Is network-based learning CALL?

Carol Chapelle
In his overview, Levy defines computer-assisted language learning (CALL) broadly as “the search for and study of applications of the computer in language teaching and learning” (Levy, 1997a, p. 1). In Chapter 1 of this volume, Kern and Warschauer describe network-based language teaching (NBLT) as “language teaching that involves the use of computers connected to one another in either local or global networks.” On the basis of these broad definitions, it appears that network-based learning might be considered one type of CALL. Consistent with this expectation, the essays in this volume raise many of the same issues that have appeared in the CALL literature since the early 1980s — issues such as evaluation and the role of the teacher.

Despite superficial appearances, however, one cannot be satisfied to consider NBLT the same as pre-network CALL simply because computers play a role in both types of activities.¹ From the perspective of second language acquisition, it is significant that learners often interact with a computer program in pre-network CALL activities, but they usually interact with other people in NBLT activities. Drawing a sharp distinction between the “impoverished” interactions afforded by pre-network CALL and those of NBLT, Debski (1997b) points out that “until recently, very few teachers looked to the potential of computer technology to enrich the foreign language classroom through fostering human to human communication and creative endeavor” (p. 46). From a historical perspective, Kern and Warschauer (this volume) explain that theoretical foundations for network-based learning are social as well as cognitive in nature and that uses of computer-mediated communication have mainly focused on creating discourse communities. The current literature continues to reflect these historical roots. The NBLT literature displays the language of “activity,” “collaboration,” “creativity,” “experiential learning,” and even “social computing” (e.g., Debski, Gassin, & Smith, 1997). The pre-network CALL literature reflects different perspectives through language

¹ CALL that does not require networking is referred to as “pre-network CALL,” even though, as Patrikis (1997) points out, approaches to computer-based teaching accumulate and coexist rather than progressing in a linear fashion replacing old (pre-network CALL) with new (NBLT).
such as "effective and ineffective uses," "meta-analytic research," and "consistent findings" (e.g., Dunkel, 1991). These language differences may reflect the divergent approaches of those concerned with pre-network CALL and NBLT, but do they actually denote critical distinctions?

To what extent is it useful to consider network-based learning the same as pre-network CALL? This question is important given the tendency of work in CALL to rediscover the same instructional practices and problems with each generation of computer hardware and software – a tendency that has stifled evolutionary progress. Some of the same software designs appeared on the mainframe computers of the 1970s, the microcomputers of the 1980s, and the World Wide Web of the 1990s – not necessarily because they were shown to be effective, but because some members of each generation were satisfied to reinvent rather than determined to evolve. If NBLT is CALL, one would hope that design and evaluation of Web-based learning would productively draw on past work in CALL. If network-based activities are different from pre-network CALL, their development and study should implicate a different set of issues from those familiar in the CALL of the 1970s and 1980s.

In this chapter, I would like to suggest that grounds for making a useful distinction between network-learning and pre-network CALL do not exist at this time. I will first discuss the type of empirically based research that would help to make meaningful distinctions among different types of CALL activities. I will then review recurring themes evident throughout the CALL literature and suggest that these themes are relevant to NBLT. Finally, I will outline the contributions that the study of NBLT offers in the evolution of CALL.

Defining types of CALL activities

To address the question of similarity between NBLT and pre-network CALL, it is necessary to have a means – beyond the broad definitions already cited – for distinguishing computer-based activities from one another. If the superficial definition "use of computers in language teaching" is inadequate, what pedagogical or analytic criteria should be brought to bear on defining types of CALL activities?

How can CALL activities be categorized?

Historically, categorization of CALL has been attempted on the basis of global judgments made by teachers and CALL developers – judgments about the intended role of the computer, the role of the target language, or a cluster of descriptive features. For example, one approach focusing on the role of the computer relative to the learner in the CALL activity
suggested that the salient feature of an activity would be whether the computer played the role of "magister" directing the student's learning or "pedagogue" assisting the student's learning (Higgins, 1988). An approach targeting the role of the target language distinguished between communicative and noncommunicative CALL activities (Underwood, 1984). Levy (1997a) reviews a number of such schemes for conceptualizing CALL that were developed primarily for pre-network CALL. Many of these suggest that CALL programs can be described through multiple features such as "language difficulty" and "activity type" (Phillips, 1985). Description of NBLT activities, in contrast, typically includes just two features of the hardware and software configurations: (1) whether the activity takes place over a local area network or a wide area network such as the Internet, and (2) whether the communication takes place synchronously (i.e., in real time) or asynchronously (i.e., with delay, such as in e-mail).

These approaches to description have provided the conceptual apparatus for teachers and CALL developers to describe and expand the methodological techniques underlying CALL design. At the same time, they fall short of what is needed in three ways, as I pointed out in 1990:

First, descriptions based on a single view of an entire CALL activity do not account for the details of student-computer interaction. . . . A second problem with general descriptions of CALL activities is that they characterize what students can or should do while working on a computer activity, failing to describe what they actually do. . . . [Third, w]hen a CALL activity is described in terms devised and defined exclusively for that [activity], it is not clear how the [activity] is similar to or different from other CALL or classroom activities. (Chapelle, 1990, p. 204)

To move beyond a superficial level of description, activities need to be defined on the basis of a description of the language that learners use through their interactions during the activity.

**CALL texts**

**CALL text** refers to the observable record of the process of learners' work on CALL activities (Chapelle, 1994). CALL texts are the data used by researchers to document the language and interactions relevant for empirically based descriptions of CALL. Table 1 illustrates the dichotomy of text types that one might associate with pre-network CALL and NBLT.

The most important differences evident in these two texts are in the function that the target language performs in each. In the pre-network CALL text (the drill and practice dialogue), the learner uses the target language to display ability to translate into French. The computer uses one word of French (i.e., to express incorrectness with *Non*) to judge the learner's performance. In the Spanish NBLT activity, the learners use the
Table 1. Example CALL texts from pre-network CALL and NBLT

<table>
<thead>
<tr>
<th>Drill and practice dialogue</th>
<th>CMC dialogue (NBLT, Pelletieri, this volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer</strong></td>
<td><strong>Learner 1</strong></td>
</tr>
<tr>
<td>Translate:</td>
<td>. . . si yo pienso, cosas</td>
</tr>
<tr>
<td>I returned the money to</td>
<td>para ayudan el aprender . . . yo no se.</td>
</tr>
<tr>
<td>you six months ago.</td>
<td></td>
</tr>
<tr>
<td><strong>Learner</strong></td>
<td><strong>Learner 2</strong></td>
</tr>
<tr>
<td>J'ai rendu à vous cette</td>
<td>cosas que ayudan a</td>
</tr>
<tr>
<td>argent six mois il y a.</td>
<td>aprender</td>
</tr>
<tr>
<td><strong>Computer</strong></td>
<td><strong>Learner 1</strong></td>
</tr>
<tr>
<td>Non.</td>
<td>si, lo siento.</td>
</tr>
</tbody>
</table>

target language to communicate with each other and negotiate meaning. Attempting to express something during the course of the conversation, Learner 1 stumbles over a grammatical form (translated by Pelletieri as “yes, I think, things for helping the learning . . . I don't know.” The other learner recognizes the error and suggests a correction (i.e., “things that help you to learn”), to which Learner 1 responds, “yes, I'm sorry.”

An empirically based definition of CALL activities

The dichotomy illustrated by the two texts in Table 1 reflects a simplistic, but popular, view of pre-network CALL versus NBLT, but it is misleading for addressing the question of similarity between pre-network CALL and NBLT. In reality, pre-network CALL consists of a variety of pedagogical activities that include software such as microworlds (Papert, 1980; Coleman, 1985), grammar checkers (Hull, Ball, Fox, Levin, & McCutchen, 1987), pronunciation feedback systems (Penninger, 1991; Anderson-Hsieh, 1994), intelligent tutoring systems (Chanié, Pengelly, Twidale, & Selj, 1992), concordance programs (Johns, 1986; Tribble & Jones, 1990), and word processing (Penninger, 1993), to name a few. Similarly, a variety of activities can be carried out through NBLT (Warschauer, 1995). Given the variety – as opposed to dichotomy – of activities that can be devised in pre-network CALL and NBLT, what is needed is a means of defining types of CALL based on observation, description, and analysis of CALL texts, that is, an empirically based procedure. An empirically based definition of CALL needs to be developed through two levels of analysis: description of CALL texts (i.e., what learners are doing with language) and explanation of activity features likely to be responsible for the significant aspects of the texts (i.e., why the activity influences the language as it does).

Descriptive research plays an important role in the study of technology
### Table 2. Examples of CALL texts from a variety of CALL activities

<table>
<thead>
<tr>
<th>Interaction</th>
<th>CALL text</th>
<th>Setting</th>
</tr>
</thead>
</table>
| Learner-computer  | Drulla [Computer]: Play, please!  
Student: Okay.  
Drulla: Thank you. What should I do?  
Student: You should tell me where the glass is.  
Drulla: The glass is on the table.  
Student: Try laying it inside the fridge.  
Drulla: Very good.                                                                 | An individual learner’s output of commands to computer and computer’s responses (Murray, 1995, p. 248) |
| Learners-computer | Computer: I have learned quite large number of words. Is there an error in this sentence?  
R: I have learned quite large number of words. Is there an error in this sentence?  
M: Quite large number  
R: I have learned quite large number.  
M: Quite large number, quite large number                                                                 | Learners sit together in front of a computer reading from the screen and discuss their responses to questions (Abraham & Liou, 1991, p. 105) |
| Learner-learner   | Kang: Alda, est-ce que tes parents parle à toi en chinois et tu parle aux parents en anglais? Moi, mes parents ne me parle pas en anglais, mais je leur parle en anglais en meme temps. C'est un peu bizarre.  
Billy: Alda, est-ce que vous êtes chinoise? Si vous êtes chinoise, avez-vous célébres la nouvelle année chinoise hier? Avez-vous recevu beaucoup d'argent de votre famille?  
Kang: Alda, pourquoi "tu n'aime pas trop de traditions chinois? Que penses-tu a la NOUVELLE ANNEE de Chinois?                                                                 | Learners discuss the topic “inter-generational differences” through computer-mediated communication (Kerr, 1995, pp. 458–459) |

and learning (Klupfer & McLellan, 1996) and in studies of second language classroom learning (Seliger & Long, 1983; Dey, 1986; Allwright, 1988; Chaudron, 1988; van Lier, 1988; Allwright & Bailey, 1991; Johnson, 1995). The application of descriptive methodologies to CALL requires examination of CALL texts as illustrated in Table 1. If texts for a variety of CALL activities were documented, one could begin to analyze ways in which they were similar and different. For example, Table 2 illustrates texts from several other CALL activities. The first one comes from an activity based on a microworld in which the language is used for commu-
nicipating meaning and in which interactions are constructed through language – the language of both the learner and the computer. “Drulla” is a Poltergeist character in an interactive computer game. The second text illustrates an activity in which learners work together collaboratively through oral language and the computer program contributes written language. The third is constructed through NBLT in which the learners communicate through computers connected in a local area network. Description of these additional texts would add complexity to the simple dichotomy of language use that was illustrated earlier by the texts in Table 1. Description of such texts might include their syntactic complexity, the types of functions used (e.g., commands in the first one, and repetitions in the second), and their linguistic accuracy.

On the basis of text description, explanatory features of the activities might be developed to account for their significant features. For example, one significant feature would be the role of the “participants” in the CALL activity (e.g., the learner[s], the instructor, other people, and the computers). Rather than defining participants’ roles in terms of the role of the computer, however, role is defined in terms of how responsibility for controlling various facets of the activity is distributed among participants. Teachers and researchers working with NBLT are expanding the set of possible descriptors for CALL. For example, the term “agentive” is introduced as a concept for explaining the type of activity perceived to be associated with the “contextually and linguistically impoverished” language of pre-network CALL (Debski, 1997b, p. 45). Additional empirical data are needed, however, to provide evidence for what such “impoverished” language use consists of within the computer uses that the author would term “agentive.” An empirically based definition of CALL activities with theoretically and empirically motivated features might support a distinction between NBLT and pre-network CALL. Support would come from description of the CALL texts in both network and nonnetwork CALL activities. Such descriptions might show systematic differences in the texts whose explanation could be found in typical features of network-based activities. However, until empirically based distinctions are made, it may be useful to consider themes from CALL that appear to continue to evolve through NBLT.

Recurring themes through generations of CALL

The NBLT-related issues raised in this volume are familiar to those who have participated in pre-network CALL. Difficult issues of evaluation, exacerbated by the temptation to equate the computer with a method of instruction, have persisted throughout CALL’s history. This conceptual “computer method” trap presents a problem for CALL research because
it locks researchers into framing questions in terms of differences between computer-assisted learning activities and other classroom activities. Nevertheless, some researchers have moved beyond this trap by investigating the effects of specific features of CALL activities and by looking for guidance to research in second language acquisition (SLA), which has pointed to avenues such as the need to investigate the classroom context of CALL and the sociocultural factors related to CALL.

The need for CALL evaluation

The concern for evaluation extends back to the 1960s and 1970s when CALL was an innovative and expensive departure from other classroom practices. But then, like now, the focus of many CALL developers was on the technology rather than on technology use. Summarizing more than 10 years of experience with CALL in the PLATO project at the University of Illinois, Hart's overview of CALL activities on PLATO included the following comment on evaluation:

It is obvious that the developers of computer-based language materials have given far too little attention to evaluation. . . . If the issues are so complex that conventional procedures (e.g., those employing group mean differences) are inappropriate for providing an answer, then we should present clear arguments why that is so and provide alternative analyses (e.g., based on individualization or optimization features). (Hart, 1981, p. 16)

The point was then – as it is now – that CALL needs to be evaluated and that more than one method is needed to do so. However, with the quickly changing technology of the 1980s and an academic community preoccupied with construction rather than evaluation, little progress was made in CALL evaluation.2

In the 1990s, CALL evaluation began to receive more attention. Dunkel's words, written 10 years after Hart's, reflect exactly the same theme:

Systematic evaluation of the effectiveness of all aspects of CALL must continue; however, new focuses as well as methods of research inquiry will need to be developed if we are to gauge correctly the power of the computer to affect different aspects of second language acquisition. (Dunkel, 1991, pp. 23–24)

In the same 1991 volume, concrete suggestions were made for "new focuses and methods" such as process-oriented studies, ethnographic research, and discourse analysis. About the same time, an important study of CALL use in Germany included a variety of methodologies for CALL evaluation, such as discourse analysis for evaluation of learners' use of

2 Despite overall trends, several papers addressing evaluation issues did appear during the 1980s (e.g., Doughty, 1987; Pedersen, 1987; Chapelle & Jamieson, 1989).
simulation programs and qualitative methods from cognitive psychology for evaluation of text reconstruction programs (Legenhausen & Wolff, 1990). Reflecting on their methodological choices, Legenhausen and Wolff reported the following:

It seems quite obvious that computer software, serving several diverse functions in the foreign language classroom, cannot be evaluated according to any single methodological principle. What we are trying to do, therefore, is to systematically vary the evaluative principles and techniques according to different CALL software types. (1990, p. 2)

Whether or not one agrees that the program should influence the choice of research methodology, it is important to note that researchers were attempting to move beyond the traditional quasi-experimental methods. At the same time, some researchers have found it appropriate to assess the particular outcomes relevant to the goals of their CALL activities (e.g., Dougherty, 1991; Nagata, 1993; Hsu, 1994). When the approaches to CALL evaluation are viewed from the perspective of traditions of second language classroom research, it is apparent that CALL researchers face conceptually similar—even if technically unique—issues in their investigations (Chapelle, Jamieson, & Park, 1996).

Despite evolution of CALL evaluation methods, the editorial comments in a 1995 issue of Computer Assisted Language Learning reflect the continued need for careful consideration of the research methods applied to CALL:

Validation and evaluation are extremely important aspects of any project and researchers should remember that if their papers are going to carry any weight, their findings have to be substantiated with the support of usage and validation. A number of submissions to this journal have been brilliant in their conception but have had to be returned because . . . the project had been poorly evaluated. (Cameron, 1995, p. 294)

Why do evaluation issues continue to plague CALL researchers? Perhaps one of the thornies: problems in evaluating CALL, which is as evident in NBLT as it is in pre-network CALL, is the temptation to equate the computer with a method of instruction.

The myth of “CALL method”

The most intuitively logical method of evaluation for CALL is comparison of the linguistic or cognitive outcomes between learners who have used CALL and those who have not. This intuitive approach to evaluation, which treats the computer as a method of instruction, has been problematic in CALL evaluation for at least two reasons. First, the focus on outcomes neglects important evidence for the quality of instruction in second language learning. As second language classroom researchers have
pointed out, assessment of outcomes alone fails to document the many contextual factors influencing the process of learning (Seliger & Long, 1983; Day, 1986; Allwright, 1988; Chaudron, 1988; van Lier 1988; Allwright and Bailey, 1991; Johnson, 1995). Other researchers in educational technology working within the social constructivist paradigm echo this concern, arguing, for example, that "the whole educational context that is created online . . . needs to be the focus of analysis" in research on computer use (Riel & Harasim, 1994, p. 92) and that "computer use in and of itself is hardly a conceptually satisfying variable likely to have consistent and predictable results" (Schofield, 1995, pp. 6-7).

The second problem with method comparison studies is that they rest on the faulty assumption that the computer itself constitutes a method of instruction. Clark (1985, 1994) argues that in such research "instructional methods [have] been confounded with media" and that "it is the methods which influence learning" (Clark, 1994, p. 22). Clark defines "methods" as the "structural" characteristics of tasks for learners that engender the processes and strategies necessary for learning; he contrasts methods with "media," a means of delivering methods to learners. His argument can be challenged on a number of grounds, including his assumption that media and methods can be distinguished, yet Clark succeeds in questioning any general claims about the effects of the computer on learning. Moreover, his argument helps to point out that, rather than studies focused on "the computer," there is a need for studies that attempt to isolate and investigate the relevant "structural" task features in computer-assisted learning environments.

Doughty (1992) develops this general argument for the specific case of second language learning and CALL, pointing out that CALL activities should attempt to operationalize those features that are theorized to facilitate instructed SLA. The object of investigation, then, changes from the effects of the computer to the learners’ interactions and outcomes involving particular features. The challenge in this promising line of research, both for pre-network CALL and for NBLT, is to identify the features that should be developed in CALL activities and to identify appropriate methods for investigating their effects.

**Significant features of activities**

Past CALL research has examined specific aspects of CALL activities such as the role of the linguistic input to learners and the type of interaction supported. For example, Schaeffer (1981) compared what he called "meaningful" versus "nonmeaningful" input in German grammar lessons and found the "meaningful" input better. Doughty (1991) compared the effects of two different types of explicitly salient ESL input with input that was not explicitly flagged to direct learners’ attention. The learners
receiving the salient input performed better on posttests on the relative clauses that had been made salient. A study comparing the value of different levels of interactivity in a CALL program for retention of German found that the interactive video condition was the one in which the subjects best remembered the material (Schrupp, Busch, & Mueller, 1983). Another study investigated the effects of various types of response-contingent feedback to learners of Japanese (Nagata, 1993) and found that learners who received “intelligent” feedback about their use of particles performed significantly better on both posttests and end-of-semester tests than did those students who had received only an indication of where they had made an error.

Results of such research are obviously useful for informing the development and use of CALL tasks, but they can also contribute to the broader research on instructed SLA if the task variables are chosen in view of theory-based hypotheses about the relationship between task features and SLA (e.g., Doughty, 1991). Such hypotheses have been formulated by researchers studying SLA from an interactionist perspective (e.g., Pica, 1994). Based on a review of this research, Pica, Kanagy, and Falodun (1993) summarized the features that had proven significant in previous research and organized them under two variables, interactionist activity and communication goal. The features are intended to define the characteristics of an L2 task that can be expected to influence learners’ texts in significant ways. The “significant ways” within the tradition of interactionist research refers to production of signals and modified output, for example, which are evident during negotiation of meaning. Another set of variables and features was developed by Skehan (1996, 1997), who was interested in identifying the task features accounting for accuracy, complexity, and fluency in learners’ task-related texts. The three general categories in this task framework are code complexity, cognitive complexity, and communication stress.

The empirical basis for these sets of features makes them particularly useful for L2 research and perhaps for CALL. Their descriptive utility, however, is confined to the particular types of tasks that have been used in this research. In order to attempt to expand the scope of this work to CALL, a relevant task framework needs to be developed. An attempt should be made to be systematic about including all of the variables expected to affect learners’ performance significantly. For example, in any given task, would the desired negotiations occur if the participants were not of equal status? How would the text differ if the communication were not face-to-face and oral, but instead were conducted in writing over the Internet? Work in NBLT makes apparent the need to look beyond the cognitive and interactive focus of SLA research to identify a fuller set of relevant variables (e.g., status relationship and medium) for defining and investigating the types of features involved in NBLT.
The need to link to SLA research

Some of the CALL literature also attempts to link evaluation methods to research in SLA, specifically including studies of interlanguage, individual differences (Skutnabb-Kangas, 1989), strategies (Wenden & Rubin, 1987; Oxford, 1990; O’Malley & Chamot, 1991), and classroom discourse (Chaudron, 1988). I will briefly summarize these CALL/SLA connections below. The CALL studies working within the tradition of interlanguage research have used the computer to collect linguistic data from language learners. Examples of such work include studies of ESL spelling errors (Chapelle & Jamieson, 1981), acquisition of German syntax (Garrett, 1982), and learners’ lexical development (Bland, Noblit, Arrington, & Gay, 1990). In the latter study, the researchers used learners’ queries to an online dictionary during completion of a writing assignment as an indicator of their lexical development. Because the linguistic data were collected while learners were focused on constructing meaningful texts in a class assignment, one might argue for the ecological validity of the data. By supporting a variety of activities or language use, NBLT affords unique opportunities to expand computer-based interlanguage research to the study of pragmatic competence.

The individual-differences research in SLA has provided some guidance for the study of CALL. Because individual differences are known to play a role in language teaching and learning and because CALL activities offer a viable means of providing individual instruction, research might ideally help to identify CALL activities that are beneficial for specific types of learners. Despite the apparent richness of this line of research, as of the late 1990s few studies had taken up the suggestion. One that did (Abraham, 1985) found that field-independent learners performed better on posttests when they had used a rule-presentation (deductive) approach and field-dependent learners performed better after using a lesson presenting examples of the structure (inductive approach). Investigating the same learner variable, Chapelle and Jamieson (1986) found that field-independent ESL students tended to have a more negative attitude toward the CALL under investigation, while the field-dependent students had more positive attitudes. A third study found that impulsive students performed better on an oral sentence-construction task in Spanish when the program required them to wait before responding (Meredith, 1978). This initial research is the beginning of what might prove to be an important line of inquiry – one that has begun to be taken up by NBLT researchers (e.g., Meunier, 1996).

Studies of strategies have been conducted to address two research objectives: investigating psycholinguistic questions about language processing, and studying conditions of learning (Chapelle, Jamieson, & Park, 1996). Examples of psycholinguistic investigations are studies of EFL
learners' reading processes through data gathered as they worked with an on-line dictionary (Hulstijn, 1993), learners' automaticity as inferred from response-time data in grammaticality judgment tasks (Hagen, 1994), and monitoring strategies through collection of error correction data from a dictation task (Jamieson & Chapelle, 1987). In each of these cases, inferences were made about learners' ability to address psycholinguistic questions about L2 processing.

Research investigating pedagogical questions relies on process data to act as evidence about the quality of a CALL activity in meeting an instructional goal. For example, Goodfellow and Laurillard (1994) reported the results of a case study investigating learners' use of a CALL program for vocabulary acquisition in Spanish. The program allowed learners to select, group, and practice vocabulary contained in on-line texts in order to achieve the pedagogical goals of learning the selected vocabulary. The researchers examined learning processes by observing the choices they made during use of the program and think-aloud protocols. The results indicated that learners were not able to use the program effectively for vocabulary learning, and that they needed more training if they were to use the software tools effectively—a result that has been found in other pedagogically oriented CALL research as well (Hsu, Chapelle, & Thompson, 1993).

A fourth connection with SLA research has called on methods of discourse analysis for describing the interactions within learning activities (e.g., Long, 1980; Allwright, 1988; Chaudron, 1988; van Lier, 1988; Allwright & Bailey, 1991). In CALL research, Esling (1991) suggested that it may be valuable to examine the oral and written texts that learners produce during CALL use:

One area in the evaluation of the effectiveness of CALL with immediate and potentially powerful research possibilities involves the assessment of the types of discourse generated during a CALL activity, and its similarities and differences to the discourse found in non-CALL classroom activities. (Esling, 1991, p. 114)

Esling's idea was that such research would improve understanding of the instructional value of various types of CALL activities by viewing them through the lens of familiar discourse types as outlined by Brown and Yule (1983). Fruitful work in using these methods has demonstrated, for example, that the discourse functions that students produce orally while working on CALL depend, in part, on the type of program the students work with (Pizer, 1986; Abraham & Lou, 1991) and that context-embedded, cognitively demanding discourse can occur in such activities (Mohan, 1992).

Chapelle (1990) extended Esling's basic idea by applying classroom discourse analysis (Sinclair & Coulthard, 1975) to the "communication"
(Luff, Gilbert, & Frohlich, 1990; Hirst, 1991) that occurs between the learner and the computer program:

Depending on the program, the interaction allowed can render possible a variety of functional acts. A precise description of an activity could be formulated by specifying the types of acts possible within a given CALL program, which acts can be used as each type of move, how moves fit together to form legal exchanges, until a grammar of the CALL activity is defined. This grammar, then, provides an unambiguous statement of the parameters of student–computer interaction within a CALL program. The grammar of possible discourse forms a framework for describing actual acts of the students as they work, as well as a basis for comparison with the acts allowed in other CALL and classroom activities. (Chapelle, 1990, p. 207)

Renec and Chanier (1995) take a similar approach in their description of a computer program by conceptualizing it as a collaborator with a French learner who participates in goal-directed scenarios such as making a reservation at a restaurant. Their approach to understanding the collaboration between learner and computer is to characterize the nature of the utterances (i.e., the acts) each can contribute to the collaboration. They are then able to speculate on the potential value of particular collaborative sequences for second language acquisition, on the basis of a Vygotskyan theory of collaboration and “exolingual interaction” theory, which hypothesizes the nature of “potentially acquisitional sequences” of interaction during collaboration.

These functional perspectives on learner–computer interaction provide a means for connecting CALL research to research on SLA tasks. For example, Hsu (1994) conducted a focused discourse analysis of interactions between learners and the computer to identify functions of interest for SLA (e.g., requests for modified input within a listening comprehension program). The normal interaction in this part of the program consisted of learners’ requests for continuation of a story with accompanying pictures on one computer screen after another. The researcher counted as “interactional modification” sequences in which this normal interaction was interrupted by the learners’ requests for modified input (which could be in the form of repetitions, written transcriptions, or written definitions for words in the input). Among the findings was a significant relationship between interactional modifications and acquisition of the specific lexical phrases with which the modifications had occurred.

Discourse analysis appears to be a useful tool for research on the language of NBLT. Investigating computer-assisted class discussion (i.e., written language transmitted over a network) in a first-year German class to seek evidence of the functions learners used, Chun (1994) found that learners used a number of interactional speech acts – for example, asking questions and requesting clarifications. She concluded that the computer-assisted class-discussion format created a context that was positive for
the acquisition of these acts. Others have concluded on the basis of discourse analysis that learners take many turns in NBLT relative to some other classroom activities, that turn taking may be more evenly distributed, and that teacher control is diminished (Beauvois, 1992; Kelm, 1992; Kern, 1995; Warschauer, 1996; Ortega, 1997).

The classroom context of CALL

In 1991, Johnson pointed out the CALL research of the 1980s needed to evolve beyond investigation of the linguistic and cognitive facets of development:

The bulk of research on computers and learning in educational environments has focused on the cognitive aspects of learning. Yet, theory in second language acquisition and research in second language acquisition classrooms indicate that the social interactional environments of the classroom are also crucial factors that affect language learning in important ways. (Johnson, 1991, p. 62)

Johnson's suggestion to expand CALL research to social interactional environments is consistent with the ethnographic tradition of classroom research that investigates the classroom contexts in which second language acquisition occurs (Watson-Gegeo, 1988). Moreover, a qualitative study of CALL conducted in an L1 classroom prior to 1991 pointed to the value of examining the role the computer plays within the larger culture of the classroom (Cazden, Michaels, & Watson-Gegeo, 1987).

Relatively little work has been done so far to probe questions about the sociocultural and classroom contexts of CALL use. One study (Park, 1994) used qualitative methods to investigate the classroom culture of ESL learners using hypermedia language learning software in an intensive English program in the United States. The research revealed the role of factors in the language program and classroom culture in shaping the learners' experiences with CALL. A second study (Edwards, 1994), conducted in an intensive program in the United States, used survey research methods to investigate how the teachers' attitudes and knowledge of CALL influenced their CALL use. Sanaoui and Lapkin's (1992) qualitative study observed the nature of the language that ESL and FSL (French as a second language) learners in Canada produced and the quality of instructional experience that learners and teachers perceived as they worked collaboratively with peers from the target language across a computer network. Research on NBLT (including the studies in this volume) helps to reveal how CALL can work within the classroom context.

Sociocultural issues of CALL

The classroom-based studies that have been cited offer insight into some of the sociocultural issues related to CALL use. Critical perspectives
on technology and society (e.g., Bowers, 1988), however, point to the need to raise fundamental questions about the culturally bound ideologies associated with educational technology. Hart and Daisley (1994) present their speculation on this issue based on their experience at an educational technology conference in Japan, but much work remains to be done. The accessibility of the Internet has increased the impact of the socio-political domain on the interplay between language and computers in all realms, including education (e.g., Murray, 1995).

It is clear that research in CALL must include cross-cultural perspectives. Even CALL researchers who wish to remain within the tradition of educational technology find that work in that area has evolved to include a number of different perspectives, including "a cultural constructivist approach" (Scott, Ccle, & Engel, 1992; Crook, 1994). This approach has roots in Vygotskian cultural psychology (Wertsch, 1985), which "makes sense of 'learning' by reference to the social structure of activity – rather than by reference to the mental structure of individuals" (Crook, 1994, p. 78). The perspective emphasizes that the values and priorities of a culture influence decisions concerning issues such as technology use within classrooms (Olson, 1987), and therefore affect learners' linguistic experiences.

None of the six themes described in this section has yet been fully developed. CALL research is just beginning to pull together the relevant questions, methods, and data. NBLT has arrived on the scene at a critical period to contribute to the evolution of CALL research.

Network learning: A critical role in CALL's evolution

Network learning significantly expands the scope of CALL activities and, as a consequence, critical investigation of NBLT offers fresh perspectives on CALL's familiar themes. NBLT has already added to current evolution in CALL and is likely to continue to do so.

The need for CALL evaluation is more evident to observers of NBLT than it has ever been. Teachers and researchers who critically observe the unique registers of Internet chat sessions (Werry, 1996) or on-line classroom discussions cannot help but ask about the effects on second language development. Such registers are characterized by a variety of features that do not appear in most forms of written language, such as partial sentences, invented words, and iconic symbols. Because NBLT activities move beyond the clear objectives and controlled instructional sequences of some pre-network CALL, the registers of language it produces can appear chaotic. Collombet-Sankey describes NBLT that she considered a success as follows:
No planned activity could have created better conditions for interaction in French. It unlocked the dynamics of the group because a new rapport among students was established based on criteria other than language competence. This reconfiguration of the culture of the language classroom which comprises a different system of socializing has to be regarded as a positive development in strategic language learning. (Colombet-Sankey, 1997, p. 149)

Despite the impression one might gain that such classroom dynamics are ideal for language learning, their success may be difficult to document in more concrete terms. When the goals of an activity are to create conditions for interaction and reconfiguration of classroom culture, methods of evaluation must focus on interactions within the classroom culture—slipperier objectives than those involving development of aspects of grammatical competence, for example.

NBLT should be more complex than pre-network CALL because network-based activities may attempt to develop a more complex set of abilities. Barson’s description of a project-based methodology for NBLT is a good example of the types of learning goals that may be targeted by NBLT:

At the heart of the paradigm being proposed is the view that learning to act as oneself in a foreign language is the primary goal of the student, a goal involving a conciliation, over time, of self-identity with the linguistic code under assimilation. (Barson, 1997, p. 12)

Such goals may prove difficult for CALL evaluation. Past work has shown that the more concretely defined the outcomes, the more successfully they are assessed (Doughty, 1992; Nagata, 1993; Hsu, 1994). Researchers attempting to assess more complex outcomes, such as development of context-embedded and cognitively demanding language proficiency, have run into challenges in assessment (Mohan, 1992). Barson’s targets for NBLT appear even more elusive, and therefore promise to challenge efforts in evaluation. Such challenges are needed, however, to push forward the scope of CALL use and evaluation.

The myth of “CALL method” is exposed in NBLT through the qualitative, process-oriented approaches in NBLT. Based on longitudinal interviews with students and teachers, audiotaping and videotaping of class sessions, analysis of electronic texts, and classroom observation, Warschauer (Chapter 3, this volume) reveals the dramatically different character of the activities in each class: “These four classes provided a powerful illustration to me that the Internet itself does not constitute a method, any more than books, or blackboards, or libraries constitute a method.” In Warschauer’s study, these differences in NBLT activities were interpreted as reflecting different teacher beliefs and institutional ideologies. Additional research on CALL may help to clarify the differences
in the language of these activities that are related to the features of the activities that teachers design on the basis of their beliefs and institutional contexts.

The pursuit of significant activity features in NBLT extends beyond those proposed for pre-network CALL. In most NBLT activities, the software does not control the goals, the topics, or the duration of activities. The teacher can choose to specify these or not, and the learners—through their language—can play a significant role in shaping the activity. One study investigating the language of an international Internet discussion list interpreted results as follows:

With new teachers and students meeting in each virtual encounter, communication forms different from those anticipated by any model of structured community, whether of a Freirian community of co-investigators or a Foucauldian model of panopticon control, will develop. Tapping into the learning possible in this creative language environment is the next task for those interested in Internet-based education. (Warschauer & Lepeintre, 1997, p. 86)

The creativity afforded by an Internet discussion group such as the one Warschauer and Lepeintre describe demands that a framework of CALL activity features include the sociolinguistic factors known to influence context-contingent communication. Given the global community that can be created through the Internet, CALL research involving network learning promises to enrich the study of sociolinguistics and language acquisition.

Links between CALL and SLA are also strengthened by NBLT studies such as Pellettiere’s (this volume), which draw on conceptual and empirical methods for investigating the language of L2 tasks. Given the principled basis for this research, the results address an important question about instructed SLA: To what extent do particular tasks provide opportunities for negotiation of meaning? Pellettiere describes the results of one such study:

The results of this study demonstrate that task-based synchronous NBC [network-based communication], such as chatting, can indeed foster the negotiation of meaning. Learners involved in NBC chats negotiate over all aspects of the discourse, which in turn pushes form-focused linguistic modifications. Additionally, learners provide and are provided corrective feedback, which was demonstrated to result in the incorporation of target-language forms. . . . (Pellettiere, this volume)

All forms of CALL have a dynamic relationship with the classrooms in which they are used, but approaches to design and research of NBLT have pushed the view of CALL to include the classroom context of CALL. Writing about NBLT, Patrikis (1997) notes that “a simple and often heard phrase like ‘the integration of computers into the curriculum’ is a false lead. Once introduced in any meaningful way, the computer
changes everything" (p. 175). Similarly, Debski (1997b) calls the relationship of language teaching and technology "ecological change" because "any significant change in one of its components may lead to changes in the remaining factor" (p. 41).

These observations are consistent with Markee's (1997) characterization of innovation in second language teaching. As illustrated in Figure 1, changes in materials do not occur independently. Instead, they must co-occur with changes in methodological teaching skills and philosophical values. The findings of NBLT studies have begun to demonstrate the interplay among these facets of teaching. For example, in his study of the CALL of several different classrooms, Warschauer observed that the "implementation of new technologies varied from classroom to classroom, influenced by the general institutional context and the particular beliefs of each individual teacher" (Warschauer, this volume). Similarly, Levy (1997b) describes how his project-based approach was influenced by institutional requirements for a syllabus at the beginning of the semester and formal evaluation of students — requirements reflecting particular pedagogical values. Other researchers have observed that when teachers do not have the values and skills that are consistent with NBLT activities, the types of changes introduced by NBLT can be "unsettling," in part because teachers' control is compromised and participation can appear "anarchistic" (Kern, 1995, p. 470).

NBLT also has much to add to the study of the sociocultural impact of CALL. Debski, for example, justifies the use of NBLT on the basis of societal values: "[I]t should be evident that current evolution of the society and the human self, and the role technology plays in shaping them, are in synchrony with the basic tenets of an exploratory, experience-based approach to second or foreign language learning" (Debski, 1997a, pp. 213–214). In this volume, the chapters by Meskill and Ranglova and by Warschauer provide the clearest examples of how technology use is subject to and becomes part of the sociocultural environment. Perhaps
the most compelling illustration of the convergence of L2 activity, cultural values, and the technology that put them together is offered in a qualitative study by Warschauer and Lepeintre (1997). They tell a vivid story of their experience with an Interne: list designed for EFL practice. The topic of war atrocities was nominated because of a question about Japanese culture posed by a Japanese learner, and a heated political discussion between members of two ethnic and cultural groups followed:

At some point, this profoundly successful discussion started to turn into its opposite. These students weren't just talking about the real world, but rather they were the real world: they were debating serious issues of international relations based on their own personal experiences with war and oppression.

(Warschauer & Lepeintre, 1997, p. 83)

What could display a greater contrast to the types of pre-network CALL dialogues illustrated in Table 1? Observations such as these indicate that NBLT pushes CALL research beyond examining the impact of importing and exporting educational technology to the study of how education, technology, language, and culture are evolving together.

Is network-based learning CALL?

This question is important for conceptual development and evolution of CALL as a whole and network-based learning in particular. In an initial response to this question, I have suggested that a meaningful definition of CALL activities requires descriptive research documenting the language and interactions that learners engage in during CALL use. I examined six themes that have emerged throughout the evolution of CALL and suggested the degree of connectedness of network-based learning to each theme. Network-based learning — in part through the studies in this volume — contributes substantially to each theme and therefore to the evolution of CALL. It therefore seems that, at least for the time being, it is useful to consider network-based learning within the scope of CALL. Debski (1997b) suggests that “the use of linguistically enriched environments (i.e., network-mediated multimedia) . . . invites a serious reconsideration of computer-aided language teaching and all of its constitutive elements” (p. 47). However, given the existing themes identified in the past CALL literature and the contributions that NBLT makes, one might suggest that NBLT represents an expansion rather than a reconceptualization of CALL.

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