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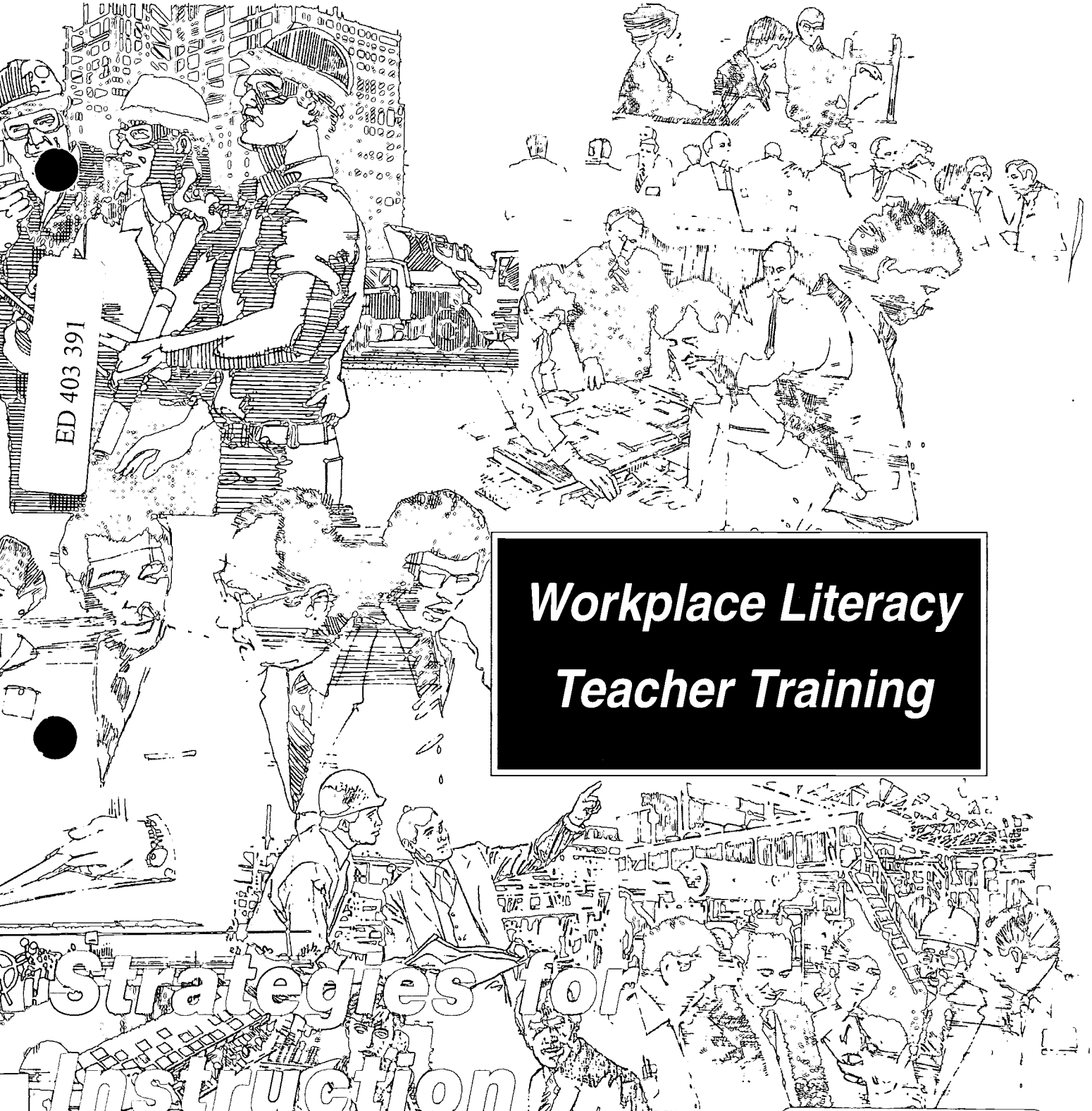
ABSTRACT

These four learning guides comprise one of four packages in the Workplace Literacy Teacher Training series that provides information and skills necessary for the user to become a successful instructor in an effective workplace literacy program. The guides in this package focus on the skills at the heart of such programs--communication, reading, mathematics, and English as a Second Language (ESL)--and present effective strategies for teaching them in the workplace context. Each guide consists of these components: introduction, objectives, list of activities to help meet the objectives, readings followed by questions for reflection, application activity, evaluation guidelines, and annotated bibliography. The first guide on communication introduces and explains the whole language perspective and describes the Language Experience Approach. The second guide focuses on the use of authentic reading experiences to teach reading. It summarizes reading skills typically needed in the workplace, discusses roles of modeling and metacognition in teaching reading skills, and describes approaches to help learners decode workplace vocabulary to construct meaning. Mathematics skills typically needed in the workplace are addressed in the third guide, which presents teaching strategies that focus on helping learners use mathematical symbols and strategies to solve real workplace problems. The fourth guide reviews the overall ESL program development process and covers detailed guidelines and strategies for teaching ESL in a workplace context. Contains 28 references. (YLB)



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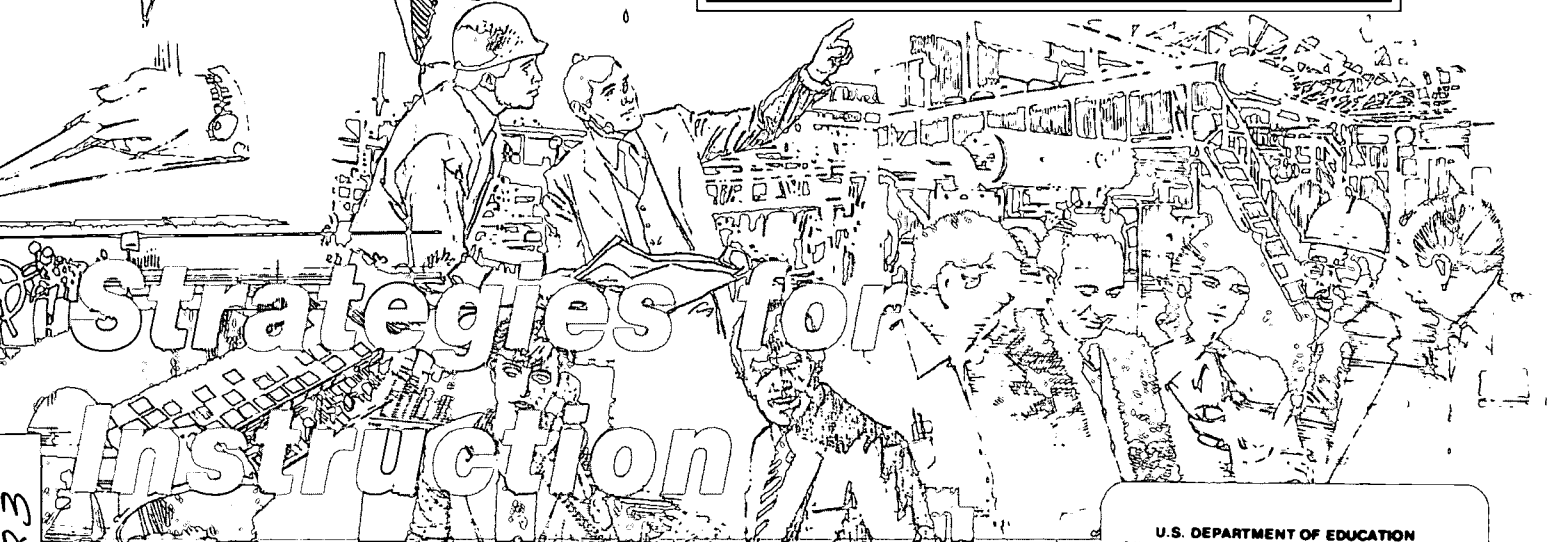

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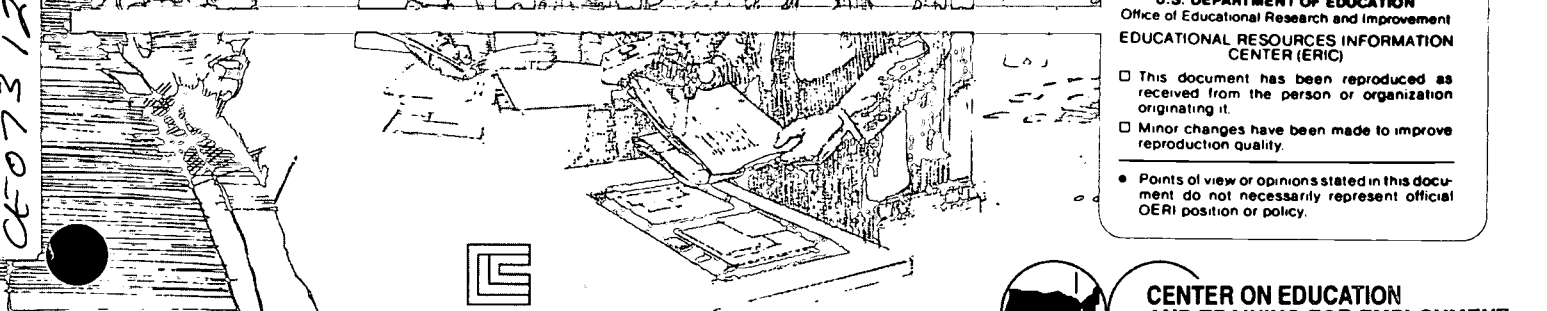

COLLEGE OF LAKE COUNTY

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
COLLEGE OF EDUCATION
THE OHIO STATE UNIVERSITY

Communications Strategies Reading Strategies Mathematics Strategies ESL Strategies

Workplace Literacy Teacher Training: Strategies for Instruction

This package contains the following learning guides:

- *Employ Strategies for Communication Instruction*
- *Employ Strategies for Reading Instruction*
- *Employ Strategies for Mathematics Instruction*
- *Employ Strategies for ESL Instruction*

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Preface

When the College of Lake County workplace literacy program staff approached us about the possibility of developing some teacher training materials to enhance their programming, the timing was ideal. At the Center on Education and Training for Employment (CETE), we were just completing our second major multi-year National Workplace Literacy Program grant, complemented by ongoing work with a series of clients over the same period of years on refining systematic processes for assisting work-based learning.

A salient driving force—indeed, evolving into our passion—was the vision of how teachers trained in the synergistically combined processes of problem-based learning, metacognitive reflection, and learner generation of job-context curriculum could become the instruments of learners' capitalizing on their own expertise and potential. We were motivated to generalize beyond the College of Lake County's specific needs to capture this vision.

The proposed learning guides were divided up among seasoned staff for draft development. Then they were subjected to intensive review and enhancement by each of the content advisors (Johanna DeStefano, Susan Imel, and myself)—three individuals who had joined their diverse perspectives successfully over the years, evolving into a team with considerable expertise in workplace learning. Finally, the consistency and coherence of the materials was crafted by Lois Harrington with an unerring sense of the components of curriculum.

It was my pleasure to coordinate the contributions. I would like to express my appreciation on behalf of CETE to the College of Lake County for the farsighted thinking of its workplace literacy staff and for giving us the opportunity to stop and take stock of what we have learned for the purpose of sharing it.

Sandra G. Pritz
Curriculum Project Director
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Foreword

Ninety-five percent of the instructors in the College of Lake County's Community Education and Economic Development Division are part-time instructors. It is from this division pool of instructors that the National Workplace Literacy Program draws. Many of them have long-time teaching experience in classroom-based adult education—but usually no experience in the workplace setting or with outcome-based instruction. Thus, staff development for part-time instructors is an ongoing process. Even though an orientation to the program and a series of workshops effectively address some of their needs, more options for gaining workplace education knowledge is necessary to help the instructors make a successful transition into the workplace. Supplementing the more "traditional" forms of staff development with a series of self-study teacher training materials was the plan.

One of the main objectives of the National Workplace Literacy grant at the College of Lake County (CLC) is to provide adequate and appropriate staff development for workplace literacy instructors. In order to fulfill this objective, CLC worked in conjunction with the Center on Education and Training for Employment at The Ohio State University to develop this plan and offer an effective alternative approach to workplace literacy staff development.

The materials have been piloted by the CLC workplace instructors, and the feedback has been positive concerning their coverage of workplace content and context as well as their provision for a variety of professional development options. This model has allowed the instructors to enhance their professional skills and knowledge, to share their philosophies and ideas with grant staff and workplace personnel, to gain sufficient exposure to resources, and to improve the quality of instruction.

The National Workplace Literacy Program hopes that by making these packages available, other educational programs and/or businesses will be able to utilize and adapt the materials to fit their workplace literacy programs and to foster the growth of their instructors as professionals in a new and exciting field.

Mary Kay Gee, Director
National Workplace Literacy Project
College of Lake County

Introduction

The functional context of the literacy program is the workplace. The literacy skills to be taught derive from that context: the tasks of the job. This defines WHAT will be taught. The guides in this package focus on the HOW: the variety of strategies that can be used to teach these skills to adults in a workplace context.

The first learning guide focuses on ***communication***: reading, writing, speaking, and listening. The *whole language* perspective is introduced and its principles explained. The communication skills needed on the job are contrasted to those usually taught in the schools. The Language Experience Approach (LEA)—a way to teach the literacy skills learners need by building on their ability to communicate orally—is described in detail.

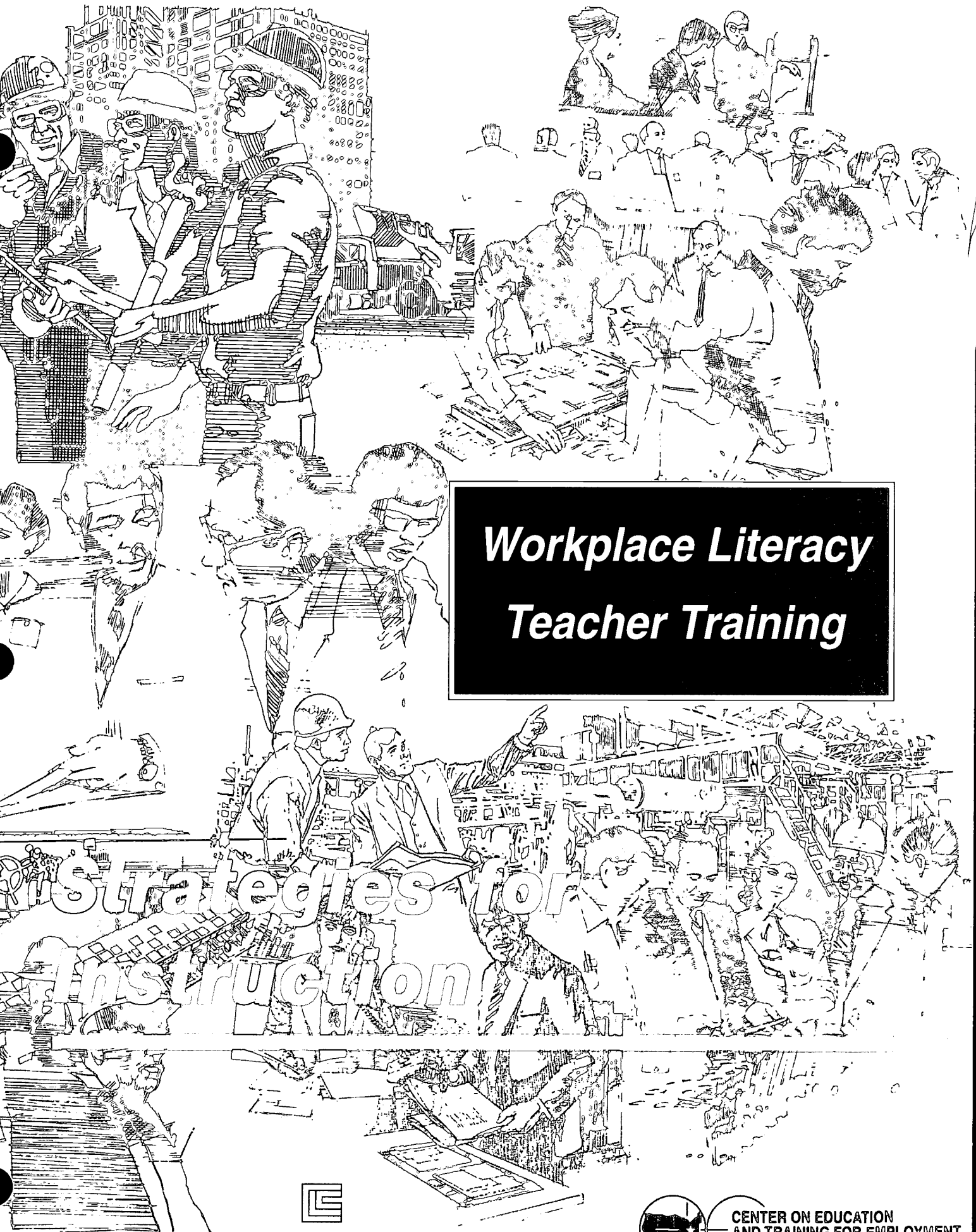
The second learning guide looks at the teaching of ***reading*** in more detail, with a focus on the use of authentic reading experiences. Readings summarize the reading skills typically needed in the workplace, discuss the roles of modeling and metacognition in the teaching of workplace reading skills, and describe the approaches that can be used to help learners decode workplace vocabulary to construct meaning.

The third learning guide starts with an overview of the ***mathematics*** skills typically needed in the workplace. The strategies for teaching mathematics then presented focus not on developing math skills using drill and practice but on helping learners use mathematical symbols and strategies to solve real workplace problems.

The fourth learning guide deals with teaching ***English*** to those for whom it is a ***second language***. Although many of the techniques appropriate to the development and implementation of any workplace literacy program apply to the teaching of ESL, there are differences. This guide reviews the overall ESL program development process, focusing on how workplace ESL differs from regular ESL programs and from other workplace literacy programs. Guidelines and strategies for teaching ESL in a workplace context are covered in detail.

Other packages in the Workplace Literacy Teacher Training series provide the additional information and skills you need to become a successful instructor in an effective workplace literacy program:

- *The Context* package looks at the unique environment and culture involved in providing education and training to adults in a workplace. The three learning guides in the package focus first on the workplace itself, then on the worker as learner, and finally on the instructor.
- The four learning guides in *The Foundations* package address the identification of business and industry needs related to the workplace literacy program, development of training plans and learning objectives, improvement of teaching effectiveness, and development of instructional resources appropriate for the workplace.
- The four learning guides in the *Strategies for Program Implementation* package provide guidance in managing instruction, assessing learner performance, individualizing instruction, and using tutoring and mentoring to enhance learners' literacy development.



Workplace Literacy Teacher Training

Strategies for Instruction

COLLEGE OF LAKE COUNTY

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
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Employ Strategies for Communications Instruction

Introduction

The core of all human interaction consists of sending and receiving messages. This is communication. Communication skills are typically defined as including reading, writing, speaking, and listening. An additional skill critical to oral communication (speaking and listening) is nonverbal communication (body language).

A worker's success may depend in part on the effectiveness of his or her communication skills. For example:

- To perform a given task, a worker may need to refer to written instructions (e.g., procedure manual, specifications, job aid). In that case, the worker must be able to receive (read) and accurately interpret the written communication produced by the author of the materials.
- When an emergency situation arises, the worker must be able to communicate key information to others quickly and succinctly and to ensure that the message is received accurately by the listener(s).
- If a work assignment or instructions are provided orally, the worker must be able to accurately interpret and retain (in memory or notes) what has been communicated.
- If that assignment were not clearly presented, the worker must be able to identify the gaps and ask questions to provide the full information needed to carry out the assignment successfully.

In a workplace literacy program, instruction starts with the literacy tasks inherent in the job. It starts with the worker's need to communicate in actual job situations. It "assumes that the desire to communicate an idea precedes the need, say, to conjugate a verb. Thus, vocabulary and grammar are developed as they relate to some of the workers' most essential needs and interests."[1]

This learning guide is designed to help you devise learning activities for the development of learners' communication skills—activities which are tied to the workplace context and which treat communication skills as integrated, not discrete and separate. Another learning guide in the series, *Employ Strategies for Reading Instruction*, treats the critical skill of reading in more depth.

1. S. D. Collins, M. Balmuth, and P. Jean, "So We Can Use Our Own Names, and Write the Laws by Which We Live: Educating the New U.S. Labor Force," *Harvard Educational Review* v59/n4 (November 1989): 464.

Objectives

- Compare workbook and whole language approaches, and define how the latter approach could be used in your own workplace literacy classes.
- From given lists of transferable communication skills, identify those that will be part of a specific workplace literacy program you will be teaching.
- Explain how language experience approach (LEA) principles apply to a workplace literacy program setting in which the learners are adults who may be highly skilled workers.
- Develop a set of workplace-based activities and materials designed to involve and develop all communication skills in an integrated way.

To Help You Meet the Objectives

- Study the material that follows:

  Reading 1: Integrating Communication Skills: The Whole Language Perspective

  Reading 2: Identifying Workplace Communication Skills

  Reading 3: Creating Workplace-Based Activities to Develop Communication Skills

- Reflect on the questions posed after each reading. The questions are designed to help you clarify and extract meaning from the reading that can be helpfully applied. There are benefits to both individual and interactive reflection—
  - ~ As an individual, consider how you would apply the information either in the program to which you are already assigned or in a program to which you might be assigned.
  - ~ If you are able to discuss these questions with other instructors or program staff, try to get other perspectives on the reading. Compare notes on the ways the ideas can be and have been applied in their experience. If the experiences differ, help each other probe the possible reasons for the differences.
- Complete the Application Activity.
- Evaluate your own competencies using the Evaluation Guidelines. This is an opportunity to assess your own learning and identify any areas in which you feel less competent or confident. If indicated or desired, take advantage of the opportunity to review the related material in the Annotated Bibliography. You may also want to seek out a more experienced person who can be a mentor to you on this topic, helping you assess your competency and acting as a resource person.
- Ask your reviewer to evaluate your skills also. Be sure to note the input from the reviewer that can provide the basis for your further competency building.

To Help the Reviewer Guide and Evaluate Learner Performance

These learning guides have been designed to allow for maximum flexibility of use. For those individuals using them for professional development (without ties to a formal program), the guides allow for self-study. Such use may, however, limit the opportunity for interaction and practice in a group setting. Therefore, if learners are completing these guides in a group setting under your direction, it is strongly recommended that you identify such opportunities and capitalize upon them.

Reflection questions at the end of each Reading and an Application Activity and Evaluation Guidelines at the end of each learning guide provide opportunities for you, as a reviewer, to monitor learner progress and evaluate learner performance on the workplace literacy knowledge and skills being developed. However, your expectations should be based somewhat on the learner's background (e.g., previous instructional experience) and the learner's progress in the program. Individuals with previous experience as instructors in workplace literacy programs should be expected to extend their thinking and activities beyond the level expected of those without such experience.

For example, if the learner is asked to "define company culture," individuals ***without*** instructional experience would be expected to respond solely on the basis of their reflections concerning the readings provided within the guide. The responses expected of individuals with instructional experience, however, should go beyond the readings, incorporating their real-world experiences as well. Likewise, as individuals complete more and more of the learning guides, their work should reflect that progress. Knowledge and skills gained in earlier guides should be ***integrated*** into their reflections and activities as they work through later guides.

Flexibility can also be provided concerning how the learner will demonstrate competency. At a minimum, the learner should submit ***written*** descriptions, definitions, and explanations to demonstrate successful completion of the Application Activity. These should be evaluated—by both you and the learner—using the criteria provided in the Evaluation Guidelines. If feasible, however, you should also arrange to meet with the learner to discuss his or her written documentation. At that time, you could also pose hypothetical or actual situations related to the skill criteria and ask the learner how he or she would handle those situations. Another possibility would be to ask individuals to perform the skill as part of a presentation or demonstration to others in the class or group.

It is also desirable that, whenever possible, you and the learner identify opportunities for expanding on the learning experiences presented in the guide—ways for the learner to apply the learning more deeply and broadly. The question, "What plans do you have for learning more about the skill covered in this guide?" could well be a standard one. In many cases, the learner can use his or her work in the Application Activity as a building block for further exploration.

In summary, the learning situation is not one in which strict criterion-referenced standards based on percentage attainment or mastery levels are suitable, nor would one mode of demonstration be feasible—or appropriate—for everyone. You and the learner should discuss and reach agreement in advance on the level of achievement expected and mode of demonstration to be used so as to create the optimal learning experience. The intent is for the learner's professional development to be competency-based, rigorous, and designed to motivate further learning, yet sensibly adapted to the situation and to the learner's needs and abilities. Hopefully, the learners will carry this flexible philosophy and approach into their own workplace literacy programs.

INTEGRATING COMMUNICATION SKILLS: THE WHOLE LANGUAGE PERSPECTIVE

Adapted from "Whole Language and Adult Literacy Education" by F. E. Kazemek
Information Update v6/n2 (December 1989): 3-5

It seems that wherever we look in the professional literature these days, we see articles and references to *whole language*. Many K-12 teachers are practicing, or trying to practice, whole language strategies in their classrooms. Publishers are developing and promoting a wide range of materials purporting to be whole language materials. And now whole language is finding its way into the adult literacy program. What exactly is *whole language*, and what does it mean for adult literacy education? In this reading, we will look at some underlying principles that support whole language teaching and learning and explore briefly the practical implications of these principles for the adult classroom.

Contrary to a common misunderstanding, whole language is ***not*** an "approach" or a "method." It is ***not*** a set of practices that all instructors and learners dutifully follow. There are no whole language instructors' guides with lists of skills and specific sequences to be followed.

Rather, whole language is a way of looking at how people—both children and adults—learn and use oral and written language. It is a particular perspective about language teaching and learning; it is a theoretical orientation—a *philosophy*, if you will. Let's look at the principles that underpin this philosophy.

General Principles of Holistic Language Education

1. All language—oral and written—reflects cognitive, emotional, social, and personal differences. Our language is what makes us who and what we are. Since we are all uniquely individual, with an almost infinite number of different life experiences, our oral and written language will oftentimes reflect those differences.

2. All language—oral and written—is social as well as personal. Although we are all unique individuals, we are also social beings. We develop our language in a myriad number of different social contexts. We learn to speak and listen as we interact with other people. Likewise, we learn to write and read as we connect with other writers and readers.

3. Written language has its roots in oral language. Vygotsky, a noted Russian psychologist, points out that oral language is "natural" in the sense that it is spontaneous, involuntary, and nonconscious. No one "teaches" us how to speak and listen; we just do. Written language, on the other hand, is abstract, voluntary, and conscious. We become literate by building on and connecting to our developed oral language.

Those first three principles lead to seven related principles of teaching and learning.

4. Instruction must build on and connect to an individual's life and language experiences. Unless learners can make the bridge between their own language and experiences and those in the materials they are attempting to read and write, they will encounter difficulty and frustration.

5. The four language modes—reading, writing, speaking, and listening—are mutually supportive and must not be artificially separated. The four modes must be integrated during instruction. Oral language supports reading and writing. Reading exposes us to a wide variety of styles, formats, and conventions. Writing helps us experience how authors put texts together.

6. Oral and written language experiences must be purposeful, functional, and real. Reading and writing activities in the adult literacy classroom

must be for real purposes (e.g., to perform workplace tasks). *Dummy runs* and *practice exercises* (e.g., workbook activities) that do not involve authentic uses of language must be avoided. Thus, complete and whole texts must be used for reading (e.g., whole scenarios, journal or newspaper articles, union contracts, company policy statements) and for writing (e.g., complete directions, task steps, memos, job forms).

7. Reading and writing—like listening and speaking—proceed from the whole to the part. Thus, for example, comprehension of written texts *leads to* an awareness and knowledge of sound-symbol correspondences (*phonics*). We can only make meaningful generalizations about these correspondences *after* we understand what we've read, and not the other way around. Likewise, the actual writing of meaningful texts *leads to* a knowledge of grammar, spelling generalizations, and so on.

8. There is no set hierarchy of skills or experiences that all adults must master in sequence. Reading and writing are complex and, in many respects, all-at-once kinds of processes; they cannot be broken down into tiny, isolated skills that are then taught in a hierarchical and linear manner.

9. Readers and writers—even those who are very proficient—often cannot articulate or demonstrate specific skills or competencies. Our language competence is almost never captured by our language performance; we always know more than we are able to display at any given time. Similarly, we can be quite competent readers and writers and still be unable to talk *about* reading and writing. For example, you can read the words *bread* and *chin*, which contain digraphs (*ea*, *ch*) without knowing what a digraph is or being able to give an example of one. Likewise, you may use many gerunds in your speaking and writing without knowing what a gerund is or being able to define it (an English verbal noun ending in *-ing* that has the function of a substantive; e.g., *working*).

10. Assessment and evaluation of whole language education must itself be holistic. We cannot adhere to the above nine principles and then attempt to assess an adult's growth by using some standardized or criterion-referenced test that measures isolated, partial, or purposeless language skills. (Consider the proficient language user in the previous item who can't define a gerund.) To do so would be like evaluating the quality of an apple by using the standards typically applied to oranges.

Whole Language Principles = Whole Language Classroom

Let's look at how the previous principles might guide what we do in the adult literacy classroom. The activities described below are ***not*** some prescribed list to be followed. Rather, they are simply illustrative of how whole language principles might be used to develop meaningful teaching and learning scenarios. There are many different strategies and sequences that might be followed in a whole language classroom. Again, ***it is the theoretical orientation or perspective that is primary; the specific activities grow out of that.***

Sustained silent reading (SSR) and writing (SSW). Adults who are becoming proficient with reading and writing need to engage in meaningful practice on a regular (preferably daily) basis.

The silent reading and rereading of self-selected materials should begin and/or end each class session; at the beginning, these silent reading sessions might last only 5 minutes or so. The text should be something in which the adult is interested, such as a job aid, an article in a company newsletter, or a work-context scenario prepared using the language experience approach (LEA), with the text dictated by the learner and written down by the instructor. (You might supply or help the student find appropriate material.) The adult doesn't have to be able to read all the words.

Similarly, a few minutes devoted to sustained writing in a personal journal (e.g., descriptions of a workplace event, notes concerning a topic discussed in class, reactions to a new company policy) will help adults experience how they can use writing to organize and express their ideas and emotions. Spelling, grammar, and punctuation are not important in such writing.

Principles 1, 4, 5, 6, 7, 8, 9

Prepared oral reading as a social activity. Oral reading allows adults to experience the rhythms, perhaps rhyme, and "feel" of written language. All oral reading should be a practiced *performance*, after a good deal of silent reading and oral rehearsal. Rehearsed oral readings done with a partner or small group provide the individual with support and peer models. This is especially important for the adult who is learning English as a second language.

There are many variations of prepared oral readings (e.g., LEA texts, a journal article on equipment trends, a newspaper article on foreign competition). Such reading develops camaraderie, confidence, and an "ear" for spoken texts.

Principles 2, 3, 5, 6, 7, 8, 9

Language experience approach (LEA) texts. Group-composed and dictated texts that are scribed by you, the instructor, are invaluable for developing meaningful reading materials, discussion about aspects of reading and writing, explorations of the world of work, and group solidarity. Paulo Freire, a Brazilian educator, says that learning to read is really learning to read the world. Group LEA activities allow adults to explore issues, feelings, "dangerous" ideas, and experiences among themselves and then to translate their oral language into a written text.

The form that the written text takes will depend on its purpose. You are not only able to serve as a model by reading and rereading the text but are also able to point out the differences between oral and written language. Moreover, through the LEA process, you are able to gather informal information about how individuals are developing as readers and writers.

Principles: all

Reading, rereading, and retelling workplace materials. LEA is incomplete unless the learners make connections between their own texts and other materials they need to use. Thus, learners' own writing—dictated or otherwise—needs to be complemented with a wide assortment of other materials. For example, an LEA text dealing with a problem workers are having in working as a team on a job task can be connected with published texts and articles on how to build teamwork.

These connections foster a great deal of reading and rereading (orally and silently, individually and with a partner or group) and, very important, retelling. Research has shown that the more we retell what we have read the better we understand it. Retellings can be as simple as telling someone else what you have read or jotting down in a journal what the text means to you (what you got out of it). Retelling contributes to social interaction and also allows both you and learner to assess how well the learner is doing in constructing meaning from a particular text.

Principles: all

Strategy instruction. Based upon the learners' reading, writing, speaking, and listening skills in the activities described previously, you can develop appropriate strategy lessons—lessons dealing with specific aspects of the reading and writing processes that the learners need to further develop.

For example, you might model how the conscious use of background knowledge, context, and understanding of sound-symbol correspondence—used together—can help a reader make a pretty good guess at an unknown word. Or you might demonstrate how reading in "chunks" instead of word by word tends to improve comprehension. Or, in regard to writing, you might explore with the learners how some kind of visual sketch, map, or organizer can help us gather and arrange our ideas before we begin to write.

The important things about strategy lessons are that they (1) ***follow from*** and ***build upon*** what adults are actually doing with language and (2) are introduced only when needed.

Principles 4, 7, 8,9, 10

Informal assessment. Holistic teaching and learning requires holistic means of assessing students' developing proficiency with written language. Such assessment, by its very nature, is informal and ongoing. Moreover, it is something that ***both*** you and the learner do. Ongoing and informal assessment allows you and the learner to document growth and plan for future instruction. Informal assessment strategies such as the following could be used:

- Keep anecdotal records of what the learner does in particular reading and writing situations.
- Listen to how the learner reads different kinds of texts.
- Have the learner listen to him/herself reading on tape.
- Meet and talk with the learner about his/her reading and writing (e.g., difficulties, strategies found to be efficient, personal goals, types of materials he or she wants to read and write).
- Prepare a checklist of specific things that you and the learner want to accomplish during a specific time period.
- Collect samples of the learner's writing and reading (perhaps on tape, using some type of miscue analysis), and chart growth over time.

All assessment, as Kenneth Goodman observes, should let you and the learners know ***what*** they are doing and ***why*** they are doing it.

Principle 10

Reflection on Reading 1

- Many teachers in Adult Basic Education programs have traditionally used workbook exercises as the primary materials for instruction. Based on this reading, outline (or discuss with peers) why this is ***not*** a currently recommended approach.

- Define in your own words what a whole language perspective would be like in your classroom (i.e., how it could be implemented in the communications area of your curriculum).

Identifying Workplace Communication Skills

The communication skills typically covered in school-based programs focus on skills required for a learning setting: reading a textbook, listening to a teacher-made lecture, writing a book report or presenting it orally. These are ***not*** usually the skills of the job.

School-Based	Workplace Context
The textbook is carefully organized for instructional purposes. The reading level is specifically designed to match the average level of students who will be using the text. Key points and subpoints are clearly presented. Headings and enhancements (bold face, italic, different sizes of type) are used to highlight key topics and terms. Illustrations support the text.	The reading material of the job, on the other hand, may consist of charts and diagrams and specifications, with little narrative text. The reading level of job procedures may be very high.
The lecture, too, should have been carefully organized for instructional purposes, with information presented point by point. The teacher not only presents the material, he or she usually feels responsible for making sure the students understand it.	When the worker is on the receiving end of oral communication on the job, the message is likely to be brief and may or may not be clear. If the speaker is a supervisor making a job assignment, he or she probably feels that the worker is responsible for understanding what was said.
The written report will undoubtedly need to adhere to all the standard grammar, style, and usage rules that generally apply in an academic setting. Any points made will need to be backed up with detailed support.	Workplace writing often violates traditional academic rules and standards. Consider the ad agent who wrote, "Nobody doesn't like Sara Lee" (double negative). Consider the busy executive—what would he or she probably prefer to receive: a 5-page memo with perfect grammar, beautiful topic sentences, and detailed support for each point . . . or a ½-page memo with a bulleted list of key points presenting the same information clearly and succinctly?
Oral reports are generally fairly formal and lengthy, with strict guidelines set for their preparation and presentation. Use of correct grammar is expected. Even in regular class sessions, there is generally a procedure governing oral participation (e.g., raise your hand, be called on by the teacher, frame your question or response in complete sentences, be polite).	Oral communication on the job often has two primary qualities: short and accurate. If Marianne clearly and quickly communicates the nature of an emergency that has arisen on the job, no one is going to chastise her because she used the word *ain't*. On the other hand, if Marianne desires to move into supervision or management in the future, she may need to learn to use more-standard English, depending on the nature and expectations of her company.

The following pages present lists of the communication skills—reading, writing, speaking, and listening—that are often necessary for the workplace setting.

Workplace Reading Skills

Vocabulary

- Recognize common words and meanings
- Recognize task-related words with technical meanings
- Identify word meanings from sentence context
- Recognize meanings of common abbreviations and acronyms

Literal Comprehension

- Identify factual details or specifications within a text
- Follow detailed, sequential directions to complete a task
- Determine the essential message of a paragraph or selection

Locating Information Within a Text

- Use table of contents, index, appendices, glossary, systems, or subsystems to locate information
- Locate page, title, paragraph, figure, or chart needed to complete a task activity

Comparing and Contrasting

- Combine information from multiple sources that contribute to the completion of a task
- Select parts of a text or visual materials to complete a task activity
- Identify similarities and differences in objects
- Determine present of a defect or extent of damage
- Match objects by size, color, or significant marking
- Classify objects by size, color, or significant marking
- Distinguish between relevant and irrelevant information in text or visuals

Recognizing Cause and Effect, Predicting Outcomes

- Use common knowledge to avoid hazard or injury
- Apply preventative measures prior to a task to minimize security or safety problems
- Select appropriate course of action in an emergency

Using Charts, Diagrams, and Schematics

- Obtain a factor specification from a two-column chart to find information
- Obtain a factor specification from the intersection of a row by a column on a table or chart
- Use a complex table or chart requiring cross-referencing within text material
- Apply information from tables or graphs to locate malfunctions or to select a course of action

SOURCE: J. W. Philippi, "Matching Literacy to Job Training: Some Applications from Military Programs," *Journal of Reading* v31/n7 (April 1988): 658-666. Adapted from research on transferable skills by Pratzner 1978, Smith 1982, and Wiant 1977.

Workplace Writing Skills

Production

- Write key technical words accurately on forms
- Spell task-related words and abbreviations correctly

Information Transfer (Single Step/Source)

- Enter appropriate information onto a form
- Record essential information that involves more than one sentence
- Record essential information in phrases or simple sentence form accurately and precisely

Information Transfer (Multiple Steps/Sources)

- Transfer numbers, codes, dates, figures from equipment or written sources onto appropriate sections of forms
- Write a report including necessary support documentation or classification

Translation

- Write brief, descriptive accounts of activities or transactions performed
- Outline a situation by identifying key ideas and supporting details
- Summarize essential details for a written communication, using a problem-solving or news-writing heuristic
- Select relevant details for a written communication
- State general impressions of an event or situation as they relate to specific report goals
- Summarize events and precise dialogue in an accurate, complete, and objective manner
- Summarize the major points presented in a written communication
- Generate written communication according to a specific format (e.g., memo, fax, or letter)

Extension/Interpretation

- Identify objectives, intent, target audience, and all essential and supporting details of a written communication
- Generate a written communication, arranging events sequentially
- Write brief justifications for actions taken and provide good reasons for rejecting alternative actions
- Appraise a written communication and make adjustments to improve clarity

SOURCE: J. W. Philippi, "Module 3: Conducting Literacy Task Analysis," in *Retraining the Workforce: Meeting the Global Challenge* (Dallas, TX: Dallas County Community College District, 1993), pp. 3-15.

Workplace Speaking Skills

Verbal Behavior

- Present information that is accurate, up-to-date, and free of bias
- Use complete sentences
- Finish one thought before starting another
- Avoid straying from main point or digressing
- Present facts and ideas coherently and in a logical sequence
- Avoid use of vague language or sweeping statements
- Use appropriate, correct vocabulary, and explain new terms
- Express ideas clearly, simply, and directly, using short, manageable sentence constructions
- Enunciate clearly and avoid running words together or mumbling
- Pronounce words correctly and avoid exaggerated pronunciation
- Use correct grammar
- Pause in appropriate places
- Control voice so that it rises and falls appropriately, and emphasize key points
- Control voice pitch so it is neither too high nor too low
- Control voice volume so it is neither too loud nor too soft

Nonverbal Behavior

- Use body language (e.g., gestures, posture, facial expressions) to reinforce the spoken message
- Use paralanguage (e.g., tone of voice, inflection) that is consistent with the spoken message
- Use body language to project an appropriate image (e.g., enthusiasm, self-confidence)
- Maintain eye contact with listeners
- Avoid use of distracting mannerisms (e.g., jingling coins in pocket, tossing chalk up and down, cracking knuckles)

SOURCE: J. A. Bell and C. C. King-Fitch, *Assist Students in Improving Their Oral Communication Skills*, Module M-4 in the Professional Teacher Education Module Series (Athens, GA: American Association for Vocational Instructional Materials, 1985), pp. 15-16. (ED 252 738)

Workplace Listening Skills

- Restate or paraphrase a conversation to confirm one's own understanding of what was said
- Ask appropriate questions to clarify another's written or oral communication
- Attend to nonverbal cues such as eye contact, posture, and gestures to derive meaning from information presented orally (e.g., job assignments, directions, conversations)
- Take accurate notes that summarize information presented orally
- Identify the main outcome expected according to directions presented orally
- Identify the main ideas in a speech or presentation
- State the most important question a speaker wants answered
- Practice flexibility in listening styles
- Pay attention to the environment
- Get feedback concerning listening patterns used
- Identify meanings of words which sound similar to known words but which have different meanings
- Use context to identify the meanings of new words heard in oral communications
- Identify true and false statements in oral presentations
- List facts that support the main idea in an oral presentation
- List directions given by a speaker
- Identify the correct order in which a number of events occurred, basing the order on an oral description of the events
- Perform activities requiring the recall of oral instructions
- Use question words (who, what, when, where, how, and why) to identify key information in a scenario described orally
- Identify (or state) causes/effects for given situations described orally
- Identify additional information you want or need after receiving information orally
- Reach and support a conclusion based on facts from information presented orally
- Answer questions requiring a generalized interpretation of facts presented orally
- State and support a prediction based on information presented orally

- The communication skills listed in this reading are general skills, transferable across occupations. If possible, identify which ones are part of the workplace literacy program you will be teaching by reviewing the job and literacy task analyses conducted or the workplace materials obtained. According to these sources, what, if any, additional communication skills would be part of your workplace program?

Creating Workplace-Based Activities to Develop Communication Skills

The best activities for the development of workplace literacy skills are those that have these "natural" qualities:

- The activity is one that the learners perform on the job.
- Literacy skills are involved in an integrated way.
- Basic skills instruction derives from the performance of the learners in carrying out the activity (e.g., if learners are having difficulty with capitalization as part of a workplace writing task, then instruction specifically related to that instance is provided).
- Instruction is individualized. For example, if only one learner is having difficulty with capitalization, instruction is provided to only that learner. Explaining why something is wrong to learners who aren't doing it wrong can serve to confuse them.

The following steps can be used to develop a sequence of lessons that have those characteristics, providing ample opportunities for speaking, listening, reading, and writing—all in a natural, integrated way.

Begin with the Language Experience Approach

Since "written language has its roots in oral language" and "we become literate by building on and connecting to our developed oral language,"[1] the approach used should begin with learners' oral language ability. The language experience approach (LEA) does just that.

In LEA, an individual learner or group of learners are asked to tell the instructor about a situation. The instructor writes down the learners' words *exactly* as dictated. This becomes the text to be used for a unit of instruction. Because the learners' exact words are used, they can make the direct connection between oral language (with personal meaning) and the written word. Furthermore, the subject of the text should have relevance and be of high interest to the learners.

As originally devised, this approach begins with the following steps:

- Engage the learner in conversation about an activity, experience, or picture. The idea is to get the learner talking so that he or she can develop a story or description using the full extent of the English he or she possesses. This is not the time to teach a new lesson. The learner's first stories may be only three or four sentences in length. That's fine.
- Use the basic questions words (*who, what, when, where, why,* and *how*) to develop the story if the learner needs prompting.
- Write down the learner's words ***exactly***.

1. F. E. Kazemek, "Whole Language and Adult Literacy Education," *Information Update* v6/n2 (December 1989): 3.

For the workplace literacy program, this approach could be focused on problem situations from the job: workplace scenarios.[2] Learners can be asked to orally describe real problems they have recently encountered—or encounter continually—on the job. In a group setting, all learners experiencing the problem (or familiar with it) could contribute to the development of the scenario. Learners not involved in describing the problem could be involved by taking responsibility for using the question words to frame and ask questions as needed to ensure that the scenario tells the whole story.

Another good subject for a workplace LEA text is an explanation of the steps in performing a job or operating a piece of equipment (i.e., their own job aids). Learners skilled in the job or operation should find it easy to orally describe the steps involved, and much discussion may occur as learners try to agree on the full range of steps involved and the order in which the steps should be performed.

If a guest speaker has made a presentation on a work-related topic (listening skills), students could later develop an LEA text that summarizes the key points made by the speaker.

The scenario can be recorded on paper by the instructor and duplicated for class use. Alternatively, it could be printed on a chalkboard or flipchart by the instructor and copied from that source by each individual learner. The latter approach has the advantage of adding writing to the integrated communication skills being used (speaking, listening, and reading).

Use the LEA Text to Build Meaningful Activities/Exercises

The next steps in the LEA process involve using the LEA text as a focal point and resource in providing the instruction, support, and practice learners need in order to develop their communication skills:

- Read the story aloud, pointing to each word as you read, while the learner reads along silently. This allows the learner to hear what his or her own words sound like. If the learner wants to change or add anything, record that carefully.
- Read aloud each sentence and have the learner repeat aloud what you have said, or read each sentence aloud in unison with the learner. Then repeat this step a second time so the entire story has been read aloud twice.
- Ask the student to read the whole story by him/herself aloud or silently.
- Ask the student to select five words for further study; for example:
  - ~ Underlining each word
  - ~ Copying each word on a small card
  - ~ Using words written on cards for such activities as (1) matching the word on each card to the same word in the story or (2) reading each card and then shuffling the "deck" and reading each card again in a different order

2. For more information on scenarios, refer to another learning guide in this series, *Assess Learner Performance*, pp. 18-21.

- Use the text for reading exercises in follow-up lessons; for example:
  - ~ Circling all words that begin with a particular letter or sound
  - ~ Finding words in the story with common endings
  - ~ Selecting words from the story that rhyme
  - ~ Identifying compound words, prefixes, roots, suffixes, syllables, contractions, silent letters, consonant blends used in the story (for the learner who is more advanced)
  - ~ Cutting the story in parts and reassembling the parts in sequential order
  - ~ Using individual word cards to recreate sentences used in the text
  - ~ Asking each other questions about the story
  - ~ Filling in missing words in a version of the story written as a cloze exercise[3]
- Soon the learner will have the story nearly memorized and will be able to successfully read it aloud on his or her own. Additional exercises will then become meaningful (e.g., copying certain words or the whole story, developing a personal dictionary or word bank, creating hand-drawn illustrations for the story, writing new sentences using the vocabulary from the original LEA story).
- LEA texts can be kept by the learner in a notebook, providing an ever-growing textbook. In the following months as the learner's language skills improve, he or she might want to return to earlier stories and correct them.[4]

Again, the exercises devised on the basis of the text should be those designed to address the particular skills learners need to develop. For example, workplace LEA texts will undoubtedly include technical terminology that will need to be the focus of vocabulary development and practice. Technical terms may be difficult to read (e.g., in health occupations, a disease called *erythroblastosis fetalis*) or have meanings that are confusing (e.g., the difference between *basting* a turkey in food service occupations and *basting* the seams of a dress in the garment industry).

Where possible and logical, activities should emphasize metacognition—self-questioning to focus not just on reading comprehension but on the reading processes used as well.

Finally, the exercises should also be those the learners will enjoy and find motivational. If, for example, a group of learners considers exercises in the form of games to be "silly," choose alternative exercises for that group. Ideas for exercises can be found in abundance in the materials available for adult basic education. Workplace-based exercises may be found in the materials listed in the bibliography. Some may be suitable for use as is; others might be able to be adapted for the specific workplaces with which you are working .

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3. For more information on the cloze procedure, refer to another learning guide in this series, *Create Literacy Resources Using Workplace Materials*, pp. 9-21.

4. The initial LEA information in this section has been adapted from C. Bis and R. Ballinger, revs. and eds., *A Guide for Basic Reading Tutors* (Grayslake, IL: College of Lake County, 1994), pp. 2, 28.

Use the LEA Text to Develop Problem-Solving/ Decision-Making Skills

When the scenario describes a problem to be solved or decision to be made, a logical next activity is to guide learners through the steps in problem solving or decision making—skills of critical importance in the world of work. You can start by providing a mini-lesson in the problem-solving and/or decision-making steps and then help them complete each step in relation to the scenario. Or you can use the discovery technique, first guiding them through process in relation to the scenario and then asking them to summarize for you the steps they followed.

The steps in problem solving are generally described as follows:

1. ***Formulate and define the problem clearly and concisely***—The problem statement should be descriptive of the difficulties to be overcome and should include such information as (1) who or what is affected by the problem, (2) what conditions are causing the problem, and (3) what the goal is. The process of communication and information-gathering will soon break down if there are several interpretations of what the problem under investigation actually is.
2. ***Identify the relevant factors***—What questions need to be answered—and what further information is needed in what areas—before a tentative solution can be arrived at? Which of these factors is most critical, and why?
3. ***Gather the needed information (facts and knowledge about the problem)***—What information do the learners already possess? What resources can be used to locate the additional information needed? Note that there may be many opportunities for reading skill development as learners use workplace resources to locate information (e.g., using an index or table of contents; skimming or scanning heads, topic sentences, and bold-faced text; reading and interpreting charts and graphs). Learners will probably also need to take notes and cite sources (writing skills) as they secure the information they seek. In some cases, facts may be compiled in tabular form according to key factors, which would make later analysis of the results much simpler.
4. ***Examine possible solutions to the problem***—After the information has been obtained and organized, each learner could be asked to list his/her own solutions on a piece of paper, or the class members could brainstorm solutions while you list them on the board. During this step, learners may discover a need to revisit Step 3 to gather additional information.
5. ***Select a tentative solution or alternative solutions***—Learners need to evaluate each proposed solution and select the one that appears to be most appropriate. If the problem deals with human relationships, more than one solution may be appropriate.
6. ***Test the proposed solution(s)***—A proposed solution may actually be tried out (implemented) in the workplace. If that is unrealistic, it can be tested mentally (e.g., through discussion or by consulting authorities).

7. ***Assess the results of the testing***—Learners evaluate the effectiveness of the solution based on the results of the tryout. If the solution was not effective, an alternative solution (Step 5) should be tested and the results assessed.[5]

Problem solving and decision making are very similar complex thinking processes. However, whereas *problem solving* uses thinking skills to resolve a known or defined difficulty, *decision making* uses thinking skills to choose the best response from several options. Decision making includes the following steps:

1. Define the problem.
2. Collect data.
3. Identify obstacles to the goal.
4. Identify alternatives, rank them, and weight the risks and benefits of each.
5. Choose the best alternative.
6. Evaluate the decision.[6]

Build in Major Reading, Writing, Speaking Assignments Where Appropriate

The related activities described thus far (LEA scenario, literacy skills exercises, problem solving and decision making) would provide some natural spinoff activities. For example:

- Learners could each be assigned a particular question to answer during the information-gathering step in problem solving. Each individual could then report back to the group on what was discovered. This might be an oral summary of what was learned, or a learner could present a rehearsed reading from a particularly good source.
- Learners could divide into small groups to complete a given problem-solving or decision-making step (e.g., identifying possible solutions, testing a solution) and then report back to the full group orally or in writing.
- Learners with a good deal of practice in problem solving and decision making could be asked to tackle a scenario on an individual basis. Each learner could then report his or her solution in writing or in an oral presentation.

Oral presentations should meet established criteria (see p. 14). Written reports, too, should be guided by specific criteria or guidelines such as those on the following page.

5. Adapted from NCRVE–OSU, *Direct Students in Applying Problem-Solving Techniques*, 2nd ed., Module C-8 in the Professional Teacher Education Module Series (Athens, GA: American Association for Vocational Instructional Materials, 1983), pp. 6-12. (ED 229 650)

6. Adapted from S. G. Pritz and M. R. Crowe, *Instructional Materials Development*, BASICS: Bridging Vocational and Academic Skills (Columbus, OH: National Center for Research in Vocational Education, The Ohio State University, 1987), p. 47. (ED 288 958)

Writing Guidelines

I. Prewriting or identifying the general writing assignment:

Step	Ask
Anticipate the audience.	Who will be reading what I am going to write?
Define the purpose of the writing.	What is it that I need to write about?
Identify the portion(s) of the written product developed so far.	Has any part of this task already been completed?
Identify/gather information about task, topic, audience, strategies, and plan of attack.	What do I know about those who will read my communication? What do they expect? What are they able to understand?
	What job knowledge do I need in order to complete the written product?
	What do I know about effective ways to structure and produce the written product I need?

II. Preparing a draft product using the information gathered from the task environment and mental schemata and employee plans:

Step	Ask
Generate ideas.	What is the information that I need to communicate?
Organize ideas.	
Set goals for task completion substeps.	
Set subgoals in task production.	
Explore the topic.	
Translate plans into action by putting ideas on paper.	What is the best way to communicate this information?
	What steps will I need to take . . . and in what order?
Review by evaluating goals and revisiting—a continual process.	Did I write what I needed to say clearly and accurately?
	Will my reader(s) understand what I have written?
	Would a particular revision improve the clarity or accuracy of what I said?

III. Monitoring between text and task:

Step	Ask
Assess appropriateness of text to task and audience.	Am I using my job knowledge correctly in the content of my writing?
	Do these words best express the information I need to communicate?
	Is this what my reader needs to know? Will my reader be able to understand this?
	Is there a clearer way to state my information?

SOURCE: Adapted from L. Mikulecky, J. Ehlinger, and A. Meenan, *Training for Job Literacy Demands: What Research Applies to Practice* (University Park, PA: The Pennsylvania State University, Institute for Study of Adult Literacy, 1987), pp. 14-22. (ED 284 968)

Note that the series of steps and activities presented in this reading represents just one possible approach to communications instruction. It is ***not*** a template to be used for every lesson. Rather, it should serve to prime your mental pumps so that you can take what you already know about the teaching of reading, writing, speaking, listening, and thinking and blend it into new and creative integrated lessons using a workplace context.

- The language experience approach (LEA) is often associated with the elementary school level. Briefly explain (or discuss with peers) how LEA principles are clearly applicable to adult learners in a workplace literacy program.

- Briefly explain (or discuss with peers) how LEA principles could be especially useful and motivational when working with learners who are highly skilled workers.

Employ Strategies for Communications Instruction

- Put into practice what you've learned about communications instruction by preparing a lesson for a workplace literacy program. If you have a specific program and learners in mind, use that setting and the needs of those learners as a basis. If not, use a setting in which you might be teaching in the future.
  - ~ Review sample materials/scenarios from a workplace setting and the skills on the communication charts, pp. 12-15.
  - ~ Following the principles presented in this learning guide, develop an extended activity or series of activities for a lesson dealing with communication skills.

TOPIC: Employ Strategies for Communications Instruction

Evaluation Guidelines

Directions: Check your competency with the following criteria:

Learner Self-Check		Review Checklist
Did you—		Did the learner—
☐	1. Build the activity(ies) around the actual materials and communication skills of the workplace?	☐
☐	2. Involve all four communication skills (reading, writing, speaking, listening) in an integrated way?	☐
☐	3. Treat communication in a holistic manner?	☐
☐	4. Provide for learners to be actively involved throughout the activity(ies)?	☐
☐	5. Incorporate modeling and metacognition into the activity(ies)?	☐
☐	6. Ensure that the activity(ies) are appropriate for (and would be likely to motivate) adult learners?	☐
☐	7. Build higher-level thinking skills (problem solving, decision making) into the activities?	☐

Learner: _____

Reviewer: _____

Level of Performance: If the evaluation results indicate a need for further competency development—or if the learner wishes to pursue the topics covered in further breadth or depth—please refer to the supplementary resources described in the Annotated Bibliography, which follows.

Askov, E. N.; Aderman, B.; and Hemmelstein, N. *Upgrading Basic Skills for the Workplace.* University Park, PA: The Institute for the Study of Adult Literacy, 1989. (ED 309 297)

Chapter 4 of this document presents a collection of sample learning activities geared to the workplace; section titles include occupational vocabulary, using occupational forms, reading comprehension, oral communication, reading charts, problem solving lesson, and metacognition. Additional activities and materials are shown in Chapter 6, pp. 6-30 to 6-48.

Bell, J. A., and King-Fitch, C. C. *Assist Students in Improving Their Oral Communication Skills.* Module M-4 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985 (ED 252 738)

Identifies elements of speaking that need to be addressed in improving (1) oral communication skills (accuracy, completeness, organization, specificity, appropriateness, conciseness, correct grammar, pronunciation, phrasing, and pitch); (2) nonverbal behavior; and (3) listening skills. Provides guidance in creating an appropriate environment (being sensitive, providing motivation, accommodating individual differences) and using a variety of effective techniques for improving learners' skills (oral presentations, role-plays, simulations, real-life situations, samples of effective and ineffective communication).

Chase, N. D. *The Hospital Job Skills Enhancement Program: A Workplace Literacy Project. Curriculum Manual.* Atlanta, GA: Center for the Study of Adult Literacy at the Georgia State University and Grady Memorial Hospital, March 1990. (ED 328 666)

Describes the curriculum portion of the program for improving the literacy skills of entry-level workers, which was based on the whole language approach. Includes copies of curriculum units and assessment instruments.

Educational Testing Service. *ETS Applied Skills Series.* New York, NY: Simon and Schuster, n.d.

Includes two workbooks covering workplace communications skills: *Document Skills for Life and Work* and *Reading Skills for Life and Work.* Each workbook provides lessons based on work-related tasks such as identifying and using information located in materials, interpreting materials, and completing an order form.

Fardig, G. E., and West, G. B. *Assist Students in Developing Technical Reading Skills.* Module M-2 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985. (ED 252 702)

Explains how to fuse the teaching of reading with occupational content; outlines the reading process in terms of the reading and study skills involved; and provides detailed information on developing a variety of exercises to develop learners' vocabulary, comprehension, and graphics skills.

Huggins, K. *Workplace Oral Communications I. A Working Curriculum.* Mount Morris, NY: The Finger Lakes Regional Education Center for Economic Development, 1989. (ED 311 152)

Huggins, K. *Workplace Written Communications I-IX. A Working Curriculum.* Mount Morris, NY: Finger Lakes Regional Education Center for Economic Development, 1989. (ED 311 153 and ED 311 154)

Geared toward persons with midlevel literacy, these modules are intended to move the learner toward the 12th-grade level. Uses workplace examples that may be used as is or adapted to other settings.

Leidig, J.; McCarty, S.; O'Rear, H.; and Hartzell, M. *The Competitive Edge: Sharpening Your Skills in the Workplace. Communications. Instructor's Guide.* Austin, TX: The University of Texas at Austin, Educational Resources Extension Instruction and Materials Center, Division of Continuing Education, 1993. (ED 356 429)

Includes over 200 pages of detailed lessons containing instruction and exercises for developing workplace communication skills, including (1) accessing information through reading (reading strategies, locating information quickly, paraphrasing information, following instructions, writing instructions, improving recall, working with tables and graphs, analyzing information); (2) decision making, problem solving, and team building; and (3) oral and written communication (sending clear messages, listening for understanding, dealing with difficult situations, introduction to writing, writing memos, applying for opportunities, writing to request, writing to return or show concern). Tools of the trade (comma, period, question mark, apostrophe, capitalization, spelling tips, run-on sentences, sentence fragments) are also presented.

Malowney, C. L. *Assist Students in Improving Their Writing Skills.* Module M-3 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985. (ED 252 737)

Relates writing skills to occupational requirements; breaks the writing task down into its individual skills (writing legibly, spelling correctly, capitalizing correctly, identifying appropriate form and style, choosing appropriate words, using correct grammar, punctuating properly, and reviewing written work); and describes techniques that can be used to improve learners' writing skills (providing models, providing occupationally related writing assignments, individualizing writing instruction, and correcting learners' writing errors using proofreader's marks).

Mikulecky, L., and Philippi, J. W. *Strategic Skill Builders for Banking.* Washington, DC: American Bankers Association; New York, NY: Simon and Schuster, 1990.

The 12-module series based on the functional context approach can be used to teach job-related thinking skills to people in a variety of job settings. Includes job skills lessons with parallel life skills lessons so learners can practice skills both on the job and in daily life.

Moore, L. *Improving Workforce Basic Skills: The Foundation for Quality.* White Plains, NY: Quality Resources, 1992.

Uses adult learning principles to describe a problem-solving approach to basic skills training in the workplace. Includes information on instructional systems design, and advocates the development of a freedom-to-learn continuum within organizations.

Paradigm Basic Skills Program. Eden Prairie, MN: Paradigm Press, 1991.

The materials—*Writing for Workplace Success* by G. McLean and A. Lyons and *Reading for Workplace Success* by R. Park and R. Olson—are designed to prepare learners to solve reading and writing problems they will encounter in training programs and on the job by teaching the strategies behind the skills. (A 1992 document on math skills is also part of the series.)

Partnership for Improved Health Care Communication. *Step Ahead.* Las Cruces, NM: New Mexico State University, 1990-91.

This series of modules is designed to improve various communication skills of health care workers with midlevel literacy skills using a job context approach to instruction. The modules include *The Write Stuff: Memos and Short Reports* by S. Bernhardt and P. Laroche (ED 343 026); *Communication for Supervisors* by S. Bernhardt et al. (ED 343 024); *Effective Presentations: Communicating in Health Care Settings* by C. Dutson-Mallory and S. Bernhardt (ED 343 023); and *Straight Talk: Communicating in Health Care Settings* by C. Dutson-Mallory et al. (ED 343 025).

Vacca, R. T., and Vacca, J. L. *Content Area Reading.* 3rd ed. Glenview, IL: Scott, Foresman, 1989.

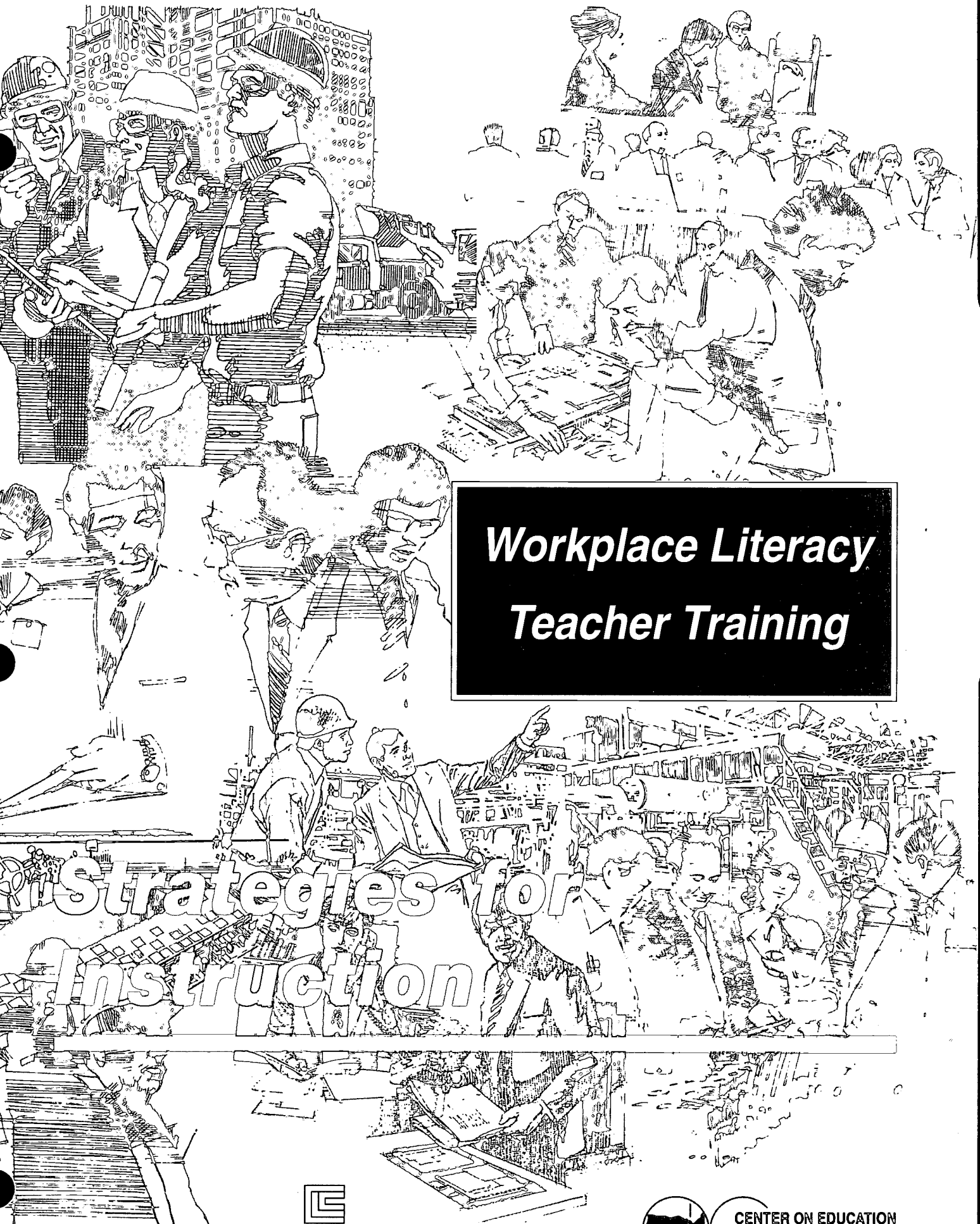
Designed to introduce teachers to approaches to improving students' ability to read texts of greater complexity in subject matter areas (especially nonliterary texts), this text is a valuable tool for workplace literacy instructors. Includes study strategies, writing process strategies, vocabulary building, and staff development. Provides many examples and sample lessons.

Wonacott, M. E., and Kendall, E. *Assist Students in Achieving Basic Reading* Skills. Module M-1 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985. (ED 252 701)

Discusses reading instruction in relation to occupational requirements; presents activities that can be used for assessment purposes; and describes techniques and strategies for improving reading skills, including teaching technical vocabulary, providing practical reading knowledge and tips, using reading games, introducing and supplementing reading assignments, individualizing reading help, and providing practice and reinforcement.

Workforce Education: Improving Educational Skills. Info-Line: Practical Guidelines for Training and Development Professionals, Issue 9310. Alexandria, VA: American Society for Training and Development, October 1993.

Summarizes important factors in workforce education (time, application of new learning to existing knowledge, continuous feedback and assessment, metacognition, and motivation); and presents an extensive index of workplace and adult basic skills software.



Workplace Literacy Teacher Training

Strategies for Instruction

Reading Strategies

COLLEGE OF LAKE COUNTY

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
COLLEGE OF EDUCATION
THE OHIO STATE UNIVERSITY

Employ Strategies for Reading Instruction

Introduction

Crucial to the workplace literacy program is the treatment of reading as the ***construction of meaning***, not as a set of discrete basic skills to be learned. According to one author, the process of learning to read is one in which the reader gradually makes sense of more and more kinds of language in more and more contexts, a process that is fundamentally a matter of experience.[1] It should be organized, therefore, to maximize the brain's strong point, the utilization of what it knows already, and minimize the brain's weakest area, which has been identified as the processing of new information, especially when that new information makes little sense.[2]

Thus, the program should not begin with school-like instruction and exercises covering, for example, phonics and word attack skills and reading comprehension—all in hopes that ultimately the learner will be able to put it all together in order to successfully read and comprehend the materials of the workplace. (A school-like approach can also be counterproductive if learners associate school experiences with their prior lack of success in literacy learning.)

Instead, the program must focus from the start on authentic reading experiences:

- A reading text reflecting the language the learner can already express orally (e.g., a workplace scenario developed using the language experience approach)
- The actual materials the learner must read on the job

The specific skills the learner must develop in order to construct meaning from those materials are then taught in relation to those materials.

This learning guide is designed to help you construct lessons for your workplace literacy program that approach reading skill development as the construction of meaning.

1. F. Smith, *Understanding Reading* (New York, NY: Holt, Rinehart & Winston, 1978), p. 191.

2. Ibid., p. 179.

Objectives

- Identify how *reading to do* and *reading to learn* might be used in a particular workplace and how the two abilities might be integrated in a workplace literacy program.
- Identify how metacognition and modeling could be applied individually and in tandem to specific approaches to reading different kinds of workplace materials.
- Identify word recognition skills that can be embedded into workplace literacy instruction to develop meaning from the materials.
- Develop a set of workplace-based activities and materials designed to develop reading skills as meaning-making.

To Help You Meet the Objectives

- Study the material that follows:

  Reading 1: Reading to Learn ... Reading to Do

  Reading 2: Strategy Development: Modeling and Metacognition

  Reading 3: Skill Development: Words, Sounds, and Meanings

- Reflect on the questions posed after each reading. The questions are designed to help you clarify and extract meaning from the reading that can be helpfully applied. There are benefits to both individual and interactive reflection—
  - ~ As an individual, consider how you would apply the information either in the program to which you are already assigned or in a program to which you might be assigned.
  - ~ If you are able to discuss these questions with other instructors or program staff, try to get other perspectives on the reading. Compare notes on the ways the ideas can be and have been applied in their experience. If the experiences differ, help each other probe the possible reasons for the differences.
- Complete the Application Activity.
- Evaluate your own competencies using the Evaluation Guidelines. This is an opportunity to assess your own learning and identify any areas in which you feel less competent or confident. If indicated or desired, take advantage of the opportunity to review the related material in the Annotated Bibliography. You may also want to seek out a more experienced person who can be a mentor to you on this topic, helping you assess your competency and acting as a resource person.
- Ask your reviewer to evaluate your skills also. Be sure to note the input from the reviewer that can provide the basis for your further competency building.

To Help the Reviewer Guide and Evaluate Learner Performance

These learning guides have been designed to allow for maximum flexibility of use. For those individuals using them for professional development (without ties to a formal program), the guides allow for self-study. Such use may, however, limit the opportunity for interaction and practice in a group setting. Therefore, if learners are completing these guides in a group setting under your direction, it is strongly recommended that you identify such opportunities and capitalize upon them.

Reflection questions at the end of each Reading and an Application Activity and Evaluation Guidelines at the end of each learning guide provide opportunities for you, as a reviewer, to monitor learner progress and evaluate learner performance on the workplace literacy knowledge and skills being developed. However, your expectations should be based somewhat on the learner's background (e.g., previous instructional experience) and the learner's progress in the program. Individuals with previous experience as instructors in workplace literacy programs should be expected to extend their thinking and activities beyond the level expected of those without such experience.

For example, if the learner is asked to "define company culture," individuals ***without*** instructional experience would be expected to respond solely on the basis of their reflections concerning the readings provided within the guide. The responses expected of individuals with instructional experience, however, should go beyond the readings, incorporating their real-world experiences as well. Likewise, as individuals complete more and more of the learning guides, their work should reflect that progress. Knowledge and skills gained in earlier guides should be ***integrated*** into their reflections and activities as they work through later guides.

Flexibility can also be provided concerning how the learner will demonstrate competency. At a minimum, the learner should submit ***written*** descriptions, definitions, and explanations to demonstrate successful completion of the Application Activity. These should be evaluated—by both you and the learner—using the criteria provided in the Evaluation Guidelines. If feasible, however, you should also arrange to meet with the learner to discuss his or her written documentation. At that time, you could also pose hypothetical or actual situations related to the skill criteria and ask the learner how he or she would handle those situations. Another possibility would be to ask individuals to perform the skill as part of a presentation or demonstration to others in the class or group.

It is also desirable that, whenever possible, you and the learner identify opportunities for expanding on the learning experiences presented in the guide—ways for the learner to apply the learning more deeply and broadly. The question, "What plans do you have for learning more about the skill covered in this guide?" could well be a standard one. In many cases, the learner can use his or her work in the Application Activity as a building block for further exploration.

In summary, the learning situation is not one in which strict criterion-referenced standards based on percentage attainment or mastery levels are suitable, nor would one mode of demonstration be feasible—or appropriate—for everyone. You and the learner should discuss and reach agreement in advance on the level of achievement expected and mode of demonstration to be used so as to create the optimal learning experience. The intent is for the learner's professional development to be competency-based, rigorous, and designed to motivate further learning, yet sensibly adapted to the situation and to the learner's needs and abilities. Hopefully, the learners will carry this flexible philosophy and approach into their own workplace literacy programs.

READING TO LEARN ... READING TO DO
Excerpted from work by J. W. Philippi,
including "Matching Literacy to Job Training: Some Applications from Military Programs,"
Journal of Reading v31/n7 (April 1988): 658-666

Each reading process identified in the job materials can be classified as either a strategy for locating information or a strategy for using information from reading to make job decisions, solve problems, or troubleshoot. Job-specific reading programs conducted by the military have labeled these categories *Reading to Do* and *Reading to Learn*, respectively.

Reading to Do tasks primarily involve finding information for immediate use in printed materials that are readily available for reference. These processes require only the use of short-term memory and limited information processing. For example:

- Following detailed, sequential directions to complete a task
- Using a table of contents, index, or glossary to locate information
- Skimming or scanning to see whether a task contains needed information
- Identifying details or specifications within a manual or text

Reading to Learn tasks focus on more complex cognitive processing and require input and retrieval of job knowledge from long-term memory. For example:

- Organizing information from different sources into a sequenced series of events
- Using knowledge to avoid hazard and injury
- Determining the presence of a defect or extent of damage

A complete list of the transferable reading competencies used to perform job-specific reading tasks was presented in the learning guide on communication skills and is repeated here on p. 6. The cognitive process used to employ each competency is applicable to job literacy in 95 different occupations. Consequently, once adult learners have mastered the process needed to accomplish these job reading tasks, they can implement them with job materials in a variety of occupational fields. Given the restructuring patterns of industry and the mobility of today's population, teaching these transferable reading processes provides the maximum benefit for adult intermediate literates.

After the reading processes have been identified, the job tasks can be categorized according to the reading processes needed to perform them. Additional published job task instructional material can be collated with the reading processes the instructor has identified. The next step is to select sample passages from the job reading materials that can be used to teach the job reading tasks.

Workplace Reading Skills

Vocabulary

- Recognize common words and meanings
- Recognize task-related words with technical meanings
- Identify word meanings from sentence context
- Recognize meanings of common abbreviations and acronyms

Literal Comprehension

- Identify factual details or specifications within a text
- Follow detailed, sequential directions to complete a task
- Determine the essential message of a paragraph or selection

Locating Information Within a Text

- Use table of contents, index, appendices, glossary, systems, or subsystems to locate information
- Locate page, title, paragraph, figure, or chart needed to complete a task activity

Comparing and Contrasting

- Combine information from multiple sources that contribute to the completion of a task
- Select parts of a text or visual materials to complete a task activity
- Identify similarities and differences in objects
- Determine presence of a defect or extent of damage
- Match objects by size, color, or significant marking
- Classify objects by size, color, or significant marking
- Distinguish between relevant and irrelevant information in text or visuals

Recognizing Cause and Effect, Predicting Outcomes

- Use common knowledge to avoid hazard or injury
- Apply preventative measures prior to a task to minimize security or safety problems
- Select appropriate course of action in an emergency

Using Charts, Diagrams, and Schematics

- Obtain a factor specification from a two-column chart to find information
- Obtain a factor specification from the intersection of a row by a column on a table or chart
- Use a complex table or chart requiring cross-referencing within text material
- Apply information from tables or graphs to locate malfunctions or to select a course of action

SOURCE: Adapted by Philippi from research on transferable skills by Pratzner 1978, Smith 1982, and Wiant 1977.

Reflection on Reading 1

- Think about the differences between *reading to do* and *reading to learn*, and briefly describe (or discuss with peers) how each type might be used in a particular workplace (e.g., one in which learners in your workplace literacy program are employed or another with which you are familiar).

- Both *reading to do* and *reading to learn* are important. How might these two abilities be integrated in a workplace literacy program?

Strategy Development: Modeling and Metacognition

Another learning guide in this series, *Develop a Training Plan and Performance Objectives from the Job and Literacy Task Analyses*, presents two concepts critical to the way in which reading should be taught in a workplace literacy program: modeling and metacognition. For those of you who want a quick reminder, the information is repeated on p. 12.

There are many reading and study skills that can be effectively taught by your applying that skill to workplace materials, while explaining ***out loud*** your thought processes as you locate the information needed . . . or interpret the information provided . . . or decode a particular word or meaning.

For example, to model how to read a three-column chart, you need a sample chart to explain how to perform the following thinking steps:

1. First, I let my eyes travel quickly over the chart, noticing words in boldfaced print and capital letters. I skim over the page to locate headings at the top of columns or to the left side of the rows. This helps me identify the location of the information the chart contains. I try to understand how the information contained in the chart is organized on the page.

2. Next, I think about the specific reason I'm looking for information in the chart. For example, I may need to find out how to replace a needle container. I pick a key word or two to describe my need. In this case, I'll use the words *replace needle container*. Then, I skim, or quickly read, the boldfaced words, or headings, in the chart, searching for my key words.

3. Then, I move my fingers down the column and across the row by each of the headings that fit my information category. Where my fingers meet and the column and row intersect, I find the cell of information I need. Let's see, sealing the opening—no; disposal of sealed container—no; replacing needle container—there it is, in the second column from the right. Now sometimes there's not a direct match. Then I have to think of synonyms, or other words that mean the same thing, to use as my search words. If I hadn't found a match for *replace needle container*, I might have used *new container* or something like that.

   Suppose I needed to find out where to throw away old containers. I could use the words, *throw away used containers*. If I skim the headings, I don't find those words. What words, which mean almost the same thing, could I use for my search words instead? . . . and so on.

You should work toward the gradual transfer of responsibility for articulating these steps from instructor to learners. Good modeling breaks instruction into manageable chunks. It requires careful explanation of each small step until learners are proficient at them all. Talking through each thinking step and guiding learners in trying out individual steps throughout the lesson helps them master the entire strategic skill before

they are asked to practice and apply it. The success they experience also builds self-confidence, which can enhance personal growth and development.

Focusing curriculum content on the step-by-step thinking strategies competent employees use to apply skills to performance of job tasks enables the learners to develop an awareness of abstract processes. It is these abstract processes, such as being able to retrieve necessary information from a three-column chart to solve a problem, that transfer from task to task.

After learners demonstrate ability to successfully complete the entire process and seem comfortable with it, they should be asked to practice the process independently on at least three additional exercises. Be sure to encourage learner metacognition as they practice, asking *how* they arrived at their answers as they work. Lots of positive feedback should be offered as well.[1]

This approach is equally valid regardless of what aspect of reading is being addressed. For example:

- Use of book parts (e.g., preface, table of contents, index, glossary, appendix) or organizational devices (e.g., color-coding)
- Interpretation of graphics (e.g., graphs, charts, diagrams, maps, tables, cartoons, photographs, drawings)
- Vocabulary (e.g., context clues, a dictionary, structural analysis)
- Comprehension (e.g., main ideas, details, organization, interpretation, application)
- Rate of reading (e.g., skimming, scanning, relating to purpose)
- Sources of information (e.g., manuals, job aids, specifications, special references)
- Note taking (e.g., outlining, mapping, summarizing, précis writing, informal note taking)[2]

If you are helping learners ***read for surface knowledge***, for example, you could walk them through the process of scanning and reading selectively, sharing your thought processes aloud as you complete each step:

- Looking at main headings, the introduction, and the conclusion
- Looking at diagram and charts or other visual material within the document
- Perhaps selecting several paragraphs at random and reading them[3]

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1. Adapted from J. W. Philippi, "How to Design Instruction: From Literacy Task Analyses to Curriculum," in *Basic Skills for the Workplace*, edited by M. C. Taylor, G. R. Lewe, and J. A. Draper (Toronto, Ontario: Culture Concepts Inc., 1991), pp. 255-258. (ED 333 180)

2. G. E. Fardig and G. B. West, *Assist Students in Developing Technical Reading Skills*, Module M-2 in the Professional Teacher Education Module Series (Athens, GA: American Association for Vocational Instructional Materials, 1985), p. 13. (ED 252 702)

3. *Integrating Literacy into Trades Training* (Government of Canada: Labour Assignment Program, n.d.), p. 5.

To help learners ***read for long-term retention***, you could model strategies such as the following in small manageable instructional chunks:

- Finding the main ideas both for paragraphs and longer texts
- Underlining key words
- Looking for the main action words
- Using the question words (who, what, when, where, how, and why) to clarify
- Reformulating text when the meaning is not clear
- Building a personal glossary
- Taking notes without recopying the whole document
- Identifying and making use of your preferred learning style
- Solving problems and making judgments based on what you read[4]

To help learners ***read and follow directions***, you can make explicit the strategies good readers automatically employ, particularly with difficult instructions (e.g., those that make assumptions about prior knowledge that aren't valid or that are written in paragraph, rather than list, form):

- Reading the whole set of directions first to get a global idea of the task
- Itemizing the tools required to carry it out
- Taking a few minutes to identify the parts of machinery referred to
- Studying any diagrams of the processes involved
- Carrying out the instructions, being careful to reread each step after it is completed and to read forward through several more steps before concentrating on the next step
- Raising critical questions and using problem solving throughout the process[5]

4. Ibid.

5. Ibid, p. 6.

Metacognition: Making Thinking Visible

One of the more sophisticated approaches that illustrate active processing is what Sam Crowell calls "metacognitive" teaching. He either models or includes students in a process and then stops to ask, "What did we do? What did you experience?" The objective is to create the exact circumstances of a concept that is being taught . . . to reflect on what happened and on the process as an experience. In this way, provided there is a general atmosphere of relaxed alertness and trust, students move to deeper levels of understanding because the experience includes dealing with the impact of the process on themselves, including emotional involvement (e.g., asking teachers to explore the values implicit in the choices they make in designing a lesson . . . how their values interact with the process). Students learn the process not as an abstract concept but in relation to their own thinking and behavior.

Metacognition—thinking about the way that we think, feel, and act—helps us to learn in much more depth because we begin to recognize and capitalize on personal strengths while improving or allowing for weaknesses. We are also better able to appreciate what is really important to us, and so access our intrinsic motivation. Hence, active processing becomes a vehicle for increasing relaxed alertness.

Active processing is not just a stage in a lesson . . . It is a matter of constantly "working" and "kneading" the ongoing experience that students have.

Excerpted from R. N. Caine and G. Caine, *Making Connections: Teaching and the Human Brain* (Alexandria, VA: Association for Supervision and Curriculum Development, 1991), pp. 148, 151, and 169-170. (ED 335 141)

A suggested lesson format, using the technique of modeling . . . and offering the student explicit instruction in metacognitive strategies follows:

1. The teacher should provide one or two selections from job materials that can be used to illustrate the desired reading process. He or she should demonstrate the process to the students by thinking each step of the entire procedure aloud as it is applied to the selection, while students follow along with their own copies of the materials. Every step of the reading task should be expressed; it should not be assumed that the students will automatically progress from one step to the other.
2. The teacher should repeat the same procedure with one or more additional selections that illustrate the process, allowing the students to take the responsibility for contributing information to different steps each time.
3. After students demonstrate the ability to successfully complete the entire process and seem comfortable with it, the teacher should allow them to implement the process independently on a follow-up selection. Immediate feed-back should be provided.
4. At least three additional selections should be available for students to use to practice the job reading task until they have mastered it.

J. W. Philippi, "Matching Literacy to Job Training: Some Applications from Military Programs," *Journal of Reading* v31/n7 (April 1988): 663-664.

Reflection on Reading 2

- Describe (or brainstorm with peers) the following:
  - ~ How metacognition could be taught via specific approaches to reading different kinds of workplace materials as outlined in this reading
  - ~ How modeling could be used with specific approaches to reading different kinds of workplace materials as outlined in this reading
  - ~ How you might model metacognition in reading instruction

Skill Development: Words, Sounds, and Meanings

The vocabulary words to be tackled should derive from the terminology included in LEA scenarios developed by the learners[1] and in the actual materials of the workplace. Learners may need help in a number of areas. Some may need help in recognizing or sounding out a word. Others may be able to read the word but not know its meaning. Some may do well when reading the word but not be able to remember how to spell it when trying to write it down.

If you have one or more learners who are nonindependent readers, you may need to refer them to various agencies that can diagnose whether they have special difficulties (e.g., severe dyslexia) and also provide basic instruction. Working with an adult nonreader or low-level reader—a beginning reader, some call them—is very challenging and requires great skill and much experience. Such individuals have had a whole lifetime in which to make their nonproductive decoding strategies habitual. They may have never realized the simple fact that reading is a *meaning-making* process. In fact, it is often easier to work with non-English speakers who are literate in their own language than to work with native English speakers with very low literacy levels or no literacy at all.

In some cases, you may have students who are not literate in their own language, and that poses another set of challenges.

In most workplace situations, however, you will find very few learners who read at the lowest levels. Instead, your biggest challenge will be enabling mid-level readers to understand and make meaning from the increasingly complex materials found in the workplace.

In approaching vocabulary with these learners, it is best to deal with only a short list of words (e.g., six to ten) at a time, regardless of the number of new words encountered in a particular text. Instruction related to these words can deal with—

- Context clues
- Sight words
- Word recognition skills
- Structural analysis: prefixes, suffixes, and roots
- Spelling
- Memory devices

1. For more information on scenarios, refer to another learning guide in this series, *Assess Learner Performance*, pp. 18-21.

Context Clues

The use of context clues[2]—the ability to search out a word's meaning from clues given by the other words that surround it— is a critical vocabulary skill. To use context clues effectively, learners must first recognize the fact that the context ***can*** provide clues to the meaning of an unknown word. They must also keep in mind that the context may reveal the meaning of a word only partially. In order for the clues to be helpful, they should be near the word, preferably within the same sentence or paragraph.

Context clues can be grouped into six categories: outright definitions, examples, modifiers, restatement, inference, and inference through established connections. If a sentence or paragraph provides context clues for a term learners are struggling to define, this is a perfect time to help learners recognize that type of clue and understand how it reveals the meaning of a word.

Outright definition. In some cases, the sentence provides a direct definition. For example, in the first sentence in the section on context clues, the term *context clues* is defined parenthetically (set off between dashes). Words that signal that a definition is being provided include the verb *to be*, *means*, *can be defined as*, *called*, and *termed*.

Pattern: Unknown word + Signal word + Definition

Example: *Cerebral hemorrhage* is another name for stroke

In other words: Cerebral hemorrhage = stroke

Learners will need to recognize the signal words that are often used as "equal signs."

Examples. Examples of commonly known things, with which the reader is likely to be familiar, are also frequently used as context clues. They are given to help the reader understand a more general term with which he or she may not be familiar. Signal words (e.g., *like*, *such as*, *for example*) are often used with examples.

Example: Many *legume* vegetables, such as navy bean, soybeans, peas, and lentils, can be dried and stored for long periods.

Modifiers. Modifiers may be phrases, clauses, or single words, often in the form of predicate adjectives. They are intended to give a more precise meaning to the word they modify.

Example: To cut curves in thin wood, one should use a thin-bladed, fine-toothed *scroll saw*.

What, then, is a scroll saw? It's a thin-bladed, fine-toothed saw used to cut curves in thin wood.

2. The information on context clues has been taken from G. E. Fardig and G. B. West, *Assist Students in Developing Technical Reading Skills*, Module M-2 in the Professional Teacher Education Module Series (Athens, GA: American Association for Vocational Instructional Materials, 1985), pp. 20-21. (ED 252 702)

Restatement. A restatement is announced by signal words such as *that is to say, that is, in other words, what this means,* or *to put it another way.* A restatement may also be announced using the word *or,* followed by a synonym. Sometimes dashes or parentheses indicate a restatement (as in the first sentence in this section).

Example: Agglutinins are chemicals that *agglutinate* cells—that is, make them stick together in clumps.

Inference. Inference is the process of gathering details and "reading between the lines" in order to perceive relationships that have not been explicitly stated. In other words, no signal words are present to connect the term with an explanation of its meaning. However, by using reason, logic, and speculation (in short, inference), you can deduce an explanation.

Example: The welding operation should be shielded so that no one in the vicinity may be in a position to look directly at the arc or have it shine in his/her eyes. If someone should accidently become severely *flashed,* special treatment should be given at once by a physician.

The meaning of *flashed* can be inferred from two clues: (1) the first sentence shows that it has something to do with looking directly at the extremely bright light of the welding arc; and (2) the fact that a person looking at an arc may need treatment by a physician is an obvious clue that being flashed is hazardous and can cause severe eye damage.

Inference through established connections. This context clue depends on relationships established by sentence construction—repetition of key words or the use of connecting words that indicate comparison or contrast.

Example: What lay people call "strokes" or "apoplexy," physicians call "cerebrovascular accidents."

Example: Teak wood has many of the same uses as black walnut but is harder to work, lighter in color, and close-grained and oily rather than open-grained.

In the first example, the common terms and the technical terms are linked by the key words, *what lay people call . . . what physicians call.* In the second example, connecting words indicate how teak contrasts with black walnut: *but* is harder . . . lighter . . . close-grained and oily *rather than* open-grained.

Sight Words

Some words must be recognized as a whole, generally because they do not decode easily using a phonics or prefix/root/suffix approach (e.g., pronunciation of the words *through, though, tough*). To teach a sight word, start with the word in context. Read the sentence and then focus on the word to be learned. In many cases, the learners will recognize the word orally and be capable of defining it for you. This ties the new information (the written word) to what they already know (the meaning of the word).

Once the group has successfully defined the word, you could ask them to summarize the definition in a few words that will be easy to remember. Recording these definitions will give learners a sense of ownership for the terms and aid learning and recall.[3]

Sometimes definitions are critical because a word may have one meaning in everyday usage and quite a different one in the workplace. For example, a doctor may *cure* a patient (make him or her well), which is quite different from what is meant when a farmer *cures* the meat from a pig (processes it so it will keep longer) or when a construction worker *cures* cement (keeps the surface wet for 24 hours to prevent cracking).

To reinforce learning of the written word, repetition is key. Since repetition can be boring, try to be creative; don't just simply have the learners repeat the word after you over and over again. Remember that the more senses involved in the learning process, the more effective it will be and the more likely to meet the needs of learners with different learning style preferences:

- Visual (sight)
- Auditory (hearing)
- Kinesthetic (motion)
- Tactile (touch)

Thus, you could start by saying the word and having the learners repeat the word after you (auditory). Learners could then be asked to look at the word, say the word, and then close their eyes and try to see the word in their minds (visual). Learners could be asked to write the word in the air (kinesthetic) or on a piece of paper (tactile). Approaches combining use of the senses can be very effective. For example, learners could be asked to orally contribute new sentences using the word (auditory), with the instructor or a more advanced learner writing each sentence on the board (visual). Individual learners could then be asked to go to the board and point to (tactile) or circle (kinesthetic) the word in each sentence.

Word Recognition Skills

New words can often be pronounced and decoded using various word recognition skills and knowledge of the meanings of prefixes, roots, and suffixes. Again, rather than developing entire lessons around instruction focusing directly on these areas, it is best if the instruction occurs indirectly, in relation to authentic textual materials. When a rule or guideline is taught in relation to material with personal meaning for the learners, it is far easier for them to grasp and retain the information.

If, for example, an LEA scenario contains three words beginning with the letters *br-* (as in *break* and *brief*), this could be a good time to talk about that *beginning blend* (two or three consonants together, each of which keeps its own sound when pronounced). How is it pronounced?

3. Adapted from J. W. Philippi, "How to Design Instruction: From Literacy Task Analyses to Curriculum," in *Basic Skills for the Workplace* edited by M. C. Taylor, G. R. Lewe, and J. A. Draper (Toronto, Ontario: Culture Concepts Inc., 1991), pp. 255. (ED 333 180)

What words do they use everyday that start with that sound? What other examples of that beginning blend can learners find in the scenario or in other written material in the classroom (e.g., material on the chalkboard, signs on a bulletin board)? As words are suggested (auditory), they can be listed on the board by the instructor (visual) and on paper by the learners (tactile).

As learners seek to identify other examples, don't neglect the opportunity to encourage dictionary or glossary use. We learn to turn to the dictionary for help by actually using it regularly for authentic reasons—not by simply being ***told*** periodically that it's a good source of information.

Or perhaps the text includes the words *chart* and *tachometer*. Here we have an opportunity for a lesson on *digraphs* (two consonants together representing a single sound) and the ***various*** sounds a single digraph might represent (in this case, *ch* and *k*).

Vowel and consonant "rules" (e.g., When a word ends in *ck*, it represents the same sound as the */k/* in *key*. Example: *back*) can also be approached in this way, starting with the authentic text, moving to what the learner already knows, and then expanding that knowledge to new situations. When working with these rules, it is important to remember that letters do not "make" sounds; they represent sounds. Oral language is primary; written language is secondary. This is crucial to understand since learners generally have a much better knowledge of the spoken language than of the printed word. Thus, the written word ***must*** be related to the spoken word, given that the spoken word is ***primary***.

Any of the numerous word recognition texts available will provide you with the information you need to master in order to teach the concepts as the need arises naturally in the process of dealing with authentic workplace materials. ***Please note*** that it is not essential, particularly early in the program, that the learner know the terms *blend* and *diphthong* and *digraph* and so on. What is important is the concepts, not the terminology, of word recognition.

Structural Analysis:
Prefixes, Suffixes, and Roots

When you teach learners that *kilogram* means "a thousand grams," you have taught them the meaning of one word. When you teach them that the prefix *kilo* means "1,000," you have given them the key to unlock the meanings (or partial meanings) of many, many words beginning with that prefix. You teach them that hidden in a seemingly single word may be several clues to its meaning. For example:

> If a text on concrete says, "We want to know the effect of both *flexual* and *compressive* stress and strength," we can help learners use known parts of the words (*flex* and *press*) and information about the prefix *com-* to figure out what the words mean.
>
> When you *flex* you muscles, you bend them. A plastic ruler is *flex*ible because it can be bent. Likewise, when a load is applied to a concrete floor, it causes bending and reaches a rupture or breaking point. Concrete's *flex*ual strength is determined in pounds per square inch. Slab cracking can occur in response to *flex*ual overstress.

> Learners undoubtedly know that *to press* means "to bear down on." You iron or press clothing. You press a button. The prefix *com-* means "together." Thus we have *compress:* "press together." If a load bears down on concrete with sufficient strength, it could rupture through compressive stress.
>
> Through examples such as these, learners will eventually realize that language is not as *haphazard* ("happening by accident or hazard") as they thought it was and that they, too, can apply this strategy to their reading.[4]

The instructor in the above example could also have introduced the meaning of the suffix used: *-ual.* The grammatical ending *-ual* makes another part of speech into an adjective (e.g., noun *fact* → adjective *factual*).

As in earlier activities, when you encounter a common prefix, root, or suffix in the material being read, you can ask learners to think of (or locate) other words with that same element, use each suggested word in a sentence, and figure out the meaning of each new word using the meanings of its parts.

Spelling

Learners should learn to spell words in the process of reading and writing them repeatedly (as in the case of the sight words), by learning an increasing number of regular sound-symbol relationships and word patterns, and by becoming familiar with the meanings of an increasing number of prefixes, suffixes, and roots. Unfortunately, English seems filled with exceptions. Actually, regularities are much more prevalent than exceptions; however, those regularities occur in Old English-origin words, Latin-origin words, and Greek-origin words, each of which has a different set of regularities. Nevertheless, some spelling rules can be helpful (e.g., *i* before *e* except after *c* or when pronounced *a* as in *neighbor* or *weigh*).

Making learners aware of homonyms (word that sound the same but are spelled differently) can also help their spelling efforts. Assume, for example, that the term *board feet* is part of the authentic text being used. The pronunciation and spelling of the word *feet* (and similar words like *beet* and *meet*) can be reinforced through repetition and use, but what happens when the learner want to describe in writing an extraordinary *feat* in which one team *beat* another?

Fortunately, many homonyms are different parts of speech (e.g., *bare bear*), so that can be used as a clue. This is especially useful for the *three 2s*: *to* (a preposition or other grammatical "bit" as in the infinitive *to cry*); *too* (an adverb); and *two* (an adjective). This also works for *its* and *it's*.

4. *Integrating Literacy into Trades Training* (Government of Canada: Labour Assignment Program, n.d.), p. 4.

One word of caution, however. Discussion of homonyms is inevitable. The minute you ask learners to use a new word in a sentence, if that word has a homonym, you may get a sentence using the homonym rather than the word in question. Identifying homonyms—a kind of playing with words and language—is fun. But it may be best to add only the original word to the list of words for further study. It's hard enough for the learner to master one new spelling; requiring the learner to master three (e.g., *vane, vein,* and *vain*) and to know which word is which is undoubtedly asking too much.

Memory Devices

If you can make a word special, you will increase the chances that it is indeed imprinted in a learner's memory.

One way is to talk about the origin of a particular word or about other words that derived from the word in question. For example, consider the following words found in the publication on concrete:

> A *darby* is a plasterer's float with two handles. If you have learners look in the dictionary, they will discover that *darby* used to refer to "handcuffs" and that *Darby and Joan* refers to an attached couple. When the term is seen in its historical relevance, it becomes more meaningful. . . . Even *bull float* may be a bit more understandable when learners discover that one meaning of *bull* is "bubble" and that the purpose of the bull float is to smooth the concrete so that there are no surface imperfections (such as bubbles).[5]

Playing with words can also make them memorable. In working with learners on the previously mentioned publication on concrete, for example, you could help them master the definition of *spalling* ("splitting or chipping") by quipping, "Chocolate spall cookies, anyone?"[6] Similarly, an individual studying for the vocabulary section of the Graduate Record Exam remembered the definition of the word *coruscate* ("to glitter") by adapting a familiar proverb as a memory device, "All that coruscates is not gold."

5. Ibid, p. 3.

6. Ibid.

- Obtain samples of workplace materials and locate—
  - ~ examples of the six types of context clues used to provide meaning to occupational terminology
  - ~ two words that should be dealt with as sight words
  - ~ two words that would provide an opportunity for introducing vowel and consonant rules
  - ~ two words that would provide an opportunity for introducing information about prefixes as meaning-making
  - ~ two words that would provide an opportunity for introducing information about roots as meaning-making
  - ~ two words that would provide an opportunity for introducing information about suffixes as meaning-making
  - ~ two words that would provide an opportunity for introducing spelling rules
  - ~ two words whose origins (as found in the dictionary) would help make the words memorable
  - ~ two words you could make memorable by playing with them in some other way (e.g., through a joke or a proverb)

Employ Strategies for Reading Instruction

- Put into practice what you've learned about reading instruction by preparing a lesson for a workplace literacy program. If you have a specific program and learners in mind, use that setting and the needs of those learners as a basis. If not, use a setting you might be teaching in the future.
  - ~ Review sample materials/scenarios from a workplace setting, the skills on the communication chart, p. 6, and the skill development descriptions in Reading 3.
  - ~ Following the principles presented in this learning guide, develop an extended activity or series of activities for a lesson dealing with reading skills.

TOPIC: Employ Strategies for Reading Instruction

Evaluation Guidelines

Directions: Check your competency with the following criteria:

Learner Self-Check		Review Checklist
Did you—		Did the learner—
☐	1. Build the activity(ies) around the actual materials and communication skills of the workplace?	☐
☐	2. Treat reading throughout as the construction of meaning, not a decoding exercise?	☐
☐	3. Treat words in context rather than as isolated items?	☐
☐	4. Embed word recognition skills into the overall instruction?	☐
☐	5. Incorporate *reading to learn* and *reading to do*?	☐
☐	6. Provide for learners to be actively involved throughout the activity(ies)?	☐
☐	7. Incorporate modeling and metacognition into the activity(ies)?	☐
☐	8. Ensure that the activity(ies) are appropriate for (and would be likely to motivate) adult learners?	☐

Learner: _____ Reviewer: _____

Level of Performance: If the evaluation results indicate a need for further competency development—or if the learner wishes to pursue the topics covered in further breadth or depth—please refer to the supplementary resources described in the Annotated Bibliography, which follows.

Askov, E. N.; Aderman, B.; and Hemmelstein, N. *Upgrading Basic Skills for the Workplace.* University Park, PA: The Institute for the Study of Adult Literacy, 1989 (ED 309 297).

Chapter 4 of this document presents a collection of sample learning activities geared to the workplace; section titles include occupational vocabulary, using occupational forms, reading comprehension, reading charts, problem solving lesson, and metacognition. Additional activities and materials are shown in Chapter 6, pp. 6-30 to 6-48.

Chase, N. D. *The Hospital Job Skills Enhancement Program: A Workplace Literacy Project. Curriculum Manual.* Atlanta, GA: Center for the Study of Adult Literacy at the Georgia State University and Grady Memorial Hospital, March 1990. (ED 328 666)

Describes the curriculum portion of the program for improving the literacy skills of entry-level workers, which was based on the whole language approach. Includes copies of curriculum units and assessment instruments.

Educational Testing Service. *ETS Applied Skills Series.* New York, NY: Simon and Schuster, n.d.

Includes two workbooks covering workplace reading skills: *Document Skills for Life and Work* and *Reading Skills for Life and Work.* Each workbook provides lessons based on work-related tasks such as identifying and using information located in materials, interpreting materials, and completing an order form.

Fardig, G. E., and West, G. B. *Assist Students in Developing Technical Reading Skills.* Module M-2 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985. (ED 252 702)

Explains how to fuse the teaching of reading with occupational content; outlines the reading process in terms of the reading and study skills involved; and provides detailed information on developing a variety of exercises to develop learners' vocabulary, comprehension, and graphics skills.

Huggins, K. *Workplace Written Communications I-IX. A Working Curriculum.* Mount Morris, NY: Finger Lakes Regional Education Center for Economic Development, 1989. (ED 311 153 and ED 311 154)

Geared toward persons with midlevel literacy, these modules are intended to move the learner toward the 12th-grade level, using workplace examples that may be used as is or adapted to other settings.

Leidig, J.; McCarty, S.; O'Rear, H.; and Hartzell, M. *The Competitive Edge: Sharpening Your Skills in the Workplace. Communications. Instructor's Guide.* Austin, TX: The University of Texas at Austin, Educational Resources Extension Instruction and Materials Center, Division of Continuing Education, 1993. (ED 356 429)

Includes detailed workplace-context lessons containing instruction and exercises for developing skill in accessing information through reading (reading strategies, locating information quickly,

paraphrasing information, following instructions, writing instructions, improving recall, working with tables and graphs, analyzing information). Tools of the trade (comma, period, question mark, apostrophe, capitalization, spelling tips, run-on sentences, sentence fragments) are also presented.

Park, R., and Olson, R. *Reading for Workplace Success.* Paradigm Basic Skills Program. Eden Prairie, MN: Paradigm Press, 1991.

Designed to prepare learners to solve reading problems they will encounter in training programs and on the job by teaching learners the strategies behind the skills.

Vacca, R. T., and Vacca, J. L. *Content Area Reading.* 3rd ed. Glenview, IL: Scott, Foresman, 1989.

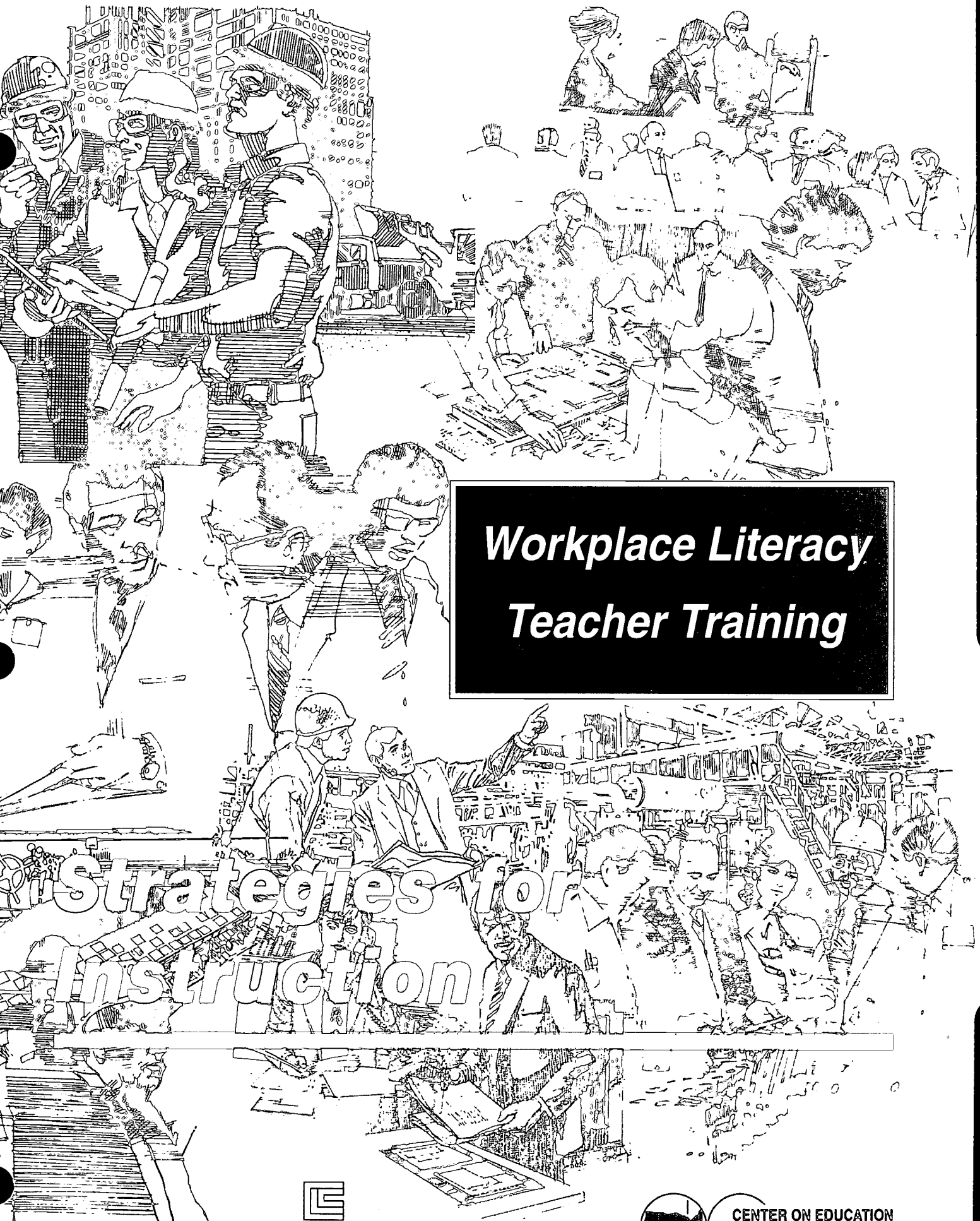
Designed to introduce teachers to approaches to improving students' ability to read texts of greater complexity in subject matter areas (especially nonliterary texts), this text is a valuable tool for workplace literacy instructors. Includes study strategies, writing process strategies, vocabulary building, and staff development. Provides many examples and sample lessons.

Wonacott, M. E., and Kendall, E. *Assist Students in Achieving Basic Reading* Skills. Module M-1 in the Professional Teacher Education Module Series. Athens, GA: American Association for Vocational Instructional Materials, 1985. (ED 252 701)

Discusses reading instruction in relation to occupational requirements; presents activities that can be used for assessment purposes; and describes techniques and strategies for improving reading skills, including teaching technical vocabulary, providing practical reading knowledge and tips, using reading games, introducing and supplementing reading assignments, individualizing reading help, and providing practice and reinforcement.

Workforce Education: Improving Educational Skills. Info-Line: Practical Guidelines for Training and Development Professionals, Issue 9310. Alexandria, VA: American Society for Training and Development, October 1993.

Summarizes important factors in workforce education (time, application of new learning to existing knowledge, continuous feedback and assessment, metacognition, and motivation); and presents an extensive index of workplace and adult basic skills software.



Workplace Literacy Teacher Training

Strategies for Instruction

Mathematics Strategies

COLLEGE OF LAKE COUNTY

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
COLLEGE OF EDUCATION
THE OHIO STATE UNIVERSITY

Employ Strategies for Mathematics Instruction

Introduction

All situations in the workplace that involve quantification and manipulation or use of numbers constitute workplace mathematics. Making sense of these situations so that they are amenable to decision making is the primary role of workplace mathematics—a much broader role than is usually ascribed by those who perceive mathematics as calculation and application of basic arithmetic and advanced theoretical functions.

Rather than a discrete domain of knowledge and skills, mathematical concepts and facts are embedded in virtually all the tasks of daily work and life. In many of these tasks, mathematics is so integrated with language, science, and other elements that it may be hardly recognizable. In fact, mathematics is itself like a language in that it expresses meaning through symbols, which are like standardized short cuts. The symbols used allow people to focus attention on relationships and to reason logically about them.

For many people who have learned to fear mathematics or to assess themselves as unable to "do math," it is important that they be led to understand these points. It is more essential as the work world becomes more technology-driven, because mathematics and logical problem solving are ingrained in applications of technology. One of the key examples today is the widespread use of total quality management (TQM), which depends on statistical process control (SPC).

The approach used to help learners build workplace mathematics skills most effectively is a metacognitive, problem-solving approach that draws from the (familiar) context of the work task and helps learners to think it through with the assistance of mathematical symbols and strategies. This is a real departure from drill and practice on abstract and fragmented sets of problems from a workbook or a textbook arranged by chapters of mathematical topics. It is through strategies that incorporate collaboration and discussion that instructors can "break through" some of the deeply held anxieties their learners often have about mathematics.

Objectives

- Specify the types of computation and problem-solving skills that constitute workplace mathematics.
- Identify myths and misconceptions that influence mathematical performance.
- Explain the teaching principles now commonly agreed upon as required for effective mathematics learning and their relationship to problem solving and metacognition.
- Develop teaching strategies to promote an integrative, metacognitive, problem-solving approach to instruction.
- Identify the key elements that should be included in a lesson plan format for a workplace literacy lesson emphasizing mathematics.
- Develop an example of a lesson plan for a task involving workplace mathematics.

To Help You Meet the Objectives

- Study the material that follows:

  Reading 1: Applications of Computation and Problem-Solving Skills in the Workplace

  Workplace Mathematical Skill Applications

  Reading 2: Beliefs and Their Influence on Mathematical Performance

  Reading 3: Teaching Mathematics for Tomorrow's World

  Metacognition: Thinking about Thinking

  Reading 4: Summary of Issues and Practical Strategies for Promoting Problem-Solving/Metacognitive Skill Development through Math Instruction

  Making Thinking Manifest

  Problem Solving: Role Modeling

  Fostering Collaborative Reading and Writing Experiences in Mathematics

  Reading 5: Instructional Lesson Plan Format, Workplace Mathematics Strand

- Reflect on the questions posed after each reading. The questions are designed to help you clarify and extract meaning from the reading that can be helpfully applied. There are benefits to both individual and interactive reflection—
  - ~ As an individual, consider how you would apply the information either in the program to which you are already assigned or in a program to which you might be assigned.
  - ~ If you are able to discuss these questions with other instructors or program staff, try to get other perspectives on the reading. Compare notes on the ways the ideas can be and have been applied in their experience. If the experiences differ, help each other probe the possible reasons for the differences.

- Complete the Application Activity.
- Evaluate your own competencies using the Evaluation Guidelines. This is an opportunity to assess your own learning and identify any areas in which you feel less competent or confident. If indicated or desired, take advantage of the opportunity to review the related material in the Annotated Bibliography. You may also want to seek out a more experienced person who can be a mentor to you on this topic, helping you assess your competency and acting as a resource person.
- Ask your reviewer to evaluate your skills also. Be sure to note the input from the reviewer that can provide the basis for your further competency building.

To Help the Reviewer Guide and Evaluate Learner Performance

These learning guides have been designed to allow for maximum flexibility of use. For those individuals using them for professional development (without ties to a formal program), the guides allow for self-study. Such use may, however, limit the opportunity for interaction and practice in a group setting. Therefore, if learners are completing these guides in a group setting under your direction, it is strongly recommended that you identify such opportunities and capitalize upon them.

Reflection questions at the end of each Reading and an Application Activity and Evaluation Guidelines at the end of each learning guide provide opportunities for you, as a reviewer, to monitor learner progress and evaluate learner performance on the workplace literacy knowledge and skills being developed. However, your expectations should be based somewhat on the learner's background (e.g., previous instructional experience) and the learner's progress in the program. Individuals with previous experience as instructors in workplace literacy programs should be expected to extend their thinking and activities beyond the level expected of those without such experience.

For example, if the learner is asked to "define company culture," individuals ***without*** instructional experience would be expected to respond solely on the basis of their reflections concerning the readings provided within the guide. The responses expected of individuals with instructional experience, however, should go beyond the readings, incorporating their real-world experiences as well. Likewise, as individuals complete more and more of the learning guides, their work should reflect that progress. Knowledge and skills gained in earlier guides should be ***integrated*** into their reflections and activities as they work through later guides.

Flexibility can also be provided concerning how the learner will demonstrate competency. At a minimum, the learner should submit ***written*** descriptions, definitions, and explanations to demonstrate successful completion of the Application Activity. These should be evaluated—by both you and the learner—using the criteria provided in the Evaluation Guidelines. If feasible, however, you should also arrange to meet with the learner to discuss his or her written documentation. At that time, you could also pose hypothetical or actual situations related to the skill criteria and ask the learner how he or she would handle those situations. Another possibility would be to ask individuals to perform the skill as part of a presentation or demonstration to others in the class or group.

It is also desirable that, whenever possible, you and the learner identify opportunities for expanding on the learning experiences presented in the guide—ways for the learner to apply the learning more deeply and broadly. The question, "What plans do you have for learning more about the skill covered in this guide?" could well be a standard one. In many cases, the learner can use his or her work in the Application Activity as a building block for further exploration.

In summary, the learning situation is not one in which strict criterion-referenced standards based on percentage attainment or mastery levels are suitable, nor would one mode of demonstration be feasible—or appropriate—for everyone. You and the learner should discuss and reach agreement in advance on the level of achievement expected and mode of demonstration to be used so as to create the optimal learning experience. The intent is for the learner's professional development to be competency-based, rigorous, and designed to motivate further learning, yet sensibly adapted to the situation and to the learner's needs and abilities. Hopefully, the learners will carry this flexible philosophy and approach into their own workplace literacy programs.

"APPLICATIONS OF COMPUTATION AND PROBLEM-SOLVING SKILLS IN THE WORKPLACE"
(Compiled from studies by Greenan 1984 and Philippi 1988)
From "Conducting Literacy Task Analyses" by J. W. Philippi, 3-16
Module 3 in *Retraining the Workforce: Meeting the Global Challenge*
Dallas, TX: R. Jan LeCroy Center for Educational Communications,
Dallas County Community College District, 1993

Whole Numbers

- Read, write, and count single and multiple digit whole numbers.
- Add, subtract, multiply, and divide single and multiple digit numbers.
- * Use addition, subtraction, multiplication, and division to solve problems with single and multiple digit whole numbers.
- * Round off single and multiple digit numbers.

Fractions

- Read and write common fractions.
- Add, subtract, multiply, and divide common fractions.
- * Solve problems with common fractions.

Decimals

- Carry out arithmetic computations involving dollars and cents.
- Read and write decimals in one and more places.
- * Round off decimals in one and more places.
- Add, subtract, multiply and divide decimals in one and more places.
- * Solve problems with decimals in one and more places.

Percents

- Read, write, and compute percents.

Mixed Operations

- * Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers.
- * Solve problems by selecting and using correct order of operations.
- Perform written calculations quickly.
- Compute averages

Measurements and Calculation

- * Read numbers or symbols from time, weight, distance, and volume measuring scales.
- * Use a measuring device to determine an object's weight, distance, or volume in standard (English) units or metric units.
- * Perform basic metric conversions involving weight, distance, and volume.
- * Use a calculator to perform basic arithmetic operations to solve problems.

Estimations

- * Determine if a solution to a mathematical problem is reasonable.

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* Indicates skills directly involved with using problem-solving strategies or interpretation.

WORKPLACE MATHEMATICAL SKILL APPLICATIONS

Excerpted from "Basic Skills/Workplace Literacy Training" by J. W. Philippi
In *Human Resources Management & Development Handbook*,
edited by W. R. Tracey, 890-891
New York, NY: AMACOM, 1994

In its recent report, *Basic Skills in the U.S. Work Force*, the Center for Public Resources (CPR) points out companies' constant need for employees who possess skills in reasoning and calculation (Henry and Raymond 1982). Business executives reported that "medium to high levels of mathematics skills are required across job categories, with consistently high levels required in manufacturing, utilities, and finance industries." Employees must use calculations to correctly conduct inventories, complete accurate reports of production and quality levels, measure machine parts specifications, and so on. They must be able to reason through problems logically in order to anticipate the consequences of their actions and assume the responsibilities of teamwork.

Employers frequently complain that their workers are deficient in computational skills, particularly those evidenced in miscalculations of decimals and fractions, which result in costly production errors (Henry and Raymond 1982). However, upon further investigation, employers confirmed that workers can, in fact, perform basic computation algorithms (addition, subtraction, multiplication, and division). The report from the National Assessment of Educational Progress study, conducted by I. Kirsch and A. Jungeblut (1986) supports this with the finding that approximately 75 percent of the young adults tested performed quantitative literacy tasks at the intermediate to adept levels or beyond. The real problem lies in workers' inability to decide which computation algorithm(s) to apply to a particular job problem or to recognize errors resulting from inappropriate applications because they do not understand *why* specific computations are used (Kloosterman and Harty 1986). Neither time-consuming computation skill drills nor the use of calculators is an effective remedy because, while both methods can correct the problem of computational errors, neither one assists the individual in knowing which computation is needed to solve an on-the-job problem (Kloosterman and Gillie 1987-88). The difficulty level of the computational task is also increased when workers must apply more than one numerical operation in the appropriate sequence or use information that is embedded in print materials (Kirsch and Jungeblut 1986).

Workplace applications of mathematical skills require employees to acquire proficiency levels in reasoning and problem solving beyond the use of basic computational algorithms. Workplace problem solving can be defined as critical or logical thinking that uses brainstorming, activates learners' schema, and involves group cooperation (Kloosterman and Gillie 1987-88, Karmos and Karmos 1986). Good problem solvers are those who can clearly define the problem, state the goal, limit the "search space" for the solution, and access prior knowledge (schema) appropriately (Chi and Glaser 1985). F. Pratzner (1978), in a report prepared for the National Center for Research in Vocational Education, lists diagnosis, estimating and problem solving (to include determining relevant information and selecting alternative solutions) as "generic," or basic, reasoning skills used in the workplace. Supporting his position with citations from studies by R. Singer (1977) and J. Altman (1976, pp. 34-35), he points out that "application and practice of these skills under a variety of realistic life and work performance conditions should facilitate subsequent application or transfer of skills, knowledge, and attitudes . . . to work settings." A. Wiant (1977) also identifies problem solving, analyzing, organizing, and decision making as skills most frequently mentioned as desirable by employer. L. Resnick, too, states, "In mathematics, recent research suggests the most successful learners . . . understand the task to be one of *interpreting* numbers, not just doing routine calculations. . . . Failure to engage in 'higher order reasoning' about quantities is related to failures in learning the 'basic' skills of calculation and number usage" (1987, p. 10).

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Singer, R. "To Err or Not to Err: A Question for the Instruction of Psychometric Skills. *Review of Educational Research* 47 (1977): 479-498.

Wiant, A. "Transferable Skills: The Employers' Viewpoint." Information Series No. 126. Columbus, OH: National Center for Research in Vocational Education, The Ohio State University, 1977. (ED 174 809)

Reflection on Reading 1

- Consider a task that you do on your job that involves numbers in some way. Which of the computation and problem-solving skills noted in this reading are needed for that task?

- How do the skills you identified for the previous question need to be linked together and sequenced?

- Estimation is often overlooked or taken for granted as an essential and much-used job skill. Think about what you did yesterday on your job. Make a list of the estimates you made—perhaps physical estimates, time estimates, cost estimates. Did any of the estimates make the task easier? What would be the potential consequences of poor estimation skills?

- Select the same or a different number-related task from your job. How do you need to *interpret* the numbers? For what purpose?

"BELIEFS AND THEIR INFLUENCE ON MATHEMATICAL PERFORMANCE" by J. Garofalo
Mathematics Teacher v82/n7 (October 1989): 502-504

Recent research in mathematics education has shown that success or failure in solving mathematics problems often depends on much more than the knowledge of requisite mathematical content. Knowing appropriate facts, algorithms, and procedures is not sufficient to guarantee success. Other factors, such as the decisions one makes and the strategies one uses in connection with the control and regulation of one's actions (e.g., deciding to analyze the conditions of a problem, planning a course of action, assessing progress), the emotions one feels while working on a mathematical task (e.g., anxiety, frustration, enjoyment), and the beliefs one holds relevant to performance on mathematical tasks, influence the direction and outcome of one's performance (Garofalo and Lester 1985, Schoenfeld 1985, McLeod 1988). These other factors, although not explicitly addressed in typical mathematics instruction, are nonetheless important aspects of mathematical behavior.

The kinds of beliefs referred to in the preceding paragraph are of two types: (1) beliefs about mathematics and the nature of mathematical tasks and (2) beliefs about oneself and others as doers of mathematics (Schoenfeld 1987, Garofalo 1987). These two categories of beliefs are important not only because they influence how one thinks about, approaches, and follows through on mathematical tasks, but also because they influence how one studies mathematics and how and when one attends to mathematics instruction. Schoenfeld thinks of these beliefs as comprising one's "mathematical world view" because they "establish the context in which mathematics is done" (1985, p. 45). This article discusses a few examples of beliefs that appear to be widely held by secondary school mathematics students. The examples that follow come from my experiences as a secondary school mathematics teacher, my observations of secondary school mathematics classrooms, and my discussions with students, preservice teachers, and secondary school teachers. Hence, I think that these beliefs will not seem foreign to most teachers. Indeed, teachers present at three workshops that I gave recently have concurred with them. (Some of these teachers even admitted that when enrolled in advanced mathematics classes, they tend to operate with such beliefs themselves!) Also, these examples are similar to some of the beliefs discussed elsewhere (see Frank 1988, Schoenfeld 1985).

This first example, a belief about the nature of mathematics problems, appears to be held, in different versions, by mathematics students at all grade levels. Given here is a version typically held by secondary school students:

> **Belief 1.** *Almost all mathematics problems can be solved by the direct application of the facts, rules, formulas, and procedures shown by the teacher or given in the textbook.*

Students who operate under the influence of this belief tend to spend their time studying mathematics by memorizing facts and formulas and practicing procedures, if they indeed spend any time studying mathematics at all. This belief influences students to approach mathematical tasks in a very mechanical fashion—by merely trying to recall the most applicable methods. It attributes little, if any, role to understanding in mathematical thinking and therefore does not encourage its subscribers to understand or make full sense out of the mathematics they are taught. This belief has an important direct corollary concerning mathematical thinking:

> **Corollary.** *Mathematical thinking consists of being able to learn, remember, and apply facts, rules, formulas, and procedures.*

Another belief about the nature of mathematics, which is somewhat related to the first and which also appears to be quite common, is as follows:

> **Belief 2.** *Mathematics textbook exercises can be solved only by the methods presented in the textbook; moreover, such exercises must be solved by the methods presented in the section of the textbook in which they appear.*

When unsure what to do with a problem or exercise given on a test, students who hold this belief will spend their time trying to remember the method given in the book, or even trying to decide which section of the textbook dealt with such problems, rather than attempt to reason through the problem. Of course, this task is easier when the order of the test questions matches that of the sections of the book. Students who hold this belief view mathematics as a highly fragmented set of rules and procedures, and they therefore approach the subject accordingly.

The next belief about mathematics also seems to be very popular with secondary school students:

> **Belief 3.** *Only the mathematics to be tested is important and worth knowing.*

This belief motivates students to ask the famous (or infamous) question "Is this going to be on the test?" Students who ask this question do not want to have to learn and remember unnecessary (untested) mathematics. This belief has a number of important corollaries, including the following:

> **Corollary.** *Formulas are important, but their derivations are not.*

Students who hold to this corollary are well aware that classroom-given formulas are useful for solving the mathematics tasks given on tests or for homework, but believe that an understanding of the derivations of such formulas is not useful or needed for anything. They think that the formulas are for students to know and for teachers to understand. Most mathematics teachers, when deriving formulas in class, have heard students mutter, or even cry out, "Just give us the formula." Such students, when looking over their notes and reading their textbooks, skip the derivations and justifications and go directly to the formulas and to the examples illustrating their use. After all, the ability to apply formulas is tested, but understanding their derivations is not.

The final example is a belief about persons who create and teach mathematics:

> **Belief 4.** *Mathematics is created only by very prodigious and creative people; other people just try to learn what is handed down.*

This belief has been presented elsewhere (Schoenfeld 1985) but is repeated here because it is so widespread. Students who hold this belief view the teacher and the textbook as the authorities in, and dispensers of, mathematical knowledge. These students accept what is presented to them at face value (Schoenfeld 1985). They never question what is taught to them, and they are disinclined to figure out or derive anything they might forget. The students who hold this belief think that they can never be more than copies or reproducers of other people's mathematics. They cannot imagine doing or producing mathematics on their own.

Discussion

I suspect that to many mathematics teachers, these beliefs seem narrow, limiting, and even foolish. Some teachers might say that students who hold such beliefs know little, if anything, about mathematics and mathematical thinking. At first glance, it might appear that such students have not learned much in their mathematics classes and from their mathematics textbooks. But on closer examination, it becomes obvious that these students have learned very much. They have learned much about their mathematics teachers, textbooks, tests, and the classroom environment. They have insight about the nature of *classroom mathematics* and have created ways of dealing with it (Cobb 1986).

The beliefs discussed in the foregoing are not foolish at all. In fact, they are very reasonable and accurate if we view them in relation to the actual mathematics education that many students receive. These beliefs are very realistic conclusions based on students' observations and perceptions of their classroom environments. They are examples of the

"seeing is believing" phenomenon. Is not the picture of mathematics given by these beliefs and corollaries an accurate reflection of many mathematics teaching practices and of the tone, style, and organization of many secondary school mathematics textbooks? Are not beliefs such as these continually confirmed in many mathematics classrooms? Given this context, we should expect many students to develop such beliefs, and we should not expect many students to develop more realistic and healthy beliefs about mathematics. And as limiting as they seem, these unhealthy beliefs suggest and imply study habits, test-taking strategies, and classroom behaviors that are very often effective ways of dealing and coping with the demands of classroom mathematics (see Cobb 1986).

General Implications for Teaching

If we do not want our students to have such narrow beliefs about mathematics, then we should not be setting up classroom environments that foster them. Instead, we should be devising total classroom environments that will help our students develop more realistic beliefs about mathematics. The approach to teaching mathematics that is based on the "Here's the procedure, here's a few examples, not here's some for practice" method cannot but put students in a position to develop beliefs like the ones listed earlier.

Mathematics teaching should emphasize activities that encourage students to explore mathematical topics; develop and refine their own ideas, strategies, and methods; and reflect on and discuss mathematical concepts and procedures. Searching for patterns, generalizations, connections, applications, verifications, and related problems must take precedence over rehearsing algorithms. Problem solving and mathematical reasoning should be major emphases of school mathematics rather than be relegated to often-omitted end-of-chapter textbook sections that emphasize rote manipulations. The mathematics classroom must be vibrant and interactive and have an atmosphere of inquisitiveness, exploration, and discovery. The mathematics teacher should be more of a facilitator and discussion leader and less of a dispenser of information. The mathematics student should be an active participant in the whole enterprise rather than a passive listener and practicer.

This kind of approach to mathematics education is now being strongly advocated by the National Council of Teachers of Mathematics through its *Curriculum and Evaluation Standards for School Mathematics* (1989). By promoting and supporting such an approach to school mathematics, we will be involving students in more interesting and more representative aspects of mathematics and mathematical thinking. Furthermore, we will be giving them better opportunities to develop more realistic beliefs about our discipline.

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Reflection on Reading 2

- Can you think of your last class in mathematics and recall operating with any of the beliefs discussed in this reading? List any examples you remember and write a brief paragraph description of one. As you reconsider it, does it seem valid to you now?

- In your past or present teaching of mathematics, can you think of any situations in which you may have inadvertently reinforced any of these beliefs? Consider how you might handle at least one of those situations differently. Discuss it with a fellow teacher if possible.

- How does the availability of the workplace setting and the job context contribute positively to your dispelling these beliefs that may be held by your learners?

"TEACHING MATHEMATICS FOR TOMORROW'S WORLD" by L. A. Steen
Educational Leadership v47/n1 (September 1989): 20

- ***Demonstrate connections.*** The power of mathematics derives both from its internal unity and its external applicability. Everything is connected. Results in number theory provide clues to problems in geometry and are applied in computer science and satellite engineering. Students must see these connections at every opportunity in their school experience. Connections motivate learning and reinforce ideas arising in different contexts. We can no longer afford to let mathematics remain an isolated discipline nor to permit continued fragmentation within the mathematics curriculum itself into isolated courses, separate topics, and disconnected bits of knowledge.

- ***Stimulate creativity.*** Too often, mathematics is judged "dull" by students, even by very good students, because teachers, textbooks, and tests insist that each problem must be solved by one proper method yielding a single correct answer. Nothing could be further from the reality of mathematics in practice. Multiple approaches, invention of new methods, and varieties of solutions are far more typical than are automated answers. Computers and calculators now perform most of the routine tasks of mathematics. In a computer age, one needs to use one's imagination as much as one's intellect, one's judgment as much as one's memory.

- ***Reduce fragmentation.*** Curriculum planning based on specific learning objectives has produced an atomized curriculum of particular techniques practiced on problems specially selected to illustrate textbook methods. Real problems don't come in compartmentalized form. In school, the best clue concerning the approach to a problem—and the approach is in many cases the most important decision—is which section of the book it appears in. Fragmenting the mathematics curriculum destroys the logical unity of mathematics that is the primary source of its unique power to model the world.

METACOGNITION: THINKING ABOUT THINKING
From "Teaching Thinking: Educators Shift Emphasis from Recall to Reasoning" by S. Willis
ASCD Curriculum Update (June 1992): 6
Newsletter supplement, Association for Supervision and Curriculum Development, Alexandria, VA

Metacognition—thinking about one's thinking—is vital to being a good thinker, experts agree. Metacognition is "one of the most powerful tactics" for improving one's thinking, says Barry Beyer of George Mason University.

There are three aspects to metacognition, he explains: planning, monitoring, and evaluating one's thinking. Through metacognition, students reflect on, articulate, and become conscious of their own thinking processes; this helps them to store thinking strategies and call them up when appropriate.

Ordinarily, students don't think about thinking. "They think it just happens; they stand around waiting for it to happen," Beyer jokes. But if students become metacognitively aware, they can make their thinking conscious, explicit, and purposeful.

Teachers need to help their students develop metacognitive awareness. "You *can* cultivate it," insists Robert Swartz of the University of Massachusetts. "It's a kind of habit of mind." Means for stimulating metacognition include double-entry journals (notes and reflections on them), discussions about thinking, and modeling.

To foster metacognition, Susan Whitten, who teaches in the Concord, Massachusetts public schools, has her students write about their thinking. She prompts them to reflect on their own thinking by asking them frequently, "What were you thinking about when you did . . . ." In time, they come to reflect on their thinking naturally, she says.

Robert Marzano of McREL warns that metacognition can also be taken to extremes. A lot of mental energy can be spent making thinking *too* conscious, he says. "Automaticity is the goal."

Reflection on Reading 3

- Select a work-related task that involves mathematics Picture yourself or someone else performing the task from beginning to end. Write down all the basic communications skills and all the math concepts needed to complete the task in a connected chain.

- Keep a log of your thinking as you do the following problem:[1]

  You are the pilot for a small island-hopping airline. You will fly a ten-passenger (plus pilot and copilot) plane today. Nine people have bought tickets for the flight. You are ready to load the plane. You look your passengers over.

  1. What reason would there be for you to look the passengers over?
     a. You want to know if they seem like nice people.
     b. You want to estimate their weight so you can decide if it is safe to take off.
     c. You want to estimate their weight so you can balance the plane as you assign the seats.

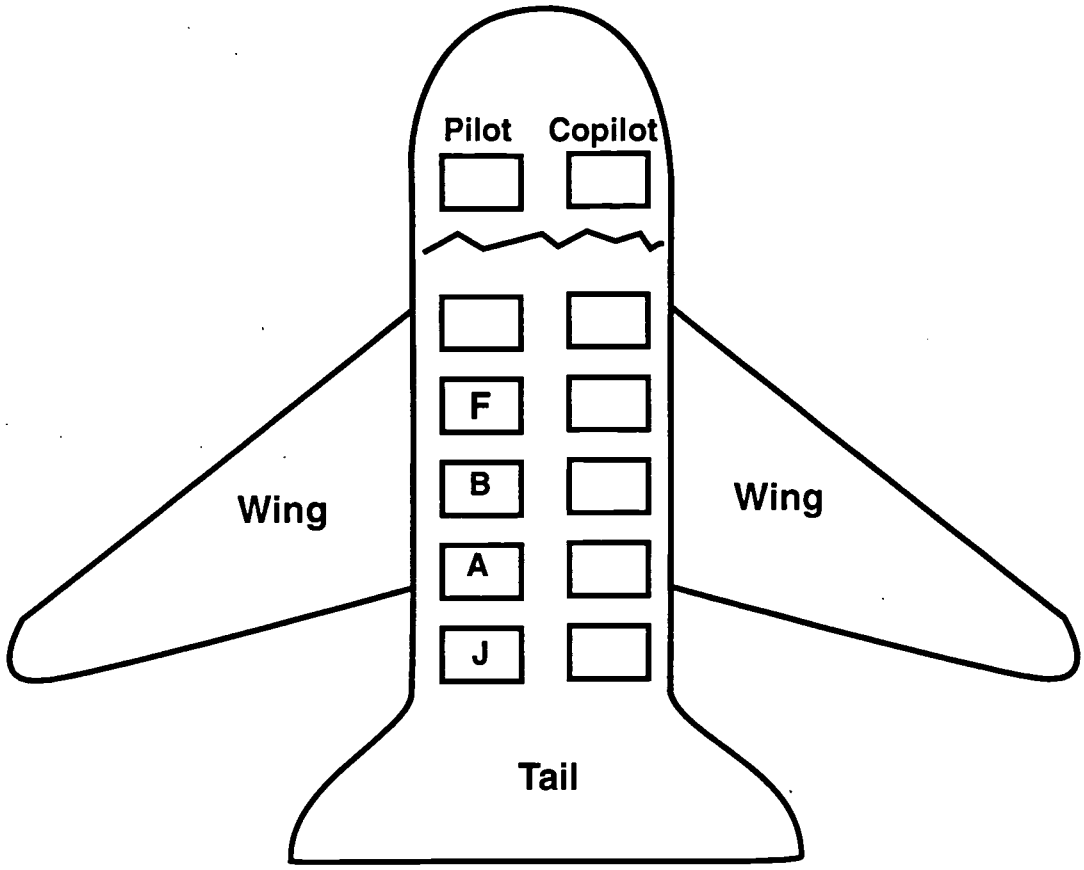
  2. You want to place roughly even weights on each side of the plane. You want less weight at the tail of the plane than over the wings and forward of the wings. You have no copilot, so you can ask a passenger to sit in that seat. (There's an exciting ride for someone!) You weigh 150 pounds.

     Here are your passengers and the assignment of empty seats:

     (A) slim boy about 5 years old
     (B) man abut 5' 11", stocky
     (C) woman abut 5' 5", medium build
     (D) slim girl about 7 years old
     (E) man, about 6' 4", medium build
     (F) woman, about 5' 2", slim
     (G) empty seat
     (H) woman, abut 5' 8", medium build
     (I) girl about 13 years old, stocky
     (J) empty seat
     (K) woman, about 5' 5", medium build

     On the following page is a diagram of your plane with some of the seats already assigned. Show how you would seat the remaining passengers by putting their letter on their seat.

1. Developed by CETE staff for *Reasoning Skills on the Job* (Omro, WI: Conover, 1989).


Pilot
Copilot
F
B
A
J
Wing
Wing
Tail

"SUMMARY OF ISSUES AND PRACTICAL STRATEGIES FOR PROMOTING PROBLEM-SOLVING/METACOGNITIVE SKILL DEVELOPMENT THROUGH MATH INSTRUCTION"
Unpublished paper compiled by N. Puleo and S. Pritz, 1990

Provide a classroom atmosphere or appropriate place for students to talk aloud through an algorithm or word problem. Words spoken aloud cause us to scan our memories, looking for missing information (Manning 1984). For someone to reflect on their thoughts, they must first make their thoughts manifest with words, pictures, diagrams, equations, graphs, music, art, facial and bodily expressions, etc. (Narode).

Model self-communication. Teachers should talk out loud as they think through problems, revealing errors, changes of strategies, memory blocks—all the muddling through associated with figuring things out. Learners need help understanding that there is usually more than one way to solve a problem and get the same correct results; one method may, however, be more concise than another (Silver 1982).

Use a vertically divided page for math work. One side is used for calculations, drawings, steps in the solution; the other is used for continuous writing to record feelings, thoughts and self-talk. This teaches anxious learners to keep writing, even when thoughts break down, and helps to build knowledge of what one is feeling and thinking in the course of problem-solving. (Examples: Do I have everything I need to do this? This looks hard. Did I skip anything? I feel panicky when I look at these numbers).

Encourage students to continually ask themselves (and answer) reflective questions. Suggest questions such as the following:

- What do I do when I see an unfamiliar problem? Why?
- What can I do when I am stuck on a problem? Do these things always help?
- Which kinds of problems are hardest to do? Why?

Involve students in pair problem-solving. Students learn from the teacher how to be interviewers. Students, or teacher and student, work in pairs; one solves a problem verbally while the other listens carefully, asking for thoughts, reasonings and clarification (Lochhead 1985). Students then exchange roles and work on another problem. Cooperative learning is key. Remember that knowledge, though constructed individually, is corroborated through consensus, a social activity (Narode).

The interviewer does not provide answers. Math is viewed as problem solving without clear directions.

Examples of interview questions that guide the student through problem-solving:

- What are you thinking about the problem?
- What does the problem ask?
- What does the problem state?
- What pictures or diagrams can you draw?

Ask students to write thoughts as they think them, then read them and study their own thought processes.

Whether the math operations are clear and simple, or complex, you can encourage metacognitive development by asking students to do the following:

- Estimate the answer.
- Check their performance against their prediction records.
- Keep records on the accuracy of their predictions.
- Think of everything they do when they practice solving mathematics problems. Why do they do these things?

Practice thinking out loud yourself. Let students hear you do this. Recognize that all problem-solving is difficult, requires motivation and confidence, and doesn't depend on memorization, speed, or being right the first time. Ask students to help you verify your own metacognitive processes.

Choose problems and exercises that promote thinking. This usually means selecting interesting word problems related to students' interests. It also means avoiding drills where the operations are all the same. If drills are necessary, precede each problem with student estimates of what the answer might be.

Make self-communicating and pair problem-solving an integral part of the class time. Metacognitive skills only become clear through verbalization. Generative knowledge can only be developed from within the student, guided by questions that help students to think about how they think.

Organize what you know and recognize what you don't know. Move in a goal-oriented way, alert to ideas worth following vs. rejecting. Use systematic assessment and review, and constant questioning. Observe the following when providing feedback to your students:

- Value questions.
- Remind students to check for errors, perform inverse procedures, draw sketches, identify strategies used repeatedly.
- Ask why—make it clear that math is meant to make sense and that people must construct their own meaning.
- Link simple familiar knowledge to more advanced ideas explicitly, and ask students to rephrase in their own words.
- Allow time for reflection and to let learners clarify ideas for themselves.
- Include discussion that promotes reflection and review (Long 1986).

Emphasize mathematical behavior, not correct answers:

- If prone to computational errors, encourage self-monitoring and checking.
- If a problem is complex, have students take more time to explore it and plan possible methods of solution. Remember that affective factors influence problem-solving/mathematical performance. Learners need to develop confidence that they are capable of doing math and that math is not only for geniuses.
- Encourage self-management skills to regulate one's activity. Self-management skills may be at the heart of success in problem-solving performance (Garofalo). In promoting self-management (self-regulation), the teacher offers information about, and activities that promote planning, monitoring, and assessing the implementation of the strategy. In other words, effective teachers help students think about how they think, but let them discover their own solutions.

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Making Thinking Manifest

From "Teaching Thinking: Educators Shift Emphasis from Recall to Reasoning" by S. Willis
ASCD Curriculum Update (June 1992): 5
Newsletter supplement, Association for Supervision and Curriculum Development, Alexandria, VA

Teaching thinking requires that teachers make an invisible process—thinking—visible. For teachers and students to discuss thinking, for example, thinking processes must be made manifest. For teachers to help students improve their thinking abilities, they must provide them with concrete models of good thinking. And students need to make their own thought processes tangible if they are to receive feedback.

Clearly, verbalizing one's thought processes is critical. "The best mirror of the mind is the mouth," says Stanley Pogrow, developer of the HOTS program. But putting thoughts into words doesn't always come easily. "It takes a little practice for kids to do this," says Barry Beyer of George Mason University. "Your first efforts are crude, but with time your representations become more sophisticated."

Teachers can use a variety of means to prompt students to articulate their thoughts, experts say. They can ask students to "talk aloud" their thoughts or to write stream-of-consciousness journals. Discussions and cooperative learning activities require students to put their thoughts into words clearly.

Of course, a verbal model "doesn't represent all that's happening in your mind," says David Perkins of Harvard's Project Zero. But such speech offers a "porthole" on mental processes. Even though think-aloud methodologies don't capture everything, they yield "plenty of payoffs" for both teachers and researchers, he says.

To provide models of good thinking, teachers can "talk aloud" their own thinking and provide written descriptions of how an expert thinker might approach a particular problem.

According to Howard Gardner of Harvard's Project Zero, students learn well when they have teachers who themselves learn well, who exhibit their learning, and who draw students into their approaches. "That is how masters work with apprentices and how professors work with graduate students," he notes.

Teachers, therefore, must be willing to reveal their own thought processes, experts agree. Anyone teaching thinking must have an open mind—literally, says John Barell of Montclair State College. Teachers must reveal how they themselves deal with problem situations. An English teacher, for example, must be willing to analyze an unfamiliar poem, in order to model the interpretive process for students. "Before I can ask, 'How did you approach this?' I need to be open enough to show my own thought processes," Barell says.

PROBLEM SOLVING, pp. 2-3
Columbus, OH: Ohio Department of Education, 1980

Role Modeling

Students need reinforcement that problem solving is more than a single aspect of instruction that receives periodic emphasis. They need to have demonstrated that problem solving is a way of approaching new situations and new challenges. Model teaching can be a very important force in nonverbally depicting desirable behavior for emulation by students.

> Education does not mean teaching people what they do not know. It means teaching them to behave as they do not behave. It is a painful, continual, and difficult work to be done by watching, by warning, by precept, and by praise, but above all, by example.
>
> —John Ruskin

Being receptive to different ideas and approaches, being alert to unexpected possibilities to reinforce problem solving instruction, using the strategies and techniques of problem solving, displaying a curious and questioning mind, exhibiting an exuberance for and appreciation of problem solving behaviors wherever they are found are practical teaching considerations that will reinforce problem solving instruction throughout the total instructional program.

However, an area which is often overlooked involves the teacher as a true problem solver, rather than as a teacher of problem solving. In most instances, the blockage in student problems will be transparent to the teacher. Therefore, the problem is, in reality, a mere exercise for him. His presentation of a problem to students or his assistance to them as they struggle with a problem will seem to be guided by inspiration and insight. Each move that he makes, each suggestion that he offers, turns out to be a good one. Therefore, students are likely to perceive problem solving as a series of uninterrupted steps of logical thinking that flow from some mystifying insight about the problem which they are unable to achieve. Not realizing that frustration and uneven advances toward solution are, in fact, part of problem solving, the student senses inadequacy and failure when it is not warranted.

To accurately model problem solving, it is therefore necessary for the teacher occasionally to present problems which he has not previously solved, and which he does not immediately see through. This involves an element of risk, but no more so than the risk he is asking a student to undertake for a situation which is a true problem for him. The struggling for solution, the generation of alternatives, the discarding of ideas, the partial failures are all a realistic part of problem solving, including the eventual exhilaration that cannot be suppressed when the problem is eventually solved.

If the problem proves to be a particularly difficult one that does not yield to an immediate assault, the setting aside of the problem for another time, in a conspicuous place, demonstrates another aspect of the accomplished problem solver—the willingness to halt problem efforts temporarily and to return to the problem later with renewed vigor, persistence, and effort until it yields. If in the intervening time, the problem is first solved by a student, then all the better. The stature of students in problem solving endeavors will be enhanced through growing confidence. Class problem solving efforts will be perceived as more coequal endeavors and the teacher as a strong partner rather than always the leader and source of all information.

The Source of Inspiration

Nearly everyone has had the experience of working diligently on a difficult problem which has failed to yield to personal efforts, and later to learn of an inspirational view of the problem which reduces it to a mere exercise. It is very satisfying to understand how the problem is solved and to have the immediate anxiety removed. There is a particularly satisfying feeling that accompanies the understanding of an elegant solution. But a larger question, one very important from a teaching perspective, remains for those who have toiled

unsuccessfully with the problem. "How did you ever think of doing that?"

The ultimate goal is to enable each student to solve as many problems himself as possible. The positive effect on a student's problem solving expertise in merely observing the solutions of other problem solvers is nebulous at best. But the teacher can play a primary role in looking back at a solved problem and helping the class understand how the successful student arrived at the crucial idea for solution. Questions posed to the problem solver can be employed for this purpose.

"What is there about the problem which prompted you to think of trying that approach, Betty?" "Was that the first thing you thought of trying, Frank, or did you discard some other ideas first?" "Ann, tell us why you didn't think that some of these other approaches suggested by your classmates would be successful with this problem. Or did you try them first yourself before hitting upon that great idea?" Or to the class the question could be tossed out again, "What if we didn't think of George's super idea? Could we have accomplished the same thing in another way? What else have we left untried?"

Confidence in problem solving comes from two sources. Of primary importance is having the "eureka experience" yourself, of enjoying directly the success of solving problems. Of secondary importance is the recognition that problems are seldom felled by one swift swoop of creative thinking. Solutions are generally the product of many unsuccessful ideas before a key one emerges.

If students understand the full implications of the problem solving process, they will come to appreciate better the techniques and strategies for solving problems that provide them things to try. They will recognize the importance of not only thinking about the problem, but of being aware of how they are going about that thinking. The importance of consciously expanding alternatives and possibilities, of looking at the problem components in different ways, of seeking creative and untried approaches will be appreciated. Then, in reviewing the successful solutions of others, they will be more sensitive to the need to look past the solution to the thinking underlying that solution. They will become more knowledgeable of the extent of work that precedes the polished and straightforward solutions that appear in textbooks or come from accomplished problem solvers.

"Fostering Collaborative Reading and Writing Experiences in Mathematics"

by K. D. Wood

Journal of Reading v36/n2 (October 1992): 96-99

Since the earliest American study on collaborative learning in 1897, hundreds of studies have been conducted attesting to the validity of employing grouping techniques in the classroom. Prominent educators such as John Dewey and Colonel Frances Parker long advocated classrooms in which learning is a collaborative effort. Interest in group learning has become an international crusade with research conducted in Israel, West Germany, Canada, and Nigeria, to name a few. In fact, according to an interview with Johnson and Johnson (in Brandt 1987), there is more evidence for collaborative learning than for any other aspect of education.

Collaborative learning is not without its advocates and its researchers in the field of mathematics as well (Davidson 1990, Grossman 1985, Webb 1985). In recent years, the National Council of Teachers of Mathematics' new Standards for School Mathematics (NCTM 1989) have included "the ability to communicate mathematics" among their five goals required to meet mathematics needs in the 21st century. Also, Steen (1989) has cited studies that suggest the need for full scale revision of the mathematics curriculum.

Among the actions called for are the need to (a) *engage students* by employing classroom strategies to make them active participants in their learning; (b) *encourage teamwork* so students can experience the universal need to work with others to achieve a common goal; (c) *encourage discussion* since nothing "engages a student's mind as well as vigorous argument and discussion"; and (d) *require writing*, because it helps students learn

to communicate about mathematics. Writing helps students clarify their own understanding, and for students who prefer written over quantitative expression, it provides a strategy more suited to their interests and abilities.

When collaborative activities are paired with writing assignments, the potential for learning is even greater. The professional literature abounds with research and ideas for incorporating writing instruction with the teaching of mathematics (Davidson 1977, Davison and Pearce 1989, Havens 1989, Keith 1988, Nahrgang and Peterson 1986, Noddings 1985, Wilde 1991).

A recent study by Smith, Grossman and Miller (1990) demonstrated how integrating reading and writing can help students critically reflect about and apply new concepts. The researchers maintain that students learn mathematics by reflecting on experience, not just repetition of experience.

Reviewing the research on cooperative learning in mathematics, Davidson (1990) reports that students engaged in small-group approaches significantly outscored their control group counterparts. Similarly, mathematician Uri Treisman discovered that when students were required to join with their peers when stuck on a problem, instead of remaining individually frustrated, their grades rose dramatically (in Shanker 1988).

Such studies illustrate how peers can help one another by discouraging immature strategies and illustrating better, more efficient strategies to take their place (Noddings 1985).

. . . [Collaborative] strategies provide ways to increase students' conceptual knowledge of mathematics through the communication processes of reading, writing, listening, and speaking . . . [and these strategies are applicable] across grade levels and across topics in mathematics.

Paired or Group Retellings

When applied to mathematics, paired or group retellings (Wood 1987, 1991) are one way to promote and practice the strategy of "talking aloud" the thought processes involved in computation and word problems. While students can be grouped randomly as needed, a more beneficial approach is to group them heterogeneously so that they can learn from their experiences and help one another.

For example, students grouped in threes could each be given a different computation problem on the same topic, such as multiplying decimals:

Transcript of a Group Retelling in Mathematics

Problem: Multiplying decimals

27.5 x .35 =

Student

A First we need to line up the numbers so we can multiply, without getting mixed up.

27.5
x.35

B Then we start at the right and multiply like we usually would. Don't worry about the decimal right now.

C 5 times 5 is 25. The 5 goes under the 5s on the right and we carry the 2. Then multiply 5 x 7, which is 35 then add 2.

A That's 37. The 7 goes under the 3 and you carry 3. Then multiply 5 x 2, which is 10 and add 3; that's 13. That's 1375.

B The next row moves over to the left one space. I get 825. How about everybody else?

C That's it. Now we add [pointing]. Bring down the 5; 7 plus 5 is 12, carry the 1; 1 plus 3 plus 2 is 6; 1 plus 8 is 9; that's 9625.

B Count the total number of digits to the right of the decimal in the problem—it's 3. Then start at the right of the answer and count 3 digits. The decimal goes to the left of the 3rd digit.

A After the 9, right?

C So the answer is 9.625!

B Rounded off, that's 9.6, not 9.7, because the 5 on the end makes the 2 a 3, and 3 is less than 5.

A If it came out 9.66, we'd have to round it off to 9.7.

Each student must first solve the problem and either think out loud or write out the processes involved. Then, in turn, the students can present to the group an enlarged version of their problem, written in large numerals or letters so all can see (a modification of the Big Book concept in reading). With the aid of a pointer (a pencil will do), they must teach their peers the processes used.

Students can also be given the same problem to solve individually and then, with input from peers, discuss and embellish each other's retellings to discourage inadequate processing strategies. . . .

Reaction Guide

The reaction guide (Bean and Peterson 1981, Herber 1970) is a strategy to stimulate students' thinking and discussion of topics before, during, or after a given unit of instruction. It consists of a series of five to eight statements that reflect general concepts or misconceptions about a topic. Students are to find evidence that either refutes or confirms each statement.

I have modified the reaction guide for mathematics and have found it more useful as a review mechanism (after a lesson or unit) to help solidify students' understanding of important concepts. In the modified version, students can work in pairs or small groups to engage in the review lesson, completing one guide between them to expedite the process. Unlike when completing the original reaction guide, students must put their evidence in writing.

[On the next page is] a guide developed and used by a middle-level teacher to review a lesson on metric measurement. As can be seen, the guide contains some statements that are deliberately incorrect. Since this is a strategy that would be used as a final synthesizing review of concepts previously discussed and practiced, encountering the common misconception again in written form helps students talk aloud with their peers and find evidence for their responses.

Further, students should be encouraged to refer to sample pages in their text, write their own examples, relate the problem to everyday life, and be as anecdotal as possible. After they have worked in their pairs or small groups on the guide, the teacher can then discuss the statements with the class, eliciting the reasons behind their answers.

A Reaction Guide in Mathematics

Names of group members:

Ryan
Mandy

The Metric System: Meters and Kilometers

Directions: With your partner, take turns reading and discussing each of the statements below. Put a check if you agree or disagree with each statement. Be sure to support your answer with at least one example. Use your book or any other sources for support.

1. The meter is a unit of length in the metric system.
   - ✓ I agree because: On page 142 in our book it said that the metric system is based on the meter.
   - ___ I disagree because:

2. The kilometer is used to measure long distances such as the distance between two cities or how far a person can jog in 30 minutes.
   - ✓ I agree because: A kilometer is like a metric mile, and a mile measures roads.
   - ___ I disagree because:

3. You would want to use the meter to measure the distance from Wadesboro to Charlotte, North Carolina.
   - ___ I agree because:
   - ✓ I disagree because: You should use kilometers to measure miles and distance; the meter is too short.

4. You would want to use the kilometer to measure how deep a swimming pool is.
   - ___ I agree because:
   - ✓ I disagree because: A swimming pool is not a long distance down. It is not that deep.

5. The only reason we need to study the metric system is because it's in our math textbook.
   - ___ I agree because:
   - ✓ I disagree because: The metric system is used in many jobs in the U.S. (architecture, science, engineering). Also, most of the rest of the world uses this system.

Note: A special thanks to teacher James Thompson for developing and using this guide.

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- Ask yourself the self-communication questions:
  - ~ What do I do when I see an unfamiliar problem? Why?
  - ~ What can I do when I am stuck on a problem? Do these things always help?
  - ~ Which kinds of problems are hardest to do? Why?

- With a colleague or fellow learner, try out pair problem-solving. Then consider what you found to be beneficial or what you think could be beneficial for learners about using this strategy. What do you think about the statement that "knowledge, though constructed individually, is corroborated through consensus, a social activity"?

- The reading suggests that the teacher should occasionally present problems with which he or she is not familiar so as to more realistically role model the solution process. That idea may leave some teachers feeling vulnerable, in contrast to the situations in which they "know all the answers." Find an unfamiliar problem and work on it independently to become more comfortable with what you might say to mirror your thoughts—and perhaps struggles—to learners, rather than showing them the solution.

- Consider how you would develop a reaction guide for a selected work-related mathematical topic. How do you need to analyze the topic so as to elicit learner thinking? Do you think it might be a good learning experience for a learner to develop a reaction guide? Why?

Instructional Lesson Plan Format: Workplace Mathematics Strand

DACUM Task Reference _____

<table>
<tr><th>Learning Objectives Addressed</th><th>Learning Activities</th><th>Learning Materials</th></tr>
<tr><td>Work context:</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>Task to perform:</td></tr>
<tr><td>Performance outcomes:</td></tr>
<tr><td colspan="3">Skills highlighted:</td></tr>
<tr><td colspan="3">Identifying the purpose:

Selecting an approach:

Gathering needed data:

Calculating:

Checking the solution:</td></tr>
<tr><th>Learner Follow-up</th><th colspan="2">Instructor Follow-up</th></tr>
<tr><td></td><th>This lesson</th><th>Next lesson</th></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Lesson Plan Sample

DACUM Task Reference *Implement SPC Procedures 3.4*

Learning Objectives Addressed	Learning Activities	Learning Materials
Work context: *Given die set ups producing parts*	*Calculating FTQ from data; plotting data on chart; integrating chart*	*Charting Easybook First Time Quality Worksheet*
Task to perform: *calculate and chart First Time Quality (FTQ)*		
Performance outcomes: *so as to monitor the quality of tooling and die set up*		

Skills highlighted: *Dividing (13)*
Calculating percentages (59)

Identifying the purpose: *Read p. 34 of the Charting Easybook. Discuss why this purpose is of importance. (#s 1 and 2 on Worksheet)*

Selecting an approach: *Learner should explain why the FTQ formula on p. 34 makes sense. Would another approach be as satisfactory? (#3 Worksheet)*

Gathering needed data: *Learner should identify the source of the numbers "dies that produce good parts" and "total dies set," then access real data from those sources.*

Calculating: *(1) Practice division of one and two digit numbers. (2) Practice conversion of decimals to percents by multiplying the decimal by 100. Complete the worksheet data and chart.*

Checking the solution: *Discuss what numbers would be reasonable solutions, what patterns would be expected.*

Interpreting information: *Complete #s 4-8 on the worksheet.*

Learner Follow-up	Instructor Follow-up	
	This lesson	**Next lesson**
Plot FTQ for your line for a month and plot the information on a Quality Improvement Process Chart (#9 Worksheet)	*If additional calculation practice is needed, assign from Job-Related Basic Math*	

Reflection on Reading 5

- How does the lesson plan format anchor or situate the learning experience in a job task?
- Although this lesson plan format emphasizes mathematics, can you identify how other basic skills could be woven in to avoid fragmentation?
- You may have noticed that calculating is only one of the five steps in the solution process on the lesson plan format. How does that fact support the overall approach to mathematics instruction presented in this guide?
- How could a learner follow up on a problem solution (in an ideal situation)?

Employ Strategies for Mathematics Instruction

Put on workplace mathematics lenses and help learners see mathematical solutions to their problems as follows:

- Select a specific workplace and a job within it for your activity. If you are already instructing in a workplace, select a job there that one of your learners holds. If you are not yet assigned to a workplace, ask another teacher to help pave your way to be involved in his/her company.

- Identify the computation and problem-solving skills that constitute workplace mathematics ***for that job.***

  1. If competencies have already been identified, use those as a framework for Step 3.
  2. If no competencies have been identified, go on to Step 3.

- Go to the job site and conduct a mathematical exploration. (You may want to take a camera or videocamera if it is available and convenient.)

  1. Arrange for the visit, and ask permission to interview and observe workers and, if possible, to photograph or videotape parts of your visit.
  2. If you don't have math competencies listed, interview a worker and ask about one or more tasks that involve computation, quantification, or estimation—in other words, tasks in which he or she uses numbers in some way. Make a list of those tasks.
  3. With your mathematics lenses firmly in place, scan the job site for evidence of use of numbers. Are there charts? graphs? data? quality control figures? numbers on computer screens or printouts? numbers on forms?

     Collect copies of any evidence of numbers as allowed. (Take a photo of what is there that cannot be removed, again as allowed.)
  4. Select one task for more detailed analysis in preparation for developing a lesson plan for it. You want to select a task that workers have some difficulty with, so that it would be a priority for instruction. If you do not know this information, discuss it with some of the workers and/or learners.
  5. Interview a worker whom you might judge from available evidence (peer reactions, supervisor recommendation) to be "expert" at performing this task. Also observe the worker doing the task and ask questions such as these:

     ~ Do you calculate, estimate, or measure to do this task?

     ~ What do you [calculate]? Tolerances? Quantities to order?

     ~ What kind of mathematics do you use? Basic functions? Addition? Subtraction? Trigonometry? Geometry?

- What kinds of numbers are involved? Whole numbers? Fractions? Decimals? Imaginary numbers?
- To complete this task, do you need to solve a problem? make a decision? analyze a situation?
- What kind of outcome is expected?

The most important observational questions may be:

- What are you thinking now?
- How did you know to do that?

Take notes, record your conversation, even video the session if it seems suitable. Be sure you leave the session with a clear idea of the facts and concepts needed to perform the task and how the worker goes about using them.

- Organize your materials so that they convey the flow of the mathematical and problem-solving aspects of the task in a step-by-step manner. (This is actually the Literacy Task Analysis.) Check with the workers about any points that seem unclear.

- Develop a lesson plan, using a problem-solving metacognitive approach to the task. Use the format shown in Reading 5. Refer to the learning guide *Improve Teaching Effectiveness Through Planning and Evaluation*, which has a section on developing lesson plans that you can use for guidance.

TOPIC: Employ Strategies for Mathematics Instruction

Evaluation Guidelines

Directions: Check your competency with the following criteria:

Learner Self-Check Did you—		Review Checklist Did the learner—
☐	1. Identify specific computation and problem-solving skills needed for the job you identified, using an existing task list or on-the-job observation?	☐
☐	2. Select a task for the lesson plan that— a. represented a priority skill need for the learners?	☐
☐	b. was substantial enough to provide the content for a full lesson?	☐
☐	3. Develop a lesson plan that— a. used a problem-solving approach to the task?	☐
☐	b. incorporated metacognition?	☐
☐	c. tied mathematical skills to their use on the job?	☐

Learner: _____

Reviewer: _____

Level of Performance: If the evaluation results indicate a need for further competency development—or if the learner wishes to pursue the topics covered in further breadth or depth—please refer to the supplementary resources described in the Annotated Bibliography, which follows.

Because many other references are given throughout this learning guide, most of the items listed here are materials that could be reviewed for potential mathematics curriculum use.

Educational Testing Service. *ETS Applied Skills Series.* New York, NY: Simon and Schuster, n.d.

Series includes three workbooks that are organized according to the three literacy domains of document, prose, and quantitative: *Document Skills for Life and Work, Reading Skills for Life and Work*, and *Number Skills for Life and Work.* Each workbook provides lessons that are based on work-related tasks such as identifying and using information located in materials, and completing an order form.

Farrell, E. J. *Workplace Mathematics, Modules, 1 & 2. A Working Curriculum.* Mount Morris, NY: Finger Lakes Regional Education Center for Economic Development, 1989. (ED 311 155)

Geared toward persons with midlevel literacy, these workplace curricula are intended to move the learner toward the 12th-grade level. Uses workplace examples, but may not be applicable to many job contexts.

Levine, P., ed. *Reaching for Solutions: Math Word Problems by the Members of the Reach One Program.* Columbus, OH: Columbus Public Schools and The Ohio State University, 1991. (ED 342 996)

This collection of mathematics word problems was developed by adult learners in the Reach One Program. The first page describes the steps that led to the finished product: having learners work word problems according to these steps; providing a list of key words that indicate what arithmetic processes are needed; having learners work in groups to solve cloze-style word problems; having learners write word problems; editing, reviewing, and revising learners' word problems; arranging word problems into an ordered collection; choosing a title, and publishing and distributing the resulting collection. The steps needed to solve word problems are listed. The booklet contains 31 word problems that require use of arithmetic operations (addition, subtraction, multiplication, and division) to solve problems related to daily experiences, such as purchasing goods, wages and earnings, and interest. Solutions to problems are provided. (YLB)

Math on the Job. Omro, WI: Conover.

Originally developed for high school students with special needs, this series consists of 30 booklets—each focused on one occupation—that provide an opportunity to explore careers and practice math skills simultaneously.

Mikulecky, L., and Philippi, J. W. *Strategic Skill Builders for Banking.* Washington, DC: American Bankers Association; New York, NY: Simon and Schuster, 1990.

This 12-module series based on the functional context approach can be used to teach people in a variety of job settings. Uses learned exercises that teach job-related thinking skills. Includes job skills lessons with parallel life skills lessons enabling learners to practice skills both on the job and in daily life.

National Research Council. *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*. Washington, DC: The National Academy Press, 1989.

This report is a "public preface" to the work of three NRC units (the Mathematical Sciences Education Board, the Board on Mathematical Sciences, and the Committee on the Mathematical Sciences in the Year 2000) in revitalizing mathematics education. *Everybody Counts* describes forces that affect mathematics education—computers, research, demography, competitiveness—and explains how each is a major force for change, while interactions among these forces produce a system that is peculiarly resistant to change. The book describes specific changes that our nation's schools and colleges must make in their mathematics programs if they are to meet the needs of students and the country.

Paradigm Basic Skills Program. Eden Prairie, MN: Paradigm Press, 1991.

The Paradigm materials focus on preparing learners to solve reading, writing, and math problems they will encounter in training programs and on the job by teaching learners the strategies behind the skills. Each is organized around common job functions and allow for either group or independent instruction. Program includes the following:

- Brooks, L. *Math for Workplace Success*, 1992.
- McLean, G. and Lyons, A. *Writing for Workplace Success*, 1991.
- Park, R. and Olson, R. *Reading for Workplace Success*, 1991.

Quality Resources, White Plains, NY.

Curriculum materials from Quality Resources can be used to develop skills in problem solving and statistical process control. The following resources will be used most effectively with learners who have midlevel reading skills:

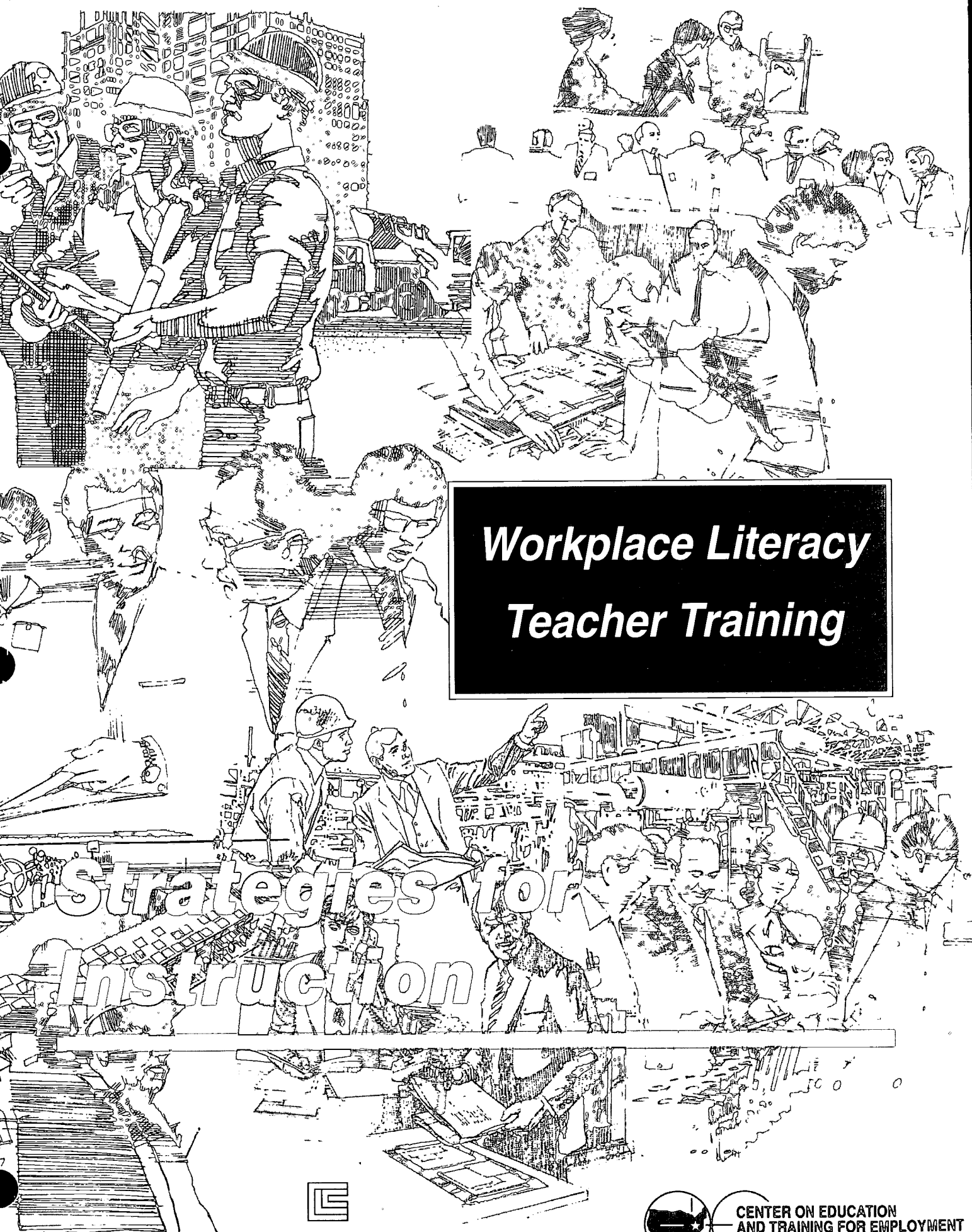
- Amsden, R. T.; Butler, H. W.; and Amsden, D. M. *SPC Simplified: Practical Steps to Quality*, 1989.

  Designed to teach statistical process control procedures in the manufacturing setting.
- Amsden, D. M.; Butler, H. E.; and Amsden, R. T. *SPC Simplified for Services: Practical Tools for Continuous Quality Improvement*, 1991.
- Kelly, M. R. *Everyone's Problem Solving Handbook: Step-by-Step Solutions for Quality Improvement*, 1992.

Reasoning Skills on the Job. Omro, WI: Conover, 1989.

A series of seven units incorporates the reasoning skills and process needed to solve work-related problems. The program is designed to help learners learn how basic reasoning skills are used by workers on the job, determine how well they can handle reasoning skills related to an area of interest, practice reasoning skills as they relate to each learner's needs, and solve occupationally-specific reasoning skills problems.

Units are available by occupational cluster or by component of the problem-solving process. The series is available in booklets or on software and is linked to Conover's broader *Integration Series*.



Workplace Literacy Teacher Training

Strategies for Instruction

COLLEGE OF LAKE COUNTY

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
COLLEGE OF EDUCATION
THE OHIO STATE UNIVERSITY

ESL Strategies

Employ Strategies for ESL Instruction

Introduction

Much of what is covered in the other learning guides in this series is applicable or adaptable to workplace ESL (English as a second language) instruction. The program starts with job and literacy task analyses; the texts are the materials of the workplace; the reading, writing, speaking, listening, calculation, computation, and problem-solving skill development needs of the learners are the focus of instruction; metacognitive approaches to learning are modeled; and the learning environment is participatory, collaborative, and adult-oriented.

What is different is the language skills of the learner. Native English speakers are just that: ***speakers*** of the language. The learners may lack reading and writing skills, but they will generally have fairly functional oral language skills. For adult learners who must acquire English as a second language, that oral foundation cannot be assumed. This will have implications for instruction. In some cases, different strategies must be used; in most cases, the strategies discussed in other learning guides in this series will work well, either as is or with minor adaptations.

This learning guide is designed to introduce you to current thinking concerning ESL instruction. It will also help prepare you to design appropriate and effective instructional strategies for the ESL program.

Objectives

- Prepare to assess the needs of ESL learners in the workplace.
- Adopt guidelines for effective ESL teaching.
- Identify adult ESL teaching strategies appropriate to the workplace.
- Identify a plan for professional development in adult ESL literacy.
- Develop a set of workplace-based activities and materials for an ESL lesson in a workplace literacy program.

To Help You Meet the Objectives

- Study the material that follows:

  Reading 1: Workplace Literacy Programs for Nonnative English Speakers

  Teaching Low-Level Adult ESL Learners

  Reading 2: Adult ESL: An Introduction

  Content-Centered Language Learning

  Pictures as a Basis for Language

  Reading 3: A Short Set of Guidelines for Effective ESL Teaching

  Cooperative Learning for Students from Diverse Language Backgrounds

  Reading 4: Creating a Professional Workforce in Adult ESL Literacy

- Reflect on the questions posed after each reading. The questions are designed to help you clarify and extract meaning from the reading that can be helpfully applied. There are benefits to both individual and interactive reflection—
  - ~ As an individual, consider how you would apply the information either in the program to which you are already assigned or in a program to which you might be assigned.
  - ~ If you are able to discuss these questions with other instructors or program staff, try to get other perspectives on the reading. Compare notes on the ways the ideas can be and have been applied in their experience. If the experiences differ, help each other probe the possible reasons for the differences.
- Complete the Application Activity.
- Evaluate your own competencies using the Evaluation Guidelines. This is an opportunity to assess your own learning and identify any areas in which you feel less competent or confident. If indicated or desired, take advantage of the opportunity to review the related material in the Annotated Bibliography. You may also want to seek out a more experienced person who can be a mentor to you on this topic, helping you assess your competency and acting as a resource person.
- Ask your reviewer to evaluate your skills also. Be sure to note the input from the reviewer that can provide the basis for your further competency building.

To Help the Reviewer Guide and Evaluate Learner Performance

These learning guides have been designed to allow for maximum flexibility of use. For those individuals using them for professional development (without ties to a formal program), the guides allow for self-study. Such use may, however, limit the opportunity for interaction and practice in a group setting. Therefore, if learners are completing these guides in a group setting under your direction, it is strongly recommended that you identify such opportunities and capitalize upon them.

Reflection questions at the end of each Reading and an Application Activity and Evaluation Guidelines at the end of each learning guide provide opportunities for you, as a reviewer, to monitor learner progress and evaluate learner performance on the workplace literacy knowledge and skills being developed. However, your expectations should be based somewhat on the learner's background (e.g., previous instructional experience) and the learner's progress in the program. Individuals with previous experience as instructors in workplace literacy programs should be expected to extend their thinking and activities beyond the level expected of those without such experience.

For example, if the learner is asked to "define company culture," individuals ***without*** instructional experience would be expected to respond solely on the basis of their reflections concerning the readings provided within the guide. The responses expected of individuals with instructional experience, however, should go beyond the readings, incorporating their real-world experiences as well. Likewise, as individuals complete more and more of the learning guides, their work should reflect that progress. Knowledge and skills gained in earlier guides should be ***integrated*** into their reflections and activities as they work through later guides.

Flexibility can also be provided concerning how the learner will demonstrate competency. At a minimum, the learner should submit ***written*** descriptions, definitions, and explanations to demonstrate successful completion of the Application Activity. These should be evaluated—by both you and the learner—using the criteria provided in the Evaluation Guidelines. If feasible, however, you should also arrange to meet with the learner to discuss his or her written documentation. At that time, you could also pose hypothetical or actual situations related to the skill criteria and ask the learner how he or she would handle those situations. Another possibility would be to ask individuals to perform the skill as part of a presentation or demonstration to others in the class or group.

It is also desirable that, whenever possible, you and the learner identify opportunities for expanding on the learning experiences presented in the guide—ways for the learner to apply the learning more deeply and broadly. The question, "What plans do you have for learning more about the skill covered in this guide?" could well be a standard one. In many cases, the learner can use his or her work in the Application Activity as a building block for further exploration.

In summary, the learning situation is not one in which strict criterion-referenced standards based on percentage attainment or mastery levels are suitable, nor would one mode of demonstration be feasible—or appropriate—for everyone. You and the learner should discuss and reach agreement in advance on the level of achievement expected and mode of demonstration to be used so as to create the optimal learning experience. The intent is for the learner's professional development to be competency-based, rigorous, and designed to motivate further learning, yet sensibly adapted to the situation and to the learner's needs and abilities. Hopefully, the learners will carry this flexible philosophy and approach into their own workplace literacy programs.

WORKPLACE LITERACY PROGRAMS FOR NONNATIVE ENGLISH SPEAKERS
ERIC Digest by J. Isserlis
Washington, DC: National Clearinghouse on Literacy Education, 1991 (ED 334 874)

Workplace-based educational programs are not new. Recent perceptions of a national literacy crisis and the need for a competitive workforce, however, have resulted in the development of new programs across the country, many of which provide literacy and language training for nonnative English speakers.

Reasons for Initiating Workplace Programs

The increasing need in the service industry for competent workers with literacy skills in English, combined with uncertain economic times, has resulted in more limited work opportunities for many nonnative speakers of English and more complex demands on those who are employed. Because of the growing numbers of nonnative English speakers in the U.S. workforce and their educational needs, some companies are beginning to provide training in literacy, numeracy, and problem-solving skills on the job (Johnston and Packer 1987).

Workplace-based programs differ from traditional classroom-based literacy programs with a workplace component. They take place at the work site or at a location designated by the site, in response to needs identified by staff at the site—top level management, personnel officers, union representatives, or line workers. Employers' stated need for their employees' education is often related to specific skills, and expectations and stakes are often high. Those initiating the program often expect significant changes in the workplace; participating workers see education as an advancement opportunity on and off the job.

Those designing workplace-based programs face an additional challenge because they must take into account not only the dynamics of the workplace itself but also the literacy needs expressed by the learners, their employers, and union representatives. Often the interests of these groups conflict. At the same time, workplace-based programs have powerful potential for promoting learning. Workers who would not attend a night class in another location have their education brought to them. Education can be tailored to the needs and interests of the workers and discussion of job-specific literacy needs can provide a starting place for addressing literacy needs beyond the workplace as well.

Types and Essential Features of Programs

Wrigley (personal communication, August 1990) suggests three models for workplace literacy: ***workplace-specific*** (which focuses on language and literacy skills needed for specific jobs at a specific site), ***workplace-general*** (which focuses on general employment skills such as seeking clarification, complaining about unfair treatment, or organizing a committee, or on issues such as cross-cultural communication), and ***workplace clusters*** (where a number of jobs or vocations are clustered together according to the functions or skills they have in common). Programs for nonnative English speaking workers tend to be both workplace-specific and workplace-general; depending on the needs of a company and its learners, workplace-specific instruction often consists of one or more units within a workplace-general curriculum.

Pelavin Associates (1991) has identified four major components of successful workplace programs: (1) systematic analysis of on-the-job literacy requirements; (2) active ongoing involvement by workers in determining the types of tasks they must perform and the literacy levels necessary; (3) active involvement by project partners (employers, unions, and teachers) in planning, designing, and operating classes; and (4) development of instructional materials related to literacy skills actually required on the job.

The design and implementation of an effective program include the components described below.

Needs Assessment

Before appropriate curricula, materials, and teaching approaches for a particular workplace program can be determined, a needs assessment must be conducted in cooperation with key company and worker representatives. Because the needs assessment involves learning about the total ecology of the work site from multiple perspectives, an ethnographic approach is most effective (see Castaldi 1991). Extended visits to the workplace—to production lines, to break and eating areas, and to office spaces—allow direct observation of activities to augment and clarify information provided by workers and employers in meetings and interviews. By speaking not only to management and personnel representatives but also to union representatives, potential learners, and key workers with whom the learners interact, the person conducting the needs assessment learns about the workings of the company and the needs of workers from a variety of perspectives, gleaning answers to questions such as the following:

- What jobs are performed? What skills are required for those jobs?
- What skills do workers have? What skills do they still need and want?
- What problems do workers experience in performing their jobs and moving to new jobs?
- Who holds the positions of power in the company, and who are their subordinates? Who makes decisions about hiring, job allocation, training, and other company policies?
- Why is the site considering an education program for its employees? Where did the idea originate, and what was the route it followed through the organizational hierarchy?
- Who determined that there was a language or literacy problem, and with whom is the problem presumed to lie?
- How will learners be recruited? Will attendance be mandatory or optional? Will a stipend be given upon completion of the program? What are the consequences of non-completion of the program?
- What are the workers' educational aspirations, and how do they participate in planning the program?
- What are the language, literacy, and cultural issues to be addressed?
- Who will measure progress in the program? How? What is at stake if a certain literacy level is not attained by the program's end?

Program Design, Curricula, and Materials

The needs assessment feeds directly into the design of the program. Mrowicki and Lynch (1991), for example, use grids and graphs to chart uses of language and literacy and potential literacy and communication problems in the workplace, and then construct appropriate curricula. Anorve (1989) bases his program design on impressionistic and descriptive observations and formal and informal interactions with employers and employees.

Workplace literacy programs are moving away from conceiving of education as remediation of learner weaknesses and toward emphasizing and building on the skills and strengths that workers already have. Eastern Michigan University's Academy, one example of an effective research-based, learner-centered adult literacy project, cites three principles basic to its approach: "Learners' strengths are recognized and built on, teachers and learners collaborate as equal partners, and the environment has a significant impact upon teaching" (Soifer, Young, and Irwin 1989, p. 66). Academy staff pay attention to the diverse prior educational experiences of learners and attempt to undo the "years of working in a very directed, repetitive situation that have only reinforced their low self-esteem and sense of powerlessness" (p. 66).

Some workplace literacy programs are also moving away from the idea that they should prepare learners for specific jobs, believing instead that workers should "develop . . . the critical understanding necessary to apply knowledge to an evolving and continuously changing environment" and have the tools necessary to cope with that environment. These tools include "the ability to think, reason, question, and to search out facts" (Pandey 1989, p. 6).

The best workplace literacy programs, in this growing view, are not those designed and carried out by outside researchers or top-level management. Instead, learners themselves are involved in formulating and implementing the program. In some instances, course content is not even fully

determined until the course is actually underway and the instructor has come to know the learners. Learners continue to participate in developing the curriculum and content throughout the course.

A critical aspect of program design is defining, clarifying, and at times overcoming the different expectations that managers, supervisors, union representatives, and workers have for workplace education. For example, employers may want workers to gain specific skills as a result of attending workplace classes, while workers may want to develop more general literacy and language skills for use beyond the workplace. Bean (1990) argues that employers need to be helped to broaden their understanding of the kinds of training that are needed. Sarmiento and Kay (1990) likewise argue for the need to reconcile workers' employment and personal literacy needs with those of the employer.

Employers *and* learners need to realize the time it takes to acquire and build on literacy skills. Workplace literacy is a long-term and ongoing process. Successful programs run for several modules or semesters and promote teacher/learner collaboration in deciding how long the learner will continue (see Pharness 1991).

Some programs use curricula, training manuals, or guidelines developed by a company, and adapt these materials to the needs of their learners. Others develop instructional plans with learners, integrating employers' stated needs (for example, "workers need to fill in work order forms more carefully") with learners' stated needs. Soifer et al. (1989) stress the need for authentic, challenging, non-threatening materials that include printed materials used on the job such as work orders, pay stubs, and handbooks.

Learner Assessment

Effective learner assessment is an important part of a workplace literacy program, because the results can have serious consequences in terms of employment options. While assessment has traditionally involved standardized pre- and post-testing (using tests such as the BEST Center for Applied Linguistics 1984 or other in-house or site-specific tests), many programs are moving to other, more qualitative means of assessment such as portfolios, periodic observations with focused checklists, or interviews with learners and supervisors (Lytle and Wolfe 1989). Programs preparing learners for licensing or other credentials must follow state or nationally developed testing procedures in addition to their own assessments.

Conclusion

Given the enormous potential for workplace learning, employers, unions, teachers, researchers, and policy makers need to work together to develop, implement, and study effective programs. Programs need to focus on long-term processes rather than quick-fix solutions; involve teachers and students in all aspects of design, implementation, and assessment; identify and build on the strengths that learner bring to instruction; and expand the focus of instruction so it does not simply develop specific skills but also increases individuals' options as workers and as citizens.

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TEACHING LOW-LEVEL ADULT ESL LEARNERS

ERIC Digest by G. M. Holt
Washington, DC: National Clearinghouse for ESL Literacy Education, 1995 (ED 379 965)

NOTE: In this reading, the term literacy *is related to low-level learning, which is a different use of terminology than in the other learning guides in this series.*

Prior to the late 1970's, instructional methods and materials for adults learning English as a second language (ESL) assumed the presence of literacy in a first language (Wrigley and Guth 1992). After 1975 the United States experienced an influx of refugees from Southeast Asia. Many had minimal or no experience in reading and writing in their native languages and, as the learners joined ESL classes, educators saw that existing methods and materials were not appropriate for these learners. Ten years later, during the implementation of the Immigration Reform and Control Act (IRCA), educators were again faced with teaching adult learners who had little or no schooling in their native countries.

What has the field learned about offering instruction to literacy level (low or beginning) adult ESL learners? This digest provides information on how to identify and assess the instructional needs of adults learning to become literate in a second language; it discusses general techniques that facilitate instruction for these learners; it provides a sample procedure for combining some of these techniques; and it describes classroom materials appropriate for low-level adult ESL learners.

Low-Level Learners

There are several categories of adult ESL learners who can benefit from the approaches and techniques used in instruction for low-level learners (Crystal 1982, California Department of Education 1992, Savage 1993). These categories include the following:

- learners who are nonliterate and have had little or no prior schooling in their native language;
- learners, such as speakers of Chinese, Arabic, or Khmer, who may not be familiar with the Roman alphabet;
- learners who may have learning disabilities; and
- learners who are literate in their native language but who may want (for various reasons such as age, health, family situation) to participate in a slower-paced class and who would benefit from classroom activities that characterize a literacy class.

Assessing the Needs of Low-Level Learners

Assessing the needs of learners who may not speak even minimal English and may not read or write in any language can be difficult. Holt (1994), Crystal (1982), and Bell (1988) offer suggestions, recommending a variety of ways to assess learners orally, through reading and writing, and through classroom observation.

Assessing orally. Educators who speak the native language of the adult learners should ask them about their educational backgrounds. Persons with three or fewer years of formal education will probably be nonliterate.

Assessing through reading. Reading readiness tasks can be used for literacy screening. For example, learners can be asked to complete the following tasks. (The literacy skills being assessed appear in parentheses.)

- Complete an alphabet cloze (for example A B __ D __ F G H __ J) supplying the missing letters (familiarity with Roman alphabet).
- Copy a sentence (speed and ease in forming words).
- Read two simple sentences (basic sight vocabulary in context).
- Point to letters corresponding to the sounds made by the teacher (simple consonant sounds not easily confused).
- Read several unfamiliar or nonsense words (blending sounds).

A learner who can recognize basic sight words or use a knowledge of phonics to approximate the sounds of unfamiliar words probably does not need basic literacy instruction.

Assessing through writing. The completion of a simple application form on which learners are asked to fill in basic information such as name, address, phone number, date, social security number, birth date, birthplace, age, and gender is a quick way to determine reading and writing ability, especially when a large number of learners have to be assessed in a short period of time. Someone who has difficulty filling out the form could probably benefit from basic literacy instruction.

A writing sample in the learner's first language is useful in determining the literacy level of the learner in his or her native language.

A writing sample in English, done at intake, can be used to compare later writing samples and to monitor the progress of each leaner's writing.

Assessing through classroom observation. Informal assessment through classroom observation can continue to assist the teacher in determining an individual learner's needs. Attention should be paid to how learners hold their pencils (awkwardly? too tightly?) and their books (upside down?), how they move their eyes (Do the eyes move to follow words?), how quickly they write (Do they hesitate? take time? labor over each letter?), and how they interact in large and small groups (Do they offer to help each other? Are they comfortable in groups?).

Techniques for Working With Adults

Knowles and other educators maintain that adult education is most effective when it is "experience centered, related to learners' real needs, and directed by learners themselves" (Auerbach 1992, p. 14). Bell and Burnaby (1984), Holt (1988), Holt and Gaer (1993), and Wrigley and Guth (1992) list techniques that involve beginning level learners as active participants in selecting topics, language, and materials.

1. Build on the experiences and language of learners. Invite them to discuss their experiences and provide activities that will allow them to generate language they have already developed.
2. Use learners as resources. Ask them to share their knowledge and expertise with others in the class.
3. Sequence activities in an order that moves from less challenging to more challenging, such as progressing from listening to speaking, reading, and writing skills. Move from language experience activities to picture-word connections to all-print exercises.
4. Build redundancy into curriculum content, providing repetition of topics. This will help overcome problems related to irregular attendance common in adult classes.
5. Combine enabling skills (visual discrimination of letters and words, auditory discrimination of sounds and words, spacing between letters and words, letter-sound correspondences, blending letters to sound out words, sight vocabulary) with language experience and whole language approaches.
6. Combine life-skill reading competencies (reading medicine labels, writing notes to the children's teachers, filling our forms) with phonics, word recognition, word order, spacing words in a sentence, reading words in context, and reading comprehension.
7. Use cooperative learning activities that encourage interaction by providing learners with situations in which they must negotiate language with partners or group members to complete a task (See Bell 1988).

8. Include a variety of techniques to appeal to diverse learning styles. For example, merge holistic reading approaches such as language experience with discrete approaches such as phonics.

An Integrated Approach to Literacy Instruction

The language experience approach (LEA)—which uses learner experiences as lesson content—is a way to introduce multiple activities that appeal to learners' diverse backgrounds and preferred learning styles while offering instruction in language that is both comprehensible and interesting (Taylor 1992). The following is an example of a modified LEA lesson that could be used with low-level learners.

1. A shared experience, such as a field trip, a common situation, or a meaningful picture is a stimulus for class discussion.
2. Learners volunteer sentences about the experience and the teacher writes the sentences on the chalkboard.
3. The teacher reads each sentence aloud, running her finger under words as each is pronounced, verifying that she has written what the student has said.
4. When the story is completed, the teacher reads it aloud.
5. Learners are encouraged to join in a second and third reading of the story.
6. A number of activities can follow at this point:
   - Learners copy the story;
   - Learners underline all the parts they can read;
   - Learners circle specific words (e.g., words that begin with a designated sound, common sight words such as *the*);
   - Choral cloze: The teacher erases some words, reads the story, and asks learners to supply the missing words;
   - Writing cloze: The teacher types the story, leaving out every fifth word. During the next class the teacher passes out the cloze and asks learners to fill in the missing words;
   - Scrambled sentences: The teacher types the story. During the next class the teacher distributes copies of the story to the class. Each learner cuts the story into strips so that there is one sentence on each strip of paper. Learners scramble the sentences and rearrange them in the proper sequence;
   - Scrambled words: More advanced learners can cut sentences into words, scramble the words, and rearrange them in order.

Selecting Appropriate Classroom Materials

Using concrete but age-appropriate materials with adult learners enhances instruction by providing a context for language and literacy development. A basic kit of materials might consist of the following objects, games, and materials.

1. Realia: clocks, food items, calendars, plastic fruits and vegetables, maps, household objects, real and play money, food containers, abacus, manual for learning to drive, and classroom objects;
2. Flash cards: pictures, words, and signs;
3. Pictures or photographs: personal, magazine, and others;
4. Tape recorder and cassette tapes, including music for imagery and relaxation;
5. Overhead projector, transparencies, and pens; video player and videos;
6. Pocket chart for numbers, letters, and pictures;
7. Alphabet sets;
8. Camera for language experience stories—to create biographies and autobiographies;
9. Games such as bingo and concentration: commercial or teacher-made;
10. Colored index cards to teach word order in sentences, to show when speakers change in dialogue, to illustrate question/answer format, and to use as cues for a concentration game;
11. Cuisenaire rods to teach word order in sentences, to use as manipulatives in dyad activities, and to teach adjectives;

12. Colored chalk to teach word order, to differentiate between speakers in a dialogue, and to illustrate question and answer format;
13. Poster, butcher, and construction paper;
14. Felt-tipped pens, colored pencils, and crayons;
15. Scissors, glue, and masking tape; and
16. Children's literature: for learning techniques for reading or telling stories to children (See Smallwood 1992, for ideas on using children's literature with adults.).

Conclusion

Providing instruction to adults acquiring ESL literacy is a challenge. When approaches, techniques, and materials are suitable for adults, are related to their real needs, and promote involvement in their own learning, there is a greater chance of success.

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This ERIC Digest was adapted, with permission, from the following:

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Reflection on Reading 1

- Consider the different types of workplace literacy programs and their essential features. What do you consider to be the advantages and disadvantages of each type for the adult ESL worker?

- Select at least two of the needs assessment questions listed in the first reading. Consider for each of these how the responses might be different for ESL workers than for native English-speaking workers. List the points you would discuss if you needed to explain these differences to company management.

- Develop a list of step-by-step instructions for your own use in assessing ESL learner needs. Include sample statements you might make to the learner in following these instructions.

"ADULT ESL: AN INTRODUCTION"
In *Adult ESL Instruction: A Sourcebook*, by L. M. Guglielmino, 3-5
Glenview, IL: Scott, Foresman, 1991

Meeting Their Learning Needs

Among the most urgent needs of adult ESL learners are the following:

1. ***A teacher-student relationship based on mutual respect.*** Adults expect to be treated like adults. They expect to have their experiences and opinions valued. There is often a temptation to treat ESL students like children, since their speech is childlike and they need a great deal of the kind of drill used with young children. An inappropriate classroom atmosphere results if that temptation is not avoided.

2. ***Involvement in the classroom.*** Student involvement is a good policy in any classroom, but it is especially important for adults in general and adult ESL students in particular. Students learn by doing. Probably the best single indication of the quality of an ESL classroom is the ratio of student speech or writing to teacher speech. The ESL student needs to ***practice using English***, not hear someone else talk about English.

   Students should be encouraged to share their experiences, questions, and cultural information. They are also more comfortable if they have some chance to voice their preferences: for topics to be covered, the order of the day's activities, or field-trip sites, for example. Lessons built around their activities and experiences are more meaningful and therefore are retained longer. Most important, they provide a valuable boost to students' self-esteem.

3. ***Relevant instruction.*** An ESL course must begin with a mutual process of identifying the gaps between where students are and where they need to be. The degree to which students can contribute to this process will vary with their language proficiency, but their input is important. The targeted level of English proficiency, the content of instruction, and its sequencing should be determined by their goals. The vocabulary, grammar structures, and dialogues they work with must have parallels in real life; they must be immediately applicable.

4. ***A climate of teacher warmth and empathy.*** Many adults feel uncomfortable in a classroom situation. Many have had unpleasant experiences in previous educational settings. Regardless of their memories of school, adult ESL students usually feel quite uncomfortable because they cannot use English as well as they would like (if at all). Teacher warmth, acceptance, and empathy are particularly important to them. A large body of research shows that if a teacher is warm, caring, and enthusiastic, students learn more.

   To create a positive and accepting climate in your classroom—

   - Smile.
   - Remember names.
   - Greet students as they enter and wish them well as they leave.
   - Notice and freely praise their successes.
   - Choose your words carefully when responding to errors. For example, avoid such negative remarks as, "No," "That's not right," and "That's wrong." Instead, say, "Let's try that again" or simply, "Once again," and repeat the phrase or question. Such actions may seem minor, but the smallest things, repeated often, can create a large impact.

5. ***Opportunities for problem-solving and self-directed learning.*** Such skill building is a must for any adult program. It is easier at the higher levels of ESL instruction, but should be incorporated wherever possible. For example, students can be asked to describe what they would do in everyday problem situations, such as returning something to a store or asking for a day off to attend a wedding. Their input can be

used to build practice dialogues. In addition, if you can let students ***find*** an answer rather than just feeding it to them, they begin to develop skills that will help them the rest of their lives. This self-directed learning helps reduce the possibility that they will become too dependent on you and hinder their own development. The old Chinese philosophy is as true today as it was centuries ago:

> Give a man a fish,
> and he eats for a day;
> Teach a man to fish,
> and he eats for a lifetime.

6. ***Opportunities for success.*** Adult ESL students have their egos battered every day. They are often looked down upon or treated rudely because many people in our culture equate "different" with "wrong" or mistakenly associate the lack of ability to communicate in English with a lack of intelligence. As a result of these attitudes and their own feelings of communicative inadequacy, ESL students often experience a great deal of frustration. They need opportunities to succeed and to be recognized for that success every day.

   One way to provide such opportunities is to encourage students to set small daily or weekly goals. As the goals are achieved, the students can be congratulated and congratulate themselves on their progress. If they face only that major goal, "to learn English" every day, it begins to seem impossible to achieve. The satisfaction of achieving smaller goals provides the motivation and encouragement to continue.

   Opportunities for success can be maximized in almost every type of classroom activity. Careful planning is especially important in oral drills, where students must perform before the group. When practicing a dialogue, for example, have the whole group respond first. Then divide the class in half and have each half respond. Next have students volunteer to respond, and finally call on each person. In this way, each student has a better chance of mastering the language before being asked to perform individually.

7. ***A comfortable yet stimulating environment.*** A classroom can be an uncomfortable physical environment, with small, hard seats and extremes of heat or cold. Many adults may have already put in a full day's work before they get to class; they will be tired. Anything that can be done to increase their comfort and liven up the class—varying teaching methods, using audiovisual aids, changing the pace of activities—will help students concentrate.

8. ***Cultural orientation.*** Effective communication depends on many other things besides vocabulary, structures, and pronunciation. A person who will not look into a job interviewer's eyes will probably not be hired. A new employee who is consistently late for work is likely to lose the job. Yet these behaviors, which seem so strange to us, are perfectly acceptable in other cultures. In Asian cultures, looking directly at a person in a position of authority is considered an insult. In Latin cultures, being on time does not carry the importance attached to it in this country.

   Culture involves a wide variety of things that we tend to take for granted: values, attitudes, goals, gestures, courtesies, eye contact, spatial awareness, time awareness, modes of dress, habits of cleanliness, and much more. If an ESL student acts in a strange or an annoying way, the behavior is probably a part of the student's native culture. Understanding cultural differences helps both teacher and students deal with them more effectively.

   A corollary need of some ESL students is teacher sensitivity to culture shock. Remember Alvin Toffler's best-seller, *Future Shock?* He described the negative impact that rapid change can have on an individual within the ***same*** culture. Imagine how easily a person who is trying to fit into a totally ***new*** culture may become disoriented, discouraged, depressed, and exhausted from trying to cope. ESL teachers must be attuned to this possibility in their classrooms, especially among students who are political refugees.

CONTENT-CENTERED LANGUAGE LEARNING
ERIC Digest by J. Crandall
Washington, DC: ERIC Clearinghouse on Languages and Linguistics, 1994 (ED 367 142)

Although estimates of the number of language minority students in U.S. schools vary, there is consensus that the numbers are rising dramatically. "Increasingly, the American classroom is multiethnic, multiracial, and multilingual at all levels" (Crandall 1992). In response, a number of program models have been developed to meet the needs of language minority students, many involving the integration of language and content instruction. In addition, attention to the lack of foreign language proficiency among Americans has led to the development of a number of foreign language programs that integrate academic content into language instruction. In this approach, the second or foreign language is used as the medium of instruction for mathematics, science, social studies, and other academic subjects; it is the vehicle used for teaching and acquiring subject specific knowledge.

This Digest discusses the rationale for integrating language and content instruction and provides an overview of some of the program models and teaching techniques that focus on this approach.

Why Use Content-Centered Instruction?

In the United States, Krashen's theory (1982) of second language acquisition has influenced the development of integrated instruction at all levels. Krashen suggests that a second language is most successfully acquired when the conditions are similar to those present in first language acquisition: that is, when the focus of instruction is on meaning rather than on form; when the language input is at or just above the proficiency of the learner; and when there is sufficient opportunity to engage in meaningful use of that language in a relatively anxiety-free environment. This suggests that the focus of the second language classroom should be on something meaningful, such as academic content, and that modification of the target language facilitates language acquisition and makes academic content accessible to second language learners.

Cummins (1981) argues that individuals develop two types of language proficiency: basic interpersonal language skills and cognitive academic language proficiency. He suggests that these two types of proficiency vary according to the degree of context available to the individual and the degree of cognitive challenge of the task. Social language can be acquired in 1 to 2 years, but the level of proficiency needed to read social studies texts or solve mathematics word problems can take 5 to 7 years to develop (Collier 1987).

Integrated language and content instruction offers a means by which English as a second language (ESL) students can continue their academic or cognitive development while they are also acquiring academic language proficiency. It also offers a means by which foreign language students can develop fuller proficiency in the foreign language they are studying. In foreign language or two-way bilingual immersion programs, in which a portion of the curriculum is taught through the foreign language, some type of integrated language and content instruction appears to be essential.

Program Models

Content-based language instruction. In this approach—also called integrated language and content instruction—ESL, bilingual, or foreign language teachers use instructional materials, learning tasks, and classroom techniques from academic content areas as the vehicle for developing language, content, cognitive, and study skills. The second language is used as the medium of instruction for mathematics, science, social studies, and other academic subjects. Instruction is usually given by a language teacher or by a combination of the language and content teachers.

Sheltered subject matter teaching. This approach involves adapting the language of texts or tasks and use of certain methods familiar to language teachers (demonstrations, visuals, graphic organizers, or cooperative work) to make instruction more accessible to students of different English proficiency levels. This type of instruction is also called sheltered English or language-sensitive content instruction and is given by the regular classroom or content teacher, or by a language teacher with special expertise in another academic area (Brinton, Snow, and Wesche 1989).

Theme-based. In these programs, a language curriculum is developed around selected topics drawn from one content area (e.g., marketing) or from across the curriculum (e.g., pollution and the environment). The goal is to assist learners in developing general academic language skills through interesting and relevant content.

Sheltered instruction. Here, a content curriculum is adapted to accommodate students' limited proficiency in the language of instruction. This model was originally developed for elementary foreign language immersion programs to enable some portion of the curriculum to be taught through the foreign language (Genesee 1987). It is commonly used in immersion and two-way bilingual programs (Met 1991) and has been adapted for use in second language programs with large numbers of limited English proficient students of intermediate or advanced English proficiency.

Language across the curriculum. This is the name given to content-centered instruction that involves a conscious effort to integrate language instruction into all other curricular offerings. This may include the development of integrated curricula and some kind of paired or team teaching.

In schools where enough students share a common first language, bilingual programs using sheltered instruction have been developed. In one program, students move from content instruction in their first language to sheltered-content instruction in English, and then to mainstream classes where they are integrated with English-speaking peers. They receive content-based ESL as well (Freeman, Freeman, and Gonzales 1987).

For schools with insufficient numbers of language minority students to create sheltered language programs, the techniques for sheltering instruction can be implemented in classes with both native and non-native English-speaking students.

Adjunct model. This model links a specific language learning course with a content course in which both second language learners and native English speakers are enrolled. The courses share a content base, but the focus of instruction differs. The language teacher emphasizes language skills, such as academic reading or writing, while the content teacher focuses on traditional academic concepts. This model requires substantial coordination between the language and content teacher; usually the ESL teacher makes the extra effort of becoming familiar with the content. An adjunct program is usually limited to cases where students have language skills that are sufficiently advanced to enable them to participate in content instruction with English speaking students.

Cognitive Academic Language Learning Approach (CALLA). This approach combines language, content, and learning strategy instruction into a transitional ESL approach for upper elementary and secondary students of intermediate or advanced English proficiency (Chamot and O'Malley 1987).

Teaching Methods

There are a variety of strategies and techniques used in content-centered second language instruction. Here, the discussion will be limited to four types of strategies—cooperative learning and other grouping strategies, task-based or experiential learning, whole language strategies, and graphic organizers—that increase attention to academic language learning, contribute to content learning, and encourage development of thinking and study skills. (See Crandall 1992 for additional information.)

Cooperative learning. In this method, students of different linguistic and educational backgrounds and different skill levels work together on a common task for a common goal in either the language or the content classroom. Cooperative groups encourage students to communicate, to share insights, test hypotheses, and jointly construct knowledge. Depending on their language proficiency, students can be assigned various roles as facilitator, recorder, reporter, or illustrator.

Other grouping strategies involve peer tutoring or pairing a second language learner with a more English-proficient peer.

Task-based or experiential learning. In this approach, appropriate contexts are provided for developing thinking and study skills as well as language and academic concepts for students of different levels of language proficiency. Students learn by carrying out specific tasks or projects: for example, "doing science" and not just reading about it (Rosebery, Warren, and Conant 1992).

Whole language approach. The philosophy of whole language is based on the concept that students need to experience language as an integrated whole. It focuses on the need for an integrated approach to language instruction within a context that is meaningful to students (Goodman 1986). The approach is consistent with integrated language and content instruction as both emphasize meaningful engagement and authentic language use, and both link oral and written language development (Blanton 1992). Whole language strategies that have been implemented in content-centered language classes include dialogue journals, reading response journals, learning logs, process-based writing, and language experience stories (Crandall 1992).

Graphic organizers. These provide a "means for organizing and presenting information so that it can be understood, remembered, and applied" (Crandall 1992). Graphs, realia, tables, maps, flow charts, timelines, and Venn diagrams are used to help students place information in a comprehensible context. They enable students to organize information obtained from written or oral texts, develop reading strategies, increase retention, activate schema as a pre-reading or pre-listening activity, and organize ideas during the prewriting stage (Crandall 1992).

Conclusion

Although this Digest has focused on content-centered language instruction in the United States, similar interest in integrated language and content instruction is evident in many parts of the world, especially in countries where English serves as the medium of instruction for part of the educational program.

Among the issues facing content-centered language instruction in the United States is the need for research to evaluate the effectiveness of integrated instruction, specifying optimal conditions for various programmatic effects, including the timing of integrated instruction, the relative effectiveness of different program models, and the use of various instructional strategies, texts, and assessment measures. Teacher training is another concern as the number of second language learners in U.S. classrooms increases. To accommodate this diverse student population, content-area teachers need to know how to shelter their instruction, and language teachers need to learn how to integrate academic language and content better in their classrooms (Crandall 1992).

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Pictures as a Basis for Language

Many ESL and ABE programs use picture books to encourage learners to provide their own stories, to tell what they see using the level of language they currently possess. For the workplace program, pictures related to the workplace can be used, or learners can be asked to draw their own personal maps of the workplace, as described in the following example:

Have workers draw a map of their workplace or work station, including the people, equipment, and other details (e.g., health and safety hazards). They can begin by drawing themselves and expand outward to include the people and things around them. When they are finished drawing, students can label what they have drawn. You can model both labeling and drawing on the board. Ask students questions to get more detail from the maps:

- Where is the worker in the map?
- Where is the supervisor?
- Where are the coworkers?
- Who sits to your left? to your right? behind you? in front of you? *(practice of direction words)*
- Do you speak to these people?
- What language do you speak to them in?

You can also have students draw lines on the map indicating lines of communication (e.g., a line between two people that says *Spanish* above it will show that these two people speak Spanish to each other).

Other questions should focus on the language needs on the job:

- Where in this map do you have to read?
- Where do you have to speak English?
- Where do you have to write?

Once the maps are finished, you can make copies and have each student present his or her own map, or have students swap maps and present someone else's. Students can then use the question words *(who, what, when, where, how, why)* to frame and ask questions of the people presenting the maps. The maps can also serve as the basis for dialogues or role plays—students can sit in the positions indicated on the maps, and you can brainstorm problems that might occur and how they would be solved. The role plays can be transcribed and used as readings later on.

The maps can be a useful record as workers are moved around, and they allow students with literacy problems to work with pen and paper without having to write much.

SOURCE: H. L. Johnson, *Curriculum Development in Selected Workplace Literacy Programs of the Consortium for Worker Education: Evaluation Study* (New York, NY: Institute for Research and Development in Occupational Education, Center for Advanced Study in Education, The Graduate School and University Center of the City University of New York, December 1993), p. 28, Appendix D.

Reflection on Reading 2

- Consider the program models that are most appropriate for the workplace setting you are in. (If you are not yet working in a company, visit a teacher who is and observe and discuss this question.)

- Can you picture yourself following the guidelines and principles discussed? Select those that you feel you can adopt immediately, and list some ideas of what you would do to implement them in your classroom.

- Discuss those you do not feel you could adopt immediately with another teacher or with your supervisor.

"A Short Set of Guidelines for Effective ESL Teaching"
In *Adult ESL Instruction: A Sourcebook*, by L. M. Guglielmino, 88-89
Glenview, IL: Scott, Foresman, 1991

If you are a new ESL teacher, one of the best ways to succeed in your new position is to find persons who do it well, watch them, and ask questions. This short chapter provides another way to do just that. A group of highly successful ESL teachers and supervisors were asked what tips they would give. Their responses follow. . . . all represent a combined total of several hundred years' experience of ESL teaching.

If you are an experienced ESL teacher, you know that one of the best ways to grow and improve in your field is to meet and compare notes with your peers. This set of guidelines gives you the opportunity to attend such a "conference." You will probably have tips of your own to add.

The first day of class—

1. Learn the students' names and how to pronounce them. Use name-tags to help students learn each other's names as well.
2. Find out something about your students' backgrounds if possible. This information would include native country, first language, level of education, job experience, and length of time in this country.
3. Create a comfortable, nonthreatening atmosphere.
4. Find out students' needs in the four skill areas: listening, speaking, reading, and writing. This does not mean you must administer a formal test on the first day.
5. Determine some short-term goals.
6. Set up a clear system of signals so that students know when you want them to repeat what you have said.

Then and thereafter—

1. Speak in a natural tone of voice. Use normal intonation, rhythm, pace, and volume.
2. Teach by topic, situation, or competency (in other words, teach for a purpose).
3. Make sure your subject matter is relevant. Your students should leave class every day with language they can use.
4. Limit your language in quantity and complexity.
5. Proceed slowly. Don't feel pressured to run through a text.
6. Remember: There is no perfect text. Adapt, adjust, and add to meet your students' needs.
7. Allow adequate time for practice of new vocabulary and language structures. The amount of drill and repetition needed can be surprising.
8. Review every day.
9. Vary activities frequently.
10. Don't correct every error when students begin to speak.
11. Avoid totally negative feedback when an error is made.
12. Help students set small, incremental goals.
13. Give students a chance to learn on their own. Don't teach everything.
14. Care about your students' lives, and show it.
15. Be flexible. The best language lesson may grow from a student's shared experience (an accident, a wedding, anything that is important to students).
16. Start learning a foreign language yourself, to see how difficult it is.
17. Don't be threatened by what you don't know. As Winston Churchill once said, "It is better to do something than to do nothing while waiting to do everything." There is an array of approaches, methods, and materials in ESL instruction. This reservoir of possibilities sometimes intimidates teachers, but if you are committed to helping your students learn English (and you are, or you wouldn't be reading this guide), you will develop an approach that works well for you and your students.

COOPERATIVE LEARNING FOR STUDENTS FROM DIVERSE LANGUAGE BACKGROUNDS
ERIC Digest
Washington, DC: ERIC Clearinghouse on Languages and Linguistics, 1992 (ED 347 853)

In cooperative learning, students work together in small groups on tasks that require cooperation and interdependence among all individuals in each group. Students help each other to complete learning tasks and are rewarded for providing that help (Jacob and Mattson 1987). Cooperative learning reward structures place students "in a situation where the task-related efforts of any individual helps others to be rewarded" (Slavin 1983, p. 4).

When the originators of cooperative learning emphasized the importance of heterogeneity, it is doubtful that they envisioned a classroom where non-English speakers and native English speakers were members of the same group. Today, a classroom with students from diverse language backgrounds is quite common, especially in states such as California, where three categories of students can be found: (1) English-only students who have learned English as their primary language; (2) English language learning (ELL) students who have a primary language other than English and are in the process of acquiring English; and (3) fluent English proficient students who have a primary language other than English, but are fully proficient in English. When students from such diverse language backgrounds are placed in the same classroom, their linguistic and cultural diversity creates challenges for teachers (Holt 1993).

Why Use Cooperative Learning with Students from Diverse Linguistic and Cultural Backgrounds?

Effective responses to student diversity include strategies that link the students in mutually supportive ways and provide them with multiple, varied, and equal opportunities to acquire content and language. Learning cooperatively in teams where "all work for one" and "one works for all" gives students the emotional and academic support that helps them persevere against the many obstacles they face in school. Not only does cooperative teamwork give students additional motivation to stay in school and improve academically, it also helps them learn the skills they will need for the increasingly interactive workplaces of the future. Cooperative learning is a key strategy for ELL students because of its potential to enhance interactions among students, as well as dramatically improve their academic achievement (Kagan 1986).

What Is the Structural Approach to Cooperative Learning?

The structural approach to cooperative learning is based on the creation, analysis, and systematic application of structures or content-free ways of organizing social interaction in the classroom. Structures usually involve a series of steps, with prescribed behavior at each step (Kagan 1993). For example, in one four-step structure, *Numbered Heads Together,* a team of students works together cooperatively to answer a question. Students who know the answer share it with those who do not because they want their team to do well; students who do not know the answer listen carefully because it may be they who are called on to answer the question.

An important cornerstone of the approach is the distinction between "structures" and "activities." To illustrate, teachers can design many excellent cooperative activities, such as making a team mural or a quilt. Such ***activities*** almost always have a specific content-bound objective and, thus, cannot be used to deliver a range of academic content. In contrast, ***structures*** may be used repeatedly with almost any subject matter, at a wide range of grade levels, and at various points in a lesson plan. Structures can be combined to form "multistructural lessons in which each structure or building block provides a learning experience upon which subsequent structures expand, leading toward predetermined academic, cognitive, and social objectives (Kagan 1993).

Why Use Different Structures?

Because each structure has distinct domains of usefulness and can more efficiently reach some but not other cognitive, academic, and social goals, the efficient design of lessons involves using a variety of structures, each chosen for the goals it best accomplishes. Reliance on any one structure limits the cognitive and social learning of students.

Different structures are useful for distinct objectives such as ***teambuilding*** (getting students acquainted and building mutual support within teams), ***classbuilding*** (creating a positive classroom climate), ***communication building*** (learning how to communicate effectively), ***mastery*** (acquiring basic skills), and ***concept development*** (acquiring higher order thinking skills) (Kagan 1990). For example, *Group Discussion* is the structure of choice for brainstorming and for reaching group consensus, while *Three-Step Interview* is better for developing language and listening skills and promoting equal participation (Kagan 1993).

An overview of selected cooperative learning structures is provided on the [next two] pages.

References

This ERIC Digest is based on two primary sources:

- Holt, D. D., ed. *Cooperative Learning: A Response to Linguistic and Cultural Diversity.* Washington, DC: Center for Applied Linguistics, 1993. (ED 355 813)
- Holt, D. D.; Chips, B.; and Wallace, D. *Cooperative Learning in the Secondary School: Maximizing Language Acquisition, Academic Achievement, and Social Development*, edited by L. V. Pierce. Washington, DC: National Clearinghouse for Bilingual Education, 1992. (ED 350 876)

Additional References

Jacob, E., and Mattson, B. *Cooperative Learning with Limited-English-Proficient Students.* ERIC Digest. Washington, DC: ERIC/CLL, 1987.

Kagan, S. "Cooperative Learning and Sociocultural Factors in Schooling." In *Beyond Language: Social and Cultural Factors in Schooling Language Minority Students*, edited by California Department of Education, 231-298. Los Angeles, CA: California State University, 1990.

Kagan, S. *Cooperative Learning Resources for Teachers.* San Juan Capistrano, CA: Resources for Teachers, 1990.

Kagan, S. "The Structural Approach to Cooperative Learning." In *Cooperative Learning: A Response to Linguistic and Cultural Diversity*, edited by D. D. Holt. Washington, DC: Center for Applied Linguistics, 1993.

Slavin, R. *Cooperative Learning.* New York, NY: Longman, 1983.

Overview of Selected Cooperative Learning Structures

Structure and Brief Description	Functions (Academic & Social)
Teambuilding	
Roundrobin. Each student in turn shares some kind of information with his or her teammates.	Expressing ideas and opinions, creating stories. Equal participation, getting acquainted with teammates.
Classbuilding	
Corners. Each student moves to a corner of the room representing a teacher-determined alternative. Students discuss within corners, then listen to and paraphrase ideas from other corners.	Seeing alternative hypotheses, values, problem-solving approaches. Knowing and respecting different points of view, meeting classmates.
Communication Building	
Paraphrase Passport. Students correctly paraphrase the ideas of the person who has just spoken and then contribute their own ideas.	Checking comprehension. Giving feedback. Sharing ideas.
Spend-a-Buck. Each student is given four quarters (or four votes) and must make a decision about what to "spend" them on or use them for in a particular situation. The team tallies the results to determine its decision.	Decision-making. Consensus-building. Conflict resolution.
Group Processing. Students evaluate their ability to work together as a group and each member's participation, with an aim to improving how the group works together.	Communication skills. Role-taking ability.
Mastery	
Numbered Heads Together. The teacher asks a question; students consult to make sure everyone knows the answer.	Review, checking for knowledge comprehension.
Send-a-Problem. Each student writes a review problem on a flash card and asks teammates to answer or solve it. Review questions are passed to another group.	Review, checking for comprehension.
Cooperative Review. Students engage in a variety of games to review the week's material.	Review, checking for comprehension.

SOURCE: Prepared by L. V. Pierce (Holt, Chips, and Wallace, 1992).

Overview of Selected Cooperative Learning Structures—Continued

Structure and Brief Description	Functions (Academic & Social)
Concept Development	
Three-Step Interview. Students interview each other in pairs, first one way, then the other. Students share with the group information they learned in the interview.	Sharing personal information such as hypotheses, reactions to a poem, conclusions from a unit. Participation, listening.
Brainstorming. Students encourage each other to generate ideas regarding a particular topic or problem and build upon each other's ideas.	Generating and relating ideas. Participation, involvement.
Group Discussion. The teacher asks a low-consensus question. Students talk it over in groups and share their ideas.	Sharing ideas. Reaching group consensus.
Multifunctional	
Roundtable. Students pass a paper and pencil around the group. The paper may contain several choices for ways of doing something (e.g., different research strategies). Each student in turn writes his name by his preferred strategy. Teams then agree on which strategies to use.	Assessing prior knowledge, practicing skills, recalling information, creating cooperative art. Team-building, participation for all.
Partners. Students work in pairs to create or master content. They consult with partners from other teams. They then share their products or understanding with the other partner pair in their team.	Mastery and presentation of new material, concept development. Presentation and communication skills.
Co-Op Co-Op. Students work in groups to produce a particular group product to share with the whole class; each student makes a particular contribution to the group.	Learning and sharing complex material, often with multiple sources. Evaluation, application, analysis, synthesis. Conflict resolution, presentation skills. Planning, group decision-making.
Group Investigation. Students identify a topic and organize into research groups to plan learning tasks or sub-topics for investigation. Individual students gather and evaluate data and synthesize findings in a group report.	Application, analysis, inference, synthesis, evaluation. Planning, group decision-making.

Reflection on Reading 3

- Select at least four of the tips from the short set of guidelines, p. 21, that you want to expand on by your reflection (and, if possible, your interaction with other teachers). Think through the specific details of how you would implement these in your classroom, and make a list of them, as appropriate.

- Lucy Guglielmino (the author of the first article in the reading) suggests that experienced ESL teachers may have tips of their own to add. Try to imagine yourself "in the shoes of" an ESL learner. Can you think of any tips to add?

- Discuss some cooperative learning structures with a peer. Consider how you would explain some of these structures to a group of ESL learners.

CREATING A PROFESSIONAL WORKFORCE IN ADULT ESL LITERACY
ERIC Digest by J. Crandall
Washington, DC: National Clearinghouse for ESL Literacy Education, 1994 (ED 369 308)

The challenges faced by many adult English as a Second Language (ESL) literacy teachers are great enough to work against the advancement of the profession itself. Classes are often large and made up of students of varying ability levels. Instruction may include basic literacy, family literacy, workplace literacy, or any number of specialized areas within the field. Funding is intermittent, limiting continuity of employment and opportunities for professional growth. At the same time, the demand for ESL instruction for adults is increasing (U.S. Department of Education 1991). Although it is clear that professional, well-prepared teachers are needed now more than ever, several factors mitigate against the development of such a workforce. The majority of adult ESL literacy instructors work part time, without contracts or benefits. Often they are volunteers. Many receive only the most limited professional preparation and then leave the field after a short period of time (Crandall 1993).

This digest explores the issue of professionalism in adult ESL literacy. It describes the current conditions of the ESL workforce, it discusses the role credentialing and certification might play in the professionalization process, and it highlights several professional development models the field might consider to help create a professional workforce.

Professional Development: Limited Opportunities

Most adult ESL literacy instructors work part time. Many work in several programs at once, each requiring different knowledge and skills. Those who are full time are likely to function as both program administrators and teachers. Thus, it is not surprising that the turnover among ESL practitioners is great. One survey of adult literacy practitioners in New York reported that a majority had been in the field for three years or fewer (Metis Associates 1986). These educators reported being greatly concerned about the need for full-time employment with benefits, more job stability, better program resources, and more opportunities for professional development.

While most ESL literacy teachers have college degrees, the degrees may be in various fields. Those with degrees in education are likely to be prepared to teach children or adolescents, not adults. Those with degrees in reading may have had little preparation for teaching literacy in a second language. And, until recently, even the M.A. programs for ESL educators (Teachers of English to Speakers of Other Languages (TESOL), Applied Linguistics) focused on the needs of elementary, secondary, or university students, not on adults with limited education. For many adult ESL teachers, staff development consists of voluntary attendance at workshops, conferences, or seminars for a day or two per year (Kutner 1992; Tibbetts, Kutner, Hemphill, and Jones 1991). Literacy volunteers, working in a one-to-one tutoring situation, often receive only 15 to 20 hours of preparation during the first year of teaching, with even less training in subsequent years (Tibbetts et al. 1991).

The Role of Credentialing or Certification

The great demand for adult ESL literacy education and the diverse needs of adult ESL literacy learners have forced the profession to engage in a delicate balancing act in deciding who is qualified to teach. While concerns about professionalizing teaching are addressed by calls for strong academic credentials, credentialed teachers who understand literacy issues and have experience teaching language to minority adults are difficult to find (and to keep). The field grapples with ensuring competence and fostering professionalism "without establishing rigid certification requirements that deny professional opportunities for good teachers who lack academic credentials" (Wrigley and Guth 1992, p.196).

The concern for professionalization of the field has led many to suggest the need for some kind of certification process involving participation in university courses. Others, however, point out that credentialing may be more appropriate for the field. Credentialing (involving demonstration of proficiency) would allow for multiple routes of access to adult ESL literacy teaching and would also serve to validate practitioners' existing knowledge, skills, and experiences. Practitioners with what Auerbach (1992, p. 28) refers to as "formal qualifications," including knowledge of theories of first and second language literacy, may have limited experience working in linguistically and culturally diverse communities. Conversely, members of these communities with informal qualifications, including understanding learners and the potential uses and contexts for literacy in their communities, may have limited theoretical knowledge. Ideally, both types could learn from each other and create a workforce that "mirrors the diversity" of adult ESL learners "and the diversity of contexts in which they seek to learn" (Lytle, Belzer, and Reumann 1992, p.9).

Models for Effective Professional Development

Although many believe that credentialing could play a valuable role in the field, there are few models of comprehensive professional development for adult ESL literacy teachers that might lead to a credentialing process. This section uses a framework developed by Wallace in his work with foreign language teachers (cited in Wrigley and Guth 1992) to suggest three promising models for professional development. They include a craft or mentoring model, in which inexperienced teachers are paired with experienced teachers; an applied science model, in which relevant research is linked with practical experience; and an inquiry-based model, in which research, teacher education, and teaching occur concurrently. Ways of combining these models to provide a true learning laboratory are also discussed.

The ***craft*** or ***mentoring model*** relies on the knowledge of an experienced practitioner to mentor less experienced practitioners. In the refugee education programs in Southeast Asia, host country teachers collaborate with one another and with a master teacher to develop lesson plans and share ideas for classroom activities. At City University of New York, master teachers open up their Adult Basic Education (ABE)/ESL classes to less experienced colleagues who are reimbursed for observing demonstration lessons. In K-12 education, alternative or "fast-track" certification programs are available to attract both under-represented minority groups and math and science professionals to teaching. These programs involve a summer orientation followed by a series of mentoring and other support activities during the first year of teaching. Returning Peace Corps volunteers with extensive experience in fields such as English language teaching can also enroll in alternative certification programs. A comparable program could be developed for potential adult ESL literacy teachers who have undergraduate degrees in related fields but lack specific education or appropriate teaching experience, as well as for community members who have valuable teaching and cultural experience but lack a background in theory and research.

The ***applied science*** or ***from-theory-to-practice model*** links relevant research with teaching practice. The Adult ESL Teacher Training Institute, developed for California, has been implemented in many other states. Instruction consists of a series of sequenced, skill-based training sessions involving the use of video training packages by trainers who are experienced teachers and certified by the Institute (Savage 1992). Video, satellite telecommunications, and other technology now make it possible for this model to be offered through distance education. Through video segments on teaching techniques and administrative strategies, Los Angeles County is using its Educational Telecommunications Network to provide training for adult ESL literacy teachers and administrators. A similar set of videotapes on exemplary programs has been developed by the author and her colleagues at the Center for Applied Linguistics. *Sharing What Works* is available from NCLE at Center for Applied Linguistics, 1118 22nd Street NW, Washington, DC 20037 (202) 429-9292.

The ***inquiry*** or ***reflective teaching model*** is an exciting approach in which teachers become active researchers—reading about, sharing, observing, critically analyzing, and reflecting upon their own practice in order to improve it. This model involves teachers in all stages of research, from determining the questions to be investigated, identifying research methods, and analyzing results, to reflecting on what changes in practice the results

might indicate. At the Adult Literacy Practitioner Inquiry Research Project in Philadelphia (Lytle et al. 1992), teachers participate in an ongoing seminar where they share what they have learned from developing and using alternative assessment tools in the classroom, examining learning strategies of students, and completing other practice-based projects. At the University of Massachusetts Bilingual Community Literacy Project, teachers in three well-established, community-based adult literacy programs and faculty of the University of Massachusetts, Boston, research ways of creating closer links with the communities in which the programs are located and of involving more community members as teachers.

Professional development schools provide an exciting example of how a combination of the three models in one setting brings together aspiring and experienced teachers, teacher educators, and others involved in education to learn from one another (President's Commission on Teacher Education 1992). Here, specially designated elementary or secondary schools serve as loci for research and improvement of practice by teachers and other school personnel who work collaboratively with university teacher educators.

There is much to recommend the use of a ***combination model*** for the improvement of adult ESL literacy education. The principle would be the same—to bring together teachers and other practitioners at all stages of their development to provide a laboratory (in a community center, worksite, or adult education program) where they could demonstrate and expand their knowledge, skills, and experiences. TESOL teacher educators and applied linguists would have much-needed, authentic adult education contexts in which to test both theory and practice; beginning teachers would be provided with both formal education and opportunities to learn from their experiences; and more experienced teachers would serve as mentors, conduct research related to their own classes, and reflect upon and share their experiences.

Conclusion

Expanding the professional development opportunities available to ESL literacy teachers will require changes in adult education policy and practice. Good models of credentialing and certification and of comprehensive professional development do exist. An exploration of these models leading to their implementation would help to create a better trained workforce while simultaneously building a much-needed research base in adult ESL literacy. In so doing, a major step would be taken towards achieving the professionalism so needed in the field.

References

Auerbach, E. R. *Making Meaning, Making Change: Participatory Curriculum Development for Adult ESL Literacy.* Washington, DC and McHenry, IL: Center for Applied Linguistics and Delta Systems, 1992.

Crandall, J. A. "Professionalism and Professionalization of Adult ESL Literacy." *TESOL Quarterly* v27 (1993): 497-515.

Kutner, M. *Staff Development for ABE and ESL Teachers and Volunteers.* Washington, DC: National Clearinghouse for ESL Literacy Education, 1992. (ED 353 862)

Lytle, S. et al. *Developing the Professional Workforce for Adult Literacy Education.* Philadelphia, PA: University of Pennsylvania, National Center for Adult Literacy, 1992. (ED 355 387)

Metis Associates. *Adult Literacy Program Personnel Profile.* New York, NY: Literacy Assistance Center, 1986. (ED 312 413)

President's Commission on Teacher Education. *Teacher Education for the 21st Century.* Washington, DC: American Association of State Colleges and Universities, 1992.

Savage, K. L. *Teacher Training Through Video.* White Plains, NY: Longman, 1992.

Tibbetts, J. et al. *The Delivery and Content of Training for Adult Education Teachers and Volunteer Instructors.* Washington, DC: Pelavin Associates, 1991. (ED 344 055)

U.S. Department of Education. *Teaching Adults with Limited English Skills: Progress and Challenges.* Washington, DC: Office of Adult Education, Division of Adult Education and Literacy, 1991. (ED 341 296)

Wrigley, H. S., and Guth, G. J. A. *Bringing Literacy to Life: Issues and Options in ESL Literacy.* San Mateo, CA: Aguirre International, 1992. (ED 348 896)

Reflection on Reading 4

- Some of the challenges faced by adult ESL teachers are shared by teachers of English-speaking adults. Identify some of the similarities and differences, and consider their implications for advancement of professional development opportunities for workplace literacy instructors.

- Do you feel that adult ESL instructors should be certified? What would you consider to be the essential elements of such certification, and why?

- Consider the professional development models suggested, and relate them to what you perceive to be your own needs and desires. Investigate the feasibility of these possibilities in your own setting.

Employ Strategies for ESL Instruction

- Put into practice what you've learned about ESL instruction by preparing a lesson for a workplace literacy program. If you have a specific program and learners in mind, use that setting and the needs of those learners as a basis. If not, use a setting in which you might be teaching in the future.
  - ~ Review sample materials/scenarios from a workplace setting and the descriptions of instructional strategies in Reading 2.
  - ~ Following the principles presented in this learning guide, develop an extended activity or series of activities for an ESL lesson in a workplace literacy program.

TOPIC: Employ Strategies for ESL Instruction

Evaluation Guidelines

Directions: Check your competency with the following criteria:

Learner Self-Check		Review Checklist
Did you—		Did the learner—
☐	1. Identify a process for assessing the needs of adult ESL learners in the workplace?	☐
☐	2. Explain the teaching principles you would use as guidelines for working with adult ESL learners in the workplace?	☐
☐	3. Develop teaching strategies that are consistent with the teaching principles discussed in (2) above?	☐
☐	4. Describe a model that you consider feasible for your own professional development in adult ESL literacy?	☐
☐	5. Develop a set of workplace-based activities and materials for an ESL lesson in a workplace literacy program?	☐

Learner: _____ Reviewer: _____

Level of Performance: If the evaluation results indicate a need for further competency development—or if the learner wishes to pursue the topics covered in further breadth or depth—please refer to the supplementary resources described in the Annotated Bibliography, which follows.

Annotated Bibliography

Auerbach, E. R. "Reexamining English Only in the ESL Classroom. *TESOL Quarterly* v27/n1 (Spring 1993): 9-32.

Auerbach argues strongly with the practice in ESOL programs of not allowing or encouraging students' use of native language in class. Supporting her contentions with extensive references and case examples, she makes a strong case that such an approach is not supported by research or experience, but instead is rooted in the teachers' need for control.

Culturgrams. Available from Brigham Young University, David M. Kennedy Center for International Studies, Publications Services, 280 HRCB, Provo, UT 84602 (phone: 801-378-6528)

These copyrighted briefings are designed to aid understanding of, feeling for, and communication with other people. Condensations of the best information available, each *Culturgram* focuses on a particular country and provides information about its ***customs and courtesies*** (e.g., greetings, visiting, eating, public meetings, gestures, shopping, traveling); the ***people*** (e.g., general attitudes, population, language, religion); ***life-style*** (e.g., the family, dating and marriage, social and economic levels, diet, work, recreation, holidays); and the ***nation*** (e.g., land and climate, history and government, economy, education, transportation, health).

Facilitator's Guidebooks. Boston, MA: World Education, 1991.

Presents four teaching methods—introducing, peer teaching, game playing, and testing—and translates them into practice activities.

From the Classroom to the Workplace: Teaching ESL to Adults. Washington, DC: Center for Applied Linguistics and National Clearinghouse on Literacy Education, 1983. (ED 227 694).

Among the six models for ESL instruction provided is occupation-specific ESL. Guidelines are provided for teaching ESL quickly and efficiently. Teaching methods, program designs, objectives, materials, testing, and suggested resources are provided.

Janney, J. S. *Constructing English Language Skills While Reconstructing Homes*. Philadelphia, PA; Center for Literacy and Norris Square Civic Association, 1990. (ED 324 476)

Contains four units of instruction incorporating construction fundamentals along with language instruction. Lesson plans are included for carpentry, plumbing, electrical work, and career information.

LaMar, M., and Schnee, E. *The Global Factory: Union Worker-Family Education Program*. New York, NY: International Ladies' Garment Workers Union, 1993. (ED 357 657).

This workshop manual includes ideas for curricula, including activities and lists of resources.

Nash, A.; Cason, A.; Rhum, M.; McGrail, L.; and Gomez-Sanford, R. *Talking Shop: A Curriculum Sourcebook for Participatory Adult ESL*. A publication of the Center for Applied Linguistics prepared by the National Clearinghouse on Literacy Education. McHenry, IL: Delta Systems, 1992. (ED 318 285)

Includes activities and examples of lessons organized according to four topics: getting things started, immigrant experiences, mothers and their children, and redefining learning and teaching.

Penfield, J. *Integrating ESL and the Workplace*. Highland Park, NJ: Penfield Associates, 1984.

Designed to prepare learners for entry-level positions in the community, this guide encourages the use of workplace pictures during instruction and recommends teaching names of action verbs; discourse routines; spatial and procedural directions; job duties; work rules; and job-related reading, writing, and math. Provides abbreviated vocabulary lists for housekeeping, food services, and health services occupations.

Vella, J. *English as a Second Language: Guide for Teachers.* Raleigh, NC: Migrant and Seasonal Farmworkers Association, 1982. (ED 231 226).

This teaching guide based on Paulo Freire's *Pedagogy of the Oppressed* is intended for use with Haitian migrant workers. General teaching principles (control, sequence, reinforcement, total physical response) are explained and illustrated; examples of substitutions and transformations related to specific competencies are presented; techniques for teaching basic reading, writing, and oral language are suggested; and planning and evaluation strategies are outlined. The importance of respect for the learners and for their situation is stressed.

Workplace Literacy Curriculum: A Competency-Based Approach for ESL, Math & Reading. Greyslake, IL: U.S. Department of Education National Workplace Literacy Program, College of Lake County, August 1994.

Includes descriptions of instructional techniques and strategies (anticipation guides, brainstorming, clustering, computer-assisted instruction, cooperative learning, directed reading-thinking activity, freewriting, games, graphic organizers, journal writing, K-W-L study strategy, language experience approach, concept mapping, problem posing, problem solving, ReQuest reading procedure, student-generated dialogues and role-plays, Think-Aloud reading strategy, total physical response). Also presents a course outline and lesson plans for ESL instruction.

Other Resources

Belfiore, M. B., and Barbara, B. *Teaching English in the Workplace.* Toronto: Ontario Institute for Studies in Education Press, 1984. (ED 252 067)

Bigelow, W., and Diamond, N. *The Power in Our Hands: A Curriculum on the History of Work and Workers in the United States.* New York, NY: Monthly Review Press, 1988.

Freeman, D. *Putting a Window on Curriculum Implementation.* New York, NY: International Ladies Garment Worker's Union, 1990.

Hart-Landsberg, S.; Braunger, J.; Reder, S.; and Cross, M. M. *Learning the Ropes: The Social Construction of Work-Based Learning.* Portland, OR: Northwest Regional Educational Laboratory, 1993.

Kainola, M. *Making Changes: Employment Orientation for Immigrant Women.* Toronto: Cross-Cultural Communication Center, 1982. (ED 238 971)

Sarmiento, A. R., and Kay, A. *Worker Centered Learning: A Union Guide to Workplace Literacy.* Washington, DC: AFL-CIO Human Resources Development Institute, 1990. (ED 338 863).

Workplace Education: Voices from the Field: Proceedings of the National Workplace Literacy Program Project Directors Conference. Washington, DC: U.S. Department of Education, Division of Adult Education and Literacy, 1992. (ED 352 496)

Also note the resources listed in the readings in this learning guide.

Adapted from *WORKPLACE ESL LITERACY EDUCATION*
NCLE Minibib, compiled by A. Fitch
Washington, DC: National Clearinghouse on Literacy Education, August 1993

Balliro, L. *WorkBook for WorkPlays: You and Your Rights on the Job.* North Dartmouth, MA: Arnold M. Dubin Labor Education Center, Southeastern Massachusetts, 1988. (ED 318 299)

This literacy curriculum (text and accompanying videotape) for intermediate ESL students integrates workplace rights and union issues into instructional materials. Using topics such as safety and discrimination, each unit is composed of short instructional skits.

Cook, C., and Godley, V., eds. *Workplace Literacy: A Curriculum Development Guide.* Wilmington, MA: Altron, Inc.; Cambodian Mutual Assistance Association of Greater Lowell, 1989. (ED 329 132)

The Cambodian Mutual Assistance Association of Lowell collaborated with a local manufacturer to establish a workplace literacy program for the nonnative-English-speaking adults employed by the plant. This curriculum guide details the processes of needs assessment, recruitment, student evaluation, and classroom organization used in the program. Instructional approaches, training techniques, assessment materials, and workplace literacy resources are described.

Cruz, J. et al. *English in the Work Place for School Custodians. Manual and Curriculum Guide.* Fairfax County, VA: Fairfax County Public Schools, Department of Vocational, Adult, and Community Education, 1990. (ED 320 459)

The Fairfax County public schools created a manual and curriculum guide to assist others who want to set up vocational ESL (VESL) programs for limited-English-proficient school custodians. The manual explores program development, needs assessment, curriculum guidelines, and classroom activities. Appendices contain a short annotated bibliography, various administrative forms, and student questionnaires.

Frazier, C., and Freer, C. *English as a Second Language Workplace Program: An ISBE 353 Special Project Grant.* Final Report. Rockford, IL: Rock Valley College, 1989. (ED 318 284)

Rock Valley College and the local Rockford, Illinois, literacy council administered a workplace literacy project that recruited and taught local nonnative-English-speaking employees. All tuition, classroom space, and instructional materials were provided by the businesses involved. This final report describes the project's objectives, the participating companies, and the types of assessment and instructional materials used.

Isserlis, J. *Workplace Literacy Programs for Nonnative English Speakers.* ERIC Digest. Washington, DC: National Clearinghouse on Literacy Education, 1991. (ED 334 874)

This digest focuses on workplace literacy programs for nonnative speakers. Topics include (1) reasons for beginning such programs, (2) essential features of the programs, (3) needs assessment, (4) curriculum development, and (5) learner assessment.

Kirby, M. *Perspectives on Organizing a Workplace Literacy Program.* Arlington, VA: Arlington County Public Schools, 1989. (ED 313 927)

The Arlington Education and Employment Program produced a handbook, for educator and employer, on developing and implementing a workplace literacy program. Focusing on job-related language needs in hotels, the handbook outlines necessary steps in curriculum development, instructor selection,

program evaluation, and learner assessment. A bibliography and a section on program partnerships for businesses are included.

Saumweber, J. et al. *ESL Workplace Literacy Curriculum for a JTPA/Family English Literacy Demonstration Project.* St Paul, MN: Lao Family Community of Minnesota; St. Paul Public School Adult Basic Education Department, 1991. (ED 339 248)

The Lao Family Community of Minnesota, in partnership with the St. Paul Public School Adult Basic Education Department, created this ESL literacy curriculum to serve a JTPA job training program that included many Hmong refugees. Four levels of ESL instruction using workplace literacy topics are found in this guide.

The Skills Enhancement Literacy Project of Hawaii: Final Program Model, Final Performance Report, Final Evaluation Report. Manoa, HI: University of Hawaii-Manoa, College of Education, 1990. (ED 324 449)

The ITT Sheraton Hotels teamed with the University of Hawaii-Manoa to develop classes in workplace literacy to serve their mostly nonnative-English-speaking workforce. The success of this project of the National Workplace Literacy Program shows promise for similar educational partnerships between universities and businesses.

Thomas, R. J. et al. *Job-Related Language Training for Limited English Proficient Employees: A Handbook for Program Developers and a Guide for Decision Makers in Business and Industry.* Washington, DC: Development Assistance Corp., 1991. (ED 342 277)

This two-part manual consists of, first, an in-depth handbook for developing workplace ESL literacy and cross cultural training programs. The second part, Guide for Decision Makers, provides employers with an overview of the benefits of workplace language training.

Waugh, S. *Workplace Literacy National Forum Report.* Toronto, Ontario: Frontier College, 1991. (ED 335 479)

In December 1990, Frontier College held a national forum on workplace literacy, and participants discussed such topics as ESL training, employer involvement in literacy, program evaluation, and staff development. This report covers forum proceedings and objectives, discussion summaries, and recommendations for future conferences.

Working Smart: The Los Angeles Workplace Literacy Project. Final Report. Los Angeles, CA: Los Angeles Unified School District, Division of Adult and Occupational Education, 1990. (ED 322 341)

The Los Angeles Unified School District teamed with area food service companies and hotels to sponsor Working Smart, a National Workplace Literacy Program project, to meet the basic educational needs of employees in these industries, many of whom had limited English proficiency. The program developed student workbooks and videodisc courseware on topics such as problem-solving skills, work attitudes, and safety skills.

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