Computer-assisted language learning:

Do ESL students explore an exploratory environment?

by

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CHAPTER I. INTRODUCTION

Introduction

Most universities or colleges have a common requirement for foreign students: every incoming student who is not from a native English-speaking country and has learned English as a Second Language (ESL) must take the English Placement Test. This test is used to examine whether the student's English ability meets the basic requirements in listening, reading, and writing. Students whose performance on this placement examination is deficient will enroll in special English classes (as determined by the test results). The objective of these classes is to improve students' English ability. However, many ESL students are simply taking these courses to pass the English requirement and lack intrinsic motivation. Intrinsic motivation is people seem to engage in the activities for their own sake and not because they lead to an extrinsic reward (Deci, 1975).

This problem has also been observed at Iowa State University (ISU). The researcher informally surveyed some students' attitude toward taking these English classes, and found that many students express a lack of intrinsic motivation. Also, Dr. Chapelle who teaches ESL class at ISU indicates that the majority of students are instrumentally motivated. Instrumental motivation refers to motivation to acquire a language as means for attaining instrumental

goals: furthering a career, reading technical material, translation, and so forth (Brown, 1987). Some research reported that ESL students with higher instrumental motivation scored higher in tests of English proficiency (Yasmeen Lukmani, 1972). Although students are instrumentally motivated, one of their major problems is that 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.

Countless studies and experiments in human learning have shown that motivation is a key to learning and have claimed that a learner will be successful with the proper motivation (Gardner, 1985). However, Brown (1987) mentioned that these claims gloss over a detailed understanding of exactly what motivation is and what the subcomponents of motivation are and how we create, foster, and maintain motivation. Human beings universally have needs or drives that are more or less innate, yet their intensity is environmentally conditioned. Ausubel (1968) indicates that six desires or needs of human organisms commonly undergird the construct of motivation: (1) the need for exploration; (2) the need for manipulation; (3) the need for activity; (4) the need for stimulation; (5) the need for knowledge; (6) the need for ego enhancement.

For ESL students who lack intrinsic motivation, how can a teacher provide extrinsic motivation to learn English by appealing to the two levels of motivation: the need for manipulation and

exploration? One way of doing this, the teacher can use computers to assist ESL students to learn English by appealing to the above two needs.

Unlike some earlier instructional tools, the computer has three special operations which make it a promising educational tool: (1) it can give immediate feedback on students' responses and records the students' progress to keep the feedback up-to-date; (2) it can provide each student with the opportunity to respond continuously during the session to as many questions as possible; and (3) it can individualize the students' instructional levels and pace their instruction at their own achievement level (Douglas, 1987).

The most traditional forms of computer-aided learning are "drill and practice" and "tutorial" programs in which students mechanically work through the problems set by the computer. To contrast with these traditional forms, Papert (1980) promoted a particular computer learning environment - a microworld. A microworld is a computerized learning environment in which a learner can experiment with ideas by manipulating and exploring elements of a computer model in order to discover its structure or refine his/her thinking skill. He created the LOGO language for children to explore "Turtle geometry".

The turtle provides an ideal bridge (or transitional objects) between the abstract world of mathematics and the concrete world

of reality. By writing instructions to control the turtle, children are required to use mathematics in a context where they can see the immediate point of what they are doing. They are thus, according to Papert, likely to grow up without the fear and suspicion of mathematics that characterizes so many of us today. Stager (1986) stated that the Turtle geometry provides a rich "mathland" in which measurement, turning, movement, logic, and many other mathematically powerful idea can be explored. Logo encourages the open-ended discovery-learning and creates an environment in which children quite naturally use geometry to solve problems (for the most part without realizing its geometry).

Based on Papert's concept of microworld, Higgins & Johns (1984) promoted a CALL exploratory program. This program can offer an environment in which the learner can explore the language, play with it, try it out, or manipulate it to see how things go together. One of these programs was written by Tim Johns and deals with the rules of English morphology such as S-ENDING.

The S-ENDING program offers to accept any "English" word, whether real or invented, and to add an -s to form the third person of a verb or the plural of a noun which is typed in by learners at the keyboard. A group of students have five to ten minutes to test out as many words as they want on the program, keeping a record of its "hits" and "misses". It has been suggested that a useful way of

exploiting this program is to allow groups of learners to try out their hypotheses at the keyboard, each group having a dictionary and grammar book that can be used to check the program's responses, then to discuss their findings around the morphological rules discovered by learners while using the program.

The traditional CALL is the "wrong-try-again" model which usually led the learner by the nose through the lesson, and the computer is a sort of taskmaster or quizmaster (Underwood, 1984). CALL exploratory programs, in contrast, allow the individual student to decide how the lesson should proceed, and the computer is a role of pedagogue, i.e., it is built to answer questions, not to ask them (Higgins, 1988). Underwood (1984) also indicated that the traditional CALL type certainly does impoverish acquisition, but the CALL exploratory program can provides elements of natural language processing and focus on meaning rather than form.

As computers have become more widely available in schools, the debate how to use them effectively has intensified. Wyatt (1988) indicated that with CALL, as in other areas of education, there has been a distinct movement towards using computers for holistic, enrichment activities and away from tutorial and drill applications. Yet it is the area of tutorial and drill that the majority of basic and applied computer education research has been performed. Although this trend - the movement towards the use of collaborative and facilitative techniques - appears to have considerable promise, there

are few research findings to support the effectiveness of such an approach.

Statement of the Problem

Despite the intuitive appeal of using the computer as an exploratory environment, there is no evidence for the effectiveness of this approach with second language learners. The first step in assessing the potential effectiveness of exploratory CALL is to document whether or not students actually explore when they are offered an exploratory environment.

Purpose of the Study

In this study, the ESL students will use the ESL Grammar program. This program provides a learning environment in which the student can manipulate and explore some English grammar concepts and sentence building. The purposes of the study are:

1. To assess the student's attitude toward the computer, learning English and CALL before and after s/he uses the ESL Grammar program.

2. To examine the amount that the student uses exploration strategies on the exercise as a whole and on grammatical forms in particular.

3. To describe any relationship between the students' attitudes toward (computer, learning English, CALL, and ESL Grammar program) and their exploration strategy.

Research Questions

Question 1: What entry attitudes toward the computer, learning English, and CALL do students have before using the ESL Grammar program?

Question 2: What attitudes toward the computer, learning English, and CALL do students have after using the ESL Grammar program?

Question 3: What is the students' attitudes toward the ESL Grammar program?

Question 4: Does the student use the ESL Grammar program as an environment which allows manipulation and exploration of the sentence building? Will the student

try more sentences after s/he has finished 10 correct sentences from the assignment? If so, how many?

Question 5: Does the student use the ESL Grammar program as an environment which allows manipulation and exploration of the grammar concepts? Will the student try different grammatical forms after s/he has found the correct one? If so, how many?

Question 6: Is there a relationship between the student's attitudes (computer anxiety, learning English, CALL, and ESL Grammar program) and their exploration strategy?

Limitations of the Study

The study was conducted in view of the following limitations:

1. The subjects in the study were not chosen randomly.

2. The subjects were taught by the researcher, who is a non-native speaker of English.

3. The experiment was performed in one school using three classes. Thus the generalizability of the study is limited to classes with the same characteristics as those in the study.

Definitions

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.

Attitude - a person's evaluation of, liking of, or emotional response to some objects or situations.

Microworld - A computerized learning environment in which interesting things happen and in which learners can manipulate and explore important ideas or refine their thinking skills (Thompson & Chen Wang, 1988).

CALL exploratory program - the aim of this program is the development of strategies for use inside and outside the classroom, for the exploration and 'puzzling out' of the target language and its underlying regularities (Higgins & Johns, 1984).

CHAPTER II. REVIEW OF THE LITERATURE

The preceding chapter stated that the main purposes of this study were to investigate the student's attitude toward a CALL exploratory program and whether he/she actually explores the exploratory environment. This chapter will cite literature and research pertinent to this study in four related major areas.

(1) The Features of CALL

(2) CALL Exploratory Programs - Exploratory Environments

(3) Second Language Acquisition Theory

(4) Research and CALL Exploratory Programs

The first section will define the features of CALL and describe the research on the relationship between CALL and students' attitudes. The CALL exploratory program section will define exploratory environment in general and the CALL exploratory program. The third section of the chapter describes the recent linguistic theory related to exploratory environment. The remaining section describes the research done on the CALL exploratory program. Finally, a summary of the research is presented.

The Features of CALL

The primary defect of the audio lab is that the sequence of items on a given tape is entirely fixed. Because of its nature as a linear medium, standard tape equipment cannot respond in any way to the student's answer, i.e., it is incapable of feedback (Wyatt, 1984). Since the computer can provide immediate feedback, there is growing interest in investigating the use of the computer as a language learning aid. CALL is commonly described as a means for "presenting, reinforcing and testing" particular language items: the learner is presented with a rule plus examples, and then answers a series of questions which test his/her knowledge of the rule, the computer gives appropriate feedback and awards a mark, which may be stored for later inspection by the teacher.

Jones and Fortescue (1987) distinguished "five roles for the computer in language learning: the computer as quizmaster, the computer as discovery device, the computer as writing tool, the computer as informant, and the computer as stimulus." The computer as quizmaster is the traditional role in CALL, which we have already mentioned. The computer assumes some of the roles traditionally associated with the teacher, particularly that of controller and source of knowledge. The computer will always decide what the student is going to study and will control her/his movements through it. The role of the student is passive. S/he

receives information, responses, and is then given feedback. The majority of programs are question-and-answer type. These programs usually deal with grammar, vocabulary, reading comprehension and listening comprehension.

The computer as a discovery device uses the computer as a medium for exploring language. This kind of program can offer an environment for students to test their hypotheses about an aspect of the target language (Higgins and Johns, 1984). For example, the computer is provided with a rule or rules, which the learner attempts to discover by trying examples of his own.

The computer as a writing tool involves using a word-processing program that transforms the computer into a sophisticated and flexible writing aid. This program can do much to improve learners' writing skills (Feldman, 1984) and their attitude toward writing (Pollitt, 1984).

The computer as informant is a role that takes advantage of the computer's ability to store large amounts of information on disks. Using 'database' programs, learners can access information of any suitable kind: vocabulary, grammar, information about a writing or discussion.

The computer as stimulus provides learners with something to talk about (in discussion, simulation or role-play) and to write about. Two kinds of programs for this purpose are simulation and

adventures. The adventure games (Culley, Mulford, and Mulbury-Steen, 1986) present a challenge that can be solved using the linguistic and strategic moves that the student devises.

Since the advantage of computers is their interactivity, much research has been conducted to investigate the relationship between CALL and students' attitudes through use of attitude questionnaires.

Contradictory findings exist across various studies. A study of students using CALL lessons in written French at the University of Calgary (Brebner, Johnson, and Mydlarski, 1984). They found that most students had postive attitudes toward CALL. Another study that investigated the possibilities of using word processors and text-analysis software with ESL students was conducted by Reid, Lindstorm, McCaffrey, and Larson (1983). They reported that "most ESL students thought that access to the word processors had improved their understanding of writing and revising academic prose." However, Saracho (1982) investigated the effect of a computer-assisted instruction (CAI) program on attitudes toward instruction of Spanish-speaking migrant children and reported that students who were in the non-CAI program had more favorable attitudes toward CAI than did students in the CAI program.

Although these observations indicate something about overall attitudes, Chapelle and Jamieson (1986) indicated that "these studies share the problems of studies of effectiveness: they attempt

to summarize the attitudes of all students toward the use of CALL in general." They suggested that a more useful direction would be to note attitude toward specific features of programs. Therefore, in the study we defined a specific ESL Grammar program which has some of features of CALL exploratory program (i.e.; it provides an exploratory environment for learners to explore the target language).

The CALL Exploratory Program - Exploratory Environment

The exploratory environment is a dynamic learning environment and allows the learner to manipulate and explore the subject matter actively and freely to discover underlying regularities. This particular type of learning environment, called a microworld, is promoted by Seymour Papert (1980).

Papert (1980) stated that "the best learning takes place when the learner takes charge." He also believed that the child's intellectual growth must be rooted in his experience (Papert, 1980). Papert describes this learning as "active and self-directed."

Furthermore, Papert (1980) suggested that the child should program the computer, rather than vice versa. What he was objecting to, of course, was precisely the "wrong-try-again" type of computer-assisted instruction that usually led the child by the nose through the lesson. Instead, he argues, children should guide themselves through the material. In fact, with LOGO, the language

he created for children to explore "turtle geometry," there is no predetermined material of any sort, but rather an environment in which discoveries can be made. Logo discoveries include information about angles, distance, shapes, etc.

Papert (1980) also indicated that Logo teaches children an approach to planning and problem-solving that will generalize to other areas of learning. Some empirical research on the effects of LOGO has been conducted. Gorman and Bourne (1983) studied fifteen third grade students who learned LOGO during the school year and reported that children who received one hour per week training on the computer in programming made significantly fewer errors in a "rule-learning" test than did the group of children who received one-half hour per week training. Another study that measures the "rule-learning" or problem solving in young children was conducted by Degelman et al. (1986). He reported that the children receiving the LOGO experience had a significantly higher proportion of correct responses on two problem solving tasks than did children in the control group.

In conjunction with the idea of a microworld, Underwood (1984) promoted a CALL exploratory program that provides an environment for learners to explore the target language, play with it, try it out, or manipulate it to see how things go together. He stated that the majority of CALL programs are the "wrong-try-again" model (computer as quizmaster) and indicated that there is a crucial flaw in

the computer's traditional role of quizmaster. The computer tries to simulate what the teacher does in the classroom: teacher (computer)-controlled, evaluative, and highly structured.

Some researchers suggest that the real advantage of the computer in language learning is that it challenges students to use their brains, to explore language, to play with it, to find out how it works and how it does not instead of telling students 'you are right or wrong' (Higgins and Johns, 1984). They also indicated that the aim of the CALL exploratory program is not the establishment of language habits, but the development of strategies for use inside and outside the classroom, for the exploration and 'puzzling out' of the target language and its underlying regularities.

Language teachers (perhaps as students) believe that learning a language requires a strong sense of play (Underwood, 1984). Therefore, he pointed out that the CALL exploratory program should offer the student an environment in which to play with language or manipulate it to see how things go together.

The ESL Grammar program which will be used in this study has some of the features of CALL exploratory program, i.e., it offers an exploratory environment for students to manipulate the construction of sentences. The details of this program will be described in a later section.

Second Language Acquisition Theory

Over the past two decades, second language learning theory has shifted the emphasis in language teaching from form to function and from product to process, with a corresponding shift in perceptions of students from their being learners (through teaching) to acquirers (through discovery) of language. Krashen's input hypothesis has been a major influence, stating (1982) that with enough concentration on communication, grammar will take care of itself (i.e., will be acquired in natural order by an assimilation of linguistic data processed from comprehensible input). Consequently, language teachers have been looking more to sources of language in the environment and less to structured materials specifically prepared for language learners.

According to the input hypothesis, classroom activities should be directed more toward the unconscious acquisition of language than the conscious learning of rules. Acquisition will take place if we provide our students with sufficient quantities of comprehensible input, language they can understand and which is at their level or just a bit beyond. This material should not be grammatically sequenced in any precise way. Class time should not be used for either grammatical explanation or drilling, and there should be no correction of errors except when the focus is on form. Teachers should provide a relaxed and supportive atmosphere for the students.

Resulting from the above input hypothesis, there has been a move toward learner-centered educational environments where the teacher becomes more a facilitator than a purveyor of knowledge disseminated from the head of the class. Thus language learning is thought to best be accomplished when language learning environments are non-threatening situations which make students feel at ease while giving them a responsible role in their own learning. This linguistic environment is similar to the exploratory environment in the CALL exploratory program.

Furthermore, MacLaughlin (1987) indicated that "according to Cognitive theory, second-language learning, like any other complex cognitive skill, involves the gradual integration of subskills as controlled processes initially predominate and then become automatic." Applying this automaticity to second-language acquistion, Tarone (1982) reported that the most systematic interlanguage style and the style least subject to interference when the data gathered in informal settings. She maintained that when the learner directs much attention to speech, the performance is likely to be interfered with - just like driveing or typing are likely to be interfered with, when these automatic skills are given too much attention. When skills are not completely automatic, performance can be improved by given the learner more time to apply controlled process.

MacLaughlin (1987) indicated that repeated performance of the components of the task through controlled processing lead to the availability of automatized routines. CALL exploratory programs also provide an computerized environment in which the learners can manipulate the components of target laguage for a long time in order to achieve automacticity with these components.

Research and CALL Exploratory Program

In CALL, as in other areas of education, there has been a distinct movement toward using computers for holistic, enrichment activities and away from tutorial and drill applications. Yet, it is in the area of tutorial and drill that the majority of basic and applied computer education research has been performed. Wyatt (1988) indicated that the newer, more holistic approaches appear to have considerable promise. However, in the absence of hard evidence for their effectiveness, it seems important to sound a note of caution.

Although, in CALL, there has been a strong movement towards the use of collaborative and facilitative courseware, and away from the greater part of the established CALL research base, there is little research on CALL exploratory programs. Therefore, the purposes of this study are to examine the student's attitude toward CALL

exploratory programs and discover if s/he explores the exploratory environment.

Summary and Approach of This Study

In this chapter, four related areas of pertinent research for this study were examined. First, the features of CALL are defined as (a) the computer as quizmaster, (b) the computer as discovery, (c) the computer as writing tool, (d) the computer as informant, and (e) the computer as stimulus. The computer as quizmaster is the traditional picture of CALL. Although most research reported a favorable attitude toward CALL, these studies share the problems of studies of effectiveness: they attempt to summarize the attitudes of all students toward the use of CALL in general. Therefore, in this study, we use a ESL WRITING program which has some of specific features of CALL exploratory program and examine the exploratory features.

In the second section, the exploratory environment and CALL exploratory program are defined. The concept of exploratory environment is from Papert's microworld comcept. According to Papert (1980), a microworld is a computerized learning environment and allows learners to manipulate and explore important ideas or refine their thinking skills. So, the exploratory environment is dynamic learning environment and allows the learners to manipulate

and explore the subject matter actively and freely, then discover underlying regularities. The CALL exploratory program is the development of strategies for use inside and out of the classroom, for the exploration and 'puzzling out' of the target language and its underlying regularities.

In the third section, linguistic theory was discussed. The theory has shifted the emphasis in language teaching from form to function and from product to process, with a corresponding shift in perceptions of students from their being learners (through teaching) to acquirers (through discovery) of language. The non-threatening and supportive environment in Krashen's input hypothesis is similar to the exploratory environment in the CALL exploratory program.

Finally, although the newer, more holistic approaches appear to have considerable promise, there is the absence of hard evidence for their effectiveness.

In this study, students will use the ESL Grammar program which has some of features of CALL exploratory program. This program provides a learning environment which allows students to explore and manipulate the language and build English sentences. Students' attitudes toward this program will be assessed, and the amount that students use exploration strategies on the exercise will be examined.

CHAPTER III. METHODOLOGY

This chapter will begin with a description of the ESL Grammar program used in this study. Next, the description of methodology will include sections on subjects, instruments, research design, procedures, and analysis of the data. The final section of the chapter provides a summary of the research methods.

Description of the ESL Grammar Program

The program used in this study was ESL Grammar which was produced by Dr. Carol Chapelle and Dr. Pete Boysen (1987) at ISU for ESL students. Seven grammar lessons were produced in this program, each containing the sentence-building exercise to explain one aspect of grammar and to allow students to practice it. An overview of the lesson topics is in Appendix A.

The exercise requires the student to construct sentences that are meaningful, true, and grammatical by choosing an element from each of three types of phrases provided. The program is written so that students are forced to select the phrases in the proper sequence to form a sentence and as each is selected, it appears on the screen. In all lessons used in the research, students must then edit one of the three parts of the sentence to make it grammatical.

For example, Lesson 5 gives the students practice forming sentences by using the present and past tense of verbs. First, students see three groups of phrases on the video screen: time phrases, subjects, and verb and complements as illustrated in Figure 1.

------------------------------------TIME PHRASES --

Currently,
  Now that the industry is recovering,
->During the 1970s,
  In the past,

When the industry was in trouble,
At the present time,
Before the industry began to recover,

------------------------------------SUBJECTS ---

the U.S. auto industry   American consumers   the U.S. labor force

------------------------------- VERBS AND COMPLEMENTS --------------------------------

use low cost materials
buy many small Japanese cars
import components form overseas
pay lower wages than in the past
produce low quality cars

have multinational interests
demand high wages
manufacture many small cars
purchase small American cars
cooperate with management

Move the arrow and press RETURN to select a phrase from each section. Then, edit the verb to make it correct.

PF1 Words   PF2 Facts   PF3 Grammar   PF4 Exit

Figure 1. Screen Display from Phrases Page of Lesson 5

After the student has combined these three elements creatively by choosing a phrase from each of the three groups, s/he edits the verb to make the tense correct. Then the computer judges for both form and meaning and returns messages about the logic, truth, and grammatical correctness of the student's sentence (some typical

errors and their corresponding messages are in Table 1). Since the computer does not provide the correct answer and just gives the explanation of error, students can edit again for the wrong answer by pressing the "return" key or can choose to make a new sentence by pressing the PF4 key.

Table 1. Example Sentences and Computer's Judging Messages

Student's Sentence	Computer's Message
MEANING ERRORS	
Currently, American consumers cooperate with manager.	The meaning doesn't make sense because **American consumers** can't **cooperate with management**.
During the 1970s, the U. S. auto industry manufactured many small cars.	That's not true because **during the 1970s** means PAST and that events is happening now.
VERB ERRORS	
When the industry was in trouble, the U.S. labor force demand high wages. .	That's the present tense. You must use the **past tense** for this event.

On the same screen, there are three special keys which offer help with the meaning of the words, the facts about the situation, and the grammar, respectively. Students can use these special keys to help them solve problems. For example, if the student does not

understand a word used in the exercise, s/he can press the PF1 key to find the definition. If the student needs some information about the lesson topic, the American automobile industry, s/he can get information by pressing the PF2 key. If the student needs help with grammar rules, he/she can press the PF3 key. After the student has made numerous correct sentences, he/she can exit from the lesson and choose another unit of grammar. Otherwise, more items of this exercise can be chosen for practice. The student can exit the program at any time.

This program provides students with immediate information about the meaning and grammaticality of the sentences they construct, thereby allowing them to experiment with a large number of sentences in a short period of time to see which ones the program accepts and rejects. The student can explore the learning environment by manipulating the phrases in these sentences and some of their grammatical properties.

Subjects

The subjects in this study consisted of a heterogeneous group of non-native English-speaking students who failed the writing section of an English Placement Test in the writing section and were therefore required to enroll in ESL writing classes: English100B (intermediate-level grammar review & composition), English100C

(advanced-level composition for undergraduates), or English100D (advanced-level composition for graduates) during the summer semester 1989 at ISU.

The subjects consisted of 34 students from 8 different countries, including China, Egypt, Hong Kong, Japan, Korea, Taiwan. There were 20 males and 14 female students with a variety of majors. Approximately forty-one percent of the students were working for a bachelor's degree, thirty-five percent for a master's degree, twenty-one percent for a Ph.D., and three percent were non-degree students.

According to the data from the pre-questionnaire (see Appendix B) about students' computer experience, thirty percent of the students had never used a computer. The majority of the students list their computer experience as observation/computer games or word processing/data entry. The data suggest that most of the students did not have much computer experience.

Instruments

The questionnaire was selected as the type of instrument used in this study. The pre- and post-questionnaire are included in Appendix B & C.

Pre-Questionnaire

The pre-questionnaire consisted of three parts. The first part was designed to identify gender, academic major, nationality, and educational status.

The second part of the questionnaire contained 5 closed response items. These items were used to measure the subjects' computer experience.

The final part of the questionnaire contained three subsections designed to assess 1) subject's attitude toward the use of computers, 2) subject's attitude toward learning English, and 3) subject's attitude toward CALL. The subjects were to answer the items on a Likert-type scale with a range from: 5=strongly agree, 4=agree, 3= undecided, 2=disagree, and 1=strongly disagree. A total of 22 statements were constructed and then randomly ordered. The following is a list of the subsections with the questionnaire items that addressed these subsections.

Subsection	Questionnaire items
Computer Anxiety	1, 3, 5, 7, 9, 11, 13, 16, 18.
English	2, 4, 6, 8, 10, 12, 15, 17, 20, 22.
CALL	14, 19, 21.

The items in the computer section were selected from the instrument developed by Lin (1985). Excluding those items with low discrimination ability and items which were highly correlated to each other, 4 positive items and 5 negative items were selected from Part II (feelings or reactions toward the learning or use of computers) and Part III (attitude toward computers) of Lin's instrument.

The items in the English section were adapted from the instrument, Attitudes toward Learning French, developed by Gardner (1985). The instrument was originally designed to measure subject's attitudes toward learning French, and the researcher changed the language objects (French) to English. There were 5 positively worded items and 5 negatively worded items in that instrument and all of these were adapted by the researcher for this study.

The items in the CALL section were designed by the researcher. There were 3 positively worded items to measure subject's feeling about using computer assisted language learning.

To estimate the reliability of each subsection of Part III, the Cronbach Coefficient Alpha Formula was used. The resulting reliability coefficients were .83 for computer anxiety, .92 for English, and .67 for CALL (see Table 2). The low reliability on the CALL section may be explained by the fact that the students had little experience and therefore may not have known how to respond.

Post-Questionnaire

The post-questionnaire also consisted of three parts. Part I: subject's basic information was same as the Part I of the pre-questionnaire. Part II: subject's attitude toward computer/learning English/CALL was the same as the Part III of the pre-questionnaire. The final part of this questionnaire asked about the subject's attitude toward using ESL Grammar program. The sixteen-item statements in this part also used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree.

The items in the ESL Grammar section were selected from Chen Wang's (1986) and Mizuno's (1989) instruments. Chen Wang's instrument was designed to measure subject's opinions about using Logo program, computer, and learning mathematics. Mizuno's instrument was designed to measure subject's feeling about ESL Grammar/Paragraph software. Items were selected that measured the following attributes: perceived usefulness, relevance, perceived level of interest, and clarity/easy for use. There were 12 positive items and 4 negative items selected to measure the subject's attitude toward using the ESL Grammar program.

To estimate the reliability of Part II and Part III, the Cronbach Coefficient Alpha Formula was used. The resulting reliability coefficient in each subsection of Part II was .86 for computer anxiety, .88 for English, and .84 for CALL. The value of .84 for CALL in post-

survey was much higher than the value of .67 in pre-survey. Also, the reliability coefficient in Part III was .93 for ESL (see Table 2).

Table 2. Instrument Reliability Coefficients

Items	Pre-Survey	Post-Survey
Computer	.83	.86
English	.92	.88
CALL	.67	.84
ESL Grammar program		.93

Research Design

In the study, the attitudes of advanced ESL students toward computers, learning English, and CALL after participating in the ESL Grammar program experience were evaluated. Each of the thirty-four subjects completed one questionnaire both before and after using this software.

Due to the lack of previous research done in the area of CALL exploratory program, a quasi-experimental design was selected for this exploratory study. According to Campbell and Cook (1979), this type of study is called the one group pretest-posttest design. It can be diagrammed below:

$$O_1 \quad X \quad O_2$$
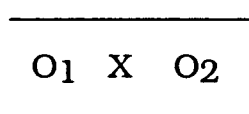
Pre-questionnaire observations (O_1) were recorded on the ESL students, who later used the ESL Grammar program (X), and after completed the post-questionnaire (O_2).

Procedure

The Iowa State University Committee on the use of Human Subjects in Research reviewed and approved this study. A copy of the approved human subjects form can be found in Appendix D.

The study was conducted over a period of four weeks in the summer semester of 1989 at ISU. One class of English 100B (intermediate-level grammar review and composition), 100C (advanced-level composition for undergraduates) and 100D (advanced-level composition for graduates) was selected for this experiment.

A letter which explained the purpose of and the procedure for this study was sent to each instructor. A copy of this letter is included in Appendix E. Each 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 the students to attend this lab.

The researcher explained to the students that they would be involved in a project designed to evaluate the ESL Grammar program. The subjects were assured that the questionnaires they completed would in no way effect their grade in the class. But completion of assignments would affect their grade.

On the first lab, after the administration of the pre-questionnaire which examined the students' computer experience, their computer anxiety, their feeling about learning English and CALL, the students were given a short orientation regarding the computer and the software: ESL Grammar and Paragraphs. In order to control teacher influence variables, the researcher presented all three orientation sessions. Then the students did a computer exercise using in this software. The schedule of assigned exercise for each lab was handed into the students (see Appendix F).

To assure that every student did something, students were required to produce 10 good correct sentences by using the Grammar program for each lab and asked to hand them in to the researcher who acted as the teaching assistant. They also wrote another exercise by using the Paragraphs software for out of computer lab, but data from this exercise were not included in this research.

During all the computer labs, students were supervised by the researcher. The only assistance given to students during use of the program consisted of instructions on use of the program, otherwise they were left to experience the program on their own. A ten-page orientation handout (see Appendix G) was also given to students for reference.

On the final day of the lab, a post-questionnaire was administrated to the students after they had finished their assignment. This questionnaire collected opinions and feeling of students about the ESL Grammar program, the computer, and the computer and learning English.

In addition to the questionnaire data, as each student interacted with the VAX computer, every move was recorded and stored in a separate file for each student. The resulting data document choices of phrases, edited forms of words or phrases, messages returned by the computer. Based on these data, the following information was obtained: the number of correct sentences each student constructed in each lesson, and the number of sentences in which each student tried different grammatical forms after s/he found the correct one. These data were used as evidence for students' exploratory strategy.

Analysis of Data

In order to answer the first and second research questions posed in this study, the students' attitude toward the computer, learning English and CALL, data from both pre- and post-questionnaires were analyzed using descriptive statistics (frequency distribution).

In order to answer the third research question posed in this study, the students' attitude toward the ESL Grammar program, data from post-questionnaire were analyzed using descriptive statistics (frequency distribution).

In order to answer the fourth and fifth research questions posed in this study, the amount of exploration that students do on the exercise as a whole and on grammatical forms in particular, the data obtained from the VAX computer were analyzed by using descriptive statistics (frequency distribution).

The data from the VAX computer were analyzed in two ways. One was the number of sentences each student tried after s/he had finished 10 correct required sentences. The other was the number of sentences each student tried alternative grammatical forms after s/he had found the correct one (as illustrated in Figure 2). The example illustrated in Figure 2 was selected from the data of Mizuno's research (1989). The following rules were followed by quantify the amount of correct sentences:

1. If the student did the same unit of exercise at different times, the total number of correct sentences from all times was used.

2. If a correct sentence was immediately followed by an identical sentence, it was a repeat and was not counted.

3. If a correct sentence was repeated, but not immediately following the same sentence, it was counted.

NEW SENTENCE TEXT

Now that the Industry is recovering, American consumers purchase small American cars.

EDIT BEGIN

purchase small American cars.
purchase small American cars.

EDIT END

MESSAGE

That's the correct verb form

EDIT BEGIN

purchase small American cars.
purchasing small American cars.

MESSAGE

You can not use the -ing form for the first auxiliary.

Figure 2: An Example of Students Trying
Alternative Grammatical Forms after
s/he Found the Correct One

In order to answer the sixth research question probing a relationship between the students' attitudes toward (computer, learning English, CALL, ESL) and their exploring strategy, data from the post-questionnaire and the VAX computer were analyzed by using Pearson product-moment correlations. The level of significance chosen for this study was .05. The above relationships were reported for the whole group (n=34) as well as for each of the 3 classes.

Summary

In summary, this chapter provided a description of the ESL Grammar Program used in this study, the subjects, instruments, experimental design, the procedures and data analysis techniques. The ESL Grammar program used in this study was a series of grammar development lessons for ESL students. This program provided a learner-controlled environment in which students were able to manipulate the construction of sentences and some of their grammatical properties.

The subjects in this study were thirty four ESL students who enrolled in the ESL writing classes during the summer semester 1989 at ISU. The study used a one group pretest-posttest design. The subjects took one questionnaire at the beginning and at the end of using the ESL Grammar program. Each subject participated in

this study for a total of four weeks (one hour per week). Each week, the students attended the computer lab and used the ESL Grammar program to do required assignment.

Data obtained from two questionnaires and the VAX computer were then analyzed to answer the research questions.

CHAPTER IV. RESULTS

In this chapter, the findings of this study will be presented as they relate to the research questions. In addition, the auxiliary findings, including differences in students' attitudes toward (computer, learning English, and CALL) before and after using the ESL Grammar program are presented. In the final section of the chapter, there is a summary of the study results.

The findings are based on survey and VAX computer data obtained from 34 students. Each subject completed two questionnaires, one before and one after using the ESL Grammar program. As each student interacted with the VAX computer, every interaction was recorded and stored as a separate file for each student. The computer program used to analyze the data was the Statistical Package for the Social Science (SPSSX). Descriptive statistics, Pearson Correlation, and the t-tests were used to evaluate the research questions.

Research Question 1

Research question 1 was stated as follows: What entry attitudes toward the computer, learning English and CALL do students have before using the ESL Grammar program?

Attitude Toward Computers

There were a total of 9 items that asked students' attitude toward computers. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were presented as both positively and negatively worded statements such as "computers are beneficial aids to a modern society," and "when I hear the word 'computer', I have a feeling of dislike." In the data analysis, the researcher reversed the scale value of negative items. Thus, for these data, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the computer scale corresponded to a more positive attitude toward computers. As shown in Table 3, the score range was from 2.55 to 4.66, and the mean score was 3.90. Since the mean score 3.90 was close to 4 = agree, it indicated students had positive attitudes toward computers.

Attitude Toward Learning English

There were a total of 10 items that asked students about their attitudes toward learning English. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were presented as both positively and negatively worded statements such as "I really enjoy learning English," and "I think that learning English is dull." In the data analysis, the researcher reversed the scale value of negative items. Thus, for these data, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the learning English scale corresponding to a more positive attitude toward learning English. As shown in Table 3, the score range was from 2.20 to 5.00, and the mean score was 3.83 which indicated a positive attitude toward learning English.

Attitude Toward CALL

There were a total of 3 items that asked students about their attitudes toward CALL. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items presented were positively worded statements such as "I like the idea of using the computer for learning English." In the data analysis, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the CALL scale corresponding to a more

positive attitude toward CALL. As shown in Table 3, the score range was from 2.66 to 5.00, and the mean score was 3.75 which indicated a positive attitude toward CALL.

Table 3. Responses to Items in Pre-Questionnaire

Items	N	Mean	Std Dev
Attitude toward Computer	34	3.90	0.54
Attitude toward learning English	33[1]	3.83	0.72
Attitude toward CALL	34	3.75	0.58

[1]One subject did not complete the English section of the questionnaire, so the data from this subject were omitted.

Research Question 2

Research question 2 was stated as follows: What attitudes toward the computer, learning English, and CALL do students have after using the ESL Grammar program?

Attitude Toward Computers

There were a total of 9 items that asked students' attitude toward the use of computers. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items presented were positively and negatively worded statements such as "computers are beneficial aids to a modern society," and "when I hear the word 'computer', I have a feeling of dislike." In the data analysis, the researcher reversed the scale value of negative items. Thus, for these data, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the computer scale corresponded to a more positive attitude toward computers. As shown in Table 4, the score range was from 2.33 to 4.88, and the mean score was 4.03 which indicated a positive attitude toward computers.

Attitude Toward Learning English

There were a total of 10 items that asked students about their attitudes toward learning English. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were presented as both positively and negatively worded statements such as "I really enjoy learning English," and "I think that learning English is dull." In the data analysis, the researcher reversed the scale value of negative items. Thus, for these data, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the learning English scale corresponding to a more positive attitude toward learning English. As shown in Table 4, the score range was from 2.60 to 5.00, and the mean score was 3.96 which indicated a positive attitude toward learning English.

Attitude Toward CALL

There were a total of 3 items that asked students about their attitudes toward CALL. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were presented as both positively worded statements such as "I like the idea of using the computer for learning English." In the data analysis, 5 always equals a very positive response and 1 equals a very negative response. This scoring

procedure resulted in the higher scores on the CALL scale corresponding to a more positive attitude toward CALL. As shown in Table 4, the score range was from 2.33 to 5.00, and the mean score was 3.79 which indicated a positive attitude toward CALL.

Table 4.   Responses to Items in Post-Questionnaire

Items	N	Mean	Std Dev
Attitude toward Computers	34	4.03	0.56
Attitude toward learning English	33[1]	3.96	0.57
Attitude toward CALL	34	3.79	0.70
Attitude toward ESL grammar software	34	3.60	0.63

[1]One subject did not complete the English section of the questionnaire, so the data from this subject were omitted.

Research Question 3

Research question 3 was stated as follows: What is students' attitude toward the ESL Grammar program?

There were a total of 16 items that asked students about their attitudes toward using ESL Grammar program. Each item used a five-point Likert scale with 5=strongly agree, 4=agree, 3=undecided, 2=disagree, and 1=strongly disagree. The items were presented as both positively and negatively worded statements such as "this program makes learning more interesting," and "I felt frustrated while using this program." In the data analysis, the researcher reversed the scale value of negative items. Thus, for these data, 5 always equals a very positive response and 1 equals a very negative response. This scoring procedure resulted in the higher scores on the ESL Grammar scale corresponding to a more positive attitude toward using ESL Grammar software. As shown in Table 4, the score range was from 2.37 to 4.75, and the mean score was 3.60 which indicated positive attitudes toward using the ESL Grammar program.

Research Question 4

Research question 4 was stated as follows: Does the student use the ESL Grammar program as an environment which allows manipulation and exploration of sentence building? That question was operationalized as follows: Will the student try more sentences after s/he has finished 10 correct sentences from the assignment? If so, how many?

As shown in Table 5, the results indicated that every student tried more sentences after s/he had completed the required 10 sentences for each week. During the four weeks, the range of extra sentences the students tried was from 1 to 40, and the mean score was 16.82. There was a great deal of variance in this range. It is notable that four students tried over thirty sentences.

Table 5. The Number of Sentences That Students Tried
after They Completed the Required 10 Sentences

# of sentences	Frequency	Percent
1	1	2.9
3	2	5.9
5	2	5.9
6	1	2.9
8	4	11.8
10	2	5.9
11	1	2.9
12	1	2.9
13	1	2.9
15	4	11.8
16	1	2.9
19	2	5.9
21	2	5.9
22	1	2.9
24	1	2.9
26	1	2.9
27	2	5.9
29	1	2.9
34	1	2.9
37	1	2.9
39	1	2.9
40	1	2.9
Total	34	100.0

Mean # of sentences = 16.82

Std Dev = 10.75

Median = 15

Research Question 5

Research question 5 was stated as follows: Does the student use the ESL Grammar program as an environment which allows manipulation and exploration of the grammar concepts? Will the student try different grammatical forms after s/he had found the correct one? If so, how many?

According to the data obtained from the recorded files of the computer, none of the subjects tried different grammatical forms after s/he found the correct one. Apparently, subjects' objectives were to get sentences correct; after doing so, they continued to try next sentence.

Research Question 6

Research question 6 was stated as follows: Is there a relationship between the student's attitude (computer anxiety, learning English, CALL, and ESL Grammar program) and his/her use of an exploratory strategy?

The student's strategy was analyzed in two ways: the number of additional sentences that students tried after they completed the required 10 good sentences and the number of times that students tried different grammatical forms after they had found the correct one. Since there was no student who tried different grammatical forms after s/he had found the correct one, this research question was narrowed down to report the relationship between the students' attitude and their exploratory strategies indicated by their trying more sentences after completing the required 10.

As shown in Table 6 for the group as a whole, there was a significant positive relationship between students' attitude toward CALL and their exploratory strategy (r=.251; p<.05). The students with more positive attitudes toward CALL did more exploration on the exercise. However, for the whole group there was no significant relationship between students' attitudes toward (computer, learning English, and using ESL Grammar program) and their exploration strategy.

Table 6. Pearson Correlations of Students' Attitude
and Exploratory Strategy for Whole Group

Correlations	Computer[a]	English[b]	CALL[c]	ESL[d]
Explore[e]	.158	-.094	.251*	.006

[a]Students' attitudes toward computers.
[b]Students' attitudes toward learning English.
[c]Students' attitudes toward CALL.
[d]Students' attitudes toward ESL Grammar program.
[e]The total number of sentences the students tried after they completed the required assignment.

*p < .05.

Table 7. Pearson Correlations between Students' Attitude
and Exploratory Strategy for Each of the 3 Groups

	Group	Computer[a]	English[b]	CALL[c]	ESL[d]
Explore[e]	100B (n=10)	.556*	.495	.543	.557*
	100C (n=12)	.003	-.420	.386	.145
	100D (n=12)	.041	-.327	-.053	-.460

[a]Students' attitudes toward computers.
[b]Students' attitudes toward learning English.
[c]Students' attitudes toward CALL.
[d]Students' attitudes toward ESL Grammar program.
[e]The total number of sentences the students tried after they completed the required assignment.

*p < .05.

Since the subjects consisted of three different groups (English 100B, C, and D), the correlation of the students' attitude and their exploration strategy for each group was shown separately in Table 7.

100B Group

English 100B group is a class of intermediate-level grammar review and composition for both undergraduates and graduates. As shown in Table 7, there was a significant positive relationship between students' attitude toward the use of computer and their exploration (r=.556; p<.05). The students who who had more positive attitudes toward computer showed that they did more exploration on the exercise.

There was a positive relationship between the students' attitudes toward using ESL Grammar program and their exploration (r=.557; p<.05). The students who had more positive attitudes toward using ESL Grammar program showed that they did more exploration on the exercise.

Although there was not a significant relationship between students' attitudes (learning English, and CALL) and their exploration, there was a high positive correlation (r=.495; r=.543). The students who had more positive attitudes toward learning English and CALL did more exploration on the exercise.

100C Group

English100C Group is a class of advanced-level composition for undergraduates. As shown in Table 7, there was no significant relationship between students' attitudes toward (computer, learning English, CALL, and using ESL Grammar program) and their exploration.

100D Group

English100D group is a class of advanced-level composition for graduates. As shown in Table 7, there was no significant relationship between students' attitudes toward (computer, learning English, CALL, and ESL Grammar program) and their exploration strategy.

Although there was no significant relationship between students' attitudes and their exploration strategy, there was a high negative correlation between students' attitudes toward using ESL Grammar program and their exploration strategy ($r=-.460$). In contrast to the 100B group, the students who had more positive attitudes toward using the ESL Grammar program did less exploration on the exercise. The possible reason for this negative correlation will be discussed in chapter V.

Additional Findings

In addition, possible difference in students' attitudes (computer, learning English, and CALL) before and after using the ESL Grammar program was tested. A t-test was used to determine statistically significant differences. The significance level was set at .05.

Attitude Toward Computers

The results analyzed showed that there was a significant difference in students' attitude toward the use of computer before and after using the ESL Grammar program (see Table 8). Students' computer anxiety reduced after using the ESL Grammar program.

Learning English

There was no significant difference in students' attitude toward learning English before and after using the ESL Grammar program. As revealed in Table 8, the calculated t- value was -1.14 with probability of 0.26 and 31 degrees of freedom. It should be noted that the mean scores of the post-questionnaire were higher than that of the pre-questionnaire, but these differences were not statistically significant.

CALL

The result failed to show any significant difference in students' attitude toward CALL before and after using the ESL Grammar program. As revealed in Table 8, the calculated t- value was -0.40 with probability of 0.69 and 33 degrees of freedom. It should be noted that the mean scores of the post-questionnaire were little higher than those of the pre-questionnaire, but these differences were not statistically significant.

Table 8. T-test for Testing Difference in Students' Attitude between Pre- and Post-Questionnaire

Items	Survey	N	Mean	SD	T	2-Tail Prob.
Computer*	Pre	34	3.90	0.54	-2.02	0.05
	Post		4.03	0.56		
English	Pre	32	3.85	0.72	-1.14	0.26
	Post		3.93	0.56		
CALL	Pre	34	3.75	0.58	-0.40	0.69
	Post		3.79	0.70		

* $p < .05$.

Summary

In this chapter, the results of the study were presented as they relate to the research questions of the study, and the additional findings were reported. The results were as follows:

1. Every student tried more sentences after s/he completed the required 10 good sentences.

2. No student tried alternative grammatical forms after s/he found a correct one.

3. For the group as a whole there was a significant positive relationship between students' attitude toward CALL and their exploratory strategy. But, there was no significant relationship between students' attitudes toward (computer, learning English, and using ESL Grammar program) and their exploration strategy.

4. Most of the students had positive attitudes toward using the ESL Grammar program.

5. Most of the students had positive attitudes toward computers, learning English, and CALL before and after using the ESL Grammar program. In addition, the students' computer anxiety was reduced after using the ESL Grammar program. A significant difference in students' attitude (learning English and CALL) between pre- and post-questionnaire was not found.

CHAPTER V. SUMMARY AND RECOMMENDATIONS

In this chapter, a brief summary of the study is presented. Discussion of the results and suggestions for further research follow the summary.

Summary

The purpose of this study was to investigate ESL students' attitude toward a CALL exploratory program and to determine if students explore an exploratory environment. The ESL Grammar program that has some of the features of a CALL exploratory program was used in this study. The ESL Grammar program provides a learning environment in which the student can manipulate the construction of sentences and some of the grammatical properties of the sentences.

Thirty-four advanced ESL students failed to pass the English Placement Test and enrolled in the ESL Writing classes at Iowa State University during the summer of 1989. The subjects were from three different classes - English 100B (intermediate-level grammar review & composition for both undergraduates and graduates), C (advanced-level composition for undergraduates) or D (advanced-level composition for graduates). Each instructor informed the students

that there was a computer lab as a part of the class and assigned them
to attend the lab one hour per week, for a total of four weeks. The
subjects were introduction to the VAX computer and its software -
ESL Grammar and Paragraph on the first lab. Then they used the ESL
Grammar software to do their required 10 correct sentences during
each lab, and used the ESL Paragraph software to do their assignment
out of the each lab. The data from students using the ESL Paragraph
software were not included in this study. As each student interacted
with the VAX computer, every interaction was recorded and stored as
a separate file for each student. The subjects completed two
questionnaires, one before and one after using this program.

Data from questionnaires and VAX computer were analyzed using
descriptive statistics, Pearson correlation, or t-test to answer the
research questions. The level of significance was set at .05.

Discussion of the Results

Six research questions were developed and tested. The results
are summarized as below:

1. Every student tried more sentences after s/he completed the
required 10 good sentences. The range of additional sentences the
students tried was from 1 to 40, and there was a great deal of variance
in this range. Thus, the results from this study showed that when the

students were offered an exploratory environment, they actually explored it as defined by making more sentences

2. No student tried alternative grammatical forms after s/he found a correct one. This result from this study showed that subjects' objectives appeared to be to get sentences correct. After forming a sentence from three phrases, the students edited it repeatedly until it was correct. When the students found the correct one, they stopped and tried another sentence. The possible reason why subjects' objectives were to get sentences correct was they was required to make 10 correct sentences. So, the researcher probably can encourage students to try different grammatical forms by changing the assignment (i.e., In addition to make correct sentences, students are required to report their fundings around the grammar rules - what kinds of rule work and what they do not).

3. For the groups as a whole, there was a significant positive relationship between students' attitude toward CALL and their exploratory strategy. The students with more positive attitudes toward CALL did more exploration on the exercise. There was no significant relationship between students' attitudes (toward computer, learning English, and ESL Grammar program) and their exploration. The specific relationships for each group in the study are reported below:

100B Group

There was a significant positive relationship between students' attitudes toward computers and their exploration strategy. Also, there was a significant positive relationship between students' attitude toward using ESL Grammar program and their exploration strategy. Although there was no significant relationship between students' attitude (toward learning English, and CALL) and their exploration, there was a moderate positive correlation between these variables r=.495 and r=.543, respectively. The 100B group is a class of grammar review and basic writing, and the students in this level explored and had positive attitudes when using the ESL Grammar software.

100C Group

There was no significant relationship between students' attitudes (toward computer, learning English, CALL, and using ESL Grammar program) and their exploration.

100D Group

Although there was no significant relationship between students' attitudes (toward computer, learning English, CALL, and using ESL Grammar program) and their exploration strategy, there was a high negative correlation (r=.-460) between students' attitudes toward using ESL Grammar program and their exploration strategy.

A possible reason for the negative relationship is explained as follows: In the100D group a contingency of students knew grammar and worked fast at making good sentences, and another faction of students in this group knew less grammar and worked slowly at the assignment. The students who worked slowly tried fewer sentences than the students who worked fast because they spent the additional time editing their sentences. Through editing the sentences, the slower students may have learned the grammar concept and had positive attitude toward the ESL Grammar software. However, the students who worked fast may have thought this software was too easy for them and thus did not have positive attitudes toward this software.

This result is consistent with another informal reports from the 100C and D instructors that most of their students prefer using Paragraph software to the Grammar one. Because the Paragraph building lesson contextualized the structures used in the Grammar software and examplified a standard method of development, the high-level students felt more challenge using it.

4. A majority of students had positive attitude toward using the ESL Grammar program. The mean score for ESL Grammar program was 3.60. The higher scores on the ESL Grammar scale corresponded to a more positive attitude toward CALL scale.

5. A majority of students had positive attitudes toward the computer, learning English, and CALL before using the ESL Grammar program. The mean score for computer was 3.90. The higher scores on the computer scale corresponded to positive attitude toward computers. The mean score for learning English was 3.83. The higher scores on the learning English scale corresponded to a more positive attitude toward learning English. The mean score for CALL was 3.75. The higher scores on CALL scales corresponded to a more positive attitude toward CALL.

6. A majority of students had positive attitudes toward the computer, learning English, and CALL after using the ESL Grammar program. The mean score for computer, learning English, CALL was 4.03, 3.96, and 3.79, respectively. The higher scores on the computer/learning English/CALL scale corresponded to positive attitude toward computers/learning English/CALL.

The results from this study showed that 1) as defined by making more sentences the ESL students actually explored an exploratory environment when they were offered one, 2) most ESL students had positive attitude toward using ESL Grammar software, especially the students in the 100B group were the successful users on using this program, 3) there was a significant positive relationship between students' attitude toward CALL and their exploratory strategy.

Recommendations for Future Research

There are some future directions which research of this kind might take.

1. A study may be conducted that uses the ESL Grammar program with low-level ESL students to find out if there is a same result. The low-level ESL students are students whose TOEFL score is below 500 and must attend the intensive English of program before starting the program.

2. Since the sample size of 100B group was small, the validity of the results could be strengthed by using a large number of subjects at their level for future research.

3. It would be useful to perform achievement tests in grammar before and after students work on the ESL Grammar program. This approach, combined with the present study, will yield a more concrete picture of exploratory CALL effectiveness.

4. Since the possible reason why subjects' objectives were to get sentences correct was they was required to make good sentences, a study may be conducted that asks ESL students to report their fundings about the grammar rules (i.e., what kinds of rules work and what they do not) to find out more about how students try different grammatical forms.

Suggestions for the Software

When students were using the ESL Grammar software, they had few complaints about it. There were suggestions for revising the software as below:

1. Students should have an option to view the correct sentences that they have done, i.e., students can press a certain key, the monitor screen will show the total good sentences the students tried before.

2. When a sentence is incorrect, there are two possible problems: its meaning or its verb form. Meaning errors can be further subdivided into two types: those that create nonsense sentences, and those that create sentences that are not true according to the facts. When students made wrong sentences due to the facts, the computer returned the message with "This sentence is not true because of subjects." Many ESL students were confused with this message since they did not have any idea about the facts of American automobile industry. Therefore, this message can be revises to "This sentence is not true because of the subjects. You can refer to FACTS by pressing PF2."

Many current approaches to CALL, in keeping with computer-assisted instruction and second language acquisition theories, suggest that the computer should provide an environment to be explored and a resource to be exploited by the learner (Chapelle and Mizuno,

forthcoming in CALICO Journal). In this empirical study, results supported this approach and indicated that when the ESL students were offered an exploratory environment, they actually explored it as defined by making more sentences. But students did not explore the exploratory environment as defined by trying different grammatical forms. It appears that the nature of instruction and assignments influences exploratory strategies. In general, the students had positive attitudes toward the exploratory CALL. It would appear that exploratory CALL programs have potential to facilitate language acquisition. Further study in this area is warranted.

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ACKNOWLEDGEMENTS

APPENDIX A: A LANGUAGE TOPIC IN THE SEVEN LESSONS

| Lesson | SENTENCE | | PARAGRAPH |
	ideas expressed	grammar to edit	methods
1	problems and solutions	verb agreement	examples
2	cause-effect and time relationships	none[1]	causes
3	main and subordinate	relative clauses	effects
4	contrasts, results, and additions	punctuation with sentence adverbs	advantage & disadvantages
5	present and past events	verb tense	contrast
6	past and past-to-present events	verb tense	enumeration
7	past and past perfect events	verb tense	chronological order

[1]After the student chooses the three parts of a sentence, it cannot be edited; either it is correct, or the student chose the wrong combination of phrases.

APPENDIX B: PRE-QUESTIONNAIRE

QUESTIONNAIRE

The purpose of this questionnaire is to identify how much experience you have and what you think about computers.

The information will be used for research conducted for the above mentioned purposes; your instructor will not see your answers and then will not in any way affect the grade you receive for the course.

Your name will not be used in the reports of the research: please answer the questions freely and honestly. When you have finished the questionnaire, please return it to your lab assistant. Thank you for your cooperation.

PART I.

I would like some information about you. Please fill in the blank that describes you or your situation.

1. Gender (check one) _____ male _____ female

2. User ID of ESL WRITING: _____

3. What country are you from? _____

4. What is your native language? _____

5. What is you major? _____

6. What degree are you working for? ____BA ____BS ____MA
                                     ____MS ____Ph.D

PART II.

In this part of the questionnaire I would like some information about your computer experience. Please fill in the blank or circle the letter that describes your situation.

1. Do you own a computer? ____ no ____ yes

2. Had you ever used a computer before this semester? ____ no ____ yes
   If yes, how many years have you used the computer?

   a. half year or less
   b. half year to one year
   c. one year to two years
   d. more than two years.

3. How often do you use the computer for completing your homework?

   a. never
   b. daily
   c. weekly
   d. monthly

4. How often do you use the computer for personal work?

   a. never
   b. daily
   c. weekly
   d. monthly

5. What is the level of your computer experience? (can be more than one choice)

   a. observation only, and/or computer games
   b. experience with word processing and data entry
   c. workshop and/or an introduction to software evaluation
   d. programming and/or instructional application taken as
      credit hours at the university level

PART III.

In this part of the questionnaire I would like some information about your feeling about computers/computers and studying English. There is no "right" or "wrong" answer. Please circle the response that best describes how your feel about the following statements.

Code: 1 = Strongly Disagree = SD
         2 = Disagree   = D
         3 = Undecided   = U
         4 = Agree   = A
         5 = Strongly Agree   = SA

	SD	D	U	A	SA
1. I prefer to stay away from computers.	1	2	3	4	5
2. I really enjoy learning English.	1	2	3	4	5
3. In today's world, everyone should know how to use computers in some way.	1	2	3	4	5
4. I hate English.	1	2	3	4	5
5. I am not the type of person who works well with computers.	1	2	3	4	5
6. Learning English is really great.	1	2	3	4	5
7. Computers are beneficial aids to a modern society.	1	2	3	4	5
8. I would rather spend my time on subjects other than English.	1	2	3	4	5
9. Computers are very useful for educators.	1	2	3	4	5
10. English is an important part of the school programme.	1	2	3	4	5

	SD	D	U	A	SA
11. I (will) avoid certain classes/jobs if they involve the use of computers.	1	2	3	4	5
12. Learning English is a waste of time.	1	2	3	4	5
13. When I hear the word "computer", I have a feeling of dislike	1	2	3	4	5
14. I like attending this computer lab.	1	2	3	4	5
15. I plan to learn as much English as possible.	1	2	3	4	5
16. Everyone should be willing to give computers a try.	1	2	3	4	5
17. I love learning English.	1	2	3	4	5
18. Computers make me feel nervous and uncomfortable.	1	2	3	4	5
19. The computer could help me learn English.	1	2	3	4	5
20. I think that learning English is dull.	1	2	3	4	5
21. I like the idea of using the computer for learning English.	1	2	3	4	5
22. When I leave school, I shall give up the study of English entirely because I am not interested in it.	1	2	3	4	5

APPENDIX C: POST-QUESTIONNAIRE

QUESTIONNAIRE

The purpose of this questionnaire is to identify what you think about computers, computers and studying English, and ESL Grammar program.

The information will be used for research conducted for the above mentioned purposes; your instructor will not see your answers and they will not in any way affect the grade you receive for the course.

Your name will not be used in the reports of the research: please answer the questions freely and honestly. When you have finished the questionnaire, please return it to your lab assistant. Thank you for your cooperation.

PART I.

I would like some information about you. Please fill in the blank that describes you or your situation.

1. Gender (check one) _____ male _____ female

2. User ID of ESL WRITING: _____

3. What country are you from? _____

4. What is your native language? _____

5. What is you major? _____

6. What degree are you working for? ____BA ____BS ____MA
                                     ____MS ____Ph.D

PART II.

In this part of the questionnaire I would like some information about your feeling about computers/computers and studying English. There is no "right" or "wrong" answer. Please circle the response that best describes how your feel about the following statements.

Code: 1 = Strongly Disagree = SD
2 = Disagree = D
3 = Undecided = U
4 = Agree = A
5 = Strongly Agree = SA

	SD	D	U	A	SA
1. I prefer to stay away from computers.	1	2	3	4	5
2. I really enjoy learning English.	1	2	3	4	5
3. In today's world, everyone should know how to use computers in some way.	1	2	3	4	5
4. I hate English.	1	2	3	4	5
5. I am not the type of person who works well with computers.	1	2	3	4	5
6. Learning English is really great.	1	2	3	4	5
7. Computers are beneficial aids to a modern society.	1	2	3	4	5
8. I would rather spend my time on subjects other than English.	1	2	3	4	5
9. Computers are very useful for educators.	1	2	3	4	5
10. English is an important part of the school programme.	1	2	3	4	5

	SD	D	U	A	SA
11. I (will) avoid certain classes/jobs if they involve the use of computers.	1	2	3	4	5
12. Learning English is a waste of time.	1	2	3	4	5
13. When I hear the word "computer", I have a feeling of dislike	1	2	3	4	5
14. I like attending this computer lab.	1	2	3	4	5
15. I plan to learn as much English as possible.	1	2	3	4	5
16. Everyone should be willing to give computers a try.	1	2	3	4	5
17. I love learning English.	1	2	3	4	5
18. Computers make me feel nervous and uncomfortable.	1	2	3	4	5
19. The computer could help me learn English.	1	2	3	4	5
20. I think that learning English is dull.	1	2	3	4	5
21. I like the idea of using the computer for learning English.	1	2	3	4	5
22. When I leave school, I shall give up the study of English entirely because I am not interested in it.	1	2	3	4	5

PART III.

In this part of the questionnaire I would like some information about your feelings about using ESL Grammar program. There is no "right' and 'wrong" answer. Please circle the response that best describes how you feel about each of the following statements.

Code: 1 = Strongly Disagree = SD
         2 = Disagree   = D
         3 = Undecided   = U
         4 = Agree   = A
         5 = Strongly Agree   = SA

	SD	D	U	A	SA
1. While using this program I felt challenged to do my best work.	1	2	3	4	5
2. This program makes learning more interesting.	1	2	3	4	5
3. I felt frustrated while using this program.	1	2	3	4	5
4. I would tell my friends to play with this program.	1	2	3	4	5
5. This program is a waste of my time	1	2	3	4	5
6. This program is fascinating and fun.	1	2	3	4	5
7. I think this program is useful.	1	2	3	4	5
8. Using this program increased my interest in learning English.	1	2	3	4	5
9. This program is boring.	1	2	3	4	5
10. I think I learned the grammar practiced from the sentence building lessons.	1	2	3	4	5

	SD	D	U	A	SA
11. I think I learned the words and expressions from the sentence building lessons.	1	2	3	4	5
12. This program is an appropriate level for me.	1	2	3	4	5
13. This program addresses my English problems.	1	2	3	4	5
14. This program is easy to use.	1	2	3	4	5
15. This program is confusing (unclear).	1	2	3	4	5
16. I learned to edit sentences from this program.	1	2	3	4	5

APPENDIX D: APPROVED HUMAN SUBJECTS FORM

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying Instructions for completing this form.)

(1.) Title of project (please type): Computer-Assisted Language Learning (CALL):

Do ESL Students Explore Exploratory Environment?

(2.) I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

Jackie Hsu	May 14, 1989	_(signature)_ Hsu
Typed Named of Principal Investigator	Date	Signature of Principal Investigator

N165D Lagomarcino Hall	294-5287
Campus Address	Campus Telephone

(3.) S

	Date	Relationship to Principal Investigator
	May 14, 1989	Major Professor

(4.) ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) Indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- [ ] Medical clearance necessary before subjects can participate
- [ ] Samples (blood, tissue, etc.) from subjects
- [ ] Administration of substances (foods, drugs, etc.) to subjects
- [ ] Physical exercise or conditioning for subjects
- [ ] Deception of subjects
- [ ] Subjects under 14 years of age and(or) [ ] Subjects 14-17 years of age
- [ ] Subjects in institutions
- [ ] Research must be approved by another institution or agency

(stamp: RECEIVED MAY 15 '89 GRADUATE COLLEGE ISU)
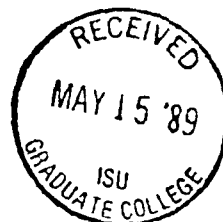
(5.) ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- [ ] Signed informed consent will be obtained.
- [X] Modified informed consent will be obtained.

(6.)
	Month	Day	Year
Anticipated date on which subjects will be first contacted:	6	14	89
Anticipated date for last contact with subjects:	7	15	89

(7.) If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments:

	Month	Day	Year

(8.)
Chairperson	Date 5/11/89	Department or Administrative Unit _(signature)_

(9.) Decision of the University Committee on the Use of Human Subjects in Research:

- [X] Project Approved
- [ ] Project not approved
- [ ] No action required

APPENDIX E: LETTER TO INSTRUCTORS

May 12, 1989

Dr. VanderMey
203 Ross Hall
Iowa State University

Dear Dr. VanderMey:

I am writing to request your participation in a computer lab program for your 100D class this summer session. The program will provide interactive exercises on grammar and paragraph development for your students for a total of 4 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.

Date	Content
1st week June 19-23	Computer orientation. Lesson 1: grammar lesson on subject-verb agreement, paragraph lesson on development by examples.
2nd week June 26-30	Lesson 5: grammar lesson on present and past tense, paragraph lesson on development by contrast.
3rd week July 3-7	Lesson 3: grammar lesson on relative clauses, paragraph lesson on development by effects

final week   <u>Lesson 6</u>: grammar lesson on past tense vs.
July   10-14   present perfect, paragraph lesson on
                         development by enumeration.

(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 the lab to take one class period every week from your regular class time.

- require students to go to the computer lab and complete the lab assignments.

      I will do an evaluation of this lab program for my Master's Thesis; therefore, I will also request students to 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 to participate in this program. I will contact you in a few days to discuss it with you.

                                             Sincerely,

                                             Jackie Hsu
                                             866 Pammel Ct.
                                             Phone: 296-8081

APPENDIX F: A SCHEDULE OF ASSIGNED EXERCISE

Syllabus for Computer Lab
English 100D

Place: E116 Lagomarcino Hall

Time: Friday, 11:00 a.m. - 12:00 a.m.

Lab Assistant: Jackie Hsu

Date	Content
June 23	Computer orientation. Lesson 1: grammar lesson on subject-verb agreement, paragraph lesson on development by examples.
June 30	Lesson 5: grammar lesson on present and past tense, paragraph lesson on development by contrast.
July 7	Lesson 3: grammar lesson on relative clauses, paragraph lesson on development by effects.
July 14	Lesson 6: grammar lesson on past tense vs. present perfect, paragraph lesson on development by enumeration.

Assignments for each computer lab

grammar lesson: print 10 correct sentences (You can try as many sentences/different grammatical forms as you like and save/print the sentences you want.)

paragraph lesson: write the outline with the ideas that are in the paragraph on the sheet which is given by the lab assistant.

Due day for assignments

grammar lesson: this should be done at computer lab and hand into the lab assistant.

paragraph lesson: this is on next class of computer lab and hand into the lab assistant.

APPENDIX G: STUDENTS' MANUAL

ENGLISH 100 -- USING THE VAX FOR ESL

Signing on and using the grammar and paragraph lessons

This paper describes how to 1) sign on to the VAX computer system, 2) enter the ESL software, 3) use the paragraph building lessons, and 4) use the sentence building lessons.

To use the VAX for your ESL, you will need to find a VAX terminal room with "GIGI" terminals like the ones in 116 Lagomarcino Hall, or VT 340 terminals like the ones in the library and in Heady Hall, for example. There are many sites with VAX terminals all over campus. You can sign on to any GIGI or VT 340 terminal that is connected to the VAX cluster. Most terminals are connected to the cluster except for those that are connected only to the Engineering VAX (evax). The evax is not part of the cluster.

1) Signing on to the VAX

To sign on, make sure the terminal is turned on. It may show you the "DIAL:" prompt, or you may have to press the BREAK key two times quickly to get the "DIAL:" prompt. Then you type "VAX" like this:

    DIAL:VAX

Press RETURN.

When the VAX requests your username, type the "UserID" that appears on your VAX card. Press RETURN. When the VAX asks for your password, type the password that appears on your VAX card. You will not see your password as you type it because it is secret. Press RETURN.

Whenever you have finished typing something, press RETURN to indicate to the computer that you are finished.

The first thing you should see is a message for new users. It contains some information for you to read and some questions for you to answer. Just follow instructions. ("Y/N" means that you should answer yes or no to the question.)

When you have finished all of that, the VAX shows you the "$" prompt. This symbol tells you that the VAX is ready to accept a command. To use the VAX for ESL, you will only need three VAX commands: a) to change your password, b) to sign off, and c) to enter the ESL software.

> a) Changing your password.
>
> The first VAX command that you need is one that will let you change your password. The password that the computer gave you will be hard to remember, so you need to change it to a five or six letter word that will be easy for you to remember. To change your password, type the following command when you see the $. (You don't type the $.)

```
$ set password
```

The VAX will request your old password, your new password, and verification of your new password. ("Verification" means you should type the new password again.) The passwords that you type will not appear on the screen because they are secret, but the VAX is receiving the information.

WRITE DOWN YOUR NEW PASSWORD. IF YOU FORGET IT, YOU WILL NOT BE ABLE TO SIGN ON NEXT TIME.

b) Signing off

When you are finished using the VAX, you should sign off by typing "lo" and the $ like this:

```
$ lo
```

"lo" means "log off," which means the same as "sign off."

c) Using the ESL software

The ESL software is in a system called "cas." Refer to Appendix A to see the place of cas in the system. Therefore, to find that software, you should type "cas" at the $ like this

```
$ cas
```

VAX takes a moment to get CAS.

2) Entering the ESL software

In cas there are several "pages" that you have to go through to get to the editor:

PAGE ONE: When you are in cas, it will ask you this question:

What do you like people to call you?

You should answer by typing your first name. Cas goes through another page quickly, then stops at the next one:

PAGE TWO: It looks like this:

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```
| COURSEWARE              student menu                        |
|----AUTHORING SYSTEM-----------------------------------------|
|-------------------------------------------------------------|
|                                                             |
|      What would you like to do?                             |
|                                                             |
|  >>>  ASSIGNMENTS      Do assignment                        |
|                                                             |
|       BROWSE           Browse through lessons               |
|                                                             |
|       MAIL             Send messages                        |
|                                                             |
|       EXIT             Exit from CAS                        |
```

From this page, you can choose what you want to do in CAS. The first choice is to do your ASSIGNMENTS for this class: do ESL lessons, and write papers. The second choice is to BROWSE (look at) some other lessons. For example, there are lessons on Agronomy, and Animal Breeding. The third option, MAIL, allows you to use the VAX mail system to send messages to other VAX users (like other people in the class). The final choice lets you out of CAS. When you choose this option, you will return to the VAX $.

You can make your choice by using the arrow keys to move the arrow. You should choose ASSIGNMENTS by pressing RETURN.

PAGE THREE: The next page shows your "assignments." There is one choice on that page. You should press RETURN to select "ESLWRITIN -- ESL Grammar, Paragraphs and Editing." After you have selected it using the arrow, choose that option by pressing RETURN.

```
| COURSEWARE              assignment list                     |
|-----------AUTHORING SYSTEM----------------------------------|
|-------------------------------------------------------------|
|                                                             |
|      What would you like to do?                             |
|                                                             |
|  >>>   ESLWRITIN      ESL Grammar, Paragraphs, and Editing   |
|                                                             |
```

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PAGE FOUR: The next page is the title for the ESL lessons.
Press RETURN.

PAGE FIVE: The next page shows the ESL lessons that you can work on:

```
                -----------------
                MAIN MENU
                -----------------
        >   1.   Subject verb agreement
            2.   Adverbial Prhases
            3.   Relative Clauses
            4.   Sentence Adverbs
            5.   Present and Past Tense
            6.   Past and Present Perfect
            7.   Past and Past Perfect
            8.   Edit Text
```

You should choose

>   1. Subject-verb agreement

The next choice is between two different lessons.

```
                -----------------
                Exercise Menu
                -----------------

            Sentence Building
        >   Paragraph Building
```

The "Sentence Building" lesson is a grammar lesson.   The
"Paragraph Building" lesson teaches paragraph development. You
should choose

>   Paragraph Building

3) Paragraph Building

The first page you will see in the directions that tell you how
to do the Paragraph Building lesson. The instructions say that
the papagraph is developed through the use of examples. You
should read the instructions and then press RETURN to continue.

On the next page, the exercise begins by showing the topic sentence (first sentence) of the paragraph and three choices for the next sentence in the paragraph. You must choose the best second sentence to develop the paragraph by examples. You should choose sentence 1, 2, or 3 from the screen, and type the number of your choice.

The U.S. automoblie industry consists of emerging multinational corporations which move their production facilities outside the United States to minimize their costs.

Which sentence goes next? [ ]

1. For example, Ford Motor Company manufactures approximately 50 percent of its cars and trucks outside the U.S. each year.

2. Multinational corporations are organized so that companies can lower their expenses by using low cost foreign labor instead of paying the high wages demanded by the American labor force.

3. Several of the most successful Japanese companies are beginning to produce some of their automobiles in the U.S.

The computer, then tells you if your choice is correct or incorrect. If your choice is incorrect, the computer tells you why.

Which sentence goes next? [3] No. Press RETURN for comments.

After you press RETURN, the computer will tell you why that is not the best choice.

This sentence introduces a NEW TOPIC -- Japanese production in the U.S. It doesn't support the given topic -- American multinational interests.

You press RETURN and try another choice. When you choose the best sentence, the computer will add that sentence to the paragraph and ask you again which sentence should come next.

> The U.S. automoblie industry consists of emerging multinational corporations which move their production facilities outside the United States to minimize their costs. For example, Ford Motor Company manufactures approximately 50 percent of its cars and trucks outside the U.S. each year.
>
>
> Which sentence goes next?
>
> 1. In addition, Ford owns twenty-five percent of Toyo Kogyo, the Japanese company that produces the Mazda line of automobiles.
>
> 2. Ford produces the other fifty percent of its cars and trucks inside the U.S.
>
> 3. Ford has its international headquarters in Dearborn, Michigan near the famous Greenfield Village and Henry Ford Museum.

The student will select from this group of sentences until he selects the correct one. At that point, the program will add the correct choice to the partially completed paragraph. This process continues until the paragraph is complete. The student can then do the paragraph again if he wants to.

As you complete the paragraph or after you have finished it, you should complete the following outline using the information in the paragraphs. Don't write complete sentences in the outline. Write notes about the information in the paragraph. The outline will show you the structure of the information in this paragraph supported by examples.

TOPIC SENTENCE   Auto industry consists of multinational corporations
                 They produce outside the U.S.

    Example (1):   Ford

       Fact (1):   manufactures 50 percent of products outside

       Fact (2):   _____

    Example (2):   _____

       Fact (1):   _____

       Fact (2):   _____

Example (3): Chrysler and American Motors

        Fact (1): _____

        Fact (2): _____

CONCLUSION: _____

        _____

When you have finished the paragraph outline, you will return to this page.

```
 ---------------------------------------------------
|                                                   |
|              ------------------                   |
|              Exercise Menu                        |
|              ------------------                   |
|                 Sentence Building                 |
|              >  Paragraph Building                |
|                                                   |
 ---------------------------------------------------
```

You should press PF4 to return to this page

```
 ---------------------------------------------------
|              ------------------                   |
|              MAIN MENU                            |
|              ------------------                   |
|                 1.  Subject verb agreement        |
|                 2.  Adverbial Prhases             |
|                 3.  Relative Clauses              |
|                 4.  Sentence Adverbs              |
|              >  5.  Present and Past Tense         |
|                 6.  Past and Present Perfect       |
|                 7.  Past and Past Perfect          |
|                 8.  Edit Text                     |
|                                                   |
 ---------------------------------------------------
```

From this page, you should choose

        > 5. Present and Past Tense

Again, the next choice is between two different lessons.

```
┌──────────────────────────────────────────────────┐
│              --------------------                  │
│              Exercise Menu                         │
│              --------------------                  │
│                                                    │
│         >   Sentence Building                      │
│             Paragraph Building                     │
│                                                    │
│                                                    │
└──────────────────────────────────────────────────┘
```

This time you should choose the "Sentence Building" lesson.

>   Sentence Building

4) Sentence Building

The sentence building part of lesson 5 gives you practice forming
sentences using the present and past tense of verbs. The first page has
instructions for the lesson. You should read these instructions and then
press RETURN to see an example. The example shows you how to form
sentences and correct the verb tense. You press RETURN until you come to
this page.

```
┌───────────────────────── TIME PHRASES ─────────────────────────────────
├─> Currently,                          When the industry was in trouble,
│   Now that the industry is recovering,  At the present time,
│   During the 1970s,                   Before the industry began to recover,
│   In the past,
├───────────────────────────── SUBJECTS ─────────────────────────────────
│   the U.S. auto industry      American consumers      the U.S. labor force
├────────────────────────────────────────────────────────────────────────
├──────────────────────── VERBS AND COMPLEMENTS ─────────────────────────
│   use low cost materials              have multinational interests
│   buy many small Japanese cars        demand high wages
│   import components form overseas      manufacture many small cars
│   pay lower wages than in the past    purchase small American cars
│   produce   low   quality   cars      cooperate  with  management
├────────────────────────────────────────────────────────────────────────
│   Move the arrow and press RETURN to select a phrase from each section. Then,
│   edit the verb to make it correct.
│
│
│   PF1 Words    P2 Facts                        P3 Grammar    P4 Exit
└────────────────────────────────────────────────────────────────────────
```

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On this page you can form sentences by choosing from the three groups. For example, if you press the right-arrow key (-->) and then press RETURN, you will choose "When the industry was in trouble," as the first part of the sentence. It will appear on the screen like this:

```
---------------------------- TIME PHRASES ----------------------------------
Currently,                              When the industry was in trouble,
Now that the industry is recovering,    At the present time,
During the 1970s,                       Before the industry began to recover,
In the past,
----------------------------- SUBJECTS -------------------------------------
-> the U.S. auto industry    American consumers      the U.S. labor force
----------------------------------------------------------------------------
---------------------- VERBS AND COMPLEMENTS -------------------------------
use low cost materials                  have multinational interests
buy many small Japanese cars            demand high wages
import components form overseas          manufacture many small cars
pay lower wages than in the past        purchase small American cars
produce   low   quality   cars                  cooperate with management
----------------------------------------------------------------------------
Move the arrow and press RETURN to select a phrase from each section.  Then,
edit the verb to make it correct.

When the industry was in trouble,



PF1 Words   P2 Facts                         P3 Grammar   P4 Exit
```

At the same time, the arrow will move to the second group of phrases so that you can choose a subject of the sentence. If you press the right-arrow key two times and then press RETURN, you will choose "the U.S. labor force" as the subject of the sentence. It will appear in the sentence like this:

```
    When the industry was in trouble, the U.S. labor force

```

Also, the arrow will move to the third group of phrases. If you press the right-arrow key once and the down-arrow key once, you will choose "demand high wages." for the rest of the sentence. The computer will add that to the rest of the sentence and allow you to edit "demand high wages."

When the industry was in trouble, the U.S. labor force demand high wages.

demand high wages.[]

You should change the verb to the past tense (demanded) because it refers to a time in the past. Use the left-arrow key to mover the cursor to the end of "demand" like this:

When the industry was in trouble, the U.S. labor force demand high wages.

demand[] high wages.

Then, type "ed" like this:

When the industry was in trouble, the U.S. labor force demand high wages.

demanded[] high wages.

Then, press RETURN. The computer will judge the verb and tell you if it is in the correct form. You can press RETURN to edit again. Press PF3 to save the sentence. Press PF4 to choose a new sentence.

If you need help with

        the MEANING of the words...........press PF1

        the MEANING of the sentences........press PF2

        the grammar........................press PF3

After you have made 10 good sentences, you can exit from the lesson. Press PF4 to exit.

When you exit, the computer will ask if you want to print out your sentences. You should choose PF1 to print sentences.

The computer will show " Name of Printer Queue: [   ]" on the screen. You can find the Printer Queue from the Appendix of this manual and type in [   ].

APPENDIX -- VAX printers and their code names

The following are the known VAX printers queues.

LOCATION	QUEUE	LOCATION	QUEUE
Atanasoff 29	EC829	Library 85	LB85, ALB85, CLB85
Atanasoff 213	ACS213	Maple-Willow C3118	BMWCOM
Carver 455	ACA455	Physics 53	DPY53
Coover 131U	BC0131U	Roberts 2220	DRB2220
Friley 2415	BFR2415	Snedecor 307	ASN307
Hamilton Hall 128	CHA128	Sweeney 101	CSW101
Heady Hall 62	AHE62	Sweeney 133	ESW133
Kildee 1	EKH1	Town Engr	BTE110
Knapp-Storms Commons	BKSCOM	Vet Med 2272	CVM2272
Lagomarcino 116	CEQE116	Wallace-Wilson Commons	DWWCOM
LeBaron 241	ELE241		