

chapter 1

► Introduction: Principles of CALL

► Focus

In this chapter you will

- reflect on definitions of CALL
- learn about conditions for optimal language learning and standards for language teaching
- discover guidelines for using educational technology
- reflect on how the learning environment functions as a framework for CALL practice

► Defining CALL

Which of these are examples of computer-assisted language learning (CALL)?

- high school Spanish learners e-mailing college Spanish learners in Spanish
- teams of elementary school students doing a vocabulary matching exercise on the computer
- Malaysian students using a self-access computer lab to complete software-based spelling activities in English
- teachers creating multilingual Web pages so that the parents of their ESL learners will understand what is happening in class
- a Russian language teacher explaining a grammar point using presentation software

If you say they are all examples of CALL, you are right. What exactly is computer-assisted language learning? Basically, it means using computers to support language teaching and learning in some way. This definition applies to all languages, skill areas, and contents. Very specifically, CALL is *software tools* designed to promote language learning (ICT4LT, 2001), but CALL can be looked at in broader ways, too. Levy (1997) describes CALL as a *field* that covers “the search for and study of applications of the computer in language teaching and learning” (p. 1). In an earlier volume, Elizabeth Hanson-Smith and I (Egbert & Hanson-Smith, 1999) characterized the basis of CALL as optimal, technology-enhanced *language teaching and learning environments*; that is, language and content settings in which technology was used as effectively as possible to support learning.

Educators regularly introduce new terms to describe CALL, demonstrating that they are still exploring its boundaries and clarifying its components. Recent labels include *computer-enhanced language learning* (CELL), the more general *technology-enhanced language learning* (TELL), and specific applications such as *computer-based language testing* (CBLT) and *computer-supported reading instruction* (CRI). There are other ways to look at CALL, too. It began as software run on mainframe computers to provide learners with drills and other language practice. Since then, CALL has come to include many different technologies: laptop computers, personal digital assistants (PDAs), digital audio recorders, modem and cable Internet access, local area networking, and more. It has expanded to include using individual drill software as well as using the Internet as a medium to support native and nonnative speaker interaction. Trying to reflect these changes and additions in one definition is an enormous task.

Some authors have attempted to explain CALL by dividing its processes and software packages into categories. For example, some have described CALL according to what students do (fill in the blanks, text manipulation, tutorials, word processing), some according to the skills that it addresses (listening software, reading software), others by where it is used (home, office, school, lab), and yet others by the philosophy that underlies its construction (e.g., Warschauer, 1996, who categorizes it as behaviorist, communicative, or integrative). Each of these definitions and categorizations is useful and correct in its own way. Fortunately, in this confusing assortment of terms and tools, three themes emerge:

1. CALL is focused not on technology but on language learning. The words *enhanced* or *assisted* indicate that technology only facilitates the language learning process. Educators need to avoid putting technology ahead of learning in their classrooms (in other words, educators should not be *technocentric* in their thinking). A more accurate term for using technology in language learning might be *language learning through technology*, reflecting the true position of language in such activity.
2. CALL occurs in many contexts and with many diverse participants. Therefore, practitioners need to be prepared to meet a variety of needs.
3. CALL pedagogy should be grounded in theory and practice from a number of fields, especially applied linguistics, second language acquisition, psychology, and computer science.

Why so much fuss over defining CALL? Like the computer, the book and the chalkboard are important tools in language learning classrooms, but educators do not hear about *book-enhanced language learning* or *chalkboard-enhanced language learning*. However, when these tools were first introduced, they also caused controversy. Books, for example, were thought to damage memory. It is only natural that a tool as new, complicated, and powerful as the computer would cause an even bigger fuss. When teachers and learners have accepted computers as just another learning tool, as they have accepted the book, practitioners in the field will worry far less about how to define CALL. In the meantime, I will define CALL with a set of practical guidelines to help teachers and learners understand and implement CALL in language classrooms.

► Research in CALL

Although CALL has been an acknowledged field for many years, research that specifically addresses CALL issues has only begun to take on the rigor and effectiveness that both teachers and researchers need. Educators' views of what CALL is and what it should be have evolved, and researchers have developed new research designs and methods that allow them to investigate complex environments that include technology. Much of the research to date is anecdotal; it consists of narratives from teachers, students, and other stakeholders about what happens in CALL environments. Researchers have also conducted empirical studies of individual tools or discrete language items, but many have commented that applying this type of research to CALL classrooms is problematic (see, e.g., Egbert & Petrie, 2005). Although the benefits of using technology in language classrooms have been widely accepted (Lui, Moore, Graham, & Lee, 2003), the literature reveals that technology does not enhance language learning across contexts as much as it inspires positive attitudes toward technology in those who use it. (For excellent overviews of previous research studies, see Basena & Jamieson, 1996, and Liu et al., 2003.) CALL research is filling these gaps. In the meantime, CALL educators can employ research-based conditions, standards, and principles as they work to use computers as effectively and efficiently as possible in language classrooms.

► Principles of CALL

Using technology to support language learning comprises four components:

1. the conditions that help create optimal classroom language learning environments
2. the national ESL standards (Teachers of English to Speakers of Other Languages, [TESOL], 1997) that they support
3. guidelines for technology use in educational settings
4. the National Educational Technology Standards (NETS; International Society for Technology in Education [ISTE], 2002b) for technology learning

Conditions for Classroom Language Learning

Any language lesson should support conditions for optimal classroom language learning environments regardless of the tools used. These

conditions, based on research from a variety of literatures, have been characterized in different ways, but a general list (Egbert & Hanson-Smith, 1999) includes the following eight items.

1. **Learners have opportunities to interact socially and negotiate meaning.**
Although individual practice (e.g., in homework) may help learners master certain elements of structure, more effective learning takes place when learners can use language actively and creatively with people they come to understand. Anyone who has struggled to learn a foreign language has probably had the experience of successfully completing grammar exercises but then being totally tongue-tied when trying to form a simple request in the target language. To prepare learners to perform in authentic settings, they must be allowed to practice in social settings.
2. **Learners interact in the target language with an authentic audience.**
Learners often have difficulty paying attention when a peer is giving a presentation in class because the information is really addressed to the teacher. They will learn more effectively if they have a stake in what other learners are presenting so that (a) learners interact with each other and (b) learners have a reason to listen and respond. During initial language experiences, negotiation with other language learners in the target language may be at precisely the right level for the struggling student. In more advanced stages of learning, students must have access to sympathetic fluent speakers who are willing to adjust their language to the students' ability.
3. **Learners are involved in authentic tasks.**
Developing authentic tasks is the most important learning condition because the task influences all of the others. For our purposes, an *authentic task* is one that learners perceive they will use outside of class in their real world or that parallels or replicates real functions beyond the classroom. Even the much maligned grammar drill and practice can be an authentic task if learners see it as enabling them to use language outside of the classroom. A teacher can shout "listen to me, listen to me" to try to get students to pay attention and learn (I have seen this happen), but giving students an interesting, active task that they have the skill, support, and time to complete is more effective. The right task will motivate them and get their attention.

4. Learners are exposed to and encouraged to produce varied and creative language.

Remember having essay anxiety? Being nervous about speaking in front of the class? Picking “C” for all the multiple choice questions you really did know the answers to but would have stated in a different way? Not everyone acquires or can demonstrate knowledge and experience in the same way; this is especially true for learners from different educational and cultural backgrounds. Learners therefore need multiple forms of input and a variety of ways to express themselves as they try on a different language and culture and possibly even a new way of approaching knowledge and the learning process.

5. Learners have enough time and feedback.

Some students work more slowly than others, and some need more or less guidance for different tasks. Giving students the right amount of time and administering appropriate feedback are among the most difficult but also most important conditions to meet.

6. Learners are guided to attend mindfully to the learning process.

All too often, students are told what to learn but not how to learn it. Although each student tends to rely on his or her own particular habits or preferences in learning style, they can learn new ones. Optimal learning, then, is also about how to learn more effectively. Students who perceive a task’s *how* and *why* will also be more attentive and more motivated to learn.

7. Learners work in an atmosphere with an ideal stress/anxiety level.

The amount of stress or pressure that helps students learn effectively is different for each person. Language learners should feel comfortable enough to take risks with the target language, but they should not be put to sleep by overly simple-minded tasks and exercises. Educators can create optimal stress (*eustress* or good stress) by matching the degree of difficulty, or challenge, to the students’ skills (Cziksentmihalyi, 1990), giving them enough difficulty to keep their attention while providing them with tasks that are possible to complete.

8. Learner autonomy is supported.

Many language classes push learners along a rigid schedule requiring a certain number of book chapters, exercises, and essays in a given amount of time. This teacher-directed syllabus may be effective for some students, but it may ignore the needs of others. Allowing learners to control some

facets of their learning can help the teacher to provide for different language levels, interests, and learning styles. For example, learners can choose their own books to read, create their own composition topics, or even choose what kind of tasks they will do and when. Some schools, the University of Oregon English Language Institute, for example, have even used completely individualized learning contracts. Teachers assist students in defining and refining their learning goals and in assessing their own progress (Averill, Chambers, & Dantas-Whitney, 2000).

These eight conditions, which work as a system, support TESOL's pre-K–12 (TESOL, 1997) and adult ESL standards (TESOL, 2003). TESOL is an international professional organization for teachers of English as a second or foreign language.

Integrating ESL Standards

ESL Standards for Pre-K–12 Students (TESOL, 1997) suggest that language learners should be able to communicate effectively in social and academic settings and that they should also learn ways to continue their learning beyond the school setting. The standards, like the conditions just stated, encourage language learning tasks that provide opportunities for students to interact socially in the target language for a variety of purposes.

These standards and conditions can be implemented using many different techniques and tools, for example,

- letting students play roles that encourage active learning
- providing a variety of opportunities for learners to interact with native English speakers
- focusing on language use instead of language study
- using higher order thinking skills
- employing different media
- encouraging meaningful language use
- providing flexible timing for tasks
- promoting a variety of sources of feedback and prompting, including other students
- offering adequate information or research resources
- seizing upon opportunities to assist learners in making crucial choices in the learning process

The TESOL standards present goals for students, and the eight conditions describe classroom learning environments in which those goals might be met.

Both require learners to participate in meeting their own language needs. Computer technologies can assist learners working toward these goals within environments that support their learning.

Meeting Learning Conditions With Computer Support

Computer technologies can help teachers create optimal learning environments in many contexts, but when planning computer-enhanced language learning activities, teachers must put learning goals ahead of technology. As you read the following real-life example, note how the project meets the conditions and standards for language learning.

Example 1

- In developing a systems analysis and design project for precollege international students in an intensive English program (see Egbert & Jessup, 2000), the teacher focused on students' interests (they were college-bound business majors), their needs (to learn the vocabulary and culture of U.S. business, to work on all four language skills), and their abilities (academic language competence ranging from intermediate to advanced*). The students were asked to build Web pages for organizations in the community. They had the opportunity to choose a client from among several that the teacher had lined up ahead of time or to find one themselves. During the project, learners received language input through activities such as participating in interviews with their clients, reviewing Web pages of organizations similar to their clients', talking with their teams and their class, and listening to technology lectures. Learner teams interacted with their native-English-speaking clients at least three times—during an initial interview about the organization, an interview after the initial page development, and a final review after the project was completed. The teacher organized the teams and provided a loose structure for the activity, but learners controlled their work process and the design of their Web pages. The teacher also led workshops for the project's technical

*For level definitions, see *ESL Standards for Pre-K–12 Students* (TESOL, 1997).

aspects and provided support for learning difficult concepts, vocabulary, and skills. The teacher and the class provided feedback on the initial designs and the completed projects. Throughout the project, learners used language for activities such as summarizing their interviews, preparing graphic layouts, and compiling a final portfolio of their projects.

This computer-enhanced language learning project met the conditions for language learning in many ways. The task provided useful skills, content, and contacts for learners in an authentic, real-world setting. Learners interacted with peers and with native English speakers who were an authentic audience because they, too, had a stake in the outcomes. Learners had many different ways to express themselves and many sources of language input—listening, speaking, reading, writing text, and creating graphics. They worked with flexible timelines, technical support, and comprehensible feedback from clients, peers, and the teacher. Furthermore, the task provided a number of opportunities for learners to make choices, and they always had a reason to listen to each other. In addition to meeting the conditions for effective language learning, Example 1 also demonstrates appropriate uses of technology in language teaching and learning.

Example 2

- Learners in an elementary school in an EFL setting were working in small groups studying vocabulary that they had to know for a quiz. Rather than having them memorize the spelling and definitions of the words by recitation, as they usually did, the instructor had taught the students to use *Puzzle Power* (Version 1.0). The students used the software to create word puzzles they could use to practice the focus vocabulary. Although crosswords were the most popular, the students also felt that the anagrams and Kriss Kross puzzles that their classmates had made were helpful for learning vocabulary.

Instructors may not be able to choose their students' goals, but they often have wiggle room in how these goals are met. In the setting described in Example 2, while using the software and the products of their computer work, the students were thinking intensively about the vocabulary, working

for an authentic audience (their classmates), interacting socially, and receiving feedback from peers and the teacher. Students also had choices about which puzzle type to make and how they would define the vocabulary words. This simple change in the way this task was structured made vocabulary learning more fun and motivating for the students and it proved an effective language experience.

Guidelines for Using Educational Technology in Language Classrooms

Providing learners with optimal learning conditions and opportunities to meet the ESL standards for language learning is crucial to CALL, but it is only part of the process. When designing instruction for CALL contexts, teachers must also consider how to use technology so that it supports effective learning. The five guidelines described below, compiled and summarized from the educational technology literature, are similar to those for general educational technology and mainstream classroom settings, but they may be applied differently in language learning contexts. Computer support that is considered effective in the language classroom may differ considerably from that in a music or history classroom, where language is not the focus. Nonetheless, all of these guidelines are important components in any classroom where language is central.

1. Use technology to support the pedagogical goals of the class and curriculum.

Teachers using computer labs are often assigned a specific day and time that their class will use the lab, regardless of whether it fits into the teachers' current learning plan. Admittedly, administrators have a duty to make sure that resources are distributed fairly and that they are used as much as possible, but they are often less concerned with how well the technology supports learning. Rather than designing instruction to use the technology and to learn technology skills (a technocentric approach), the technology use must be subordinated to the learning goals. In other words, teachers should not use the computer simply for its own sake.

2. Make the technology accessible to all learners.

Because learners are individuals, CALL activities should address more than one type of intelligence and more than one style of learning (see Gardner, 1993; Reid, 1997). The technology should be used to address the learners' needs and be useful for a variety of instructional purposes. For example, some students prefer visual activities and others prefer

verbal ones; hence, technology that allows learners to choose whether information is presented through pictures or written text would meet more students' needs than technology that does not offer learners a choice.

3. Use the technology as a tool.

Computers are often said to play at least three roles in the classroom: tutor, teacher, and tool (Levy, 1997). The computer as tutor presents drills and practice, usually with some explanatory rules. This role is useful in some cases because remediation and more practice have been shown to improve some students' proficiency. However, drill and practice alone has not been shown to increase language learning. The computer cannot actually serve as a teacher, either, because it is not intelligent or capable of individualized, creative feedback. Turing (1950) suggested that a computer could be deemed intelligent if it could fool someone into thinking that a person rather than a machine were responding when it is asked questions. (This is known as the *Turing test*; technology that passes this test is not yet available in schools.) The most useful way to look at technology is as a tool that supports learning in a wide variety of ways.

4. Use technology effectively.

Effective means that students learn language better or faster using the technology than they would have using the tools that would ordinarily be available. Even in the mundane area of grammar drills, for example, the classroom teacher can provide a limited amount of feedback to each learner because only one student at a time can answer a grammar practice exercise and receive the teacher's assessment. By using a grammar software package in the computer lab, however, each student can obtain instant and appropriate (although not creative) feedback. In this case, the grammar software might provide more effective grammar practice than the teacher could in the classroom. CALL technology can perform functions previously undreamt of in the classroom, which is why CALL users are so enthusiastic about it.

5. Use technology efficiently.

Efficient indicates that technology accomplishes learning goals with less time and work for teachers and learners. For example, a listening program on a computer can instantly replay a passage while an older technology, such as the audio tape, may waste the students' time because it requires rewinding and hunting for the right segment many times.

Another example is simulation software that enables the computer to keep track of thousands of calculations that affect the outcomes. Using this software, the learner can focus solely on the language and content, while, in the background, the computer remembers scores, locations on the screen, turn taking, timing, and so on.

Language teachers designing CALL lessons should consider these guidelines; how these guidelines play out, however, will differ according to not only the course's content, but also to other contextual features such as grade level, student proficiency level, and curricular goals.

Completing a WebQuest (Dodge, 1998) is one effective way to use the computer for language learners across contexts. It uses two of the most powerful electronic tools currently available: the Internet and the word processor. A WebQuest is an inquiry-based task that uses authentic Web and non-Web resources to transform knowledge in some way. Each learner has one or more roles and is actively receiving and using language throughout the task. Example 3 shows how a group project can enable all learners to participate.

Example 3

- In Cohee's (n.d.) *Wandering the World WebQuest* for ESL students, learners are placed in teams and asked to develop an itinerary for a trip with their teammates. They are to prepare travel plans for New Delhi, Mexico City, and Beijing. Within each group, one member is responsible for figuring out what to pack, one for deciding how much and what kind of money they will need, and the third for choosing interesting tourist sites. Combining all the information they find, team members negotiate the order in which they will visit these destinations, what they will pack, how much money they will take, and what they will see. After completing their itinerary, teams write postcards home from each place they "visit."

In this example, learners are immersed in the language throughout the task; the Web sites they visit on the Internet will be written in the target language and will provide both textual and graphical support (and possibly also musical enhancement) for students with different learning preferences and abilities. Students negotiate meaning with their teammates while solving

a problem, in this case, seeking information and organizing it into an itinerary. They communicate and receive language input both orally, as they compile team information, and in written form, as they write their postcards. In addition, giving each team member a different role to play will keep learners constantly on task. The students have easy access to information and can interact immediately with an authentic audience appropriate for their experiences and language level. Using these technology tools is appropriately efficient and highly motivating in ways that book research using pencil and paper cannot match. Under these conditions, using CALL would likely enable effective language and content learning.

Integrating the National Educational Technology Standards

Although using technology as a tool can help our language learners to achieve, it can also help them to meet many of the ISTE's (2002b) NETS for technology-literate students. The NETS were developed to assist educators in "establishing enriched learning environments supported by technology" (ISTE, 2002b). CALL educators share this goal. Upon leaving school, the NETS require that students will be able to

- use a computer and peripherals
- practice responsible use of technology
- use electronic resources appropriately
- design, develop, and publish products
- gather information
- collaborate with others

These standards fit together nicely with the TESOL standards, technology guidelines, and learning conditions already noted. For example, the TESOL standards and the conditions suggest that students use different kinds of media in their learning, and the NETS advise students to use a computer and peripherals, which provide access to a variety of media. In addition, the TESOL standards recommend that students learn to use language and pragmatics appropriately—which might also meet the NETS of using resources appropriately and responsibly. The NETS goals of publishing, gathering information, and collaborating provide language learners with effective opportunities to learn language as described by the conditions and the TESOL standards.

► Conclusion

Standards, guidelines, criteria, definitions—it seems that teachers have much to think about. However, the conditions, standards, and guidelines overlap, which suggests that using technology for language learning relies on certain fundamental principles and that choosing one set of standards, conditions, or guidelines as a foundation for designing a CALL activity might help teachers to meet many of the others. In this text, the eight language learning conditions form the framework for discussions of both theory and practice, reflecting the belief that CALL should focus on language learning. For easier reference, these conditions will be referred to throughout the text as

- interaction
- authentic audience
- authentic task
- production and exposure
- time and feedback
- intentional cognition
- atmosphere
- autonomy

These conditions are described in more detail throughout the book, and tips and techniques to help teachers meet these conditions are discussed in each chapter. Where appropriate, discussions will also mention relevant standards and guidelines to demonstrate clearly how these principles can be applied to CALL thinking and practice. Just as in any classroom, these conditions, standards, and principles are essential for ensuring that using technology in language classrooms always facilitates learning.

► Teachers' Voices

The fact is, technology does mess up and sometimes my whole lesson goes down the drain because things aren't working the way they should. I think you have to be aware and have a back-up plan in the beginning . . . what will I do if things don't go as planned? I'm amazed how flexible my students can be and how willing to try . . . [and] try again.

I think one of the reasons I have felt overwhelmed with the use of technology in the classroom is that I would think about how to use the technology versus how to best integrate technology into the learning

process. By starting first with the goal or standard I want my students to master and demonstrate their learning, I can now better see how to integrate a variety of methods to teach the concepts, and for students to demonstrate what they learn, technology being one of the methods.

The ISTE standards are very comprehensive. I am surprised that more schools are not familiar with them. When my husband was involved in hiring an interim technology teacher, I suggested that he ask the candidates about the ISTE standards. He received many blank stares from candidates for the position. We are using the ISTE standards in our school/district to create grade-level proficiency goals for technology. Unfortunately, technology goals are often tacked on rather than infused into content-area curriculum goals. While there are specific technology goals established by a technology committee, there needs to be ownership over who will be responsible for addressing these goals.

When deciding whether or not to use software, I think it is important to evaluate if technology would be better than other methods, such as hiring an aid to help the students or having native English speakers work with English language learners. I do realize that technology is a wonderful creation, but not all students work best with a computer screen.

I think that technology provides another medium for students to express themselves—by showing their work or interacting with concepts/content through the computer. For those students who aren't solely auditory or visual learners, they can go to a computer and often engage in multiple forms of intelligence and learning styles (through multimedia).

Maybe you can help answer this question for me. In the chapter, one of the principles or guidelines stated that if the computer doesn't support learning, it shouldn't be used just to be used. I completely agreed with this statement as I read it, but later began to reflect upon when it wouldn't be used to support learning. For example, if all students are doing is just playing around on a computer, aren't they still meeting some of the ISTE national standards for technology, by just learning how to operate and work with a computer? True, it would be better if students were also doing something with content or language learning at the same time . . . but, still, even if all they are doing is exploring how a computer works, aren't they still learning something valuable?

I agree that exploration and practice itself is a task that will facilitate future use of the computer for students in general. I believe that teachers will be

the ones to guide the children through the process of familiarizing themselves with the “how” and “why” things work. At the same time I agree with Condition number 7 in that “language learners should feel comfortable enough to take risks . . . but they should not be put to sleep by overly simple-minded tasks.”

Computer access or no computer access, students first need to know how to ask questions that will get to meaningful answers. Even if we don't have computers for all our students all the time, we can still teach these skills.

You can't force curriculum to relate to a learner's life, but you can use the learner's life to reinforce curriculum.

chapter 7

▶ Content-Based Instruction

▶ Focus

In this chapter you will

- learn about content-based instruction
- review the development of language objectives for content-based lessons
- reflect on the use of content-based software for language classrooms

As you read the scenario, reflect on how using technology supports content and language learning in the project.

During her vacation, Ms. Peng, a middle school social studies teacher, completed the content based language teaching through technology (CoBaLTT) professional development modules (University of Minnesota, n.d.). She feels that what she learned will help her to teach content and language more effectively for her seventh graders, some of whom are English language learners. Ms. Peng wants to put this new information to use while she is designing lessons for her upcoming U.S. history course. The school curriculum specifies that the course should include studying U.S. pioneers, and Ms. Peng feels that technology can not only help her to address the students' content and language needs but also help them to have some authentic pioneer experiences. After she develops her objectives for both content and language for her unit on pioneer life, she decides to use a networked version of Broderbund's popular Oregon Trail software (5th edition) to supplement the textbook. To help students understand the issues and content necessary to have a successful journey on the Trail, she scans the museums on *MuseumLink's Museum of Museums* site (<http://www.museumlink.com/>) and finds a site provided by the National Museum of American History (Smithsonian Institution, 2002) where students use knowledge and logic to build a sod house, a common form of pioneer housing. To help her students reach the language objectives for the sod house lesson, Ms. Peng scans the graphic organizers available from North Central Regional Educational Laboratory (Learning Point Associates, 1988) and CoBaLTT (Cammarata, 2003). She decides that the "Decision-Maker's Flow Chart" (Cammarata, 2003) will support student language during the sod house exercise by integrating a writing component, scaffolding group discussion, and encouraging students to use lesson-compatible language. Although Ms. Peng will not use technology for all of her lessons, she feels that technology will help her learners stay engaged in pioneer life and meet the unit's objectives.

► Overview of Content-Based Instruction

Other chapters in this book have touched on the use of content-based software and Web sites to support learning activities such as inquiry, production, and communication. This chapter focuses on using content-based

technologies for content and language learning. Content-based language instruction (also known by many other names, e.g., *content-centered instruction*) attempts to meet students' needs in both content and language, and it can occur in both language and content (at the elementary school level called *mainstream*) classes. There are variations on the theme, ranging from using content area texts and materials to offering adjunct language support courses along with the content courses, to providing theme-based or sheltered language courses. In content-based language learning classrooms, content is purposeful, not just a vehicle to learn language; rather, the language is the vehicle for content learning (Crandall, 1994). In other words, content area teachers and language teachers need to learn some of each other's expertise so that they can not only meet their students' needs but also successfully work together in doing so.

Language teachers have many reasons to focus on content. Because each content area has its own jargon, culture, and methods and employs language structures in specific ways, language plays an essential role in content learning. In addition, as Crandall (1994) mentions, content makes tasks meaningful, authentic, and accessible to learners. It also helps them to acquire academic language proficiency while learning language, rather than having to learn the language first and then learning academic concepts (Cummins, 1999). Furthermore, each content area has its own standards (see ISTE, 2002a), and the sooner learners begin working toward these standards, the more they can achieve. During her unit on pioneer life, for example, Ms. Peng is working toward these social studies standards for middle grades while she is teaching the language needed to reach them:

- Describe how people create places that reflect cultural values and ideals as they build neighborhoods, parks, shopping centers, and the like.
- Examine, interpret, and analyze physical and cultural patterns and their interactions, such as land use, settlement patterns, cultural transmission of customs and ideas, and ecosystem changes.
- Describe how historical events have been influenced by, and have influenced, physical and human geographic factors in local, regional, national, and global settings. (National Council for the Social Studies, 1994)

Ms. Peng is still working within the conditions for optimal language learning environments while she develops her content goals. The ultimate goal of integrating content and language is to help students become academically proficient with the content of the discipline.

► Supporting Content-Based Language Instruction

The literature on content-based instruction includes many ideas for how to support both language and content learning. Below are two especially important techniques.

1. **Teach content in a culturally responsive manner.**

Teaching in a culturally responsive manner means using literature that is culturally relevant (Echevarria & Graves, 2002), using first language cognates where it helps student comprehension, and adapting lessons to reflect the contributions of all relevant groups. For example, Mexicans, Puerto Ricans, and people of other backgrounds and nationalities fought for the United States during World War II, and lessons on the war should reflect this diversity. Web and software resources can help teachers be culturally responsive by allowing them to access culturally relevant information quickly when needed; these resources may also suggest places to include such information that the teacher might not have considered. Using software to make family connections (as suggested in chapter 10) can also help teachers understand learners' cultural resources. As part of the unit described in this chapter's opening scenario, Ms. Peng will include culturally relevant material in each lesson; for example, she will address who the pioneers were, where they came from, what contributions they made, and also what problems they caused.

2. **Adapt materials so that they are appropriate for learners, but do not sacrifice academic content.**

To make materials more accessible to students, Echevarria and Graves (2002) suggest that teachers

- use graphic depiction
- outline the text
- rewrite the text
- use audiotapes
- provide live demonstrations
- use alternate books

It is important, in addition, that the grammatical structures in the adapted materials include the types of structures found in the original text.

Teachers do not have to make all of these changes themselves—they can enlist more proficient students to help, work in teacher groups and share materials, and find many of these materials already posted to the Web.

► Tips for Designing Content-Based Language Instruction

In addition to the two techniques just mentioned, an important skill for teachers to develop is the ability to create measurable objectives that address both language and content. The literature provides suggestions for how this may be done, and many tools exist for this purpose. One of the most useful is Short and Echevarria's (1999) *The Sheltered Instruction Observation Protocol*, which helps to develop content-based language instruction by providing a thorough and pedagogically sound set of criteria. Another useful tool is the lesson plan outline used in the CoBaLTT project database (Johnshoy, 2001). Each plan lists objectives for content and culture and then breaks language objectives into two categories: content obligatory, which students must use to complete the lesson, and content compatible, which are related language objectives that students can focus on. The lessons also include objectives for strategies and social development. To this set of objectives teachers can also add technology objectives that meet technology standards. In short, whether teachers formally document what their students need to learn using these tools or use a less formal system, teachers of content-based language lessons must keep in mind both content and language objectives.

► Examples of Using Content, Language, and Technology Objectives

Language teachers may have difficulty setting content objectives, and content teachers may have difficulty setting language objectives. For this reason, among others, language and content teachers should coordinate their instruction and cooperate in developing objectives. Finding lessons on the Web that have objectives outlined can also facilitate this process, as can practice developing objectives.

Examples of content and language objectives for CALL lessons follow; these examples also integrate sample content-area standards. The sample activity included in each example suggests technologies that may be used to meet the objectives. Although not specifically mentioned here, each lesson is developed with the conditions for learning (chapter 1) in mind.

Content Area: Science

Objectives

- **Content:** Identify simple machines, understand and apply the equation $\text{force} \times \text{distance} = \text{work}$, understand the relationship of force and distance to work, set up an experiment, and observe and chart the mechanical advantage gained from using simple machines. (Some of the objectives are taken from the teacher's guide for the Science Court: Work and Simple Machines, Version 1.0.3 software mentioned later.)

Language: *Content Obligatory:* Define and use with increasing accuracy these words: *work, force/effort force, mechanical advantage, simple machine*. Use present tense to describe events that happen regularly. Predict, summarize, listen for facts, exemplify. *Content Compatible:* Participate comfortably in discussion, use appropriate turn-taking, ask questions, and disagree politely.

Standards: National Academy of Sciences (1996)

Goal: A1. Abilities necessary to do scientific inquiry:

- ask a question about objects, organisms, and events in the environment
- plan and conduct a simple investigation
- employ simple equipment and tools to gather data and extend the senses
- use data to construct a reasonable explanation
- communicate investigations and explanations

Sample Activity

During this lesson, the learners participate in multimedia tasks presented in the Science Court: Work and Simple Machines software (Version 1.0.3) and accompanying external documents. The software presents cartoon video footage of a four-part trial in which scientific knowledge determines the outcomes. Students work in cooperative groups to collect data, answer questions, make predictions, and demonstrate understanding of the concepts presented.

Content Area: Mathematics

Objectives

- **Content:** Choose appropriate arithmetic operations, compute answers, communicate about math, perform multistep problems with multiple operations, estimate, and present mathematical ideas orally.

Language: *Content Obligatory:* Define and use with increasing accuracy the following vocabulary: *number, step, unit, multiply, divide, add, subtract, quantity*. Use past tense to describe orally and in writing mathematical processes (e.g., I took 10 away from b and divided by a). Understand and follow the steps in the problem-solving process. Watch and listen for essential information, take accurate notes, and explain mathematical answers orally and in writing without using numbers. *Content Compatible:* Use appropriate group processes, demonstrate accurate subject and verb agreement (e.g., She tooks, no she *took*, the money to the bank), demonstrate accurate number agreement, express reasons for choices, and construct simple sentences.

Standards: National Council of Teachers of Mathematics (1998)

Standard 6: Problem-solving. Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students

- build new mathematical knowledge through their work with problems
- develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics
- apply a wide variety of strategies to solve problems and adapt the strategies to new situations
- monitor and reflect on their mathematical thinking in solving problems

Standard 8: Communication. Mathematics instructional programs should use communication to foster understanding of mathematics so that all students

- organize and consolidate their mathematical thinking to communicate with others
- express mathematical ideas coherently and clearly to peers, teachers, and others
- extend their mathematical knowledge by considering the thinking and strategies of others
- use the language of mathematics as a precise means of mathematical expression

Sample Activity

As part of this lesson, learners complete tasks presented in the software package Fizz and Martina's Math Adventure: Project Sphinx (Version 3.3). Much like with the Science Court software, Math Adventure presents students with a set of multimedia scenarios during which they must note and use mathematical data to help their team solve the characters' problems.

Content Areas: Geography, Social Studies, Mathematics

Objectives

- **Content:** Use trial and error to develop a balanced town ecology; research facts related to decisions; track, record, and report on processes and outcomes; and explain outcomes in terms of geography, culture, quantity, and so on.

Language: *Content Obligatory:* Define and use with increasing accuracy the following vocabulary: *town, city, goods and services, balance, development, costs, pollution, quantity, description, data, pattern, ecology, housing, resident, labor*. Express and support opinions. Indicate agreement and disagreement. *Content Compatible:* Use descriptive words (e.g., *big, small, extra, difficult*) appropriately, use past tense to describe group processes (e.g., *We agreed to add the school*), and make suggestions.

***Standards: National Council for the Social Sciences (1994);
Qualifications and Curriculum Authority (2001)***

Attainment level: knowledge and understanding of
environmental change and sustainable development

Sample Activity

SimTown (n.v.), mentioned previously, is a virtually text-free simulation that allows users to build a town from the ground up, succeeding or failing based on the balance that they achieve among all the important components. In cooperative groups, learners make decisions about what to add to the town, why to add it, and where it should be placed. Group members must research successes and failures in other forums and explain the outcomes.

Content Area: Music

Objectives

- **Content:** Listen to and choose music appropriate to a chosen culture, explain the music chosen, use authentic personal materials from the target culture to support ideas or issues, research ideas and issues, choose key concepts related to music, and summarize and present in a multimedia project.

Language: *Content Obligatory:* List vocabulary relevant to topic, use present tense to describe everyday events, take notes from authentic sources, and use comprehensible pronunciation during presentation. *Content Compatible:* Use pronouns appropriately (e.g., instruments as *it* or *they* rather than *he* or *she*), use article/noun agreement accurately (e.g., *a* flute, *some* instruments), and use and explain phrases and idioms appropriate to the target culture.

Standards: National Association for Music Education (n.d.)

Standard 6: listening to, analyzing, and describing music

Standard 9: understanding music in relation to history and culture

Sample Activity

Using any of the many multimedia tools available, learners create a presentation that presents an overview of the music of a chosen culture, preferably one with which they are familiar or have had experience.

► Tools for Content-Based Technology

Many Web sites and software programs emphasize content learning in effective and authentic ways, from the global *Cable News Network* (<http://www.cnn.com/>) and the *U.S. National Aeronautics and Space Administration* (<http://www.nasa.gov>) to Encarta (n.v.) and Sammy's Science House (Version 1.4), and many more can support content-based learning, such as PowerPoint, FrontPage, and other multimedia development packages. However, many language educators ask whether commercial software and Web sites intended for native-speaking audiences can or should be used in language classrooms.

The answer is that teachers should use such software and Web sites only when they have carefully planned how to use them so that they meet the conditions for effective language learning (chapter 1). Meeting those conditions means, in part, that teachers have provided any necessary organizers, prompts, or adaptations to make the language and content accessible to the students; that the content and language are relevant and authentic; and that the objectives for the language and content are clear. If these conditions are met, the technology's multimedia-multimodal-nonlinear presentation of information will probably result in more gains than losses.

► Conclusion

Content cannot be learned without language, and even language can serve as content for lessons. In addition, learners usually demonstrate understanding of content by using language, and they demonstrate language learning by discussing or writing about content. In other words, the relationship between language and content is both receptive and active. Because the two are intertwined, CALL teachers need to be mindful of the difficulties that learners can face in meeting both language and content objectives, particularly if these objectives are not made explicit. Teaching in a culturally

responsive manner, including making sure that software and Web sites do not present unexplored biases, can help learners achieve in both language and content areas.

► Teachers' Voices

I like PBS and National Geographic for the multimedia presentation they offer, lesson plans recommended, connection to television shows, and the variety of themes to represent.

I always provide students with books, encyclopedias, atlases, magazines to conduct research as well as Web sites, Encarta, McNally Atlas CD. Some of us still prefer written material we can touch, quickly refer back to. I find that when I read longer materials on the computer that I tend to click on links and eventually lose my original place.

I really enjoyed this Web site and wanted to emphasize it to all of you. The Web site is www.nationalgeographic.com; go into the NG Kids [section]. I found some exciting experiments that our students could do at home with materials they would all have access to. Also they can be performed in class if you choose. This site has a lot for all ages. The graphics are wonderful and the feature stories are very engaging. There are contests, jokes, and many links. I hope you find it as rewarding for our ELLs (and all other students) as I did.

I know this is way above pre-primer, but I was really amazed to find that Encarta has a read-aloud option. What is cool is that you can change the pitch of the computerized voice (so it sounds more like a man's or a woman's voice), and you can change the speed, so it can read really slow. You can read selected parts of the text or the whole thing. I wish I had known about this earlier. I have not used all aspects of Encarta with many of my kids, because the reading level is too high; however, I think a lot (but not all!) could listen to it and get something out of it.

I have found that multimedia authoring software, for me, is time consuming and not always the best use of my time. . . . Granted that authoring software is more flexible; I just do not know if the time investment is always worth it. My students have used PowerPoint, Excel spreadsheet for graphs [and] data; we have a class scanner, a digital camera, [color] printer. Students use the technology for their research projects. I always provide

specific Web sites they may use for their research—otherwise they are all over the place and never find the needed information.

The cover story in April, 2003, *NEA Today* is about computers and technology. You can access the article at <http://www.nea.org/neatoday/0304/cover.html>. The things they are doing in regular classrooms is awesome—animate long division problems, diagram the parts of a cell, complete a spelling quiz their teacher “beams” to them . . . WOW.

