DOCUMENT RESUME

ED 376 336 CE 067 630

TITLE	Development of a Curriculum To Enhance Adult Learners' Higher Order Skills. Final Report.
INSTITUTION	Pennsylvania State Univ., University Park. Inst. for the Study of Adult Literacy.
SPONS AGENCY	Pennsylvania State Dept. of Education, Harrisburg. Bureau of Adult Basic and Literacy Education.
PUB DATE	94
CONTRACT	98-4003
NOTE	115p.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Adult Basic Education; Adult Literacy; Classroom Techniques; *Creative Thinking; *Critical Thinking; *Curriculum Development; Educational Strategies; Learning Activities; *Literacy Education; *Metacognition; Resource Materials; Teaching Methods; *Thinking Skills
IDENTIFIERS	353 Project; Pennsylvania

ABSTRACT

This document consists of the final report and teacher handbook from a project conducted to develop a curriculum of information, strategies, and activities for adult basic education teachers, tutors, and counselors to use in helping adult students improve their higher order thinking skills. Findings of a review of the available literature on higher order thinking skills were incorporated into a curriculum designed to develop students' critical thinking, creative thinking, and metacognition skills by using the following teaching techniques: questioning, modeling, bridging, visualization, and reflection. The curriculum was tested at three pilot sites. After a summative evaluation and further revision, the curriculum and an accompanying handbook for teachers and tutors were disseminated through Pennsylvania's state resource centers. Appended to the final report is the instrument used by teachers to evaluate the curriculum at the three pilot sites. The teacher/tutor handbook contains the following: background information on higher order thinking, teaching techniques, and methods of observing students' progress; lists of 19 resource organizations, 21 supplemental materials, and 49 additional readings; and curriculum materials and sample learning activities. Contains 39 references. (MN)

Development of a Curriculum to Enhance Adult Learners' Higher Order Skills

Final Report

Priscilla S. Carman, Project Director
Project Associate
Institute for the Study of Adult Literacy

Dr. Eunice N. Askov, Grantee
Professor of Education and Director
Institute for the Study of Adult Literacy
Penn State University
204 Calder Way, Suite 209
University Park, PA 16801-4756

Fiscal Year: 1993-1994
Contract #: 98-4003
Federal Project Cost: $21,000

The activity which is the subject of this report was supported in whole or part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education or the Pennsylvania Department of Education, and no official endorsement by these agencies should be inferred.

ABSTRACT

Title: Development of a Curriculum to Enhance Adult Learners' Higher Order Skills
Project #: 98-4003 **Funding:** $21,000
Project Director: Priscilla Carman **Phone #:** (814) 863-3777
Contact Person: Priscilla Carman **Phone #:** (814) 863-3777
Agency Address: Institute for the Study of Adult Literacy
204 Calder Way, Suite 209
University Park, PA 16801

Purpose: The purpose of the project was to adapt research findings and develop a curriculum of information, strategies, and activities for adult basic education teachers, tutors, and counselors who wish to help adult learners enhance their higher order thinking skills.

Procedures: The project director researched the literature and developed the curriculum, field tested the curriculum at three pilot sites, conducted a summative evaluation of the curriculum, and analyzed and disseminated the project findings.

Summary of Findings: All project objectives were met. The first two objectives involved synthesizing the literature concerning higher order thinking skills and then incorporating research on teaching techniques with practitioner's needs into the design of the materials. Field testing of the materials yielded constructive suggestions for revising the curriculum. Summative evaluation indicated that the curriculum is very useful for the target audience but that a more "user friendly" format would improve its usability.

Comments: All project personnel (project and pilot site staff) believed this subject is an important one for the field of adult education and that this project represented an important start in addressing the need for more information and materials. However, all personnel believed much more can and should be done in this area.

Product(s): In addition to this final report, the project developed a curriculum handbook, *Helping Adult Learners Develop their Higher Order Thinking Skills*, that includes information and resources for teachers, tutors, and counselors as well as sample activities for learners.

Target Audience: The materials are intended for teachers, tutors, counselors, and adult learners in basic education, workplace, workforce, life skills, family literacy, and correctional education programs.

CONTENTS

INTRODUCTION

Rationale and Background

According to many adult educators and employers, both young and older adults' higher level thinking skills are inadequate for the demands of a more information-rich, technologically complex society. Recent national and state assessments, such as the National Adult Literacy Survey (NALS) and the National Assessment of Educational Progress (NAEP), confirmed their observations. For example, participants in these and other assessments had trouble consistently performing tasks that required higher levels of thinking and problem solving skills; the results were even more pronounced among minority participants (Kirsch, Jungeblut, Jenkins, & Kolstad, A., 1993; Kirsch & Jungeblut, 1992 and 1986).

These findings are disturbing for several reasons. One, the American workplace is currently restructuring and reorganizing. All workers will need advanced thinking and problem solving skills to work cooperatively (often internationally) and to adapt to technological changes and increased literacy demands in the workplace. Furthermore, research suggests that a positive relationship exists between job performance and higher order thinking skills (Mikulecky & Drew, 1991). In addition, the American workforce is expected to become increasingly racially and ethnically diverse.

The adult education system will play a critical role in preparing adults to meet the demands of a more complex society and workplace. Teachers, tutors, and counselors in this system face the challenge of helping learners with diverse backgrounds and educational needs develop the basic and higher order thinking skills they need to meet their goals and adapt to changes in society.

Purpose and Objectives

The purpose of this project was to address the need for higher order skill development in adult learners by adapting the research findings and developing a curriculum of information, resources, and materials for practitioners and learners. The project had five objectives: 1) research the literature; 2) develop the curriculum; 3) field test the curriculum in three pilot sites; 4) evaluate the curriculum; and 5) disseminate the project findings.

Time Frame

The project was funded during the fiscal year 1993-1994. During the first quarter, project staff worked on the first two objectives. During the second and third quarters, project staff worked on the second and third objectives. Objectives four and five were met during the last quarter.

Project Staff and Key Personnel

Dr. Eunice N. Askov, Director of the Institute for the Study of Adult Literacy (ISAL), was responsible for administering the project. Priscilla Carman, project director, researched the literature and interviewed the practitioners, developed the curriculum, conducted the field testing, developed and administered the teacher evaluation instrument, analyzed the project findings, and wrote and disseminated the final report. Barbara Van Horn, ISAL Assistant Director, assisted with the editing of the final report and handbook.

Pilot site teachers at the Lincoln Street site of STEP, Inc. in Williamsport, PA were Vicky Beckstrom, Sherry Harris, and Lee Stahl. Cheryl Gibson, a teacher at the Pennvale Community Center site of STEP, Inc. also participated in pilot testing the materials. The initial contact at STEP, Inc. was Dan Merk, Program Manager. Sharon Miller, a teacher in a Single Point of Contact

(SPOC) program for the Central Susquehanna Intermediate Unit (CSIU) in Lewisburg, PA, also participated. The initial contact at CSIU was Michael Wilson, Program Manager for Adult Education.

Audience

The target audience of the materials are teachers, tutors, and counselors in adult basic education programs, such as workplace, workforce, life skills, GED, family literacy, and correctional education programs. The audience for the learner materials are students in these programs who read at a mid-literacy level (between fifth and seventh grade).

Addresses Where Reports May Be Obtained

People in Pennsylvania may borrow copies of this report and the handbook, *Helping Adult Learners Develop Their Higher Order Thinking Skills*, from the state resource centers or PA Department of Education:

AdvancE
PA Department of Education
333 Market Street, 11th Floor
Harrisburg, PA 17126-0333
(800) 992-2283

Western PA Resource Center
5347 William Flynn Highway
Route 8
Gibsonia, PA 15044-9644
(800) 448-5607 Ext. 216

Division of Adult Basic and Literacy Education Programs
PA Department of Education
333 Market Street
Harrisburg, PA 17126-0333

People outside of Pennsylvania may purchase copies of the handbook and this report from:

Institute for the Study of Adult Literacy
204 Calder Square, Suite 209
University Park, PA 16801
(814) 863-3777

STATEMENT OF THE PROBLEM

In the past, most educational practices were based on the belief that the "basic" skills of reading, writing, and math had to be taught before the "higher" skills of critical thinking, reasoning, and problem solving. In fact, each basic skill was taught with a particular emphasis that perpetuated the belief. For example, teaching of reading focused on phonetic decoding of words, math education focused on arithmetic operations, and writing instruction focused on the mechanics of writing, such as grammar, punctuation, and spelling. Higher skills--such as reading for meaning, mathematical reasoning, and writing to communicate--were not emphasized until the basics had been mastered.

Additionally, research revealed that these emphases were even more pronounced in classrooms with educationally disadvantaged and minority students. For example, Cazden (1985) reviewed the research on the ways in which the social contexts of the classroom affect learning. Several studies looked at the focus of reading instruction and discovered there was more emphasis on reading for meaning with advanced students and more focus on phonetic skills with poor and minority readers. In addition, recent research by the American Association of University Women (AAUW) showed that African American girls interact less frequently with teachers than do white girls even though they initiate contact more often (AAUW, 1993). These and other related studies suggest that educationally disadvantaged and minority students may be adversely affected by the social context of the learning environment itself.

A growing body of research evidence from the fields of cognitive psychology, literacy education and linguistics, and mathematics education suggests that basic and higher order skills can and should be taught together

within real-life contexts (Means and Knapp, 1991). However, most adult literacy practitioners do not have the time or the resources they need to synthesize and adapt this research to meet their and their students' needs. They may work part-time or volunteer. They may have feelings of professional isolation or even think their students may not be able to develop their higher order thinking skills.

GOALS AND OBJECTIVES

The overall purpose of this project was to adapt the research information for adult educators and develop activities for adult learners. The project had five objectives:

Objective 1: Research the literature

Objective 2: Develop the curriculum

Objective 3: Field test the curriculum

Objective 4: Evaluate the curriculum

Objective 5: Disseminate the project findings

PROCEDURES

This section discusses how each objective was carried out and the results of each objective. (Objectives four and five address the issues of evaluation and dissemination respectively.)

Objective 1: Research the Literature

The project director first reviewed the literature concerning definitions of higher order thinking and its component processes. Various interpretations and definitions of higher order thinking were discovered. In fact, Resnick (1987) stated that a definition is often dependent on the background of the person defining it. For example, some researchers focus on the critical

thinking and logical reasoning aspects of higher order thinking. Others, such as those from a cognitive psychology background, focus on the metacognitive aspects. Therefore, the project director synthesized the various interpretations and definitions from the literature and divided them into three component processes:

• *Critical thinking*--carefully analyzing and evaluating incoming information and situations as well as supporting one's own beliefs with logic and good reasons;

• *Creative thinking*--being flexible and looking at information and situations in new and imaginative ways to come up with alternatives and possibilities;

• *Metacognition*--understanding and monitoring ones' own thinking and learning behaviors and patterns.

Next, the project director reviewed the literature concerning teaching techniques to develop higher order thinking skills. Numerous teaching techniques were identified. The following five frequently mentioned teaching techniques were included in the curriculum handbook:

• *Socratic questioning* plays an important role in developing higher order thinking skills. Socratic questioning means reacting to learners' questions and answers in ways that guide them to construct their own knowledge and meaning. Pogrow (1990) discussed the use of Socratic questioning and conversation in computer programs. Relatedly, the importance of dialogue has been demonstrated in numerous studies, including Gentile and McMillan (1992); Thompson (1991); Kuhn (1992); and Spener (1990).

• *Modeling* is showing others what they should see, know or do. Modeling higher order thinking is demonstrating thinking skills and strategies needed to understand or accomplish a complex task. Research studies by Palincsar and Brown (1984) have demonstrated how modeling can help learners

develop higher order thinking skills. In addition, computer modeling of higher order thinking skills has also been effective (Adams & Mikulecky, 1989).

• *Bridging* (or teaching for transfer) helps learners connect current learning with past and future learning (Thomas, Anderson, & Getahun, 1992). For example, bridging to the past facilitates learners' access to their prior knowledge. Bridging to the future helps learners make connections from current learning to other applications, such as when and how skills or knowledge might be used in other situations.

• *Reflection* means consciously thinking about one's learning and thinking behaviors. To-Dutka (1991) provided research evidence that supports using reflection to develop higher order thinking skills. Brookfield (1988) discussed how reflection can help learners observe and evaluate their thinking processes.

• *Visualization* is thinking, reasoning, and remembering with images. Mayer (1989) reviewed the research concerning the effectiveness of conceptual models (diagrams, process charts, or schematic drawings). Clarke (1991) discussed the use of time lines, Venn diagrams, concept maps and flow charts. Collins (1991) discussed the effectiveness of mental imagery to increase thinking abilities.

The project director also interviewed teachers at the pilot sites to obtain the practitioner's perspective concerning the teaching of higher order thinking. Teachers discussed their students' needs, such as problems with transfer and visualizing mathematical word problems. They also discussed their own needs and concerns related to teaching higher order thinking skills, such as lack of appropriate materials, especially "jargon-free" materials that help learners concentrate on the higher order skill itself.

Objective 2: Develop the Curriculum

The project director wanted the curriculum to encompass the research as well as address practitioners' concerns. A handbook format was chosen and entitled, "*Helping Adult Learners Develop Their Higher Order Thinking Skills.*" Section 1 of the handbook includes background information and teaching techniques for developing higher order thinking skills. Section 2 provides resource organizations, supplemental materials, and additional readings. Section 3 includes sample activities that help learners explore and develop their critical thinking, creative thinking, and metacognitive abilities. It was designed to be reproduced as is or adapted to meet specific needs. For example, workplace programs can change the activities to address work-related issues and concerns.

Objective 3: Field Test the Curriculum

Section 1 of the curriculum handbook was delivered to the sites at the end of the second quarter. The project director met with the teachers in January of 1994 to discuss their reactions to Section 1. Reactions were positive and teachers felt the information would be beneficial for teachers. Minor changes were made to make the information more accessible to volunteer tutors.

The learner activities in Section 3 were delivered or sent to the sites as they were developed during the second half of the project period. The project director conducted discussions and demonstrations concerning how the materials might be used. For example, one site visit included a demonstration and lesson using metacognitive activities with learners followed by a discussion with the teacher. Throughout the third and fourth quarters, teachers field tested the learner activities with students who were present in their classes on those days. In addition, teachers at the pilot sites communicated with the project director concerning how they were using or

adapting the learner activities. Changes were made to the curriculum in response to their suggestions. For example, teachers at one site suggested that the format of the metacognition activities (which originally came first in Section 3) were abstract and difficult for learners. The materials were then refined and moved to the end of Section 3.

Objective 4: Evaluate the Curriculum

An evaluation form was developed to obtain teachers' reactions to the curriculum. It was designed to obtain quantitative as well as qualitative information regarding the effectiveness of the curriculum. Quantitative information was obtained from eleven statements to which teachers responded from 1 (strongly agree) to 5 (strongly disagree). Qualitative information was obtained from responses to nine open-ended questions. Appendix A contains a copy of the evaluation form.

Results from the quantitative questions are summarized below:

Question #	Mean	Standard Deviation
Section 1: Background Information		
1 (clearly written)	1.5	.5
2 (useful teaching techniques)	2.5	.866
3 (useful information)	1.75	.433
4 (appropriate for tutors)	2.5	1.118
Section 2: Resources		
5 (organizational resources)	1.75	.433
6 (supplemental materials	1.75	.433
7 (additional readings)	2.125	.8926
Section 3: Learner Activities		
8 (will increase student awareness)	1.33	.471
9 (learner-appropriate language)	1.5	.5
10 (will use activities in future)	2.25	.433
11 (activities facilitate transfer)	1.75	.433

Table 1: Teacher Evaluation of Curriculum

The results from the nine open-ended questions were varied. This section describes teachers' responses to the five open-ended questions concerning the curriculum handbook. When asked which activities they would use again, teachers said they would most often use the critical thinking activities, the bridging techniques, and the activities concerning distractions and inner-language. None of the teachers gave a response to the question, "Which activities would you not use again?" Although all pilot site personnel felt that adult educators could benefit from using the curriculum and learning more about higher order thinking, over half were concerned with the format of the materials. They felt that the learner materials in particular could be enhanced by graphic illustrations and a more "user-friendly" format. A teacher at one pilot site suggested using the learner materials in "thinking skills workshops." Finally, pilot site teachers felt that the curriculum would be most valuable for adult learners in employment training programs, especially welfare mothers and recovery populations.

This section describes teachers' responses to the four open-ended questions concerning the teaching of higher order thinking in general. All teachers agreed it is worthwhile and essential to focus on higher order thinking skills, although one teacher voiced the concern that it may be difficult for learners to "think about thinking." When asked what barriers they have encountered when teaching higher order thinking, teachers' responses ran along two lines--barriers within their students and barriers within themselves. First, teachers mentioned that higher order thinking is a weak area for many students. Specific responses included that learners may be "unmotivated, afraid of failing, or nonresponsive" and that they may have "low reading levels or special learning problems." In addition, teachers mentioned again that students have problems transferring skills to new

applications. Second, teachers mentioned barriers within themselves. For example, one teacher responded that it is often difficult to identify component higher order skills in situations, especially "on the spot" while teaching. The same teacher mentioned that it takes time (which is often insufficient) and practice to become adept at teaching higher order thinking. When asked what suggestions they had for other teachers, teachers said it is important to provide ample time for students to reflect on and discuss their use of higher order skills. Teachers also discussed the importance of providing real-life practical applications of skills.

This section describes two changes to the evaluation plan as it was outlined in the project proposal. One, the proposal narrative described a student evaluation of the curriculum. Because the sample of learners changed throughout the project period, student evaluation of the curriculum was not implemented. Two, the project proposal also discussed the possibility of using the new Test of Adult Basic Education (TABE) Work-Related Problem Solving Test as an evaluation instrument. The project director reviewed the test but chose not to use it as an assessment tool because the test questions did not correlate with the content of the curriculum. The test could be used in other projects, however, to assess students' applications of higher order skills.

In summary, the evaluation plan yielded positive information about the project. All project personnel felt that the curriculum handbook was useful and informative. Although additional revisions to learner materials were not made due to time constraints at the end of the project period, all personnel felt that the content and variety of activities would be beneficial for adult learners, especially welfare mothers and recovery populations in employment training programs.

Objective 5: Disseminate the Findings

Copies of this report and the handbook, *Helping Adult Learners Develop Their Higher Order Thinking Skills*, will be available through the Pennsylvania state resource centers. The Institute for the Study of Adult Literacy (ISAL) will publicize the project nationwide through its informational newsletter, *Mosaic: Research Notes on Literacy*, and in its brochure, *Publications and Resources*.

The project director is currently revising an article for journal publication which addresses higher order thinking. This project and other ISAL projects related to higher order thinking are discussed in the article. The project director is also interested in learning how people have reacted to the project and how they have used or adapted the materials. In addition, the project director is interested in developing workshops related to this topic for regional staff development centers in Pennsylvania.

CONCLUSIONS AND RECOMMENDATIONS

Higher order thinking is a complex topic, even among people who spend their professional lives studying it. From a research perspective, this project revealed that higher order thinking is difficult to define and describe precisely (Resnick, 1987). However, research also revealed successful techniques for developing higher order thinking skills, such as bridging, modeling, questioning, reflection, and visualization. From the practitioner's perspective, this project revealed that higher order thinking is an issue and concern for teachers and adult learners. Teachers described the lack of appropriate learner materials; they described how they often lack sufficient time to "really focus on higher order thinking."

This project attempted to bridge the gap between the research findings and practitioners' concerns. The project materials and information are accessible to teachers and tutors from a variety of settings and can be used in different ways. However, much more can and should be done in this area. The following recommendations address this need:

• **More learner materials should be developed**. A future project could refine and add to the existing materials from this project. Perhaps a computer-based version could be developed. The software could include real-life scenarios in which higher order skills must be applied; supplemental instruction for the scenarios could demonstrate how and why specific higher order skills are applied in the scenarios.

• **Additional research studies should be conducted.** For example, a study could be designed in which an experimental group uses the learner materials. Their success in the regular curriculum could be compared with a group who did not use the materials. Or, a qualitative study could investigate teachers' and tutors' use of the teaching techniques in the classroom.

• **Staff development efforts in this area should be increased**. As stated previously, research suggests that higher order thinking skills are not always stressed in the classroom, especially in classrooms with educationally disadvantaged and minority populations. For example, teachers may "tell the answer" rather than encourage learners to construct knowledge. They may focus on discrete subskills with little or no emphasis on performing the skills in meaningful situations. Staff development workshops could focus on specific teaching techniques, such as questioning and bridging, to address these problems. Workshops would also provide opportunities for teachers to discuss and reflect on their own practice.

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APPENDIX A

Pennsylvania Department of Education
353 Special Demonstration Project
"Development of a Curriculum to Enhance
Adult Learners' Higher Order Thinking Skills"
Project #98-4003

Evaluation of Curriculum by Teachers at the Pilot Sites

Priscilla Carman, Project Director
Institute for the Study of Adult Literacy
Penn State University
204 Calder Way, Suite 209
University Park, PA 16801-4756
(814) 863-3777

To the Teachers at the Pilot Sites

Please respond to each question. Any specific comments you add will be appreciated. Thank you again for your cooperation and feedback.

Section 1

1. Section 1 is clearly written.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

2. Section 1 provides good teaching techniques for developing higher order skills.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

3. I will use the information in Section 1 in my teaching.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

4. Volunteer tutors will be able to use the information in Section 1.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

Section 2

5. The organizational resources in Section 2 will be helpful.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

6. The supplemental materials resources will be helpful.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

7. I will refer to the additional readings listed in Section 2.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

Section 3

8. The activities in Section 3 will increase students' awareness of higher order thinking skills.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

9. The language in the student activities is appropriate for adult learners.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

10. I will use the activities in Section 3 in my classroom.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

11. The activities in Section 3 will help learners apply higher order skills in a variety of applications.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

12. Which learners activities will you use again and why?

13. Which learner activities will you not use again and why?

14. Would you recommend this curriculum? Why or why not?

15. Do you think it is worthwhile to focus on higher order thinking skills? Why or why not?

16. What types of programs will find the curriculum most valuable? Why?

17. For what audience of learners will the curriculum be most valuable? Why?

18. What problems/barriers have you experienced when helping adult learners develop higher order thinking skills?

19. What problems do students have transferring higher order skills to various applications?

20. What suggestions do you have for teachers and tutors who wish to focus on higher order thinking skills?

Helping Adult Learners Develop Their Higher Order Thinking Skills

A Handbook for Teachers and Tutors

Priscilla S. Carman, Author
Project Associate

Dr. Eunice N. Askov, Grantee
Professor of Education and Director
Institute for the Study of Adult Literacy
Penn State University
204 Calder Way, Suite 209
University Park, PA 16801-4756

Fiscal Year: 1993-1994
Contract #: 98-4003
Federal Project Cost: $21,000

The activity which is the subject of this report was supported in whole or part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education or the Pennsylvania Department of Education, and no official endorsement by these agencies should be inferred.

Acknowledgments

We wish to thank the administrators and teachers at the pilot sites for their cooperation and involvement in the project. Special thanks go to Sherry Harris and Vicky Beckstrom at STEP, Inc. in Williamsport, PA for their insightful comments and suggestions.

Contents

To Teachers and Tutors

All adult learners (from beginning level to advanced) can benefit from further developing their higher order thinking skills and they need to be able to apply their skills in a variety of situations. Recent research on learning and thinking discusses higher order thinking skills and techniques to develop them. This handbook adapts this information for use in the adult education setting. It can be used or adapted by teachers, tutors, and counselors working with adult learners in a variety of settings, including:

- Adult basic education (ABE) programs
- General Education Development (GED) programs
- Literacy councils
- Life-skills programs
- Family literacy programs
- Correctional education programs
- Workplace and workforce programs, including workplace literacy programs, Job Opportunities and Basic Skills (JOBS) programs, and Job Training and Partnership Act (JTPA) programs

This handbook includes information and resources for teachers and tutors, and materials for learners. It has three sections:

Section 1: Background Information guides teachers and tutors in helping adult learners develop their higher order thinking skills. It includes a discussion of higher order thinking skills, teaching techniques to develop them, and an informal checklist for observing growth in learners' skills. *Review Section 1 first.*

Section 2: Resources contains a list of state and national resource organizations, supplemental materials available commercially and through the Pennsylvania Resource Centers, and a reference list of additional readings for teachers and tutors.

Section 3: Curriculum Materials for Learners provides sample activities (written at about a fifth grade reading level) to help learners explore and develop their critical thinking, creative thinking, and metacognitive skills. The activities and materials "turn the spotlight on" learners' thinking skills and mental habits. They are intended to make learners aware that higher order thinking plays an important role in all life situations--from studying for the GED, to making decisions in the family, to writing a letter to a friend, to solving problems in the workplace. The activities are also intended to provide students with a better understanding of some specific skills and strategies involved in higher order thinking. Upon completion of the activities, learners should have a new understanding of themselves as thinkers and learners and should be able to apply new learning and thinking behaviors in their lives.

This handbook may be used in a variety of ways:

- You may use the information in Sections 1 and 2 to supplement your instructional program.
- You may use the learner activities in Section 3 (as provided) to raise students' awareness of and strategies for using higher order thinking skills. Also, the activities help you learn more about how learners think and solve problems.
- You may select some of the student activities in Section 3 and offer a "thinking skills workshop" for students to brush up on their skills.
- You may adapt the activities in Section 3 based on your students' needs. For instance, you can read aloud any worksheets students cannot read on their own. You can role play or discuss writing activities.
- You may use the sample activities in Section 3 as models and change them to reflect the focus of your program. For example, family literacy programs can change the examples in the activities to reflect parenting and family-related concerns. Workplace literacy programs can change the examples to reflect work-related issues and concerns.
- Students may complete the activities independently or in small or whole group discussions.

Section 1:

Background Information

Introduction

What is Higher Order Thinking?

In a general sense, higher order thinking is the *purposeful* and *active* way we make sense of the world. With higher order thinking, we purposefully process, analyze, and reflect on information, situations, ourselves, and others in order to solve problems and make decisions. Higher order thinking is active because we know we must work to make meaning apparent for ourselves. We do not expect understanding to be immediately apparent or shown to us by others.

Higher order thinking involves *critical thinking, creative thinking,* and *metacognition.* Although they are discussed separately here, these higher order thinking skills are interrelated in real life. Critical thinking means analyzing and evaluating information and situations. It means supporting our own beliefs with good reasons and evidence. Creative thinking means looking at information and situations in new and imaginative ways to come up with alternatives and possibilities. It means being flexible and adaptable to changes. Metacognition means understanding and managing yourself as a learner and thinker. It means knowing your abilities and limitations, such as knowing when you understand and what to do when you don't understand.

Higher order thinking skills are difficult to define precisely because they are complex and interrelated. Simplifying them and discussing them separately, however, allows us to better understand them so that we can help learners to improve them. Consider the following example. Critical thinking, creative thinking, and metacognition are all essential components of successful problem solving. Creative thinking imagines possibilities for solving the problem. Critical thinking evaluates and tests those possibilities for strengths and weaknesses. Critical thinking interferes with creative thinking and vice versa so they must be used separately. Meanwhile, metacognitive skills direct and control the whole problem solving process and help us know when and how to use both kinds of thinking.

Why is Higher Order Thinking Important?

Adults face new and complex information and situations every day in the workplace, family, community, and society. Higher order thinking skills enable us to be flexible and adaptable in a changing world. They should be developed in the educational setting because it's more important than ever to know how to think *clearly, flexibly,* and with *confidence.*

Higher order thinking also helps us put together, or *orchestrate,* all of our knowledge and skills so that we may adapt and apply them in various situations. For example, consider our basic skills of computation, reading, and writing. Higher order skills enable us to recognize situations in the world as being appropriate to using certain mathematical operations. In reading, higher order thinking directs and controls the reading effort. It helps readers go beyond the surface-level facts to come to a deeper understanding and interpretation of a reading. In writing, higher order thinking skills allow writers to adapt their knowledge of the mechanics of writing (like spelling and grammar) to their purpose for writing and to the characteristics of their audience.

Higher Order Thinking

This section describes higher order thinking skills in detail. First, consider the following general points. Higher order thinking skills:

- are complex and interrelated;
- can and should be developed and improved in the educational setting;
- should be stressed at the most basic to the most advanced level of instruction;
- are important in all curriculum areas, although they may vary depending on the situation in which they are used;
- may be discussed differently by other people (i.e., you may see the skills organized or defined differently in other materials);
- enable learners to adopt an active rather than a passive approach to understanding themselves and the world.

Critical Thinking

Critical thinking skills move us beyond "knee-jerk" reactions to well-reasoned responses and deeper understanding of information and situations. Critical thinking affects the way we process incoming information. For example, as our critical thinking skills develop, we learn to question and analyze incoming information to determine whether it makes sense to us and if we should accept it. We analyze information from our individual perspective and store it in memory in our own unique way. Critical thinking also influences the way we reflect back to the world our own thoughts and beliefs. For example, critical thinking skills enable us to discuss our ideas in an organized way rather than saying the first thing that comes to mind. The next two paragraphs describe some processes involved in critical thinking.

Critical thinking involves *analysis* of information and situations. For example, experienced readers analyze text to discover how the information is organized and to determine the writer's purpose and point of view. Listeners may try to identify the underlying values in what another person

says. Or a person calling to make a complaint about a product thinks ahead about how to explain his unhappiness with the product.

Critical thinking also involves *evaluation* of information and situations. For example, concerned parents might consult several doctors, nurses, other parents, and medical books and evaluate the information they get from each to help them decide the best treatment to pursue for their sick child. Or, listeners may examine how a controversial speaker's values affect his or her thinking so they can respond less emotionally and with evidence that challenges the speaker to defend his or her point. Or, consider the customer service representative whose job it is to listen to the customer's complaint. He or she must evaluate the evidence the customer gives to determine if it adequately supports his complaint. In short, critical thinkers examine and weigh the pros and cons of all sides of an issue to make better, more informed decisions.

Teachers and tutors should be aware of common *barriers* to critical thinking. Some students may mistakenly believe, especially at first, that thinking critically means having a critical attitude. For example, a person with a critical attitude may be critical merely for the sake of criticizing or proving another person wrong. Such an attitude is emotional and may be destructive in intent. Critical thinking is positive in intent, however, and strives to thoroughly explore a situation to better understand it. In addition, some students may have difficulty breaking old habits of "passive acceptance"; that is, they may be accustomed to simply accepting the beliefs of others without question. Or, some students may feel they are being rude and may not want to differ with what someone says, especially a person who is perceived to be more knowledgeable or powerful.

Creative Thinking

Bill Moyers, creator of a television program that explored creativity, said "defining creativity for everyone to see wasn't exactly easy" (*Smithsonian*, January 1982). Part of the reason for this difficulty is that creativity is most obvious in the genius of great artists, musicians, or writers. Most of us can not relate to or understand this kind of genius, however. We may even

believe that only these great artists and writers have creativity. But all humans think creatively and the ability to do so can be nurtured in the educational environment. When we think creatively, we are sensitive to our intuitions. We are open to exploring new insights. We make connections by seeing patterns, relationships, and similarities in situations and information. All are important traits of higher order thinking.

Creative thinking helps us see and make connections from the outside world to our own knowledge and beliefs so that we may better understand both. Creative thinking also helps us use our knowledge in new ways for different purposes. It allows us to be flexible and adaptable in changing situations. The next two paragraphs explore some processes involved in creative thinking.

One process involved in creative thinking is *elaboration*. Elaboration helps us understand new information by connecting it to what we already know. For example, a learner may have a hard time understanding how the human heart works until he realizes it works like a pump, something he knows from experience. Elaboration also helps us make connections from what is given or obvious on the surface to what we already know or have experienced. These connections are important because much of what is meant by others is either unstated or implied. We must fill in the gaps to create true understanding. For example, elaboration is required to understand the following phrase, "We better pack up. It's time to hit the road." Elaboration helps us understand idioms, metaphors, and analogies.

Another process involved in creative thinking is *synthesis*, or seeing how to put information or resources together in a new way. A simple example is using a phone book to prop up a broken chair leg. Or, a writer might bring together diverse points of view in a new way to convincingly support his or her point. When we synthesize, we see how resources, knowledge, or skills may be used for different purposes. We are also open and sensitive to opportunities to see things in a new light. Some people call this the "aha!" or "eureka!" response. For example, the inventor of Velcro™ realized on close inspection of a common burr that his fastener could be designed with a similar structure. As Bill Moyers said about

creativity, "All creative behavior makes a break from the past but remains indebted to it" (*Smithsonian*, January 1982).

One common *barrier* to creative thinking is the desire for conformity and to be like everyone else. Some learners may not want to explore or express new ideas because they fear criticism or ridicule. Another barrier to creative thinking is an environment that does not support creative thinking. For example, some learners' past educational experiences may have focused solely on the "right answer" in situations where other possibilities may have existed. Or, learners may never have been challenged to imagine, hypothesize, or think about things in new ways. They may be rigid in their thinking patterns. Another barrier to creative thinking is lack of prior knowledge. Some learners may simply lack the appropriate background or relevant experiences to draw from to make important connections.

Metacognition

Metacognition means "thinking about thinking," or being aware of your thoughts and thought processes. It means knowing your abilities and limitations as a learner and thinker. It means knowing when you do understand and knowing when and what to do when you do not understand. People with well-developed metacognition are in charge of their thinking and learning and do not expect others to direct it. The next two paragraphs examine two components of metacognition.

Metacognition includes *self-awareness* of one's thinking processes, abilities and limitations. This self-awareness includes knowledge of skills and strategies to direct one's thinking, such as self-questioning, self-testing, summarizing, organizing thoughts, and using text structure. It also includes knowledge about the kind of thinking that is negative or unproductive. For example, experienced readers know the signs that their attention is wandering away from the material.

Researchers believe that the self-awareness component of metacognition (sometimes called knowledge about cognition) is late developing. This has important implications for teachers and tutors who wish to help adult learners develop an awareness of thinking strategies and processes.

Metacognition also includes *self-control* of one's thinking. The self-control component (sometimes called regulation of cognition) involves planning, monitoring, and revising one's thinking strategies. For example, experienced problem solvers purposefully choose a plan for solving a problem and continually assess how well the plan is working. They also control negative "self-talk" that interferes with the process.

Consider the following *barriers* to metacognition. Some learners may have difficulty consciously reflecting on their own thinking. Or, they may not understand how to control their thought processes or why it is important. Influences from personal factors also create barriers. For example, some learners may have low self-esteem. They may see failure to solve a problem as a lack of their own ability and think that nothing can be done about it. This is sometimes called "learned helplessness." Negative self-talk perpetuates this problem. Still other learners may have drug or alcohol problems that affect their abilities to think clearly about their own thinking.

Teaching Techniques

This section discusses five broad, research-supported techniques to help learners develop higher order thinking skills. The five techniques accommodate various learning and teaching styles. Some teacher/tutor tips for developing higher order thinking skills are also provided. All teaching techniques and tips can be incorporated into any teaching session.

Questioning

Questioning is an important technique for helping learners develop their higher order thinking skills. Although it is not a new technique, new variations of questioning have been used successfully. Also, research supports using questioning with all learners, not just advanced learners.

One variation of the technique is for teachers to question learners to help them *clarify* their thinking processes. This is sometimes called Socratic questioning. For example, learners may be asked:

- to explain or support an idea or belief
- to analyze how values affect beliefs
- for the sources of their information
- to evaluate various sources of information
- to weigh the pros and cons of different points of view to better understand and defend their own position.

For example, suppose a learner says, "Politicians don't really know what most people are really concerned about." This is a time when the teacher or tutor can ask the learner to support his views with examples. Then, the discussion could focus on the politician's point of view and then compare the different sides of the issue.

Another variation is for teachers to question learners to help them *expand* their thinking processes. For example, learners may be asked to hypothesize, predict, look for similarities or differences, or to imagine and brainstorm answers to "What might happen if ..." questions. In the previous example, the discussion might be expanded by asking questions such as, "What are some ways for people to communicate their ideas to politicians and people in government?"

Learners may also be asked to *examine* their thinking processes and strategies. For example, they may be asked questions such as:

- What do you do when you come to a word you don't know?
- How do you know when you do not understand what you are reading?
- What do you do when you're not sure how to solve a problem?
- How did you go about solving that problem?
- How did you know you had the correct answer?

Learners may be asked questions that help them *explore* the world around them. They may be asked open-ended questions about relevant issues or concerns, such as:

- What kinds of problems exist between (workers and management, parents and children, landlords and tenants)?
- How do you think these problems begin? Where do they end?
- What is your mental picture of the ideal (workplace, community, family life)? What conditions prevent you from experiencing this ideal?

There are some limitations to this approach. Learners may be intimidated at first by Socratic questioning. Their past educational experiences may have focused on "knowledge transmission" from teachers to learners rather than "knowledge construction" by learners. Also, discussion techniques may be more effective after trust and open communication have developed in the class. This approach may also be time consuming; it may not be appropriate for covering large amounts of content and students need time to think about their answers. In addition, teachers and tutors may find it helpful at first to come up with possible questions ahead of time.

Modeling

All modeling is showing others what you want them to see, know, or do. Modeling higher order thinking skills means demonstrating the thinking processes and strategies used to solve problems, make decisions, and understand information. This kind of modeling is sometimes called metacognitive modeling or *thinking aloud*. Metacognitive modeling is

important because it helps to make hidden thinking processes strategies apparent. Also, it shows complex thought processes in manageable steps.

Metacognitive modeling can range from simple to complex. For example, it may be as simple as modeling and discussing your own enthusiasm and open mind to encourage creative thinking. Or, it may be more complex such as discussing and modeling thinking strategies to understand a complex reading. Metacognitive modeling includes teachers modeling for learners and experienced learners modeling for less experienced learners. It may take place as role plays or demonstrations, or through discussion. For example, an experienced worker may talk through, step by step, how she solves a problem for a new worker, including how she knows the problem exists. Or, a teacher and a student may role play a situation in which the teacher models and explains aloud the critical thinking strategies used to communicate with a coworker in a group problem solving situation.

Some teachers and tutors may find this technique difficult to incorporate into lessons. Putting into words what one does automatically or subconsciously requires analyzing ahead of time the component thinking processes to be modeled.

Bridging

Bridging (or teaching for transfer) helps learners make *connections*. It involves helping learners see how current learning connects with past and future learning. Bridging also helps learners connect information or skills from one subject area to another. For example, learners may discuss how evaluating arguments is important in social studies as well as in parenting and on the job.

Bridging to the past helps learners build on their prior knowledge to elaborate on the current situation or information. Learners may be asked: "What do you know from the past that can help you understand this?" or "How is this situation similar to a situation you experienced in the past?" For example, suppose you are discussing why it is important to see other

points of view. Learners can discuss how a customer service representative helped them in the past and the kinds of techniques that person used to help them solve the problem, including working to see the customer's point of view.

Bridging to the future helps learners connect current learning and experience to new applications. Call attention to opportunities in the program and in students' lives when skills may be applied. Learners may be asked how, where, or in what situations new skills or knowledge may be helpful or important. They may be asked how the skills may be used in the same ways and how they may be used differently. For example, suppose you are discussing strategies to understand paint can labels, such as noticing the differences between the warnings and the directions on the labels. Learners may be asked to think of other situations when the strategy might apply. For example, they may read labels on equipment or supplies at work. They may read labels on food, health, or beauty supplies in the home. Learners can discuss how the strategy might be used differently in these other situations, such as when the warnings may be more important than the directions and vice versa.

Some learners may lack the prior experience or concept background required to make important connections. For example, some learners may have great depth of knowledge in some areas but may lack the breadth of experience required to bridge to new situations. In addition, some learners may have incorrect background knowledge.

Visualization

Visualization is thinking, reasoning, and remembering with images. These images and pictures make information vivid or alive in students' minds. They also help learners to see things in more variety and detail. Learners should be encouraged to use both internal and external visualization.

Internal visualization, or *mental imagery*, helps learners picture in their minds what they must understand or remember. Students can be

encouraged to use visualization on their own, such as to "see pictures" of what they are reading. Or, teachers can guide students to use mental imagery to process information more deeply. For example, suppose you are doing concept building about pensions before reading about them in benefit materials. Use prompts that create strong mental images, such as: "Picture an elderly woman sitting alone in her apartment. Her husband died years ago. She has never worked outside the home. Her husband had a small amount of retirement money put aside. Now this woman survives on monthly assistance from the government. She is barely able to make ends meet each month."

External visualization includes teacher-made or learner-made *visual organizers*. Visual organizers help learners organize their knowledge and also aid memory. They show the component pieces of a topic and their relationship, such as comparisons, rankings, or steps in a procedure. Visual organizers include arrays, process charts, Venn diagrams, concept maps and any other kind of visual that helps learners visualize multiple aspects of information or situations (see references in Section 2).

Some students may not learn with this method; they may not be visual learners. Or, some learners may have trouble independently using visualization strategies but may benefit from teacher guidance.

Reflection

Reflection is thinking consciously about or *taking stock* of thinking and learning behaviors. When learners reflect on their thinking skills, they develop increased awareness and control of them. Reflection also helps teachers and tutors observe learners' perceptions and growth of their thinking skills. Learners can reflect on the higher order thinking skills they used, how they worked, how they didn't work, and how they might be used next time. They can reflect on their current thinking habits and on their new ones.

Reflection can be done alone or with others. Learners can reflect on their thinking skills in discussion or in writing. For example, learners might

discuss what happened when their attention wandered during an exam and how they were able to bring their attention back. Or, learners might write in a journal about what happened when they worked to see another person's point of view. They can write about the situation in which the skill was used (such as during a conflict with their spouse), how well it worked, what was easy for them, what was hard for them, and how they might use the skill again in another situation.

Consider some limitations of this technique. Some learners' writing skills may not be developed enough for journal writing. Others may have demands on their time and may not be able to commit to out-of-class time for journal writing. Still others may find it too challenging or intimidating at first to engage in this kind of self-analysis and self-exploration.

Teacher/Tutor Tips

Use *small groups* to supplement individual or whole group work. Small groups increase the verbal and social interaction in the classroom. Students learn from each other by listening and observing the other members of their group. They see first-hand the different approaches people take to understanding information, solving problems, and making decisions.

Whenever possible, *label* students' higher order thinking behaviors to help them become more independent thinkers and problem solvers. Labeling helps learners recognize when and how they use certain higher order thinking skills and behaviors. For example, you might say something like, "Your questions show me you are questioning the source of information. That's an important skill for forming carefully-reasoned responses to new information."

Provide a variety of supports, including *emotional* and *social support*. Learners should be encouraged to support each other. They need to know that the instructor and the other learners value and respect their input, experiences, and thinking, however divergent or diverse. Provide *cognitive support* (also called *cognitive apprenticeship*) inside and outside the classroom environment. For example, suppose you wish to help learners

develop the skill of asking questions to clarify another person's point of view. Begin by modeling the skill in a role-play of a situation when it might be used, such as at a parent-teacher conference. Then have learners to practice the new behavior with your support (or with an experienced learner), such as in a role-playing situation in the classroom. Support learners when needed, such as suggesting possible questions they might ask the teacher. Then have learners use the skill on their own, such as during a conference with their child's teacher. After the conference, have them reflect on the situation, either in discussion or in writing. Learners should also be encouraged to reflect on how the real situation is different from the classroom situation. They should be encouraged to discuss how the classroom situation might be structured differently to be more like the real situation.

Observing Progress

Learners can be observed informally for growth in their higher order thinking skills. For example, they should:

- move from little participation or exchange of ideas to active involvement
- participate willingly and comfortably in class discussions
- be persistent at completing tasks
- be less impulsive
- gather more information before beginning a task
- take time to reflect on an answer
- ask hypothetical questions
- make sure they understand directions before beginning a task
- listen and respond to others' points of view
- plan a strategy to solve a problem
- display flexibility in thinking
- check for accuracy
- be more precise in language and thought
- be more specific about the kind of help they want or need
- display enjoyment in problem solving
- be independent thinkers and problem solvers
- perceive failure to accomplish a task as an opportunity to grow
- use strategies, such as self-questioning or visualizing information

See Section 2 for resources (materials and references) for assessing higher order thinking skills.

Section 2:

Resources

Organizations

National Organizations

American Association of Adult and Continuing Education (AAACE)
2101 Wilson Boulevard, Suite #925
Arlington, VA 22201
(703) 522-2234

Association for Community Based Education (ACBE)
1805 Florida Avenue, NW
Washington, DC 20009
(202) 462-6333

Clearinghouse on Adult Education and Literacy
Division of Adult Education and Literacy
Mary E. Switzer Building, Room 4428
Washington, DC 20202-7240
(202) 205-9996

Creative Education Foundation
1050 Union Road
Buffalo, New York 14224

ERIC Clearinghouse on Adult, Career, and Vocational Education
1900 Kenny Road
Columbus, OH 43210
(800) 848-4815

ERIC Clearinghouse on Reading and Communication Skills
Indiana University
Smith Research Center, Suite 150
2805 East 10th Street
Bloomington, IN 47408-2698
(812) 855-5847

Institute for the Study of Adult Literacy (ISAL)
204 Calder Way, Suite 209
University Park, PA 16801
(814) 863-3777

National Adult Literacy and Learning Disabilities Center
1875 Connecticut Avenue, NW
Washington, DC 20009
(202) 884-8185

National Center for Research in Vocational Education (NCRVE)
University of California at Berkeley
2150 Shattuck Avenue, Suite 1250
Berkeley, CA 94704
(800) 762-4093 or (510) 642-4004

National Center on Adult Literacy (NCAL)
3910 Chestnut Street
Philadelphia, PA 19104-3111
(215) 898-2100

National Center for Family Literacy (NCFL)
Waterfront Plaza, Suite 200
325 W. Main Street
Louisville, KY 40404-4251
(502) 584-1133

National Issues Forums
The Kettering Foundation
100 Commons Road
Dayton, OH 45459-2777
(513) 434-7300

National Clearinghouse on Literacy Education
1118 22nd Street, NW
Washington, DC 20037
(202) 429-9292

Right Questions Project
(provides workshops that prepare low-income parents to support, monitor, and advocate for their children's education)
Contact: Ana Rodriquez (617) 628-4070

Study Circle Resource Center
P.O. Box 203
Pomfret, CT 06258
(203) 928-2616

Pennsylvania Organizations

AdvancE
Pennsylvania Department of Education Resource Center
333 Market Street, 11th Floor
Harrisburg, PA 17126-0333
(800) 992-2283 or (717) 783-9541

Regional Staff Development and Training Centers
(Ask your program administrator for information)

Pennsylvania Association for Adult and Continuing Education (PAACE)
P.O. Box 3796
Harrisburg, PA 17105

Western Pennsylvania Adult Literacy Resource Center
5347 William Flynn Highway
Route 8
Gibsonia, PA 15044-9644
(800) 448-5607 Ext. 216

Supplemental Materials

Commercial Materials

Contemporary Books
Two Prudential Plaza
Chicago, IL 60601-6790
(312) 540-4500
(*Skills for the Workplace* series teaches basic and higher order skills in realistic workplace contexts)

Critical Thinking Press & Software
P.O. Box 448
Pacific Grove, CA 93950
(800) 458-4849 or Fax: (408) 372-3230
(Supplemental books and software that emphasize critical thinking skills)

CTB Macmillan/McGraw-Hill
20 Ryan Ranch Road
Monterey, CA 93940-5703
(800) 538-9547 or Fax: (800) 282-0266
(*TABE Work-Related Problem Solving Test* and *TABE Work-Related Foundation Skills Test*)

Curriculum Associates
5 Esquire Road
North Billerica, MA 01862-2589
(800) 225-0248 or (508) 667-8000
(*A Day in the Life....* instructional software to develop basic and higher order thinking skills through job simulations)

Institute for the Study of Adult Literacy
204 Calder Way, Suite 209
University Park, PA 16801
(814) 863-3777
(*S.C.O.R.E.*--software to develop basic and higher order skills of customer service personnel; *Job-Linked Skills Program*-software to develop basic and higher order skills of health insurance employees)

Honoring Diversity: A Multidimensional Learning Model for Adults

By Leslie Shelton, Joan Sheldon Conan, & Holly Fulghum-Nutters (1992)

California State Library Foundation

1225 Eighth Street, Suite 345

Sacramento, CA 95814

(916) 447-6331

(Curriculum to help teachers and tutors provide a learning environment that is sensitive to learners' unique intelligences and learning styles. Based on Gardener's *Multiple Intelligences*)

Interactive Knowledge

P.O. Box 560865

Charlotte, NC 28256

(704) 344-0055 or Fax: (704) 344-1505

(Multimedia materials for learners in ABE programs, workplace programs, and family literacy programs)

New Reader's Press

Box 888

Syracuse, NY 13210-0888

(800) 448-8878

(*National Issues Forums* abridged edition issue books to explore issues such as the health care system, day care, AIDS, and the national debt with an emphasis on critical thinking skills; *Let's Work it Out -- Topics for Parents* series; *Can't We all Just Get Along* -- a curriculum to explore racism from a critical thinking perspective)

Trillium Press

PO Box 209

Monroe, NY 10950

(914) 783-2999

(*Reading, Writing, Thinking for Life-* - a problem solving series with a focus on higher order thinking skills applications in parenting)

Materials in PA State Resource Centers

PA 98-0024
"Obtaining and retaining employment: skill development beyond the basics"

PA 98-0040
"Parent/student study skills connection"

PA 98 1025
"Building reading, writing, and critical thinking in social studies through computer-supported intentional learning"

PA 98-1021
"Interactive health/wellness curriculum"

PA 98-2043
"ESL/adult literacy tax program instruction manual"

PA 98-2003
"Exploring the comprehension skills and strategies of ABE students"

PA 98-2006
"Reading, writing, and critical thinking in mid-sized businesses"

PA 98-2038
"Second wind: Bringing good coping skills materials to more adult students" (*What's a Parent to Do?; When a Relationship Seems Rocky; Staying Healthy is Up to You; When Money is Tight; Dealing with Death*)

PA 98-2025
"Self-esteem for parenting"

PA 98-2022
"Study skills for single parents"

PA 98-2011
"Unheard voices: A creative writing curriculum"

PA 98-2036
"Using drama to encourage critical thinking on critical issues"

Additional Readings

ERIC Materials

Fellenz, R. A., & Conti, G. J. (1989). *Learning and reality: Reflections on trends in adult learning.* Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

Imel, S. (1992). *Small groups in adult literacy and basic education.* (ERIC Digest No. 130). Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

Kerka, S. (1992). *Higher order thinking skills in vocational education* (ERIC Digest No. 127). Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

Lankard, B. A. (1992). *Cooperative learning in vocational education* (Trends and issues). Columbus, OH: ERIC Clearinghouse on Adult, Career, and Vocational Education.

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Section 3:

Curriculum Materials for Learners

Note to Teachers and Tutors

Section 3 contains materials for learners to learn about and explore their critical thinking, creative thinking, and metacognitive abilities. The materials may be used or adapted by a variety of programs. For example, some programs may use the materials without making any changes to them. Other programs, such as workplace literacy programs, may want to change the examples or scenarios in the activities to reflect work-related materials, situations, or concerns. Section 3 also contains a response sheet to keep track of the activities tried and responses to them.

The sample critical thinking activities provide learners with background reading about critical thinking, analysis, and evaluation as well as related activities to develop and practice the skills. The sample creative thinking activities provide learners with background reading about creative thinking, brainstorming and brain:calming, visualizing, and making connections as well as related activities to develop and practice the skills. The sample metacognition activities provide worksheets for learners to self-assess (or assess with your guidance) what they know about their thinking strategies and mental habits related to personal qualities, inner language, distractions, reading, writing, and math.

Each activity should be accompanied by guided class discussions that emphasize why the skills are important and when and how they can be applied in real-life situations. For example, learners in pre-GED programs can discuss how the critical thinking skills can be used in the GED workbooks and in their lives. Learners in workplace literacy programs can discuss how the creative thinking skills can be used to solve problems in the workplace.

Sample Critical Thinking Activities

Critical Thinking

Critical thinking means thinking **carefully** about what we read, see, and hear. It means looking beneath the surface to find the deeper meaning of the information we deal with in our daily life. With critical thinking, we judge the good and bad points of things. For example, suppose you see an ad in a magazine for a diet product. The ad says you can "lose weight *instantly*." At first, the product might seem like a good one. Then you ask yourself, "Can a person lose weight instantly?" Critical thinking tells you the ad cannot be true. People do not lose weight instantly. Even if we could, it would not be a healthy way to diet.

Critical thinking also means thinking carefully about our own thoughts and ideas. We don't have to say the first thing that comes to mind. We often need to take time to think about how to respond to a question or situation. Then we can support what we think with good reasons. For example, suppose your young child has a problem at school. He says his teacher has been treating him unfairly. You arrange to meet with the teacher. Before the meeting, you would think critically about the situation. You might ask your child for examples of how the teacher treats him unfairly. You might ask him how the teacher treats other children. You might explore his feelings about the situation. You might explore your own thoughts about the situation. You might think about what the teacher will say. Then, when you go to the meeting, you will be ready to discuss the situation in an organized way and have good reasons for your beliefs.

Critical thinking also means being honest about our own thoughts and ideas. We don't have to say what we think others want to hear. For

example, suppose you feel confused about something you are learning. You may feel uncomfortable asking for help. You may ignore the situation or even say you do understand. It's important to tell someone you are confused. It's important to take time to think about how and why you are confused. Then you can ask for the kind of help you need. In turn, your thinking will become more clear.

Critical thinking does not mean having a negative attitude. It does not mean finding fault with something or somebody just to criticize. For example, did a friend ever "put you down" when you talked about something you were proud of? How did you feel? You might say that friend has a "critical attitude." On the other hand, did a friend ever suggest something that helped you think more clearly? How did you feel? Your friend was thinking critically in a positive instead of negative way. True critical thinking is positive and helps you think more clearly.

Critical thinking is important for many reasons.

- The things other people say or do may be misleading. For example, magazine ads and television commercials use many "tricks" to get you to buy their products.

- The things other people say may be unclear. They may leave out information that could help you better understand. They may think you know something you don't. For example, read this sentence:

Set the torque meter to zero.

The writer assumes you know what a torque meter is. The writer assumes you know how to set it. This sentence is hard to understand if you don't already know these things.

- Everyday we deal with complex information and situations. For many issues, there are no right and wrong answers. We need to take time to figure them out for ourselves. We have to decide what we think and why.

- People do not always say what they mean. For example, a person might say something as a joke. If we don't notice the joke, we might think the person is serious.

Directions: Answer these questions about critical thinking.

1. Discuss critical thinking in your own words.

2. How is critical thinking different from a critical attitude? Give an example from your life when someone was critical in a negative way. Give an example when someone was critical in a positive way.

3. Give some examples of how you can use critical thinking in your life. For example, how might you use critical thinking with your family? in class?

4. How can critical thinking help you solve problems and make decisions?

5. Think about something difficult you have to do in the near future. How can critical thinking help you accomplish this task?

Analysis

Analysis is an important part of critical thinking. Analysis means **looking closely at the parts** of what we read, see, and hear. Looking closely at the parts helps us better understand the whole. For example, suppose your car shakes when you drive it. You probably aren't sure why it shakes. You might look at different parts of the car, like the tires and the steering. You might listen for certain sounds, like scraping noises. In short, you would analyze the parts to find out why the car shakes.

When we look closely at the parts, we also look at how the parts affect each other. Let's look at the car example again. One part of the car affects another. For example, a lump on a tire might make the steering shake. Or, something loose in the steering might make the tires shake. It's important to look at how the parts affect each other.

Now let's look at some ways to analyze the parts of what we read. We might look at the language in the selection. Is it serious or funny? Are there facts or opinions? We might also look at the author's purpose for writing. Did she want to convince, inform, or amuse us? Usually, the author's purpose determines the kind of language he or she uses. All of these things work together to affect what we think of the whole reading selection.

When we analyze, we also need to think about different points of view. That helps us get a "big picture" of the information or situation. Take the car example. Maybe the shaking problem isn't in the car at all. Maybe the road is rough. Let's look at another example. Suppose you go to a parents' meeting about guns in the schools. A speaker thinks the

schools should search lockers without the students' permission. Some parents agree with him. Other parents think searching lockers goes against students' civil rights. People may never agree. But each side needs to work to see the other's point of view. They need to get a "big picture" of the issue. That will lead to a deeper understanding of the situation. It will help the group find ways to deal with the problem.

We can also analyze our own thoughts and ideas. One way to do this is to ask ourselves questions. For example, suppose you are unsure how you feel about students' rights. You can ask yourself questions to sort out your thoughts. A good place to start is with the questions, "who, what, where, when, why, and how?" For example:

- Who is involved?
- What is each person's point of view?
- Why do they think this way?
- What do I think? What are my reasons?
- Where can I get more information?
- What questions will people ask me about my beliefs?
- Where and when is this issue important to me?
- How might this issue affect my life?

All of these things help us think critically. They help us analyze what we read, see, and hear. They help us analyze our own thoughts and ideas.

Part 1 Directions: Read each memo. Then read and answer the questions that help you analyze and compare the parts of each memo.

MEMO
Date: July 14
From: John Gold, President
To: All employees
Re: Promotions

Check the bulletin boards for openings in your area. The following appears on p. 7 of your contract:

Article VI
1.1 When an opening occurs, first preference shall be given to employees with the greatest skills and abilities. The department supervisor has the exclusive right to determine an employee's qualifications for promotion. When all applicants are judged to be equal in skills and abilities, department seniority shall then be considered.

MEMO
Date: July 14
From: Jay Black, President
To: All employees
Re: Promotions

It's the time of year when people ask about promotions. Check the bulletin boards for openings in your area.

We want to help employees move up in the company. Our system for giving promotions is fair to everyone. We look at a person's skills and abilities and how long he or she has been with the company. Everyone has an equal chance to be considered for promotion. For more information, check Article VI of your contract.

What is the purpose of the memo?

#1

#2

What kind of words are used? What is the tone? How does it affect you?

#1

#2

How are the two memos alike?

How are they different?

Which memo do you like? Why?

Who would you rather have for a boss, John Gold or Jay Black? Why?

Part 2 Directions: This exercise will help you explore other points of view. For each scenario, give each person's point of view. List the reasons why the person might think that way.

Scenario 1: In October, you wrote a note to your boss telling him you were invited to a wedding on November 11. He said you could have the day off. On November 1, everybody received this memo:

> There will be a special sale on Saturday, November 11. All prices will be marked down 25%. We expect more customers than usual on that day. No one may take vacation that day.

Your point of view:

Reasons:

Boss' point of view:

Reasons:

Scenario 2: You are going on a job interview in a few days. List 3 questions the person might ask you. What are her reasons for asking these questions? How will you answer her? What are your reasons?

Questions:

Reasons:

Your answers:

Reasons:

Scenario 3: You have been asked to help a day care program deal with a complex problem. A young child at the center has tested positive for the HIV virus. The child's parents both work full-time. The day care program is their only option for day care. Some workers and parents at the center have learned of the test results. They have copies of an article that says AIDS can be transmitted through saliva. Parents are threatening to picket outside the building if the child is not removed. Some workers are threatening to walk off the job. A meeting will take place one week from today. At that time, you will present a "big picture" of the problem to the parents, workers, and management.

Child's parents point of view:

Reasons:

Other parents' point of view:

Reasons:

Workers' point of view:

Reasons:

Management's point of view:

Reasons:

Evaluation

Critical thinking also involves evaluation. Evaluation means **judging** the parts of what we read, see, and hear. We use evaluation to decide how good information is and whether we should believe it. For example, suppose you go to a town meeting. A speaker says the town should build a mall. You might ask him why he thinks the way he does. You might ask him where he gets his information. You might weigh the good and bad points of what he says. All of these things help you evaluate the information and the situation. We also use evaluation to judge our own thoughts and beliefs. Often, we can't just say what we think. We need to say why we think the way we do. And we need to have good reasons.

One way to evaluate what you read, see, and hear is to **judge the information** itself. Ask yourself:

- Is the information supported with reasons? Are they good ones? Suppose the speaker says a mall would create jobs. Is that a good reason? Or, suppose he says a mall would be good for the town. Which reason is better?
- Is the information current? In the example above, suppose the speaker says the town has many people out of work. Is that true? Maybe a new plant just hired many people in the town.

You can also **judge the source** of the information. Ask yourself:

- Where does the information come from? Does the source have any reason to distort the information? In the example above, maybe the speaker is a builder. Maybe he is the mayor. Who is a better source?

• Can the source be trusted? Has the source been right (or wrong) in the past? For example, maybe the speaker has been involved in community development in the past. Have his ideas been good ones?
• Is there another, perhaps better, source of information? A different speaker may point out reasons why a mall might be bad for the town. For example, a mall would cause more traffic.

We can also **look at the values** behind what someone says or does. Values are the things and beliefs people think are important. In the example above, some people think the town needs a mall. They value economic growth. Other people think that a mall would destroy the beauty of the town. They value beauty more than money. Each point of view holds a different value. To evaluate in this way, ask yourself:
• What are the values behind this information?
• Does the information make sense with your values? Is it important that your values agree?

Another way to evaluate is to **weigh the good and bad points** of different points of view. In the example above, you might write down all the good points about having a mall. Then you might write down all the bad points. Are there more good points or bad points?

Remember, evaluation is an important part of critical thinking. Use it whenever you need to look closely at information or situations. Evaluation helps you weigh the good and bad points of the information or situation. It also helps you look closely at your own thoughts and ideas.

Part 1 Directions: Read about these problems. Put an X beside the best source of information.

1. Angela wants to help her child stop biting his fingernails.
   _____her child's doctor
   _____her ex-husband
   _____*Reader's Digest* magazine

2. Robert wants to find out how to write a good resume.
   _____the library
   _____his neighbor
   _____*Working Woman* magazine

3. Carol is going to college. She needs information about school loans.
   _____her minister
   _____her school guidance office
   _____the *Job Service* office

4. Jose wants to find out more information about the people who are running for mayor.
   _____his coworkers
   _____the newspaper
   _____the current mayor

Part 2 Directions: Read these arguments. Then read the questions that follow. Write yes or no in the space.

1. People under age 18 should stay in school. They should not be allowed to work. In the past, they had to work to help their families. But today, young adults do not have to work.

   Is the information current? _____
   Is the argument supported with reasons? _____
   Are they good reasons? _____
   Does the argument make sense with your beliefs? _____

2. People who earn minimum wage make enough money to support their family. They do not need government help.

Is the information current? _____
Is the argument supported with reasons? _____
Are they good reasons? _____
Does the argument make sense with your beliefs? _____

3. I don't think people should be allowed to smoke in public. Their smoke bothers the people around them. That's just they way I feel.

Is the information current? _____
Is the argument supported with reasons? _____
Are they good reasons? _____
Does the information make sense with your beliefs? _____

Part 3 Directions: Read these points of view. Put an X beside the sentence you think is true.

1. Radio stations should not be allowed to play music that has violent language or dirty words.

_____ This person values free speech.
_____ This person values censorship.

2. The government should provide food, health care, and housing to people who don't have these things.

_____ This person values compassion.
_____ This person values individual responsibility.

3. Parents should not be allowed to spank their children.

_____ This person values the rights of parents.
_____ This person thinks the government should have some control over what happens in people's homes.

Part 4 Directions: Turn back to page 36. Look at the day care problem again. Evaluate each person's (or group's) point of view. Discuss the strong points and the weak points of each point of view. Which person (or group) has the best argument? Why do you think this way?

Child's parents

Other parents

Workers

Management

Who do you think has the strongest or best argument? Why?

Part 5 Directions: This activity will help you make a case and evaluate it. Choose the question you want to answer. Take the side that is closest to what you believe. Then answer the questions below.

Question 1: What causes unemployment?
Side 1: Lack of jobs
Side 2: People don't want to work

Question 2: Why do people commit crimes?
Side 1: They can't help themselves
Side 2: Problems in society, like violence on TV and poverty

What are your reasons for choosing this side?

Suppose another person chose the other side. What might he or she ask you about your point of view?

What values do your beliefs reflect?

When did you form your beliefs? Who influenced your beliefs?

Have your beliefs changed? When and why did they change?

Critical Thinking and Television

Americans of all ages watch a lot of television. We watch TV for many reasons. Sometimes we watch TV just to relax and be entertained. Sometimes we watch TV to get information. In fact, many Americans get most of their information about what is happening in the world from television. But watching too much television is not always a smart way to spend our time. We are usually passive when we watch television. That means we sit and take in the information without giving it much thought. Some people think that watching TV in this way can be harmful. It keeps us from exercising our minds and bodies. It influences the way we think without our even knowing it.

Watching television is a good time to practice critical thinking skills. You have to be active and pay close attention. You may be surprised at what you discover! You can explore:

- how television ads influence your (or your children's) thinking;
- how TV "twists" the truth;
- how much time you (or your children) spend watching TV;
- what you (or your children) really do when you watch television;
- how television shows reflect certain values, such as respect for older people.

Watching television critically can help you in several ways.

- You can become a more informed shopper. For example, you will notice advertising tricks that get your attention and appeal to your emotions. You will recognize how ads influence your thinking. You will recognize how ads influence what you buy.

• You can take more control of how television influences your family life. For example, you can keep track of how much time family members watch television. You can discuss the good and bad points of what happens in shows. You can compare TV family's values to your family values.

Part 1 Directions: Watch some commercials and think about these questions. After you watch the ads, write your answers here:

1. What is the purpose of the ad?

How is the product presented?

What kinds of tricks are used to get your attention?

What emotions does the ad appeal to? Who does it appeal to?

What conclusions do they want you to make?

2. What kinds of ads are shown on:

sports shows?

family shows?

children's cartoons on Saturday morning?

soap operas?

MTV or VH1?

3. What kinds of ads are shown during different times of the day? Who do they appeal to?

4. Why do you think different ads are shown at different times and during different programs?

5. How do television ads influence your thinking? How can you use what you learned?

Part 2 Directions: Watch some campaign ads on television and think about the following questions. Try to watch at least one ad from each political party.

What is the purpose of the ad?

#1

#2

What is the tone? How does it affect you?

#1

#2

What kind of language is used? (serious, funny, formal, slang)

#1

#2

What kinds of tricks are used to get your attention?

#1

#2

What emotions does the ad appeal to? Who does it appeal to?

#1

#2

Are there facts or opinions? How do you know?

#1

#2

What isn't said? Is any important information left out?

#1

#2

What conclusions do they want you to make?

#1

#2

Suppose a person is undecided about his or her beliefs. Which ad is more convincing? Why?

Does one of the ads reflect your beliefs or values? Would you add or say anything else to make it more convincing?

Part 3 Directions: Read over this worksheet. Watch a television show about families. Examples of family comedies are *Blossom, Cosby, Fresh Prince, Full House,* and *Roseanne.* Examples of family dramas are *I'll Fly Away, Little House on the Prairie, Picket Fences, Sisters,* and *Waltons.* Then answer the questions below.

1. What did you like about the show? What did you dislike?

2. What problem did the main character have?

3. How was the problem solved?

4. How did the person's values affect the situation?

5. Do you have the same values? If not, what are your values?

6. Do you agree with the way the problem was handled? Why or why not?

7. Suppose you want to discuss the show with a child. What are some questions you could ask?

Sample Creative Thinking Activities

Creative Thinking

Creative thinking means **using our imagination** and intelligence to think of new ideas. It means looking at the world in new ways to solve problems and make decisions. Many people think the word "creative" means artistic. They think of great artists and works of art. That's one way to be creative. But there are many ways to be creative. All of us think creatively every day. For example, we think creatively when we daydream about the good life. Comedians use creative thinking when they make us laugh about the things that happen. Teachers think creatively when they make information "come alive" for us so we can understand it.

We use creative thinking to solve problems. For example, we use creative thinking when we fix a broken chair with a phone book. We use creative thinking to come up with new ideas, such as when we think of ways to entertain children when they are bored. We also use creative thinking to adapt to the many changes we face in our lives. You may know someone who lived through a hard time by using what they had in new ways. For example, people have used dishwater to water their plants during a dry spell.

Sometimes we need to allow time for our creative ideas to grow in our mind. For example, suppose you have a difficult problem to solve. The solution to a problem isn't always clear right away. It takes time. Being stuck and trusting that we <u>will</u> solve the problem is often part of the creative process. We may need to give our ideas time to develop.

Directions: Answer these questions about creative thinking.

1. Do you know anyone you think is very creative? What is that person like?

2. Give some examples of how you use creative thinking. For example, how do you use creative thinking with your children? in class? at work?

3. How can creative thinking help you solve problems and make decisions? How can it help you reach your goals?

4. Think of a something you have to do in the near future. How can creative thinking help you?

Brainstorming

Brainstorming is one way to encourage creative thinking. When you brainstorm, you try to think of as many ideas as you can. Don't analyze or judge your ideas when you brainstorm. Just let all your ideas come out, including the wild and crazy ones. Wild ideas often give birth to new or better ideas. Write your ideas on paper as you think of them. That will help you remember them.

You can also use brainstorming with a group of people. Brainstorming with a group has advantages. People encourage each other's creativity. For example, one person may say something that makes you think of a new idea. When you brainstorm with a group, be sure everybody knows the rules:

1. Choose one person to write down the ideas.
2. Let the ideas come out.
3. Don't evaluate the ideas at first.
4. Don't pass judgment on your own or anyone else's ideas.
5. Be sure everyone contributes.
6. Decide as a group when you run out of ideas.

The opposite of brainstorming is braincalming. It is another way to encourage creative thinking. Braincalming frees your mind of thoughts and worries. It is like meditating and it quiets your mind. Braincalming also helps your ideas "take root." For example, braincalming often happens on vacations. When you're on vacation you don't have as many demands on your time. You begin to relax. Suddenly, ideas begin to flow or become clear in your mind.

Part 1 Directions: Here are some brainstorming topics. Do #1 and #2 by yourself. Brainstorm #3 and #4 with a group.

#1: Write down all the things your are good at, even the silly ideas.

#2: Write down all the ways you spend money.

#3: You work at a job where you hardly ever see other people. Write down all the ways you can get to know people at work.

#4: Write down everything you think would happen if children had no rules to guide them.

Part 2 Directions: Here are some braincalming activities you can try. If they work well for you, use them when you want to quiet your mind.

#1: Close your eyes. Take a deep breath. Exhale slowly. Try to keep your breathing steady and even. Listen to the sound of your breathing. Don't pay attention to anything else. Do this for a few minutes.

#2: Now, combine activity #1 with a daydream about your favorite vacation spot. Practice breathing slowly and quietly. Picture in your mind the place that makes you relax. Picture yourself in that place. Keep the picture in your mind as you breathe slowly and quietly. Do this for a few minutes.

Visualizing

Visualizing also helps us think creatively. When we visualize, we make **pictures of information or ideas** in our mind. The pictures (or images) we make help us better understand the world. For example, visualizing helps us think and remember more clearly. We see information or ideas in more detail. We remember the information for longer periods of time.

One way to visualize is to see things in your "mind's eye." What is your mind's eye? Say the word "explosion" to yourself. Do you picture it in your mind? Maybe you see movement and action when you think of the word. Maybe you even hear it in your "mind's ear." Visualizing in your mind's eye makes information and ideas come alive.

You can use your mind's eye in different ways. For example:

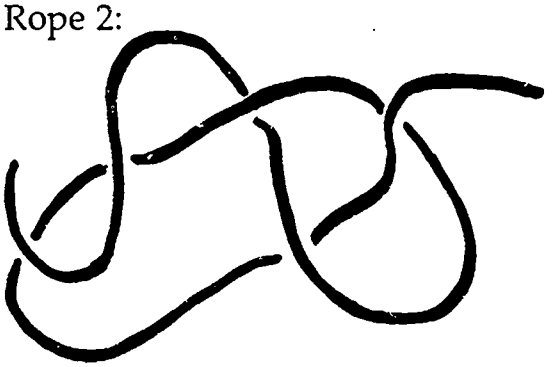
- Use your mind's eye when you read. Try to picture what you read and make it come alive in your mind. Feel it, smell it, hear it, see it moving when you can.
- Use your mind's eye when you solve math problems. Try to picture the problem and all its parts. Try to see the steps you will take to solve it. Picture yourself successfully solving the problem.
- Use your mind's eye to work on all your goals. For example, suppose you are working toward a degree. Picture in your mind how you want things to turn out. See yourself working hard to reach your goal. Picture yourself sticking with it, even when you make mistakes. Picture yourself correcting your mistakes and moving toward your goal again. See yourself at graduation and on the job.

Visualizing really works! In fact, some doctors even use it to help cancer patients get well. Make the technique work for you.

Part 1 Directions: This activity will help you use your mind's eye. First, look at these pictures of rope. Imagine that you pull the ends. Picture it in your mind. Which ones will make knots? Did you see the ropes in your mind? You were using your mind's eye.

Rope 1:

Rope 2:



Now, use your mind's eye to picture a problem you have to solve in the near future. Imagine yourself in the situation. Picture it turning out the way you would like things to happen. See yourself succeeding at solving the problem. Practice this exercise every day until you have to work on the problem. Use the technique while you solve the problem, also.

Part 2 Directions: Read the two paragraphs. Which one do you like better? Which one did you see more clearly in your mind's eye? Why? Underline words or phrases that helped you visualize.

Paragraph #1:

The queen bee is very different from the worker bees. There is only one queen bee in a hive but there may be hundreds of worker bees. The queen bee's body is longer and she has teeth in her jaws. Her stinger is smooth and she can remove it from her victim. A worker bee's stinger has sharp barbs on it. The stinger remains in the prey and the worker bee dies trying to remove it.

Paragraph #2:

The queen bee and the worker bees are amazingly different. The queen bee is truly a "queen" in the hive. There may be hundreds of worker bees. There is only one queen and the worker bees treat her like royalty. The queen's body is much longer than the worker bee's. Her jaws have sharp cutting teeth. Her stinger is smooth and curved. She can easily remove it from the flesh of her victim. She can sting again and again. The worker bee's stinger has barbs on it. The needle sharp barbs stay in the flesh of the victim. The worker bee dies as it tears away part of its body trying to remove the stinger.

Making Connections

Another way to think creatively is to make connections. When we make connections we try to **see how things or ideas are related**. We try to see how they are the same. We may say or think to ourselves, "This reminds me of.... " or "This is like....." For example, suppose you already know something about a pump. Now you are learning about the human heart. Thinking about the pump can help you better understand the heart. They work in similar ways.

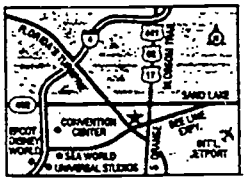
Making connections in this way helps us solve problems. For example, suppose your boss asks you to take on more responsibility at work. You may be unsure of how to finish all the new tasks. You might think about how you managed more responsibilities when your children were born. You could try some of the same techniques at work. Or, suppose you are learning a new skill, such as how to use files on the computer. You might think about how you look for paper files in a file drawer. You could try some of the same techniques on the computer.

When we make connections, we also see how things can be used in different ways. We look at ordinary, everyday items in a new way. For example, one inventor looked at woodpeckers to get ideas for football helmets. Another looked to burrs and invented Velcro™. People use charcoal to draw with when they don't have pens or crayons.

Making connections is an important part of creative thinking. They help to make conversation and writing more interesting. They help to make life in general more interesting. Practice the activities on the next two pages. Use the ideas to encourage your own creative thinking and problem solving.

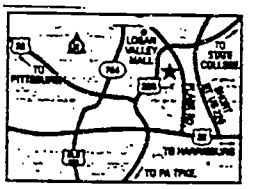
Part 1 Directions: This activity will help you use what you know to solve a problem. Look at the map. Do you see anything familiar on it? Use what you already know to figure out the state.

#1:



State_____

#2:



State_____

Part 2 Directions: Practice looking at things in a different way.

#1: Think of 10 uses for a library (besides looking up information).

#2: Think of 10 things to do with a paper bag (besides using it for garbage or groceries).

#3: Think about something you use on your job. Think of 5 other ways to use it.

Part 3 Directions: This activity shows how connections make ideas or information more interesting.

#1: This activity involves analogies. Analogies are comparisons. Have you ever heard the expression, "Life is like a football game." Think of the comparisons in the expression. People take sides, they cooperate with the people on their team, they try to win the game. Finish these analogies and explain what you mean.

Laws are like

A garden is like

#2: Sometimes connections don't seem to make sense. For example, think about the phrase "pleasing pain." The two words seem to have opposite meanings. Have you ever exercised when your body hurt but it made you feel better? Try to think of examples that show how these phrases make sense.

honest thief

fun fear

healthy poison

Sample Metacognition Activities

Factors that Affect Thinking

Part 1 Directions: This worksheet will help you explore some of the factors that affect thinking. Look at each factor. Think about how it affects your thinking. Decide if it is something you use and control to your advantage. Then write one of the following numbers in the space:

1 - use often
2 - use sometimes
3 - hardly ever use

Personal Qualities

motivation _____
curiosity _____
persistence _____
confidence _____
health _____
control _____
attention _____
memory _____
feedback _____

Do other personal qualities affect your thinking?

What are your two strongest qualities?

What two qualities would you like to work on?

Sources of Information

books from library _____
personal experience_____
magazines _____
newspapers _____
family _____
friends _____
coworkers _____
professionals _____
computers _____
government _____
TV, movies _____

Do other information sources affect your thinking?

Which sources of information do you use most often?

Which sources of information would you like to use more often?

Support Systems

family _____
friends _____
coworkers _____
community _____

Do other support systems affect your thinking?

Which support system is your strongest?

Which support system would you like to improve?

Part 2 Directions: The way people act often reflects the way they think. This worksheet will help you explore other people's thinking. For each scenario on the following pages:

- Identify the personal qualities, sources of information, and support systems that affected each situation.

- Think about how these factors affected the outcome in each situation. For example, sometimes a factor may have a positive effect, such as when a person stays with a task until it is completed. Sometimes a factor may have a negative effect, such as when a person doesn't listen to the feedback he gets from someone else.

- Think about other factors the person might develop or use to his or her advantage.

Scenario #1

Brenda is a single mother of three school-age children. She lives in the same town as her mother and grandmother. She often calls on them to baby-sit her children. Brenda works in the emergency room of Rosewood Community Hospital. She has an average income but struggles every month to make ends meet. Her ex-husband does not make reliable or regular child support payments.

It's the middle of January and two of her children are sick with the flu and won't be able to go to school the next day. Brenda does not want to expose her mother or grandmother to the virus. But she can't take any more time off work. Brenda begins that night to call friends and neighbors to find a sitter. After ten calls, she still hasn't found anyone. She feels discouraged but thinks she hasn't explored all her options yet. She looks through the phone book but doesn't come up with any ideas there. Then she remembers a pamphlet she got from a local parent's group. She calls them and they give her phone numbers for emergency child care providers in the community.

Personal qualities Brenda used to her advantage

Personal qualities she could develop

Sources of information she used

Sources of information she could have used

Support systems she used

Support system she could develop

Scenario #2

Cal is training for a sales position at the Clean Sweep Industrial Vacuum Company. The company has 5,000 employees and is the largest employer in the city. Cal has almost memorized the training manual. His trainer, Virginia, is impressed with the amount of information Cal remembers. Cal is going to make his first sales call. Virginia is going with him to observe and offer feedback. Cal will meet with Mr. Kirby, the equipment and supplies buyer for a hotel chain.

During the call, Cal asks questions about the vacuum system the hotel chain currently uses. Mr. Kirby describes the product. Cal asks him why they are looking for another product. Mr. Kirby starts to respond but Cal begins to describe the features of the Clean Sweep Industrial Vacuum. Virginia suggests that Cal explore why Mr. Kirby is unhappy with his current product. But Cal asks Mr. Kirby if he would like to buy the Clean Sweep Industrial Vacuum.

Cal asked the right questions. He correctly described the product. But Mr. Kirby did not buy the product. Virginia suggested that Cal work with an experienced employee on sales calls.

Personal qualities Cal used to his advantage

Personal qualities he could develop

Sources of information he used

Sources of information he could have used

Support systems he used

Support systems he could develop

Inner-Language

Our thoughts are made up of words and pictures (images). The words in our thoughts are sometimes called our "inner-language" or "self-talk." Sometimes our inner-language is clear, such as when we know exactly what we think and why. Sometimes it is mixed up, such as when we have trouble understanding a difficult reading. Our inner-language can also be negative or positive. For example, when we remind ourselves of our strong points, our inner-language is positive. It is negative when we say things in our head like, "I hate this" or "I won't ever be able to do this."

Our inner-language can help us reach our goals. It can also keep us from completing the tasks we set out to do. It's important to find out when and how our inner-language helps us and hurts us. Then we can work to control it so it helps us more often. Some people say we always have the power to control our thinking so it helps us.

Directions: This activity will help you explore your inner-language. Read over this worksheet. Don't do any writing at first. Try to notice when your inner-language is positive and negative. It may take many weeks or months for you to become familiar with your self-talk. When you are ready, use this worksheet to write about what you observe. Or, you may discuss this worksheet in class with your teacher or other class members. (You may also want to keep a journal to become more aware of your own inner-language. Discuss this idea with your teacher.)

Positive inner-language (Write about what you were doing.)

Negative inner-language (Write about what you were doing.)

Think about some things you have to do in the next few weeks. Can you predict when your inner-language might be negative or positive? Why?

Would you like to be able to change negative self-talk into positive self-talk? If so, write about how you will do this.

Can you control negative "self-talk?" If so, how do you control it?

Do you see any connections between your self-talk and your personal qualities? For example, does your self-talk help or hurt you when you have to persist with a task?

Have you noticed any growth or changes in your self-talk? If yes, explain what you have noticed.

Exploring Distractions

Directions: This activity will help you explore when and how you think best. Put an X in the space that describes the way you prefer to think, read, or solve problems.

When I have to read or study something hard, I like to

_____be alone in a quiet spot.

_____read and discuss it with another person.

_____(you fill in) _____

When I want to relax, I like to be in:

_____a soft chair and a quiet room.

_____the out-of-doors, in the sun and fresh air.

_____(you fill in) _____

When I have to think about something new or difficult, I do my best thinking in:

_____the morning.

_____the afternoon.

_____the evening.

_____late at night.

List one thing that keeps you from concentrating. For example, is it the telephone or a family member? How can you work around this distraction?

When I have more than one thing to do, I usually start with:

_____the easiest.

_____the most difficult.

I do my best thinking

_____ after I've eaten.

_____ before I've eaten.

When I am thinking about something difficult, I get distracted by:

_____things outside myself, such as who just walked by.

_____things inside myself, such as negative self-talk.

_____other responsibilities I have to meet.

_____ (you fill in) _____

When I avoid what I have to learn or think about, I usually:

_____talk to or call someone on the phone.

_____turn on the television.

_____get something to eat.

_____(you fill in) _____

Did any of your answers surprise you? If so, why?

How can you use this information about yourself?

Thinking and Reading

Directions: This worksheet will help you explore how your thinking guides you when you read. Put an X in the space that describes what you do most often.

Before you read, do you think about:

	Yes	No
why you will read?	_____	_____
what you know about the topic?	_____	_____
how you will read it? (all of it or parts of it; fast or slow?)	_____	_____
why it might be hard to read?	_____	_____
what you want to find out?	_____	_____

While you read, do you think about:

	Yes	No
what will happen next?	_____	_____
whether it makes sense?	_____	_____
why you do not understand it?	_____	_____
what will help you understand it?	_____	_____
what will help you remember it?	_____	_____

After you read, do you:

	Yes	No
think about what you learned?	_____	_____
go over the information? (aloud, in your head, or on paper)?	_____	_____
put the information in your own words?	_____	_____
think about how to use the information?	_____	_____

Directions: Finish these sentences.

I am really good at reading

When I do not understand what I am reading, I get the following signs:

One thing that helps me understand what I read is

Reading is hardest for me when

I would like to work on

Thinking and Math

Directions: This worksheet will help you explore how your thinking guides you when you solve math problems. Put an X in the space that describes what you do most often.

Before you solve a math problem, do you think about:

	Yes	No
what you have to find out?	_____	_____
where you get the information to solve the problem?	_____	_____
if the problem is like any you have solved before?	_____	_____
the steps you should take to solve the problem?	_____	_____

While you solve a math problem, do you:

	Yes	No
break the problem into small steps?	_____	_____
check your work as you go along?	_____	_____
make a "picture" to solve the problem?	_____	_____
think through the problem out loud?	_____	_____

After you solve a math problem, do you:

	Yes	No
ask yourself if the answer makes sense?	_____	_____
check your work again?	_____	_____
ask yourself if there might be more than one answer?	_____	_____

Directions: Finish these sentences.

I am really good at math when

I am pretty sure I am not solving a math problem correctly when I

One thing that helps me solve math problems is

Math is hardest for me when

I would like to work on

Thinking and Writing

Directions: This worksheet will help you explore how your thinking guides you when you write.. Put an X in the space that describes what you do most often.

Before you write, do you think about:

	Yes	No
who will read it?	_____	_____
why you are writing?	_____	_____
what you will write about?	_____	_____
how you will organize your ideas?	_____	_____

While you write, do you think about:

	Yes	No
including everything you want to say?	_____	_____
whether the sentences flow together?	_____	_____
whether the paragraphs flow together?	_____	_____

After you write, do you think about:

	Yes	No
how clearly it is written?	_____	_____
how it is organized?	_____	_____
the grammar?	_____	_____
the punctuation?	_____	_____
the spelling?	_____	_____
who else might want to read it?	_____	_____

Directions: Finish these sentences.
My strongest points in writing are

I have a hard time writing when

One thing that helps me write is

I would like to work on

Response Sheet

Response Sheet

Briefly describe:

Activity

Materials

Methods

Skills developed by the activity

What worked

What didn't work

What you would do differently

What you would do the same

Learners liked/disliked (circle one) this activity because

Specific reactions from learners include

For Your Own Reflection

From this experience I've realized

I may need to reconsider my beliefs about

Some questions this raises for me are