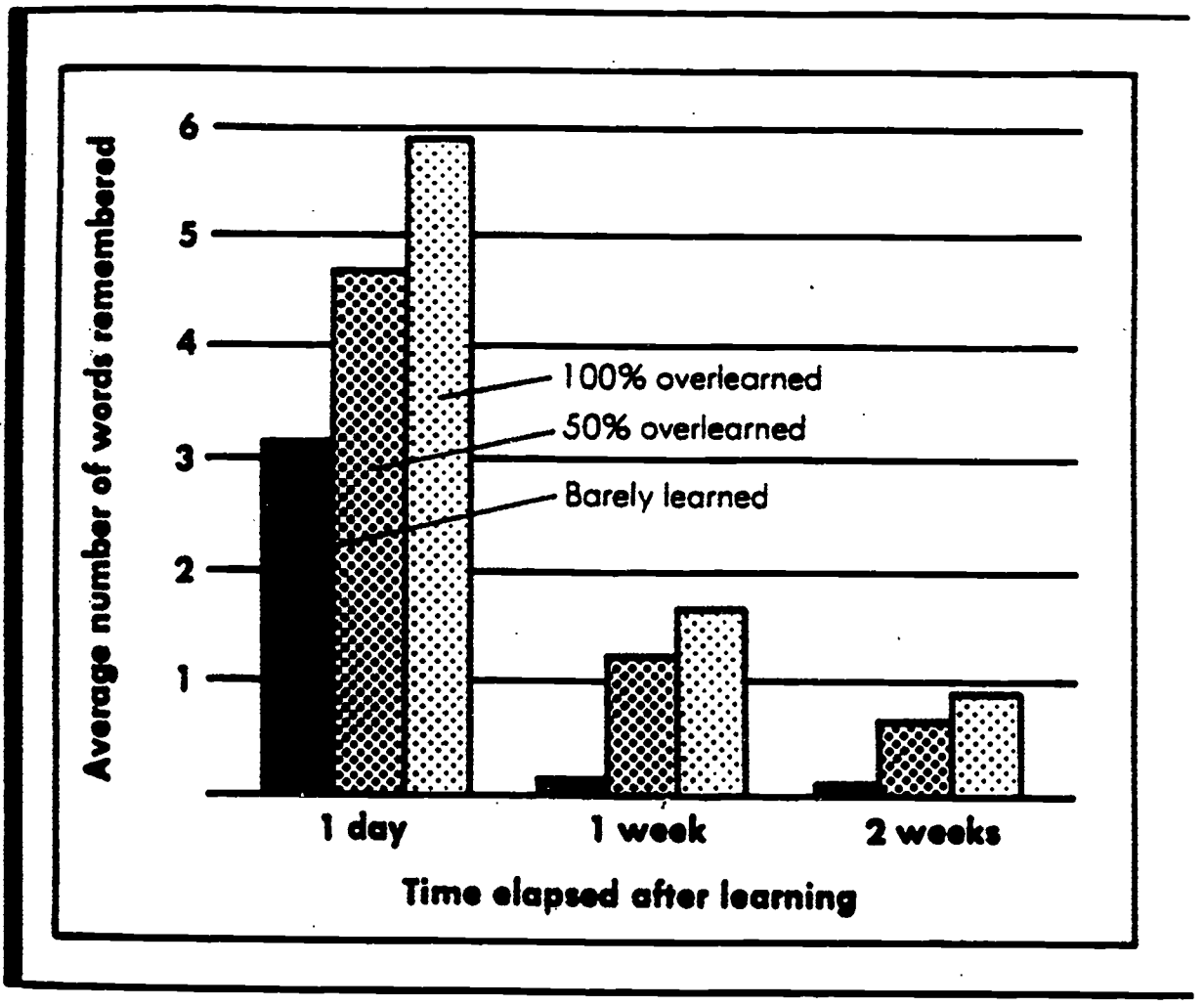
Factors Influencing Forgetting

1. **Disuse**

2. **Interference**
   - ★ Retroactive Inhibition - new learning interferes with material previously learned
   - ★ Proactive Inhibition - "wrong" previously learned materia interferes with new learning.

3. **Repression - Overlooking or Forgetting Things We Do Not Like**
   - ★ We tend to forget things that do not fit our own personal expectations or experiences.
   - ★ We tend to forget unpleasant things or those we feel negative about.
   - ★ We often "edit" out or forget things that are not acceptable to us.

4. **Underlearning - Forgetting Because of Inadequate Learning**
   - ★ from studying passively rather than actively
   - ★ from failing to find meaning in the material
   - ★ from poor concentration


Average number of words remembered
6
5
4
3
2
1
100% overlearned
50% overlearned
Barely learned
1 day
1 week
2 weeks
Time elapsed after learning

MEMORY

If you don't learn and review the material periodically, you won't be able to retrieve it as readily as someone who learns and reviews it. You have to review and actively interact with the material. We tend to forget information we don't use. Some feel that they are losing their because they forget things. In most cases, our memory isn't bad. If you are typical, you tend to forget if you don't do something with the material.

A study by Spitzer, published in "Studies in Retention," Journal of Education psychology, gives some important statistics for us to remember.

...Approximately 40% is forgotten after one day.

...Approximately 80% is forgotten after two weeks.

...Approximatley 82% is forgotten after one month.

When you put a large roast in the oven, put a small one in at the same time; when you smell the small one burning, you'll be reminded that the large one is ready.

--Gracie Allen

LIST 1

BWJ

RPF

QSK

VZI

MLD

LIST 2

CIA

NBC

CNN

AFL

EPA

LIST 3

HOT

BED

PAT

OFF

RUN

LIST 4

THE

DOG

WAS

NOT

HIT

petunia

fried chicken

basket

bike

sunglasses

Bill Clinton

hammer

Coke

school

tiger

marshmallow

toothpaste

pizza

robin

cigar

computer

daisy

flour

telephone

dump truck

football

desk

gold

weasel

MEMORY TIPS

1. Intend to remember.

2. Get it correct.

3. Chunk materials into categories.

4. Know the number of items in each category.

5. Make vivid and unusual associations, visual pictures, rhythms, and songs to help your memory.

6. Rehearse the information right away, then periodically.

7. Use all the modalities when trying to memorize. Write the information, say it, sing it, walk about or tap your pencil while you rehearse it. Use every means at your disposal when you are making demands on your memory.

8. Know the difference between recall and recognition.

9. Be aware of the powers of follow-up or incorrect learning.

10. Don't assume that every little lapse of memory is a sign of approaching old age. Everybody needs to use memory aids sometimes.

VOCABULARY

Keep your eyes and ears open for new words

Associate words in phrases

Associate words in families (prefixes, roots, and suffixes)

Associate words in images

Seek for reinforcement--Look and Listen

SPELLING STRATEGIES

Spelling is a writing skill. You can understand, say, and read many words you can't spell. To improve your spelling skill, improve your visualization skills. You'll find it much easier to *picture* a word and then write it than to *sound out* a word and write it. Practice the following steps as you learn to spell a new word or a troublesome old one. An important key to learning how to spell a word is to make sure you know what the word means and how it's used.

1. Write the word on a note card. Hold the card so that you have to look up to see the word.

2. Using your eye as a pencil, trace each letter in the word. Note and remember which letters go up or down. How many vowels are they? In what order are they? Are there any silent letters? Double letters? Small words within the word? What trouble spots do you have? Put those letters in red in your mind, or put a box around them. Play with the letters in this way until you have a clear visual memory of it.

3. Put the card down, and look up again. Can you "see" the word? (If you can't, repeat step 2 until you can.) Again, play with the word. What letters go up or down? What are the vowels? etc.

4. When you feel confident that you have a good visual memory of the word, spell the word forwards then backwards. "Look" at the letters as you spell. Don't use your ear or memory, just your eyes. When you can spell the word backwards as quickly as you can spell it forwards, you know the word.

5. Put the word back into your visual field and take a mental picture of it.

6. Write the word. Be conscious of how the word feels as you write it. When does your hand go up or down? Pay attention to how your body reacts: If your brow wrinkles at a point in the word or if your hand pulls back, you've probably written a wrong letter. Go back and fix the word.

7. Look at the word one last time. Does it match what you've written? If not, go back and fix your visual memory of the word. Exaggerate the problem spots: Put them in red in your mind., or put them in a box. Recognize them as trouble spots, and be aware of them when you spell the word.

When you're through learning, you're through.

--Vernon Law, pitcher, Pittsburgh Pirates