STRATEGIES

For Teaching
Limited English Proficient Students

CONTENT AREA STRATEGIES

Part II

ARIZONA DEPARTMENT OF EDUCATION

June 1990
ADDITIONAL COPIES AVAILABLE

Additional copies may be ordered through the Arizona Department of Education, Central Distribution Services, 1535 W Jefferson, Phoenix, AZ 85007. The cost of printing plus postage and handling will be charged. Please note that out-of-state purchase orders will not be accepted. For current ordering information, call (602) 542-3088.

Unless identified as having been adapted, the related articles included in this packet have been reproduced exactly as received from the persons or organizations originating them. Points of view or opinions stated do not necessarily represent official Arizona Department of Education position or policy.

The Arizona Department of Education is an equal opportunity employer and educational agency and affirms that it does not discriminate on the basis of race, color, national origin, age, sex, or handicapping condition.

The development of these materials was supported in whole or in part by the U.S. Department of Education under a Title IV Civil Rights Act Grant; however, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education, and no official endorsement should be inferred.
# TABLE OF CONTENTS

Introduction .................................................................................................................................1

Arizona Department of Education—Bilingual Unit Handouts

Content-based ESL .................................................................................................................3
Characteristics of Content-based ESL Classes .................................................................7
How to Make Content More Comprehensible .................................................................8
Other Suggestions for Content-based ESL .................................................................9
Working With LEP Learners in the Content Classroom
Pamela Sharpe ..................................................................................................................16

Related Articles

Helping the ESL Student in Your Class
TESOL-Secondary Interest Section ......................................................................................22

ESL Hints for Content Area Teachers
Intercultural Development Research Association ............................................................24

"Teaching" English Through Content-area Activities
Sarah Hudelson ................................................................................................................26

ESL Through Content-Area Instruction
Tarey Reilly ......................................................................................................................38

Guidelines for Implementing a Content-based English Language Development Program
Anna Uhl Chamor ..............................................................................................................43

Adapting Materials for Content-based Language Instruction
Deborah Short .....................................................................................................................46

Helping Language Minority Students
Else V. Hamayan and Ron Perlman .................................................................................59

The Educational Background of Limited English Proficient Students: Implications for the Arithmetic Classroom
Walter G. Secada ..............................................................................................................73
The New Science Framework and Implications
Alice A. Addison .................................................................91

Meeting the Demands of the Real World: Literacy Based Content Instruction
Karen M. Feathers and Frederick R. Smith.......................................................... 95

Content Reading Specialists Evaluate Teaching Practices
Thomas C. Gee and Steven J. Rakow .............................................................102

ESL Reading "Strategies": When Can I Find the Time?
Dennis Terdy .........................................................................................107

Resources ..............................................................................................110
INTRODUCTION

This packet was developed by the Bilingual Unit of the Arizona Department of Education. The purpose of the packet is to provide information and assistance to educators involved in the teaching of Limited English Proficient students. Material included in the packet is appropriate background reading for ESL teachers, bilingual teachers, regular classroom teachers, administrators and support personnel. An ESL curriculum guide is not included in the packet since ESL students follow the same Essential Skills required for all students in Arizona.

The first packet in this series, "Strategies for Teaching Limited English Proficient Students, Part I: General ESL Strategies," contains handouts and articles related to the teaching of English as a Second Language and the development of English oral and literacy skills. This packet, "Part II: Content Area Strategies," addresses the teaching of English through subject matter classes. A majority of the articles are appropriate for grades four through twelve.

Permission is given to the recipients of the packet to reproduce the Arizona Department of Education-Bilingual Unit handouts for educational purposes with a citation reading, "From ‘Strategies for Teaching Limited English Proficient Students, Part II: Content Area Strategies’ Arizona Department of Education Bilingual Unit, March, 1991." In reproducing a related article, the citation of the original source of the article must appear on the copy as it does in this packet.

Special acknowledgement is given to Connie Beyer, former staff member of the Bilingual Unit, for her original work on the development of the handouts in this packet and for her collection of some of the articles included within.
Historically, ESL students have experienced minimal success in the content areas. Beginning English speakers are often denied access to content instruction until they reach a certain level of oral fluency. Then as soon as they begin to sound somewhat fluent, they are immersed in regular classroom content instruction, receiving little or no additional support. In both situations they are thrust into a "no-win" position.

Content-based ESL is designed to alleviate the problems caused by this approach. Advocates of content-based ESL recognize that ESL students must receive appropriate content education while they are acquiring English if they are to achieve academic equity with other students. Failure to "keep up" academically has resulted in disproportionate numbers of ESL students being remediated or retained. They also experience a high dropout rate.

Since it is generally believed to take two to three years to learn to speak a second language, but five to seven years to achieve proficiency in the abstract and academic language associated with content instruction, the most appropriate type of content instruction would be native language instruction. Since that is not always available, however, an approach must be implemented which affords an opportunity for ESL students to learn content while they are acquiring English. Content-based ESL provides a dual curriculum; the focus is on acquiring content knowledge with language development also comprising a major component. The subject matter and objectives are basically the same as those for all other students but the delivery system is modified. Current ESL methodology is used to ensure the comprehensibility of content for all students, regardless of language level.

Content-based ESL is also an extremely effective approach for acquiring English. It provides the optimal conditions for students to acquire language. Language is best acquired when students are using it to learn something other than language. ESL students acquire English when they use it to negotiate meaning with their peers and their teachers in a meaningful and relevant context. Content-based ESL encourages the integration of listening, speaking, reading and writing skills and requires the use of higher order thinking skills. It provides the perfect opportunity for maximizing cognitive and linguistic growth.

Teachers of content-based ESL differ from regular content teachers in several important ways.
1. **Planning:**

Content-based ESL teachers must plan their lessons very carefully. They have to be dually aware of the extent of the subject matter they need or wish to teach and the language abilities of their students. Based on these factors, they make creative and discriminating choices of what to teach and how they will teach it. Students also have input as to the topics to be studied. Once the teacher and students decide upon the topics that they will be studying, content-based ESL teachers determine the main concepts within each topic and the subconcepts needed to understand those concepts. From a language viewpoint, they investigate the vocabulary and academic phraseology that the students will be encountering and determine which ones may present difficulties to second language students. They then make a determination of which techniques, materials, and strategies they will need to use to make the subject more comprehensible to their ESL students and the methods they will use to evaluate them. Initial planning of content can be time-consuming but the task gradually decreases as teachers become adept at employing the various alternatives available to them. Planning and appropriate choice-making are absolutely essential to the success of content-based ESL.

2. **Modified use of instructional language:**

Content-based ESL teachers often must adapt the language that they use for instructional purposes. They may need to simplify concepts or speak a little more slowly. They will need to use context-embedded language, to paraphrase new ideas and vocabulary, and expand on basic concepts in various ways. They will gradually expose their students to more abstract textbook language as the students are ready. Content-based ESL teachers thoroughly plan their lessons so they may present information in a well-organized manner, staying on the topic so as not to confuse second language students. "Lecture time" will be much shorter; teacher-student discussions will be more in evidence. Content-based ESL teachers ask appropriate questions—based on the ability of the students—recall, one-word answer questions for very beginning ESL students but moving to process questions requiring higher order thinking skills as quickly as possible. They also allow more time for students to answer questions since ESL students often need a longer "processing time."

3. **Types of materials and activities used:**

Content-based ESL teachers have an abundance of concrete objects, models, films, pictures, graphs and other visuals available to make the subject matter more comprehensible for their ESL students. They frequently use demonstrations and body language to get their point across.
Students are actively engaged in experiencing and doing rather than just listening to the teacher: hands-on activities and experiments are a mainstay. Appropriate guests are invited and, related literature, magazines, and newspapers are utilized.

Textbooks are used very discriminately by content-based ESL teachers. They may decide to use the text only as a guide or a resource instead of the reading focus or they may choose to use it as a summary for new concepts, not an introduction of those concepts. Content-based ESL teachers may choose to teach only parts of a chapter or leave out entire chapters. Depending on how important teachers rate a certain chapter, they may decide to spend weeks on a chapter that non-ESL students would spend days on or vice versa. They may decide that some students will read some parts of a chapter and some will read other parts.

In a content-based ESL class, writing is also seen from a different perspective. The focus is on authentic, meaningful communication instead of just answering the questions at the end of the chapter. Students keep content journals, lab notebooks, or logs. They correspond with people who have a connection to the area of study; they create their own newspapers, perhaps writing articles related to the content.

4. **Use of strategies:**

In addition to strategies involving the use, of instructional language, type of materials, and class participation previously mentioned, content-based ESL teachers use other strategies that have been proven effective for learning in general and ESL students in particular. Peer interaction, or cooperative learning, is a highly successful strategy for learning content, especially when then groupings are heterogeneous. Working in small groups or dyads, students have the opportunity of using other students as sources for information and as language models.

Another important strategy that effective ESL teachers employ is physically demonstrating the skills that they want their students to use. They do not just tell their students to take notes; they show them how. They show them how to find the main ideas in a text, how to use reference books and maps and how to outline. They do not assume that their students already know what to do nor that they will totally grasp new skills by being "told" what to do. They give students ample time to practice new skills and information in various ways and provide specific feedback as soon as possible.

Content-based ESL teachers not only review previously learned material frequently but they also preview or overview all new material. They brainstorm with students to find out what they know about a new subject and
what they would like to know. They encourage students to become more personally involved with the subject. What do they think might happen next? How do they think the people felt about what happened? How would they feel if they were in the same situation?

Perhaps the single most important strategy that effective content teachers employ is connecting new material to the prior knowledge of the students. For students to truly learn something they must somehow relate it to their own lives. All new learning occurs when new information is connected to something the student already knows. Even the readability of the text or other literature is not determined as much by reading skill but by what the student already knows about the subject. Since ESL students have different background experiences, they do not always have the same prior knowledge as majority culture students. They often do not have the "culturally coded" words and experiences needed as a foundation for new knowledge. Understanding the American Revolution, for example, may be difficult if a student has not grown up in the United States. Teaching the concept, of the American Revolution becomes much easier for the ESL student, however, when the teacher can relate it to Mexico's fight for independence for Mexican students or the French revolution for French students. If students do not have any prior knowledge of the new subject, the teacher must provide the background knowledge needed before presenting the new material. Research has shown that the more discussion and relevant activities that take place before new information is taught, the better all students learn.

5. Importance of atmosphere:

Studies show that students acquire a second language best in a nonthreatening, stress-free and comfortable environment. Since language development is a goal in content-based ESL situations, that atmosphere must be present. This type of effective environment calls for a more informal, personal teaching style. Competition is discouraged and mistakes are allowed. Students are accepted exactly as they are culturally, linguistically, and individually and emphasis is placed on building on the strengths of the students, not on their supposed deficiencies.

Arizona Department of Education
Bilingual Unit
CHARACTERISTICS OF CONTENT-BASED ESL CLASSES

Content-based ESL classes differ from regular content classes in several important ways. There are specific affective and academic factors present which ensure maximum opportunity for ESL students to learn content while they are acquiring language.

Affective Factors:
1. Teacher as facilitator and collaborator
2. More informal, nonthreatening environment
3. High expectations
4. Concern with students as individuals
5. Success-oriented curriculum built on students’ strengths
6. Self-esteem of each student very important
7. Enrichment not remediation
8. Cooperative spirit
9. Relevant, meaningful, interesting, practical, curriculum
10. Use of nontraditional approaches, strategies, techniques
11. Reciprocal interaction between teacher and students and among peers

Academic Factors:
1. Language/content integrated (dual curriculum)
2. Focus on subject matter
3. Comprehensibility is top priority
4. Hands-on, activity-based curriculum
5. New information related to prior knowledge/personal experiences
6. Background information provided when needed.
7. Content modified—not "watered down"
8. Concentration on understanding the main concepts
9. Key vocabulary identified/taught in context
10. More emphasis on oral communication by teacher and student
11. Language simplified when necessary
12. Slower pacing when necessary
13. Frequent checking for comprehension
14. Modeling of what is expected
15. Use of higher-order thinking skills (problem solving)
16. Frequent use of small, heterogeneous groups
17. Evaluation based on content, not English ability

Arizona Department of Education
Bilingual Unit
HOW TO MAKE CONTENT MORE COMPREHENSIBLE

ESL students can only learn content if it is comprehensible. It is the responsibility of content-based ESL teachers to take the abstract and academic language of content subjects and make it relevant and accessible to ESL students. The following are suggestions for making content comprehensible for ESL students:

1. Graphs line, bar, picto-, pie
2. Charts-flow, category
3. Webbing
4. Diagrams
5. Time line
6. Mapping—sequence
7. Pictures, photographs, slides
8. Newspaper, magazines
9. Filmstrips, films (with/without sound)
10. Symbols (arrows, mileage)
11. Realia/concrete objects
12. Demonstrations
13. Hands-on activities/labs/experiments
14. Field trips
15. Color-coding
16. Illustrations
17. Maps-colorized, 3D, pictures
18. Overheads
19. Drama, pantomime
20. Music, art
21. Illustrated vocabulary charts
22. Posters
23. Body language/gestures
24. Lists
25. Guests
26. Supplementary materials from lower grades, if appropriate
27. Related literature
28. Games
29. Props, costumes
30. Clustering/categorizing
31. Models/mock-ups
32. Compare to something else
33. Step-by-step directions
34. Make connections
35. Paraphrase/synonyms
36. Give examples
37. Describe, explain, define
38. Glossaries, with simple definitions
39. Relate to prior knowledge

Arizona Department of Education
Bilingual Unit
OTHER SUGGESTIONS FOR CONTENT-BASED ESL

**MATH**

1. Teach specialized math vocabulary in context. Point out vocabulary that may have a different meaning in a non-math context, e.g., value, table, mean.

2. Connect new learning to previous learning.

3. Use a variety of manipulatives, symbols, graphs and illustrations to teach new concepts.

4. Give several concrete examples of a new concept, not just one. Move from the concrete to the abstract.

5. Use overheads to demonstrate math problems as you "talk through" the process. Provide step-by-step instruction.

6. Allow students to work with partners or small groups to discuss problems.

7. Point out the various ways that the same process might be requested, e.g., subtract, minus, take away, decreased by, less than, difference.

8. Pay particular attention to story problems because of the language factors:
   a. Have students identify the question being asked by underlining it or drawing a circle around it.
   b. Ask students to change the question into a statement, inserting a blank where the answer would be. For example, "How many children went to the zoo?" would be changed to: children went to the zoo.
   c. Have students illustrate the problem or use manipulatives to visualize what the problem "looks like" before trying to answer it.
   d. Make up appropriate story problems using real-life situations and materials, such as newspaper ads or store catalogs.
   e. Encourage students to make up their own story problems.
9. Give lots of in-class practice providing immediate feedback. Do not give new material for homework unless you are sure they understand it.

10. Use assignments for evaluation purposes. Do not just mark an answer as incorrect. Ask students to explain the process they used to arrive at their answers. Use this information to diagnose any misconceptions and to plan further assistance.
SOCIAL STUDIES

1. Brainstorm with the students to see what they already know about the subject. List what they would like to know as well.

2. Teach content-related vocabulary and academic phraseology in context. Point out the "social studies" meaning of multiple meaning words, e.g., change, power, office.

3. Allow students to listen to a teacher-made tape about the topic. Working in pairs and stopping and starting the tape as needed, have students discuss and list the most important points. Have dyads compare and discuss their lists.

4. Do a similar activity using short sections from the textbook.

5. Tell students that the most important information in a paragraph is usually found in the first and last sentences. Have students work in pairs copying the first and last sentence of each paragraph in a section and see if this is valid. Discuss why/why not.

6. To acquaint students with textbook language, you may want to try a technique called "reciprocal questioning." Show a paragraph from a chapter on an overhead. Read the first sentence to the students. Tell the students that they are to ask you a question that relates to that sentence. The question can refer to the vocabulary used or facts that are presented. The teacher then asks the students questions about the sentence. This continues as long as either can think of a question to ask. Then the teacher reads the next sentence and the process is repeated. As students advance, they can take on the teacher’s role.

7. Preview or overview all new material. Encourage as much discussion as possible before a new topic is begun. Connect all new learning to previous learnings.

8. Be open to nontraditional methods of giving reports or test answers, such as illustrating events, making models or dioramas, oral presentations, role-playing, or debates.

9. Help students become more personally involved in content by asking them how they would feel if they were involved in this event or what they might have done in those circumstances. Ask them to predict what might happen next and discuss their predictions.
10. Whenever possible, integrate relevant reading and writing activities with the content being taught:


12. Allow students to take part in the 'evaluation process by encouraging small groups to develop their own questions and answers for another group to answer.
SCIENCE

1. Use a process-oriented, problem-solving inquiry approach. Whenever possible, allow students to investigate and come up with their own answers. Ask students to observe, discover, keep logs, predict, describe and compare.

2. Demonstrate semantic mapping/webbing to help students visually organize information. The web may begin at the start of a unit when students brainstorm everything they already know about a given topic. It may be reorganized, added to, and deleted from throughout the study of the topic. Draw a circle in the middle of the paper. Write the topic or main idea in large letters in the center of the circle. Draw lines out from the circle. Ask students to tell you all the subtopics related to the main topic and write them on the lines. Draw lines off the longer lines to represent details of the subtopics. Teach students how to use this strategy on their own or in small groups. See Figures 1 and 2.

FIGURE 1
3. Emphasize a hands-on, experiential lab-based methodology. ESL students acquire vocabulary and concepts more efficiently when they are actively involved.

4. Teach specialized science vocabulary in context. Point out science words which have different meanings in other contexts, e.g., gas, cell, model.

5. Demonstrate all experiments before asking students to perform them. "Talk through" each step. Also, write down each step in simple language on a large chart.

6. Have students relate in their own words, orally or in writing, any new concepts which they have learned. Give immediate feedback to any misconceptions.

7. Have students write the directions they have received in their own words. Ask students to picture in their heads what they will be doing at each step. Ask them to explain to you exactly what they will be doing before they do it.
8. Have students make their own subject-related dictionaries—writing the new vocabulary in their native language, defining them in their own words in English and illustrating them, if possible.

9. Help students relate new concepts and ideas to their own lives. How does gravity affect them personally? Why do they need to know the boiling point of water?

10. Allow students to collaborate with their peers, whenever possible. Heterogeneous, small groups or dyads help the process of acquisition of language and concepts.
WORKING WITH LEP LEARNERS IN THE CONTENT CLASSROOM

Dr. Pamela Sharpe
Northern Arizona University-Puma

The list of suggestions below was compiled from a random sample of articles, guidelines, teacher in-service materials, and classroom observations of successful teachers of LEP students.

FIFTEEN STRATEGIES AND ONE SECRET

1. **SPEAK SLOWLY.**

   *This does not mean* that you should pause between every word.

   *It does mean* that you can help LEP students by pausing longer where you would normally pause in speaking. For example, where you would usually take a breath or insert a comma or period.

2. **REPEAT OFTEN.**

   *This does not mean* that you should say the same sentence three times.

   *It does mean* that you can help LEP students by saying important sentences in several different ways. A good strategy is to say an important sentence, then say it again in a different way, and finally, repeat the original sentence. It is also a good idea to teach LEP students some signal words that will alert them that you are ready to use this strategy. For example, "In other words" or "That is."

3. **USE SIMPLE LANGUAGE.**

   *This does not mean* that you should speak baby talk or imitate the simple but ungrammatical language that LEP students are beginning to use.

   *It does mean* that you can help LEP students by breaking down long, complex sentences, into short, simple sentences. And, as soon as it is possible, you can use the same strategy that was described in number 2 above to put them back together again.
4. **USE EASY WORDS.**

This does not mean that you should rely on grade level word lists. A first grade word is not necessarily easier for an LEP student than a eighth grade word.

It does mean that you can help LEP students by using basic words and cognates. Basic words have broad meanings. For example, “cut” which can be used instead of the more specific words, slice, chop, saw, peel, slit, slash, etc. Cognates are similar in both form and meaning across languages, such as visit and visitor.

5. **USE GESTURES AND PANTOMIME.**

This does not mean that you should try to act out everything that you say.

It does mean that you can help LEP students by synchronizing selected gestures with the words that carry the same meaning. A gesture that is not timed well can be confusing instead of useful.

6. **USE PICTURES AND OTHER VISUALS.**

This does not mean that all visuals and pictures are equally supportive of comprehension.

It does mean that you can help LEP learners with single vocabulary items by selecting visuals that are not cluttered. It also means that you can help them by synchronizing your hand movements with your words as you focus on different parts of a more complex visual.

7. **USE REALIA.**

This does not mean that you should use realia as decoration.

It does mean that you can help LEP students by encouraging them to manipulate real objects while they are using language. Math and science offer a variety of opportunities for using manipulatives. You can help LEP learners explore concepts by collecting realia and developing activities that include it.
8. **GIVE CLEAR DIRECTIONS.**

*This does not mean* that you should speak more loudly.

*It does mean* that you can help your LEP students understand directions by providing them in both oral and written form. The written form offers a unique opportunity to model a mini composition, using appropriate transition words, such as first, then, and last. If directions are written down, LEP students can read them more than once, and show them to others who may also be helping them. Do watch the volume. Although it is natural to speak more loudly when the other person appears not to have understood, to LEP students it can seem that you are speaking to your other students and yelling at them.

9. **TEACH SELECTIVELY.**

*This does not mean* that you should teach less than you feel is appropriate.

*It does mean* that you can help LEP students by being clear about what you feel is important for them to know. We don't teach or expect any student to learn everything that is in the textbook. It also means that you can help by avoiding the tendency to digress without identifying it as a digression in a second language, it is even more difficult than it is in a first language to identify topic and separate the important points from the peripheral.

10. **INCLUDE FREQUENT CHECKS FOR COMPREHENSION.**

*This does not mean* that you should test students more frequently.

*It does mean* that dialogue between you and your LEP students can alert you to confusion while it is occurring, and while it is relatively easy to clarify. A comprehension check can be as simple as asking, "And where did the water go in this experiment?" It also means that it is not helpful to ask, "Does everyone understand?" The question is too vague, and some LEP students will tell you that they understand even when they don't. Why? Because they are reluctant to imply that you didn't teach them the first time.
11. **GIVE ALTERNATIVE ASSIGNMENTS.**

   *This does not mean* that you should give LEP students easier assignments.

   *It does mean* that you can help LEP students by giving them options for different assignments. If the teacher speaks the student's first language it is helpful if students are allowed to respond in that language. An oral report instead of a written report or a composition that in the first language can not only fulfill requirements but also indicate the level of content comprehension more accurately.

12. **PROVIDE SUPPLEMENTARY MATERIALS.**

   *This does not mean* more worksheets and exercises for LEP students.

   *It does mean* that background information in the first language can support LEP students. Some examples of background information materials are visuals labeled in the first language and first language books with information about the unit or topic being presented.

13. **WORK IN GROUPS.**

   *This does not mean* that LEP students should be encouraged to become passive group members.

   *It does mean* than in cooperative learning, every Job should be important and necessary, and sometimes the LEP student should have an opportunity to be more than an observer.

14. **ASSIGN A PEER TUTOR.**

   *This does not mean* that the peer tutor for the LEP student should take responsibility.

   *It does mean* that the tutor should show the LEP student how to do things for himself or herself. It also means that several different tutors or buddies are preferable to one, and that the relationship usually has best results when it is purely voluntary on the part of both participants.
15. **DESIGN ALTERNATIVE TESTS.**

This does not mean that you should expect less of your LEP students and provide an easy version of your tests.

It does mean that second language learners need more time to process and produce their second language, and therefore need more time to complete a test in a second language. It also means that an LEP student may know the answer to a question but may not have enough English to prove that he or she knows. Test questions in the first language, drawings, charts, numbers, gestures are all alternatives to written exams prior to adequate language acquisition.

..AND THEN, BE WILLING TO LOVE THEM.

January 1990
Reprinted with permission of author.
HELPING THE ESL STUDENT IN YOUR CLASS

What the Teacher Can Do Before Class:

- Identify main concepts and essential supporting details for the student. If possible, put these in outline form. (This may already exist in the form of a study guide.)

- Identify essential vocabulary. Give students a list of key, recurring terms that introduce and summarize information, as well as content vocabulary. Be sure to indicate instructional phrases that you may use, such as "try this."

- Try to let the student know the assignment pages and vocabulary ahead of time. It's easier for him or her to understand something that s/he is familiar with.

- Use visuals and demonstrations whenever possible.

- Give multiple messages. Write key words on the board as you talk.
  
  Note: Some ESL students cannot yet read cursive writing, but can read if you print. Use as many non-verbal strategies to reinforce as you can. (For example, use charts, graphs, or symbols.)

- Identify essential vocabulary in basic terms at least twice.

- Assign some projects that require less English, such as graphs, maps, and pictures.

What the Teacher Can Do to Evaluate the LEP Student:

- Observe performance on projects.

- Let students demonstrate knowledge of concepts through charts, graphs, or even pointing.

- Try to evaluate the specific skill taught. Try not to test language in content area courses. For example, in geography class, let them point to items. In math, initially stress computational skills.

- On fill-in-the blank tests, put the words at the top; in matching, don't put in extra words. When you do this, you're asking for several things at once. It's difficult for the student to do several things at the same time in a foreign language.
• Eliminate sections of the test which may be difficult strictly because of the language used. For example, try to eliminate essay questions where lack of comprehension of one word can change the entire meaning.

• Try to use examples already given during class.

• Allow for pass-fail options when permitted.

• Give additional time for slow readers. Many LEP students can successfully complete tests if they have some extra time in which to read the test.

• Allow students to use foreign-language dictionaries if it makes them more comfortable.

Adapted from
TESOL-Secondary Interest Section Bulletin
Fall 1983
ESL HINTS FOR CONTENT AREA TEACHERS

1. Explain special vocabulary terms in words known to the students.
2. Provide pictures to illustrate new words and terms.
3. Use pictures, tables, maps, diagrams, globes, and other visual aids to assist in comparison and contrast for comprehension of concepts.
4. Present clear illustrations and concrete examples to assist the students in understanding complex concepts and skills.
5. Prepare difficult passages from textbooks on tape for listening activities.
6. Maintain a library of supplementary books and workbooks written in simple English which offer additional illustrations for problems.
7. Highlight written materials for readability by enlarging the size of print, by organizing chapters meaningfully, and by writing headings that show introductions or transition from one idea to another.
8. Provide biographies of significant men and women from different cultures.
9. Develop interests and arouse curiosity through hands-on experiences, the out-of-doors, pictures, newspaper clippings, and periodicals.
10. Use outline maps for students to practice writing in the details and labels.
11. Support reading instruction by providing films, records, filmstrips, and other materials which may be used independently or in small groups.
12. Tape record problems for independent listening assignments.
13. Offer a variety of reference materials at the students' instructional level for independent use.
14. Collect many of the comic books available that portray historic and cultural events in simplified language.
15. Encourage the use of diagrams and drawings as aids to identify concepts and seeing relationships.
16. Keep a variety of number games to be played by pairs of students or small groups.

17. Show the same information through a variety of different charts and visuals.

18. Write instructions and problems using short and less complex sentences.

19. Use student pairs for team learning, especially for reports, experiments, and projects.

20. Limit the number of problems that must be worked.


22. Limit the number of variables in laboratory experiments.

23. Ask numerous questions which require higher level thinking responses.

24. Use language experience techniques in discussing concepts and ideas.

25. Assign short homework tasks that require reading.

26. Have students prepare collections of science objects, such as sticks and leaves.

27. Have students prepare individual card files of science, mathematics, and social studies vocabulary.

28. Have students compile notebooks of their hypotheses, materials, procedures, data, conclusions of experiments, and field experiences.

29. Have students use a time line to arrange and sequence important facts.

30. Have students underline key words or important facts.

Adapted from

**Integrating the ESL Student into the Content Area Classroom**

Intercultural Development Research Association (1988)

Reprinted with permission.
If we were to visit any number of elementary and secondary school classrooms, probably the dominant way students would be asked to learn would be through using textbooks. Students would be asked to open their books, to read out loud or silently, to answer oral or written questions, and perhaps later, to be tested on the content. While significant numbers of educators would question this practice for any student, this way of approaching content and texts is particularly inappropriate for students whose native language is not English.

However, ESL students are in the classrooms, and the expectation is that they should receive the school's curricula in the content areas. So what are teachers to do? One way of addressing this problem is to use content-area material as a vehicle for language development (Cantoni-Harvey 1987; Chamot and O'Malley 1987; Terdy 1987). The specific approach proposed here involves examining the content-area objectives that school districts and/or state departments of education create, and then beginning the teaching of content there, rather than with the textbook. But looking at content-area objectives themselves is not enough. What is necessary is the combining of content-area goals with some specific principles of learning in general, and language learning in particular, in order to move from the objectives to sets of activities that will provide meaningful learning experiences for students still developing as English users. The following principles, based on personal interpretations of some recent literature on first- and second-language development, may be used as a starting point for developing learning activities from content-area objectives.

**Principles**

1. Students learn both content and language by being active, by doing things, by participating in activities directly related to specific content, and by using both oral and written language to carry out these activities. Language develops holistically, not in parts. Language develops through use, not through isolated practice (Lindfors 1987). This is true in both a native and a second language.
2. Students learn both content and language by interacting with others as they carry out activities. These "others" may be both other students (peers) and adults who provide input and authentic reasons to communicate (Enright and McCloskey 1985; Krashen 1982; Lindfors 1987; WK 1980). This is true in both a native and a second language.

3. All of the language processes are interrelated, and students become more able language users when they make use of all the processes in classroom activities when they are asked to use both oral and written language for varied purposes, and when they see the connections between experiences and oral and written language (Allen 1986; Goodman 1987; Hudelson 1984; Rigg and Enright 1986). This is true in both a native and a second language.

4. Students learn to read by interacting with whole, authentic texts (by reading), and they learn to write by creating whole, authentic texts (by writing), by having others react to what they have created, by revising their pieces, and by using their reading knowledge to help them write like readers. The acquisition of written language is a holistic process, as is the acquisition of oral language. Literacy is acquired through use, not through practice of isolated skills (Goodman 1987; Harste, Woodward, and Burke 1984; Smith 1982). This is true in both a native and a second language.

5. Reading comprehension is facilitated by having prior knowledge of the topic of the text (Bainitz 1985; Rigg 1986). Background knowledge may be activated or developed through classroom activities that involve all of the language processes, including reading from a variety of sources other than the textbook. This is true in both a native and a second language.

**Applications: Instead of the Text**

Beginning with those principles, the rest of this chapter will illustrate ways that they may be applied to specific content objectives in the development of classroom activities. The objectives used have been developed by Dade County Public Schools, Florida, in the areas of math, science, health, and social studies.

**Objective: Children will, understand family roles and division of labor within the family.** This is a primary-level social studies objective. In the Florida state-adopted social studies texts, children would be expected to read an informational selection, accompanied by pictures that would talk about the jobs various members of the family are responsible for. They
would also read a short piece about a mother going back to work outside the home, and the children feeling that the mother doesn't have time for them anymore. Our concern is the provision of activities for ESL children that will enable them to meet the content-area objective while using English to do so, but in ways that are more sensible than simply being exposed to the text material. What kinds of activities might be organized?

An initial activity might be a chart to fill out that would involve the children answering such questions as: In your family, who cooks the food? In your family, who washes the clothes? In your family, who cleans the furniture? In your family, who buys the groceries? The students would be divided into small groups. Each child would first fill out the chart individually, after which the groups would meet to compare their answers and come up with a group summary of responses to each question. Putting the students into groups means that they can help each other with reading and answering the questions. The group chart assignment will also mean that the children will have to talk to each other about what they have done individually. After the groups have had a chance to share and organize their data, the class would come back together and complete a whole class chart.

The whole-class charting activity might be followed by a learning log activity. In a learning log, children use writing as a way of reflecting on content they have studied. In this case, children would respond in their learning logs to the following questions: What did you learn about your own family from doing this activity? What did you learn about the families of others in this class?

In addition to these activities, several books or stories that reflect the theme of family interdependence would be shared with the children during storytime and made available for the children to read on their own. Some examples of such titles are: *The Little Red Hen*, Aesop’s *The Grasshopper and the Ants*, *Cinderella*, and Lois Lenski’s *Family Small*. The stories would also provide an opportunity for groups of children to create a skit or play to share with others. Another activity based on the content and concepts would involve dividing the children into groups, giving them two or three different family situations, and asking the groups to take the roles of family members and act out what the family would do in each situation.

All of these activities, spread out over several days or weeks, would give the children the opportunity to use English in both oral and written forms, in varied ways, as they came to understand the concept of family roles.
Applications: Making the Text Readable

The activities used demonstrate clearly that it is not necessary or even advisable to be limited to the textbook in terms of content teaching and ESL learners. Content objectives may be achieved by using a variety of materials and activities. But if teachers either choose or feel compelled to use the textbook, a variety of activities could be undertaken to provide the children with necessary background experiences and language that should make their reading of the text successful. When the children do see the text, it is critical to begin their reading with a pre-reading activity, that asks student to list what they already know about the topic, in this case, what they already know about family roles. An alternative would be to construct a semantic map or web of what the children already know about family roles. After what they already know has been listed or mapped, children would read the selection and then compare what they listed to what was actually in the selection. After reading it is logical to ask, "What else did you learn about family roles from what you just read?" This means that the variety of activities just detailed here may be used as alternatives to the text, or they may be used as background builders to the text. In either case, it is important for the students to spend time working together with a content focus, including reading and writing for various purposes.

Applications: Mathematics Example

Let's look at another objective, this time from mathematics. An intermediate and junior high math objective in Dade County is the following: Students will determine probability, meaning equally likely or not equally likely events. For many learners, the concept of probability might be most understandable if it were considered initially in a nonmathematical way by dealing with the idea of chance in people's daily lives. Chance refers to the idea that something might or might not occur. It could happen, but maybe it won't. Here, for example, are some questions that students might be put into groups to answer: "Who will win the city championship in football (or any sport) this year? Will all the members, of our class be in school tomorrow? How many members of our class will have perfect math papers this week? Will you see a Toyota car on your way home from school this afternoon?" Students would consider these questions and come up with answers (their best guesses). After students have reported what their groups decided, the teacher could conclude that all of these were chance events, giving students the specific vocabulary for the concept that they have been investigating.
Having demonstrated the concept of chance, students could then begin to consider the concept of probability. In groups once again, students could deal with statements such as: "Which is more likely or more probable, that one of the students or that the teacher will be absent from school tomorrow? Which is more likely, that you will have pizza for breakfast or that you will have pizza for lunch? Which is more likely, that you will go swimming in the summer or in the winter?"

Students might also work in groups to come up with answers to such statements as: "Is it more likely than not that you can find the sum of 324 and 465? In Phoenix, Arizona, in July, is it more likely than not that the sun will be shining at noon?" Then groups could respond to similar statements by categorizing them as certain/uncertain/impossible. Sample statements: "I will use my brain sometime this week. My dog can write his name in Spanish. All new cars will use water instead of gasoline for fuel. We will see the sun tomorrow. I will sleep eight hours on Tuesday night. I will not sleep at all this week." Activities such as these will give students the opportunity to experiment with chance and probability in their own lives, to use their collective experiences and language abilities to consider the statement, and to develop an experiential understanding of probability to which the term probability may then be affixed by the teacher. First the concept, then the label.

Following these nonmathematical activities, the mathematical side of probability should be developed. In groups once more, students would solve a variety of probability problems by carrying out sets of written directions that would ask them to do such things as: Toss a coin into the air a certain number of times (twenty, for example) and record whether it lands heads or tails; toss a die a certain number of times and note whether the number of dots on the top face is even or odd; toss a die a certain number of times and note what numbers come up. Small-group charts would be shared with the rest of the class and used to construct entire class charts.

As the learners solve these kinds of problems and struggle with answers to some of the questions, the learning logs would be a logical vehicle to use for enabling learners to consider what they were learning about probability.

For teachers interested in extending the ideas of chance and probability into other contexts and written material, an amusing book like Remy Charlip's Fortunately, Unfortunately could be used, both for a light change of pace and as a possible model for student creation of chance and probability stories. In this book a series of chance occurrences, one after the other, keeps the main character going from something good happening to something bad happening. Students could
create their own fortunately/unfortunately; good luck/bad luck sequences which would utilize various chance happenings. All of these activities would serve as background and language builders that should ensure greater success with the probability problems in the mathematics textbooks.

**Applications: Science/Health Example**

Another way to approach the task of combining language and content is to group together a set of related objectives, such as the following set of intermediate science/health objectives: *Children will define the basic food groups, will recognize and understand cultural differences in foods eaten, will define what is needed to stay healthy, will evaluate specific foods and diets in terms of how healthy they are.* What kinds of activities could be organized to help students achieve these objectives?

As an initial activity, children could be asked to keep a record or log of all the food that they eat over a certain period of time (for one or two days). These logs would be kept individually and then brought to school. In school students in groups would share their logs with the goal of determining which foods they all have eaten and which foods they have eaten are unique to them or to their ethnic or cultural group. After small groups have listed the foods eaten, a class list would be developed. Then small groups would work again to put the foods eaten into categories. How would the students categorize the foods they eat? Which foods would they put together, and why? After the groups have reached consensus about food groups (an activity that requires children to use language informatively and persuasively with each other), they might consult their textbooks or other, written sources, including informational books, food group posters, etc., to compare their categories to those of nutritionists.

Another activity would involve children in using information about food groups to create their own menus. Using newspaper ads, students would be asked to come up with menus for certain meals. They could put together both menus reflecting what they would eat if they had a choice and menus reflecting well-balanced meals. In many areas ethnic grocery stores advertise their food specials in city and neighborhood newspapers and flyers, so advertising could be chosen that reflects cultural differences in what people eat. Mathematics could be added to the activity if students received a certain amount of money with which they would need to buy groceries for a certain number of meals for a certain number of people. A requirement could be that the meals are well-balanced in terms of representing the basic food groups. Again the text or other written material on the food groups, as well as newspaper advertisements, could be consulted to
determine what foods could be used to represent certain groups and how many servings of which were recommended each day.

Still another way to examine foods would be a study of the nutritional elements in certain kinds of packaged foods, such as breakfast cereals. Students could be asked to bring in cereal boxes and then to compare the nutritional elements of their favorite cereals. As an extension, groups of students could create their own breakfast cereals, including name, package design, ingredients, and nutritional elements of the cereal that they created. In addition to the box and nutritional elements, students could create an advertisement for the cereal they had created, and they could try to sell their cereals to the others in the class. The advertising activity also demonstrates that an intermediate social studies/economics objective—understanding advertising as a way of persuading—could be incorporated into the teacher's plans. The students could pitch their cereal and others could vote on which cereal they would most like to eat.

It should be obvious by now that students have used talking, reading, and writing for a variety of purposes. From the point of view of reading, a wide variety of informational reading materials has been utilized. Additionally, reading material such as cookbooks created for children could be used by the students as they consider menus they would like to create. Fun books, such as Strega Nona by Tomie de Paola could be shared. Strega Nona is the tale of a witch and her magical pasta pot, a pot that runs out of control when Strega Nona leaves Big Anthony alone in her house. De Paola's wonderful wordless picture book Pancakes for Breakfast could be used by children to create their own written stories to share with others. Informational books such as those on vitamins and junk foods could be used by the children as sources of information about nutritional elements.

From the point of view of writing, children could create their own recipe books or bring in favorite recipes from home. Cooking could be carried out in the classroom, and taste tests performed to see which ethnic foods students preferred. Learning logs could be utilized as students considered what they had learned about nutrition. And all of these literacy activities necessarily involve students in talking with one another to accomplish various tasks. All of these are examples of the kinds of integrative language activities advocated as crucial to the language and cognitive growth of ESL students.

Applications: Social Studies Example

Let's look now at content-area objectives from one more perspective, that of objectives which sometimes are divided into content objectives and process or skills objectives. Many of these objectives appear, albeit with
some variation at several educational levels. As an example, at both elementary and, secondary school levels, social studies objectives in Dade County deal both with the content of immigration as a factor in the United States history and with such "skills" or process objectives as time line and map construction and interpretation. Both kinds of objectives could be joined together and activities developed that would be of interest and relevance and that would provide for necessary skill development. In terms of ESL, some of the same objectives could be used successfully with different age groups of second-language learners. From the point of view of language development this kind of recycling of objectives would give students more opportunities to use content-focused language. What might change would be not so much the activities or interactive processes, as the sophistication of the students' products and some of the written materials utilized.

Looking at content objectives in the area of immigration, intermediate group objectives state that students will be able to explain that the people of the United States are immigrants linked to the rest of the world through their immigrant heritage, and that students will be able to tell how their own immigrant heritages link them to the rest of the world. (Obviously, this curriculum is not drawn from states like New Mexico or Arizona, both of which have large populations of ESL speakers whose ancestors preceded English speakers by many, many years.) At senior high level, the expectation is that students will be able to describe the role of immigration in the growth of this country, list chronologically and describe the waves of immigration to this country, and describe the contributions of various immigrant groups to the United States. An examination of the "skills" objectives reveals that students at both levels are expected to be able to use maps of various kinds, identify items on maps, and construct and interpret time lines.

In terms of activities that might enable students to meet these objectives, the most logical place to begin the study of immigration is with something that may be in the students' experiences: their own immigration to this country. One of the things that many students know or can find out about is information about their own families. So an initial assignment could be to ask students to find out where their ancestors came from, when they came to this country, why they came here, and any other important facts in their family's history that they would like to share. Students who didn't have the information on a firsthand basis might interview one or more family members in order to come up with what they needed to share. This might mean that the interview would be conducted in a language other than English, but the sharing in class would be in English. After the students had collected information about their families, they would divide
into groups to share what they had learned and to create group charts about group members' ancestry and reasons for coming to this country. Group sharing with the class would result in a whole-class chart that would reflect the heritages of all the class. This should mean that everyone in class would be able to participate, whether their families have been in this country for five years or a hundred years or more.

A *caveat* should be issued here. The purpose of this activity is not to determine who may be here on an undocumented basis. Care must be taken in the use of this activity, so that families do not get the impression that the school is about to turn them in to INS. Also, some refugee students may have suffered such trauma in escaping their native land, perhaps watching members of their families be killed, that they do not feel comfortable with this assignment. The sensitive teacher may decide to explore the possibility of this activity before assigning it.

After a class chart has been developed, maps would be used to locate the countries of the students' ancestors. Countries of origin would be highlighted, as well as routes drawn to the countries. In addition, maps that focus on political changes, economic conditions, and geographic realities as factors in immigration could be used and interpreted.

From the initial activity based at least partially on the students' own experiences, several other projects could be undertaken. The teacher might share the history of his or her family's arrival in this country with the class and demonstrate the use of a time line as one way of visualizing the chronology of one family coming to this country. The teacher's model could prove useful to students as they created their own individual time lines.

Instead of individual projects, students could be asked to investigate a variety of immigrant groups to this country, different sets of students taking different groups. As a part of a report that each set would prepare for the rest of the class, students would construct time lines illustrating their immigrant group's history and contributions made by the group to this country over the years. As they prepare their reports, students will make use of a variety of written sources, books, encyclopedia, news articles, magazines, maps, atlases, films and filmstrips, television programs, interview data, etc., which the teacher will help them choose and utilize based on what they can handle. Involved in this report-writing will be sharing of information, creating initial drafts, sharing what has been written, and revision and editing.

For a slightly less ambitious project the teacher might take the text information on immigration and carry out a jigsaw activity by asking students in groups to read different parts of the material and to report to
each other. Because each group will report on information that the others have not read, there will be an authentic reason for listening. At the conclusion of the jigsaw activities, students would create a class bulletin board about immigration. For some students, it would be interesting and important to raise issues such as: "Did everyone who came to this country come of their own accord? If not, how were the experiences different?" This would give students the opportunity to compare the concept of immigration, which many would see as voluntary, to the history of slavery in this country.

Report-writing for the purpose of different groups sharing, information that they have learned already has been mentioned as one kind of writing students could do. What other kinds of writing could be carried out in terms of the objectives stated? Certainly learning logs could be used, as students were asked on a regular basis to consider what they had learned. Another meaningful writing project would be the construction of student autobiographies, with special emphasis given to each student's immigrant experience, whether this experience took place recently or several generations ago. As with the report projects, the creation of autobiographies could take several days or weeks to complete and the processes of drafting, sharing, receiving reactions, and revising should be utilized, from, the point of view of expanding students' language abilities. In all of these activities, the processes students are engaged in should be viewed as at least as important as the final products.

In the examples given so far, little or no mention has been made of utilization of the arts, such as music, dance, and drama. Obviously they could be included here (and in other content areas). Songs such as Neil Diamond's "Coming to America" could be considered in terms of the message the song provides. Music from various countries and its influence in this country could be seen as part of the immigrant heritage and contribution. So could dance. The possibilities are many. From a set of objectives many weeks interesting and meaningful work, for both teachers and students may be developed.

Summary

These, then, are some examples of one way of approaching the issue of combining language and content learning in classes, including ESL learners. This chapter has tried to illustrate both that important school content may be viewed as a vehicle for language development, and that language is crucial to students as the major way they have of demonstrating their knowledge of content. The perspective taken is that language and content learning do not mean isolated skills and drill work. The aim of the
activities presented has not been to assure that students get the correct answers to questions at the end of the chapter. The perspective presented is not that of the transmission classroom, in which the teacher doles out knowledge or facts (content of some kind), and the students give it back. The aim of considering the objectives is not even that of "covering" all of the objectives in any content area, just so the claim can be made that the students "did" the material. All of the biases or perspectives just stated apply to native English speakers as well as to those developing a second language.

Rather, the major concern is that learners, whether they be ESL students or native speakers of the language, grapple with content-area concepts and information, and that they use language to share what they know; to work through what they're learning; to ask questions about what they want to know; and to seek answers to their questions both from other people and from varying sources of material. This concern is realized in the activity-based approach delineated in the previous pages. From my perspective, this kind of approach does the following: (1) It provides students with the opportunity to use English in both oral and written forms, for varied purposes. That is, the approach demonstrates to students what English is for. (2) It adds to students' background of experiences, experiences that should help them as they cope with' regular classroom. (3) It adds to students' knowledge of and abilities to deal with English, because of the variety of things learners do and because of the ways they use language to do these things. (4) It demonstrates to students that learning can be fun, exciting, and challenging, and that we believe that our content learning does not mean isolated skills and drills work. I believe that we owe our students, and ourselves, no less.

References

**FROM When They Don't All Speak English**
Edited by Pat Rigg and Virginia Allen
Copyright 1989 by the National Council of Teachers of English
Reprinted with permission
ESL and Content-Area Instruction

Content-based ESL is a method that integrates English-as-a-second-language instruction with subject-matter instruction. The technique, focuses not only on learning a second language, but on using the language as a medium to learn mathematics, science, social studies, or other academic subjects. Although this approach has been used for many years in adult, professional, and university education programs for foreign students, content-based ESL programs at the elementary and secondary school levels are just emerging. One of the reasons for the increasing interest among educators in developing content-based language instruction is the theory that language acquisition is based on input that is meaningful and understandable to the learner (Krashen, 1981, 1982). Parallels drawn between first and second language acquisition suggest that the kinds of input that children get from their caretakers should serve as a model for teachers in the input they provide to second language learners, regardless of age. Input must be comprehensible to the learner and be offered in such a way as to allow multiple opportunities to understand and use the language. If comprehensible input is provided and the student feels little anxiety, then acquisition will take place.

Krashen posits a dichotomy between acquisition and learning, with one (acquisition) serving to initiate all language and the other (learning) serving only as a monitor or editor, activated when the learner has time and is focusing on the correctness of his or her language. In another dichotomy, Cummins (1979, 1981) has hypothesized two different kinds of language proficiency: basic interpersonal communication skills (BICS), which are language skills used in interpersonal relations or in informal situations; and cognitive academic language proficiency (CALP), which is the kind of language proficiency required to make sense of and use academic language in less contextually rich (or more context-reduced) situations. Cummins suggests that BICS are relatively easy to acquire, taking only 1 to 2 years, but that CALP is much more difficult, taking 5 to 7 years and necessitating direct teaching of the language in the academic context.
Many content-based ESL programs have been developed to provide students with an opportunity to learn CALP, as well as to provide a less abrupt transition from the ESL classroom to an all-English-medium academic program. Content-based ESL courses—whether taught by the ESL teacher, the content-area teacher, or some combination—provide direct instruction in the special language of the subject matter, while focusing attention as much or more on the subject matter itself.

**Mathematics and ESL**

The language of mathematics has its own special vocabulary, syntax (sentence structure), semantic properties (truth conditions), and discourse (text) features. Math texts: (a) lack redundancy and paraphrase, (b) are conceptually packed, (c) are of high density, (d) require up-and-down and left-to-right eye movements; (e) require a slower reading rate than natural language texts, (f) require multiple readings, (g) use a variety of symbols such as charts and graphs, and (h) contain a large number of technical words with precise meaning (Bye, 1975). These language features, when combined with the mathematics content of the written text, require the students to apply mathematics concepts, procedures, and applications they have already learned.

The classroom environment in which ESL is taught through mathematics content should be carefully structured so that second language acquisition can occur. Instructional activities should promote second language development through a natural, subconscious process in which the focus is not on language per se, but on communicating the concepts, processes, and applications of mathematics. Instructional activities in both the ESL and mathematics classroom should be built on students' real-life experiences and prior knowledge of mathematics, and offer situations in which students can interact with the teacher and fellow students. Lessons that teach new concepts in mathematics should use graphics, manipulatives, and other hands-on, concrete materials that clarify and reinforce meanings in mathematics communicated through language. Studies have shown that limited-English-proficient students can acquire both mathematics and English simultaneously when they are involved in interactive activities (Wilson, DeAvila, & Intili, 1982; DeAvila & Duncan, 1984).

**Science and ESL**

Science is generally defined as a set of concepts and relationships developed through the processes of observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena. Through scientific inquiry, students develop learning processes inherent in thinking:
observing, classifying, comparing, communicating, measuring, inferring, predicting, and identifying space and time relationships. Current approaches to science and second language education based on research and classroom practice indicate a set of central notions for relating science and ESL.

Science inquiry facilitates the development of ESL by providing the following:

- a "sociocognitive conflict" that spurs development of a new language system;
- a source of meaningful and relevant language input, using hands-on materials and texts with extralinguistic devices (diagrams, charts, pictures) to clarify meaning;
- positive affective conditions of high motivation and low anxiety; extensive opportunities for small-group interactions in which students negotiate meanings and receive comprehensible language input;
- opportunities for heterogeneous grouping with the role of peer tutor alternating among students, factors that contribute to input, interaction, and a positive, affective climate;
- experience with a wide range of language functions,
- extensive vocabulary development needed for school success;
- the integration of all modalities of language use: listening, speaking, reading, and writing;
- literacy-related tasks for development of cognitive/academic language proficiency; and
- the use of prior cultural and educational experiences for developing new concepts.

Science provides a rich context for genuine language use. From a language acquisition perspective, science can serve as a focal point around which oral language and literacy in ESL can develop. Specifically, science offers:

- interesting, relevant, and challenging content;
- opportunities for students to negotiate meanings;
- an abundance of appropriate language input;
- conditions for keeping students involved;
- materials for development of reading;
- activities for development of writing; and
- experiences with the forms and functions of English.
**Social Studies and ESL**

An ESL/social studies class should be concerned with more than just historical facts, geography, and terminology. It can promote the development of critical concepts of American history, thereby helping culturally different students to understand their new country, the United States, and its origins. Teachers can use language classes as a means of expanding social studies knowledge as well as use social studies content to enhance language development. Conventional instructional activities may be adapted by teachers not only to enhance LEP students' language development and knowledge of social studies, but also to develop their cognitive skills as well. Strategies include:

- **Use of Manipulatives and Multimedia Materials.** Students need visual materials to understand time periods in history; for example, photographs and prints, realia, and filmstrips help students understand ways of life of the Americans living in the colonial period.

- **Language Experiences.** The teacher guides students' spontaneous speech by targeting specific vocabulary structures and concepts from the stories elicited from the students. For example, in an intermediate-level ESL social studies class studying the role of the Constitutional Convention in writing the U.S. Constitution, the concept of reaching compromises to make decisions may be an entirely new idea. The social studies teacher needs to determine whether the students can recall aspects from their own countries' governments that might be similar. If the students do not clearly understand the topic, then the teacher must create an experience that the students can draw from later. For example, the students could role-play various scenes from colonial times, when power was concentrated in the hands of a few. They could represent different interest groups, each arguing to have certain laws passed. With the teacher as facilitator, the students will come to understand that they must give up certain wants if any progress is to be achieved. Once the students have understood the concept of compromise, the teacher can proceed with the lesson on the Constitution and how its laws were created.

- **Semantic Webbing.** Students learn how to perceive relationships and integrate information and concepts within the context of a main idea or topic (Freedman & Reynolds, 1980). Following an oral discussion or reading, students construct web strands and supports by putting key words or phrases in boxes. Boxes are connected to illustrate relationships and subheadings under the main idea, greatly aiding comprehension. For example, the students draw boxes with the events that led to the American Revolutionary War.
• **Content-area teaching of English as a second language is not an end in itself but a means to an end.** The strategies used for LEP students in social studies, mathematics, and science classes equip them with skills that will help them achieve success in the mainstream classroom.

This *Digest* is based on the ERIC/CLL *Language in Education* series monograph entitled *ESL Through Content-Area Instruction: Mathematics, Science, Social Studies*, JoAnn Crandall, editor. It is available from Prentice-Hall/Regents.

### References


### About the Monograph

*ESL Through Content Area Instruction: Mathematics, Science, Social Studies* includes an introductory chapter on content-based ESL by volume editor, JoAnn Crandall, as well as the following three subject-specific chapters:

**Mathematics**—Theresa Corasaniti Dale, Gilberto J. Cuevas  
**Science**—Carolyn Kessler, Mary Ellen Quinn  
**Social Studies**—Melissa King, Barbara Fagan, Terry Bratt, Rod Baer.

**ERIC Clearinghouse on Languages and Linguistics**  
May 1988  
Reprinted with permission
GUIDELINES FOR IMPLEMENTING A CONTENT-BASED ENGLISH LANGUAGE DEVELOPMENT PROGRAM

By Anna Uhl Chamot
National Clearinghouse for Bilingual Education

Content-based English language development (ELD) for limited-English-proficient (LEP) students involves the simultaneous instruction of both the language and academic skills required of students in the different mainstream curriculum areas. By adding a content component to English as a second language (ESL) instruction or a language component to the regular content area curriculum, content lessons can be made more comprehensible to LEP students, thus providing a greater chance for success in the mainstream classroom.

For such a program to be successful, a close collaboration between ESL and content area teachers is essential to ensure that the language and academic components of the curriculum are properly integrated and that each of the two teacher groups is aware of the instructional approach and goals of the other. Teachers should also take special care not to "water down" the curriculum when adjustments in language content are made.

The following suggests ways in which ESL and content area teachers can work together to develop a content-based ELD program for LEP students at any grade level.

1. **Clearly define the instructional objectives of the program, with an emphasis on congruence with mainstream objectives.**

   - If the primary instructional goal is to teach subject-specific language, such as English for mathematics, then the emphasis will be on language.
   - If the course will substitute for a mainstream content course (i.e., be a "sheltered" content course), then the emphasis will be on content.
   - If the goal is to develop academic language skills and content subject matter simultaneously, then the emphasis will be divided equally between the two objectives.
2. **Plan joint in service training for ESL and content teachers.**

- ESL teachers observe mainstream content classes to gain understanding of concepts taught, language functions required, language skills emphasized, and teachers' expectations of student participation.

- Content teachers observe ESL classes to gain an understanding of language difficulties encountered by LEP students and of ways in which ESL teachers simplify their language output so that it becomes comprehensible to the students.

- The school organizes workshops on approaches to teaching content-based ELD.

- ESL and content teachers cooperate in developing curricular and instructional materials.

3. **Plan curriculum and course content.**

- Identify and sequence concepts to be taught.

- List basic vocabulary and technical terms required to understand and express concepts.

- Identify language functions needed in the mainstream classroom for each content area (e.g., requesting clarification, understanding expository text).

- List major structures and discourse features found in mainstream textbooks (and teachers' explanations and lectures) for the subject and grade level (e.g., passive constructions, cause and effect statements).

- Identify language skills actually needed in the content classroom (e.g., note taking, presenting oral reports).

- Integrate the language development component into the scope and sequence of the content component.

4. **Develop and adapt instructional materials.**

- Content teachers select key sections of mainstream textbooks for submission to ESL teachers, who then analyze the sections and simplify the language—but not the concepts—where necessary.

- ESL teachers prepare additional lessons designed to develop language skills appropriate to the content presented.
5. **Plan assessment procedures.**

- Program planners refer to the instructional objectives to decide if assessment will focus on content, language, or a combination.

- Content teachers and ESL instructors examine both teacher-made and commercially produced subject area tests for linguistic content, and ESL teachers rewrite linguistically difficult test items. Content teachers check to make certain that the concepts tested have not been inadvertently simplified.

- ESL teachers provide information to content teachers on ways to assess students' comprehension of concepts' with minimal reliance on student language skills.

---

**NCBE FORUM**

**December 1985**

Reprinted with permission
ADAPTING MATERIALS FOR CONTENT-BASED LANGUAGE INSTRUCTION

Deborah J. Short

Language and Content Integration: An Introduction

Language minority students are often enrolled in mainstream classes without either the English language or academic skills needed for successful functioning in these classes. Content-based language programs have emerged, at the elementary and secondary school level, as a way to prepare language minority students for the overall academic demands of mainstream classes. Content-based language instruction is an approach that integrates second language instruction with subject matter instruction. Each lesson in a content-based class has content, objectives (e.g., math, science, social studies) and language objectives (e.g., grammar, functions). Students learn language through the context of specific subject matter rather than through isolated language features.

Integrated language and content programs may function in two ways. In language classes, the content-based program provides subject matter for language learning. Students practice the four skills—listening, speaking, reading, and writing—as they participate in activities that focus on content objectives drawn from science, math, or social studies. The language teachers' primary goal is still to help students develop language competence, but their secondary goals are to introduce terminology, content reading and writing skills, and study skills; and to reinforce content area information taught in other classes. Language teachers are already skilled in methods and techniques for teaching English to limited-English-proficient (LEP) students. However, in order to adopt and implement a content-based program, they need materials and training that will familiarize them with the subject matter to be taught.

An integrated approach can also be used in content classes and is sometimes referred to as language-sensitive content or sheltered instruction. In this case, teachers adapt their instructional techniques to meet the needs of LEP students, for whom traditional approaches may not be appropriate. Demonstrations, manipulatives, discovery learning, and other student-centered techniques may all be used to help reduce reliance on oral language, which is often difficult for LEP students to follow. The
problem is more complex because standard textbooks are rarely written with the language minority reader in mind.

Both language and content classes also promote the development and nurturing of cognitive thinking skills. By using student-centered activities that require students to interact with content, teachers provide opportunities for such thinking skills as analysis, synthesis, and clarification. These skills are essential in mainstream classes.

There is a growing consensus among language educators academic progress of LEP students should NOT be delayed by deferring content area instruction until students are proficient in English. But if students are to participate in content classes, they will need to have academic language preparation in their ESL classes to serve as a bridge to participation in regular content classes. An integrated approach helps prepare students for mainstream classes by incorporating subject matter instruction at the start of LEP students' schooling and increasing the complexity of this instruction as the students' language proficiency improves. As students are also placed in language-sensitive content classes, the delay of academic progress is further diminished. In addition, by providing the opportunity for these students to study content areas, teachers can recognize those students with special talents in one discipline or another.

For the approach to work; however, cooperation between language teachers and content teachers is essential. Program planning and in-service teacher training workshops can help achieve collaboration and provide opportunities to develop curricula and materials and share expertise for both teachers and school administrators.

Unfortunately, there are few textbooks that integrate language and content, and fewer still that address different levels of language proficiency. The dearth of materials is a common cause of frustration for teachers attempting to integrate instruction. Teachers must create or, adapt their own materials, but adaptation may be an unfamiliar process for all. The following specific guidelines for materials adaptation can serve as a reference, and facilitate the teacher's task of adaptation.

**Materials Adaptation**

When teachers are asked to describe the process of adapting materials, they often focus on vocabulary. They suggest replacing words with simpler synonyms or defining terms at the beginning of a reading passage. Some teachers will also point to sentence length and suggest writing shorter statements. At least one teacher in a group will likely voice concern about "watered-down" materials. "When I simplify materials, I lose the substance," that teacher might say. This may indeed occur, but it need not.
Successful materials adaptation goes far beyond simplifying vocabulary and shortening sentences and avoids watering down essential information. Materials adaptation is not rewriting prose at a lower grade level, but adapting information to make it accessible to language minority students. Certainly, one of the end goals of the content-based approach is to develop students' ability to read standard textbooks, reference materials, and news articles; but many limited-English-proficient students find prose passages very threatening at the start. The visual presentation of information is, therefore, key to adaptation.

Pictures, charts, and timelines make materials more "user friendly." A series of pictures or a flow chart can convey a process to a student more rapidly than a paragraph or two filled with transitional adverbs and complex-compound sentences. Through comprehensible chunks of words and phrases, an outline can concisely convey essential information drawn from a passage. Timelines can subtly encourage the higher order thinking skill of sequencing, whereas charts exercise the skill of comparing and contrasting. Formats such as these highlight specific points and diminish extraneous information.

While adapting or creating, teachers have the opportunity to use authentic materials in an abridged form. News articles may be adapted; post office or banking transactions may be taped and used as listening exercises; authentic literature may be included in the lessons. Teachers, having greater control over the content and being sensitive to the cross-cultural differences among students, can adapt materials to meet the students' level of cultural and linguistic understanding.

It may be useful here to review an original passage and its adaptation, and then look at specific considerations for adapting materials. The original text, United States History 1600 - 1987, distributed by the US Immigration and Naturalization Service to applicants seeking citizenship, was recently adapted for limited English speakers. The following two paragraphs are taken from a chapter in the original text on the first two permanent colonies in North America.

**Virginia**

The first permanent colony was Jamestown, Virginia (1607). These colonists came from England to try to make money by trading with Europe. They believed they would find gold and silver as the Spanish had found in South America, and then they would be rich. When they got to Jamestown, most of the men tried to find gold. They did not want to do the difficult jobs of building, planting food crops and cutting firewood: One of the colonists, John Smith, saw how dangerous this could be. He took charge
and made everyone work to survive. He is remembered for his good practical leadership. Still, less than half of the colonists survived the first few years. Only new settlers and supplies from England made it possible for the colony to survive. The discovery of tobacco as a cash crop to be traded in Europe guaranteed that the colony would do well.

Massachusetts

Many of the colonists came to America to try to find religious freedom. The Catholics had troubles in England and other parts of Europe. The rulers of these countries told their citizens that they must go to a specific church and worship in certain way. Some people believed differently than their rulers and wanted to have their own churches. The first group to come to America for religious freedom was the Pilgrims in 1620. They sailed across the ocean in the Mayflower and landed at Plymouth, Massachusetts. Before landing at Plymouth, the Pilgrims agreed on the government they wanted. The agreement was called the Mayflower Compact. It had two important principles:

- the people would vote about the government and laws; and,
- the people would accept whatever the majority chose.¹

For a beginning or intermediate language learner, these passages are full of pitfalls. For instance, an immigrant to California, who has been in the United States for only a few weeks, may have no knowledge of the location of Massachusetts and Virginia. That same immigrant may not recognize that England is part of Europe, nor that the Pilgrims were not Catholic. The syntactic and semantic structures of the passage may also pose problems: less common verb tenses (e.g., had found, to be traded), temporal and relative clauses; indirect speech, and complex lexical words and phrases (e.g., less than half of, whatever).

The following is an adaptation of the passage developed for advanced beginning-level students.
The First Two Colonies

This map shows the first two permanent English colonies in North America.²

This layout, which uses a map and highlights the information about each colony in a comparable manner, offers limited-English-proficient students access to the pertinent details of the passage. The map places the colony names in context. The inclusion of the compass symbol can lead to a class activity on map skills. The information is structured to explain:

- when the colonies were formed;
- who the colonists were;
- what the colonies were named;
- why the colonies were formed; and,
- an interesting fact about each colony.
Information has been conveyed through a pictorial representation (the map) with chunks of information that can be processed more easily than sentences. Teachers can use this adaptation as the basis of a lesson, and build upon the information as appropriate to the proficiency level of their students. Although Thanksgiving was not mentioned in the original text, it was included as an interesting fact about Plymouth Colony so that teachers could expand the cross-cultural awareness discussions about that holiday.

Both language and social studies teachers could use this adaptation in the classroom. Language teachers may ask students to use the information to write sentences comparing the two colonies, or they may encourage predictions about the seasons according to the different latitudes of the colonies. Social studies teachers may expand on this material by having groups of students research one of the colonies in more detail. Because the students will have already been presented with this background information, they have a schema upon which to add and link more facts and impressions.

**Steps in Adapting Materials**

The above illustration is one example of adapting an original text passage. There are a number of steps for teachers to follow in adapting materials. Many of these are described in *How to Integrate Language and Content: A Training Manual* (Short, et al., 1989).

**Consider the students' proficiency level.** The first step in materials adaptation requires a teacher to consider the proficiency level of the students and then review possible formats for the presentation of information. Does the information to be presented lend itself to a graph, chart, outline, or simplified prose version? Pictures, diagrams, and graphs are suitable as introductory formats because they tend to be labeled with fewer words. Outlines, timelines, charts, and prose versions will offer more of a challenge. Overall it is best to vary the format of the presentation. Exposing students to different formats will help cater to different learning styles and to relieve boredom.

**Build on students' prior knowledge.** The second step involves the teachers' moving from the known to the unknown, and from the concrete to the abstract, while relating materials, as much as possible, to student experiences. For instance, in the example above, the map depicting the eastern coast of the United States and the Atlantic ocean is a familiar sight for most students, it immediately places Massachusetts and Virginia in context. To relate materials to personal experiences, of the students, teachers can initiate conversation about the colonists' reasons for coming to America—religious freedom and trade—and then lead into a class discussion in which students explain their own reasons for coming to the United States.
**Highlight specific text.** As teachers begin adapting written material, they should try to reduce the amount of text. Main points should be highlighted, and extraneous detail can be excluded. During the course of a lesson, though, teachers may insert details if students express interest in the subject. By using bold typeface, underlining, and italics, teachers can provide visual clues that point to the main idea and the supporting facts.

**Control new vocabulary.** When teachers adapt materials, they can control vocabulary. For this process, teachers should follow certain recommendations. Vocabulary can be simplified, but key technical terms must be retained. Students are being prepared for mainstream classes, so they need to learn the academic language that accompanies the content area subjects. The use of synonyms should be minimized to avoid confusing students who are trying to grasp the essence of the prose. The language in mathematics classes, where synonyms abound in word problems, may be problematic. For example, the operation of subtraction may be referred to in more than ten ways in simple word problems (e.g., subtracted from, decreased by, diminished by, less than, etc.). Teachers should wait for the students to master the mathematical concepts before introducing synonymous terms. Finally, new vocabulary should be clearly introduced (and, where possible, explained before a reading—unless the purpose of the activity is for students to discover vocabulary meaning in context) and reinforced within the adaptation and subsequent materials.

**Simplify grammar.** At the start, teachers should use simple verb tenses, such as present, present continuous, simple past, and simple future. Commands (imperative verb forms) are appropriate for asking students to perform an experiment or discovery exercise. Teachers should simplify word order in sentences by eliminating clauses and relying on the common subject-verb-object format. They should also write in the active voice, and limit the use of pronouns and relative clauses. By repeating the subject noun or breaking the *who* and *which* into separate sentences, tenses, teachers write straightforward, prose that facilitates student comprehension. Similar care should be taken with negations. Students learn the *auxiliary verb + not* structure fairly quickly, but are often confused by *hardly, no longer,* and *no more.*

**Structure paragraphs carefully.** If teachers plan to adapt material in prose form with paragraphs, they must remember certain points. The topic sentence should appear first. Students can then recognize the main idea of the paragraph and learn to look for supporting information in the following sentences. Also, key features of the text that guide the flow of information should be maintained. Terms such as first, next, and then, indicate sequence; but indicates contrast; because can indicate cause and effect. As students develop higher-order cognitive skills, they learn to recognize these markers.
Sample Adaptations

Following is a passage from a fifth-grade social studies book that has been adapted three ways for different proficiency levels and activities. (For additional activity suggestions with adapted materials, see Brinton et al., 1989.)

The following is the original version from The United States Yesterday and Today:

Agriculture—Farmers in the Middle Atlantic States grow many kinds of crops. In much of the region, the soil is fertile, or rich in the things plants need for growth. There is usually plenty of sunshine and rain. Each state has become famous for certain crops. New York is well known for apples. New Jersey tomatoes and blueberries, Delaware white sweet corn, Pennsylvania mushrooms, and Maryland grains are other well-known crops. Herds of dairy cattle and livestock for meat are also raised in the Middle Atlantic States. The region produces a great deal of food for the millions of people who live there.

Truck Farms—New Jersey is famous for its truck farms, which grow large amounts of many different vegetables for sale. Truck farms usually sell their products to businesses in a nearby city. New Jersey truck farms are the best known, but truck farms are found in all the Middle Atlantic States.

Another way truck farmers sell their crops is at farmers' markets in cities. Sometimes a farmers' market is outside, on the street or in a city park. A market may be in a railroad station or in the lobby of a skyscraper. At a farmers' market, city people and farmers can meet each other face-to-face.3

In the first adaptation that follows, teachers focus on map skills. Students, learn about the well-known crops for each state and how to read a key. This adaptation is suitable for beginning-level students because it is largely pictorial. It can also lead to a class discussion or a simple writing exercise.
In the second adaptation, teachers create an outline of the passage. This can be used with lower-intermediate-level students. Teachers may have groups of students use the outline as a basis for writing sentences or paragraphs. They may also use this as a cloze exercise with more advanced students who can read the original passage. By filling in blanks on the outline, students practice study skills as they read the text.

**Middle Atlantic States**

I. Agriculture  
   A. Many kinds of food crops  
   B. State crops  
      1. New York apples  
      2. New Jersey-tomatoes, blueberries  
      3. Delaware-corn  
      4. Pennsylvania-mushrooms  
      5. Maryland-grains  
   C. Cows for milk and meat

II. Truck Farms  
   A. Many truck farms in New Jersey  
   B. Sell vegetables to stores in a city
III. Farmers' Markets
   A. Farmers sell crops
      1. On a street
      2. In a park
      3. In a train station
      4. In a building
   B. Farmers and city people in the city meet

The third adaptation is a rewritten version of the prose. It may be used in a lesson for intermediate level students. The students may be asked to respond to comprehension questions or to write their own outline about this paragraph. They may also be asked to create a key for a map of the Middle Atlantic States. A dictation or listening cloze could be based on this passage. These paragraphs provide only an overview, but they could be the basis for more detailed group reports about agriculture in these states.

Agriculture in the Middle Atlantic States

Farmers grow many foods, or crops, in the Middle Atlantic States. The soil is good for plants. The plants have enough sunshine and rain to grow. Each state has one or two special crops:

- New York—apples,
- New Jersey—tomatoes and blueberries,
- Delaware—corn,
- Pennsylvania—mushrooms,
- Maryland—grains.

The farmers also raise cows. They get milk from some cows. They get meat from other cows.

New Jersey has many truck farms. The farmers grow a lot of vegetables. They bring the vegetables to the city by truck. They sell the vegetables to stores in the city.

Farmers also sell their crops at farmers' markets. Some markets are outside. They can be on streets or in city parks. Other markets are inside. They can be in train stations or in buildings. City people and farmers can meet each other at the markets.
**Benefits of Materials Adaptations**

There are many benefits of using adapted materials. The first is teacher control over content. Teachers can adjust both language and format to the proficiency level of their students. A second benefit is teacher control over cultural bias in materials. Teachers can eliminate language that assumes a particular cultural background, control the introduction of new cultural information, and relate content to the students' native culture.

A third benefit is teacher control over skills development. Teachers can provide a wealth of skill-development exercises. Students can practice transferring information, using one basic language skill and then another. For example, after reading a graph, or looking at a series of pictures, students can retell the information orally or in writing. In this way, they exercise more than one language skill. Timelines and charts lend themselves to information-gap activities\(^4\) and other listening activities. Study skills are honed when students take notes, draw diagrams, or make outlines, charts, or graphs from prose adaptations.

In addition, by using adapted materials, teachers can help students develop the cognitive academic skills required in mainstream classes. Charts can be used to explain the rhetorical styles of cause and effect, or comparison and contrast. Time lines can be used to encourage students to make predictions or hypotheses. Further, by reducing prose to a skeleton of salient points, teachers require students to analyze information, draw inferences, and reword information. This process tests and encourages development of students' higher order thinking skills.

Finally, by adapting materials, teachers can readily integrate language and content. They can focus on the particular needs of their own students and use their own curriculum. When language teachers and content teachers collaborate, they plan their instruction to reinforce the information presented in other classes. This careful pairing of language and content better prepares language minority students for academic mainstream classes.
Notes

3. From The United States yesterday and today. © 1988 Silver, Burdett & Ginn Inc. All rights reserved. Used with permission. (Boldface words indicate vocabulary highlighted in the original)
4. In an information-gap activity, a student with some information works with a partner with complementary information to complete a timeline, chart, map, etc.

References


Further Reading


**ERIC/CLL News Bulletin**
ERIC Clearinghouse on Languages and Linguistics
Volume 13, No. 1
September 1989
Reprinted with permission.
HELPING LANGUAGE MINORITY STUDENTS*

By Else V. Hamayan and Ron Perlman
Illinois Research Center

Introduction

This guide is a resource for mainstream classroom teachers (K-12) who want to provide language minority students with additional support to help their transition into the classes where English is the medium of instruction. Many of the suggestions offered, however, can contribute to making education more effective for all students, not just those who have a language background other than English. The guide also can be used for teacher training, to increase mainstream classroom teachers' awareness of some of the factors that may contribute to difficulties encountered by language minority students even after they have been graduated from bilingual education or English as a Second Language (ESL) programs.

(Editor's Note: Arizona law does not allow for limited English proficient (LEP) students to be exited from bilingual education or ESL programs until they have met 5 criteria-one of which is the ability to function successfully in all-English instruction without additional assistance.)

The linguistic demands on students in content area classes increase as a function of grade level. A look at elementary school curricula reveals an increasing emphasis on literacy in the middle and upper grades as a medium for transferring academic content area knowledge. (Chamot 1983). This emphasis on literacy invariably necessitates a command of cognitively demanding academic language skills, particularly those required in the content areas.

Some language functions, such as following directions, asking for clarification, and understanding specialized vocabulary are predominant in all of the content areas. Others, such as obtaining information from graphs, charts and tables, are more content-specific. These specific language functions as well as the more generalized or holistic ability to understand and express content area concepts are potential areas of difficulty for students with limitations in English-language proficiency. The first step for teachers to take when a student joins the all-English-medium classroom is to assess that student's English-language skills in these specific and global areas of content-specific language proficiency.

* Adapted from, "Helping Language Minority Students After They Exit From Bilingual/ESL Programs"
Assessing Students in Content-specific Language Proficiency

Before assessing students' language proficiency, you should find out as much as possible about the educational history of the students who exited from the bilingual or ESL program. In many districts, the special program designed for language minority students is kept isolated from other programs in the school. This is not only ineffective for students in the special program but also makes it quite difficult to ensure the continuity between the special program and the mainstream. Programs for language minority students vary tremendously from district to district; in fact, they even vary within large districts from school to school. It is important to find out what instructional components were given to the student, and in what context.

Here are some pertinent questions that might help you to gauge your students' experience:

1. How much content area instruction was integrated with ESL?
2. Was the ESL instruction based upon content-based thematic units or was it guided by language units?
3. What content area textbooks was the student exposed to? In what language?
4. If the student was in a bilingual program, what content area curriculum was covered in the student's native language?

Next, you may wish to complete an informal assessment of the student's ability to use content-specific language functions. This can be done by developing a simple rating scale based on selected language functions which could be observed by any teacher who knows the student. The assessment scale would extend from "not at all" to "very well, most of the time." Figure 1 presents a sample assessment instrument based on some observable items. The sample in Figure 1 can be modified by adding items that are important in your own context and by omitting others that are not.

Any teacher who is familiar with the student can use this assessment instrument. The ESL teacher who has either taught your students in the past or is currently teaching them would be a valuable resource person for this assessment even if the content area is not integrated with the instruction of ESL. You also can fill this out once the student becomes more familiar to you, and you have had a chance to observe the student in class informally.
FIGURE 1

Sampling assessment instrument for content-specific language functions

<table>
<thead>
<tr>
<th>Student:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher:</td>
<td>Subject Taught:</td>
</tr>
</tbody>
</table>

**Listening: The student is able to**
1. Understand explanations without concrete referents.
   - not at all  
   - some of the time  
   - very well most of the time
2. Follow directions for experiments.
   - not at all  
   - some of the time  
   - very well most of the time
3. Understand oral numbers.
   - not at all  
   - some of the time  
   - very well most of the time
4. Understand oral problems.
   - not at all  
   - some of the time  
   - very well most of the time

**Speaking: The student is able to**
1. Answer questions.
   - not at all  
   - some of the time  
   - very well most of the time
2. Ask for clarification.
   - not at all  
   - some of the time  
   - very well most of the time
3. Participate in discussions.
   - not at all  
   - some of the time  
   - very well most of the time
4. Explain and demonstrate a process.
   - not at all  
   - some of the time  
   - very well most of the time
5. Present oral reports.
   - not at all  
   - some of the time  
   - very well most of the time
6. Explain how an answer was derived.
   - not at all  
   - some of the time  
   - very well most of the time
**Reading: The student is able to**

1. Understand specialized vocabulary.
   - not at all  
   - some of the time  
   - very well most of the time
2. Understand information/explanations in textbooks.
   - not at all  
   - some of the time  
   - very well most of the time
3. Find information from graphs, charts, and tables.
   - not at all  
   - some of the time  
   - very well most of the time
4. Follow directions for experiments.
   - not at all  
   - some of the time  
   - very well most of the time
5. Find information in reference materials.
   - not at all  
   - some of the time  
   - very well most of the time
6. Read at varied rates (skimming and scanning).
   - not at all  
   - some of the time  
   - very well most of the time
7. Read mathematical notations and equations.
   - not at all  
   - some of the time  
   - very well most of the time
8. Understand written word problems.
   - not at all  
   - some of the time  
   - very well most of the time

**Writing: The student is able to**

1. Write answers to questions.
   - not at all  
   - some of the time  
   - very well most of the time
2. Note observations.
   - not at all  
   - some of the time  
   - very well most of the time
3. Describe experiments.
   - not at all  
   - some of the time  
   - very well most of the time
4. Write reports.
   - not at all  
   - some of the time  
   - very well most of the time
5. Label maps, graphs, and charts.
   - not at all  
   - some of the time  
   - very well most of the time
6. Write verbal input numerically.
   - not at all  
   - some of the time  
   - very well most of the time
An observational rating scale is also helpful to an ongoing assessment of language minority students (or, in fact, for any student in your class). If you rate the student occasionally by using the same rating scale and by dating your ratings, you will have a continuing record of a student's proficiency in precisely those language functions which you have determined to be important in the acquisition of concepts in different content areas. This rating will allow you to keep track of any changes in students' content-specific language skills and of their progress over time.

Another way of assessing students' ability to handle content area material in English is by creating a simple reading test from the textbook being used in the content area, class, and by comparing language minority students' performance on the test to that of language majority students. A cloze procedure is adequate for this purpose. Choose a representative passage from the textbook and make a cloze passage out of it by blanking out every seventh word, leaving the first and last sentences intact. Ask the students to read the entire passage before attempting to fill in the blanks. Then, ask them to fill in each blank with the word which they think fits best. (See Cohen 1980, for a description of how to construct a cloze test.) By giving the test to the entire class, you can establish a standard against which the language minority students' performances can be compared. Calculate the average number of correct responses for the group of language majority students on the same cloze passage. If a language minority student scores more than ten percentage points below the average score of the language majority students, you may need to monitor that student's performance in class and consider some of the ideas suggested in the following sections of this guide.

**Setting Up a Buddy System**

One of the first things that can be done to help a language minority student make a smooth transition into the mainstream is to pair him or her with an English proficient peer. The role of the buddy is to serve as a guide to the mainstream classroom by helping the student understand the tasks that students face daily. It is best to choose buddies from among the student's age and academic peers, so the buddy can guide the student through various activities during the school day. If the buddy is also to do some tutoring, either during or after class, it may be advisable to assign an older tutor. The following process is suggested for setting up a buddy system.
(1) Recruiting and selecting buddies

Solicit recommendations for buddies from other teachers, or ask for volunteers from among your own students. Buddies may be bilingual themselves or they may be monolingual English-speaking students. Buddies who share a language other than English with the student would be able to provide the language minority student with native-language mediation; on the other hand, an English-speaking buddy would provide more reinforcement in English. If students have completed two or three years, bilingual or ESL program, it is likely that they no longer need 100 percent mediation through their native language; thus, an English speaking buddy may be more appropriate for those students. Select the buddies on the basis of how interested they are in other cultures, how well they work independently, how well they communicate and explain, how responsible they are, and how patient they are with others (Bohlender 1986). Cross-age tutors do not, need to be selected from among the highest-achieving students. In fact, assigning a tutoring role to lower achieving students who are experiencing academic difficulty themselves is beneficial to those students as well, and at the same time is very helpful to the students being tutored (Heath 1990).

(2) Training the buddies.

The training should focus on the specific expectations of the buddies as well as of their partners. Also, recruit the help of the ESL teacher, who can show the buddies or tutors some simple teaching techniques and strategies. The suggestions given in this guide on how to adapt lessons and how to teach some core vocabulary in advance are also useful to tutors (see Buehler and Meltesen 1983, for a listing of simple guidelines for tutors). Suggestions also can be given to tutors or buddies as to how to obtain information about the students' native language, and culture from the students themselves. Not only do the buddies benefit from this information, but also the exchange of information equalizes the status of the two partners, and contributes to a more effective relationship.

(3) Providing in-class support.

Allow buddies to work closely in class with the language minority student to whom they have been assigned. You may want to change the physical arrangement of the classroom in order for pair-work to be possible on a ongoing basis.
However, a warning is in order. Although the language minority student ends up with a constant and helpful guide, the teacher needs to ensure that all communication with the student does not pass through the buddy, but rather is addressed to the student directly. We have observed cases where the teacher gets too comfortable with the buddy system and begins to rely too heavily on the buddy. In these situations, the teacher begins to talk less and less frequently to the language minority student and opts to address him or her only through the intermediary. The teacher also needs to ensure that the language minority student is not neglected and is included in all activities in the classroom.

A cooperative learning approach, which is described in the last section of this guide, is one way of ensuring that language minority students' are actively involved in all classroom activities (Cochran 1989).

(4) Monitoring the tutoring process.

Daily monitoring of the tutoring process is essential, especially during the first two months. Ask buddies to reflect on how they are doing, what aspects of the tutoring they find easiest or most difficult, and in what areas they need more training or help. Buddies also may wish to meet together once a month to exchange ideas and insights. You also need to give the buddies some recognition either in the form of credit or a token present (for example, a lapel pin containing the flag of the country or state of origin of the tutee) that makes the students feel part of a distinctive group.

The duration of the formal partnership between a buddy or a tutor and a language minority student varies. When the student begins to feel more comfortable with the instruction in the mainstream classroom, he or she will rely less on the buddy and eventually will move away completely from the partnership. Buddies need to be alerted to this likelihood so that they are not disappointed or feel rejected. It is not uncommon, however, for a buddy to remain friends with the language minority student even when formal help is no longer necessary.

Preparing the Student for a Content Area Lesson

One of the difficulties that language minority students face in content area classrooms is the simultaneous processing of new vocabulary items and cognitively demanding concepts. Teachers can prepare students for a lesson that is to be taught by following two simple steps. First, they can let students become familiar with the core vocabulary that will be essential in presenting lesson to a class. Second, they can provide students with information about the lesson prior to the formal presentation of the lesson.
This is a difficult task for a single teacher to do alone. Teachers of different content areas may wish to collaborate in this effort by letting each other know what lessons they are working on with a group of language minority students and to share their support strategies with other teachers who have those students in their classrooms. This will provide some continuity in the different components of instruction that a student receives and will also provide teachers with wider context within which to teach the students. Although most teachers do not have much opportunity to interact with other teachers within the school day, it may be worth the additional effort to do so. Some teachers opt for a simple form that they can use to exchange information on each group of students, while others leave it up to informal but regularly scheduled get-togethers. Teachers also may wish to recruit the help of the peer tutors by assigning them the task of vocabulary presentation, as suggested in the following section.

(1) Teaching core vocabulary in advance.

The principle behind this suggestion is simple. If students are familiar with the core vocabulary that constitutes a given lesson, they are more likely to understand new concepts presented through those words. This is especially an issue with language minority students, because they may not even be familiar with some less common non-content related words. The language minority student needs to become familiar with these types of words, along with the content specific ones, before the beginning of a lesson. For example, a lesson on the human heart (see Figure 2) might involve less common words such as; valves, pump blood, veins, and arteries.

1. Most textbooks highlight the content-specific words in each chapter. If the textbook you are using does not do that, identify a list of content-specific words for each lesson you are about to present. This list could range between five and seven words. Write those words on a sheet of paper; indicating the chapter in the textbook from which they came.

2. Scan the chapter and your lesson plan for other generic words that you suspect your language minority students may not be familiar with. Add those four or five words to your list. Cross-age tutors may be able to help you with these first two steps.

3. Give your language minority students the list of words, preferably the day before you are to present the lesson.
4. Ask your students to try and find out the meaning of these core words by referring to the chapter from which they were taken. Students may use a dictionary or work in pairs, with their buddies or with other language minority students, to figure out the meaning of the core words. Encourage students to guess the meaning of confusing words from the pictures in the chapter.

5. Students can write their own explanations of the words or translations, or even draw illustrations that will serve as meaningful clues. They can bring their list of words to class the following day and use it as a resource.

**FIGURE 2**
(2) **Contextualize a lesson.**

An extensive introduction to a lesson helps clarify the context in which new concepts are to be presented. The teacher needs to familiarize students with the general area under consideration (Mohan 1986), and to give students a set of ideas or plans with which to make sense out of new information.

1. Draw from the students' personal experience in the topical area or one closely related to it. For example, if you are teaching a lesson on the heart, get students to tell you about any experiences they have had with family members or friends who have heart problems and the causes of the problem.

2. Have the students, either in small groups or in pairs, list everything they know about the topic to be presented.

3. Guide the students in categorizing the different pieces of information they have listed. They may do this in the form of a web, such as the one presented in Figure 2. This helps to organize the information; that students already have about a topic to prepare to learn more about it.

4. To help students read a chapter in a content-area textbook more easily, highlight the main idea and supporting details of the chapter. This can be done either by a teacher, a teacher's aide, or by a cross-age tutor. Most textbooks highlight the main idea of each chapter, but the summary sentence may be either buried in the text or may be linguistically too complex for second language learners. In either case, the sentence (or two) can be pulled out and written in simple English on a separate sheet of paper and given to students for reference.

*Making Language More Comprehensible*

As mentioned in the introduction, one of the difficulties that language minority students encounter in the mainstream classroom is in processing abstract cognitively demanding information in English. To make their task easier, hands-on demonstrations should be used as often as possible. By demonstrating new concepts, meaning is conveyed not through language alone, but with the help of concrete referents that the students can touch, hear, and see (and sometimes, taste and smell!). In hands-on demonstrations, meaning is also invariably conveyed through gestures and body language, making it easier for students to comprehend the concepts being presented.
To accompany these hands-on demonstrations, teachers also can attempt to simplify their language and to contextualize it as much as possible. This general strategy of making content-specific language more comprehensible is known as "sheltered instruction." Sheltered classrooms essentially use ESL teaching techniques to teach content-area lessons and attempt to make instruction more comprehensible for students who are learning English as a second language. Teachers in these classrooms are conscious that language minority students are developing their language at the same time they are developing concepts (Krashen and Biber 1988).

In sheltered classrooms, instruction is given in a controlled "sheltered" format. The language used by teachers is characterized by linguistic modifications, such as simplified (but always accurate and appropriate) syntactic structures, controlled vocabulary, and shortened sentences. In addition, much of the language used by the teacher already is known to students, and the language that is new is acquired in a meaningful context. Changing one's speech style consciously in order to accommodate listeners is very difficult, especially when the primary goal of communication is the teaching of new concepts. Teachers who are either reluctant to try this strategy or who have encountered frustration at the difficulty of the task may want to consider getting help from a colleague. Teachers can help each other by observing one another in the classroom setting and by coaching each other in very specific teaching tasks. Coaching can be a very useful tool for developing and improving skills, especially in the area of sheltered instruction (Kwiat 1988).

Another characteristic of sheltered instruction is the active involvement of students in the act of learning. Lessons usually revolve around an activity, and students are led to their own discoveries about the concept being taught. These discoveries are attained under the guidance of the teacher and by working together with other students in cooperative groups. Thus, students can be given a topic to research or an experiment to complete; they do these activities in small groups, where each student has a specific role to play.

To summarize, sheltered classes provide instruction through context embedded language, through active participation of students in the lesson, and by building on students' own experience.

**Classroom Management: Cooperative Grouping**

Cooperative grouping has been shown to be an effective classroom management technique that promotes learning among heterogeneous groups of students (Slavin 1981). The approach is different both from traditional whole classroom instruction and from other forms of group work. In
cooperative groups, students of different levels are assigned roles which encourage them to work interdependently on a specific task.

Cooperative groups are heterogeneous both linguistically and in reading or ability level. Thus language minority students are mixed in with language majority students; students who are having difficulty reading the textbook work alongside those who are reading at or above grade level. The roles that are assigned in groups vary, but the following types of roles are common to different models of cooperative grouping: a materials director, who is responsible for getting and putting away the needed for the activity; a timekeeper, who makes sure that the group keeps track of the time involved; a supervisor, who makes sure that the group is doing what it is supposed to do; and a reporter, who is responsible for either writing or telling students in other groups about the group's activity. The assignments are changed occasionally so that every student has a chance to experience the different roles involved. It is essential, however, that a role be assigned to each student to ensure that no one strays; in fact, you may wish to assign a student the role of the monitor whose responsibility is to make sure that everyone in the group is on task.

Cooperative grouping is especially useful for involving language minority students who have just joined the mainstream classroom from the ESL or bilingual program. These students can be an integral part of any small group by virtue of the role that each student is assigned. If the activity is well chosen, each student has a vital part to play in completing the task that the group is given. Each member of the group becomes important for the success of the group, and consequently the language minority student is not left out of the activity.

Cooperative grouping is also very helpful to language minority students in content-area classrooms because it promotes activity-centered lessons, where students work together to complete a given task. Students not only learn from each other but also have a chance to hear and speak language that is related to the task at hand. As mentioned in the preceding section, active involvement of the student is one way of ensuring learning. (See Cochran, 1989, for a detailed description of how to set up a cooperative group in the classroom.)

**Teacher Collaboration: Working with the ESL Teacher**

The content teacher, especially at the middle and secondary levels, often does not have the specialized training for teaching language minority students that the English as a Second Language (ESL) teacher has received. Collaborative efforts between content and ESL teachers can be most effective since such cooperation allows for the creating of language-rich
activities that help the language minority student understand the content work better. The ESL teacher can be an important resource for mainstream teachers. The ESL teacher can assist the content teacher to reduce linguistic problems by suggesting how materials and the level of language used for instruction may be modified and by helping identify potential areas of difficulty. Content learning is facilitated when reliance on language is reduced by using demonstrations, visuals, and gestures; and by encouraging students to work together in problem-solving and cooperative activities. In order to achieve this, consistent commitment and collaboration is required of language and content teachers in order to make all classrooms effective learning environments for language minority students.

**Conclusion: Language Minority Students As Resources in the Mainstream Classroom**

The time and energy it takes to provide language minority students in the mainstream classroom with some type of assistance to help them in their transition from the ESL or bilingual program is certainly worth the investment. Many of the students who have exited from special programs such as ESL or bilingual education may not be ready to tackle the rather difficult task of functioning in an academic setting where English is the medium of instruction. In order to succeed in school, a student ultimately must feel as though he or she truly belongs in the mainstream classroom. Many language minority students are branded as different, as having had a special need in the past, and having been involved in a special program that is perceived by some in the school as being inferior. Sadly, it is also the case that students, and sometimes faculty, who do not belong to a language minority group, may think of bilingualism and cultural diversity as problems that need to be overcome. These attitudes, among other factors, often present serious hurdles to language minority students.

Changing the attitudes of others is an arduous task that many may not want to undertake. Yet, it is our responsibility to see to it that language and cultural diversity are seen as a tremendous source of richness from which all students can benefit. Thus, in addition to asking what we can do for language minority students, we should be asking what language minority students—in particular, those students who are limited in their English proficiency—can do for language majority students and the rest of the school.

Language minority students' contributions could be numerous. They can teach others their language and about their language, and they can teach others about their cultural heritage and their way of doing things. Language minority students can serve as native-language tutors to peers or younger students who need native language support. They also can serve as links to
parents who are not proficient in English. In short, they can expand a school's horizons and open a pathway to all corners of a school building, the community in which the school resides and other lands beyond the school's immediate surroundings.

By adopting this view, we would be ensuring a higher likelihood of language minority students becoming proficient in English and succeeding in the mainstream, at the same time providing all students with a richer and more vibrant education.

References
Bohlender, J. (1986). Setting up an ESL peer tutoring program. TESOL Elementary SIG Newsletter, 7,8.

About the Authors
Else V. Hamayan is the coordinator of training and services at the Illinois Resource Center in Des Plaines, Illinois. Dr. Hamayan's research interests include second language acquisition, social parameters of language use and the development of literacy in English as a second language. She received her Ph.D. in Psychology from McGill University.

Ron Perlman is the director of the Illinois Resource Center. Dr. Perlman’s areas of research include school change and program policy, design of instructional services, program policy and decision making in the education of language minority students. He received his Ph.D. in Educational Psychology from Northwestern University.
A student who has been exposed to a language other than English while growing up (called the "home language") and whose subsequent command of English (oral and academic skills) is less than that of his English speaking age mates is considered to be limited English proficient (LEP) (Federal Register, 1980, 45 CFR 123.4). LEP students come from a variety of backgrounds: they may be native born Americans or immigrants; their native languages might be as common as Spanish, Arabic, Vietnamese, Thai, Lao, Hmong, or as rare as Hausa, or Malay are in the Midwest (Secada, 1982); their command of English might range from virtually nil to a superficially strong command of spoken English; they range from impoverished to upper class members of the elite; finally, and the concern of this paper they might have little or a great deal of education prior to entering the American school system. All of these factors need to be considered in the LEP student's education. The purpose of this paper is to focus on one factor the student's educational background; and to describe how that factor might affect that student's learning of arithmetic.

There are many reasons why an arithmetic teacher should be concerned with a student's educational background. The first group of reasons have to do with specific ties between what a student knows and the curriculum, methods of instruction, or testing. A student might already know a specific topic and not need to relearn it; he might know it, but not as fully as desired. In either case the curriculum for that student could change. Furthermore, the student's knowledge of a topic might take a form different from what is commonly taught in the United States (see the examples below). In this case, the arithmetic teacher would need to modify her instructional style so as not to conflict with how the student is understanding and approaching the given topic. Further, testing should be modified to allow the student to show what he knows and the teacher's grading should not penalize the LEP student who "gets the right answer, but did it the wrong way (Footnote 1)."

A second group of reasons for attending to an LEP student's educational background concerns a shifting of focus from what the student cannot do (i.e. his limitations in English) to what he can. The arithmetic teacher not
only should think about what the student needs to learn, but also should plan on exploiting what the student already knows. The LEP student who may have learned some things differently will see this concern for him as a sign that he is a valued member of the class. His self-esteem can only rise. Furthermore, if he is asked to show other students how he approaches problems, he will become a resource for enrichment lessons in arithmetic and his competence in English will increase as he becomes more fully integrated into the class.

Finally the LEP student's knowledge of arithmetic can be a major clue to other things about the student in general. If a recent immigrant, from an Indochinese refugee camp displays a strong grasp of arithmetic, it is likely he received on going instruction from his extended family or that they went to great lengths to ensure that he continued his educational progress.

This would indicate a strong familial commitment to the student's education. Family members might be asked to assist in that individual's and other LEP students' arithmetic instruction.

Students with a limited background in arithmetic might have had (and might continue to have) other, pressing concerns which interfered with their educations. Counselors and teachers involved in remedial work would need to take those concerns into account; otherwise, the student might fall progressively behind.

In the following sections, examples of different ways to read and write numbers as well as of different subtraction and division algorithms are presented. They are meant to illustrate how LEP students have learned to approach basic arithmetic in ways that are qualitatively different from how it is taught in the regular classroom. The implications of these differences and some specific suggestions for instruction will be discussed.

These examples were collected at numerous workshops given throughout the Midwest on the teaching of math to LEP students. The commonly taught American algorithms would be contrasted to others in terms of their steps and underlying thought processes. Participants, particularly those taught in other educational systems, would be asked to identify those examples which they had learned or LEP had used or which they had seen LEP students using. Based on this on-going informal survey of expert informants, the following examples have been identified to their respective countries.

In the final section of this paper, some general conclusions and recommendations are made.
Reading and Writing Numbers

Probably the most widespread difference between the United States and other countries for the writing of numbers lies in the uses of the comma (,) and period (.). Whereas the comma is used to denote powers of a thousand in this country, the period serves that function in most of Europe, Latin America, and parts of Asia using "Arabic" numbers. Alternately, the decimal point, which is denoted by a period in this country, is marked by a comma in those number systems. Thus, the number 2,500 might be understood as 2 1/2 by an LEP student; he might write 3.600 when meaning 3 thousand, 6 hundred. Teachers encountering such students should probe for the student's meanings when they read and write numbers and they should point out, to the student, that numbers are written differently in this country.

The numerals themselves show variation from country to country as well. In many countries outside the United States, the one is written like seven with a sharper top: e.g., ١ or even ٢. Some students place an underscoring line: ٣. The seven is distinguished from the one by a line crossing its middle: ٨. It seems unnecessary to force an LEP student to follow American conventions in these cases; however, he should understand that the teacher and most of his classmates do write their numbers differently.

The true Arabic numerals are written differently than the ones we use (see Figure 1). Not only must a student who uses these numerals learn, the American version, but also he must keep the two sets of numerals from interfering with each other. For instance, a period at the end of a statement involving numbers might be confused for an added place: ۵ + ۲ = ۸. (eight or eighty?). The student might understand the ۳ as a backwards ۴. He might write "۴" meaning "4." Once again, the simplest solution is to directly tell the student how numbers are written in this country and to give him some practice reading and writing numerals. A "translation" chart in the classroom might also prove helpful.

FIGURE 1: ARABIC AND ENGLISH NUMERALS

<table>
<thead>
<tr>
<th>Arabic:</th>
<th>(10)</th>
<th>(9)</th>
<th>(8)</th>
<th>(7)</th>
<th>(6)</th>
<th>(5)</th>
<th>(4)</th>
<th>(3)</th>
<th>(2)</th>
<th>(1)</th>
<th>(0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>English:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The tens and units in Arabic are read and said in reverse order than in most other number systems. 43 is read as "three and forty," 543 is read as "five hundred; three and forty." A teacher might say a number and find out that an Arabic student has written the tens and unit digits in transposed order.

Arabic languages- are read from right to left; Chinese, from top to down. These conventions might interfere with a student's reading a page full of numbers (as in the case of worksheets) or with situations in which the left to right direction implies the ordering of a set.

It is important to recognize, moreover, that the student who is following conventions such as the above ones shares much in common with the American student in the mainstream arithmetic classroom: knowledge of base 10, of place value, etc. Thus, knowledge of the student's educational background can help a teacher to pinpoint those areas which differ from what the student's peers already know about numbers and the American conventions for expressing that knowledge. The next examples provide instances of where a student's way of doing things is sufficient and additional work is not required.

The Subtraction Algorithm

Initial meanings for subtraction range from take away to missing addends. These meanings, and the algorithms which are developed from them, vary, from country to country around the world. The four subtraction algorithms presented in this section represent four different ways of writing the solution process, and also four different thought processes, each one embodied by a different algorithm.

The first algorithm is based on the commonly taught meaning of taking away (Figure 2): The bottom number is taken away from the top. If the lower digit in a given column is larger than the upper, a "10" is borrowed from the column to the left. This algorithm is the one commonly taught in the United States. It is also found in countries importing American texts or which have received American Peace Corps volunteers, such as Jamaica.

The next algorithm, missing addend subtraction, is based on the addition meaning of subtraction (Figure 3). Rather than thinking in terms of take away, the student thinks in terms of adding a number to the bottom digit (in a given column) in order to get the digit in the top row. As can be seen, when the sum—the subtrahend plus the (partial) difference—exceeds 10, the 10 is "carried" to the next column on the left. In more advanced forms of this algorithm, the 10 is carried mentally and not written down. This algorithm seems most common in countries that adopted the French
educational system while they were its colonies: Vietnam, Thailand, Laos. Though not agreeing universally among themselves, teachers and aides educated in Hong Kong, Mexico and other countries in Latin America also recognized this algorithm as being taught in their native educational systems.

The equal addition form of subtraction is a mixture of two meanings: take away and related addition (Figure 4). When the bottom digit of a given column is larger than the upper digit, the former is converted to a ten by adding a suitable number to it. The 10 is carried to the next column; simultaneously, the number added to the bottom must be added to the top digit to keep the problem the same. But this number can be brought down immediately since zero from anything is that number. Though less common than either of the first two algorithms, some teachers from this country as well as from Latin America say they learned to use equal additions.

The final subtraction algorithm which uses negative number meanings for its execution seems to be used in Eastern Europe and in the Soviet Union (Figure 5). It is based on understanding that a larger from smaller digit yields a negative digit and that the final answer can be obtained by adding together all the positive and negative numbers obtained from each individual column's substep.

These four algorithms differ in their written forms; in the thought processes and understandings which they embody; and finally, in the related skills and abilities required for their successful execution. The teacher accustomed to the first, take-away, algorithm will probably be confused when seeing any of the other three. Furthermore, the second (missing addend) and third (equal addition) algorithms are remarkably similar in their written forms: in their most advanced forms, only the answers to the algorithms are written; in their intermediate forms, 10's are "carried" along the bottom row. Thus a teacher who suspects that a student is using one of these alternative algorithms will need to ask the student about how he solves subtraction problems. Furthermore, students using the latter three algorithms are encouraged to do most of their computations in their heads. This might lead a teacher to suspect cheating when an LEP student can get the right answers but fails to show his work. The student's inability to express himself in English might reinforce that impression since he will find it difficult to explain a complicated process (which he is just mastering) to someone who doesn't understand it (Footnote 2). Needless to say, much care and sensitivity is needed in a situation such as this.
### FIGURE 2: TAKE AWAY SUBTRACTION

<table>
<thead>
<tr>
<th>Written Form</th>
<th>Thought Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>542 - 289</td>
<td></td>
</tr>
<tr>
<td>31 542 - 289</td>
<td>I can’t take 9 from 2. Borrow a 10 to make it 12. 4 becomes 3.</td>
</tr>
<tr>
<td>31 9 from 12 is 3.</td>
<td></td>
</tr>
<tr>
<td>31 8 from 13 is 5.</td>
<td></td>
</tr>
<tr>
<td>413 1 542 - 289</td>
<td>2 from 4 is 2</td>
</tr>
<tr>
<td>413 2 from 4 is 2</td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 3: MISSING ADDEND SUBTRACTION

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline
3
\end{array}
\]

Thought Process
9 plus what number is 12? 3. Write the 3.

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline \frac{3}{3}
\end{array}
\]

Thought Process
Since \(9 + 3 = 12\), not 2, I need to carry a “1” to the next column.

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline \frac{3}{3}
\end{array}
\]

Thought Process
8 + 1 = 9. 9 plus what number is 14? 5. Write the 5.

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline \frac{5}{3}
\end{array}
\]

Thought Process
Now, \(8 + 1 + 5 = 14\), not 4; so carry 1 to the next column.

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline \frac{5}{3}
\end{array}
\]

Thought Process
2 + 1 = 3. 3 plus what number is 5? 2. Write the 2.

\[
\begin{array}{c}
\text{Written Form} \\
\hline
542 \\
-289 \\
\hline \frac{5}{3}
\end{array}
\]

Thought Process
Check 253 + 289 = 542, so 253 is my answer.
FIGURE 4: EQUAL ADDITION SUBTRACTION

<table>
<thead>
<tr>
<th>Written Form</th>
<th>Thought Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>542 - 289</td>
<td>I can’t take 9 from 2. If I add 1 to 9, it becomes a 10, and I can take 0 away from anything. But, if I add 1 to the 9, I also must add 1 to the 2 to keep the problem the same. 2 + 1 is 3, and 0 (in the 10) from 3 is 3.</td>
</tr>
<tr>
<td>* 542 - 289</td>
<td>The 8 is now a 9 since I added 1 to 89. I can’t take 9 from 4 so I add 1 to it to make it a “10.” 1 + 4 is 5.</td>
</tr>
<tr>
<td>* 542 - 289</td>
<td>The 2 is now a 3 since I have added 11 to 89 (or 10 to 90, or 1 to 9). 3 from 5 is 2.</td>
</tr>
<tr>
<td>* 542 - 289</td>
<td>This reminds the student that the 8 has become 8 + 1 = 9, and the 2 has become 2 + 1 = 3.</td>
</tr>
</tbody>
</table>

* An intermediate form includes “carries” of the number added.
### FIGURE 5: USING NEGATIVE NUMBERS FOR SUBTRACTION

<table>
<thead>
<tr>
<th>Written Form</th>
<th>Thought Process</th>
</tr>
</thead>
</table>
| \[
\begin{array}{c}
542 \\
-289 \\
\hline
-7
\end{array}
\] | 9 from 2 is minus 7. |
| \[
\begin{array}{c}
542 \\
-289 \\
\hline
-4-7
\end{array}
\] | 8 from 4 is minus 4. |
| \[
\begin{array}{c}
542 \\
-289 \\
\hline
3-4-7
\end{array}
\] | 2 from 5 is 3. |
| \[
\begin{array}{c}
542 \\
-289 \\
\hline
253
\end{array}
\] | 300 – 40 is 260; 260 – 7 is 253 |

These four algorithms represent qualitatively different basic understandings of subtraction: take away, related addition, facts up to 10, and negative numbers respectively for each algorithm. Teachers who insist that all students take away and borrow risk confusing their students needlessly and causing conflicts at home where the students' families are probably trying to help by teaching their children the algorithms as taught in their home countries.

The prerequisite skills for each algorithm also differ: subtraction number facts, related addition facts, addition facts to 10, and negative numbers. Students who are learning the missing addend algorithm might have difficulty
memorizing their subtraction facts unless they are presented in that format. Moreover, these students probably will not need to spend much time learning subtraction number facts since they are taught solely for use in the take-away algorithm. Since the students should already know the related addition facts, subtraction facts would be redundant.

Students who have already learned one of the three alternate subtraction algorithms do not need to learn the one based on take away meanings. Nor, should they be penalized for using that different algorithm. The subskills associated to take away, including subtraction facts, are superfluous for these students and they should not be tested on those skills.

An LEP student's knowledge of an alternate algorithm could be the basis for an enrichment lesson. The teacher could explain that there are other ways of doing subtraction to the class and she could ask the student to demonstrate one of those ways. After the student has made his presentation, the teacher should be ready to provide additional explanations and examples to the class.

The problem of teaching students who do not have perfect mastery of an alternate algorithm remains. If a teacher can diagnose the source of a minor error, he should remediate it in a manner that is consistent with what the student knows and consistent with the underlying thought processes. For instance, if a student is forgetting to carry a ten in the missing addend algorithms, his teacher should use the terminology of addition (not take away) when explaining to the student why and how to carry the 10.

If a teacher does not understand the algorithm being used by the student, she should say so to the student and see if another student or member of the student's family could help the student. Failing in these options or determining that the student really does not know what he is doing, a teacher should explain that she does not understand what the student is trying but that she can show him a different way of solving the problem. The teacher should be alert in case bugs arise in the new algorithm due to interference from the old one.

These and other subtraction algorithms are discussed in Beattie (1979); Bell, Fuson & Lesh (1976); Leutzinger & Nelson (1979); Musser (1982); and Sherrill (1979). Teachers should be able to recognize when their LEP students are using alternate algorithms. In such cases, changes in the student's curriculum, instruction and testing are indicated.
The Division Algorithm

Unlike the subtraction algorithm, for which there seem to be many variants taught around the world, there seem to be two main division algorithms. The first is the one commonly taught in this country as long division (Figure 6). The dividend is placed to the right of the divisor with the short end of a sideways "L" separating the two. The thought process for the algorithm is based on dividing the quotient into groups the size of the divisor. The subskills required for division this way include the ability to make a good initial estimate as to how many times the divisor will fit into the dividend, multiplication, and subtraction. Other division algorithms have been suggested as transitional, due to the difficulty of the one followed in this country (Bell, Fuson & Lesh, 1976; Lang & Mayer, 1982).

The alternate algorithm whose intermediate and advanced forms are seen in Figure 7 is taught in France, Spain and their former colonies which retained their educational systems: Latin America, Indochina (Footnotes 3 and 4). In this algorithm, the dividend is written to the left of the divisor; while the quotient is written underneath. In its intermediate form, the results of the multiplication step are written above the dividend; those of the subtraction, below. In the advanced forms of this algorithm, the multiplication and subtraction steps are done mentally with only the remainders being written below the dividend (see bottom of Figure 7).

The thought processes followed by this alternate algorithm stress the relationship between multiplication and division. The student is taught to ask himself what number times the divisor yields an approximation to the dividend. The use of mental computations requires that the students have well-developed multiplication and subtraction reflexes.

The relationship between division and multiplication is also stressed by students being taught to check their answers. Hispanic students are taught to do so by working the related multiplication problem; if there was a remainder from the original division problem, that number gets added to the result of multiplying the divisor by the quotient. Indochinese and other students who have gone through French-based educational systems, will check their answers by casting-out-nines for the related multiplication problem.
**FIGURE 6: LONG DIVISION**

<table>
<thead>
<tr>
<th>Written Form</th>
<th>Thought Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 _ 1872</td>
<td>2 can’t go into 1. 2 into 18 is 9; but 9 times 4 is 36 so it’s too big. Try 8.</td>
</tr>
<tr>
<td>3 _ 8</td>
<td>8 times 4 is 32. Put down your 2, carry one 3.</td>
</tr>
<tr>
<td>3 _ 1872</td>
<td>8 times 2 is 16; 16 + 3 is 19; 8 is still too big. Erase and try a 7.</td>
</tr>
<tr>
<td>2 _ 7</td>
<td>7 times 4 is 28. Put down your 8, carry a 2.</td>
</tr>
<tr>
<td>2 _ 1872</td>
<td>7 times 2 is 14; 14 + 2 is 16.</td>
</tr>
<tr>
<td>24 _ 1872</td>
<td>8 from 17 is 9; 6 from 7 is 1. Bring down the 2.</td>
</tr>
<tr>
<td>7 _ 1872</td>
<td>2 into 19 is 9; but 9 times is 36, so 9 is too big. It can’t be 7 because 7 times 24 is 168. Try 8.</td>
</tr>
<tr>
<td>7 _ 1872</td>
<td>8 time 4 is 32, put down a 2, carry your 3. 8 times 2 is 16; 16 plus 3 is 19.</td>
</tr>
<tr>
<td>7 _ 1872</td>
<td>The Amount is 78</td>
</tr>
</tbody>
</table>
What number times 24 is close to 187? It can’t be 8, because 8 times 4 is 32, and 16 + 3 is 19. So it’s 7.


<table>
<thead>
<tr>
<th>1872</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

7 times 24; 7 times 4 is 28; 7 times 2 is 14; 14 plus 2 is 16; so, 168.

187 less 168 is 19, bring down the 2.

What number times 24 is close to 192? 8.

<table>
<thead>
<tr>
<th>168</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 1872</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

8 times 24. 8 times 4 is 32. 8 times 2 is 16; 16 + 3 is 19.

192 less 192 is 0.

The answer is 78; now check related multiplication problems.

* Most students are taught to carry out the multiplication and subtraction steps in their heads. Thus the numbers with an * are not written in the advanced, more mature form:

<table>
<thead>
<tr>
<th>1872</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

8 times 24. 8 times 4 is 32. 8 times 2 is 16; 16 + 3 is 19.

192 less 192 is 0.
In Figure 8 are outlined two examples of casting-out-nines for multiplication. A large X is drawn to the side of a problem. For each multiplier, the digits are added together until a single digit remains. The top multiplier's digit goes atop the "X"; the second at the bottom. These two digits get multiplied and the resulting number undergoes a similar reduction process until a single digit remains. This number gets placed to the right of the cross. From the original multiplication problem, the product undergoes the same reduction process of adding all its digits until a single number remains. This goes in the left side of the "X". If the two digits to the right and to the left of the "X" match, the answer is correct (up to the factor of 9).

Casting-out-nines can be used to check all of the basic operations. It is described in greater detail in Bell, Fuson & Lesh (1976). It is given that name because nines can be dropped immediately from the reduction process. For instance, 93 reduces to a 3: 9 + 3 = 12; 1 + 2 = 3. However, if the 9 is dropped or cast out, 3 (the answer) remains.

In division problems where a remainder is left over, the remainder gets added to the reduced digit at the right of the "X". This new number gets reduced via casting-out-nines; the new result then must match the reduced dividend.

Not only is the alternate division algorithm taught differently than in American schools, but also it requires a different set-up, different thought processes and more advanced mental computational skills than does its American counterpart. These demands and the practice for mental computations afforded by the alternative algorithm and its casting-out-nines checking method, might help explain why teachers report that some of their Indochinese students are well ahead of their other students in computational arithmetic. Indeed, for some Indochinese students, our algorithm may be the "low stress" alternative.

The points already made about curriculum, instruction and testing vis-a-vis the subtraction algorithms also apply for division. Moreover, teachers should be careful in their tests that division problems are not set up only as in Figure 6. Students used to the alternative algorithm might read the problem as 24 ÷ 1872 rather than the reverse. An alternative would be to write problems in their universally understood format (1872 ÷ 24) as well as having both set ups from Figures 6 and 7.
Example 1:

2 + 1 = 3
2 + 7 = 9; 3 remains
1 + 3 = 4

Example 2:

2 + 3 + 7 = 12; 1 + 2 = 3
2 + 7 = 9; 3 remains
7 + 6 + 3 + 1 + 4 = 21; 2 + 1 = 3
6 + 3 = 9; 7 + 1 + 4 = 12; 1 + 2 = 3
3 + 2 + 2 = 7

3 x 7 = 21; 2 + 1 = 3
3 x 4 = 12; 1 = 2 = 3
How a student would check the division problem of Figure 7 is outlined in Figure 9. The related multiplication for the sample problem of Figure 8 is $24 \times 78 = 1872$. The student works out the casting-out-nines check for this problem.

**FIGURE 9: CHECKING DIVISION BY CASTING-OUT-NINES**

<table>
<thead>
<tr>
<th>Written Problem</th>
<th>Casting-out-nines</th>
<th>Thought Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>24</td>
<td>24 is the divisor $2 + 4$ is 6. Write that at the top of the “X”.</td>
</tr>
<tr>
<td>192</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>24</td>
<td>78 is the quotient. $7 + 8 = 15; 1 + 5 = 6$. Write that on the bottom of the “X”.</td>
</tr>
<tr>
<td>192</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>24</td>
<td>6 $x 6 = 36; 3 + 6 = 9$. Write that to the right of the “X”.</td>
</tr>
<tr>
<td>192</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>24</td>
<td>1872 is the dividend (or, the product of 24 $x$ 78). $1 + 8 = 9$; drop them. $7 + 2 = 9$. Write 9 to the left of the “X”.</td>
</tr>
<tr>
<td>192</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>24</td>
<td>The two 9’s match; the answer is correct. So, $1872 \div 24 = 78$.</td>
</tr>
<tr>
<td>192</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Some General Conclusions and Recommendations

These examples were meant to illustrate the point that LEP students' educational backgrounds may have implications for the arithmetic classroom. This background can influence how the students read, write and understand numbers, how they perform basic operations and other related areas of concern to the arithmetic teacher.

When preparing to introduce a new topic, a teacher should ask herself if that topic's presentation should be modified in order to accommodate her LEP students' prior education. The teacher might interview the student himself, older students, members of the student's family or other adults (e.g. aides). She should then check to see how far the student has developed his understanding and skills as related to that topic. If the student already knows the topic, but in a different way, he might be given other work or he might participate in the lessons as a form of enrichment. If the student is en route to a full mastery of a given point, a careful analysis of the topic is necessary for adapting curriculum, instruction and testing to fit the student's level of mastery.

Care is needed to build upon what a student already knows and to avoid confusing him with extraneous information. Even if a teacher determines that an LEP student lacks any background experiences in a specific topic, she still should take into consideration the student's linguistic and cultural background. These other factors are discussed, in part, by Castellanos (1980) and by Lovett (1979).

FOOTNOTES

1. In workshops I have given throughout the Midwest on teaching mathematics to LEP students, I have heard this or a similar refrain enough times to become concerned that many classroom teachers rigidly adhere to a single way of doing mathematics. This unyielding rigidity is immediately harmful to LEP students who may have learned different algorithms or approaches to certain topics, but whose grades unfairly drop. It is also harmful to all students who pick up similar attitudes about mathematics.

2. When foreign educated teachers or aides have attempted to present alternate subtraction and division algorithms to their peers at workshops, I have been impressed by how difficult it is for other teachers to understand the new algorithms. Commonly, the presenters work the problems while providing only a few comments to explain the steps and their underlying thought processes. Also, teachers in the audience try to interpret the algorithms in terms of the "right way".
Given the difficulty educated adults have in explaining these algorithms, we should understand the enormous difficulties facing LEP students as they attempt similar tasks.

3. In Hong Kong the algorithm and thought processes are taught identically to those outlined in Figure 4. However, the initial set-up differs in that the dividend is to the right of the divisor: 241 1872.

4. A totally different written algorithm is used in Germany (Kulm, 1979) and probably would be taught in its former colonies. However, it also stresses the relationship of multiplication to division.

References


*Federal Register*, 1980, 45 (67), 23211-23228.


ERIC DOCUMENT

Reprinted with permission
The L2 Science Classroom and Sheltered Instruction

One day last spring I walked into a ninth grade science classroom filled with over 35 limited-English-proficient (LEP) students from our English as-a-second language (ESL) classes. The paired students were sitting at tables, and on each table was a pile of leaves. The teacher was circulating from pair to pair, checking with students as they proceeded to classify the leaves with the help of charts, pictures, books, and each other's advice. Within a moment of walking into this "sheltered"—or, as in our district, a designated "L2" classroom—I saw the key elements of effective sheltered content instruction:

1. The student is the center of the learning process.
2. The teacher continually monitors and adjusts the instruction to raise the LEP student to increasingly higher levels of thinking, of content knowledge, and of L2 proficiency.
3. The learning process is highly contextualized, personalized, interactive, and, task/function-oriented.

Scientific Thinking Processes and the "Science Framework"

I also saw what the new Science Framework describes as the scientific thinking processes that help students “build their own concepts about the natural world” and the connections to our technological society. These processes are observing, communicating, comparing, ordering, categorizing, relating, inferring, and applying. These are what all students are expected to be able to do.

Integration of ESL and Science Instruction and Materials

How can we promote the learning of science for LEP students?
1. Provide sheltered English classes in ESL and science as a transition from first language/bilingual instruction.
   a. Group students for ESL, and science by learner needs.
   b. Focus on science concepts and meaning.
   c. Relate new learning to student's experience.
   d. Modify speech and printed material while maintaining meaningful chunks of language.
   e. Teach the discourse of science in context (definitions, classifications, process descriptions) with lots of reading and writing support.
   f. Use contextual clues and multiple modalities.
   g. Promote two-way interactions' and equal status roles.

2. Maximize interaction to engage students.
   a. Provide background notes and reading guides.
   b. Teach learning strategies, and study skills.
      - Rehearsal: repetition, underlining
      - Elaboration: analogies, mental images
      - Organization: categorizing, mapping
      - Comprehension checks: self-review/self-test
      - Affect: focusing attention, self-reward
   c. Allow time for peer tutoring with all students.
   d. Schedule several cooperative learning and laboratory activities per week where all students participate in achieving group and individual rewards.
   e. Promote "study groups" of LEP and non-LEP students to review, practice, and study for tests.
   f. Provide for language development and academic achievement by including both heterogeneous and homogeneous groups according to language proficiency.

3. Provide a variety of appropriate materials which include science investigations, laboratory activities, environmental examinations, realia classifications, and hypothesis formulations.
   a. Core texts from different grade levels
   b. Reference texts in different languages
   c. Supplemental materials rich in visuals
   d. Films, videos, realia, and games related to science

4. Encourage ESL and science teachers to meet regularly, observe/coach each other, and collaborate on activities to meet mutual learning needs of their students.

5. Train all science instructional staff (teachers, migrant and bilingual instructional, aides, peer tutors) in strategies which promote high expectations, filtering techniques (interactive, contextualized, personalized, modified), and reading/writing across the curriculum processes.
6. Integrate community resources to provide greater access for scientific inquiry.
   a. Engage bilingual and first language guest speakers (parents and college-age peers) knowledgeable in the field.
   b. Make home inquiry assignments to discover various culturally appropriate solutions to problems.

**Implications for Staff Development, Materials Use, and Assessment**

There are implications for staff development which include allowing time for each ESL teacher and science teacher to plan together, observe others' classes, and establish peer coaching and feedback processes. Bringing the science materials into the ESL classroom and comparing rollsheets for science and ESL classes are feasible first steps to teacher collaboration.

Implications for materials use are also given in the Framework and include the selection of the core textbook. Materials should provide for interaction through a variety of question types at increasingly higher levels of thinking, a discourse focused on the demands of science instruction, and more access to the new language. Increased access occurs through redundancy features, such as fuller explanations, more examples, and use of graphic and picture space to exemplify key science ideas.

Adapting the textbook already in use for native English speakers is also possible. If the students are at least at the intermediate ESL level, such sheltering strategies as cooperative, two-way tasks with visuals from the textbook charts, cooperative Jigsaw chapter*, reading, cloze-type readings as a preparatory set for the chapter as a vehicle, and mapping for chapter notetaking are useful.

Supplements to the core text include first language science, references, science textbooks from various grade levels, bilingual laser video materials, and visual aids, such as a large picture file/realia collection.

Finally, just as there are implications for planning and staff development and resources and textbook use, with the new Science Framework, there are implications for assessment that go "beyond the bubble" of paper/pencil multiple choice tests. The California Assessment Program (CAP) is inaugurating an integrated writing assessment.** In the future more prompts will derive from the content curriculum, with science problem solving and cooperative interaction

---


** The Arizona Student Assessment Program (ASAP) also integrates content areas into the reading, writing, and math assessments.
activities under consideration for assessment by CAP. There is more room for integrated assessment of students, for monitoring and adjusting the instruction, and for raising expectations of success.

Such student engagement as I saw in that sheltered science classroom increases the intellectual potential for students because of the absence of preventive circumstances, the appropriate sequence of experiences, and a determination to learn. It's a matter of seeing language minority students not "at risk" but rather "at promise" for developing to their fullest intellectual capacities.

References


5Ibid., pp. 139,145-47,173-74.

6Addison, "Raising Expectations." Presentations given before Santa Barbara County Schools CABE, CATESOL audiences, 1988, 1989.


8Science Framework Field Review Draft, pp. 143-44.


Editor's Note: The California Science Framework is philosophically comparable to the Arizona Science Essential Skills (1990).
In the real world—the one outside the classroom—reading is an integral component of everyday functioning. It is very difficult to function today without reading, and one could argue that we require reading if we are to participate fully in society.

That reading is, however, meaningful to the reader-directions for doing something, information required to make decisions, and facts about people, events, and issues within the reader's sphere. The reader determines that information is needed and seeks it out, so it is both relevant and meaningful.

As people function in the real world, they use multiple sources of print and nonprint information. A person who is going to wallpaper a room might consult one or more books on how to do it, talk with personnel selling the wallpaper, watch a TV program on the topic, or ask, a neighbor for advice. Prior to choosing a political candidate, a voter might read many newspapers or magazine articles, listen to live or televised speeches, read pamphlets, and talk to others about candidates and issues.

As they gather information, individuals compare and evaluate the sources, judging which are most reliable and useful and which contain facts that match other sources. The information is not simply acquired but is used to accomplish a task, make a decision, satisfy a curiosity, or be stored as general background for later application. It is interpreted in light of sources and purpose, and the reader integrates new information with old through synthesis, generalization, and application.

The entire process is individual—it is the individual who perceives a need and seeks the information. It is the individual who selects sources. It is the individual who uses the information in some relevant way.

(Editor's Note: Although this article does not specifically address limited English proficient students, the meaningful reading situations and practices discussed herein are essential to the academic success of this population.)
An instructional model

Model classroom instruction mirrors real-world uses of informational material. Since in daily life problems and issues relevant to the individual are the basis for using materials, then school instruction also centers on issues and problems relevant to the students and to the world outside. In addition, instruction emphasizes relationships between events in the real world and events studied in school. Linkages between course topics and the world are fostered and class activities give students experience with real-world tasks.

Likewise, sources of material used in the classroom reflect those available elsewhere, both print and nonprint material, such as newspapers and magazines, audio and video tapes from radio, TV, films, speeches, and meetings, advertisements, pamphlets, and commercial notices. A variety of types of material—for example, narratives, biographies, poetry—are used as well as informational texts.

Students are provided instruction and experience in locating and understanding material, evaluating and comparing sources, and expanding beyond the material through generalization, synthesis, interpretation, and the application of information.

Some real classrooms

A comparison of this real-world model of instruction with actual classroom instruction suggests that, at least in some content classes, this model is not operative. Data collected from 4 classrooms will be used to clarify this point.

We observed 2 high school and 2 middle school social studies classes daily for periods of 4 to 14 weeks (high school classes in the fall and spring for 4 to 8 weeks, middle school classes for 4 to 6 weeks in the fall only) for a total of 120 hours. Teachers and a sample of students were interviewed at the end of each observation period. (See also Smith and Feathers, 1983a, 1983b.)

• Reading. As we looked at the classes, it became clear that there was little similarity between what was occurring with print in these classrooms compared with the real world.

To begin with, reading was not required. In 2 classes teachers assigned only 5-8 pages a week, but even where reading was assigned, it was not necessary for passing the course. A large proportion of students only looked up answers to worksheet questions, while others merely copied answers from other students or filled in answers during class discussions.
• **Content.** In addition, there was little relation between what was being dealt with in class and the students' world beyond the school. Course content was determined by the textbook, with chapters assigned in order regardless of related outside occurrences.

Instruction centered not on issues or problems but on acquisition of information from the textbook. Most class time was spent discussing worksheets, with the teacher asking questions and then correcting and expanding answers. Tests typically evaluated student acquisition of the same material identified on worksheets and discussed in class.

On only a few occasions did the instructors relate or ask the students to relate what was being studied to what was happening outside school. We never saw instruction begin with the students' world before moving to the class. Nor did we observe instruction that culminated in application to current real-world situations. Events beyond the classroom were almost never mentioned.

The exclusive focus on the text and lack of linkage with the world beyond the classroom left the students with no real purpose for acquiring the information presented except to pass the test. It had the effect of isolating the students from the world they inhabit out of school and which they will inhabit for the rest of their lives. This, we found, resulted in student perceptions of the course as not meaningful or useful, which undoubtedly contributed to the general apathy noted among the students.

• **Sources.** For the most part, class assignments were limited to the basic text, although a few handouts, primarily photocopies from other textbooks, provided reading material. These sources were supplemented by some films and filmstrips (mostly in high school classes) and some library material. No other sources were introduced, discussed, or required.

The use of other books was very limited. During the observation period, 1 high school class was assigned a short report that required 2 outside sources, 1 of which could be an encyclopedia.

In another class, students could do book reports for extra credit. This option was not well publicized nor related to the course's instructional thrust. Students did not do these reports, although our interviews indicated that several were. reading books they might have reported on.

Except for these isolated instances, no reading was assigned in outside sources, either teacher-selected or student-selected. In addition, although almost all students indicated in interviews that they did some leisure reading, no teacher asked the students about their out of class reading.
Assignments calling for the use of the media were even less frequent. During the observation periods, no assignments required sources such as newspapers, magazines, TV, films, or radio, and information available from these sources was rarely referred to.

In spite of an almost total absence of sources outside the textbook, we noticed that students sometimes referred to them in class and indicated in interviews a willingness to read such material in place of, but not in addition to, current assignments, since they were not eager to increase the amount of assigned reading. Some said they would prefer this type of reading and would learn more from it.

- **Intellectual activity.** Although teachers generally identified high level objectives for those classes (developing competent citizens, with advanced thinking skills, refining positions on issues, teaching responsibility and, general knowledge), these goals were not apparent in classroom activities. The greatest portion of class time was spent on worksheets that typically consisted of literal questions, answered with words or phrases copied from the text.

Class discussions were teacher directed, generally with the teacher asking questions from the worksheet and students providing short responses. Occasionally the teacher lectured to provide background, but these lectures also focused on specifics.

We did not observe any instructional activities that required students to focus on issues instead of facts or engage in higher level intellectual activities, nor did we see instances which required them to identify and seek out information or, to analyze; evaluate, criticize, or synthesize ideas. No panels, student centered discussions, student, reports, or debates were observed. Group work occurred only in 1 class, for 3 days. Student directed activities that focused on problem solving were never observed.

What we have learned is similar to what others have found where teachers use the single textbook in the isolated classroom (Mikulecky, 1982, 1984; Neilsen, Rennie, and Connell, 1982; Nicholson, 1984; Ratekin et al., 1983; Wolf and Greenwald; 1980). Instructional activities in these classrooms were text-centered and teacher-directed and offered students no opportunities to engage in the real world tasks of identifying, seeking, and using needed information. It is not surprising that our interviews showed that the students view classroom content and tasks as unrelated to their functioning elsewhere.
Some alternative classrooms

These 4 classrooms do not match the model suggested by real-world reading demands, and, unfortunately, we have not observed other secondary classes that do. However, 2 classes of 6th graders observed by Feathers during the spring of 1985 and 1986 do suggest that content instruction can reflect real-world demands.

These 2 classrooms were observed for 1 full day each week for an entire semester, and 5, full days for the last 2 weeks of school, totaling 25 days (approximately 150 hours) of observation of each class.

Since the intent was to assist teachers in developing curricula that reflected "real" reading/learning processes, Feathers spent approximately 3 hours per week planning classes with the teachers. Although all class periods were observed, only social studies classes will be described for comparison here.

- **Reading.** In these classrooms, reading was not only assigned but integral to the class. Students were required to read both their texts and other material, and were given time to do so. They were taught strategies that promoted more effective reading, and were given assignments similar to activities that might occur in the real world. These assignments often involved notetaking, writing, art, oral presentations, and discussions as well as reading.

- **Content.** As in the secondary classes, course content was primarily determined by the textbook, but there were some differences. The teachers selected topics and chapters and felt free to skip parts or entire chapters and units. Thus, although the text was used as a guide for curriculum, teachers did not allow it to constrain what they wanted to do with the topics.

   In addition, not everyone read all of the text that was covered; students were often assigned topics in groups and read only those parts pertinent to their topics.

   In these classrooms, emphasis was placed on providing the students with opportunities to relate topics to each other, to the world outside, and to themselves in a personal way. Relationships among items were highlighted through strategies such as summary writing, conceptual mapping, and notetaking—all of which were done as group activities to allow discussion.

   Learning was made relevant through activities that asked students to take a personal view and to state it for consideration by others. For example, students wrote fictional journals of various people mentioned in
the text; they wrote letters to each other explaining their topic and asking questions about their correspondent's topic; they found news items and discussed and wrote about how the news was related to their topic.

- **Sources.** Although the assigned text remained the primary source, others were also used. The classes read related stories, poems, and content material that the teachers brought in or that students found when working in research groups, where they were free to locate needed material in the classroom, the library, or outside school. The media were also used for research reports and for specific assignments.

- **Intellectual activity.** To emphasize the importance of identifying and seeking needed information through research groups, students were given class time to discuss their topic, determine what was needed, seek the material in classroom or library, read it, discuss what they had learned, and prepare a report or oral presentation. Work in research groups allowed them to compare and evaluate sources, as well as interpret, synthesize, and summarize information.

  Sometimes different groups were given the same topic so that further evaluation could be made. Going beyond the details to organize information and relate it to their own lives was accomplished by creating charts and other graphics; writing journals, summaries, letters, and reports, and suggesting solutions to problems encountered in the news media.

  In these classrooms, the teachers focused on providing students the means by which to learn the content. They did things to help the students become aware of the problems with their texts and how to overcome them, take effective notes, see relationships, analyze, interpret, and evaluate information, form personal opinions, and relate the material to their lives.

  Students had opportunities to work these things out through cooperative learning in pairs and small groups. They worked together or individually and, then compared with others so that they had the chance to discuss not only the content but the means by which they were learning it.

**Implications**

The chief difference between the primary and secondary classes we observed seems to be the instructional focus. In the secondary classrooms, instruction centered on content what Barnes (1975) labeled "transmission teaching the transfer of information from the teacher (or textbook) to the student. In contrast, the 6th grade teachers focused on the process of learning content or interpretation teaching," with the result that their students learned both the content and strategies for learning.
If literacy is essential to function in the real world—a point which seems hardly debatable—then we can begin by helping students read and comprehend their textbooks more effectively, but the effort must not stop at that. Few of our students will ever pick up a textbook once they leave school. Teaching and learning activities in schools must reflect tasks, problems, issues which commonly confront citizens outside school, and the skills for dealing with them. Only then can we develop individuals who will be both literate and informed, and therefore better prepared to function well in-the real world.

References


*Feathers teaches with the Department of Elementary Education Reading Program at East Texas State University, Commerce, Texas. Smith teaches and is Director of Development at the Bloomington Campus, Indiana University.*

*From: The Journal of Reading, March 1987*

*Reprinted with permission of the International Reading Association*
Most secondary content teachers readily admit that at least some of their students have great difficulty reading assigned materials. Some teachers, in fact, confess that they have given up making reading assignments, relying on lecture, demonstration, and discussion for the learning that takes place in their classrooms.

Although most teachers have developed ways to bridge gaps between readers and texts, they often report that neither their preservice education nor their school's in-service program prepared them to feel confident that their teaching practices help students comprehend assignments or build good reading habits.

Results of a recent survey of content reading specialists at U.S. universities may help content teachers answer the question "What can I do to help students comprehend given texts and develop good reading habits as I teach the content of my discipline?" (Please refer to the chart on page 105.)

A list of good practices

We asked 37 reading professors which teaching practices they believed content teachers could incorporate easily into their teaching and which would significantly help students learn from texts. All 37 participants actively publish research related to content reading instruction; 21. have published textbooks in secondary or content reading; all lead workshops aimed at improving reading in the content areas.

A list of 23 practices was assembled from recommendations made in reading journals. Participants were asked to rate these in light of their experience and knowledge of research, rating highly those which would likely help students read content materials, taking account of the practice's relative benefits for the majority of students in heterogeneous groups in classes such as literature, mathematics, science, and social studies. They rated each practice on a 5 point scale from "of no value" to "most always valuable."

(Editor's Note: Although this article does not specifically address limited English proficient students, the observations and practices discussed within are germane to them. As is the case with many effective teaching strategies, these are essential to ensure the academic success of this population.)
In addition participants were asked to identify any practices not listed that they considered particularly effective for improving comprehension. The table presents the content reading specialists' ratings of 23 practices.

Since the list had been based on recommendations from learned opinion and research, it was not surprising that the mean rating given for all but one was from 3.3 to 4.8 (from "occasionally" to "often" valuable).

The respondents did indicate that teachers have to make the final decision regarding the appropriateness of any practices in their classrooms, since effectiveness depends on many factors including the readers' prior knowledge and abilities, the purpose of the assignment, the text to be read, and other classroom variables.

Certainly, how well practices are carried out affects how helpful they will be. For example, the value of asking questions following reading depends on the quality of the teachers' questions. Likewise, the value of previewing and studying graphic aids in a selection depends on the quality of the preview activity, students' familiarity with the passage content, and the type of graphic aids.

While most respondents agree that a discussion of how to use a textbook is desirable, they recommended that such a preview be done just once or when it is evident that students need help.

In general, then, endorsement of the listed practices should be thought of as a general recommendation for using them when they serve a good purpose. They should be adapted to the students' needs.

**Other good practices**

In addition to recommending 22 of the 23 practices as "occasionally" or "often" valuable, the content reading professors suggested additional practices for integrating reading and study skills with the teaching of content. Four patterns of suggestions emerged.

(1) **The importance of using multiple texts in content classrooms.** By reading accounts from more than one source, students learn that no text is a final authority on a subject. By using multiple sources, teachers can provide both easier and more detailed accounts of a topic for students who are not appropriately served by the account in a single text.

(2) **Study guides for focus.** Study guides are seen as particularly helpful for directing students to the most important information in a text.
(3) **Metacognitive strategies.** Content area teachers should encourage students to question how they read most effectively and teach them to recognize when they are failing to understand what they read. For example, as part of a metacognitive process, students think through how they can employ fix-up strategies such as rereading, ignoring minor obstacles in hopes that later clues will help comprehension, and stopping to summarize.

(4) **Direct instruction and modeling plus independence.** Although respondents advocated practices of direct instruction and teacher modeling, several indicated that some of the students' best learning comes through student-centered activities. For example, students improve their reading as they set their own purposes for reading the day's lesson, as they summarize what they have learned into learning logs, or as they develop concept maps or graphic organizers to represent their understanding. To gain independence and confidence, students must learn to apply strategies and take increasing responsibility for learning through reading.

**Grouping the practices by focus**

The practices which content reading specialists evaluated as "occasionally" or "often" valuable are consistent with those recommended in current research studies (e.g., Berliner, 1975; Brophy, 1979; Duffy and Ball, 1986; and Graves and Cooke, 1980) and by popular teaching cycle models (e.g., Hunter, 1977; and Pearson and Leys, 1984).

- Practices 1, 3, 4, 6, 9, and 16 focus on prereading guidance. The importance of activating prior knowledge and developing schema is reflected in Numbers 2, 8, 11, and 12.

- Several practices the specialists valued highly focus on direct instruction and modeling (Numbers 5, 7, 13, 15, 17, 19, 20, 23); these can directly help students read given materials and summarize their learning for later study.

- Postreading discussions (Numbers 10, 12, 18, 21, and 22) encourage students to reflect on what they read.

In suggesting that teachers ask students questions about how they read and understand, the respondents recognize the importance of metacognitive strategies for gaining independence in reading.
## Content Reading Professors' Ratings of Selected Teaching Practices

### Teaching Practice

<table>
<thead>
<tr>
<th>Often Valuable</th>
<th>Rank</th>
<th>Mean Rating*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Teacher sets purpose or facilitates students purpose for reading.</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>2. Teacher asks students to discuss their own experiences with or opinions</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>about the topic before asking them to read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Teacher previews key vocabulary before asking students to read.</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>4. Teacher asks students to preview an assignment before reading (e.g., note</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>chapter titles, typographical aids, etc.) before asking students to read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Teacher discusses the significance of graphic aids in selections. (e.g.,</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td>pictures, tables, etc.) before asking students to read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Teacher provides a summary, outline, or graphic overview of what is to be</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td>read before students read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Teacher conducts a discussion of how to use an assigned textbook (e.g.,</td>
<td>7</td>
<td>4.1</td>
</tr>
<tr>
<td>table of contents, glossary, chapter headings, etc.) before asking students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Teacher asks students to discuss or list everything they already know</td>
<td>7</td>
<td>4.1</td>
</tr>
<tr>
<td>about the topic before asking them to read.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Teacher gives students instructions on how they should read an assignment</td>
<td>9</td>
<td>4.0</td>
</tr>
<tr>
<td>(e.g., skip this; read pp. 312-14 carefully; study the chart on p. 97, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Teacher asks students to retell or discuss what they have read.</td>
<td>9</td>
<td>4.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occasionally Valuable</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Teacher asks students to compare information from one reading source</td>
<td>11</td>
<td>3.9</td>
</tr>
<tr>
<td>with information they had prior to reading or to compare information from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>several sources.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. After asking students to read an assignment, the teacher asks students</td>
<td>13</td>
<td>3.9</td>
</tr>
<tr>
<td>to discuss their own experiences with or opinions about the topic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Teacher provides instruction on how to write various kinds of summaries</td>
<td>14</td>
<td>3.8</td>
</tr>
<tr>
<td>and asks students to summarize.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Teacher teaches students to combine class discussion/lecture notes with</td>
<td>14</td>
<td>3.7</td>
</tr>
<tr>
<td>notes they have taken while reading.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Teacher offers instruction on how paragraphs and longer units are</td>
<td>14</td>
<td>3.7</td>
</tr>
<tr>
<td>organized.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Teacher gives students questions to answer before asking them to read an</td>
<td>16</td>
<td>3.6</td>
</tr>
<tr>
<td>assignment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Teacher conducts specific instruction for locating main ideas, chapter</td>
<td>16</td>
<td>3.6</td>
</tr>
<tr>
<td>summaries, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Teacher reviews key vocabulary after students have read an assignment.</td>
<td>16</td>
<td>3.6</td>
</tr>
<tr>
<td>19. Teacher explains and reinforces use of an overall reading strategy.</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>20. Teacher provides instruction on how to outline information and asks</td>
<td>19</td>
<td>3.5</td>
</tr>
<tr>
<td>students to outline.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Teacher asks students to answer questions over their readings.</td>
<td>20</td>
<td>3.4</td>
</tr>
<tr>
<td>22. Teacher discusses the significance of graphic aids in selections (e.g.,</td>
<td>20</td>
<td>3.4</td>
</tr>
<tr>
<td>pictures, tables, etc.) after asking students to read an assignment.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rarely Valuable</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Teacher reads aloud or tape records material for students to listen to as</td>
<td>23</td>
<td>2.6</td>
</tr>
<tr>
<td>they follow the text.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rating scale: 1-5 (from “of no value” to “most always valuable”)
A helpful repertoire

There is no foolproof repertoire of practices suitable for all students, texts, or teaching styles. The recommendations from this survey, however, can help teachers identify teaching practices which knowledgeable reading specialists consider very beneficial to students reading content materials.

In the short term, these teacher directed strategies may help students with given assignments. In the long term, students may learn from the teachers' direction that self-directed previewing, questioning, and summarizing are worthwhile as they read assignments independently.

The suggested practices are ones which the classroom teacher can integrate easily with the teaching of content. Teacher educators may also find them helpful for preservice and in-service programs, since these teaching practices have demonstrated effectiveness.

References


Gee is a professor at the University of HoustonIClear Lake, Houston, Texas. He has worked with content teachers in a number of schools Rakow teaches elementary and secondary science methods and educational research at the same university.

Journal of Reading
December 1987
Reprinted with permission of the International Reading Association.
ESL READING "STRATEGIES"
WHEN CAN I FIND THE TIME?

By Dennis Terdy

Across the country ESL instructors are being asked how much time is essential before limited English proficient (LEP) students can fully participate in a "regular" program. When is it "all" going to happen? - one year - two years - three years? Given this "subtle" pressure, secondary ESL teachers feel more strongly than ever the necessity focusing on the reading needs of the "regular program."

What are the reading skills needed by limited English proficient (LEP) students in a secondary program? Where and when are content reading skills taught? Much of what is done in reading is not enough and often inappropriate. Time limitations within the ESL classroom may be partially to blame, but another cause of the problem might be a failure to look clearly at LEP student's needs for reading skill development. Therefore, a concerted effort to identify essential reading skills as well as integrating them early into the ESL secondary program is necessary. In addition, these skills must be ones which allow for the student to assume some of the responsibility for application outside the ESL program. The skills can easily be taught and practiced within the context, of the ESL class, yet most of their use would be on outside reading material.

Four reading skills or "strategies" which can be helpful are the GENERAL reading skills of getting the main idea and establishing meaning of new vocabulary from context and the CONTENT-related reading skills of skimming and scanning.

General Reading - Main Idea

There is a strong need to teach second language learners the ability to discriminate between main ideas and details. Too often they are interpreted as one in the same. In fact, most frequently, the ESL reading comprehension questions, so often a part of ESL structured readers, make students focus on details. This often creates readers good at identifying or locating details but not very capable of identifying broader ideas and concepts. LEP readers need to identify main ideas. The quantity of outside reading they are or will be required to do reinforces this notion. Main idea identification directs the student's attention away from details and isolated vocabulary and more towards general information and concepts (Kelnitz, 1931). Activities which require LEP students to identify main ideas can be included at even the earliest level of instruction. Furthermore, they can be
included as part of any presently used general or content area reading material. The goal with this skill or strategy is to develop the student's ability in looking for broader concepts and ideas. It is not done at the expense of general comprehension and or detail recognition but in addition to them.

**General Reading - Meaning from Context**

Establishing meaning from context is another essential reading strategy. Many ESL reading activities focus on vocabulary development, yet so often, they consist of looking up word definitions in a dictionary (bilingual) and synonyms/antonyms work with little else. Activities which promote vocabulary development by guessing at the meaning of new words from context enable the second language reader to leave the bilingual dictionary. They enable the student to use various context clues to learn the meaning of new words. One such activity is the Cloze procedure. Consisting of deleting every 5th or 7th word from a reading passage, the Cloze procedure clearly focuses on developing the skill.

With this, the student learns not only that the meaning of every word is not essential to understand the general content but also how to guess intelligently at the meaning of unknown words. In addition, it is clear that this skill can further increase reading speed and efficiency.

Another activity which can further work on establishing meaning from context is to identify key words actually in a passage and without defining them, ask students to guess their meaning. This not only enhances the vocabulary development of the student but also legitimizes educated guessing as part of reading skill development (Kelnitz, 1981). Again, this is not done in place of vocabulary activities already done but as a supplement to them.

**Content Reading Skimming**

Goodman and others have defined the reading process as a "psycholinguistic guessing game" (Goodman, 1972). An essential skill in developing "good guessers" is skimming. Often described as part of the prereading process, skimming consists of surveying material for general impressions and ideas. Although quite important and easily recognized by many, skimming is very seldom purposely introduced in an ESL classroom. Its appropriateness lies in the fact that it predisposes the reader to content soon to be read. It allows the student to hypothesize about the content and, coupled with additional "survey" approaches as noting readers cues, subtitles, and use of visual graph charts. Aukeman (1972) provides a very efficient "strategy" to prepare the student for reading material.
Again, the integrations of teaching such a strategy is not very time consuming and can be used with any ESL reading materials. Furthermore, it is a strategy which LEP readers can apply immediately to outside reading.

**Content Reading - Scanning**

An additional "strategy" of scanning (for specific information) is also helpful in content area reading. This is a skill many English readers take for granted, and one which LEP readers can use very effectively. By demonstrating to an LEP student that specific information can be found without the need for 100% comprehension, scanning further develops LEP reading strategies. As mentioned before, this strategy is not taught at the expense of comprehension development. It is to supplement. The main purpose of scanning as another "strategy" is to develop flexible and efficient reading skills for content material.

LEP students at the secondary level require and even deserve ESL activities that provide reading skill development beyond what is often given. Time limitations do cause problems, yet the integration of many of the reading "strategies" can begin at lower levels of ESL without additional time required. The point to keep in focus is if ESL teachers don't teach these strategies who will? These strategies will not take much additional time, and will surely have an impact on silencing those who continually ask "When is it 'all' going to happen?"

TESOL-Secondary Interest Section Bulletin
Fall, 1983
Reprinted with permission


ORGANIZATIONS

NABE (National Association for Bilingual Education)
Union Center Plaza
810 First Street, N.E., Third Floor
Washington, DC 20002-4250
Telephone: (202) 898-1829

NCBE (National Clearinghouse for Bilingual Education)
1118 22nd St., N.W.
Washington, DC 20037
Telephone: 1-800-321-NCBE

NCTE (National Council of Teachers of English)
1111 Kenyon Road
Urbana, IL 61801
Telephone: (800) 369-6283

TESOL (Teachers of English to Speakers of Other Languages)
1600 Cameron Street, Suite 300
Alexandria, VA 22314
Telephone: (703) 836-0774