Computer Assisted Language Learning (CALL): the effect of ESL students' use of interactional modifications on listening comprehension

Jing-Fong Jane Hsu
Iowa State University

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Computer Assisted Language Learning (CALL): The effect of ESL students’ use of interactional modifications on listening comprehension

Hsu, Jane Jing-Fong, Ph.D.

Iowa State University, 1994
Computer Assisted Language Learning (CALL): The effect of ESL students’ use of interactional modifications on listening comprehension

by

Jing-Fong Jane Hsu

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For the Graduate College

Iowa State University
Ames, Iowa

1994
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CHAPTER I. INTRODUCTION

There is a commonly held belief that watching TV is a good way for students to improve their listening comprehension while they are learning second/foreign languages. However, Krashen (1988) argued that "the apparent failure of educational TV programs to teach foreign languages is in the beginning stages because the input is simply not comprehensible." (p. 333). He provided a personal example stating that his own English speaking children had watched Spanish TV programs for years and could only count from one to ten in Spanish and recognize a few words. He pointed out when the learner does not understand the message, s/he will acquire nothing because the input is only "noise". (p. 334). Therefore, he defined a good learning situation as teachers who can provide comprehensible input to a non-native learner. This characteristic of comprehensible input was recognized early in the comprehension-based approach to teach listening comprehension.

Second Language Listening Comprehension

In the mid 1960's, the following idea about the listening process gained wide acceptance: listening is the primary channel for language input and acquisition in the beginning stages of learning (Nida, 1957; Rivers, 1966; Weaver, 1972). In particular, several SLA theorists and researchers have
developed a comprehension approach (Rivers, 1966; Asher, 1969; Belasco, 1971; Postovsky, 1974; Terrell & Krashen, 1982). Blair (1991) defined comprehension approach as follows:

An approach which focuses on establishing receptive skills first (listening comprehension in particular, but to some extent also reading comprehension) and does not attempt specifically to train oral production-oral fluency being expected to emerge naturally and gradually out of the data base established through ample comprehension experience of the right kind. (p. 25)

The main characteristic of the comprehension approach are "listening to understand" which has been suggested by the major insights drawn from the research into children's first language acquisition (Brown, 1973; Lahey & Bloom, 1977; Leonard, 1978). Asher (1981) pointed out readiness to talk is a developmental phenomenon in the infant which is preceded by hundreds of hours of listening, and speech can not directly be taught to the students just as a parent can not directly teach the infant to talk. Again, in the 1980's there is a focus on communicative language teaching--teaching second languages for the ultimate goal of communication with native speakers of the second language. Dunkel (1986) asserted the key to achieving proficiency in speaking is developing proficiency in listening comprehension. As a way of increasing second language students' development of listening comprehension, Krashen (1982) suggested that the target language input the students receive needs to be comprehensible.
Comprehensible Input, Interactional Modifications, and Second Language Acquisition

Comprehension is a necessary condition for language acquisition, but it is not sufficient. In his input hypothesis, Krashen (1985) theorized that acquisition takes place as a result of the learner having understood input that is a little beyond the current level of his/her competence (i.e. the i+1 level). That is, input should to be comprehensible to the learner, but it must also contain new linguistic material that is a little above the learner's current level.


Interactional modification refers to a process of modifying the interactional structure of conversation between a native and a non-native speaker. An example of interactional modifications is shown in the Figure 1. The native speaker reacts to a lack of comprehension by a non-native speaker and makes modifications to the linguistic input. These modifications allow the non-native speaker to understand unfamiliar linguistic material (i.e., making i+1 input comprehensible). Long (1983e) developed a model to account for the way in which interactional modifications in two-way communication aid second language acquisition (SLA). The model (Figure 2)
describes the relationship between negotiated interactions, comprehensible input, and language acquisition (i.e., the negotiated interactions promote comprehension of input, then comprehensible input promotes language acquisition.) Allwright and Bailey (1991) also speculated that the effort (i.e., asking questions, indicating confusion, or requesting clarification or repetition) made by a non-native speaker to comprehend the input probably promotes language development.

The principal features of interactional modifications have been identified in a number of studies on foreigner-talk (Ferguson & Debose 1977, Hatch 1980, Arthur et al. 1980, Long 1980, 1981, 1983b). In Long's study of

<table>
<thead>
<tr>
<th>Native speaker:</th>
<th>Can you give me a jump cable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non native speaker:</td>
<td>What you mean? (<strong>modification request</strong>)</td>
</tr>
<tr>
<td>Native speaker:</td>
<td>A jump cable. (<strong>modification of input</strong>)</td>
</tr>
<tr>
<td>Non native speaker:</td>
<td>A jump cable. (<strong>modification request again</strong>)</td>
</tr>
<tr>
<td>Native speaker:</td>
<td>A jump cable is a cable used to connect two battery to start dead car. (<strong>modification of input again</strong>)</td>
</tr>
</tbody>
</table>

Figure 1. An example of interactional modifications.
native speakers conversational adjustments to non-natives speakers, he reported a statistically significant subset of the "interactional modification" features native speakers used with non-natives speaker while comparing native speakers conversational adjustments to native speakers. These features include more repetitions, more clarification requests, more explanation, more confirmation checks, and more comprehension checks. Examples of these types of interactional modifications in an example of foreigner-talk are listed in Figure 3 (Long, 1983d).

These interactional modifications are intended to simplify utterances in order to make the non-native speaker easier to perceive and understand, or to clarify what the native speaker wishes to say by repeating words or utterances, or discovering what a non-native speaker has said through confirmation.
checks or clarification requests. Through the process of interactional modifications, the non-native speaker has opportunities to negotiate meaning by seeking further input, then s/he can understand the input s/he received, in order to facilitate communicative learning.

<table>
<thead>
<tr>
<th>Type of modifications</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-repetitions</td>
<td>NS: He got stuck in the window trying to get in. He got stuck.</td>
</tr>
<tr>
<td>Other-repetitions</td>
<td>NNS: I went to the cinema. NS: Yeash. You went to the cinema.</td>
</tr>
<tr>
<td>Clarification requests</td>
<td>NNS: She very high. NS: Sorry?</td>
</tr>
<tr>
<td>Expansions</td>
<td>NNS: I wear a sweater. NS: Yes, you're wearing a red sweater.</td>
</tr>
<tr>
<td>Confirmation checks</td>
<td>NNS: I went to cinema. NS: The cinema?</td>
</tr>
<tr>
<td>Comprehension checks</td>
<td>NS: It was raining cats and dogs. Do you follow?</td>
</tr>
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(NS = native speaker, NNS = non-native speaker)

Figure 3. Six types of interactional modifications in foreigner-talk (Long, 1983d).
Because special constraints operate in the second language classroom with one teacher and many L2 students, research on interactional modifications has been conducted in language classrooms on teacher-talk (Gaies, 1979). Teacher-talk refers to the language that teachers address to L2 students with its own specific formal and interactional properties. Several researchers (Henzl, 1979; Chaudron, 1983; Wesche & Ready, 1983; Long, 1985) examined the kinds of speech modifications teachers made when teaching L2 students in comparison with teaching native-speaking students. The results of these studies showed a range of speech modifications. The input directed at L2 learners was slower with more accurate pronunciation, more and longer pauses, and less complicated phrases, and it contained more repetition than speech between native speakers.

Two researchers selected the features of interactional modifications used in a foreigner-talk to examine the interactional modifications of the teacher's input to L2 learners. These features included confirmation checks, comprehension checks, clarification checks self-repetitions, other-repetitions, and expansions. Ellis (1985) examined the interactional modifications of a teacher's input to two children. He reported that two interactional features, self-repetitions and expansions in the teacher's speech, significantly proved sensitive to students' language level of development. In a study examining input and interaction in communicative language classroom, Pica and Doughty (1985) reported that the following interactional modifications occurred in the classroom: self, other-repetition, clarification requests, confirmation requests, comprehension checks. Also, those interactional
modifications occurred in the teacher-fronted activity more than in the group activity. However, in comparison to the results of studies (Long, 1981) about native speaker to non-native speakers interaction outside of the classroom, the teachers in the Pica’s and Doughty’s study made few interactional modifications. They explained that the teacher-talk occurred in one-to-many interactions where the learners varied in their level of proficiency and where there was limited feedback from a few students. Therefore, it created difficult situations for teachers who wanted to engage in interactional modifications with individual L2 learners. The quest for new and improved methodologies for teaching L2 language started in the early 1980s.

**Computer Assisted Language Learning**

"In the 1980s, no single medium of instruction or object of instructional attention produced as much excitement in the conduct of elementary and secondary education as did the computer" (Becker, 1990). Because the primary advantages of using the computer are that it can offer individual instruction and interactive learning, there is a growing interest in the use of computer assisted language learning (CALL) (Ahmad, 1985). CALL developers claim that CALL offers an environments in which an L2 student can participate in interactive learning. In particular, some computer software provides the following comprehension tools which allow L2 students to request
modification of the input they hear/read in order to aid their comprehension (Kenning, 1990).

1. The computer can offer explanations, rephrasings, glossaries, and dictionary to make the meaning of a text clearer for an L2 learner when s/he confronts a piece of text containing some unfamiliar lexical items. For example, in The Dark Castle (Saunders, 1987), L2 learners look up a word by placing the cursor under it and pressing a dedicated key. The appropriate explanation appears a few seconds later at the bottom of the screen.

2. Combining a computer with CD-ROM or videodisk, the computer can provide extra-linguistic supports, such as crystal sounds, pictures, real-life video images, animations, etc. These extra-linguistic supports can aid an L2 learner's comprehension. For example, the interactive videodisk program "A la rencontre de Philippe" can provide numerous real-life images such as visits to a French apartment (room by room), use of authentic newspapers, use of a telephone, and use of Philippe's answering machine with clear French audio sound (Watkins, 1992).

These computerized tools can remain hidden from view until expressly requested by the learner and give learners a choice between alternative means of making input comprehensible. Also these tools stand a better chance of
matching a learner's individual needs than the most traditional forms of support.

Several CALL researchers have begun to investigate different types of computer-student interactions (Jamieson & Chapelle, 1987; Robinson, 1991). For example, Jamieson and Chapelle (1987) investigated the different working styles as students performed different tasks (CALL spelling and dictation lessons). In another study, Chapelle and Mizuno (1989) investigated learning English as a Second Language (ESL) students' use of resourcing strategies (i.e., choices of "help" options) while using CALL grammar lesson. Robinson (1991) conducted a study to examine the effectiveness of different types of CALL feedback. Hsu, Chapelle, and Thompson (1993) examined students' exploration strategies through editing acts and exchanges (i.e., number of times students tried alternative grammatical forms after they had the correct one.)

Chapelle (1990) suggested that "if researchers hope to understand what and how particular students learn using CALL material, it is necessary to characterize the interaction that takes place while they work." She proposed a precise analysis of student-computer interaction in CALL research by using the principles of classroom discourse analysis developed by Sinclair and Coulthard (1975).
Classroom Discourse Analysis in Computer Assisted Language Learning Research

When target language input is made available to the L2 learner, this input is not determined solely by the teacher. It is also determined by the learner himself/herself. The feedback s/he provides affects the nature of subsequent input from the teacher. Because one affects the other, it is more fitting to consider the joint work done by teacher and learner by looking at the discourse they construct together. The method for undertaking this is known as discourse analysis (Ellis, 1985). This discourse analysis system views interaction as a chain of teacher and student behaviors. It attempts to describe not just the function of individual utterances, but how these utterances combine to form larger discoursal unit (i.e., it attempts to analyze fully the discourse of classroom interaction in structural-functional terms.)

One such discourse analysis system that developed by Sinclair and Coulthard (1975) is comprised of five hierarchical ranks: lesson, transaction, exchange, move, and act. Higher ranks are defined by the units of lower ranks they comprise. The lowest rank of this discourse system is comprised of acts that teachers and students say in the classroom. An act might be something like the teacher's question, "Is the clock on the wall?" or a student's response "Yes, the clock is on the wall." or the teacher's evaluation "Good. The clock is on the wall." An act might initiate the next higher rank, move. The following three particular moves in this discourse system are prevalent in teacher-centered classrooms: Initiation, response, and feedback (follow-up).
Teacher: What do you do every morning? Initiates
Student: I clean my teeth. Responds
Teacher: You clean your teeth every. Feedback

(McTear, 1975)

The teacher often initiates questions, and the student responds. Then teachers often follow up when they evaluate and comment on students' responses. When these moves come together in a sequence, they are analyzed as an exchange. For example, a sequence of moves (initiation, response, and feedback) is defined as a type of teaching exchange (Sinclair & Coulthard, 1975); a frame exchange indicates boundaries in the lesson, the end of one stage and the beginning of the next. A series of an unspecified number of teaching and other types of exchanges compose a transaction. For example, one transaction might consist of a series of frame and teaching exchanges. A series of transactions is analyzed as a lesson which is the highest rank of this discourse system.

By adapting the units of analysis and structures suggested by Sinclair and Coulthard for classroom discourse (1975), Chapelle (1990) did a discourse analysis of student-computer interaction on a CALL grammar lesson (Chapelle & Boysen, 1990). This analysis applies Sinclair and Coulthard's discourse analysis method by viewing the student and the computer rather than the student and teacher as two participants in a dialogue. Chapelle stated that "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, and so on until the grammar of the CALL activity is defined." (p. 207)

At the last two lower levels of this system, Chapelle summarized the functional acts and moves that the computer and the student could perform in the lesson she analyzed (Figure 4). She also described three types of exchanges which were comprised by moves in this CALL grammar lesson (Figure 5). She suggested that this discourse analysis approach can be used to characterize systematically student-computer interaction as students work with the computer.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Move</th>
<th>Acts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>Initiate</td>
<td>Offer help, offer exit, offer phrase, require edit, offer save sentence</td>
</tr>
<tr>
<td>Computer</td>
<td>Obey</td>
<td>Exit, save sentence</td>
</tr>
<tr>
<td>Computer</td>
<td>Follow up</td>
<td>Add phrase, judge, provide help</td>
</tr>
<tr>
<td>Student</td>
<td>Choose</td>
<td>Choose help, choose exit, choose save sentence</td>
</tr>
<tr>
<td>Student</td>
<td>Respond</td>
<td>Select phrase, edit</td>
</tr>
</tbody>
</table>

Figure 4. The Grammar lesson: participants, moves, and acts (Chapelle, 1990, p. 212).
### Statement of the Problem

Research on second language acquisition indicates that modification in the interactions between teachers and L2 learners is positive for their acquisition of language. Through the process of interactional modifications, L2 learners have the opportunity to negotiate meaning and make input comprehensible while hearing unknown linguistic elements. Therefore, the role modification is believed to play is to facilitate communication and language acquisition (Long, 1985; Larsen-Freeman & Long, 1991).

Because the number of students continues to grow in today's L2 classroom, it is difficult for a teacher who would like to do interactional modifications with the individual learner. Computer technologies appear to offer individual interactive learning which may offer a significant partial solution to this dilemma. Computers provide numerous comprehension tools (i.e., repetitions, dictionary, glossary, clear sounds, or pictures) which

---

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Moves (in the order indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>Initiate, respond, follow up</td>
</tr>
<tr>
<td>Modification</td>
<td>Initiate, choose, follow up</td>
</tr>
<tr>
<td>Teaching</td>
<td>Initiate, choose, obey</td>
</tr>
</tbody>
</table>

Figure 5. The Grammar lesson: exchanges and moves (Chapelle, 1990, p. 213).
allow an individual L2 learner to modify the input s/he hears/reads in order to aid her/his comprehension. There has been little research that specifically describes an L2 learner's moves that request modifications to the input s/he receives while using a computer to confront new linguistic material and that assesses the impact of these moves on comprehension and acquisition.

The need exists for a study that describes L2 learners' moves (i.e., based on the principles of classroom discourse analysis) that request modifications of the input they receive while working on the computer. Research is also needed to examine 1) the effect of those interactional computerized modifications on L2 learners' comprehension and their language acquisition, and 2) the types of interactional modification that are effective for L2 learners.

Purposes of the Study

In this study, the international students of Intensive English & Orientation Program (IEOP) at Iowa State University (ISU) will use an interactive CD-ROM program to help them practice their listening comprehension. Because this program offers comprehension tools (i.e., repetition, text reinforcement, and dictionary) which allow an ESL student to make modifications on the input s/he hears, it is intended to be in aiding listening comprehension. The purposes of this study are:
1. To describe ESL students' moves (i.e., based on the principles of classroom discourse analysis) requesting modifications (i.e., requesting dictionary, aural repetition, or text reinforcement) on the input they receive while working on this program which confronts them with new linguistic material.

2. To describe what types of modifications (i.e., dictionary, repetition, or text reinforcement) the ESL student perceives as effective.

3. To describe the relationship between those interactional computerized modifications which ESL students request and their listening comprehension scores.

4. To describe the relationship between the modification an ESL student requests and her/his improvement on individual words in pre- and post-tests.

Research Questions

The research questions examined in this study are:

1. Do ESL students demonstrate functional moves which request the dictionary, the text reinforcement, or the repetition type modification, while working on this interactive CD-ROM program to hear unknown linguistic material? If so, what kinds of modification patterns do ESL students use?
2. Do ESL students believe these interactional computerized modifications help their listening comprehension? What is the rank order of these different type of interactional computerized modifications (dictionary, text reinforcement, and aural repetition) ESL students perceive as effective for them, as measured by a self-assessment instrument?

3. Does the amount of these interactional computerized modifications ESL students request correlate to their listening comprehension scores?

4. Is there a relationship between improvement on individual words (partial dictation pre- and posttest) and students' use of modification?

**Limitation of the Study**

This study was conducted in view of the following limitations:

1. The subjects in this study were not chosen randomly.
2. The experiment was performed in one university using one class. Thus the generalizability of the study is limited to the class with the same characteristics as this in the study.
3. A possible novelty effect due to an unfamiliarity with CD-ROM.
4. The software used was a choice made by the researcher alone.
5. In the partial dictation test, there is a possibility that subjects might write down right answers without comprehending but by on the basis of clues in other parts of the text.
6. This study was conducted in a volunteer setting rather than a required classroom setting.

Definition of Terms

CD-ROM (Compact Disc-Read Only Memory): A storage device that uses laser technology to present audio and video displays. CD-ROM are much smaller than videodisks, but have great storage capacity (Thompson & Schmidt, 1993).

Computer Assisted Language Learning (CALL): A language learning technique in which the student interacts with instructional language stimuli at a computer terminal on a one-to-one basis.

English as a Second Language (ESL): Students who are non-native English speaking and learn English as their second language.

Interactional modification: This refers to those modifications that occur in conversations between native speakers and second language learners. These interactional adjustments include a whole range of attempts to understand and be understood (i.e., native speakers make modifications to the linguistic input which is comprehensible to the second language learners.)

Videodisk: A video recording and storage system in which audiovisual signals are recorded on plastic disc, rather than on magnetic tape (Heinich, Molenda, & Russell, 1993).
CHAPTER II. REVIEW OF THE LITERATURE

Introduction

In the preceding chapter, it was stated that some computer software provides comprehension tools that allow second language students to request modification of the input they receive from the computer in order to aid their comprehension. In theory, such tools are ideal for second language acquisition; however, in practice, little is known about how students actually interact in such environments. The main purposes of this study were to examine 1) if second language students request modifications of the input they hear while working on a computer-based listening exercise, and 2) if these interactional modifications in a computer assisted learning language setting help second language students' listening comprehension and language acquisition. This chapter will cite literature and research pertinent to this study in four related major areas.

1. Second language listening comprehension
2. Comprehensible input, interactional modifications, and Second Language Acquisition
3. Computer assisted language learning
4. Classroom discourse analysis in computer assisted language learning research
The first section begins with a discussion of the theoretical perspective on the development of listening comprehension in a second language. This is followed by a discussion of the relationship among comprehensible input, interactional modifications, and second language acquisition. Next is a summary of the research on interactive computer assisted language learning environments and computer-student interaction. The final section defines the principles of the classroom discourse analysis and describes the use of this system for analysis of computer assisted language learning. Finally, a summary of the research review is presented.

**Second Language Listening Comprehension**

Since the middle 1950's, several language theorists and researchers have emphasized the following idea: listening is the primary channel for language input and acquisition in the beginning stages of learning (Nida, 1957; Rivers, 1966; Weaver, 1972). Peterson (1991) recounted Nida's observations of the way in which Africans easily learn the many tribal languages in their environment:

They go to a place to live, they listen without attempting to speak, and quite soon they find that they can 'hear' the language. Only after internalizing some part of the language do they try to speak. (p.108)
Although language theorists and researchers agree on the importance of listening, there are two perspectives on listening and language instruction: the first is "listening to repeat" from the audiolingual method and the second is "listening to understand" from the comprehension approach. The audiolingual method was firmly grounded in behaviorism, and the comprehension approach was developed due largely to the investigations of children's first language acquisition and language development (Brown, 1973; Lahey & Bloom, 1977; Leonard, 1978).

The middle part of this century was characterized by a zeal for the application of behavioristic approaches to language teaching. Behaviorism is a scientifically based approach to the study of human behavior, and behaviorists (i.e., Skinner) advocate habit-formation and conditioning models (i.e., stimulus-response-reinforcement). Since the audiolingual method is married with the behaviorism, language learning is viewed as a process of mechanical habit formation and the learner as a language-producing machine, and listening and repeating are key components in this method. Students are asked to listen, in order to 'hear' a model (e.g., a sentence, a phrase, a word) and in order to imitate it. The listening is regarded as sound recognition/discrimination and prosodic patterning of spoken language as involved in memorization and habit formation. However, Terrell (1982), a second language theorist, had the following comment on this method:
Students in an audiolingual method usually have excellent pronunciation, can repeat dialogues and use memorized pattern in conversation. What they very often cannot do, is participate in a normal conversation with a native speaker. (p. 121)

The main characteristic of the comprehension approach is "listening to understand" which has been suggested by the major insights drawn from the research into children's first language acquisition (Brown, 1973; Lahey & Bloom, 1977; Leonard, 1978). Asher (1981) points out readiness to talk is a developmental phenomenon in the infant which is preceded by hundreds of hours of listening, and speech can not directly be taught to the students just as a parent can not directly teach the infant to talk. Similarly, the advocates of the comprehension approach suggest that listening comprehension should be the focal methodology in second language instruction, particularly at the initial stages of language study (Rivers, 1966; Asher, 1969; Belasco, 1971; Postovsky, 1974; Terrell, 1982). Rivers asserted that since speaking did not of itself constitute communication unless what is said was comprehended by another person, teaching the comprehension of spoken speech was of primary importance in second language teaching.

Again, in the 1980's there is a focus on communicative language teaching--teaching second languages for the ultimate goal of communication with native speakers of the second language. Dunkel (1986) asserted that if ability to communicate in person-to-person encounters is perceived as one of the primary goals for learning a second language, the goal is achieved by
putting the horse (listening comprehension) before the cart (oral production). In other words, the key to achieving proficiency in speaking is developing proficiency in listening comprehension. As a way of increasing second language students' development of listening comprehension, Krashen (1982) suggested that the target language input the students receive needs to be comprehensible.

Comprehensible Input, Interactional Modifications, and Second Language Acquisition

In considering the role of comprehensible input in second language acquisition, Krashen (1980, 1985) put forward what he calls the input hypothesis in a series of papers. He suggested that acquisition of a second language depends primarily on students' receiving plenty of comprehensible input. The input must be interesting and must include language slightly beyond the current level of the students' language ability. He points out that a good language classroom is designed to make input comprehensible, through extra linguistic support (use of visuals, gestures, and context) and by use of textual features (repetition, redundancy, and simplification).

Larsen-Freeman and Long (1991) had the following comments on interactional modification:

Modification of the interactional structure of conversation or of written discourse during reading ... is a [good] candidate for a necessary (not sufficient) condition for acquisition. The role it plays in negotiation for meaning helps to make input comprehensible while still containing unknown linguistic elements, and hence, potential intake for acquisition. (p. 144)

Interactional modification refers to a process of modifying the interactional structure of a conversation between a native and a non-native speaker which makes input comprehensible to the non-native speaker. For example, a native speaker asks for a jump cable from a non-native speaker, and the non-native speaker asks clarification due to confusion. Then the native speaker modifies the input by repeating the same sentence. But the non-native speaker requests another modification on the definition of "a jump cable". The native speaker explains the meaning of a jump cable to the non-native speaker. During this conversation, the native speaker reacts to a lack of comprehension by a non-native speaker and makes modifications to the linguistic input. These modifications allow the non-native speaker to understand unfamiliar linguistic material.

Long (1983e) developed a model to account for the way in which interactional modifications in two-way communication aid second language acquisition (Figure 2). This model is different from Krashen's idea of the sequence of events involved in language acquisition. Krashen emphasized
that language can be acquired simply by comprehensible input and minimized
the role of output in the acquisition (i.e., output is just a means for receiving
more comprehensible input.) Krashen (1982) summarized his position as
follows:

Comprehensible input is responsible for progress in language
acquisition. Output is possible as a result of acquired
competence. When performers speak, they encourage input
(people speak to them). That is conversation. (p. 61)

In contrast, Long's model emphasized the primacy of interactional
modifications of the conversation, their role in obtaining comprehensible
input, and language acquisition. Allwright and Bailey (1991) also speculated
that the effort (i.e., asking questions, indicating confusion, or requesting
clarification or repetition) made by a non-native speaker to comprehend the
input probably promotes language development. An important area of
research in second language acquisition has been concerned with describing
what modifications occur in input and interaction directed at learners (Ellis,
1986). The next two sections summarize work on interactional modifications
first in natural settings and second in classroom settings.

Interactional modifications in natural settings

Second language acquisition researchers seek to determine how speech
addressed to non-native speakers differs from language used in native speaker
conversation and if these differences aid comprehension or acquisition. In
general, the study of interactional modifications in natural settings is named foreigner talk. An example of the foreigner talker is in the following example:

Native speaker: . . . uh you're from Taiwan, right?
Nonnative speaker: Yeah.
Native speaker: Yeah. What does your father do in Taiwan?

In normal native speaker-native speaker conversation, the native speaker's second question would be 'What does your father do (there)?'

In foreigner talk, interactional features consist of specific discourse functions performed by native speakers. The principal features of interactional modifications which have been identified in a number of studies on foreigner-talk (Ferguson & Debose 1977, Hatch 1980a, Arthur et al. 1980, Long 1980, 1981, 1983b) were confirmation checks, comprehension checks, clarification requests, self-repetition, other-repetition, expansions, here-and-now topics, topic-initiating moves. In Figure 6, an example and description of the features of interactional modifications in foreigner talk appears. In Long's study of native speakers conversational adjustments to non-native speakers (1983d), he reported that native speakers used significantly more repetitions, clarification requests, explanations, confirmation checks, and comprehension checks with nonnative speakers than they used with native speakers.
1. **Confirmation checks**
   When the native speaker repeats part or whole of learner's immediately preceding utterance and employs a rising intonation or when the native speaker repeats the utterance and adds a question tag. They are designed to elicit confirmation that the utterance has been correctly heard or understood. An example is as follow:
   
   Non native speaker: I went to cinema.
   Native speaker: The cinema?

2. **Comprehension checks**
   Attempts by the native speaker to establish that the learner is following what s/he is saying. Typical realizations are "Right?" "OK?" "Do you follow?" An example is as follow:
   
   Native speaker: It was raining cats and dogs. Do you follow?

3. **Clarification requests**
   These differ from confirmation checks in that there is no presupposition that the native speaker has understood or heard the learner's previous utterance. They can take the form of questions (e.g., "Sorry?") statements ("I can't hear."), or imperatives ("Say it again."). They are designed to get the learner to clarify an utterance which has not been heard or understood. An example is as follow:
   
   Non native speaker: She very high.
   Native speaker: Sorry?

Figure 6. An example and description of interactional modifications in the foreigner talk (Ellis, 1986, p. 136).
4. **Self-repetition**
When the native speaker repeats part or the whole of his preceding utterance and also when the teacher paraphrases part or whole of his/her preceding utterance. An example is as follow.

Native speaker:  He got stuck in the window trying to get in. He got stuck.

5. **Other-repetitions**
When the native speaker repeats (but doesn't paraphrases) part or the whole of the learner's preceding utterance without seeking confirmation. An example is as follow.

Non native speaker:  I went to the cinema.
Native speaker:  Yeah. You went to the cinema.

6. **Expansions**
When the native speaker expands a previous learner utterance whether by supplying missing formatives or by adding new semantic information. An example is as follow.

Non native speaker:  I wear a sweater.
Native speaker:  Yes, you're wearing a red sweater.

7. **Here-and-now topics**
The native speaker refers to objects/events which are contiguous. An example is as follow.

Native speaker:  What's that you are wearing?

8. **Topic-initiating moves**
The native speaker starts a conversation topic by asking a question or making a comment.

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Figure 6: Continued.
These interactional modifications are intended to simplify utterances in order to make them easier to perceive and understand, or to clarify what the native speaker wishes to say (e.g., by repeating words or utterances), or discovering what a non-native speaker has said (e.g., through confirmation checks or clarification requests). Through the process of interactional modifications, the non-native speaker has opportunities to negotiate meaning by seeking further input, then s/he can understand the input s/he received, in order to facilitate communication.

Interactional modifications in classroom settings

The last section examined the interactional modification in the natural setting. This section considers the classroom settings. During the last twenty years, there has been an indication that in a language lesson, successful outcomes may depend on the type of language used by the teacher and the type of interactions occurring in the classroom (Ellis, 1986). Therefore, there has been a growth of interest in the analysis of teacher language and interactions occurring in the classroom.

The study of teacher talk parallels that of foreigner talk. The teacher talk refers to the language that teachers address to second language students with its own specific formal and interactional properties (Gaies, 1979). Studies of teacher talk can be divided into those that investigate the formal modifications and those that investigate the interactional modification. Several researchers (Henzl, 1979; Chaudron, 1983; Wesche & Ready, 1983; Long, 1985) examined the kinds of formal speech modifications teachers made when teaching second
language students in comparison with native-speaking students. The results of these studies showed a range of speech modifications. The input directed at second language learners was slower with more accurate pronunciation, more and longer pauses, and less complicated phrases, and it contained more repetition than speech between native speakers.

Some researchers have selected the features of interactional modifications used in a foreigner-talk to examine the interactional modifications of the teacher's input to second language learners. These features included confirmation checks, comprehension checks, clarification checks self-repetitions, other-repetitions, and expansions. Ellis (1985) examined the interactional modifications of a teacher's input to two children. He reported that two interactional features, self-repetitions and expansions in the teacher's speech, significantly proved sensitive to students' language level of development. In a study examining forms and functions of teachers' questions, Long and Sato (1983) reported that comprehension checks were more frequent in the classroom, confirmation checks and clarification requests were less frequent. In a study examining input and interaction in the teacher-fronted and group activities, Pica and Doughty (1985) reported that some interactional modifications occurred in both activities: self-repetition, other-repetition, clarification requests, confirmation checks, comprehension checks. Also, those interactional modifications occurred in the teacher-fronted activity more than in the group activity. However, these interactional modifications were few in number in both teacher-fronted and group situations than in foreigner talk. The teachers in the Pica's and Doughty's study made few
interactional modifications compared with native speakers in those studies of native speaker to non-native speaker interaction in a natural settings (e.g., Long, 1981). Pica and Doughty explained that the teacher-talk occurred in one-to-many interactions where the learners varied in their level of proficiency and where there was limited feedback from a few students. Therefore, the classroom created difficult situations for teachers who wanted to engage in interactional modifications with individual second language learners.

Larsen-Freeman and Long (1991) acknowledged that second language learners should not be viewed as passive recipients of input made comprehensible for them by others since comprehensible input results from a negotiated process. Second language learners are responsible for the input they receive by seeking comprehensible input through interactional modifications. The quest for new and improved methodologies for offering an environment in which learners can participate in interactive learning continues in the 1990's; the work described in the following section summarizes this quest.

**Computer Assisted Language Learning**

"In the 1980s, no single medium of instruction or object of instructional attention produced as much excitement in the conduct of elementary and secondary education as did the computer" (Becker, 1990). The primary advantages of using the computer are that it can offer individual instruction, interactive learning (i.e., providing immediate feedback), an impartial and
unbiased tutor, and it is non-linear and can branch to different parts of the program as the learner desires. There has been a growing interest in the use of computer assisted language learning (Ahmad, 1985).

Computer assisted language learning developers claim that computer assisted language learning offers environments in which a second language student can participate in interactive learning. In particular, some computer software provides the following comprehension tools which allow second language students to request modification of the input they hear/read in order to aid their comprehension (Kenning, 1990).

First, the computer can offer explanations, rephrasings, glossaries, dictionary, and translation to make the meaning of a text clearer for second language students when they confront a piece of text containing some unfamiliar lexical items (i.e., making input comprehensible for students.) For example, in The Dark Castle (Saunders, 1987), second language students look up a word by placing the cursor under it and pressing a dedicated key. The appropriate explanation appears a few seconds later at the bottom of the screen.

Second, combining a computer with CD-ROM or videodisk, the computer can provide extra-linguistic supports, such as clear sounds, pictures, real-life video images, animations, etc. These extra-linguistic supports can aid second language students' comprehension. For example, the interactive videodisk program. "A la rencontre de Philippe" can provide numerous real-life images such as visits to a French apartment (room by room), use of authentic newspapers, use of a telephone, and use of Philippe's answering machine with clear French audio sound (Watkins, 1992).
These computerized tools can remain hidden from view until expressly requested by the learner and give learners a choice between alternative means of making input comprehensible. Also, these tools stand a better chance of matching a learner's individual needs than the most traditional forms of support. For example, as explanations remain hidden from view until expressly requested by the learner, there is less risk of the learner receiving superfluous information.

When the computer began to gain attention in the classroom, educational research was done to find the computer influence on students' learning (products). Many researchers probed the effectiveness of computers assisted language learning in this traditional way (i.e., investigating the effects of the computer). These studies used a media comparison method that included an experimental group receiving a certain "treatment" (e.g., computer assisted language learning reading lessons), whereas the control group received no such treatment. The researchers tried to hold all other variables constant. After a period of time, the researchers tested the subjects to see whether the particular target skill (e.g., reading comprehension) was better developed in the experimental than in the control group.

Contradictory findings exist across various studies. In a study of students using computer assisted language learning lessons in written French at the University of Calgary (Brebner, Johnson, & Mydlarski, 1984), the researchers concluded that computer assisted language learning lessons, as used in the experimental group, had not effected any greater improvement in achievement than had the ordinary instruction. Another study investigated
the effect of computer assisted language learning on ESL reading achievement (Kleinmann, 1987) and reported that reading achievement gains did not differ significantly when the control groups were compared with the computer assisted language learning treatment groups. However, Saracho (1982) investigated the effect of a computer assisted language learning program on basic skills achievement of Spanish-speaking migrant children, and the results indicated that students who used the computer assisted language learning program had greater achievement gains than did students who participated in the regular classroom program. Reid (1986) found that students who used a text analysis program improved their writing and editing skills in comparison with students who did not use this program. In a study of the effect of word processing on composition, Dalton and Hannafin (1987) reported that word processing was superior to conventional instruction for low achievers. Oates (1981) did an evaluation of CAI for English grammar review and reported that CAI section's grammar test score was significantly higher than the non-CAI section.

This media comparison studies tended to focus on "the computer" as the independent variables and thus assumed the computer itself was directly affecting the students' learning (Papert, 1987). Clark (1985) strongly questioned the basic research question in media comparison studies, such as the following: what is the effect of the computer on an Limited English Proficiency student's learning English or an American student's learning French?. He pointed out that when computer attributes are found to influence students' achievement,
the actual effect may be confounded in the uncontrolled factors of different instructional methods, content, or novelty.

Besides the problem of using the computer as the experimental factor, some flaws of these computer assisted language learning research designs were that possible additional practice received by the treatment group, or the amount of treatment time, or the Hawthorn Effect on the treatment group (Dunkel, 1991). In order to understand the impact of computer assisted language learning, Dunkel (1991) asserted that the researchers should take into account other variables besides the computer, such as the information delivered by the computers (computer assisted language learning lesson) and the recipient of message (the second language learner), and the need for research on the cognitive and social effects of computer assisted language learning. She also suggested researchers need to begin to investigate a number of different types of computer-student interactions, and aptitudes (e.g., cognitive style; second language proficiency) that interact with the computer assisted language learning treatment, and a wide of range of the educational outcomes of computer assisted language learning (e.g., speaking, reading comprehension skill development).

Recently, some computer assisted language learning researchers have shifted from investigating the effects of the computer to examining the role of the computer in context. These researchers have attempted to describe the influence factors which affect computer assisted language learning use, such as different characteristics of learners, different learning strategies, or effective feedback strategies. In a study done by Chapelle and Jamieson (1986), the
researchers examined the aptitude-treatment interaction effects of using computer assisted language learning and reported that the use of computer assisted language learning lessons predicted no variance on the criterion measures beyond what could be predicted by the cognitive/affective variables. In addition, the researchers found that time spent using and attitude toward computer assisted language learning were significantly related to field independent and motivational intensity. In a study by Jamieson and Chapelle (1987), the researchers investigated the amount working strategies differed as students performed different tasks (computer assisted language learning spelling and dictation lessons). Data were collected by computer and used to infer three metacognitive strategies: advance preparation (the amount of time it took students to press the first key of their answers), monitoring output (the number of times a student changed his answers on an item before judging), monitoring input (the average number of times each item that a student chose to have audio cue repeated). The result indicated that all three working strategies were used significantly more by students in the dictation lessons than in the spelling lesson. In a study by Chapelle and Mizuno (1989), they observed ESL students' requests for help options (i.e., grammar, facts, or dictionary) as evidence for resourcing strategies while using computer assisted language learning grammar lessons. The results indicated that students used a resourcing strategy as they were working on the lesson, and the low proficiency students used significantly "facts" help (i.e., students used this help to learn about the situation and chose phrases composing sentences that were meaningful) more than high proficiency students did. Hsu, Chapelle, and
Thompson (1993) examined students' exploration strategies while working on ESL grammar software. The results indicated that ESL students explored the learning environment in a routine way (i.e., students tried additional sentences after they had completed the required 10 good sentences), but failed to explore creatively the program's morphosyntactic possibilities (i.e., students did not try alternative grammatical forms after they had the correct one.)

Robinson (1991) conducted a study to examine the effectiveness of different types of computer assisted language learning feedback. The researcher reported that computer assisted language learning feedback which guides learners to discover correct and incorrect responses themselves was more effective than program disclosure of answers and incorrect responses.

The research results on learning strategies will more comprehensible and generalizable if definitions of investigated strategies are phrased in terms of students' acts performed within a defined domain of possible discourse (Chapelle, 1990). Chapelle suggested that if researchers hope to understand what and how particular students learn using computer assisted language learning material, it is necessary to characterize the interaction that takes place while they work. She proposed a precise analysis of student-computer interaction in computer assisted language learning research by using the principles of classroom discourse analysis developed by Sinclair and Coulthard (1975). This discourse analysis system is described in the next section.
Classroom discourse analysis

Interest in the language of the classroom has grown steadily in the last twenty years. It has been motivated by the recognition that successful outcomes in language instruction may depend on the type of language used by the teacher and the types of classroom interactions (Ellis, 1986). The earliest study of communication in the language classroom was performed through interaction analysis, which consists of using sets of categories to code the kinds of language use which occur in classrooms (Gaies, 1983). An alternative approach focused only on the language used by the teacher when addressing L2 learners. It sought to tabulate the adjustments which occur in teacher talk. However, Hatch (1978) argues:

It is not enough to look at input and to look at frequency; the important thing is to look at the corpus as a whole and examine the interactions that take place within conversation to see how interaction itself determines frequency of forms and how it shows language functions evolving. (p. 403)

One influential approach to studying classroom interaction was developed at the University of Birmingham and is known as classroom discourse analysis (Sinclair & Coulthard, 1975). This discourse analysis system views interaction as a chain of teacher and student behaviors. It attempts to
describe not just the function of individual utterances, but how these utterances combine to form larger discoursal units. This discourse analysis system has focused on one particular type: the three-phrase discourse unit which was prevalent in the traditional language classrooms (i.e., teacher-centered classrooms), where teachers and students spoke according to very fixed perceptions of their roles (i.e., the teacher initiates, the pupil responds, and the teacher supplies feedback) and where the talk could be seen to conform to highly structured sequences. For example:

<table>
<thead>
<tr>
<th>Teacher:</th>
<th>What's that, Trevor?</th>
<th>Initiates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student:</td>
<td>An ax.</td>
<td>Responds</td>
</tr>
<tr>
<td>Teacher:</td>
<td>It's an ax yes.</td>
<td>Feedback</td>
</tr>
</tbody>
</table>

In this three-phrase discourse unit, the teacher seeks both to impart knowledge s/he possesses (and assume the students do not) and to reinforce his social role as the arbiter of all classroom behavior (Barnes, 1976). An excerpt from Sinclair's and Coulthard's data (Figure 7), a clear pattern seems to be repeated: the teacher asks something, the student answers, and the teacher acknowledges the answer and comments on it.

This discourse analysis system is comprised of five hierarchical ranks: lesson, transaction, exchange, move, and act. Higher ranks are defined by the units of lower ranks they comprise. For example, the rank move is comprised of several acts while the rank exchange is comprised of several moves, and the
(T = teacher, P = any pupil who speaks)

T: Now then. . . I've got some things here, too. Hands up. What's that, what is it?
P: Saw.
T: It's a saw, yes this is a saw. What do we do with a saw?
P: Cut wood.
P: Cut wood.
T: We cut wood. And, erm, what do we do with a hacksaw, this hacksaw?
P: Cut tree.
T: Do we cut tree with this?
P: No. No.
T: Hands up. What do we do with this?
P: Cut wood.
T: Do we cut wood with this
P: No.
T: What do we do with that then?
P: Cut wood.
T: We cut wood with that. What do we do that?
P: Sir.
T: Cleveland.
P: Metal.
T: We cut metal. Yes we cut metal. And, er, I've got this here. What's that? Trevor.
P: An ax.
T: It's an ax yes. What do I cut with the ax?
P: Wood, wood.
T: Yes I cut wood with the ax. Right . . . Now then, I've got some more things here. . . (etc.)
The lowest rank of this discourse system is an act that teachers and students perform in the classroom. An act might be something like the teacher's question "What's that, Trevor?" or a pupil's response "An ax." or the teacher's evaluation "It's an ax yes." Each act might be used as an initiating move, the next higher rank. There are several types of moves in this system, such as initiation, response, follow-up, or framing (Figure 8). Three particular moves are prevalent in the teacher-centered classrooms: Initiation, response, and feedback (follow-up). The teacher often initiates questions, and the student responds. Then teachers often follow up when they evaluate and comment on students' responses. A framing move indicates boundaries in the
### Figure 8. Different types of moves in classroom discourse analysis.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Act</th>
<th>Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>What's that, Trevor?</td>
<td>Initiates</td>
</tr>
<tr>
<td>Student</td>
<td>An ax.</td>
<td>Responds</td>
</tr>
<tr>
<td>Teacher</td>
<td>It's an ax yes.</td>
<td>Feedback (follow up)</td>
</tr>
<tr>
<td>Teacher</td>
<td>Now then . . .</td>
<td>Framing</td>
</tr>
<tr>
<td></td>
<td>I've got some things here..</td>
<td></td>
</tr>
</tbody>
</table>

lesson (i.e., the end of one stage and the beginning of the next). In this short extract, the teacher uses the words now then and right . . now then to give his pupils a clear signal of the beginning and end of this mini-phase of the lesson.

When those three moves come together in a sequence, they are analyzed as an **exchange**. A sequence of initiation-response-follow up is named a teaching exchange by Sinclair and Coulthard (Figure 9). A teaching exchange is directly related to the instructional task. A series of exchanges compose a **transaction**. One transaction might consist of a series of framing and teaching exchanges. For example, in this short extract, the two framing moves together with the question and answer sequence that falls between them (i.e., a series of teaching exchanges) is a transaction. A series of transactions is analyzed as a **lesson** which is the highest rank of this discourse system (i.e., this short extract is part of a larger discourse 'a lesson'.).
<table>
<thead>
<tr>
<th>Exchange</th>
<th>Moves (in the order indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>Initiate, respond, follow up</td>
</tr>
</tbody>
</table>

Figure 9. An exchange and moves in classroom discourse analysis.

**Discourse analysis in CALL research**

In hopes of obtaining similar insights (i.e., detailed description of classroom interactions) into computer assisted language learning student interactions during use, researchers have observed students as they work together or alone at computer (Chapelle & Jamieson 1991). Chapelle (1990) pointed out that there were two possible discourse situations in computer assisted language learning software. In the first one, computer assisted language learning software can be used as the interactive center of an activity that promotes conversation among students. In the second one, computer assisted language learning software provides interactive environments for student to work. Chapelle suggested that the classroom discourse analysis system can be used to characterize systematically student-student/computer-student interaction as students work with the computer.

Several computer assisted language learning researchers have conducted research on the first type of discourse situation (Watkins, 1992; Abraham & Liou, 1990; Piper, 1986). All three studies examined both the quantity and the quality of spoken English generated by second language learners working on different computer programs. In Piper's study (1986), she looked at the
"conversational spin-off" from three small groups of ESL students each working on a different text-manipulation program (i.e., two types of gap-filling tasks and one type of re-order jumbled words to make a correct sentence). Her results indicated that students' talk contained a considerable number of repetition with "impoverished" lexical and syntactic variety, little negotiation of meaning among learners, and no self-correction of error. Abraham and Liou (1990) also analyzed the quantity and quality of the discourse generated on three computer programs (i.e., a grammar lesson, a communication program, a problem-solving simulation). They broke down students' talk into "acts" (i.e., the lowest level of rank in discourse analysis). Each act in the English data was coded and each act was assigned a language function, such as repeating, managing discussion, or showing emotion and feeling for others. For example, a repeating function was a student reading from computer screen or repeating his/her partner's or his/her utterance. The findings suggested that computer program could spark useful talk among students. Also, the quality of talk elicited was better than that in Piper's. Another similar study was done by Watkins (1992); she used an interactive videodisk program "A la rencontre de Philippe" to analyze the types of language function students used. Her findings reported that overall talk produced was greater when using this computerized videodisk program than those found in two of the three programs that Liou examined; also students' utterances represented higher order thinking skills (i.e., this program appeared to provide students a more meaningful situation where they must process, and therefore evaluate the information provided in order to formulate an appropriate response.)
Since there was no research done in the second discourse situation (i.e., student-computer interaction), Chapelle (1990) did a discourse analysis of student-computer interaction on a CALL grammar lesson (Chapelle & Boysen, 1990) by viewing the student and the computer as two participants in a dialogue. This grammar software provided the learners an environment in which they could compose English sentences by selecting and editing phrases. The environment works by having the learners select phrases which the software places side by side on the screen; the student then edits the completed sentence to correct it according to the formal rules of English. For example, a student might choose the three phrases "since the 1970s," "American automobiles," and "become more fuel-efficient." The computer would place the phrases side-by-side to create the sentence, "Since the 1970's, American automobiles become more fuel-efficient." The student would then edit the verb to put it in the correct form (i.e., have become). The computer returns a message for each completed sentence, indicating to students where there are problems with the meaning or grammar of their sentences. As the student works, three kinds of help are available for requesting. (Chapelle, 1990).

Chapelle specified the types of acts possible within this grammar program, which acts could be used as each type of move, how moves fitted together to form legal exchanges, and so on until the grammar activity was defined. At the two lowest levels of this system, she summarized the functional acts and moves that the computer and the student can perform (Figure 3.) The computer can perform the following acts: offer help (facts, words, grammar), offer a phrase, offer to let the student exit, require the
student to edit, save a sentence, and judge a sentence. The student can perform
the following acts: choose help, choose to exit, select a phrase, and choose to
save a sentence. She described an initiating move in this CALL grammar
lesson as follows: The computer can perform an initiating move that could be
realized as offering help; offering to let the student exit; offering a phrase; or
offering to save a sentence.

Three types of exchanges which comprise moves in this CALL grammar
lesson were teaching, focusing, and framing (see Figure 4). A teaching
exchange is related to the instructional task and begins with the computer
initiating, or asking for a response. Next, the student responds—either selecting
a phrase, or editing a phrase. Then the computer follows up—either adding a
phrase to the sentence, or judging the student's sentence. For example, the
computer begins offering phrases; then the student chooses phrases
composing the sentence "Since the 1970's, car buyers begin to want new cars."
and edits the verb "begin" to "began"; Next the computer responds that "You
need the present perfect (with have) for this event because it happened in the
past and continues now." A focusing exchange provides students with
additional help and begins with an initiating move made by the computer. The
initiating move is followed by the student's choice for help (facts, words, or
grammar). The follow-up move is realized by the computer providing the
corresponding help." For example, the computer begins offering phrases and
helps; then the student chooses phrases composing the sentence "During the
prosperous 1960's, car buyers purchase" and asks the meaning of the word
"prosperous"; next the computer provides the meaning of the word "prosperous".

**Summary**

In this chapter, four related areas of pertinent research for this study were examined. First, the listening comprehension approach in SLA theory was reviewed. Second, research that was pertinent in the area of interactional modifications and SLA was also examined. Third, research that was pertinent in the area of computer assisted language learning (CALL) was also reviewed. Finally, classroom discourse analysis was defined, and CALL research in the use of classroom discourse analysis was examined.

The following idea about the listening process has gained wide acceptance in the last years: listening is the primary channel for language input and acquisition in the beginning stages of learning (Nida, 1957; Rivers, 1966; Weaver, 1972). In particular, several SLA theorists and researchers have developed a comprehension approach that featured "listening to understand" (Rivers, 1966; Asher, 1969; Belasco, 1971; Postovsky, 1974; Terrell & Krashen, 1982). The key role listening comprehension plays in the language acquisition process has been suggested by the major insights drawn from the research into children's first language acquisition. Again, in the 1980's there is a focus on communicative language teaching—teaching second languages for the ultimate goal of communication with native speakers of the second language. Dunkel
(1986) asserted the key to achieving proficiency in speaking is developing proficiency in listening comprehension. The way of increasing second language students' development of listening comprehension, Krashen (1982) suggested that the target language input the students receive needed to be comprehensible.

Several researchers who agree on the importance of comprehensible input to SLA have asserted that interactional modifications play a role in making input comprehensible (Hatch, 1983; Long, 1981, 1983a, 1983b; Pica & Doughy, 1985; Allright & Bailey, 1991). The bulk of SLA research has been conducted by describing interactional modifications in natural settings (i.e., foreigner talk) and in classroom settings (i.e., teacher talk). The principal features of interactional modifications which have been identified in foreigner-talk were confirmation checks, comprehension checks, clarification requests, self-repetition, other-repetition, expansions, here-and-now topics, topic-initiating moves (Ferguson & Debose 1977, Hatch 1980a, Arthur et al. 1980, Long 1980, 1981, 1983b). These researchers reported that second language learners could obtain comprehensible input through these interactional modifications. Some researchers selected the features of interactional modifications used in a foreigner-talk to examine the interactional modifications in second language classroom. They reported that some of these interactional modifications occur in classroom, such as self-repetitions, confirmation checks, expansions (Ellis, 1985; Sato, 1983; Pica & Doughty, 1985). However, the teachers made few interactional modifications compared with native speakers in natural setting (Long, 1981). They explained the possible
reason for this finding as follow: the teacher-talk occurred in one-to-many interaction where the students varied in their level of proficiency and where there was limited feedback from a few students. Therefore, the classroom created difficult situations for teachers who wanted to engage in interactional modifications with individual second language students.

The primary advantages of using the computer are that it can offer individual instruction, interactive learning, an impartial and unbiased tutor, and it is non-linear and can branch to different parts of the program as the learner desires. There has been a growth of interest in the use of computer assisted language learning (Ahmad, 1985). Many early researchers have explored the effectiveness of computers in the area of second language learning. Contradictory findings exist across various studies. A number of studies have found that the CALL group had better achievement than the non-CALL group (Oates, 1981; Saracho, 1982; Reid, 1987; Dalton & Hannafin, 1987). However, results from other studies indicated that there was no significant difference between CALL and non-CALL groups (Brebner, Johnson, & Mydlarski, 1984; Kleinmann, 1987). Because the simple comparison between CALL and non-CALL instruction could not provide a meaningful interpretation of how CALL was used effectively in language learning (Chapelle & Jamieson, 1989), Chapelle (1990) suggested that if researchers hope to understand what and how particular students learn using CALL material, it is necessary to characterize the student-computer interaction.

Interest in the language of the classroom has been motivated by the recognition that successful outcomes may depend on the type of language used
by the teacher and the types of classroom interactions (Ellis, 1986). Therefore, SLA researchers' attention to the important types of classroom interaction, such as the amount and functions of the target language used, and the turn-taking behavior of students (Chaudron, 1988). One influential approach to studying the classroom interaction is known as classroom discourse analysis (Sinclair & Coulthard, 1975). This system attempted to describe not just the function of individual utterances, but how these utterances combined to form larger discoursal units. In hope of obtaining comparable insights (i.e., detailed description of classroom interactions) into CALL student interactions during use, researchers have observed students as they work together or alone at computer (Chapelle & Jamieson, 1991). Chapelle (1990) proposed a precise analysis of student-computer interaction in CALL research by using the principles of classroom discourse analysis. This study described here is a response to Chapelle's proposal and seeks to examine the effect of modifications in CALL interactive environment by using the principles of classroom discourse analysis.
CHAPTER III. METHODOLOGY

In this chapter, the methodology used to examine the research questions will be described. Sections included in this research methodology are:
1) descriptions of the interactive Active English CD-ROM program used in the study, 2) a description of discourse analysis of the Active English CD-ROM program, 3) the pilot study conducted before the study, 4) subjects used in the study, 5) the development of the instrument used to measure effects of the treatment, 6) the research design used in conducting the study, 7) the procedures, and 8) data analysis.

Interactive Active English CD-ROM program

"Active English Two, the Winter" produced by Courseware Publishing International (1992), is one of a set of four CD-ROM based courses in English as a second or foreign language. The language level in the program is low intermediate to high intermediate. The goal of this series is to provide interactive practice in listening comprehension. It presents authentic materials by using clear audio, life-like characters, mnemonical graphics, and formal and informal English in real-life situations. It also introduces aspects of U.S. culture and information about the world. The course is organized by a hybrid of a situational and content-based syllabus, the guiding feature of which is the maintenance of learner interest. The series as a whole covers one year in
the lives of several teenage characters at a fictitious high school in Washington D.C., with each course centered on a season. The characters are a high school freshman named Karen, her cousin Da Wei from Taiwan, and their friend Jim (both seniors). Karen is Chinese-American, Jim is Anglo, and Da Wei has been in the U.S. for about a year. Thus, his language is at a fairly fluent level, but he still has some questions about the culture. The characters provide a vehicle for natural dialogue about families, interests, and cultural differences. The content-based sections of the course often come from presentations in their classes or student activities in which they participate, such as the International Club. A unique feature of this program is that a real person appears as a guest speaker in each course. For example, the second course has a presentation on weather by television meteorologist Janice Huff.

The disk used for the study consisted of three lessons: Weather and Climate, Descriptions, and Finding Your Way, with each lesson revolving around a particular theme. Each lesson typically consists of six activities. The first three activities introduce new material and the final three recycle it in some way for further practice (i.e., a variety of exercises to build both listening and general comprehension skills.) The first of the three activities is usually a presentation or a monologue commonly consisting of material likely to be somewhat familiar to students. The second activity includes one or more dialogues often centering on information about the characters, such as their families, interests or personalities. The third activity is a monologue that contains information that is new to many of the students. Below is a
description of nine activities that comprise the content of the Active English lessons:

1. **TV Weather**: This section introduces Janice Huff, a television meteorologist from Channel 4 in San Francisco. As the guest speaker, Janice tells about weather and climate and also about weather reporting. Janice Huff is a real person as are all of the guest speakers. The voice students hear is her own.

2. **How's the Weather**: This section has two engaging dialogs where weather is the focus. First Karen and Jim meet in a sporting goods store where Karen is buying gloves. The second dialog features Mr. Rice and Miss Chew; Mr. Rice's car has a dead battery and Miss Chew offers to help.

3. **The Ice Age**: During science class, Mr. Simons gives a lecture about the Ice Age. Students learn about glaciers and the earth's past weather patterns.

4. **Using Words**: Mr. Rice gives a presentation on how words can be used effectively to make a story more interesting. The focus is on adjectives that can be used to describe people and things.

5. **Christmas Shopping**: Karen and her cousin are going shopping for Christmas presents. They describe gifts they will buy for their friends and relatives. At the mall, we learn about different kinds of stores and what can be purchased there.
6. **Shopping Practice:** We return to the mall and, in four separate parts, we must select the store where different items can be found. Each part has ten questions. When the user gets all ten questions correct they are rewarded with a joke or riddle told by Karen and her cousin.

7. **Karen's Story:** Karen's cousin and his parents have come over to her house for dinner to celebrate Karen's 15th birthday. While they are waiting, Karen reads a story she wrote for her English class. It sounds like when her cousin first arrived in the U.S. and got lost in Los Angeles.

8. **The Almond Oil:** Karen and her cousin are out to find Almond Oil and must receive directions to several different stores before they succeed. Students learn about giving and receiving directions.

9. **The National Mall:** A tour through the Washington Mall where students can learn about the Capitol Building, White House, Lincoln Memorial, Washington Monument, and Smithsonian Institution.

Each activity starts by presenting a small segment. The learner is asked one or more questions about it. All of the questions are listening comprehension activities (i.e., they must be understood in order to be answered appropriately.) These questions are often drawn at random from a database so that students are not likely to get the same set of questions when they go through a lesson more than once. The difficulty of these questions varies considerably. Some are fairly straightforward (true/false or yes/no types) while others may be quite challenging (multiple choice). The objectives
of particular sets of questions also vary. Many of the true/false questions are
direct comprehension checks to motivate learners to maintain attention.
Others require the short-term retention of a key piece of information such as a
date or location. And others require active problem solving such as calculating
metric system equivalents of U.S. measurements.

Students can use three basic types of comprehension tools from each
lesson. The tools allow a second language learner to make modifications on
the input s/he hears, thereby aiding listening comprehension. Three
comprehension tools are:

1. Repetition tool: Students can click on the repeat button and the
   sentence most recently presented will be repeated. This type of
   repetition is similar to the "other-repetition" repetition in the
   interactional modifications described above.

2. Text reinforcement tool: Students can see the text they are hearing.
   There is a button at the button of the screen which visually presents
   the text that is being presented aurally. The function of text
   reinforcement is for the L2 learner desiring more explicit instruction
   or confirmation of her/his guess. This type of text reinforcement is
   similar to the "confirmation checks" feature in the interactional
   modifications described above.

3. Dictionary tool: Students can get definitions and additional examples
   for words highlighted in the text line by clicking on them. This type
   of dictionary is also similar to the "expansion" feature in the
   interactional modifications described above.
Description of Discourse Analysis of the Active English CD-ROM program

By adapting the units of analysis and structures suggested by Sinclair and Coulthard (1975) for classroom discourse, a discourse analysis can be performed on the Active English CD-ROM program (Appendix A). In this discourse system, the computer is viewed as a participant in a conversation with the students. In the lowest rank of this system (i.e., it is comprised of five hierarchical ranks: act, move, exchange, transaction, and lesson), the computer can perform the following functional acts:

- Offer repetition of a sentence, text reinforcement, or dictionary
- Utter speech
- Ask questions
- Repeat a sentence, reinforce text, or define words as a student's request
- Evaluate an answer

The students can do the following functional acts:

- Request repetition of a sentence, text reinforcement, or dictionary while hearing unknown material
- Select answers

Moves

Figure 10 illustrates the functional acts of participants. Each act is assigned to a particular type of move (the next higher rank). The possible moves in this Active English activity are listed in Figure 10. For example, the modification request move can be explained as follows: The student can do a modification request move that can be recognized as requesting repetition of a
sentence, text reinforcement, or dictionary. These moves can fit together in an exchange (i.e., a computer's initiating move - a student's modification request move - a computer's modified input move; or a computer's initiating move - a student's responding move - a computer's feedback move).

<table>
<thead>
<tr>
<th>Participant</th>
<th>Move</th>
<th>Acts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>Initiate</td>
<td>Offer repetition of a sentence, text</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reinforcement, or dictionary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utter speech</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ask questions</td>
</tr>
<tr>
<td>Computer</td>
<td>Modify Input</td>
<td>Repetition of a sentence, text reinforcement, or dictionary</td>
</tr>
<tr>
<td>Computer</td>
<td>Feedback</td>
<td>Evaluate an answer</td>
</tr>
<tr>
<td>Student</td>
<td>Modification Request</td>
<td>Request repetition of a sentence, text reinforcement, or dictionary</td>
</tr>
<tr>
<td>Student</td>
<td>Respond</td>
<td>Select answers</td>
</tr>
</tbody>
</table>

Figure 10. The Active English CD-ROM lesson: participants, moves, and acts.

**Exchange**

There are three exchanges allowed in this program: modification, listening, and teaching exchanges (Figure 11). A listening exchange begins with an initiating move made by the computer (i.e., utters a sentence) and comprises an optional modification exchange (e.g. if students understand the input, they will not perform a modification request move, and there is no
A modification exchange is used for students to modify inputs they hear when they hear unknown linguistic material. It begins with an initiating move made by the computer (i.e., the computer offers repetition of a sentence, text reinforcement, or dictionary). This initiating move is followed by a modification request move made by the students when they hear unknown linguistic material (i.e., request repetition of a sentence, text reinforcement, or dictionary). The next modify input move is recognized by the computer doing repetition of a sentence, text reinforcement, or definition of a word and expression. A teaching exchange also begins with an initiating move made by the computer (i.e., asking a question) and comprises an optional modification exchange. Next, the initiating move is followed by a responding move made by the student (i.e., selecting an answer). Then, the next feedback move is made by the computer (i.e., judging the student's answer). Actually, the modification exchange is of most interest in this study.

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Moves (in the order indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening</td>
<td>Initiate (Modification exchange)^1</td>
</tr>
<tr>
<td>Modification</td>
<td>Initiate, Modification Request, Modify Input</td>
</tr>
<tr>
<td>Teaching</td>
<td>Initiate (Modification exchange)^1, Respond, Feedback</td>
</tr>
</tbody>
</table>

1^The parentheses indicates optional moves.

Figure 11. The Active English CD-ROM lesson: exchanges and moves.
Transaction/lesson

A transaction is defined as a sequence of exchanges (Sinclair and Coulthard, 1975). There are two transactions allowed in this program. Transactions within the student-computer interaction can be defined in the following series of particular obligatory and optional exchanges:

Transaction 1:  Listening (modification)*

Transaction 2:  Teaching (modification)*

The parentheses indicate optional exchanges; the asterisks indicate an unlimited number of exchange types. The above grammar can be explained as follows: The first transaction includes a series of obligatory listening exchanges which comprise optional, unlimited modification exchanges. The second transaction includes a series of obligatory teaching exchanges which comprise optional, unlimited modification exchanges. A series of both transactions form a lesson, noted as follows:

Lesson = transaction1 transaction2

An example of coding

Based on the above discourse analysis structure, the researcher did an example of coding (Figure 12) to analyze interactions between a student and the computer.
Karen's story lesson

R = repetition
T = text reinforcement
D = dictionary
Initiate1 = computer offers comprehension tools
Initiate2 = asking questions

Transaction 1: listening (modification)* exchange

<table>
<thead>
<tr>
<th>Participant</th>
<th>Content</th>
<th>Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer: (utters speech) Would you like to hear the story I wrote for my English class while we're waiting for dinner. (and also offers &quot;R&quot;, &quot;T&quot;, and &quot;D&quot; buttons)</td>
<td>Initiate1</td>
<td></td>
</tr>
<tr>
<td>Student: (the student is listening to above speech, and doesn't take any action)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment: listening without modification exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer: (utters speech) Sure, I'd love to (and also offers &quot;R&quot;, &quot;T&quot;, and &quot;D&quot; buttons)</td>
<td>Initiate1</td>
<td></td>
</tr>
<tr>
<td>Student: (the student is listening to above speech, and doesn't take any action)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment: listening without modification exchange</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 12. An example of coding.
Computer: (utters speech)  
OK. here's how it goes:  
(and also offers "R", "T", and "D" buttons)  
Initiate1

Student: (the student is listening to above speech,  
doesn't understand some aspects of its  
meaning and clicks "R" button)  
Modification  
Request

Computer: (repeats the sentence)  
OK. here's how it goes:  
Modify  
Input

Comment: listening with modification exchange (repetition type)

Computer: (also offers "R", "T", and "D" buttons)  
Initiate1

Student: (the student is listening to above speech,  
doesn't understand some aspects of its  
meaning and clicks "T" button)  
Modification  
Request

Computer: (shows the text of the sentence on screen)  
OK. here's how it goes:  
Modify  
Input

Comment: Listening with modification exchange (text reinforcement type)

Computer: (also offers "R", "T", and "D" buttons)  
Initiate1

Student: (the student reads the text which is on screen)

Figure 12. continued.
Computer: (continually utters speech)
Once upon a time, a teenage boy and his parents came to America from a faraway land.

(and also offers "R", "T", and "D" buttons) Initiate1

Student: (the student is listening to above speech, doesn't understand some aspects of its meaning and clicks "R" button) Modification Request

Computer: (repeats the sentence)
Once upon a time, a teenage boy and his parents came to America from a faraway land.

Modify Input

Comment: listening with modification exchange (repetition type)

Computer: (also offers "R", "T", and "D" buttons) Initiate1

Student: (the student is listening to above speech)

Computer: (continually utters speech)
They were moving from their country to Los Angeles.

(and also offers "R", "T", and "D" buttons) Initiate1

Student: (the student is listening to above speech, and doesn't take any action)

Comment: Listening exchange without modification exchange

Figure 12. continued.
Transaction 2: teaching (modification)* exchange

<table>
<thead>
<tr>
<th>Participant</th>
<th>Content</th>
<th>Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer:</td>
<td>(asks a question that requires a student response)</td>
<td>Initiate2</td>
</tr>
<tr>
<td></td>
<td>What did the boy see first?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(shows three pictures of palm tree, park, and duck on the screen)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(and also offers &quot;R&quot;, &quot;T&quot;, and &quot;D&quot; buttons)</td>
<td>Initiate1</td>
</tr>
<tr>
<td>Student:</td>
<td>(Click the picture of palm tree)</td>
<td>Respond</td>
</tr>
<tr>
<td>Computer:</td>
<td>(utter speech)</td>
<td>Feedback</td>
</tr>
<tr>
<td></td>
<td>Good. You are right.</td>
<td></td>
</tr>
</tbody>
</table>

Comment: teaching without modification exchange

| Computer:   | (asks a question and require S to respond it)                          | Initiate2|
|            | The female ducks are smaller than the male ones.                        |         |
|            | (shows words of "true" and "false" on the screen)                       |         |
|            | (and also offers "R", "T", and "D" buttons)                             | Initiate1|
| Student:   | (the student is listening to above speech, doesn’t understand some aspects of its meaning and clicks "R" button) | Modification Request |

Figure 12. continued.
Computer: (repeats the question)
The female ducks are smaller than the male ones.
(shows words of "true" and "false" on the screen)
(and also offers "R", "T", and "D" buttons)

Student: (the student is listening to above speech, doesn’t understand some aspects of its meaning and clicks "T" button)

Computer: (shows the text of the question on screen)
The female ducks are smaller than the male ones.
(shows words of "true" and "false" on the screen)
(and also offers "R", "T", and "D" buttons)

Student: (the student reads the text and click the word "True")

Computer: (utter speech)
Very good. You are right.

Comment: teaching with two modification exchanges (repetition type and text reinforcement type)

Figure 12. continued.
Pilot Study

Content expert review

To match the CD-ROM program with international students' proficiency level, two experienced Intensive English Oriented Program (IEOP) instructors were invited to view the program. Each instructor received an evaluation sheet from the researcher to obtain information on the level of students' English proficiency. In the Appendix B showed that four out of nine lessons were chosen by these instructors and used in this study.

Pilot study 1

Based on both instructors' decisions, a pilot study was conducted over a period of 2 weeks in the summer semester of 1993 with one student from the beginning class and another student from the intermediate listening/speaking class of IEOP. The purpose of the pilot study was to 1) decide the appropriate level of student for this program, 2) to estimate the approximate time necessary for individual students working on one lesson, and 3) to develop instruments.

In the first week of the pilot study, each individual student was given a short orientation regarding the computer and the software. Each student then practiced as many lessons as possible until s/he was comfortable with the computer program. During a two hour time span, both of the students practiced two lessons: Using Words and The Ice Age.

In the second week, each student was given a dictation test two days before s/he worked on another computer lesson: Karen's Story. A dictation
test and a survey (see the section on instruments) were given to each student immediately after s/he finished the Karen's Story lesson. As each student interacted with the computer, the whole process of interaction was recorded by a video camera.

The dictation test in this pilot study consisted of a pre-recorded 124-word passage which students listened to three times: the entire passage was read once at normal speed, a second time in chunks with a short pause, and a third time at normal speed with a short pause at the end of each sentence. Students did not write during the first reading; they wrote verbal sequences of material as the chunks played back from the recording during the second reading; then, they did final corrections on the third reading (Oller, 1979). Both students indicated negative feeling toward the amount of handwriting and the amount of time required for the task.

A partial dictation test is similar to the dictation test described above except the students are given a written version of the text (along with the spoken version) in which certain portions of the written passage are left out. The students must listen to the spoken material and fill in the blanks in the written version (Oller, 1979). Because the time of handwriting requirement of a standard dictation test, the partial-dictation test was chosen as an instrument (see the section on instruments). To obtain more information on the student's listening comprehension, a multiple-choice instrument was included (see the section of instruments).
Pilot study 2

Because the instruments had been modified, a second pilot study was conducted over two weeks period in the summer of 1993. One student from the intermediate listening/speaking class of IEOP participated in the second pilot. This student went through the same procedures as the students did in the first pilot study except the new instrument was used. He took a partial-dictation test for the pretest and a partial-dictation and a listening comprehension tests for the posttest.

Based on the results of both pilot studies, the following decisions were made: 1) beginning level IEOP students would be the subjects for the study, 2) subjects would participate in the treatment one hour per week for 4 weeks, 3) the whole process of interaction would be recorded via video camera, 4) the partial-dictation test and the multiple-choice test would serve as instruments for measuring the student's listening comprehension.

Subjects

The subjects consisted of a heterogeneous group of non-native English-speaking students who enrolled in the beginning listening/speaking IEOP course at Iowa State University during the fall semester of 1993. Because most of international students had recently arrived in the U.S. from different countries, the curriculum of this beginning listening/speaking class focuses on activities and skills which help students adjust to living in Ames, Iowa. The
goals of IEOP course are: 1) to acquaint students with life in Ames, Iowa and the American educational system, and 2) to expose students to listening situations that deal with survival skills.

The subjects consisted of 15 students (11 males and 4 females) from four different countries (South Korea, Russia, Saudi Arabia, and Puerto Rico). In the first week of the study, the researcher asked students about their computer experience. Four students reported that they had never used a computer; the remaining students reported their computer experience as computer games or word processing/data entry.

**Instruments**

A partial-dictation test, multiple-choice test, and a questionnaire were selected as the type of instruments used in this study. The partial-dictation and multiple-choice tests were used to measure students' listening comprehension scores. The questionnaire was used to collect data on the participants' about 1) computer anxiety, 2) the quality of the Active English program, and 3) the types of interactional modifications enhance comprehension.

**Development of the partial dictation test**

Henning and Gary (1983) described "the test as a narrative passage prepared with a certain number of content words deleted. Subjects are given a
written version to read and then they listen to the passage and try to replace the deleted words." (p. 287) For this study, partial dictation pre- and posttest were designed for each computer lesson.

The partial dictation pre- and posttest were designed by an IEOP instructor and a graduate student. The IEOP instructor selected target words which students might learn from each computer lesson (Figure 13). Then, a graduate student in Teaching English as a Second Language (TESOL) and an experienced instructor of IEOP, constructed an individual narrative passage for the pre- and post-test based on those target words and the factual content of the computer lesson (Figure 14 and 15).

<table>
<thead>
<tr>
<th>Lessons</th>
<th>Target words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karen's Story</td>
<td>once upon a time, remind, palm tree, ocean, wide, pond, Sea Gull motel, ask direction, frown, accent, complain, fault, path, park, lost, understand.</td>
</tr>
<tr>
<td>The Ice Age</td>
<td>ice age, glacier, earth, climate, cool, winter snow, summer, thick, centuries, form, reflect sunlight, temperature, huge sheet, cover, surface, warm, melt, cycle, start, join.</td>
</tr>
</tbody>
</table>

Figure 13. The target words were selected for each computer lesson.
**Pretest**

Once upon a time, a boy came to the United States with his family. They spent the night in the Sea Gull motel alongside a wide street near the ocean. He saw many palm trees there, and a park with a pond. The boy started to walk along a path near the street, but he became lost. He asked directions from a woman who had a frown on her face, but she didn't help him. Then the boy saw an old man who reminded him of his grandfather. The old man had trouble understanding the boy's accent, but gave him directions to the motel. The boy's parents told him it was his fault he became lost, but he was so glad to be home, he didn't complain.

**Posttest**

Once upon a time, a woman traveled across the ocean to live in a new country. When she arrived, she found many things that reminded her of home. There were palm trees growing near the ocean, and wide streets with a pretty park and a small pond, much like the city she came from. She knew about the Sea Gull motel next to the park, so she asked a man for directions. But the man had a frown on his face and said he couldn't understand the woman's accent. The woman felt sad, but she didn't complain. She told herself it wasn't her fault she didn't speak English very well yet. She kept on walking along a path by the park, and knew she was lost.

1Words in the bold were the target words in the lesson.

Figure 14. The narrative passages for Karen's Story lesson.
LESSON: THE ICE AGE

Pretest

Ice ages occur in cycles. The last ice age took place thousands of years ago when glaciers covered large areas of the earth. The cycle starts when the climate gets cooler and winter snows don't melt completely in the summer. This snow gets thicker and thicker over several centuries, and finally turns into a glacier. As glaciers form, they reflect sunlight, keeping temperatures cool, so that more and more glaciers form. Eventually the glaciers join other glaciers and form a huge sheet of ice that covers much of the earth's surface. Eventually the climate gets warmer and the ice begins to melt. Over many centuries the ice sheets disappear, and slowly the cycle starts all over again.

Posttest

During the last ice age, huge sheets of ice covered most of the earth's surface. These sheets of ice were slowly formed over many centuries from glaciers. Glaciers develop in the mountains when winter snows don't melt completely during the summer. If many summers are cool, more and more snow remains, and eventually turns to ice, forming a glacier. Glaciers reflect sunlight, which continues to keep temperatures cool, and more and more glaciers then tend to form. As more glaciers are formed, they join together until huge sheets of ice cover most of the earth. This is an ice age. Ice ages occur in cycles, and eventually the earth's climate will warm up and the ice will begin to melt. Over many centuries the ice will melt away, but eventually the climate will turn cool again, and the cycle will start over.

Figure 15. The narrative passages for the Ice Age lesson.
A professor in TESOL reviewed the pre- and post-test narrative passages to ensure that the exams were similar but not identical. In addition, the Grammar Checks in the Microsoft Words program were used to analyze the pre- and post-test narratives. This analysis included the Flesch-Kincaid grade level (Table 1). A Flesch-Kincaid grade level of 7, for example, indicates the writing sample can be understood by average English-speaking reader who has completed seven years of education in the United States. The results from Flesch-Kincaid grade levels analysis showed the pretest (5.4+) and the post-test (5.4+) were the same in Karen's Story lesson; also the pretest (7.6+) and the post-test (8.0+) were similar in the Ice Age lesson. Finally, a graduate student in TESOL and an instructor of IEOP recorded the passages on an audiotape for use during the study.

Table 1. Flesch-Kincaid grade level of the pre- and post-test narrative passages.

<table>
<thead>
<tr>
<th></th>
<th>Karen's Story</th>
<th>The Ice Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Flesch grade level</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Flesch kincaid</td>
<td>5.4</td>
<td>5.4</td>
</tr>
</tbody>
</table>
The administration of the partial dictation test involved three complete presentations of the test passage on audiotape. The total administration time was approximately 15 minutes for each test, and included 1) the first presentation of the test passage, during which the entire passage was read to the students without interruption; 2) the second presentation of the test passage with pauses at the end of each sentence to allow the students time to fill in the blanks, 3) the third presentation of the entire passage which was read to the students without interruption. During the first presentation, students listened to the passage and did not write (i.e., students were instructed to listen and try to understand the general meaning of the passage.) During the second presentation, there was a pause at end of each of the sentence. Students were told to fill in the blanks with the same word(s) they heard. After the third presentation, students had 3 minutes to make any final corrections.

To reduce the possibility that students might write down correct answers without comprehending, the blanks were constructed so as to not indicated the number of words in the phrase; thus each blank was only a single line (Appendix C). The length of the pause used for the second presentation was determined by estimating the time required by students to write their answer (Cziko & Lin, 1984). The length of each pause (in seconds) after each sentence was determined by dividing the number of letters the students were to write by two (i.e., if the answer required students to write 16 letters, then an 8 seconds pause was provided at the end of the sentence.)
Scoring procedures

As described by Oller (1979), students were graded for accuracy. The test was scored by allowing one point for every word in the text. Students lost one point from a total of 34 for each place where their response deviated (because of deletions, distortions of form or sequence, intrusions, unrecognizable words, etc.) from the spoken passage. However, in the following criteria were not counted as errors: 1) omitted or inserted of the articles, such as "a" and "the", 2) omitted or inserted word tense, such as "ask" or "asked", 3) omitted or inserted plural of words, such as "tree" or "trees", 4) spelling error (as long as it did not look like another word in English, such as "sad" - "said").

Interrater reliability

The partial dictation tests were graded by the researcher. However, four samples of partial dictation tests were randomly selected and reviewed for reliability by an IEOP instructor based on the previously described scoring procedures. Grading between the IEOP instructor and the researcher was consistent and highly reliable (Table 2).

Development of the multiple-choice test

To measure students' listening comprehension, the multiple-choice test was used as a posttest-metric for each lesson. The item included on the multiple-choice test were drawn from the question database of the Active
Table 2. Grading the partial dictation tests by an IEOP instructor & the researcher.

<table>
<thead>
<tr>
<th></th>
<th>Karen's story</th>
<th>The Ice Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>IEOP instructor</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>The researcher</td>
<td>8</td>
<td>15</td>
</tr>
</tbody>
</table>

1Target Words in the partial dictation tests.
2Fill Words in the partial dictation tests.

English computer program. To ensure the appropriateness of these items, two IEOP instructors reviewed them. Twelve items were based on for Karen's story lesson and ten items from the Ice Age lesson (Appendix D). Items used when students were working on the computer lessons were not included on the multiple-choice posttest.

Instrument reliability coefficients

To estimate the reliability of the partial dictation and multiple-choice tests, the Cronbach Coefficient Alpha formula was used. The reliability coefficient in Karen's Story lesson was .85 for partial dictation pre-test, .84 for partial dictation post-test, and .30 for multiple-choice test. In the Ice Age lesson, the reliability coefficient was .87 for partial dictation pre-test, .80 for partial dictation post-test, and .45 for multiple-choice test (Table 3). The small
number of items on the multiple-choice test was a possible reason for the low reliability.

Development of the questionnaire

The questionnaire (Appendix E) consisted of two sections. The first section was designed to identify gender, nationality, and academic major; the second section of the questionnaire contained three subsections designed to assess a) the types of interactional computerized modifications students believed aided comprehension b) students' feelings about the Active English CD-ROM program c) students' computer anxiety. A Likert scale, with a range of: 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree, was used to measure students' response on section two of the questionnaire. A

Table 3. Instrument reliability coefficients.

<table>
<thead>
<tr>
<th></th>
<th>Karen's Story</th>
<th>The Ice Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial dictation test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>.85</td>
<td>.88</td>
</tr>
<tr>
<td>Post-test</td>
<td>.84</td>
<td>.80</td>
</tr>
<tr>
<td>Multiple-choice test</td>
<td>.30</td>
<td>.45</td>
</tr>
</tbody>
</table>
total of 14 statements were constructed. The following is a list of the items included in the three subsections of section two.

<table>
<thead>
<tr>
<th>Section Two of Questionnaire Subsections</th>
<th>Questionnaire items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of modifications</td>
<td>6, 7</td>
</tr>
<tr>
<td>Active English CD program</td>
<td>1, 2, 3, 4, 5, 8, 9, 10, 11</td>
</tr>
<tr>
<td>Computer anxiety</td>
<td>12, 13, 14</td>
</tr>
</tbody>
</table>

The items include in the types of modifications subsection were designed by the researcher, and ask students to rank order the types of modifications they perceived as most useful and used most frequently to aid listening comprehension.

The items in the Active English CD program were selected from Mizuno's (1989) instruments. Mizuno's instrument was designed to measure subject's feelings about ESL Grammar/Paragraph software. Items were selected that measured the following attributes: perceived usefulness, perceived level of interest, and clarity/ease of use.

The items in the computer anxiety section were selected from the instrument developed by Lin (1985). Because students' computer anxiety was not a primary question being investigated, the researcher randomly selected three items from Lin's instrument to assess students' computer anxiety.
Research Design

Due to the lack of previous research in the area of CALL interactional modification, a quasi-experimental design was selected for this exploratory study. The one group pretest-posttest design was used in this study (Campbell and Stanley, 1969). It can be diagrammed as:

```
O1  X  O2
```

In the study, students who completed the partial dictation pretest (O1) later used the Active English CD program (X), and then completed the partial-dictation posttest, the multiple-choice test, and the questionnaire (O2).

Procedure

Based on the model of the pilot studies, the experimental study was conducted over a period of 4 weeks in the Fall semester of 1993 at Iowa State University. The proposal for this research study was reviewed and approved by the Iowa State University Human Subjects Committee (Appendix F). The beginning listening/speaking class of IEOP was selected for this study.
A letter which explained the purpose and the procedure for this study was sent to the instructor and coordinator of IEOP (Appendix G). The instructor informed students that as part of the class they would be expected to participate in a computer lab for one hour per week for four weeks.

The researcher explained to the students that they would be involved in a project designed to evaluate the Active English CD-ROM program. The subjects were assured that their scores on tests and the survey they completed would in no way effect their grade in the IEOP class (Appendix H).

During all of the computer labs, students were supervised by the researcher. The only assistance given to students consisted of instructions on the use of the computer program.

In the first week, each individual student was given a short orientation regarding the computer and the software. Each student then practiced as many lessons as possible until s/he was comfortable with the computer program.

In the remaining three weeks, students worked individually on an assigned computer lesson: Karen' Story and The Ice Age. Prior to beginning their work with the assigned lesson, students were given a partial dictation pretest. In addition, they completed the partial dictation posttest and a multiple-choice test after each lesson. In the last week of the lab, a questionnaire was given to individual students following their completion of the posttest.

In addition to the test and the survey data, as each student interacted with the computer, the whole process of interaction was recorded by a video camera. Later, the researcher had a script of each lesson and viewed the
recording videotapes to document series of interaction between computer and each student (i.e., any types of modification each student performed and messages returned by the computer (Appendix I). Based on these data, the following information was obtained: what types of modification (i.e., dictionary, text reinforcement, or aural repetition) and amount of interactional modifications each student performed in each lesson.

Data Analysis

To answer the first research question: Does ESL students demonstrate functional moves which request the dictionary, the text reinforcement, or the repetition type modification, while working on this interactive CD-ROM program? If so, what kinds of modification patterns do ESL students use? the data obtained from the video recording on students' functional moves were analyzed by using descriptive statistics (frequency distribution).

To answer the second research question: Do ESL students believe these interactional computerized modifications help their listening comprehension? What is the rank order of these different type of interactional computerized modifications ESL students perceive as effective for them? the data from the questionnaire were analyzed by using frequency distribution, total weight ranking, and Wilcoxon signed-rank test. The Wilcoxon signed-rank test is analogous to the t-test for correlated means except that it makes no
assumptions regarding the shape of the score distribution or homogeneity of variance between two sets of scores.)

To answer the third research question: Does the amount of these interactional computerized modifications ESL students request correlate to their listening comprehension scores? the data from the partial-dictation pre- and posttest, the multiple-choice test, and the video tapes were analyzed using partial correlation (i.e., the amount of modifications students requested was correlated to their partial dictation posttest score and multiple-choice test score controlling for the partial dictation pretest score.)

To answer the fourth research question: Is there a relationship between improvement on individual words (pre- and posttests) and students' use of modification? the Phi coefficient was used to correlate two variables that are both true dichotomies. For example, in this study one variable was improvement on individual word (yes/no) and another variable was use of modification (yes/no). For each student who did not get a correct word on the partial dictation pretest, these words were checked again to see if there was any improvement of the individual word (yes/no) in the partial dictation posttest. Also, each individual word was assessed to see if the student used any type of modification (yes/no) in the lesson.
Summary

The purpose of this chapter was to describe the methodology used in this study. It provided a description of the Active English CD-ROM program used in this study, discourse analysis of the Active English CD-ROM program, the pilot study, the subjects, the instruments, the experimental design, the procedures, and the data analysis techniques.

The Active English program provided comprehension tools which allow second language students to request modification of the input they received from the computer to aid their listening comprehension. The subjects in this study were international students who enrolled in the IEOP beginning listening/speaking class during the fall semester 1993 at ISU. The study used a one group pretest-posttest design. The subjects took a partial-dictation pretest before using the Active English program and took a partial-dictation posttest and a multiple-choice test after using the computer program. Each subject participated in this study for a total of four weeks. Data obtained from the partial-dictation pre- & post-test, the multiple-choice test, the questionnaire, and the video tapes were analyzed to answer the research questions.
CHAPTER IV. RESULTS

The purpose of this chapter is to present the results of the study; results relating to each of the research questions in Chapter One are summarized. In addition, auxiliary findings, including students' computer anxiety and students' attitude toward the Active English CD-ROM program are presented. A summary of the study results appear in the final section of this chapter.

Research Question One

Research question one was stated as follows: Do L2 students demonstrate functional moves which request the dictionary, the text reinforcement, or the aural repetition type modification, while working on this interactive CD-ROM program to hear unknown linguistic material? If so, what kinds of modification patterns do L2 students use?

As each student interacted with the computer, the entire process of interaction was recorded by a video camera. The researcher had a script of each lesson and viewed the videotapes to assess the types of modifications each student used on each lesson. The data obtained from the videotapes were analyzed using descriptive statistics. Based on the results shown in Appendix L every second language student demonstrated functional moves that requested dictionary, text reinforcement, or aural repetition, while working with each interactive CD-ROM program lesson.
Karen's Story lesson

There were a total 81 sentences in Karen's story lesson; the range for total sentence modifications requested by learner was from 2 to 57, and the mean score was 23 with a standard deviation 16. In particular, the range for the aural repetition type of modification was from 0 to 53, and the mean score was 10 with a standard deviation 13. The range for the text reinforcement type of modification was from 2 to 50, and the mean score was 20.2 with a standard deviation 15. The range for the dictionary type of modification was from 0 to 13, and the mean score was 5 with a standard deviation 4. (Table 4).

Table 4. Range, mean, and standard deviation scores for L2 learners on type of modification requested in Karen's Story lesson.

<table>
<thead>
<tr>
<th>Modifications</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences (37)</td>
<td>2</td>
<td>57</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Repetition (37)</td>
<td>0</td>
<td>53</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Text reinforcement (37)</td>
<td>2</td>
<td>50</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Dictionary (37)</td>
<td>0</td>
<td>13</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

The Ice Age lesson

There were a total 37 sentences in the Ice Age lesson, the range for total sentences modification requested by learners was from 1 to 28, and the mean score was 12 with a standard deviation 7. The range for the repetition type of
modification was from 0 to 26, and the mean score was 5 with a standard deviation 7. The range for the text reinforcement type of modification was from 0 to 28, and the mean score was 10 with a standard deviation 8. The range for the dictionary type of modification learners requested was from 0 to 11, and the mean score was 4 with a standard deviation 4 (Table 5).

Table 5. Range, mean, and standard deviation scores for L2 learners on type of modification requested in the Ice Age lesson.

<table>
<thead>
<tr>
<th>Modifications</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences (37)</td>
<td>1</td>
<td>28</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Repetition (37)</td>
<td>0</td>
<td>26</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Text reinforcement (37)</td>
<td>0</td>
<td>28</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Dictionary (37)</td>
<td>0</td>
<td>11</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Types of modification patterns

In general, there are two kinds of modification patterns students used in these interactive CD-ROM program lessons: Repetition/Text reinforcement/(Dictionary) and Text reinforcement/(Dictionary). In the Repetition/Text reinforcement/(Dictionary) pattern, students chose the repetition type of modification first and the text reinforcement type of modification second and then optional dictionary type of modification when
they heard unknown linguistic material. In the Text reinforcement/ (Dictionary) pattern, students chose the text reinforcement type of modification first and the optional dictionary type of modification when they heard unknown linguistic material. The students who had lower language competence (i.e., according to the partial-dictation pretest) tended to use the first type of modification pattern—Repetition/Text reinforcement/(Dictionary), while those students who had higher language competence used the second type of modification pattern—Text reinforcement/(Dictionary).

**Research Question Two**

Research question two was stated as follows: Do L2 students believe these interactional computerized modifications help their listening comprehension? What is the rank order of these different types of interactional computerized modifications (dictionary, text reinforcement, and aural repetition) L2 students perceive as effective for them, as measured by a self-assessment instrument?

**Students' opinion toward the computerized modifications**

There were three items on the questionnaire that assessed L2 students' feelings about the value of the interactional computerized modifications in helping their listening comprehension. Each item used a five-point Likert scale where 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were positively worded statements such as "When
hearing unknown material in these lessons, the aural repetition tool aided my listening comprehension." Thus, for these data, 5 always equaled a very positive response and 1 equaled a very negative response. This scoring procedure resulted in the higher scores corresponding to more positive feeling toward the interactional computerized modifications. As shown in Table 6, the range of scores was from 1 to 5 on each item, and the mean score was 3.74. These data indicated that L2 students agreed these interactional computerized modifications helped their listening comprehension.

Table 6. Range, mean, & standard deviation on students' overall feels about the computerized modifications.

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Range</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students' opinion toward computerized modifications</td>
<td>15</td>
<td>1-5</td>
<td>3.74</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Students' opinion toward the different types computerized modification

Two items on the questionnaire requested students to rank the order (i.e., 1 being low, 3 being high) the different types of modifications they used according to how often they used the modifications and their perceived
usefulness when hearing unknown material in the lessons. As shown in Table 7, students indicated that the text reinforcement type modification (total weight score = 39) as the most frequently used tool, the aural repetition type modification (total weight score = 35) as the second most frequently used tool, and the dictionary type modification (total weight score = 18) as the least frequently used tool. As shown in Table 8, students perceived the text reinforcement type modification (total weight score = 40) as the most useful tool, the aural repetition type modification (total weight score = 33) as the second most useful tool, and the dictionary type modification (total weight score = 19) as the least useful tool. Thus, L2 students perceived the text reinforcement type modification as the most effective tool to help their listening comprehension.

Table 7. Total weight ranking scores of the different types of modifications students used according to frequency.

<table>
<thead>
<tr>
<th>Rank Order</th>
<th>Repetition</th>
<th>Text reinforcement</th>
<th>Dictionary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most frequency (3)</td>
<td>8&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Next frequency (2)</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Least frequency (1)</td>
<td>3</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Total weight score</td>
<td>35</td>
<td>39</td>
<td>18</td>
</tr>
</tbody>
</table>

<sup>a</sup>Number of students chose the repetition type modification as most frequently used tool
Table 8. Total weight ranking scores of the different types of modifications used according to the student perceived usefulness.

<table>
<thead>
<tr>
<th>Rank Order</th>
<th>Repetition</th>
<th>Text reinforcement</th>
<th>Dictionary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most usefulness (3)</td>
<td>7\textsuperscript{a}</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Next usefulness (2)</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Least usefulness (1)</td>
<td>4</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Total weight score</td>
<td>33</td>
<td>40</td>
<td>19</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Number of students chose the repetition type modification as most useful tool

Differences among the computerized modifications

By using the Friedman test (nonparametric statistics), a significant difference was found among the three types of modifications according to the frequency at which L2 students' requested them (Table 9). The Wilcoxon signed-rank test (nonparametric statistics) was used to determine if there was a significant difference in the mean scores for each type of modification. There was significant differences on mean scores between the dictionary and the text reinforcement types of modification and the dictionary and the aural repetition types of modification (Table 10 and 11). However, there was no significant difference between the aural repetition and the text reinforcement types of modification (Table 12).
Table 9. Friedman analysis of variance for three different types of modifications.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Rank</th>
<th>Case</th>
<th>Chi-Square</th>
<th>Df</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Modification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aural repetition</td>
<td>2.27</td>
<td>15</td>
<td>14.93</td>
<td>2</td>
<td>.0006**</td>
</tr>
<tr>
<td>Text Reinforcement</td>
<td>2.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dictionary</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Wilcoxon matched-pairs signed-ranks test for the dictionary and the aural repetition types of modification.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Rank</th>
<th>Case</th>
<th>Z</th>
<th>2-Tailed Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Modification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dictionary</td>
<td>4.00</td>
<td>15</td>
<td>-2.7262</td>
<td>.0064**</td>
</tr>
<tr>
<td>Aural Repetition</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11. Wilcoxon matched-pairs signed-ranks test for the dictionary and the text reinforcement types of modification.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Rank</th>
<th>Case</th>
<th>Z</th>
<th>2-Tailed Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Modification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dictionary</td>
<td>0.00</td>
<td>15</td>
<td>-3.4078</td>
<td>.0007**</td>
</tr>
<tr>
<td>Text Reinforcement</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 12. Wilcoxon matched-pairs signed-ranks test for the aural repetition and the text reinforcement types of modification.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Rank</th>
<th>Case</th>
<th>Z</th>
<th>2-Tailed Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of Modification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aural Repetition</td>
<td>5.50</td>
<td>15</td>
<td>-0.8736</td>
<td>.3824</td>
</tr>
<tr>
<td>Text Reinforcement</td>
<td>8.29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research Question Three

Research question three was stated as follows: Does the amount of these interactional computerized modifications ESL students request correlate to their listening comprehension scores?

Students' listening comprehension was measured with two instruments: the partial dictation test and the multiple-choice test. In both lessons, each student took a partial dictation pre- and post-test and a multiple-choice test. The scores of these tests for each lesson are shown in Table 13 and 14.

Table 13. Mean and standard deviation on the partial dictation pre- & post-test and multiple-choice test on Karen's Story lesson.

<table>
<thead>
<tr>
<th>Test</th>
<th>Total points</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial dictation pretest</td>
<td>34</td>
<td>16.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Fill words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial dictation posttest</td>
<td>34</td>
<td>22.0</td>
<td>5.1</td>
</tr>
<tr>
<td>Fill words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial dictation pretest</td>
<td>22</td>
<td>8.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Target words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial dictation posttest</td>
<td>22</td>
<td>13.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Target words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple-Choice test</td>
<td>12</td>
<td>10.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Table 14. Mean and standard deviation on the partial dictation pre- & post-test and multiple-choice test on the Ice Age lesson.

<table>
<thead>
<tr>
<th>Test</th>
<th>Total points</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial dictation pretest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fill words</td>
<td>33</td>
<td>16.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Partial dictation posttest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fill words</td>
<td>33</td>
<td>23.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Partial dictation pretest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target words</td>
<td>22</td>
<td>12.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Partial dictation posttest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target words</td>
<td>22</td>
<td>17.0</td>
<td>4.7</td>
</tr>
<tr>
<td>Multiple-Choice test</td>
<td>10</td>
<td>6.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>
There was a statistically significant difference between the partial dictation pretest and posttest on Fill words \((t=-10.18, p<.000)\) and Target words \((t=-11.46, p<.000)\) on Karen's story lesson (Table 15). Also, there was a statistically significant difference between the partial dictation pretest and posttest on Fill words \((t=-7.52, p<.000)\) and Target words \((t=-5.62, p<.000)\) on the Ice Age lesson (Table 16).

**Correlation of students' use modification and their listening comprehension**

Using Partial Correlation and the partial diction pretest as a covariate, correlation coefficient were calculated on the posttest scores (the partial dictation posttest and the multiple-choice test) and the number of modifications students requested. In Karen's story lesson, there was a significant positive relationship between the use of the dictionary type modification and students' listening comprehension scores on the partial dictation posttest; there was also a significant positive relationship between students' requested modifications on sentences and their listening comprehension scores on the multiple-choice test. Moreover, there was a significant positive relationship between use the text reinforcement type modification and their listening comprehension scores on the multiple-choice test. These data appears in Table 17.

In the Ice Age lesson, there was a significant positive relationship between students' requested modifications on sentences and their improved listening scores on the partial dictation posttest and the multiple-choice test (Table 18). There was also a significant positive relationship between use the
Table 15. Mean, standard deviation, and T-test for paired samples on partial dictation pre- and posttest on Karen's Story lesson.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Std Dev</th>
<th>(Difference) Mean</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFW1</td>
<td>15</td>
<td>16.2</td>
<td>5.8</td>
<td>-5.8</td>
<td>-10.18</td>
<td>.01**</td>
</tr>
<tr>
<td>POSTFW2</td>
<td></td>
<td>22.0</td>
<td>5.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRETW3</td>
<td>15</td>
<td>8.3</td>
<td>4.0</td>
<td>-5.0</td>
<td>-11.46</td>
<td>.01**</td>
</tr>
<tr>
<td>POSTTW4</td>
<td></td>
<td>13.3</td>
<td>3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Fill Words in the partial dictation pretest
2Fill Words in the partial dictation posttest
3Target Words in the partial dictation pretest
4Target Words in the partial dictation posttest

Table 16. Mean, standard deviation, and T-test for paired samples on partial dictation pre- and posttest on Ice Age lesson.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Std Dev</th>
<th>(Difference) Mean</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFW1</td>
<td>15</td>
<td>16.8</td>
<td>6.7</td>
<td>-6.6</td>
<td>-7.52</td>
<td>.01**</td>
</tr>
<tr>
<td>POSTFW2</td>
<td></td>
<td>23.4</td>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSTTW3</td>
<td>15</td>
<td>12.7</td>
<td>4.6</td>
<td>-4.2</td>
<td>-5.62</td>
<td>.01**</td>
</tr>
<tr>
<td>POSTTW4</td>
<td></td>
<td>17.0</td>
<td>4.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Fill Words in the partial dictation pretest
2Fill Words in the partial dictation posttest
3Target Words in the partial dictation pretest
4Target Words in the partial dictation posttest
Table 17. Partial Correlation between the amount of modifications students requested and their listening comprehension scores controlling for partial dictation pretest scores on Karen's Story lesson.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Partial dictation Posttest</th>
<th>Multiple-choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence</td>
<td>.2264</td>
<td>.5710**</td>
</tr>
<tr>
<td>Repetition</td>
<td>.1040</td>
<td>.1603</td>
</tr>
<tr>
<td>Text Reinforcement</td>
<td>.2629</td>
<td>.5662**</td>
</tr>
<tr>
<td>Dictionary</td>
<td>.4828**</td>
<td>.3124</td>
</tr>
</tbody>
</table>

**p < .05.

Table 18. Partial Correlation between the number of modifications students requested and their listening comprehension scores controlling for partial dictation pretest scores on the Ice Age lesson.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Partial dictation Posttest</th>
<th>Multiple-choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence</td>
<td>.6175**</td>
<td>.7833**</td>
</tr>
<tr>
<td>Repetition</td>
<td>.0281</td>
<td>.0391</td>
</tr>
<tr>
<td>Text Reinforcement</td>
<td>.6064**</td>
<td>.8372**</td>
</tr>
<tr>
<td>Dictionary</td>
<td>.1814</td>
<td>.4128</td>
</tr>
</tbody>
</table>

**p < .05.
text reinforcement type modification and their listening comprehension scores on the partial-dictation test and the multiple-choice test.

In summary, there was a significant positive correlation between the number of modifications L2 students requested and their listening comprehension scores. In particular, the text type modification correlated most with students' listening comprehension scores. This result was consistent with students' percepts concerning the usefulness of the text reinforcement modification type.

Research Question Four

Research question four was stated as follows: Is there a relationship between improvement on individual words (partial dictation pre- and posttest) and students' use of a type of modification?

To measure student improvement on individual words, each word a student missed on the partial dictation pretest was included on the partial dictation posttest; answers on these items were scored improvement or no improvement. In addition, data was gathered on whether or not the student used any type of modification with the individual words on the posttest. The Phi coefficient was used to correlate any improvement of the individual word (improvement/no improvement) and use of any type of modification (yes/no). The data had been analyzed and recorded for individual students on both lessons (Appendix K). As shown in the Tables 19 and 20, there were significant moderately positive correlation between improvement on
Table 19. Phi correlation coefficient between improvement on individual words (partial dictation pre- and posttests) and students’ use of modification on Karen’s Story lesson.

<table>
<thead>
<tr>
<th>Students ID</th>
<th># of words</th>
<th>Phi Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>14</td>
<td>.57</td>
</tr>
<tr>
<td>02</td>
<td>14</td>
<td>.57</td>
</tr>
<tr>
<td>03</td>
<td>15</td>
<td>.53</td>
</tr>
<tr>
<td>04</td>
<td>14</td>
<td>.78</td>
</tr>
<tr>
<td>05</td>
<td>15</td>
<td>.40</td>
</tr>
<tr>
<td>06</td>
<td>14</td>
<td>.64</td>
</tr>
<tr>
<td>07</td>
<td>5</td>
<td>.80</td>
</tr>
<tr>
<td>08</td>
<td>6</td>
<td>.83</td>
</tr>
<tr>
<td>09</td>
<td>13</td>
<td>.76</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>.66</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>.70</td>
</tr>
<tr>
<td>12</td>
<td>17</td>
<td>.64</td>
</tr>
<tr>
<td>13</td>
<td>16</td>
<td>.37</td>
</tr>
<tr>
<td>14</td>
<td>20</td>
<td>.35</td>
</tr>
<tr>
<td>15</td>
<td>14</td>
<td>.50</td>
</tr>
</tbody>
</table>

Mean = .60

1The number of words students missed on the partial dictation pretest
Table 20. Phi correlation coefficient between improvement on individual words (partial dictation pre- and posttests) and students' use of modification on the Ice Age lesson.

<table>
<thead>
<tr>
<th>Students ID</th>
<th># of words (^1)</th>
<th>Phi Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>9</td>
<td>.66</td>
</tr>
<tr>
<td>02</td>
<td>9</td>
<td>.66</td>
</tr>
<tr>
<td>03</td>
<td>12</td>
<td>.66</td>
</tr>
<tr>
<td>04</td>
<td>3</td>
<td>.66</td>
</tr>
<tr>
<td>05</td>
<td>11</td>
<td>.81</td>
</tr>
<tr>
<td>06</td>
<td>11</td>
<td>.72</td>
</tr>
<tr>
<td>07</td>
<td>4</td>
<td>.75</td>
</tr>
<tr>
<td>08</td>
<td>3</td>
<td>1.00</td>
</tr>
<tr>
<td>09</td>
<td>10</td>
<td>.60</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>.70</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>.56</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
<td>.66</td>
</tr>
<tr>
<td>14</td>
<td>18</td>
<td>.55</td>
</tr>
<tr>
<td>15</td>
<td>12</td>
<td>.66</td>
</tr>
</tbody>
</table>

Mean = .71

\(^1\)The number of words students missed on the partial dictation pretest
individual words and students use of modifications in the Karen's Story lesson (mean $r=.60$) and in the Ice Age lesson (mean $r=.71$).

Additional Findings

Additional findings on students' computer anxiety and students' attitude toward the Active English CD-ROM program are reported on this section.

Students' computer anxiety

Three items on the questionnaire were used to assess students' computer anxiety. Each item used a five-point Likert scale where 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. Some items were positively worded and other negatively worded statements such as "Computers make work more enjoyable." and "Computers make me feel nervous and uncomfortable." In the data analysis, the researcher reversed the scale value on the positive item; thus, with this scoring procedure higher scores on the computer anxiety scale indicated to high computer anxiety. As shown in the Table 21, the range of scores on the three item was from 1.00 to 4.00, with a mean of 2.42. This suggests that students had low computer anxiety.
Students' attitude toward the Active English computer program

Nine items on the questionnaire were used to assess students' attitude toward the Active English CD-ROM program. Each item used a five-point Likert scale where 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were positively worded statements such as "This program can improve my listening comprehension." Thus, for these data, 5 always equaled a very positive response and 1 equaled a very negative response. As shown in the Table 21, the range of score was from 1.22 to 4.78, and the mean score was 3.92. That data indicated that overall students had a positive attitude toward the Active English CD-ROM program. After activities of the study were completed, Twelve students requested to continue using this program during the semester.

Table 21. Responses on items in questionnaire

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Range</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students' computer anxiety</td>
<td>15</td>
<td>1.00-4.00</td>
<td>2.42</td>
<td>0.86</td>
</tr>
<tr>
<td>Students' attitude</td>
<td>15</td>
<td>1.22-4.78</td>
<td>3.92</td>
<td>0.88</td>
</tr>
<tr>
<td>toward CD-ROM program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary

In this chapter, the results of the study were presented as they related to the research questions of the study. Also, and the additional relevant findings were reported. The major results of the study were:

1. Every L2 student demonstrated functional moves that requested dictionary, text reinforcement, or aural repetition types of modification while working on interactive computer-based listening lessons.

2. L2 students who had lower language competence (i.e., according to the partial dictation pretest) tended to use one type of modification pattern--Aural repetition/text reinforcement/(dictionary), while those students who had higher language competence used the text reinforcement/(dictionary) type of modification pattern.

3. L2 students agreed that these interactional computerized modifications helped their listening comprehension. In particular, they viewed the text reinforcement type modification as the most effective tool for their listening comprehension.

4. With respect to the frequency of different types of modification, L2 students requested, there was a significant difference between the dictionary and the text reinforcement type modification; also there was a significant difference between the frequency of the dictionary and the aural repetition types of modification. But there was no significant difference in the frequency of the aural repetition and the text reinforcement types of modification.
5. There was a significant positive correlation between the amount of modification L2 students requested and their improved scores. In particular, the text reinforcement type modification was the most effective tool for improving students' listening scores. This result was consistent with students' perception as reported on the questionnaire.

6. There was a significant moderately positive correlation between improvement on individual words and L2 students' use of modification.

7. There was a statistically significant difference between the L2 students' partial dictation pre- & posttest scores on both interactive computer-based listening lessons.

8. L2 students had low computer anxiety.

9. L2 students had a positive attitude toward the Active English computer CD-ROM program.
CHAPTER V. SUMMARY, DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

The purpose of this chapter is to summarize the research study, discuss the results, present suggestions for further research, and draw conclusion about the findings of this research. Thus, the chapter is organized into the following sections:

1. A brief summary of the research study
2. Discussion of the study results
3. Suggestions for the further research
4. Conclusions

Summary of the Research Study

Theory and research on SLA indicates that modification in the interactions between second language students and native speakers may have a positive influence on their acquisition of language (Hatch, 1983; Long, 1983; Allright, 1991; Larsen-Freeman & Long, 1991). However, there is not enough opportunity for interactional modifications in the second language classroom because there is only one native speaker for many students making it impossible for teachers to engage in interactional modifications with individual students. CALL developers claim that CALL offers an environment
in which a second language student can participate in interactive learning (Ahmad, 1985; Kenning, 1990). In particular some computer software provides comprehension tools that allow second language students to request modifications of the input they receive in order to aid their comprehension. In theory, such tools are ideal for second language acquisition. However, in practice, little is known about how students actually interact in such environments. The first purpose of this study was to investigate if second language students' moves request modifications of the input they hear while working on a computer-based listening exercise. The second purpose was to examine if these interactional computerized modifications help second language students' listening comprehension and language acquisition.

Methodology

The Active English program was used in this study; it provided comprehension tools which allowed second language students to request modification of the input they hear in order to aid their listening comprehension. The subjects in this study were fifteen international students who enrolled in the Intensive English Oriented Program beginning listening/speaking class during the fall semester 1993 at Iowa State University. The instructor informed students there would be a computer lab as a part of the class for one hour once a week for 4 weeks and assigned students to attend this lab. The students were given a short orientation regarding the computer and the Active English program during the first week. In the following weeks, students continued working individually on assigned computer lessons:
Karen's Story and The Ice Age. As each student interacted with the computer, the entire process of interaction was recorded by a video camera. This study used a one group pretest-posttest design. The subjects took a partial-dictation test before using the Active English program and took a partial-dictation test and a multiple-choice test after using the computer program. The alpha level for the study was set at .05.

Data obtained from the partial-dictation test, the multiple-choice test, the questionnaire, and the videotape were analyzed using the SPSS statistical program. Those statistics techniques used were descriptive statistics, t-test for correlated means, partial correlation, total weight ranking, Wilcoxon signed-rank, and Phi coefficient.

Discussion of the Study Results

Four research questions were developed and tested. A summary of the results follows:

Research question one was stated as follows: Do ESL students demonstrate functional moves which request the dictionary, the text reinforcement, or the aural repetition type modification, while working on this computer-based listening exercise to hear unknown linguistic material? If so, what kinds of modification patterns do ESL students use?

The results from this study showed that when students were offered a computerized interactive environment which provided comprehension tools,
(i.e., aural repetition, text reinforcement, or dictionary) they actually used these tools to modify the input they heard in aiding their listening comprehension. There were a total of 81 sentences in Karen's story lesson; the range of total sentences ESL students requested for modification was from 2 to 57, and the mean score was 23. Regarding the specific types of modification, the range of the aural repetition type of modification ESL students requested was from 0 to 53, and the mean score was 10. The range of the text reinforcement type of modification ESL students requested was from 2 to 50, and the mean score was 20. The range of the dictionary type of modification ESL students requested was from 0 to 13, and the mean score was 5.

There were a total of 37 sentences in the Ice Age lesson; the range of total sentences ESL students requested for modification was from 1 to 28, and the mean score was 12. Regarding the specific type of modification, the range of the repetition type of modification ESL students requested was from 0 to 26, and the mean score was 5. The range of the text reinforcement type of modification ESL students requested was from 0 to 28, and the mean score was 10. The range of the dictionary type of modification ESL students requested was from 0 to 11, and the mean score was 4.

Second language classroom researchers hypothesize the positive effects of interactional modifications on language acquisition, but there is not enough opportunity for interactional modifications in the classroom because there is only one native speaker for many students. Since the results of this study showed that ESL students actually used these computerized tools to modify the input they heard in aiding their listening comprehension, ESL instructors
may be able to use this type of computerized environment as one way of relieving a dilemma in second language classroom.

In general, there were two kinds of modification patterns students used in both listening exercise lessons. ESL students who had lower language competence (i.e., according to the pre-dictation test) tended to use one type of modification pattern—Aural repetition/text reinforcement/(dictionary). In this pattern, students chose the repetition type of modification first and the text reinforcement type of modification second and then the optional dictionary type of modification when they heard unknown linguistic material. Those students who had higher language competence used the other type of modification pattern—text reinforcement/(dictionary). In this pattern, students chose the text reinforcement type of modification first and the optional dictionary type of modification when they heard unknown linguistic material. Based on the informal interview with a few students, the possible reason for using different modification patterns is explained as follows: the low proficiency students confronted more unknown linguistic material than the high proficiency students did. Thus, the low proficiency students requested the aural repetition type modification first to have another opportunity to understand the unknown linguistic material. The high proficiency students requested the text reinforcement type modification first since they desired more explicit instruction or confirmation of their guesses immediately (i.e., they were able to make guesses first time around.)
Research question two was stated as follows: Do ESL students believe these interactional computerized modifications aid their listening comprehension? What specific type of interactional modification do students believe the most effective?

The results revealed that ESL students agreed that interactional computerized modifications helped their listening comprehension. The mean score for students’ opinion toward those interactional computerized modifications was 3.74 on a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree.

Regarding the specific type of interactional modification, the results showed that ESL students viewed the text reinforcement type modification as the most effective tool, the aural repetition type modification as the next most effective tool, and the dictionary type modification as the least effective tool when hearing unknown linguistic material. This result was based on the usefulness and the frequency of the specific type modification as reported by ESL students.

With respect to the usefulness of the specific type modification ESL students reported, the total weight score was 40 for the text reinforcement type modification, 33 for the aural repetition type modification, and 19 for the dictionary type modification. With respect to the frequency of the specific type modification ESL students requested, the total weight score was 39 for the text reinforcement type modification, 35 for the aural repetition type modification, and 18 for the dictionary type modification.
The results of this study (i.e., the text reinforcement type modification was the most frequently used tool) are consistent with results from a study done by Long and Sato (1983). They examined forms and functions of teachers' questions and reported that the comprehension check modification was more frequent in the ESL classroom. The function of using the comprehension check modification in Long's and Sato's study (i.e., attempts by the teacher to establish that the student is following what s/he is saying) is similar to the function of performing the text reinforcement type modification in Active-English CD-ROM program. For example, when ESL students were confused, the sentences were presented aurally by the computer, they could click a button at the button of the screen which visually presented the text (i.e., students could see what they heard.) The function of the text reinforcement type modification was for students desiring more explicit instruction or confirmation of their guesses (i.e., students could follow what the computer was saying.)

The developers of the Active English computer program claimed that the goal of this program was to provide interactive practice in listening comprehension, and students could use the three comprehension tools -- aural repetition, text reinforcement, and dictionary -- to modify the input they heard thereby aiding listening comprehension. However, Robinson (1991) pointed out that "With numerous and instantaneous forms of help made possible through interactive multi-media (e.g., scene replays, sentence replays, text explanations, translations, grammar review-sometimes combined with visual
overlays), research is needed to identify which of these constitute the most effective types of helps for particular learners at particular levels of learning." (p. 161). The results of this study indicated that these beginning level ESL students believed those computerized interactional tools helped their listening comprehension. In particular, students perceived the text reinforcement type modification as the most effective tool, the aural repetition type modification as next effective tool, and the dictionary type modification as the least effective tool.

Research question three was stated as follows: Does the amount of these interactional computerized modifications ESL students request correlate to their listening comprehension scores?

The result revealed that there was a significant positive correlation between the amount of modification ESL students requested and their listening comprehension scores (i.e., the more modifications students requested, the higher were their listening comprehension scores.) This result supports the SLA researchers' hypotheses that interactional modifications promote comprehension of input. In this study, when students were confused about some aspects of the sentences were presented aurally by the computer, they requested modifications (i.e., aural repetition, text reinforcement, or dictionary) to make input comprehensible. The correlation between the amount of modification ESL students requested and their scores on the partial-dictation test was $r=.27$ for Karen's story lesson and $r=.57$ for the Ice age lesson; the correlation between the amount of modification ESL students requested
and their scores on the multiple-choice test was \( r = .62 \) for Karen's story lesson
and \( r = .78 \) for the Ice age lesson.

In particular, the text reinforcement type modification had the highest
Correlation on students' listening comprehension scores on both lessons: \( r = .57 \)
for the Karen's Story lesson and \( r = .84 \) for the Ice Age lesson. This result was
Consistent with students' opinions. A possible reason that the text
Reinforcement type modification was the most effective tool is explained as
Follows: the text reinforcement tool can provide students more explicit
Instruction or confirmation of their guesses which helps students' listening
Comprehension. Based on the informal self-report TOEFL scores, most ESL
Students had higher score in the reading section than in the listening section of
The TOEFL (i.e., students could know some texts through reading, but they
could be confused same texts which were aurally presented.) Therefore, when
Students did not understand the sentences presented aurally by the computer,
they requested the text reinforcement modification which visually presented
The text (i.e., students could see what they heard.) to confirm their guesses,
thereby aiding their listening comprehension.

Research question four was stated as follows: Is there a relationship
Between improvement on individual words (partial dictation pre- and posttest)
And students' use of modification?

The results revealed that there was a significant moderate positive
correlation between improvement on individual words and ESL students use
Of modification (\( r = .60 \) for Karen's Story lesson and \( r = .71 \) for the Ice Age lesson).
The results showed that the more ESL students used modification, the more likely they were to get correct words on the partial dictation posttest that they missed on the partial dictation pretest.

In the input hypothesis, Krashen (1985) hypothesized that target language data which were understandable but with effort -- and were slightly more advanced than the ESL student's current level of competence -- would promote language acquisition. However, Long (1983b), Allright (1991), and Larsen-Freeman and Long (1991) claimed that interactional modification was an essential factor for second language acquisition because interactional modification allowed students to understand unfamiliar linguistic material. The findings in this study supported the latter hypothesis that interactional modifications promote language acquisition. Students took a partial dictation test before working on each computer-based listening exercise and a partial dictation test after they had completed the lesson. The words that each student did not get correct in the partial dictation pretest were checked again to identify improvement in the partial dictation posttest (i.e., any language acquisition). Also the individual word missed on the partial dictation pretest was checked if the student did use any type modification in the lesson (i.e., use of modifications). The results revealed that the more ESL students used modification, the more they improved on the partial dictation posttest.

Again, the results of this study showed that the ESL learners were more likely to acquire new words through the text reinforcement (i.e., the confirmation checks features). But in a study examining the role of interactional features in the children's SLA, Ellis (1985) reported that children
were more likely to produce "new" forms when the teacher provided feedback via the expansion features (i.e., the teacher gave feedback on the new utterances produced by children through expansions which supplied the missing parts of utterances which the children has struggled to produce.) The possible reasons for the different results are the differences between classroom and computer. In the Ellis's study, the interaction of the classroom is between the teacher and the children, where the children are passive recipients of input made comprehensible for them by the teacher. But in this study, the interaction is between the learners and the computer, where the learners are responsible for the input they receive by seeking comprehensible input through interactional modifications.

In auxiliary findings, it was reported that a majority of ESL students had low computer anxiety. The mean score for computer anxiety was 2.42. The higher scores on the computer anxiety scale corresponded to higher computer anxiety. Also, the majority of ESL students reported a positive attitude toward the Active English CD-ROM listening exercise program. The mean score for the Active English program was 3.92. The higher scores on the Active English program scale corresponded to a more positive attitude toward the Active English CD-ROM program. Several instructors who teach Intensive English Oriented Program indicate that the majority of ESL students lack intrinsic motivation because they have studied English for so long but still can not use it effectively. So, they are tired of taking English and lack intrinsic motivation. The auxiliary findings revealed that most ESL students would like to work on this computerized interactive learning environment. Thus, a teacher might be
able to provide extrinsic motivation to learn English by using this computer program.

The most significant findings of this study were that 1) ESL students used the interactional modification tools made available by computer technology to make input comprehensible, 2) it supported SLA researchers' hypothesis that modification promote comprehensible input and language acquisition, 3) the text reinforcement type modification was effective for beginning level ESL students in listening comprehension.

**Recommendations for Further Study**

Although this study indicated promising results, further research is needed to confirm the findings. Recommendations for further research are as below:

1. Since the sample size of IEOP Listening/Speaking group was small, the validity of the results should be examined with a large number of subjects in a variety of situations.

2. One of the limitations of this study was a possible novelty effect due to an unfamiliarity with CD-ROM. A study should be conducted that extends the length of the study to a total 8 weeks (i.e., students work on 6 listening-based exercises).
3. Since this study was conducted in a volunteer setting (i.e., students were working on the computer CD-ROM program after their regular class hours), a study should be conducted in a required class setting.

4. The Active English CD-ROM program has a set of four listening-based courses in English as a second or foreign language. The language level in the program is high beginning to high intermediate. A study should be conducted that uses a listening-based course on the high intermediate language with the intermediate level ESL students to find out if the result is the same.

5. It would be useful to examine the second language student's use of strategies on the Active English program, such as self monitoring (e.g., requesting the text reinforcement to check one's listening comprehension), resourcing (e.g., requesting the dictionary), and repetition (e.g., requesting the aural repetition). This approach, combined with the present study, will yield a more complete picture of the effectiveness of modifications in CALL.

6. The results of the research were affected by the types of tests chosen to measure listening. Douglas (1998) categorized the current work in listening comprehension testing as follows: multiple-choice test, dictation test, partial-dictation test, interaction test (i.e., students demonstrate comprehension by providing an appropriate response to a conversational stimulus.) and media-transfer test (i.e., students' abilities to transfer between two or more media--aural, written, pictorial, diagrammatic--to demonstrate comprehension.) The multiple-choice test was chosen in this study to measure students' listening comprehension. The multiple-choice format can be advantages in terms of objectivity, scoring and administrative convenience. Again, this multiple-
choice test has high validity because items in the test are related to the content of the computer-based lesson. Although the multiple-choice test is a good instrument to measure listening comprehension, a study should be conducted that uses different formats of listening comprehension test, such as interaction tests or media-transfer test to find out if there is a same result.

7. The Active English CD-ROM developers claim that this program presents mnemonical graphics, and some ESL students have informal comments that these graphics are beneficial for their listening comprehension. A study should be conducted to investigate the effect of requesting the mnemonic graphics on students' listening comprehension.

Conclusion

Many researchers who agree on the importance of comprehensible input to second language acquisition have asserted the importance of the role of interaction in making input comprehensible (Hatch, 1983; Long, 1980, 1981, 1983; Doughy & Pica, 1986; Allright, 1991). Again Long (1983b), Allright (1991), Larsen-Freeman and Long (1991) claimed that interactional modification is an essential factor for second language acquisition. However, there is not enough opportunity for interactional modifications in the second language classroom because there is only one native speaker for many students, making it impossible for teachers to engage in interactional modifications with individual students. Computer assisted language learning developers claim
that computer assisted language learning offers an environment in which an second language student can participate in interactive learning (Ahmad, 1985; Kenning, 1990). This computerized interactive environment could help the dilemma in the second language classroom. In particular some computer software provides comprehension tools which allow Second language students to request modification of the input they receive in order to aid their comprehension. In theory, such tools are ideal for second language students' language acquisition. However, in practice, little is known about how students actually interact in such environments. Thus, this study attempted to examine how students actually interact in the computerized interactive environment by using the Active English listening exercise program. In this empirical study, results indicated that when students were offered a computerized interactive environment which provided comprehension tools, they actually used these tools to modified the input to aid their listening comprehension. Also, results supported second language acquisition researcher's hypothesis that modifications promote comprehensible input and language acquisition. In particular, this study found that the text reinforcement type modification was effective for beginning level learning English as a Second language students in improving their listening comprehension.

Chapelle (1990) suggested that if researchers hope to understand what and how particular students learn using computer assisted language learning material, it is necessary to characterize the interaction that takes place while they work. Again, Chapelle (1993) asserted that computer assisted language learning researchers must investigate the computer-student interaction in
computer assisted language learning activities with method similar those used by other second language classroom researchers. This study examined student-computer interaction from the perspective of discourse functions, applying the positive aspects of classroom interaction discovered by second language researchers; these aspects are detailed in the following paragraph.

Long (1985) has hypothesized that the process of interaction with the target language input to make input comprehension is a key second language acquisition (i.e., the student receives the input and is confused about some aspects of its meaning and therefore requests repetition, clarification or other type of modification.) One example is learners' moves which request aural repetition, text reinforcement, or dictionary -- all of which are intended to help them to understand the meaning of the input they receive. In computer assisted language learning texts of this study, the researcher found the learner's moves which requested modifications of the input they received. In Figure 12 illustrates the types of modifications the researcher found in CALL texts.

Although this study applied the positive aspect of interactional modifications in second language classroom research, the focus here was on the computer not the classroom teacher. Those studies of interactional modifications in classroom settings investigated the interaction between the teacher and the students, where the students were passive recipients of input made comprehensible for them by the teacher (Long & Sato, 1983; Pica & Doughty, 1985; Ellis, 1985). Pica and Doughty also pointed out that the conversational modifications in the teacher-fronted activity were not necessarily relevant to individual students' comprehension levels, because
Karen's Story Lesson

R= aural repetition
T= text reinforcement
D= dictionary

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<th>Participant</th>
<th>Content</th>
<th>Move</th>
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<td>Computer:</td>
<td>(utters speech) Once upon a time, a teenage boy and his parents came to America from a faraway land. (and also offers &quot;R&quot;, &quot;T&quot;, and &quot;D&quot; buttons)</td>
<td>Initiate</td>
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<tr>
<td>Student:</td>
<td>(the student is listening to above speech, doesn't understand some aspects of its meaning and clicks &quot;R&quot; button)</td>
<td>Modification Request on Aural Repetition</td>
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<td>Computer:</td>
<td>(repeats the sentence) Once upon a time, a teenage boy and his parents came to America from a faraway land. (also offer &quot;R&quot;, &quot;T&quot;, and &quot;D&quot; buttons)</td>
<td>Modify Input</td>
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<tr>
<td>Student:</td>
<td>(the student is listening to above speech, still doesn't understand some aspects of its meaning and clicks &quot;T&quot; button)</td>
<td>Modification Request on Text Reinforcement</td>
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<tr>
<td>Computer:</td>
<td>(shows the text of the sentence on screen) Once upon a time, a teenage boy and his parents came to America from a faraway land)</td>
<td>Modify Input</td>
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Figure 12. The types of modification in CALL texts
class learners who listened while their teacher interacted with others in the classroom. However, in this study, the interaction was between the learner and the computer, where the learner was responsible for the input they received by seeking comprehensible input through interactional modifications. In computer assisted language learning texts of this study, the researcher found evidence for comprehensible input for individual learner requesting the modification.

In conclusion, this study investigated student-computer interaction in applying the positive aspect of interactional modifications in second language acquisition research and supported the positive effect of interactional modifications in a computer context. This study provides a clear direction for future computer assisted language learning research. Researchers could examine the effects of different computer assisted language learning texts by looking at student-computer interaction from the perspective of discourse functions. Moreover, researchers could examine particular sequences of discourse in computer assisted language learning texts and relate these results to previous second language classroom research which has investigated the positive effects of particular sequence of discourses. For example, Swain (1985) stated that comprehensible output is important for language acquisition, particular acquisition of grammatical competence; thus the researcher could investigate if the comprehensible output is present in computer assisted language learning texts. It should be noted that the significant results of this study were obtained even thought this study was conducted in a volunteer setting. Students were voluntarily working on the computer CD-ROM
program after their regular class hours (i.e., students usually worked between 4:00 PM and 8:00 PM) and each student completed the whole study without absence. This voluntary attendance revealed strong evidence that this program offers extrinsic motivation for students to learn English. It will be important to examine any influence on the results from the volunteer setting when a similar study is conducted in a required class setting.
BIBLIOGRAPHY


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Furthermore, I am grateful to Dr. Morgan, Dr. Douglas, Miss Benner, and Mr. Papajohn in English department for their advices and technical assistance. The innovative input that they offered was essential to this study.

Finally, I thank my husband for his understanding, patience as well as support. To my mother-in-law a special thanks for coming to U.S. several times to take care of my son during my Ph. D. program.
APPENDIX A: A FLOW CHART OF DISCOURSE ANALYSIS OF THE ACTIVE ENGLISH CD-ROM PROGRAM
APPENDIX B: SAMPLE INSTRUCTOR'S EVALUATION FORM
This CD-ROM disk has three lessons. Each lesson consists of six activities. The first three activities introduce new material and the final three recycle it in some way for further practice.

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APPENDIX C: PARTIAL DICTATION TESTS
Partial Dictation Test 1
Lesson: Karen's Story

Name: Karen

Directions: In this passage you will fill the missing words in the blank as the passage is read to you. This passage will be read to you three times at a normal speed. During the first reading, you read the passage and do not write. Try to understand the general meaning of the passage. During the second reading, there is a pause at the end of each of the sentence. You have to fill in the blanks with the same word you hear. Then, you will have 3 minutes pause after the third reading for final corrections. NOW LISTEN:

Once upon a time, a boy became to the United States with his family. They spent the night in the small motel alongside a bar near the museum. He saw many things there, and a park with the plane.

The boy started to walk along a street, but he became lost. He asked directions from a woman who had child on her face, but she didn't help him. Then the boy saw an old man who was his grandfather.

The old man had trouble with the boy's name, but gave him directions to the museum. The boy's mother told it was his first he became lost, but he was so glad to be home again, he came back.
Partial Dictation Test 2
Lesson: Karen's Story

Name: _______________________

Directions: In this passage you will fill the missing words in the blank as the passage is read to you. This passage will be read to you three times at a normal speed. During the first reading, you read the passage and do not write. Try to understand the general meaning of the passage. During the second reading, there is a pause at the end of each of the sentence. You have to fill in the blanks with the same word you hear. Then, you will have 3 minutes pause after the third reading for final corrections. NOW LISTEN:

_______ a woman _______ across the ocean to live in a new _______. When she arrived, she _______ many things that _______ home. There were _______ growing near _______ and _______ streets with a pretty park and a _______ much like the city she came from. She knew about the _______ next to the park, so she _______ a man for _______. But the man had _______ on his face and said he _______ the woman's _______. The woman felt _______, but she _______. She told herself it wasn't her _______ she didn't _______ very well yet. She kept on walking along _______ by the _______, and knew she _______.
Partial Dictation Test 1
Lesson: The Ice Age

Name: [redacted]

Directions: In this passage you will fill the missing words in the blank as the passage is read to you. This passage will be read to you three times at a normal speed. During the first reading, you read the passage and do not write. Try to understand the general meaning of the passage. During the second reading, there is a pause at the end of each of the sentence. You have to fill in the blanks with the same word you hear. Then, you will have 3 minutes pause after the third reading for final corrections. NOW LISTEN:

- **Occur in cycles.** The last ice age **thousands** of years ago when **covered large areas of** earth.
  - The cycle starts when the **and** don't melt in the **.** This snow gets **and** thicker over **and** finally **a glacier.** As glaciers **they** keeping cool, so that more and more glaciers form. Eventually the glaciers **other glaciers and form a huge of ice that** much of the earth's. Eventually the climate gets **and the ice begins**. Over many centuries the ice sheets **and slowly all over again.**
Partial Dictation Test 2
Lesson: The Ice Age

Name: [Redacted]

Directions: In this passage you will fill the missing words in the blank as the passage is read to you. This passage will be read to you three times at a normal speed. During the first reading, you read the passage and do not write. Try to understand the general meaning of the passage. During the second reading, there is a pause at the end of each of the sentence. You have to fill in the blanks with the same word you hear. Then, you will have 3 minutes pause after the third reading for final corrections. NOW LISTEN:

During the last [BLANK], huge sheets of ice [BLANK] most of the [BLANK]. These sheets of ice were slowly [BLANK] over [BLANK] from [BLANK]. Glaciers develop in the [BLANK] when [BLANK] don't melt completely during the [BLANK]. If many [BLANK], more and more snow [BLANK], and eventually turns to ice, [BLANK] a glacier. Glaciers [BLANK] which continues to [BLANK] cool, and more and more glaciers then tend to form. As more glaciers are formed, they [BLANK] until [BLANK] of ice cover most of the earth. This is an ice age. Ice ages occur [BLANK], and eventually the earth's [BLANK] will [BLANK] and the ice will begin to melt. Over many centuries the ice will [BLANK], but eventually the climate will turn cool again, and the cycle will [BLANK].
APPENDIX D: MULTIPLE-CHOICE TESTS
Listening Comprehension Test
Lesson: Karen's Story

Name: ____________________________

Direction: Read the following questions and circle a best answer for each question.

1. In the middle of the park was a pond, and there were lots of ducks in it.
   a. true
   b. false

2. What were the baby ducks swimming behind?
   a. a black dog
   b. brown female ducks
   c. sea gulls
   d. a goose

3. The woman walking with her dog was happy.
   a. true
   b. false

4. The woman growled at the boy as she walked away.
   a. true
   b. false

5. The woman walking with her dog, what was she wearing?
   a. hat
   b. sunglasses
   c. coat
   d. black shoes
6. A young black-haired woman sitting at a bus stop reading a paper.
   a. true
   b. false

7. How much money did the boy have?
   a. 13 cents
   b. 17 cents
   c. 23 cents
   d. 53 cents

8. How much did the apple cost?
   a. 3 cents
   b. 13 cents
   c. 15 cents
   d. 23 cents

9. The woman walking the little black dog was blonde and thin.
   a. true
   b. false

10. The boy had to get off the bus because he did not have enough money.
    a. true
    b. false

11. Karen's cousin got lost when he came to Los Angeles.
    a. true
    b. false

12. Who read the story in English class?
    a. Karen
    b. Da Wei
    c. Helen
    d. John
Listening Comprehension Test
Lesson: The Ice Age

Name:

Direction: Read the following questions and circle a best answer for each question.

1. What is causing the earth's climate to change?
   a. glacier
   b. air pollution
   c. clouds
   d. sun

2. Scientists think the earth is getting warmer.
   a. true
   b. false

3. If 0 were the sea level during the last ice age, what is the sea level now?
   a. +300 ft
   b. +100 ft
   c. 0 ft
   d. -300 ft

4. Humans went from Asia to North America during the last ice age.
   a. true
   b. false

5. Where do the glaciers start?
   a. mountain
   b. river
   c. sky
   d. tree
6. Glaciers are huge sheets of ice.
   a. true
   b. false

7. Glaciers keep the temperature warm.
   a. true
   b. false

8. Which direction do glaciers move in South America?
   a. east
   b. west
   c. south
   d. north

9. During the ice age, very thick sheets of ice covered the earth's surface.
   a. true
   b. false

10. Australia was connected to Asia by a land bridge during the last ice age.
    a. true
    b. false
APPENDIX E: QUESTIONNAIRE
QUESTIONNAIRE

In this questionnaire I would like some information about your feelings about Active English CD-ROM program and the computer. There is no "right" or "wrong" answer. Please circle the response that best describes how you feel about each of the following statements. Your name will not be used in the reports of the research: please answer the questions freely and honestly. Thank you for your cooperation.

Part I. Personal information

Gender (check one) male female

Name ____________________________

What country are you from? _______________________

What is your native language? _______________________

What major do you plan for the future? _______________________

Part II. Feelings about CD-ROM program and the computer

1. The level of these lessons is appropriate for me.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree
2. I learned the words and expressions from these lessons.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

3. When hearing unknown material in these lessons, the "repetition" tool aided my listening comprehension.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

4. When hearing unknown material in these lessons, the "text reinforcement" tool aided my listening comprehension.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

5. When hearing unknown material in these lessons, the "dictionary" tool aided my listening comprehension.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree
6. Please rank order (i.e., 1-3) the following tools according to the frequency you used them. (1 being the most, 3 being the least)

   ______ Repetition
   ______ Text reinforcement
   ______ Dictionary

7. Please rank order (i.e., 1, 2, 3) the following tools on their usefulness to aid listening comprehension, while hearing unknown material in these lessons. (1 being the most useful, 3 being the least useful)

   ______ Repetition
   ______ Text reinforcement
   ______ Dictionary

8. This program makes learning more interesting.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

9. This program is easy to use.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

10. This program can improve my listening comprehension.

    Strongly agree
    Agree
    Undecided
    Disagree
    Strongly disagree
11. Using this program increased my interest in learning English.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

12. When I hear the word "computer", I have a feeling of dislike.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

13. Computers make work more enjoyable.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree

14. Computers make me feel nervous and uncomfortable.

   Strongly agree
   Agree
   Undecided
   Disagree
   Strongly disagree
APPENDIX F: HUMAN SUBJECTS APPROVAL
Information for Review of Research Involving Human Subjects
Iowa State University
(Please type and use the attached instructions for completing this form)

1. Title of Project: Computer Assisted Language Learning: ESL Students’ use of Interactional Modifications

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

   Jing-Fong Jane Hsu
   8/10/93

   Typed Name of Principal Investigator

   Date

   Signature of Principal Investigator

   Curriculum & Instruction Technology
   1421 Lagomarcino Hall
   515-294-6900/294-9997

   Department
   Campus Address
   Campus Telephone

3. Signatures of other investigators

   8/10/93
   Major professor

   Relationship to Principal Investigator

4. Principal Investigator(s) (check all that apply)
   □ Faculty  □ Staff  □ Graduate Student  □ Undergraduate Student

5. Project (check all that apply)
   □ Research  □ Thesis or dissertation  □ Class project  □ Independent Study (490, 590, Honors project)

6. Number of subjects (complete all that apply)
   _ # Adults, non-students
   _ # ISU student
   _ # minors under 14
   _ # minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions. Item 7. Use an additional page if needed)

   In this study, international students who enroll Intensive English and Orientation Program (IEOP) in the beginning/intermediate listening/speaking class at ISU during fall semester of 1993 will be selected as subjects. They will use an interactive CD-ROM computer program. Because this program can offer comprehension tools (i.e., repetition, text reinforcement, and dictionary) which allow a learner to make modifications on the input s/he hears, it may be effective in aiding listening comprehension. The purposes of this descriptive study are:
   1) what students’ moves are that request modification on the input they receive while using Active English CD-ROM computer program and confronting new linguistic material, 2) the effect of those interactional modifications on the listening comprehension, 3) types of interactional modifications that are useful for students.

   Procedure

8. On the first week, each individual student will be given a short orientation regarding the computer and the software. Each student will then be assigned the lesson, Using Words, to practice until s/he is comfortable on the computer program.

   In the following 2nd, 3rd, and 4th weeks, students will continue working individually on an assigned computer lesson: Karen' Story and Christmas Shopping. Also, students will be given a listening recall test before and after they
9. **Confidentiality of Data:** Describe below the methods to be used to ensure the confidentiality of data obtained. (See instructions, item 9.)

A consent form will be sent to students through which they can request that their data not be included in the analysis. Although students' names will be include in survey and pre- & posttest, students will only be identified by an identification number for the data analysis and the instruments will be destroyed as soon as the study is completed.

10. **What risks or discomfort will be part of the study? Will subjects in the research be placed at risk or incur discomfort?** Describe any risks to the subjects and precautions that will be taken to minimize them. (The concept of risk goes beyond physical risk and includes risks to subjects' dignity and self-respect as well as psychological or emotional risk. See instructions, item 10.)

   No discomfort or risks will be in this study.

11. **CHECK ALL** of the following that apply to your research:

- [ ] A. Medical clearance necessary before subjects can participate
- [ ] B. Samples (Blood, tissue, etc.) from subjects
- [ ] C. Administration of substances (foods, drugs, etc.) to subjects
- [ ] D. Physical exercise or conditioning for subjects
- [ ] E. Deception of subjects
- [ ] F. Subjects under 14 years of age and/or
- [ ] G. Subjects in institutions (nursing homes, prisons, etc.)
- [ ] H. Research must be approved by another institution or agency (Attach letters of approval)

If you checked any of the items in 11, please complete the following in the space below (include any attachments):

- **Items A - D** Describe the procedures and note the safety precautions being taken.
- **Item E** Describe how subjects will be deceived; justify the deception; indicate the debriefing procedure, including the timing and information to be presented to subjects.
- **Item F** For subjects under the age of 14, indicate how informed consent from parents or legally authorized representatives as well as from subjects will be obtained.
- **Items G & H** Specify the agency or institution that must approve the project. If subjects in any outside agency or institution are involved, approval must be obtained prior to beginning the research, and the letter of approval should be filed.
APPENDIX G: LETTER TO INSTRUCTORS
August 16, 1993

Dr. Barbara Matthies  
339 Ross Hall  
Iowa State University

Dear Dr. Matthies:

I am writing to request your participation in a computer lab CD-ROM program for your IEOP beginning or intermediate listening/speaking class this Fall. The program will provide interactive practice in listening comprehension for your students for a total of 3 weeks during the semester. These lab sessions will be staffed by me, a graduate student in the College of Education; therefore, it will not be necessary for you to attend, although you are welcome to.

Following is an explanation of (1) the specific content of the material to be covered in the lab, (2) the reports I will return to you concerning the students work, and (3) what you will need to do to participate.

(1) The following details the content of the material to be covered during each of the lab sessions.

<table>
<thead>
<tr>
<th>Date</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>Computer orientation.</td>
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</table>
| August 30 - Sept. 3 | Lesson: Using Words  
|             | Mr. Rice gives a presentation on how words can be used effectively to make a story more interesting.  
|             | The focus is on adjectives that can be used to describe people and things. |
| 2nd week   | Lesson: Karen's Story                                                    |
| Sept. 7 - 11 | Karen tells about a story she wrote for English. It sounds a lot like when her cousin first arrived in the U.S. and got lost in Los Angeles.  
|             | Test: Listening comprehension test                                      |
3rd week
Sept. 13-17

**Lesson:** The Ice Age
Mr. Simons science class is the setting as we learn about the glaciers and the earth's past weather patterns.

**Test:** Listening comprehension test

(2) Reports of your students work in the lab will be kept and submitted to you every week. An example of the "Reports from Computer Lab" form is on the following page.

(3) To participate in this program, I am requesting that you do the following:

- allow me to take 10 - 15 minutes every week from your regular class time to conduct a pre-test.
- require students to go to the computer lab and complete the lab assignments.

I will do an evaluation of this lab program for my Ph. D. dissertation; therefore, I will also request students fill out a questionnaire about their use of the program. If you have any question on this program, please feel free to call me or my committee members, Dr. Ann Thompson (4-5287) and Dr. Carol Chapelle (4-7274).

Thank you for considering participate on in this program. I will contact you in a few days to discuss it with you.

Sincerely,

Jing-Fong Hsu
N031 Lagomarcino Hall
Phone: 294-6840
## Reports from Computer Lab

<table>
<thead>
<tr>
<th>Student Name</th>
<th>1st week</th>
<th>2nd week</th>
<th>3rd week</th>
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<tbody>
<tr>
<td></td>
<td>Lesson Completed</td>
<td>Pre-test</td>
<td>Lesson Completed</td>
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</tbody>
</table>
APPENDIX H: LETTER TO STUDENTS
Dear Intensive English & Orientation Program (IEOP) Students:

As a graduate student in Curriculum Instruction Technology at Iowa State University (ISU), I am interested in studying 1) what students' moves are that request modification on the input they receive while using Active English CD-ROM computer program and confronting new linguistic material, 2) the effect of those interactional modifications on the listening comprehension, 3) types of interactional modifications that are useful for you. Results from this study should help Teaching English as a Second Language (TESOL) teachers to incorporate computers into listening/speaking class.

The study is scheduled to begin August 23 and by completed by September 17, 1993. For this study, you will be asked to attend computer lab three times. The lab is located at Lagomarcino Hall, ISU. Working on computer lessons will be a part of the assignment in the IEOP high beginning listening/speaking class. You will be given a pre-test and post-test before and after working on a computer lesson. You will also be given a survey after the study. Although your name will be included in survey and pre- & posttests, you will only be identified by an anonym for the data analysis and survey will be destroyed as soon as the study is completed.

Although you will complete the pre-test, post-test, survey and work on computer lessons as a part of your normal classroom assignment, you may request, at any time, that the information collected from you not be included in the analysis of the data. Should you have any questions, please do not hesitate to contact me (515)294-6840.

Sincerely,

Jing-Fong Jane Hsu
APPENDIX I: SAMPLE CODING SHEETS
### Lesson: Karen's Story

- \( \Pi \) = the computer does an initiating move (i.e., offering comprehension tools)
- \( \Pi \) = the computer does an initiating move (i.e., asking questions)
- \( \text{MR} \) = the student has modification request on input
- \( \text{MI} \) = the computer modifies input
- \( \text{RS} \) = the student responds the questions (i.e., choosing answers)
- \( F \) = the computer judges the answers
- \( R \) = repeat the previous sentence
- \( T \) = text reinforcement
- \( D \) = dictionary
- \* = the asterisk indicates an unlimited number of modification exchange.

### Transaction: Listening Event / Modification exchange

<table>
<thead>
<tr>
<th>Karen: Would you like to hear the story I wrote for my English class while we're waiting for dinner?</th>
<th>( \Pi )</th>
<th>( \text{MR} )</th>
<th>( \text{MI} )*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Da Wei: Sure, I'd love to.</td>
<td>( R )</td>
<td>( T )</td>
<td></td>
</tr>
</tbody>
</table>

Karen: OK, here's how it goes:

- Once upon a time, a teenage boy and his parents came to America from a faraway land.
- They were moving from their country to Los Angeles.
- They stayed the first night in a place called the Sea Gull Motel.
- The boy was very excited. He couldn't sleep that night.
- He listened to the sound of the ocean waves hitting the beach.
Karen:  Very early the next morning, before his parents were awake, he got up.

And he went outside for a walk in this strange new country.

He walked on a path beside a wide boulevard with palm tree along the sides.

After a few minutes, he came to a park with trees and grass everywhere.

In the middle of the park was a pond.

There were lots of ducks in it.

There were male ducks with brightly colored necks.

There were also smaller brown females.

Many of the brown ducks had baby ducks swimming behind them.

The baby ducks swimming behind their mothers reminded the boy of his family.

So he decided it was time to go back to his motel.

**Transaction: Teaching Exchange**

Q1: What did the boy see first?

Choose:  Palm tree
          Park
          Duck

Q2: The female ducks are smaller than the male ones

Choose:  True
          False

**Correct Answer:**

- Q1: Palm tree
- Q2: True
Transaction: Listening Event /Modification exchange

Karen: He start walking again on the path beside a wide boulevard with palm trees along the sides.

Only it wasn't the same boulevard.

He walked and he walked for a long time, but he didn't see the motel.

He knew he was lost.

He stopped at the nearest corner and looked down the side street.

He saw a thin, blonde woman walking her little black dog along the sidewalk.

She was wearing sunglasses and had a frown on her face.

He wanted to ask her for directions to the Sea Gull Motel.

But the boy didn't speak English very well.

'Excuse me', he said. 'Sea gull?'

The woman looked down at her animal.

'No,' she snapped, 'This is a dog.'

'Yes, a dog' he said. 'Where is the sea gull?'

'Oh, there are some sea gulls back there,' she replied.

And she pointed in the direction she'd come from.

'Thank you' said the boy, and he went in that direction.

'Hmph,' said the woman and went on her way.

The dog growled at the boy as they walked away.
Transaction: Teaching Exchange

Q1: The boy spoke English very well.
Choose: True  (Correct)

Q2: The woman had a blonde dog.
Choose: True  (Correct)

Q3: What was the woman walking with?
Choose: Duck  (Incorrect)

Transaction: Listening Event / Modification exchange

Karen: After three more blocks, he came to a young black-haired woman sitting at a bus stop reading a paper.

'Excuse me,' he said. 'Where is ... sea gull?'

'The sea gulls are mostly by the ocean,' she answered pleasantly.

'But you can also find them down the shops,' she continued.

'They like to get food from the customers at the sidewalk cafe.'

'The bus that stops here will take you there.'

Just then the bus arrived.

The boy got onto the bus after the woman and saw her put some money in a box.

The boy took all the coins from his pocket and showed them to the driver.
Karen: 'How much?' asked the boy.

The driver looked at the two dimes and three pennies.

'Not enough,' he answered. 'You'll have to get off.'

Sadly, the boy turned around and got off.

Da Wei: Wait a minute. Is this story about me?

Karen: Please don't interrupt. Just wait and see.

Now, where was I? Oh yes.

The bus drove away, and the boy started walking in the direction it had gone.

Q1: The boy didn't have enough money for the bus.

Choose: True  False

Q2: Where are most of the sea gulls?

Choose: Park  Pond  Goose  Bus  Ocean

Q3: The woman gave the boy some money.

Choose: True  False
Transaction: Listening Event / Modification exchange

Karen: The boy was getting hungrier and hungrier when he came to a block with some shops on it.
There was an old man selling fruits and vegetables.
The boy picked up the biggest yellow apple.
He reached into his pocket and pulled out all his coins.
'How much' he asked hopefully.
The man looked at the tired, hungry boy.
'This much,' he said and took the three pennies.
The boy took several quick bites from the apple.
'Sea gull?' he asked.
The man didn't understand his accent.
'See girl?' said the man.
'I like to see girls when I was your age, too.'
'No, no, no' said the boy. 'Sea gull. Sea Gull Mo... Motel'
'Oh, the Sea Gull Motel.' said the man.
'It's about six blocks west of here, down by the ocean.'
The boy said, 'Thank you.' and started running toward the ocean.
After a couple of minutes he saw the sign of the Sea Gull Motel.
His parents were waiting outside.
Later that day they moved to their new house.
And that weekend, I came to visit them, because the boy was my cousin.
Transaction: Listening Event / Modification exchange

Da Wei: Hey, wait a minute. This was about me!
  But that's not what happened when I came to Los Angeles.
  We stayed in a downtown hotel, and we went to Disneyland the next morning.
  I never got lost, and my English was never that bad.

Karen: OK, so I changed a few of the facts.
  It's not my fault your real life isn't very interesting.
  And stop complaining. After all, I read this to my English so now you're famous.

Da Wei: Oh, no!

Transaction: Teaching Exchange

Q1: Was this a true story?
Choose: Yes  No

Q2: Would you like to repeat this lesson
Choose: Yes  No
Lesson: The Ice Age

I = the computer does an initiating move (i.e., offering comprehension tools)
I² = the computer does an initiating move (i.e., asking questions)
MR = the student has modification request on input
MI = the computer modifies input
RS = the student responds to the questions (i.e., choosing answers)
F = the computer judges the answers
R = repeat the previous sentence
T = text reinforcement
D = dictionary
* = the asterisk indicates an unlimited number of modification exchange.

Transaction: Listening Event / Modification exchange

Mr. Simon: Good afternoon, everybody.

I hope you didn't freeze coming to school this morning.

It's really cold today.

We've heard a lot of new recently about how the earth's climate is changing.

Many scientists think the earth is getting warmer.

This is happening because of air pollution.

But the earth's climate has changed many times in the past.

Studying those changes may help us understand what's happening now.
Mr. Simon: Today I'm going to talk about a time when the earth was much colder.

Thousands of years ago great sheets of ice called glaciers covered much of the U.S.

We call that time the ice age.

Mr. Simon: During an ice age, ice sheets cover millions of square miles of land.

These white sheets reflect the sunlight back into space.

This helps to keep the temperature cold.

The sheets can be more than a mile thick.

Because so much water is caught in the ice, the sea level changes.
Mr. Simon: During the last ice age, the sea level was about 300 feet lower than today.

With the water low, there were land bridges.

That's how humans spread from Asia to North America and Australia.

Q1: Humans spread from Australia to Asia during the last ice age

Choose: True False

Q2: What continent wasn't connected to Asia by a land bridge?

Choose: Europe N. America Australia

Q3: If 0 is the sea level now, what was the sea level during the last ice age?

Choose: +300 ft 0 ft <300 ft

Mr. Simon: The last ice age ended just 10,000 years ago.

However, there have been three other ice ages in the past half million years.

Each of these has lasted thousands of years, but there have been warmer periods in between.
Mr. Simon: So we can see that there is a cycle to the ice ages.

At the start of an ice age, the ice sheets grow year after year, century after century.

Then after thousands of years they stop growing and slowly begin to melt.

QI: How many years ago did the last ice age end.

Choose:  
1.000
10,000
70,000
80,000

Mr. Simon: All ice ages begin in the same way—with glaciers.

Glaciers start in the mountains when the winter snow doesn't melt all the way in the summer.

After hundreds of years of this, the snow becomes very thick, and turns to ice.

When there is enough of the ice, it begins to move down the mountain.

Then it's a glacier.

If summer are cool, then year after year the glacier moves to the bottom of the mountain.

There, it joins other glaciers and forms one huge ice sheet.
In the northern half of the world, this sheet moves south pushing big rocks in front of it.

In the southern half of the world, glaciers move toward the north.

After a long time, the summer get warmer, and the glacier sheet begins to melt.

The rocks the ice sheet moved are left behind.

And the melted water makes hundreds of new lakes.

The ice age is over for now, but it will be back someday.

**Q2**: Which direction do glaciers move in North America?

Choose: East, West, South, North
APPENDIX J: DATA SHEETS OF ESL STUDENTS REQUESTING MODIFICATIONS
The number of different types of modifications L2 learners did in Karen's story lesson

<table>
<thead>
<tr>
<th>ID</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
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<th>Std</th>
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<td>4</td>
<td>3</td>
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$^1$Total sentences of listening modification  
$^2$Repetition type of listening modification  
$^3$Text reinforcement type of listening modification  
$^4$Dictionary type of listening modification  
$^5$Total sentences of teaching modification  
$^6$Repetition type of teaching modification  
$^7$Text reinforcement type of teaching modification  
$^8$Dictionary type of teaching modification  
$^9$Standard deviation
The number of different types of modifications ESL learners did in the Ice age lesson

| ID | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | Mean | Std^9 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|------|
| LMS^1 (37) | 9 | 9 | 11 | 5 | 11 | 14 | 12 | 14 | 1 | 6 | 5 | 16 | 21 | 28 | 28 | 12.6 | 7.9 |
| LMR^2 | 0 | 8 | 2 | 2 | 11 | 14 | 7 | 1 | 1 | 2 | 0 | 13 | 2 | 26 | 0 | 5.9 | 7.3 |
| LMT^3 | 9 | 2 | 11 | 4 | 3 | 12 | 4 | 14 | 0 | 4 | 5 | 15 | 19 | 26 | 28 | 10.4 | 8.6 |
| LMD^4 | 0 | 1 | 3 | 0 | 0 | 5 | 1 | 2 | 1 | 0 | 3 | 8 | 10 | 11 | 8 | 4.2 | 4.2 |
| TMS^5 (8) | 1 | 2 | 3 | 0 | 5 | 3 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 8 | 2 | 2.1 | 2.3 |
| TMR^6 | 1 | 2 | 0 | 0 | 5 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 6 | 0 | 1.6 | 2.2 |
| TMT^7 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 8 | 2 | 1.3 | 2.3 |
| TMD^8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.3 |

^1Total sentences of listening modification
^2Repetition type of listening modification
^3Text reinforcement type of listening modification
^4Dictionary type of listening modification
^5Total sentences of teaching modification
^6Repetition type of teaching modification
^7Text reinforcement type of teaching modification
^8Dictionary type of teaching modification
^9Standard deviation
APPENDIX K: SAMPLE SHEETS OF ESL STUDENTS REQUESTING MODIFICATIONS AND THEIR IMPROVED WORDS
Lesson: Karen's story

Student's name: Ho Sern Chui

<table>
<thead>
<tr>
<th>Wrong words in Pretest</th>
<th>Words in Posttest</th>
<th>Improvement</th>
<th>Modifications</th>
</tr>
</thead>
<tbody>
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<td>+</td>
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<tr>
<td>option</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>palm</td>
<td>+</td>
<td>+</td>
<td>TO</td>
</tr>
<tr>
<td>fun</td>
<td>palm</td>
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<td>-</td>
</tr>
<tr>
<td>pack</td>
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<td>-</td>
<td>T</td>
</tr>
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<td>fr</td>
<td>-</td>
<td>T C</td>
</tr>
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<td>+</td>
<td>T</td>
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<td>complain</td>
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<td>se</td>
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<td>T</td>
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</tr>
<tr>
<td>address</td>
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</table>

Listening Mod. Sentences (81) 32
repeat 5
text reinforcement 30
dictionary 4

Listening Mod. Sentences (9) 3
repeat 2
text reinforcement 1
dictionary 0

Score: 17/12 (94%)
Level: 9
Lesson: The Ice Age

Fill words (33)  Target words (23)

Pretest score:  
Posttest score:

<table>
<thead>
<tr>
<th>Wrong words in Pretest</th>
<th>Words in Posttest</th>
<th>Improvement</th>
<th>Modifications</th>
</tr>
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<td>+</td>
<td>+ T</td>
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<tr>
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<td>huge</td>
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<td>T</td>
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</table>

Listening Mod.

Sentences (38) 9
- repeat 1
- text reinforcement 0
- dictionary 0

Sentences (8) 1
- repeat 1
- text reinforcement 0
- dictionary 0

Phi: 0.666