Mr. Tran teaches middle schoolers literacy in the content areas in a large U.S. southern coastal city. Students in his school district represent more than twenty different languages. Many are first-generation immigrants. Spanish speakers (using various dialects of Spanish) from Latin America and the Caribbean are the largest group. Some from Caribbean nations speak both English and a French Creole (which often varies from island to island). There is also a fairly large number of Asian students who bring with them diverse languages. Many of Mr. Tran’s students are bilingual (although English is not always one of their languages). Their previous educational backgrounds are as diverse as the language and ethnic families they represent.

Mr. Tran uses an interdisciplinary approach to science, math, and social studies instruction because he understands that people learn best when they can see connections and construct meaning from the content. Further, this approach makes it possible for Mr. Tran to personalize instruction to meet the diverse needs of his students.

A recent learning project centered on the nature of scientific inquiry. In this project students collected data (e.g., daily high and low temperatures, wind speed and direction, rainfall) using a weather station on the school campus provided by a local television station. The station is one of the school’s business partners in education. In math they used the data to answer questions (e.g., What is the average temperature this month?). While working in cooperative groups collecting and analyzing the data, students spontaneously generated a number of other questions. A student in one group noted that the cool, rainy January weather they were experiencing was very different from her tropical Caribbean home where January was the dry season. Lucinda’s comment sparked a lively discussion about weather the students had experienced.

Building on student interest, Mr. Tran suggested they search the Internet for sites that provide global weather information. The youngsters found several, including some with satellite maps, forecast information, and warnings of dangerous weather systems.
The students began to systematically collect weather data on a number of international cities (sparked by curiosity about the weather in places they or their families had lived). Once each week they charted and graphed the data looking for similarities and differences. This led to a study of climate and the impact of climate on how people live, what they eat, the houses they build, etc. Students used textbooks, tradebooks, interviews with family and community members, and on-line sources in their inquiry. The learning project culminated with student groups sharing research results with the class. Some groups chose traditional oral presentations using charts, tables, and maps to illustrate findings. One group employed song and dance to describe climate and culture in Guatemala. This group painted a stunning mural that accurately depicted the plants and animals of Central America as a backdrop for their performance. Another group used realia, real-life objects and artifacts, in their presentation. The group that included students from the islands of Jamaica and Dominica effectively used recipes and tastes of foods they’d prepared to demonstrate how climate, history, and ingenuity combined to create such dishes as Jamaican jerk pork and Dominican provisions—part of the heritage of slave ancestors who escaped sugar cane plantations and subsisted in rain forest jungles.

Mr. Tran used his observations of the students, knowledge of cognitive learning theory, a good understanding of district, state, and national content and performance standards, and his own experiences as an English-language learner to facilitate the youngsters’ acquisition of content knowledge and language. He provided the scaffolding (lots of oral language support, modeling, direct instruction, cooperative learning groups, hands-on experiences) to insure student success. As the students read, talked, wrote, listened, learned to navigate the Net, and developed their presentations, Mr. Tran constantly monitored comprehension, collected writing samples, and made notes about developing language proficiency. This ongoing assessment embedded in daily instruction helped Mr. Tran develop curriculum, instruction, and ways to support his students as they read science, mathematics, and sociocultural texts and conducted personally meaningful scientific inquiry. He helped them understand and use the unique and technical vocabulary they discovered in their investigations. Perhaps most importantly he helped the students see themselves as capable of doing serious scientific inquiry and as successful learners.

Mr. Tran understands well the difficulty of acquiring a new language and learning academic content simultaneously. In the late-1970s when he was eight years old, his family arrived in the United States after leaving their home in Vietnam. Although he was a fluent speaker of both Vietnamese and French and knew a number of English words and phrases, his first few years of U.S. schooling were challenging and often frustrating. Therefore, when another teacher in Mr. Tran’s sixth grade team gave the students an exam from the textbook and few students did well on the paper-and-pencil test, Mr. Tran was not surprised nor was he disappointed. He knows his students have better understanding than is reflected by the test results. He knows that they, just like he once did, have difficulty articulating in English what they know and can do. For this reason Mr. Tran uses a performance-based approach to assess content knowledge as part of the cycle of instruction and assessment. Mr. Tran uses the information gained from students to inform instruction. Assessment and instruction, therefore, are woven together in an endless cycle. Learning activities and student responses are part of the ongoing assessment that helps Mr. Tran plan additional teaching and learning activities. By watching this exemplary, knowledgeable teacher, who is passionate about student learning, we can learn much about assessment of literacy in the content areas for English-language learners.
CHAPTER 5

Research Background

Demographics

Predictions based on the last national census suggest that there are already 3.3 million children, between 5 and 17 years of age, who have limited English proficiency (Alvermann & Phelps, 1998). Moreover, another six million school-age youngsters speak languages other than English at home (Minami & Ovando, 1995). Without the ability to use reading to engage in a variety of ways of thinking, our students will be incapable of communicating in our society (Conley, 1995), and communication is vital to quality of life issues—academic, economic, and social ones.

Seventeen states require English-language learners (ELLs) to pass one or more content-area tests to receive a standard high school diploma (Rivera & Vincent, 1997). These states approach testing ELLs in several ways: (1) deference of ELL students from the first administration of the test, (2) allowing test accommodations, (3) making the test available in students’ native languages, and (4) using alternative assessment procedures. Although these practices offer some benefit in making high school graduation tests more accessible to these students they only accommodate the needs of a limited number of ELLs (Rivera & Vincent, 1997).

English-language learners are diverse in their language and literacy abilities. No single description applies to all students—as is clear by the profile of youngsters in Mr. Tran’s classes. Further complications arise when you think about the distinction between second-language acquisition and second-language learning. According to Gee (1996) “acquisition is a process of acquiring something (usually subconsciously) by exposure to models, a process of trial and error, and practice within social groups, without formal teaching” (p. 138). First language development for native English speakers is primarily a matter of acquisition although formal schooling is also involved—it is not unusual for native speakers to study English for twelve or more years. For most of us, using a second language is attained by some mixture of acquisition and schooling (Alvermann & Phelps, 1998), just as most of us develop our first language through a combination of acquisition and schooling. School success depends in large measure on students’ ability to read and learn from text, that is, their content literacy.

Content Literacy and English-Language Learners

Content reading gets its name from the first priority of subject matter teachers: to teach content. Every subject (or content area) has its own content or defining set of facts, concepts, and principles that are neither static nor solid (Conley, 1995). Literacy, once associated almost exclusively with written text is now thought of in broader terms. Literacy relates to the ability to construe meaning in any of the forms used in the culture to create and convey meaning (Alvermann & Phelps, 1998). Most researchers agree that the traditional notion of literacy and its asso-
Assessment in the Content Areas for Students Acquiring English

The association with text has been replaced by the concept of multiple literacies: cultural, civic, computer, scientific, and technological literacies. Content literacy is the ability to use reading and writing to learn subject matter in a given discipline and how a student uses literacy to learn.

The work of Lev Vygotsky, a Russian psychologist, has greatly influenced how we currently view teaching and learning content literacy. A Vygotskian perspective on learning assumes the learner benefits from having someone guide the learner. He believed that mental functioning originates in social, communicative processes and that language is a tool vital to this process. An emphasis on the sociohistorical and cultural aspects of language as a mediator of even the most private forms of thinking has a profound influence on how we view literacy acquisition and development (Alvermann & Phelps, 1998). Language plays a vital role in understanding technical terms and greatly influences the success of students in the content-related fields. Language helps a learner make sense of the world, to understand and be understood. As a result, language and meaning cannot be severed from one another (Vacca & Vacca, 1993). Non-English-speaking students are expected to adapt to two or more languages and still make sense of content reading. Because developmental English speakers have to acquire English language skills and knowledge that students who arrive in school speaking English already possess, supplemental performance and assessment standards should be developed (August, 1994).

Collier (1995) provides evidence that to succeed in school, students must develop the cognitive and academic skills required for learning academic subject matter. To achieve this goal, teachers must integrate language learning with content learning, make use of learners’ experiences, and focus on higher-level cognitive skills. Instead of seeing language merely as a means of communication, teachers must see language as a medium of learning. The challenge is to identify effective ways in which instruction and assessment in language and academic content can be successfully combined, so as to introduce children to a new language and a new set of cultural experiences simultaneously. The language of instruction must be adapted without watering down the content, and materials must be used that follow the core curriculum but are adapted or supplemented for students acquiring English (Tinajero & Schifini, 1997). This is a huge challenge complicated by the fact that textbook and technical writing are among the most difficult types of literacy processes.

Nature of Expository Text

Expository text, that is text written to provide an explanation, is generally more difficult for all students to comprehend than narrative text, or text written to tell a story. Primary reasons are the unique structure and the often specialized and technical vocabulary. Expository text is also usually less redundant and less “reader friendly” than narrative.

Likewise, technical writing is more difficult to do well than narrative writing. Technical writing tends to be succinct, linear, and hierarchical. It lacks the dis-
cursive redundancies found in most narratives. Clearly written reports, explanations, and directions can be difficult even for professional writers. That difficulty is multiplied for ELLs.

**Content Area Text Structure.** In English, narrative has a predictable beginning, middle, and end structure. Expository text, on the other hand, may be structured in any of the following ways:

1. *Topically.* Science texts may have one unit on mammals and another on mass and matter. A government text may move from a chapter on the Constitution to one on the three branches of government. Such an arrangement can make it difficult for students to see connections between content from section to section.
2. *Chronologically.* History texts are usually structured from past to present.
3. *Numerically.* Charts, graphs, tables, and other graphic aids may be arranged using numbers.

Teachers like Mr. Tran have developed methods of simultaneously teaching text structure and assessing whether students understand. Examples are included in the section on practical classroom applications.

**Content Area Vocabulary.** Another issue that directly influences the reading comprehension of ELLs is the specialized and often technical terms used in the content areas. Vocabulary in content area classes may not be used outside the classroom (few of us talk about divisors and quotients or vertebrates and invertebrates except in math or biology class); therefore, students typically use or practice these terms only when doing school work. Because so many English words have multiple meanings, students can become confused. The commonly used meaning of a word may be quite different from the specialized meaning in a content area. *Infinite* is commonly used to mean unlimited or without end. That somewhat vague meaning differs from the precise definition in mathematics that defines infinite as “a set is infinite if it has a proper subset with which it can be put into one-to-one correspondence” (Bennet & Nelson, 1985, p. 56). Opportunities for confusion about vocabulary abound and ongoing assessment of student comprehension must be embedded within instruction (Figure 5.1).

**Enhancing Comprehension of Concepts and Vocabulary**

Educators have long known that a strong relationship exists between

- vocabulary knowledge and comprehension
- prior knowledge and comprehension
- active engagement with text and comprehension
- metacognitive awareness and comprehension (McNeil, 1992)

Because of these relationships, comprehension is a continuous process; it is not simply a postreading occurrence. Mr. Tran engages his students in activities de-
signed to increase vocabulary knowledge, activate existing schema, and keep them actively engaged and aware in pre-, during, and post-reading phases. These instructional activities have the dual purpose of providing assessment information. Several are described in the section on practical classroom applications.

While content area reading is more difficult for most students simply because of the nature of expository writing, it is even more challenging for ELLs. Because ELLs have historically suffered from disproportionate assignments to lower curriculum tracks on the basis of inappropriate assessment, changes in assessment have much to do with whether or not equity becomes a reality in education.

**Implications for the Classroom**

A primary classroom implication from the foregoing research background is directly related to the increasing language diversity in U.S. schools. As educators we must work at making our classrooms equitable learning environments for all students. To do that, we need to find ways to assess effectively students’ comprehension in content area reading and development of technical writing ability. That knowledge enables us to plan effective instruction.

**Equity Issues in Assessment**

Considering the large, growing, diverse groups of ELLs entering U.S. schools, almost every teacher and every school district serves or will serve ELLs (LaCelle-
Peterson & Rivera, 1994). All assessment programs in all states should report on the educational progress of ELLs in terms of developing English proficiency and content knowledge. There seem to be four major equity issues that repeatedly appear in the literature influencing learning and assessment.

1. Encouragement of development of native language abilities rather than submersion in English and eradication of language and culture
2. Equal curriculum access for all children rather than tracking and labeling ELLs
3. Equal participation in meaningful interaction with challenging subject matter, peers, and teachers rather than limited participation
4. Real world application and success in learning the challenging content areas rather than useless memorization of facts and watered down curricula

An important question to ask is what information should assessment provide to educators, parents, and students?

Information Needed from Assessment

The information that content area teachers need to know about learners is largely determined by two factors. First, students vary greatly in the extent to which they are prepared to read and write technical material, and second, the nature of content area reading requires applications of reading skills that make direct instructional assistance necessary (Lapp, Flood, & Farnan, 1996). Lapp, Flood, and Farnan identify seven categories of information that content area teachers need to know about their students and that should be considered when planning within the cycle of instruction and assessment.

(1) students’ ability to perform the kinds of integrated reading and writing tasks that make up much of learning in the content areas, (2) students’ interest and attitudes, (3) the reading strategies that students employ when they attempt to understand and apply content area reading, (4) students’ background knowledge of the subject matter, (5) students’ instructional reading levels, (6) the extent to which particular materials are appropriate for student use, and (7) students’ skill with study techniques. (p. 388)

Classroom assessment in content areas should be ongoing and flexible (Ryder & Graves, 1994). End of semester or one shot assessment does not give educators a full view of student understanding. Multiple indicators and continuous checking for understanding should be used to assess ELLs’ learning and consequently to develop instruction.

Guiding Principles of Assessment

While many approaches to assessment problems have been suggested in recent reform recommendations, six basic principles for classroom assessment may be used to summarize the research. These principles are supportive of ELLs and just
Assessment in the Content Areas for Students Acquiring English

Principle 1. Assessment Activities Should Help Teachers Make Instructional Decisions. Assessment activities should reveal insights into the effectiveness of certain teaching methods, classroom environmental features, materials selected to enhance learning, grouping strategies, and actual learning of the content. For example, Mr. Tran used insight gained from Lucinda’s remark about differences in January weather in parts of the world to develop an integrated, interdisciplinary learning project that built on students’ own experiences and interests.

Principle 2. Assessment Strategies Should Help Teachers Find Out What Students Know and Can Do . . . Not What They Cannot Do. When teachers understand what students know or how far skills have developed in a target area, appropriate planning can be prepared that extends their knowledge. The performance-based assessment that was a part of the student-group presentations allowed students to demonstrate their strengths while providing Mr. Tran with information on areas that need more work.

Principle 3. The Holistic Context for Learning Should Be Considered and Assessed. The term holistic context implies that teachers consider all factors that have an impact on teaching and learning. This includes affective responses toward the subject area, classroom environment, parental and cultural attitudes toward schooling, and physiological needs. This is particularly important for youngsters learning English as a second or other language. These students bring rich cultural background to the classroom simply by virtue of their life experiences. Rather than ignoring the background and prior knowledge of students, life experience can be used by knowledgeable teachers to enhance student achievement. In Mr. Tran’s class, students learned about the world (including science, social studies, and math content) from one another. Students and their families were sources of knowledge just as texts, maps, and websites were sources of knowledge.

Principle 4. Assessment Activities Should Grow Out of Authentic Learning Activities. Authentic assessment strategies involve the daily collecting of evidence of student learning as they perform real-world application tasks. Part of the assessment for each student would likely include a qualitative-analytic evaluation of portfolio contents. Mr. Tran’s students’ portfolios included written reports and narratives; audio recordings of their music; drawings and paintings; student-made maps, charts, graphs, and tables; and videotapes of presentations.

Principle 5. Best Assessments of Student Learning Are Longitudinal. . . They Take Place over Time. Multiple samples of students’ work taken from a variety of situations constitute valid evidence of what students can do. This approach avoids the assessment phenomenon created when teachers use the quick pencil-and-paper approach to assessment. While it is easy to give a pencil-and-paper test as one teacher in the middle school team did, such tests are very limited at providing useful information if students still learning a language cannot read and write English sufficiently to show what they know and are able to do.
Chapter 5

Principle 6. Each Assessment Activity Should Have a Specific Objective-Linked Purpose. Quality assessment grows out of careful observations, discussions, and conferences with students. As teachers discover what students can do, natural assessment questions arise concerning the depth of understanding. For teachers of ELLs, it is particularly important to keep principle 6 in mind, for if the objective is to assess the degree to which students can engage in hands-on scientific inquiry or whether they solve an algebraic equation, assessment cannot be language dependent. For example, a student may be able to design and carry out an elegant demonstration to show that mass and weight are not the same. That same student, however, may have difficulty articulating the concept in English. Mr. Tran allows children to include their native language when discussing and writing about their work. Language differences should be more than tolerated; they need to be celebrated and affirmed (Alvermann & Phelps, 1998).

These implications and principles have practical applications for the classroom.

Practical Classroom Applications

Writing, discussing, concept mapping, and reading their own thoughts are vital to the success of content literacy. Middle schoolers must be involved in assessment processes because that can help them become more metacognitively aware as they use language to communicate. A large body of research evidence exists showing that students who are active, engaged, and cognizant of their own thinking processes learn more. Helping students learn how to learn is a major objective of content area teachers.

The following assessment procedures provide a broad view of student understanding to both teacher and student. These types of assessment are also accessible to parents in ways that standardized, norm-referenced test results rarely are. Use of content reading-writing inventories, learning journals, concept-vocabulary maps, and portfolio performance-based events allow ELLs to communicate their understanding of the concepts without being language dependent. Each of these also helps students learn how to learn more effectively.

Content Reading and Study Skills Inventory

The Content Reading and Study Skills Inventory (box) can be used as an individual or small or large group activity. The greatest value is usually obtained from conversations about student responses. The teacher should help students see the importance of engaging with the text pre, during, and postreading and brainstorm ways to for them to do so.

Learning Journals

Journals can be a tremendous learning tool for ELLs in content area classes. Learning journals are more flexible than typical learning logs in which students
Content Reading and Study Skills Inventory

Directions: The purpose of this activity is to help you understand how you read and study your textbooks and to help you think of more effective study reading strategies. There are no correct or incorrect answers. Just place an X under the answer that is most true for you. For some questions, you will need to write a response.

Before Reading

1. Do you look over the chapter just to see what it’s about, perhaps stopping to look at pictures or read captions and titles?
2. Do you think about what you’ve already heard or read about the topic?
3. Do you wonder or ask yourself questions about what the chapter is about?
4. Do you know what the teacher will expect of you after reading (answer questions, summarize what you read, etc.)?
5. If you do anything else before reading an assignment, write about it on a separate page if you need more space.

During Reading

6. Do you expect (most of the time) to understand what you read?
7. As you are reading, can you identify which parts of the assignment you can understand and which parts are confusing?
8. Do you stop to read captions under pictures, look at maps, charts, etc.?
9. Do you mentally translate words or phrases from English to your first language and think about them in your first language?
10. When you do not understand, what do you do? Write your answer on a separate page if you need more space.

After Reading

11. Do you go back and reread confusing sections?
12. Do you write questions to ask the teacher or a classmate about things you don’t understand?
13. Do you make notes in your first language or in English to help you remember important information?

14. Do you make drawings to help you remember?

15. Can you explain what you read in your own words?

16. Can you usually predict the questions your teacher will ask about the material?

17. Do you talk with someone (a classmate, family member, teacher, etc.) about what you read?

18. Describe how you study for tests. Write your answers on a separate page if you need more space.

<table>
<thead>
<tr>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
</table>

may simply log in pages read, activities completed, and perhaps a comment (often forced) about what was learned. Learning journals may include assigned pages and activities because that helps students learn to organize their work. Journals also provide a place for students to record personal responses to content and vocabulary including questions. Confusing concepts and terms are noted.

Scientists, scholars, and adventurers have maintained learning journals. This time-honored method of recording observations, thoughts, and questions has been used for centuries. Students enjoy looking at copies of journals of Leonardo Da Vinci, Lewis and Clark, Sigmund Freud, Thomas Edison, and their teachers.

Because the major purpose of learning journals is to communicate ideas, problems, observations, and so on, the writing is personal and active. Usually only the individual student and teacher read them unless a student elects to share. Emphasis is placed on content (what the learner writes or illustrates graphically) not on grammar or mechanics (how it is written) (Alvermann & Phelps, 1998). Learning journals provide a longitudinal record of a student’s literacy development and understanding of content knowledge. Thought and language can be effectively used together in learning journals. Figures 5.2 and 5.3 are examples of two different types of learning journals. Luis recorded his observations in an unstructured journal. Paulina used a structured journal observation form.

**Concept and Vocabulary Maps**

Concept maps, advance organizers, outlines, semantic webs, and other types of graphic organizers have long been made by teachers and curriculum developers to illustrate structure and connections between concepts and vocabulary terms. Student-made graphic outlines of content also have powerful potential for ELLs. Student-made concept maps by their very nature require the integration of content with oral and written language. Additionally, they allow for almost seamless integration of instruction and assessment.
FIGURE 5.2  Luis' Science Observation Journal.
Name Paulina
Date 9/21/99

Salt Down and Oil Up

Purpose of experiment: to observe and record the interaction of three different substances—oil, water, and salt—having three different densities.

Procedure:
- Measure ½ cup water—pour into cup (add food coloring to provide a greater contrast)
- Measure ¼ cup canola oil—pour into cup

Record observations:

What will happen if you add salt to water and oil? Write your predictions.
- Measure ¼ teaspoon table salt
- Sprinkle a few pinches of salt on oil

Predictions:
I think that the oil will go down and the salt will go up.

Record observations:

Discuss observations and different densities of substances.

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Oil</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom of cup</td>
<td>Middle of cup</td>
<td>Bottom of cup</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 5.3 Paulina’s Learning Journal.
Journal observation form developed by Suzane Meyers, a student at The University of Texas at El Paso in Dr. Sally Blake’s class.
For example, cooperative learning groups of four or five students each can preview a chapter in their text and work together to outline key ideas by making a concept map. Figure 5.4 is a sample prepared from a chapter in a U.S. history textbook on the Cold War. At the end of the project, students can again make concepts maps (Figure 5.5).

The added detail and connecting information indicate the improved understanding one would expect at the end of a unit of study. So while concepts can be excellent instructional tools to enhance comprehension, they can also be used as meaningful pre- and postassessments.

In science, vocabulary maps (Figure 5.6) typically begin with the core concept to be learned and move outward to encompass key vocabulary.

**Portfolios and Performance-Based Assessment**

The following examples of performance-based assessment activities designed to be included in portfolios are adapted from National Science Standards (1996) and the Kentucky Education Reform Act (KERA) (1991). They are particularly suited for ELLs because each effectively integrates the use of communication skills while learning and demonstrating knowledge of science content. The activities shown are especially appropriate for introducing students to the nature of scientific activity, building background knowledge about what science is, and actively engaging them in doing science. Assessment criteria used with the activities are included.

![Image of concept map](image)

**FIGURE 5.4** A sample concept map at beginning of project.
This approach to assessment allows Mr. Tran to determine the depth of students' thinking and their ability to apply content knowledge. While use of technical vocabulary is an important element in content reading, it is even more important that teachers of ELLs determine the students' ability to think about and apply concepts. Reading assessment in the content areas must be considered in the context of the total assessment program. Improving assessment in the
content areas is dependent on understanding how formal and informal assessment fits together and the role language plays in learning (Lapp, Flood, & Farnan, 1996).

Reflections

As the public school population changes rapidly, more and more classrooms will exhibit the language and cultural diversity seen in Mr. Tran’s class. A more complex knowledge-based and diverse society creates new expectations for teaching and learning. To help diverse learners master challenging content, teachers must go far beyond dispensing information, giving a test, and assigning a grade. Teachers must know their subject areas deeply, and how to best facilitate literacy learning, and they must understand how students think as well as what they know to create experiences that produce learning. Moreover, as students with a wider range of learning needs enter and stay in school—a growing number whose first language is not English, many others with learning differences, and still others with learning disabilities—teachers need access to the growing knowledge that exists about how to teach different kinds of learners effectively (National Commission on Teaching and America’s Future, 1996). Thus performance based assessment is essential.
**Concept: Nature of Scientific Activity**

**Portfolio Task**
Students design and conduct an investigation of some aspect of animal behavior and write about the design of the investigation, results, and conclusions. Native language is allowed and diagrams are encouraged.

**Event Task**
Students are provided a plan for a paper airplane. They construct two to three airplanes with different modifications, test their flight, and identify as many variables as they can that affect the distance of flight. Students then propose characteristics and their best design for a paper airplane, defending their position on the basis of their findings.

**Event Task**
Students are provided a bag of trash. They infer where the various materials originated and construct a chart showing possible ways the garbage might be discarded. They also infer which of the ways identified is least harmful to the environment.

**Performance Criteria**
The extent to which students
- accurately identify and control variables
- accurately and consistently collect, record, and interpret data
- make appropriate and accurate conclusions based on data
- accurately measure and estimate during the problem-solving process
- state appropriate hypotheses

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**Concept: Patterns**

**Event Task**
Given a cross section of a tree, students determine the age of the tree and differentiate between wet and dry years.

**Event Task**
Students write letters to a friend in different states describing the seasonal changes in their area and how they affect their lives.

**Portfolio Task**
Students design and conduct demonstrations that illustrate the role of energy as a factor in physical changes.

**Performance Criteria**
The extent to which students
- use patterns to give meaning to phenomena
- use patterns to explain past, present, and future events
- identify and predict patterns
Concept: Systems and Interactions

**Portfolio Task**
Students select materials for an aquarium or terrarium containing both plant and animal life and explain how the organisms are related to each other. Discussions may be taped, or students may write their explanations in a journal.

**Event Task**
Students design and construct a simple machine from a variety of objects that can be used to elevate a box of books from the floor to the table (without direct lifting). Students produce a sketch and an explanation of how the apparatus works.

**Event Task**
Students identify the components of an electric circuit and the role each component plays (energy source, conductors, etc.). Students explain the impact on the circuit if components are changed.

**Performance Criteria**
The extent to which students
- identify components of a system or subsystem and the roles components play in the system
- identify interactions of systems
- identify and explain the concepts and interactions of systems and subsystems

Concept: Models and Scale

**Portfolio Task**
Students invent a nonhuman organism and describe the necessary body organs essential to its life.

**Event Task**
Students build a working model of a circuit, incorporating a battery, bulb, and wire. They draw a plausible illustration of the circuit.

**Portfolio Task**
Given a standard area map, students create a topographical map and a corresponding relief map using clay models and plastic boxes filled with water. (A photograph of the model should be placed in the portfolio with the maps.)

**General Performance Criteria**
The extent to which students
- identify and describe components necessary to the proper functioning of the model
- use models to explain or predict the behavior of objects, materials, and living things in their environment
- construct models to represent real-world objects or phenomena
- demonstrate an understanding of scale and proportion
Concept: Constancy

**Portfolio or Event Task**
Students conduct an experiment to demonstrate how heartbeat rate varies around a stable norm.

**Portfolio Task**
Students design and conduct an experiment to determine how length and/or mass and initial displacement affects the period of a pendulum.

**Portfolio Task**
Students draw illustrations of the moon’s position and appearance over two months recording with date and time in a chart format.

**Performance Criteria**
The extent to which students
- identify and/or explain the interacting factors which contribute to constancy
- identify or explain any disruptive factors

Good assessment of students learning English helps form instruction and develops students’ language and content learning. The cycle of formative assessment and instruction used by exemplary teachers like Mr. Tran provides optimum support for student achievement. Content area reading is vital to insure that all students have equal opportunity to compete and survive in a technologically changing society, and authentic assessment will give students the understanding and confidence to move into the new century.

**DISCUSSION QUESTIONS**

1. Why is expository text (content area reading and technical writing) typically more difficult for students than reading and writing narrative text?

2. Can teachers use best practices in assessment and simultaneously meet the unique needs of English-language learners? Why or why not?

3. Why is it important to engage students in pre-, during-, and postreading activities?

4. What is the purpose of graphic organizers?

5. Describe ways in which performance-based assessment can be used with portfolios.
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