Chapter 1

Introduction: Foundations for Teaching and Learning

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Focus

Wiki, weblog (blog), RSS, social software, chat room, m-computing, pop mailer, phishing, Web 2.0, virus—educational technologies involve a lot of scary-sounding jargon. In fact, technology presents a whole new language, but the language of technology, although important, is not the most crucial information that educators need in order to use technology effectively in their language classrooms. More important is an understanding of good pedagogy and the relationships among teaching, learning, and technology.

In 1990, Levy pointed out the need for a theory of computer-assisted language learning (CALL) that would provide educators with a framework for teaching and learning with technology. He noted that “our language teaching philosophy, method, or approach needs to be broadened to encompass new technologies, and the inter-relationship between language teaching and computing needs to be carefully explored” (p. 5). Supporting the need for a theory of CALL was the increase in the number of computers available to language educators and learners and the desire of educators to apply theories of second language acquisition (SLA) to the computer-using classroom. Hypothetically, a theory of CALL could assist teachers in making decisions about ways to prepare language learners for the high-technology future that they face; in describing the kinds of theoretically sound, vital changes in curricula that can and should be made; and in assessing the types of technology needed to assist in the effective and efficient learning and teaching of additional languages. At that time, the thought was that a theory of CALL could help educators evaluate how and which students learn with different kinds of technology, identify factors that must be addressed in the application of the technology, and serve as a guide for research on language learning.

If technology is replaced with textbook in the preceding paragraph, the hypothetical theory of CALL sounds not much different from an integrated theory of language acquisition; in fact, it is the same. In the years since
Levy's proposal, CALL educators have understood that a theory of CALL is a theory of language acquisition; the fact that the technology changes does not mean that the principles of language development do. Therefore, rather than making the use of technology in language classrooms focal, we now talk about how additional languages are learned and how this learning might be supported by technology.

This chapter introduces the concepts and ideas that ground the chapters in this book by first discussing how languages are learned and then describing goals for and of language learners. Next, the chapter posits conditions for optimal language learning environments and suggests how technology might support the development of such environments. The chapter ends with a discussion of how educators might investigate their own technology-supported language learning environments.

Background

Language Learning Theory and the Learning Environment

The number of theories of language acquisition and knowledge of the processes underlying these theories increase slowly but surely. Researchers and teachers generally accept that language acquisition is the result of an interplay between some kind of cognitive mechanism and environmental factors. They also acknowledge that not all language learners learn in the same way, at the same rate, or for the same purposes. Spolsky's (1989) still-viable general theory of conditions for language acquisition encompasses these variables in the form of the equation in Figure 1-1. According to this theory, abilities include physiological, biological, intellectual, and cognitive skills. Opportunity implies the learning environment, or time multiplied by exposure to the language. In the classroom, how or when a learner acquires language depends on the optimal strength of each of these variables for each learner.

![Figure 1-1. Spolsky's (1989) Theory of Conditions for Language Acquisition](image-url)

The learner's:
- $K_p$: Knowledge in the present
- $A$: Abilities
- $M$: Motivation/affect
- $O$: Opportunity

$K_f$: Knowledge and skills in the future
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Although it is not yet known for certain whether nature (cognition) or nurture (the classroom environment) is more important in the acquisition of additional languages, researchers have shown that the learning environment (opportunity, the term used by Spolsky, 1989) is a critical component. In addition to being a valid predictor of learning outcomes (see, e.g., Fraser, 1986), the classroom environment can mediate between the learner and macroenvironmental variables such as socioeconomic status, family circumstances, and language status. Most important, the classroom language learning environment is also the component of language acquisition that teachers, researchers, learners, and technology use can directly influence.

Creating optimal language learning environments is the essential business of the language teacher. Understanding this, educators and their language learners can observe circumstances under which learners acquire language and make adjustments to the classroom environment, thereby playing an instrumental role in students’ learning. Because computers are becoming an increasingly significant element in the teaching and learning environment, a clear theory of language learning that takes into account the significance of that environment in turn has critical implications for CALL. In other words, educators do not need a discrete theory of CALL to understand the role of technology in the classroom; a clear theory of SLA and its implications for the learning environment serves this goal.

In each part of this book, language learning theory and research and their implications are discussed before technology is addressed because of our understanding that technology use is support for the central objective: meeting language learners’ needs and goals. Some books about technology use in classrooms focus on one learning theory or philosophy as a guide for technology use; throughout this book, however, the authors call upon a variety of philosophical stances and literatures, just as effective teachers do. More important than a single theoretical viewpoint is a focus on basic principles of language learning and essential learning goals in creating effective classroom language learning environments.

Establishing Goals for Language Learning Classrooms

Language learning classroom goals can be established in a number of ways, but effective learning environments emphasize the needs of both the learner and other stakeholders. Goals for language learners at all levels have moved beyond a mere understanding of language. For example, national and state legislation throughout the world—such as the U.S. national ESL standards (TESOL, 2006), technology standards (ISTE NETS Project, 2000–2005c), the Council of Europe’s (2001) Common European Framework of Reference for Languages, and various content-area standards—determines in large part what kindergarten through adult students are expected to learn and be able to do. Most of
these standards for language, technology, and content areas have in common seven 21st-century goals for all learners:

1. knowledge acquisition
2. productivity
3. creativity
4. communication
5. research
6. problem solving
7. critical thinking

Closely tied to these learning goals are new literacies, or new ways of being knowledgeable. Recent attention has been drawn to the idea that, along with traditional text literacy and numeracy, visual, information, technological, and media literacies are crucial to help learners succeed outside of classrooms. In addition, standardized tests, student interviews, and nontraditional assessments can uncover areas where language development is most needed and explore the needs of students for engagement and relevance in their learning.

These learning goals, widely supported in the literature as essential to helping learners become fully realized human beings, are addressed in many ways throughout this book. Central is the idea that language is learned through and in pursuit of these goals, and that language learning environments must provide opportunities for language learners to reach these goals.

**Conditions for Optimal Language Learning Environments**

In the first edition of this book, we proposed a model of eight conditions comprising a variety of classroom environmental variables that may affect learners’ acquisition. Research since that time has further supported this model; therefore, these variables still form the theoretical framework for this volume’s discussion of CALL.

In the SLA, ESL, and learning theory literatures, research repeatedly points to eight conditions (see Figure 1-2) that, when present in the language learning environment in some form and in some amount, seem to support optimal classroom language learning. Although other factors may come into play, and different names are often applied, these eight are the most widely researched and supported in the literature and make up a general model of optimal environmental conditions. Below is a brief overview of these conditions, each of which is described in more detail in later chapters. This model forms the book’s theoretical framework, one that you as a teacher can use to guide your deployment of technology in the language classroom.
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Condition 1: Learners have opportunities to interact and negotiate meaning

Many researchers have noted that learning is essentially the result of interaction between learners and others (see, e.g., Ahmad, Corbett, Rogers, & Sussex, 1985; Kelman, 1990; Levin & Boruta, 1983; Vygotsky, 1978). If learning is a social process, then interaction with other people is necessary. This concept, addressed in Part I, is not new to second language instruction, as many researchers have called attention to the importance of the negotiation of meaning and modification of interaction in second language development (Long, 1985; Long & Porter, 1985; Pica, Holliday, Lewis, & Morgenthaler, 1989; Porter, 1986).

Condition 2: Learners interact in the target language with an authentic audience

Researchers (see, e.g., Ernst, 1994; Pica, 1987; Pica, Young, & Doughty, 1987; Webb, 1982, 1985) have found that language learners must be involved not only in social interaction but in purposeful interaction, which includes a real audience that is actively involved with the learners. The implication, then, is that involving learners in authentic social interaction in the target language with a knowledgeable source (e.g., the teacher, another learner, a family doctor, another person who can negotiate in the target language) facilitates language acquisition. The question of audience is taken up in Part II.

Condition 3: Learners are involved in authentic tasks

Many researchers (e.g., Chun, 1994; Kelm, 1992; Meagher, 1995) have reported that learners tend to be inspired by having not only a real audience but also an authentic goal for their work, and in this context the language used tends
to be candid and heartfelt. Authentic tasks are those having the same types of cognitive challenges as complicated real-world tasks do. The cognitive demands, that is, the thinking required, should be consistent with the cognitive demands in the environment for which the learner is being prepared. In the context of language learning, this means, for example, that language teachers want students not simply to learn about English or French but rather to be engaged in the use of English or French in ways that native speakers normally are. It is important to design tasks so that students can use their current proficiency level to function in authentic communications. Even less proficient students should have the ability to handle the task well and gain confidence from it. As Vygotsky (1978) believed and research has shown, learners grow into an activity that has meaning for them in its own right and at the same time grow out of the need for external support in the activity. The notion of task is addressed in Part III.

**Condition 4: Learners are exposed to and encouraged to produce varied and creative language**

Spolsky (1989) claims that

> whatever the language learner brings to the task, whether innate ability, a language acquisition device, attitudes, previous knowledge, and experience of languages and language learning, the outcome of language learning depends in large measure on the amount and kind of exposure to the target language. (p. 166)

An authentic task alone, therefore, may not be sufficient for language acquisition; the phrase *varied and creative language* implies that learners are involved in a diversity of tasks with a variety of sources of language input (Krashen & Terrell, 1983). In addition, Swain (1985) and others have confirmed the need for output as a means to language development. The use of varied and creative language also means that learners tap both receptive and productive language skills and that the tasks take into account the multiple learning styles and preferences among learners. Research on and examples of exposure and production are discussed in Part IV.

**Condition 5: Learners have enough time and feedback**

Learners need adequate time and feedback, both of which facilitate the formulation of ideas. Within the classroom, individual differences in ability, motivation, and other factors determine how much time each learner requires to complete a task successfully. This fact implies that some flexibility must be built into the timeline for the task. In this way, all learners have the opportunity to reflect on and communicate their ideas.

In addition, explicit, appropriate, individualized feedback is critical in helping learners reach the goals of a task. *Explicit* feedback addresses the
learner’s task-related questions; an example is help with the ordering of subtasks, with a relevant grammar point, or with general task instructions. *Appropriate* signifies as much assistance as the learner needs but neither less nor more. Learners also vary in the amount and kind of task feedback that they require. This condition does not indicate, however, that teachers must act as private tutors; it suggests that tasks, the grouping of learners, and learners’ opportunities to receive help should be planned carefully. Part V addresses this topic, looking particularly at assessment in the classroom as a means to both feedback and learning.

**Condition 6: Learners are guided to attend mindfully to the learning process**

An authentic task and audience, exposure to and opportunities to produce language, and sufficient time and feedback do not imply that learners will take these opportunities or make the best of them. During the learning process, learners must be *mindful* (Salomon, 1990); that is, they must be motivated to take the opportunities presented to them and to be cognitively engaged as they perform them. A certain degree of metacognitive guidance (instructions and examples about how to learn), whether from peers, teachers, or others, may facilitate learning and promote cognitive engagement (Vygotsky, 1978; Zellermayer, Salomon, Globerson, & Givon, 1991). Research has repeatedly shown that the conscious or deliberate use of learning strategies is related to language achievement and proficiency (Oxford, 1994). By consciously understanding and applying metacognitive strategies, learners are prompted to be aware of their language use and learning and thus become more efficient in both. Learning styles and strategies and related issues are discussed in Part VI.

**Condition 7: Learners work in an atmosphere with an ideal stress/anxiety level**

Before becoming mindfully engaged and willing to communicate their ideas, learners must experience an optimal level of anxiety in the language learning environment; any feelings of worry or apprehension must be facilitative rather than debilitative (H. D. Brown, 1994; Krashen & Terrell, 1983; Lozanov, 1978). Educators can assist in the development of an environment with an optimal stress level by creating a learner-centered classroom, which implies that learners have some control over their learning (see, e.g., Bereiter & Scardamalia, 1987; Kremers, 1990; G. Robinson, 1991). A learner-centered environment also suggests that the teacher’s expectations are reasonable and that goals are attainable. Peyton (1990b) suggests that giving more control to the learner removes the confounds of teacher, learner, school personalities, styles, and goals. These issues and their applications in the language classroom are discussed in Part VII.
**Condition 8: Learner autonomy is supported**

Thein (1994) describes a learner-centered classroom as one that develops learners' confidence and skills to learn autonomously and to design and coordinate tasks in a variety of contexts. In a learner-centered classroom, learners are given ownership of the process of developing solutions to their learning tasks and may, in fact, with the teacher's guidance or mentorship, devise their own learning agenda. This does not mean that learners have complete autonomy in the classroom; the instructor should determine boundaries so that learners can develop meaningful problems or tasks in that domain. Savery and Duffy (1995) believe that a teacher's role is to challenge learners' thinking, not to dictate or attempt to regulate their thinking for them. In this context, the learner decides on learning goals, but the modeling, mediation, and scaffolding provided by the instructor are indispensable. Consultation with and feedback from the instructor are crucial, as students require varying degrees of control. Issues of autonomy and their relationship to the CALL environment are discussed in Part VIII.

These eight conditions affect and overlap each other; thus, so do the chapters in this volume. The literature does not suggest the nature or impact of interplay among the conditions or their necessary or relative optimal strengths. What is known, however, is that the eight conditions act and interact in different ways in different classrooms depending on variables such as student population, content area, and learning context. Therefore, teachers must attempt to tailor these conditions in ways that are best for the learners in their specific classrooms. Classroom-situated research, or action research, discussed below, is one way to determine if and how the conditions are being met.

**Using Electronic Technologies in Optimal Learning Environments**

The focus of this volume is electronic technology because technology-enhanced environments can readily support optimal learning conditions. Electronic technologies include, in general, hardware, software, and the connections among them. Although the emphasis has until recently been on computers and the Internet, technologies such as iPods, handheld personal digital assistants, and cell phones are increasingly being used to create effective learning environments for language learners. Further, the current generation of *digital natives* (Prensky, 2001) that teachers encounter in their classes increasingly expects technology to be a part of the learning experience. As technology access improves around the world, teachers owe it to their students to explore the tools and resources it provides.

In supporting learning goals and conditions for optimal learning environments, technology can be used to change and improve how learning occurs in classrooms. Children and adults learn at home and in the world in very different ways than they do in classrooms. A huge disconnect exists when
learners are asked to memorize and listen in class but outside of class learn naturally by exploring, inquiring, experimenting, and working together with teammates or peers. Technology can make it possible for language students to learn in more natural ways by offering resources, support, and feedback that teachers alone may not be able to provide. Of course, teachers must use technology in ways that support the goals of language learning and the creation of optimal language learning environments. The goal is to make the technology itself invisible while exploring the interactions, content, and processes of the learning that occurs with, through, and around technology.

Exploring the CALL Environment Through Research

Throughout this text, particularly in the Explorations sections, we propose questions that should be asked about CALL; however, even if all these questions are answered to our satisfaction, there will still be much to learn. The brief discussion below presents general guidelines for developing inquiries in the area of CALL. The purpose of classroom research is to find out what works for you as a teacher and to add to the growing body of knowledge concerning the CALL environment. The framework provided below for the exploration and presentation of research on CALL should have the very practical effect of leading you to uncover ways to meet the eight conditions for learning in your own setting.

Purcell (1996) notes that research generally has six levels—observation, recording, investigation, use of a model, experimentation, and enlightenment. He adds that the conduct of research involves six steps of analysis, synthesis, and evaluation:

1. Describe a question significant enough to merit research.
2. Review in the relevant literature the knowledge to date about the research question.
3. State a tentative answer to the research question, or declare the further knowledge required to answer the question.
4. Determine how to test the research question or gather the required information, and state it as an if-then sentence.
5. Test the hypothesis or gather the data carefully.
6. Refine the tentative answer to the research question, or present the clarification derived from the data; generalize the result of the particular research performed, and suggest ways to further study the research question.

These generic steps do not speak to specific research methods or measurement tools; researchers should use whatever is appropriate to the study. (See the article on Research [2006] for many more specifics and definitions.
of various types of research.) Even though conducting research following these guidelines seems simple enough, CALL environments require further considerations as noted by many of the authors in this volume. However, the most critical step in conducting research is formulating a research question of significance, Purcell's Step 1.

**Step 1: Ask the right questions**

In the years since the first edition of *CALL Environments*, research in CALL has exploded. Refereed journals focusing on language (as well as general) learning with computers abound and are readily accessible online (see, e.g., *Language Learning & Technology, Innovate, Reading Electronically*). Some of these, for example, TESL-EJ and *Teaching English With Technology*, focus particularly on foreign language teaching. Likewise, many new books on teaching with computers have appeared in the past few years, such as *CALL Essentials* (Egbert, 2005), *Learning Languages Through Technology* (Hanson-Smith & Rilling, 2006), *Laptops and Literacy* (Warschauer, 2006), and far too many others to list in this short introduction. However, research in computers and language learning can never tell teachers exactly how to use computers in a particular class. Just as there seems to be no one right way to teach or learn language (see Stevick, 1976, for numerous examples underscoring why this is so), there is no one best way to use computers for language learning. Researchers and educators looking for the CALL research study that can answer specific questions about the best way to teach must look also to the large body of research in SLA and language learning; in fact, much of the outstanding research cited in this volume comes from these and other academic fields or areas of study, as has the framework of environmental conditions that serves as the structure for this book. As we suggest above, perhaps the best way, if there is one, to teach in a CALL classroom is to create an optimal language learning environment for each learner.

One difficulty in researching CALL environments has been controlling all the variables. Even early on, Salomon (1990) and Ehrmann (1995) clearly saw that computers (or the introduction of any new factor) can radically change many parts of the environment. New skills are needed to perform the task, motivation to do the task may increase, and the task itself may be defined in new and different ways. Because technology introduces many new variables and myriad other, even more subtle changes, the comparison of a CALL environment with a non-CALL environment is misleading and can rarely describe accurately the effectiveness of computers for language learning in terms of simple linguistic measures, standardized tests, or discrete environmental variables (Salomon, 1990). Good research questions should focus on whether the system of teacher, student, and technology is working for the learners (see Egbert, 1993, for an example of a systemic approach to CALL research).

The *Explorations* sections at the end of each chapter in this volume demonstrate what we consider some of the right questions to ask about the
CALL environment. Questions that focus on conditions in language learning environments go far toward educating teachers about the effectiveness of technology in language learning. For example, the questions that Pica (1994, p. 52) asks of language learning research are just as critical in the computer-assisted classroom:

- How effective is group work as an aid to second language learning? What kinds of groups work best?
- Should students drill and practice new structures? If so, what kind of feedback should be given?
- What can be done to encourage participation among students who seldom ask questions or initiate interaction? Are these students more apt to interact when online? Under what conditions?
- To what extent does the correction of errors assist second language learning? How can errors best be corrected?

In addition, as Ehrmann (1995) notes, some technologies support some teaching methods better than others do, leading to the question:

- Which technologies are best for supporting the best methods of teaching and learning? For which type of student?

Studies of CALL environments must consider other important factors in SLA research. Ehrmann (1995) points out that one teacher using technology can influence a student’s learning but that the cumulative effects of many teachers supporting good learning across the curriculum are far more significant. Therefore, what is needed are questions that address the study of CALL within and across courses and programs. Along the same lines, Chapelle (1995) notes that the many layers of the language learning environment can affect what happens in the classroom. Questions that investigate the political and social milieus in which CALL takes place are no less important than those that investigate CALL activities within one classroom. One may ask, for example, What are some of the assumptions that come with technology? What are the goals of technology use in my school?

**Step 2: Review the literature**

In CALL research, Purcell’s (1996) Step 2 may involve more careful selection and analysis of research literature than is the case with typical SLA research. Much that has been written about using computers in language education has been descriptive rather than analytical: Technology-using teachers explain their program and curriculum and the way they have integrated CALL. Although these anecdotes are useful, they do not constitute rigorous research and should be used as guidelines for practice and as a starting point for scientific inquiry rather than as support for specific theories. A large body of research regarding educational technology does exist (see the journals and books
Another pitfall to watch out for in the literature (and in any SLA research) is the Hawthorne effect: Any group that is being studied while doing a new or different activity usually performs better. As noted earlier, this is only one way that the language learning environment changes upon the introduction of technology.

**Step 3: State a hypothesis**

Your search of the literature, beginning perhaps with some of the articles cited in the chapters in this volume that are pertinent to your inquiry, should give you a fairly comprehensive overview of what has already been accomplished in CALL research. Your study might lead you to replicate prior research, making appropriate corrections in procedures, or you may wish to strike out in a new direction. A tentative research question reflects only what you hope to find.

**Step 4: Determine how to test the research question**

Purcell’s (1996) Step 4 is fraught with hazards. One truism of quantitative research in the past was the attempt to reduce or eliminate all variables except the one to be researched. However, testing pedagogical theory and application is one of the most difficult undertakings in the social sciences, because so many variables are at work at the same time. A quantitative focus cannot deal adequately with this “anarchic” environment. Happily for both researchers and classroom educators, many paradigm shifts have taken place since the days when only quantitative methodologies constituted “real” research. Structured qualitative studies, complementary analytic and systemic views, action research, and many other designs have successfully shed new light on what occurs in language classrooms (see D. Johnson, 1991, for an overview). Rather than forcing the design to fit into expected or traditional paradigms, you as a classroom CALL researcher should consider a design that takes into consideration what your questions are really asking.

**Step 5: Gather data**

Purcell’s (1996) Step 5 cautions researchers to gather data accurately in order to test the hypothesis carefully. As we pointed out earlier, the CALL environment does not compartmentalize neatly into either quantitative or qualitative research and should be viewed through a lens that either combines these two paradigms or considers the classroom as the interacting system that it is.

The computer itself allows the generation of considerable data for many kinds of analyses. For instance, the usefulness of saving students’ e-mail files to study as examples of interaction strategies is demonstrated in chapter 11. You might also have students save separately all drafts of a word-processed essay and later use them for an analysis of composing and editing strategies. Blogs and wikis are organized so that you may easily view successive drafts
of a composition. Many software programs, for example, Live Action English Interactive (2006), also assist in data collection because a built-in record keeper notes the parts of the software that were accessed, the time spent on a task, and the results of tests or exercises. Collecting the same information about students working in a traditional classroom or studying the same material at home would be very difficult. At the University of Puerto Rico, Cayey’s self-access lab, the coordinator created a similar but far simpler record keeper with HyperStudio (2005): Before logging out, students write up a record of their work with any questions they have after each session in the lab. A brief video clip on the first card explains how to use the software. Similarly, in an Internet-enabled lab, log-out could trigger a link to SurveyMonkey (SurveyMonkey.com, 1999–2006) for a brief questionnaire.

The computer combined with video and audio recording also presents interesting opportunities to collect data about students’ behavior with technology. Pujol (1995/1996) provides an excellent model for CALL research in which learners were video- and audiotaped as they used software. For more on interviewing and recording students’ aural production, see chapter 27. Although video and audio recording may be used successfully in a traditional classroom for data collection, professionally developed software can allow sound files to be kept as records and later reviewed by the teacher, researcher, and student with regard to such variables as pronunciation and accent. Podcasts offer simple ways to maintain and access students’ recordings online (for examples of student work, see Yeh, n.d.). A record of all keystrokes as students work at a terminal would allow close observation of how they use a tutorial, compose and revise an essay, or conduct an Internet search. Excellent models for quantitative research in CALL are to be found in Language Learning & Technology, a free, wholly online, refereed journal.

Many research models can be used to collect data for the study of a CALL environment, among them a discourse model with a hierarchical analysis of the interaction (Chapelle, 1990), a systemic model of the language learning environment like the one proposed in this book (see, e.g., Egbert, 1993; Egbert & Petrie, 2005), and a set of indicators like those proposed by B. F. Jones, Valdez, Nowakowski, and Rasmussen (1995) and by others. Regardless of the model, technology clearly does not dictate methods or questions; however, the model chosen must be appropriate to the setting and the technology under study. Questions of media are not of prime importance—questions about what is being taught and what is being learned must be the focus.

**Step 6: Refine your answer**

In both CALL and non-CALL research, Purcell’s (1996) final step is sometimes treated with the perfunctory phrase “more research is needed in this area.” A considerably more useful approach is to determine exactly where your research design may have gone astray or how data unaccounted for by your initial hypothesis might be incorporated into a different design or analytical
framework. A number of the studies cited throughout this volume (e.g., in chapter 8) follow the latter approach and thus present useful starting points for your own research project. Action research, in which teachers carefully try out specific approaches and techniques with their students, making notes of successes and setbacks, is particularly suited to successive refinements as the teacher explores lesson plans and classroom strategies.

Conclusion

The eight learning conditions presented here can help meet goals in the language classroom by means of many general strategies, including using group work, providing concrete opportunities to interact in English, focusing on survival skills and functions or on content-based tasks, using problem solving, and recycling lesson content in various ways while providing open-ended opportunities for meaningful language use. In addition, you can provide adequate time for tasks, adequate feedback, appropriate prompting and other assistance, and adequate information or research resources while giving learners opportunities to choose goals and participate consciously in the learning process. The environmental conditions, however, do not dictate specific methods, techniques, content, or tools. Language educators are now using technology effectively to support these learning conditions in a wide variety of settings.

Chapters 2–27 explore in more depth the research that provides the empirical basis for each of the optimal language learning conditions. Each part of this book contains a chapter detailing research and describing the present state of theoretical knowledge about classroom language learning, especially as it relates to CALL (Theory and Research). Subsequent chapters discuss current teaching practices that apply the theory to computer-enhanced instruction, including activities, software, and hardware that support an optimal learning environment (Classroom Practice). Also included are chapters on matters related to the environment in which technology is used (Critical Issues). As requested by readers of the first edition of CALL Environments, each chapter now closes with suggestions for projects and questions for reflection that will help you understand more about CALL practices and conduct research with your own students in a computer-enhanced learning environment (Explorations). The text concludes with a reprise of “20 Minutes Into the Future” (Meskill, chapter 28) from our first edition, flanked by a new chapter, “The Future Is Now” (Price, chapter 29), which explores the new inventions and tools that will form the groundwork for CALL in the next several years. The appendixes provide names and uniform resource locators (URLs) for key World Wide Web sites and software, contact information for professional development, and other resources to help you explore the CALL environment with students. A new feature in this second edition, requested by our readers, is an index of terms used throughout the book.
Explorations

1. This chapter began with some computer jargon: wiki, blog, RSS, social software, chat room, m-computing, pop mailer, phishing, Web 2.0, virus. Begin a technology vocabulary journal by finding out what each of these terms means and how they might apply to your students’—or potential students’—learning situation. Keep a record of new terms and their uses throughout your reading of this text.

2. Examine the lab and/or other computer opportunities available to students in your school or a neighboring community. What types of access are available, and what limitations might be imposed on students (e.g., cost, limited time, lack of knowledgeable staff)? What remedies for these limitations might be found?

3. If you are currently working with a group of students or a tutee, follow the six steps outlined in this chapter to develop a research question and an appropriate means to explore it. Begin a preliminary exploration of the Internet and a range of journals in the profession for information about topics related to your question, and try to formulate a working hypothesis. Discuss your question and hypothesis with others in your class or in your work community, and revise as needed.

4. You may wish to begin classroom-situated action research either by observing a class or by collecting artifacts from your students. Be sure to obtain your students’ informed consent before undertaking research with them.

5. As you sift through and organize the data you collect, be sure to refine your hypothesis and discuss your research with others in your working community. Decide what kinds of action you might take based on your hypothesis, your paper and Internet research, and the data you have explored. If you are in a teacher education class, your instructor may want you to submit oral and/or written reports based on your findings.