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# The effects of computer-assisted language learning on English language learners with and without disabilities in an elementary school setting

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# THE EFFECTS OF COMPUTER-ASSISTED LANGUAGE LEARNING ON ENGLISH LANGUAGE LEARNERS WITH AND WITHOUT DISABILITIES IN AN ELEMENTARY SCHOOL SETTING

by

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ABSTRACT

**The Effects of Computer-Assisted Language Learning on English Language Learners With and Without Disabilities in an Elementary School Setting**

by

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The purpose of the study was to investigate the effects of the English Language Learners Instructional System (ELLIS) on oral language, written language, and reading achievement among students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with computer-assisted language learning (CALL) and the use of ELLIS were assessed. Participants were 78 third, fourth, and fifth grade students with and without disabilities enrolled in a public elementary school. All participants were of Hispanic descent and were identified as being Non- or Limited-English Proficient based on the Language Assessment Scales (LAS) (CTB Macmillan/McGraw-Hill, 1994). Twelve of the participants were identified as having a documented disability according to the *Individuals with Disabilities Education Act* (2001). Participants were randomly assigned to one of three groups. Treatment Group A included students with and without disabilities and received individual instruction on the ELLIS program.

Treatment Group B included students with and without disabilities and received ELLIS instruction in student pairs. The third group of students was a control group and did not receive instruction using the ELLIS program. Data were collected to answer eight research questions related to the effectiveness of the ELLIS program. The Language Assessment System Links (CTB Macmillan/McGraw Hill, 2005), an updated version of the LAS was administered to all participants at the end of the study. Scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest scores of the experimental groups to adjust for pretest differences. Finally, qualitative data obtained from the open-ended interview with the implementing teacher were analyzed. The ANOVA and ANCOVA analyses revealed that students with disabilities who received instruction using the ELLIS program performed similarly to students with disabilities who did not receive instruction using the ELLIS program in oral language, written language, and reading achievement; and that students without disabilities who received instruction using the ELLIS program performed similarly to students without disabilities who did not receive instruction using the ELLIS program in oral language, written language, and reading achievement. Additionally, paired instruction using the ELLIS software program had similar effects on student performance as individual instruction using the ELLIS software program. However, results from the open-ended interview revealed high levels of teacher satisfaction with the ELLIS software program. Results of this research indicate that the ELLIS software program did not improve the oral language, written language, and reading

achievement among students who are English language learners with and without disabilities, but further investigation of computer-assisted language learning for elementary students with and without disabilities is important.

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# CHAPTER 1

## INTRODUCTION

According to the U.S. Department of Education Office of English Language Acquisition, Language Enhancement, and Academic Achievement for Limited English Proficient Students, during 2000-2001, the enrollment of limited English proficient (LEP) students in U.S. public schools continued to increase both in numbers and as a percentage of total student enrollment. The results from the 2000-2001 *Survey of States' Limited English Proficient Students and Available Educational Programs and Services* indicated a total of 4,584,946 students. This represented approximately 9.6% of the total school enrollment of 44,015,482 students in Pre-Kindergarten through Grade 12. Over 67% of all LEP students were enrolled at the elementary level, and accounted for more than 11% of the total school enrollment. Over 44% of all LEP students were enrolled in Pre-Kindergarten through Grade 3 (Kindler, 2002).

According to the Elementary and Secondary School Civil Rights Compliance Report administered by the Office for Civil Rights and the U.S. Department of Education there were 357,325 special education students who were also LEP (SpEd-LEP) in grades K-12 in U.S. public schools during the 2000-2001 school year (Hopstock & Stephenson, 2003). This number represented 7.9 percent of the overall LEP student population. The distribution of SpEd-LEP students at the elementary level was 50.5%.

The trend of increasing numbers of LEP students enrolling in public schools is even more profound in the state of Nevada. The total enrollment of LEP students in Nevada went from 14,370 in 1993/1994 to 58,753 in 2003/2004, an increase of 325.1% (U.S. Department of Education Office of English Language Acquisition, 2004). The number of SpEd-LEP students was 3,188 in 2000 which accounted for 7.7% of all LEP students for Nevada (Hopstock & Stephenson, 2003).

As the numbers of LEP and SpEd-LEP student enrollment continued to increase, President, George W. Bush, secured the passage of the landmark *No Child Left Behind* Act of 2001 (NCLB Act), to facilitate educational reform in the United States (Executive Summary, 2001). The intent of the NCLB Act was to improve the performance of America's elementary and secondary school students while ensuring that all, including those with limited English proficiency and/or disabilities, are performing at the expected standards for their grade level. School personnel are held accountable for students achieving Annual Yearly Progress (AYP). With the increasing number of students who are not proficient in English and the increased expectations of the federal government, the public education system needs to seek new alternatives to traditional methods of teaching and learning. One such alternative is computer-assisted instruction. Howard Gardner (2000) stated, "Schools of the future will be largely organized around computers that deliver personalized curriculum matching each student's learning style and level of proficiency" (p. 30).

## Historical Development of Computer-Assisted Instruction for Language Learning

To adequately understand the evolvement of computer-assisted instruction for language learning, it is important to consider both the development of computer use for learning and the emergence of various language acquisition theories. This historical perspective will help clarify current thinking about computer-assisted instruction for teaching second language learners.

### *Emergence of Computer-Assisted Instruction*

The idea of using computers to enhance learning has been around for decades. Computers were designed and built in universities in the 1950s, but due to complicated programming languages these machines were not user-friendly for K-12 schools until the 1960s (Baker, 1975). It was at this time that the first major computer-assisted instruction project began under the direction of Dr. Donald Bitzer at the University of Illinois. Programmed Logic for Automatic Teaching Operation (PLATO) was designed to add a dimension of automation to the current individualized instructional materials (Hart, 1995; Niemic & Walberg, 1989).

In 1970, a new approach to computer-assisted instruction was introduced at Brigham Young University under the direction of Dr. C. Victor Bunderson. The Time-shared Interactive Computer Controlled Information Television (TICCIT) project combined television and computer technology. The unique combination of video, audio, and text information made this system the first multimedia computer assisted instruction system in the world (Merrill, Schneider, & Fletcher, 1980). Though multimedia had already been widely used in educational practice, computers had not previously been included.

To a certain extent, both PLATO and TICCIT evolved to accommodate subsequent advances in computer hardware, and the systems exist today on a number of mainframe computers at universities and in the form of TICCIT for personal computers. In the interim, these systems were not feasible for most school districts prior to the microcomputer revolution due to the enormous set-up and maintenance costs of mainframe computers. It was not until 1975 that the first microcomputers were available for purchase. By 1983, 53% of all elementary schools (grades K-5) and 91% of all secondary schools (grades 6-12) had at least one microcomputer (Niemiec & Walberg, 1989). This opened the door to computer-based instruction in efforts to increase student achievement.

In a review of literature, researchers Niemiec, Samson, and Walberg (1987) concluded that computer-based instruction raised student outcomes by about 16 percentile points above control groups who were taught by conventional methods. Niemiec and Walberg (1987) reported an average effect size for computer-assisted instruction of about .36 derived from an extensive meta-analysis that indicated the median student scoring at the 50$^{th}$ percentile in a traditional classroom would score at the 64$^{th}$ percentile if he used computed-assisted instruction. Computer-based instruction was also found to be more cost effective than reducing class size or increasing the number of instructional minutes in a school day (Levin, Glass, & Meister, 1985). Computer-assisted instruction brought about new perspectives on teaching that lead to many new applications including computer-assisted language learning (CALL).

*Emergence of Language Acquisition Theories*

In order to effectively use computer technology to increase the acquisition of language, software developers needed to have an understanding of how second languages are learned. Second language Acquisition (SLA) theories have been studied for decades. One of the most revolutionary changes in the way a second language was taught came as a result of the landmark book *Verbal Behavior* (Skinner, 1957). In this book, Skinner discussed the theory of operant conditioning in relationship to the way humans acquire language. Language was seen as a form of behavior, therefore, Skinner advocated that the stimulus-response-reinforcement model could account for how humans learned language.

As Skinner's behaviorist model of language learning, Audiolingualism, was becoming accepted as a classroom practice, it was challenged by Noam Chomsky's theory of competence and performance (Chomsky, 1959). In his well known review of Skinner's *Verbal Behavior*, Chomsky argued that language is not merely an outward form of behavior, but rather an intricate rule-based system. He argued that children have an innate capacity to develop grammar based on the linguistic input they receive. Cognitive psychologists of this time maintained that the mind is an active participant in the thinking-learning process and that learning involves perception, acquisition, organization, and storage (Sole, 1994).

Krashen presented a new view on language learning theory. He argued for a distinction between *acquisition* and *learning*. According to Krashen (1985), *acquisition* of language is a subconscious process of which the acquirer is typically unaware; whereas *learning* is a conscious knowledge about language. He insisted that language

cannot be learned, but only acquired through natural communication which was the basis for the Krashen's Monitor and Acquisitition/Learning Hypothesis (Krashen, 1976). The implication of this theory was that conscious learning strategies are not useful in the development of language. Although Krashen had many opponents to his theory, one aspect that is still widely held today is the importance of comprehensible input (Krashen, 1985); the process of providing background information and context to messages to ensure understanding.

Researchers Cummins and Swain (1986) believed that second language learners would learn more rapidly when the learning environment was rich with contextual clues and meaningful vocabulary. They argued that in a learning environment filled with context-embedded learning activities, students would acquire higher levels of Cognitive Academic Language Proficiency (CALP). Whereas, in an environment that was less context-embedded, the same students would demonstrate fewer CALP skills, but would build more Basic Interpersonal Communicative Skills (BICS). Genesee (2000) supports this belief as evidenced through his statement, "Instruction for beginning language learners, in particular, should take into account their need for context-rich, meaningful environments," (p. 5). Although both BICS and CALP are important for the ELL student, it is the CALP that provides the language skills required for academic achievement in the classroom and is quite different from the basic skills necessary for everyday communication (Johns & Torrez, 2001).

Experts in the field of second language acquisition have become more eclectic in their attitudes and more willing to recognize the potential merits of a variety of methods and approaches (Griffiths & Parr, 2001). It has been suggested that a second language

acquisition theory may be possible, but the need to incorporate so many variables may make it too general to be of use (Beatty, 2003). Regardless of theory, language learning and teaching is a dynamic process in which a variety of learning and teaching styles need to be accommodated on an almost individual basis. One way to provide individualized instruction in the typical public school classroom is through the use of technology.

*Use of Technology for Teaching English as a Second Language*

Many practitioners and researchers view technology as a tool to assist in teaching students a second language. Hunt and Pritchard (1993) reported the use of computers in teaching language minority students to be effective in improving their language acquisition skills. Willetts (1992) reported that technology-assisted instruction offers many possibilities to second language learners including the provision of responsibility for their own learning. Cassidy (1996) pointed out that computer-assisted instruction can provide the perfect medium to create partnerships between students who are learning English as a second language and the teacher, learners, and their peers. However, no data were collected to support this premise. In a review of research on computer-assisted language learning (CALL), Miech (1996) noted that CALL can substantially improve student achievement as compared to traditional instruction.

The nature of computer-assisted language learning is changing because of improvements in computer literacy among learners and advances in computer hardware and software. However, in the design of CALL it is important that pedagogy drives technology rather than technology driving pedagogy. The developers and publishers of the English Language Learners Instructional System (ELLIS) market this program as being pedagogically sound. The ELLIS software program is designed to meet the needs

of students who are learning English as a second language through an eclectic approach of techniques and methodologies that encompass best practices in teaching and learning in the areas of vocabulary, listening, pronunciation, grammar, and communication skills (English Language Learning & Instructional System, 2002a).

In Chicago area public schools, students ages 6 to 10 years old who were English language learners using ELLIS scored higher in standardized testing than their non-ELLIS using counterparts. The average student improvement using ELLIS was four times as great in as little as four months. In several case studies of English language learners, ELLIS yielded promising results for increasing users' English proficiency. One case study conducted in Salem-Keiser School District in Oregon included 22 elementary schools, 4 middle schools, and 4 high schools. The initial responses from teachers and students were overwhelmingly positive, and the district will be increasing the implementation of the ELLIS program in the future (English Language Learning & Instructional System, 2002b). In addition to these two preliminary reports, several studies at the post-secondary level have been conducted (Luk, 1999; Nutta, 1998; Soo, 1997). The program was found to be effective for post-secondary students. A more detailed review of these studies is provided in the subsequent review of literature chapter.

## Statement of the Problem

It takes about 5,000 hours of instruction in a second language to produce adequate fluency and literacy in that foreign language (Stern, 1983). According to Goodfellow (1994), it takes the equivalent of a 4-year full-time job for non-native speakers to be able to read a quality newspaper and another 13 years to become completely fluent in English.

Unfortunately, with the increasing numbers of students enrolling in U.S. public schools who are not proficient in English (Kindler, 2002) and the expectations delineated in the NCLB Act, there is a critical need to identify effective second language acquisition teaching strategies and methodologies that require significantly less than 5,000 hours of instruction or the equivalent of a 4-year full-time job. Thus, researchers have noted the need to develop and assess the effectiveness of English language fluency programs using technology (Miech, 1996). However, few studies have been devoted to assessing the effectiveness of computer-assisted instruction for LEP students (Dunkel, 1990).

The purpose of this study is to investigate the effects of the English Language Learners Instructional System (ELLIS) on oral language, written language, and reading achievement among students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with CALL and the use of ELLIS were assessed. Specifically, the following questions will be addressed in this study:

Question 1. Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners with disabilities?

Question 2. Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners without disabilities?

Question 3. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners with disabilities?

Question 4. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners without disabilities?

Question 5. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners with disabilities?

Question 6. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners without disabilities?

Question 7. Is there a difference in effectiveness between individual and paired instruction using the English Language Learners Instructional System?

Question 8. What is the level of teacher satisfaction with the use of the English Language Learners Instructional System?

## Significance of the Study

The significance of this study lies in the potential benefit to students who enter the educational system lacking the language skills needed to master grade level curriculum. Despite efforts by classroom teachers to deliver content curriculum using a variety of approaches such as sheltered instruction and multiple learning styles, there is a great need for targeted intervention designed to increase the ELL students' ability to effectively comprehend and use academic English. CALL has the potential to meet this need.

This study contributes to the body of research related to computer-assisted language learning, specifically for students who are English language learners with and without disabilities. The current literature suggests that the use of technology is an effective instructional method for learning a second language (Hunt & Pritchard, 1993;

Willets, 1992; Cassidy, 1996; Miech, 1996). In a review of research on CALL, Inoue (1999), found that most of the research was quantitative in nature or based on case studies. She argued for more rigorous research, specifically experimental research that includes control groups.

Additionally, the bulk of research to date has been conducted on college aged students and/or adults. There is limited research on the effects of CALL with elementary aged students even though over 67% of all limited English proficient students are enrolled at the elementary level (Kindler, 2002). Finally, limited research has been conducted on ELL students with disabilities despite the fact that there were over 350,000 SpEd-ELL students enrolled in U.S. public schools in the 2000-2001 school year (Hopstock & Stephenson, 2003).

## Limitations

This study had several identified limitations. The first limitation involved the grade levels of the participants. Because these students were enrolled in grades three to five, caution should be exercised with regard to generalizing the findings to students enrolled in other grades. The second limitation involved the study setting. This study was conducted within one elementary school within a large, metropolitan school district. Thus, the results may not generalize to secondary school settings and/or elementary schools in other types of school districts (e.g., rural). A third limitation of this study is that the students received English language arts instruction in addition to using the ELLIS program. This presented a confounding variable but withholding required curriculum

was not an option. The inclusion of a control group that did not receive the ELLIS program reduces concern related to this limitation.

## Summary

The number of students with and without disabilities who are learning English as a second language is rapidly increasing in U.S. and at an even higher than average rate in the state of Nevada (Kindler, 2002; Hopstock & Stephenson, 2003). The increased accountability for all students placed in the public education system by the NCLB Act has prompted local education personnel to seek alternatives to traditional teaching methods for the purpose of acquiring proficiency in English. One such alternative is computer-assisted language learning. The ELLIS program has shown promise in case studies in other states including Illinois and Oregon (English Language Learners Instructional System, 2002b) and in several research studies (Soo, 1997; Nutta, 1998; and Luk, 1999) with post-secondary students. However, research using ELLIS is limited, and no research to date has been conducted with English language learners with disabilities. While it appears that ELLIS may increase language acquisition and student achievement, further research is needed to validate this premise.

## Definitions

The following are terms and definitions used in this dissertation:

Computer-assisted language learning (CALL). Any process in which a learner uses a computer and, as a result, improves his or her language (Chapelle & Jamieson, 1986; King, 1985).

Computer-assisted instruction (CAI). Any process in which a learner uses a computer for instructional purposes (Niemiec & Walberg, 1989).

English language learner (ELL). A student who is learning English as a second language (Johns & Torrez, 2001).

English language learner with disabilities. A student who is learning English as a second language and qualifies for specialized services according to the Individuals with Disabilities Education Improvement Act of 2004.

English Langauge Learner Instructional System (ELLIS). A computer-assisted language learning program designed to increase English language learners' skills in vocabulary, listening, pronunciation, grammar, and communication in English (ELLIS computer software, 1996).

Fully English proficient (FEP). Designation by the Nevada Department of Education for a student who scored between 241 and 300 on the Language Assessment Scales (LAS) indicating that a student has demonstrated proficiency in the acquisition of English skills.

Language Assessment Scales (LAS). A standardized assessment tool that assesses oral language acquisition and reading and writing skills in English published by CTB Macmillan/McGraw-Hill, 1994.

Language Assessment System Links(LAS Links). An updated version of the LAS, a standardized assessment tool that assesses oral language acquisition and reading and writing skills in English published by CTB/McGraw Hill, 2005.

Limited English proficient (LEP). Designation by the Nevada Department of Education for a student who scored between 61 and 240 on the Language Assessment

Scales (LAS) indicating that a student has not demonstrated a basic level of proficiency in the acquisition of English skills.

Non English proficient (NEP). Designation by the Nevada Department of Education for a student who scored between 0 and 60 on the Language Assessment Scales (LAS) indicating that the student has limited to no English language skills.

Oral language. The ability to use spoken words to communicate with others and/or listen to spoken words to gain information.

Reading achievement. The ability to decode written language to gain information.

Second-language acquisition (SLA). The process of acquiring a second language to the degree that the acquirer is able to successfully use the second language for oral and written communication (Cummins & Swain, 1986).

Written language. The ability to write words for the purpose of communication.

# CHAPTER 2

## REVIEW OF LITERATURE

The purpose for this chapter is to summarize and analyze existing professional literature related to computer-assisted language learning (CALL) and its effects on the acquisition of oral, written, and reading skills in English. Knowledge of this literature base is needed to understand CALL and how it can be used to benefit students who are English language learners with and without disabilities. The chapter begins with a brief discussion of the terminology used when identifying students who are learning English as a second language. Next, the potential benefits of computer-assisted language learning are discussed. Then, the literature review procedures and selection criteria used to locate experimental studies involving CALL for the purpose of second language acquisition are described. The subsequent sections of this chapter include review and analysis of experimental studies related to: a) the effectiveness of CALL for elementary ELL students, b) the effectiveness of CALL for secondary and post-secondary ELL students, and c) the effectiveness of the English Language Learner's Instructional System (ELLIS). Finally, a culminating review of literature is provided.

While reviewing the literature related to this dissertation, it became apparent that educators and researchers have used a variety of terms when referring to students who are learning English as their second language. Such terms included Second Language

Learners, English as a Second Language Learner, and Second Language Acquisition Students. However, the preferred and most common term for this population is English Language Learner (ELL) (Johns & Torrez, 2001). This term denotes a positive perspective on what the students are working to accomplish versus a negative perspective on their language deficiencies (e.g., Non-English Proficient and Limited-English Proficient). Unfortunately, personnel working in many State Departments of Education and Local Education Agencies continue to use the older, less positive terms to identify students who are eligible to receive additional educational services. For the purpose of this literature review, the current, preferred terminology was used for consistency even if it differed slightly from what was used in the original research reports.

## Potential Benefits with Computer-Assisted Language Learning

Researchers Johns and Torrez (2001) emphasized that in order for those students identified as ELL to acquire the second language, three conditions must be met. First, the learner must perceive a need to communicate in the new language. Second, the learner must receive comprehensible input (Krashen & Terrell, 1983) which means that the learner acquires an understanding of the message but does not focus on or analyze the form of the input. Third, the comprehensible input must occur in a low-anxiety, non-threatening environment where the emotional barrier to language learning is lowered (Krashen & Terrell, 1983). CALL by design meets all three of these conditions.

Language learning through the use of computers promotes communicative fluency through meaningful learning experiences in the target language and culture (Nulman, 1993). Coleman (1991) explained how interactive video with computers

moderates the anxiety often experienced during language acquisition and in so doing also provides increased opportunities for comprehension. He stated, "the physical setting, the speaker's or speakers' identity (age, gender, socio-cultural markers such as clothes), paralinguistic features (including gesture, posture and facial expression), and last but not least visible lip movements, all help the learner to decode the verbal message" (p. 88). He went on to emphasize that this allows for more challenging material to be presented to the second language learner without departing from Krashen's principle of comprehensible input.

*Teacher Responses to the use of Computer-Assisted Language Learning*

In addition to meeting the previously discussed criteria for second language acquisition, CALL also seems to result in high levels of teacher satisfaction. Researchers Gillespie and Barr (2002) studied staff reactions towards the use of CALL in three different universities, two in the United Kingdom and one in Canada. They found that staff members were not resistant to the use of CALL and any hesitations they had were due to practical concerns such as time pressures and course relevance. Researchers Debski and Gruba (1999) conducted a qualitative study of eight university instructors to investigate their attitudes toward project-based computing in second language study. They found that the teachers agreed upon the empowering value of CALL, but shared some concerns with attempts to integrate it into existing curricula. The teachers as a whole seemed inclined to accept the concept of project-based CALL as a basis for curriculum innovation.

*Student Motivation Related to the use of Computer-Assisted Language Learning*

It has been noted that CALL enhances student motivation and satisfaction with learning. In a comparative study between print-oriented and a computer-assisted multiple choice for learning English as a second language, researchers found students' motivation to access computer-assisted information higher than when accessing similar information in print-oriented references (Rico-Garcia & Vinagre-Arias, 2000). Ayres (2002) examined the attitudes of 157 non-native undergraduate students towards the use of CALL and their perceived views of its relevancy to the course of study. He found that the learners appreciated and valued the learning that they did using the computers. They viewed CALL as an important and extremely useful aspect of their studies. Forsyth and Archer (1997) also found that university students rated computer-based instructional components positively. These findings were supported by Holmes (1998) who found that Japanese university students agreed as to the benefits of CALL in language education and the enjoyment of using computers to learn English. Although the literature related to teacher satisfaction and student motivation related to the use of computer-assisted language learning is very sparse, it is encouraging to note that the findings across researchers are consistent. Social validity and ease of use is particularly important related to intervention research. Teacher opinions related to the intervention are likely to influence the frequency of implementation. Unfortunately, there is limited research on elementary teachers' satisfaction and students' motivation related to CALL.

## Literature Review Procedures

A systematic search through four computerized databases including Education Resources Information Center, Academic Search Premier, Psychological Abstracts, and Dissertation Abstract International was conducted. The following descriptors were used: computer assisted language learning, computer assisted language learning and language acquisition, computer assisted language learning and English as a second language, computer assisted language learning and disabilities, computer assisted language learning and special education, and computer assisted instruction and language acquisition. Next, a manual search of the latest issues from 2003 – 2005 of journals that emerged from the computerized search took place. Included among the manual journal search were: *TESOL Quarterly* from spring 2003 through June 2005, *Journal of Research on Computing in Education* from fall 2003 through summer 2005, *Journal of Educational Computing Research* from volume 31(1) 2004 through volume 31(4) 2004, *and Computers in Schools* from volume 21(1/2) 2004 through volume 21(3/4) 2004. The last step in the search process involved an ancestral search through the reference lists of the obtained articles.

## Selection Criteria

Studies were included in this review if: (a) the procedures and data-based results were published between 1985 and 2006, (b) the subjects were non-native English speakers, (c) the subjects were elementary, secondary, or university level students with or without disabilities, (d) treatment consisted of some form of computer-assisted

instruction, and (e) the purpose of the study was to examine the effectiveness of computer-assisted instruction on students' oral or written English language skills.

Studies were excluded from this review if: (a) the participants were native English speakers and were learning a foreign language; (b) the participants were adults not attending school; and/or (c) the treatment consisted of online communication between learners such as video-conferencing, online chatting, or email.

## Review and Analysis of Studies Related to Effectiveness of CALL for Elementary ELL Students

Marjorie H. King (1985) conducted a large scale study to determine the effect of computer-assisted instruction on the English language acquisition of students who were learning English as a second language and did not have access to bilingual programs. The study was conducted in the Irvine Unified School District in Irvine, California at five school sites. A total of 235 kindergarten through eighth grade students participated in this study. These participants were identified as Limited English Proficient based on their scores on the Language Assessment Scales (LAS), Irvine Management System for Language Arts, and California Test of Basic Skills. The students' native languages were Korean, Japanese, Chinese, Vietnamese, Farsi, Filipino, Spanish, or Portuguese as well as a small number of students speaking one of the other thirteen languages represented in the district. Thus, participants selected for this study represented a wide range of languages, backgrounds, and socio-economic levels.

Of the 235 participants, 125 were assigned to the treatment group. These participants were pulled out of their general education classroom for 20 minutes a day to

work on a computer in a laboratory setting with the assistance of a trained computer technician for one calendar year. Students worked with instructional support software designed by the researchers that focused on functional areas of language acquisition in the areas of: socialization, imparting and seeking information, expressing and investigating attitudes, and ability to get things done in an efficient manner. This laboratory assistance was supplemental to existing efforts of school personnel. The 110 students assigned to the control group remained in their general education classrooms and did not receive English as a second language instruction on the computer during the length of this study. They did, however, receive support in the regular classroom for the development of English language skills including assistance on a pull-out basis from speech teachers, aides, cross-age tutors, and resource teachers.

The results of the study revealed a statistically significant difference between the two groups in the area of written expression skills. A near significant difference was noted in the area of reading comprehension. These two differences favored the treatment group. It was concluded that improved performance might have reached the significant level in reading and language with another year of treatment.

Although this study shows promise for the use of computer-assisted instruction for learning English as a second language, it would be difficult to replicate. The program software was developed by the research team and limited information was given regarding the content of that software. Additionally, the control group received additional supports in a pull-out model for language acquisition, but the researchers did not indicate whether the treatment group received these same supports. Finally, the impact of computer-assisted instruction on the acquisition of English as a second

language was limited compared to the amount of classroom instructional time, 20 minutes per day for a calendar year, spent in the computer laboratory setting.

In another study, Sook-Hi Kang (1995) investigated the effects of computer-assisted instruction on the acquisition of English as a second language for elementary aged children. The purpose of this study was to investigate whether the use of computer-based interactive multi-modal materials could facilitate the vocabulary development of elementary aged children who are beginning to learn English as a second language. In order to obtain a sample population of participants that had not been previously exposed to English, the study was conducted in Seoul, Korea with 76 fifth grade children.

Participants were randomly assigned to one of three treatment groups with the goal of teaching 100 targeted English vocabulary words using computer-assisted language learning. Treatment 1: Definition, involved a decontextualized, definition-based approach. Each target English word was presented on a screen for the student to explore its definitions (in Korean), given example sentences, and the English pronunciations. A practice activity was provided that involved paired-associate word learning with sound. Treatment 2: Picture, included all of the instructional features included in Treatment 1. In addition, pictures of word meanings were utilized during treatment 2, and the practice activity was the same as Treatment 1 with the addition of pictures. Treatment 3: Context, involved a context-based approach. In this treatment, vocabulary was introduced in contexts prior to presenting definitions. Illustrative scenes were presented visually, one at a time, along with a written English sentence with its pronunciation. As a practice activity, the participant was placed in a simulated real-world

situation in which recognizing the word and correctly attaching a meaning to the word was instrumental to accomplishing a given task.

The treatment consisted of five sessions on different days. During each one class period session, participants went through their given experimental treatments. A follow-up test was administered at the end of each of the five sessions and again three days later to determine retention. The test consisted of definition recall, listening comprehension, and spontaneous use of vocabulary. Several Analyses of Variance tests were run to compare the three groups on their follow-up test performance on the definition recall measure. Significant differences among the group means were found only for Session 4 and on the retention test with the Context group outperforming the other groups. The univariate ANOVA analyses on the follow-up listening comprehension test data revealed a significant context effect for Session 2 and a significant picture effect for Session 3. On the retention test, the Context group scored the highest, followed by the Picture group, and then by the Definition group. A pair-wise planned contrast was performed to analyze the contrast between the Definition and Picture groups and between the Picture and Context groups on contextualizing vocabulary instruction. While no Picture effect was found for any session, a Context effect was found for Session 4 and the retention test. It was concluded that computer-assisted language learning on second language vocabulary instruction must be context embedded for best results.

This study was a preliminary effort to empirically examine the effectiveness of computer-assisted language learning on second language vocabulary instruction for grade school children by comparing three different computer-based treatments. It would have been beneficial to have one treatment group receive traditional language instruction from

a teacher to compare the effectiveness of traditional language instruction to that of computer-assisted instruction. The researchers did not refer to the level of computer proficiency of the participants which may have affected the outcome if some participants were more proficient than others with the computer. Additionally, the limited number of treatment sessions may impede the researcher's ability to generalize the results.

In another study, Sun and Dong (2004) looked at supporting young children's second language vocabulary acquisition. Software to facilitate English vocabulary learning among Chinese children was developed for use in the study based on a segment of a popular Disney cartoon that included 29 English sentences. It was a 6-minute animated segment that included 19 words, 4 of which were identified as target words.

The study included 67 Grade 1 and Grade 2 students with an average age of seven years and three months. The students attended an urban Beijing school and could speak Chinese fluently and had not yet taken English classes in school. A pretest was conducted to determine whether any of the students knew the meanings of the target words. It was determined that none of the children could correctly identify the meaning of any target words.

A one-factor experimental design was used in this study. Participants were randomly assigned to one of three learning conditions: No Support (NS), Sentence-Level Translation (SLT), and Sentence-Level Translation + Target Warming-Up (SLT + TW). Each participant watched the computer-based animation twice. Under the NS condition, participants merely watched the English language animation, receiving the second language input without any learning support. After each English sentence in the SLT condition, participants were provided a Chinese translation orally by the computer

program. For the SLT + TW condition, participants were presented with the flash cards of the individual target words prior to viewing the animation and asked to read each word after the experimenter read them. This session lasted approximately five minutes and then the participants watched the same animation shown in the SLT condition.

Immediately following the viewing of the animation, all participants were asked to complete three successive computer-based posttests designed to evaluate word pronunciation, word understanding, and sentence translation. Because equal variance was not assumed, a Mann-Whitney U Test was conducted to examine the effect of the learning conditions. Participants in the SLT + TW condition significantly outperformed those in the other two conditions on the word pronunciation test and word understanding. Participants in the SLT and SLT + TW conditions scored significantly higher than the NS condition on the sentence translation. It was concluded that second language vocabulary acquisition for young children requires learning supports.

The findings in this study support computer-based instruction with learning supports as a means of developing English as a second language vocabulary. However, because the study only selected four target words and the instruction took place over a short period of time, the results may not be generalized to more extensive second language learning over a longer duration.

## Summary of Research Related to Effectiveness of CALL for Elementary ELL Students

Based on this review of literature, it appears that the use of CALL has the potential to improve written expression and reading comprehension (King, 1985) and

second language vocabulary (Kang, 1995; and Sun &Dong, 2004) in elementary students who are learning English as a second language. No research was found on the impact of CALL on oral language acquisition or the use of CALL with students with disabilities. The research base involving elementary students is sparse. Therefore, there is a need for additional research in this area that includes a treatment group that receives CALL and a control group that receives only traditional classroom instruction. It is also important for future research to include students with disabilities and to measure oral language acquisition along with reading comprehension and written expression.

## Review and Analysis of Studies Related to the Effectiveness of CALL for Secondary and Post-Secondary ELL Students

Carol Chapelle and Joan Jamieson (1986) investigated the effectiveness of computer-assisted language learning in the acquisition of English as a second language by Arabic- and Spanish-speaking students. The study attempted to answer two questions. The first question was to determine what kind of student likes to use CALL. The second question was whether those students who spent more time using CALL receive higher scores on the end-of-semester English tests than those who spent less time using CALL.

The study was conducted at the University of Illinois and included students enrolled in the Intensive English Institute during the Fall 1982 semester. Of the 84 students in the Institute, 28 Spanish-speaking and 20 Arabic-speaking students agreed to participate. The participants ranged in age from 18 to 40 and had Test of English as a Foreign Language (TOEFL) scores ranging from 430 to 510.

All participants used ESL PLATO courseware that is primarily a drill and practice curriculum of lessons in the skill areas of grammar, reading, and listening. Participants were assigned to work 4 hours a week in the PLATO lab. However, the lab time was not monitored and participant attendance varied. English proficiency was measured at the end of the semester by the TOEFL and an oral test of communicative competence (Bachman & Palmer, 1982) that measured three general competence areas: grammatical, pragmatic, and sociolinguistic. Additionally participants were given a test of field independence/dependence, ambiguity tolerance, English-class anxiety, motivational intensity, and a participant information questionnaire in the seventh week of the semester all of which were translated into their native languages.

Pearson product-moment correlations were calculated to determine if students' cognitive/affective characteristics were related to time spent using CALL and attitude toward CALL. Then, a multiple regression analysis was performed to determine if one predictor variable accounted for the variance in time and attitude. Additionally, multiple regression analyses using the end-of-semester language measures as dependent variables were completed. There was a significant negative correlation between field independence and both time and attitude. A significant positive correlation was found between motivational intensity and both time and attitude. There were no significant correlations between ambiguity tolerance and English-class anxiety with time and attitude. There was no significant difference between participants who used CALL more than participants who spent little time using CALL.

Chapelle and Jamieson (1986) concluded that CALL cannot be evaluated without looking at other student variables that are important in second language acquisition.

Specifically, consideration of field independence/dependence, which was negatively correlated with time using CALL and positively correlated with ESL proficiency, rendered time spent using CALL insignificant. They recommend additional research in which relevant student variables are taken into account in a control/treatment design assessing use of CALL versus no use of CALL.

The study contributed to the body of research on CALL by taking into consideration variables of individual participants. However, it was limited in that it did not have a control group for comparison purposes. Additionally, the study did not clarify the difference in time spent using CALL between those who spent more time using CALL than those who spent less time using CALL.

Carol Chapelle conducted another study in conjunction with Suesue Mizuno (1989) that examined to what extent "high level" and "low level" ESL students employ five distinct learning strategies when using a CALL program. The five strategies included resourcing (using reference materials in the target languge), practicing, self-monitoring (correcting own grammar), self-management, and self-evaluation.

The study conducted at Iowa State University included 34 participants among a pool of 105 students enrolled in five intermediate ESL classes. These 34 participants came from 12 different countries. Ten participants were female, and the other 24 were male. In addition, 13 of the 34 participants were placed either in a "high proficiency" group (n=7) or a "low proficiency" group (n=6) based on their scores on an English placement test they had taken earlier when entering Iowa State University.

All participants completed grammar lessons designed for intermediate and advanced ESL students. Every keystroke made by each participant in the CALL program

was recorded by the computer and then later used to determine the total amount of time each participant spent on the grammar lessons, the number of sentences each participant constructed, the number of times each participant used the help option, how each participant edited his or her own work, which phrases each participant chose, and which feedback messages each participant received from the computer. No achievement test was administered at the completion of the grammar lessons. Instead, the researchers focused on the process of student learning instead of the product.

Analysis of the data revealed that the participants did not use resourcing strategies often. No significant differences were noted between the high proficiency group and low proficiency group in the use of help options, amount of practice. Students employed self-monitoring in about 82% of the CALL lessons, self-management in about 81% of the CALL lessons, and self-evaluation in about 46% of the CALL lessons. No significant differences were found between the high and low proficiency groups in employing these strategies.

It was concluded that importance must be placed on observing students as they work on CALL lessons, and that researchers need to use empirical evidence to design better CALL programs that help students select appropriate learning strategies for particular situations. The results of this study should be interpreted with caution due to the small sample size and lack of a control group.

A study conducted by Stenson, Downing, Smith, and Smith (1992) tested the hypothesis that international teaching assistants (ITAs) using an IBM software program which provides visual representations of speech would make greater gains in their overall pronunciation and, in their ability to pronounce key words in their academic fields, than

would those ITAs working with more traditional methods of pronunciation practice. The study was conducted at the University of Minnesota over the course of one quarter.

The study included 18 participants in the treatment group and 35 participants in the control group. Both groups attended one two-hour group session each week in groups of four participants. In addition, each participant received 50 minutes of one-on-one instruction every week. Participants in the treatment group accessed the computer software program for approximately 15 minutes at a time during the 50 minute session for a total of 80 minutes during the quarter. Participants in the control group did not have access to the computer software during the 50 minute sessions.

Participant pronunciation performance was assessed using an exam from the Educational Testing Service called SPEAK and the "Mimic Test" designed by the researchers. No significant differences were found between pre- and post-test scores for the CALL group and the control group on both assessment measures. Stetson et al. (1992) concluded that the CALL group did not get enough practice with the software program to show significant results. The minimal amount of time spent on the software program does pose a limitation to the study, and makes it difficult to draw conclusions from the data.

Patricia B. Machado (1997) examined the effects of computer-assisted technology on the language acquisition rates of second language learners. The purpose of this study was to determine if second language learners were able to acquire English language fluency better and at a faster rate when specially designed academic instruction in English (SDAIE) teaching strategies were paired with technology.

The ten week study was conducted in two middle schools in the Norwalk-La Mirada Unified School District in Los Angeles County, California. The participants in the study were approximately 200 students from grades six, seven, and eight who had been identified as second language acquisition students, either non-English proficient (NEP) or limited-English proficient (LEP). These designations were based on scores obtained from the Idea Proficiency Test (IPT) that assessed listening and speaking, and on scores obtained from the district's rubric-graded writing proficiency test.

Participants were randomly assigned to either a treatment group or a control group. All participants in the study received 45 minutes of English language instruction daily from SDAIE-trained teachers in the areas of listening, speaking, reading, and writing. However, the treatment group received computer-assisted instruction during their daily 45 minute English language lesson. Specifically, they used *The Bilingual Writing Center* by the Learning Company.

At the conclusion of the ten weeks, posttests were administered and the results were analyzed using descriptive statistics, one-way analysis of variance, and two-way analysis of variance without replication. Scheffe Post-Hoc analysis was used when significant differences emerged. These analyses revealed statistically significant differences between the treatment and control groups in the areas of oral language assessment (IPT), writing, and an observation matrix of students' oral language performance in the classroom with the treatment group outperforming the control group.

The results of Machado's research support the use of computer-assisted technology for increasing rates of acquiring English as a second language. A strength of this study is that the computer-assisted instruction was incorporated into an already

existing program within the schools. The comparison of students receiving second language instruction with and without computer-assisted instruction clearly demonstrated that computer technology showed promise in addressing the language acquisition needs of middle school aged students. Unfortunately, the researcher did not provide detail as to the content and structure of the computer-assisted instruction which would make it difficult to replicate the study.

Allum (2002) compared teacher delivery and CALL delivery of the same instructional material. The study was completed during 90-minute classes held weekly for 11 weeks. Participants were alternately assigned to a group which resulted in 28 students in the CALL group and 26 in the classroom group. All participants were first year university students taking compulsory English. The materials used were authored by the researcher, and students completed almost exactly the same exercises on the computer as they did in the book. All students heard the same accompanying audio CD.

Identical pre- and posttests were administered at the beginning and the end of the 11 weeks. Additionally, pre- and posttests were administered for each unit of study. These tests measured vocabulary, listening comprehension, grammatical construction, functional phrases, and spelling. Additional data were obtained through a questionnaire on student attitudes to the material, method, and sense of progress. Finally, the researcher collected informal observation data of student behavior in the CALL classroom.

Data were analyzed using T-tests on the results of pre- and posttests and comparative differences in improvement. The pre- and posttests for the individual units of study showed significantly greater gains for the classroom group in listening and

written dialogue skills. Both groups scored equally on the translation test of phrases. The CALL group showed significantly greater accuracy on the grammar test that focused on prepositional phrases dealing with locations. The results of the study suggest the CALL is effective for some aspects of second language acquisition, but should not be relied on solely to deliver materials over longer periods of time.

This comparative study contributes to the body of knowledge on the role of CALL in second language acquisition. A strength of this study was that both the teacher delivery group and the CALL delivery group received the same instructional content making the comparison of results more reliable than other studies using different instructional materials for each group. However, the variables within the classroom setting are hard to control for and to replicate. Specifically, the quality of teacher and the strategies for delivery of instruction can have a significant impact on student learning. Thus, questions regarding whether another teacher would have had similar results emerge. A possible solution would be to have more than one classroom teacher with both teachers teaching a control and treatment group. This type of counter-balancing would help control for teacher effect.

Tozcu and Coady (2004) investigated the effect of CALL on vocabulary knowledge, reading comprehension, and speed of word recognition. Participants in this study included 56 university students studying English full time for university academic preparation with scores on the Michigan English Language Assessment Battery ranged from 48 to 74. The participants in the study came from different language backgrounds (i.e., 43 were Asian, 10 Latin American, 1 European, 1 Russian, and 1 Middle Eastern).

Participants were randomly assigned to either treatment or control groups. An adaptation of the Meara vocabulary test was administered to determine approximate vocabulary levels of the participants. The 12 students in the treatment group with lower vocabulary scores were assigned to Treatment Group A and studied vocabulary levels 1 and 2. The other 16 students were assigned to Treatment Group B and studied vocabulary levels 2 and 3. The students in the control group with lower vocabulary scores were assigned to Control Group A, and the remaining students were assigned to Control Group B.

Participants in both the treatment and control groups were given pre- and posttests in vocabulary, reading comprehension, and reaction time for word recognition. The vocabulary software program utilized for this study was *New Lexis*. *New Lexis* employs Study, Practice, and Review modes for 6,400 highly frequent words in English. The treatment groups studied approximately 2,000 of the highly frequent words in English on the computer for 3 hours per week for 8 weeks. The control group spent the same amount of time reading texts and doing reading comprehension exercises.

The data were analyzed using repeated measure ANOVAs. The results indicate that both groups made gains in vocabulary knowledge, but the treatment group showed significantly greater gains than the control group. Similar results were found with the reading comprehension and reaction times. Both groups made gains, but the treatment groups made significantly greater gains than the control group. The researchers concluded that individualized learning on the computer is effective for facilitating vocabulary acquisition which is likely to have a positive effect on reading comprehension and rate of speed for frequent word recognition.

This study provided strong evidence for the use of CALL for second language acquisition for this age group. The study would be relatively easy to replicate using the *New Lexis* software program. It is not clear if the benefits of this program would generalize to younger children.

In another study with university students, Torlakovic and Deugo (2004) examined whether CALL grammar instruction contributes to improving learners' performance and confidence in positioning adverbs in an English sentence. The participants in this study were 21 ESL learners from four ESL classes at Carleton University in Ottawa, Canada, between the ages of 20 and 35. Participants volunteered to be in the study which was completed outside of regular class time, and all of the students were at the same intermediate proficiency level of the English language.

Participants were randomly assigned to one of three groups. The first experimental group was designated as the computer group and started with 10 participants and ended the study with 8. The second experimental group was designated as the in-class group and started with 11 and ended the study with 5 participants. The third group was designated as the control group and started with 10 and ended the study with 6 participants.

All three groups were administered a pre- and posttest. The computer group used the Adverbial Analyzer, a CALL program designed for the study, in a computer lab setting for two consecutive weeks for 60 minute sessions three times a week for a total of 6 hours. The in-class group had 6 hours of instruction with an experienced ESL teacher. The instruction was organized the same as instruction for the computer group. The control group was only involved in the administration of the pretest and posttests. One

posttest was administered on the last day of instruction, and a second delayed posttest was administered two weeks later.

The data were analyzed for improvement of performance using 'percent correct' of each participant and ANOVA procedures were used to determine differences between the groups. It was found that there was no significant difference among the three groups when looking at the percent correct. All three groups had some performance improvements. Students in the computer group showed a significant improvement from the pretest to the posttest, and from the posttest to the delayed posttest. Students in the in-class and control groups did not show a significant improvement in any test comparisons.

The study showed that CALL grammar instruction significantly improved the grammatical performance and confidence of intermediate ESL students. However, the findings may differ if more students had participated and/or if the treatment had been used for a longer period of time.

## Summary of Research Related to the Effectiveness of CALL for Secondary and Post-Secondary ELL Students

Based on this review of literature, it appears that computer-assisted language learning has some potential to improve language skills of students learning English as a second language, but the research is not conclusive. Some researchers found that students using CALL had higher oral language assessment and writing scores (Machado, 1997), made greater gains in vocabulary knowledge, reading comprehension, and reaction time (Tozcu & Coady, 2004), and significantly improved grammatical

performance (Torlakovic & Duego, 2004). Other researchers found no significant differences between students using CALL and students in a control group (Stenson et al., 1992), and one researcher found that the classroom group scored higher in listening and written dialogue skills while both groups scored equally on translation test of phrases and the CALL showed more accuracy on the grammar test (Allum, 2002). Researchers did note the importance of taking into account student variables and of observing students using CALL in order to design better CALL programs (Chappelle & Jamieson, 1986; and Chappelle & Mizuno, 1989). There was no available research that included students with disabilities. Due to the inconsistencies within this body of research, there is a need for additional research to conclusively determine the effectiveness of CALL for secondary and post-secondary students with and without disabilities who are learning English as a second language.

## Review and Analysis of Studies Related to the Effectiveness of the English Language Learner's Instructional System (ELLIS)

Three studies were identified that used the English Language Learner's Instructional System (ELLIS) computer software program as the CALL intervention. In the first study, Keng-Soon Soo (1997) conducted one of the first studies on large scale uses of multimedia in ESL teaching in Southeast Asia. The purpose of this study was to determine whether CALL is as effective as traditional instructor-led ESL classes.

The study was conducted at the University of Malaysia where students are required to take the Test of English as a Foreign Language (TOEFL) exam upon entrance. The TOEFL measures Listening Comprehension, Structure and Written

Expression, and Vocabulary and Reading Comprehension. Those who scored below 550 on the TOEFL were randomly assigned to one of 10 classes. Six of these classes were designated as the experimental group with a total enrollment of 121 students. The other 4 classes were designated as the control group with a total enrollment of 63 students.

During the 16 week study, the experimental group went to a 24 workstation Multimedia Language Laboratory where they accessed the ELLIS program for as many hours as they wanted. There was no limit on how much time these participants spent on the program, but they were required to attend a weekly session led by a research assistant to discuss what they had learned during the week and what they did not understand. The control group learned in traditional ESL classes that met on a weekly basis. Due to technical problems with the computer laboratory, the experimental group started five weeks after the control group. At the end of the 16 weeks, both groups were given a parallel TOEFL test as the post-test.

Results were analyzed using a one tailed t-test on the gain scores of the two groups. It was found that the experimental group improved significantly more than the control group in Listening Comprehension and Vocabulary and Reading Comprehension. Both experimental group and control group showed improvement on the Structure and Written Expression section of the test, but there was no significant difference between their improvements. Soo (2002) concluded that CALL can deliver better learning outcomes than traditional instructor-led ESL classes.

Although this study supports the use of CALL as an effective tool for increasing the language skills of students learning English as a second language, it has some limitations. It is difficult to compare the experimental group to the control group

because there was no control for the number of hours spent in the laboratory and no description of the curriculum used with the control group. If in fact the experimental group spent twice as much time on learning tasks as the control group, it would be a logical conclusion that the experimental group would score higher on the post-test. Additionally, if the curriculum used with the control group was not similar to the curriculum covered with the experimental group then it is difficult to determine whether CALL was the important variable instead of the curriculum.

In a second study, Nutta (1998) examined whether computer-based grammar instruction is as effective as teacher-directed grammar instruction for postsecondary students at multiple levels of proficiency in an intensive English as a Second Language (ESL) program. Participants in the study included 53 students enrolled in an intensive academic ESL institute at a major university in Florida. The university offers four levels of instruction and uses the Comprehensive English Language Test to place students.

Two experiments were conducted at different levels of English language proficiency. The first experiment compared the performance of level-one and level-two students in a computer-based group versus those in a teacher-directed group. The second experiment compared the performance of level-three and level-four students in a computer-based group versus those in a teacher-directed group. Ten students were enrolled in level one, 9 in level two, 20 in level three, and 14 in level four. Participants were randomly assigned to computer-based or teacher-directed groups.

The treatment consisted on one hour of instruction per day for seven days. The students who participated in Experiment One used ELLIS Middle Mastery (1996), and the students who participated in Experiment Two used ELLIS Senior Mastery (1996).

ELLIS was selected because of its multimedia delivery, its modeling of natural and contextualized language, its interactivity, and its clear grammar explanations and practice activities.

The pretests were administered three days prior to the beginning of the treatment, the immediate posttests were administered on the last day of the treatment, and the delayed posttests were administered two weeks after the posttests. Each test consisted of a discrete-point multiple choice test, a fill-in-the-blank test, and an open-ended test developed by the researcher. Analysis of Covariance was used to analyze the data. Because of the small sample size, the alpha level was set at .10 for tests of significance.

Analysis revealed a significant difference between the test scores of the students in the computer-based groups and those in the teacher-directed groups on the open-ended immediate posttest and open-ended delayed posttest with the computer-based group having higher mean scores. The students in the computer-based group scored significantly higher than the students in the teacher-directed group on the fill-in-the-blank immediate posttest. However, this difference was no longer evident in the delayed posttest. No significant differences were found between the groups for the multiple choice immediate posttest or delayed posttest.

This study supports the promise of computer-assisted instruction for the purpose of learning English as a second language. However, the duration of treatment was limited, and it is questionable whether the content of the ELLIS Middle and Senior Mastery software would be appropriate for younger students.

In another study using the ELLIS and Rosetta Stone software, Luk (1999) examined the impact of video disc and multimedia computer assisted language learning

on community college students studying English as a second language. The researcher attempted to determine the benefit of students' additional use of CALL software in a laboratory setting to extend the time they spent learning in an ESL classroom. A multiple group, non random design was used to investigate the effects of time spent in the computer assisted language learning lab and time spent in the regular classroom on student learning. A single sample, pre-post design was conducted to address the selection bias weaknesses of the first part of the study through the use of a different type of design.

The 250 participants in the study were enrolled in 10 ESL classes at the Pasadena City College, Community Education Center and ranged in age from 30 to 49. The 125 students enrolled in the five morning classes were assigned to the treatment group receiving classroom instruction and additional access to CALL each week. Of those students, 62 self-selected themselves into the treatment group. Within this group, 37 students completed the semester and 25 students dropped out over the course of the semester. The 125 students enrolled in the five afternoon classes served as the comparison group receiving only classroom instruction. Of those students, 89 students participated in the study, and 35 dropped out over the course of the semester. The sample is also represented by students with 12 different home languages.

Students' English proficiency was measured at the beginning and the end of the ten week study using the Comprehensive Adult Student Assessment System. All participants in the study received ESL instruction in a classroom setting for a maximum of 12 hours per week over the 10 week semester. Participants in the treatment group had the opportunity to work up to four hours a week in the CALL lab over the 10 week semester. This lab time was not required. Student's ability level and particular software

package were carefully matched using The Rosetta Stone or ELLIS, Senior and Middle Mastery programs.

Data were analyzed using descriptive statistics comparing the treatment and comparison groups initially. Group means were tested with T-tests. Then a correlation matrix was developed to examine possible relationships between variables. Finally, a multiple regression analysis was performed to determine significant predictors. It was suggested that CALL lab time is a significant predictor of learning. The effects of one hour of CALL lab time are about three times greater than the effects of one hour of classroom time on learning. It was noted that optimal time spent in the laboratory appears to be between 11 and 30 hours. After 30 hours, learning begins to fall off.

This study provides strong support for supplementing classroom instruction with CALL. Since students attended the CALL laboratory voluntarily, it is difficult to determine what role motivation played in student learning.

## Summary of Research Related to the English Language Learner's Instructional System (ELLIS)

Based on this review of literature, it appears that the ELLIS computer software program has the potential to be an effective intervention when using CALL for post-secondary students learning English as a second language. CALL using ELLIS as the intervention resulted in better learning outcomes than traditional instructor-led ESL classes (Soo, 1997), higher mean scores on curriculum-based assessments (Nutta, 1998), and was a significant predictor of learning (Luk, 1999). However, there is a need for

additional research to be conducted with students at the elementary and secondary level that includes students with and without disabilities.

## Review of Literature Summary

Based on this review of literature, there are mixed findings related to the effectiveness of computer-assisted language learning for increasing language achievement for students who are learning English as a second language. Several researchers have proven CALL's effectiveness at the elementary (Kang, 1995; King, 1985; and Sun & Dong, 2004), secondary (Machado, 1997), and post-secondary (Allum, 2002; Torlakovic & Duego, 2004; and Tozcu, 2004) levels. However, Allum (2002) had mixed findings in which the classroom group scored higher in listening and written dialogue, both groups scored equally on translation test of phrases, and the CALL group showed greater accuracy on the grammar test. Stenson et al. (1992) found no significant differences between CALL groups and control groups. None of the above mentioned research included students with disabilities. The limited and mixed research findings demonstrate a need for additional research on CALL for ESL students with and without disabilities.

One CALL intervention identified and tested in the research was the English Language Learner's Instructional System (ELLIS). This software program shows promise in increasing student achievement when used as a CALL intervention (Luk, 1999; Nutta, 1998; and Soo, 1997). This body of research exclusively involved post-secondary students. Therefore, there is a need for research using ELLIS as the CALL intervention that involves elementary aged students with and without disabilities.

It is important to identify CALL that is effective when used with elementary aged students with and without disabilities to promote the acquisition of English as a second language in order to ensure student achievement in English. The research in this study will contribute to this knowledge base and better prepare elementary school personnel to make informed decisions about the use of CALL and the effectiveness of the ELLIS software program as a CALL intervention.

# CHAPTER 3

## METHODOLOGY

The purpose of this study was to investigate the effects of the English Language Learners Instructional System (ELLIS) on oral language, written language, and reading achievement among students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with CALL and the use of ELLIS were assessed. Specifically, the following questions were addressed in this study:

Question 1. Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners with disabilities?

Question 2. Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners without disabilities?

Question 3. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners with disabilities?

Question 4. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners without disabilities?

Question 5. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners with disabilities?

Question 6. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners without disabilities?

Question 7. Is there a difference in effectiveness between individual and paired instruction using the English Language Learners Instructional System?

Question 8. What is the level of teacher satisfaction with the use of the English Language Learners Instructional System?

Outlined in this chapter are the methodological components of the study beginning with identifying the subjects, setting, and instrumentation. Next, a description of each phase of this study is provided. Finally, information on how the data was analyzed to answer each of the research questions is shared.

## Participants

The participants for this study were 78 third, fourth, and fifth grade students with and without disabilities enrolled in a public elementary school in the Clark County School District in Las Vegas, Nevada. These students are all of Hispanic descent and have been designated as Non-English Proficient or Limited-English Proficient based on LAS scores of 240 or less. Twelve of the subjects have also been identified as having a disability based on the criteria established by the *Individuals with Disabilities Education Act* (2004). A summary of specific subject demographics is provided in Table 1.

The elementary school is located in the East Region of the Clark County School District. The East Region has adopted a region wide model of sheltered instruction based

on the Sheltered Instruction Observation Protocol (SIOP) Model. Sheltered instruction (SI) in this model is defined as:

> an approach to teaching that extends the time students have for receiving English language support while they learn content subjects. SI classrooms, which may include a mix of native English speakers and English language learner or only ELLs, integrate language and content while infusing sociocultural awareness. Teachers scaffold instruction to aid student comprehension of content topics and objectives by adjusting their speech and instructional tasks, and by providing appropriate background information and experiences. The ultimate goal is accessibility for ELLs to grade-level content standards and concepts while they continue to improve their English language proficiency (Echevarria, Vogt, & Short, 2004, p. 223).

All classroom teachers at the elementary school where the study took place received a half-day training on the SIOP model and the ELL facilitator met with grade levels on a monthly basis to continue to provide staff development and support as needed to ensure proper implementation of the model for all participants in this study.

The participants were randomly assigned to one of three groups. Treatment group A received individual CALL instruction on the ELLIS program in addition to the mandated sheltered instruction in their classrooms. Treatment group B was assigned a partner and received paired CALL instruction on the ELLIS program in addition to the mandated sheltered instruction in their classrooms. The third group served as the control group and only received the mandated sheltered instruction in their classrooms.

Table 1

*Demographic Information for Participants*

| Treatment Group | Group A: Individual | Group B: Paired | Group C: Control |
|---|---|---|---|
| Grade | | | |
| 3 | 10 | 11 | 12 |
| 4 | 9 | 8 | 7 |
| 5 | 7 | 7 | 7 |
| Gender | | | |
| Male | 11 | 16 | 14 |
| Female | 15 | 10 | 12 |
| IDEA Eligibility | | | |
| Mental Retardation | 1 | 0 | 1 |
| Specific Learning Disability | 2 | 1 | 5 |
| Visual Impairment | 1 | 0 | 0 |
| Speech Impairment | 0 | 1 | 0 |
| Language Proficiency | | | |
| Non-English Proficient | 4 | 2 | 2 |
| Limited-English Proficient | 22 | 24 | 24 |

## Setting

The study took place at William E. Ferron Elementary School within the Clark County School District. Ferron Elementary was classified as a school that demonstrated Adequate Yearly Progress (AYP) during the 2005-2006 school year according to the progress indicators outlined in the *No Child Left Behind* Act of 2001. The enrollment at this school for the 2005-2006 school year was 738 students. The student ethnicity as reported on the 2005-2006 School Accountability Report included: 1.8% American Indian, 5.0% Asian/Pacific Islander, 42.3% Hispanic, 11.2% Black/African American, and 39.7% White. Additional data from the Accountability Report included a transiency rate of 52.3% compared to the district average of 35.8%. The enrollment percentage of student's receiving special education services was 16.7% compared to the district average of 10.8%. The percentage of students who are identified as Limited English Proficient was 23.0% compared to the district average of 17.3%. The percentage of students qualifying for free and reduced lunches was 65.6% compared to the district average of 45.6%.

Participants accessed the ELLIS program in a mini computer lab with 10 computers. The ELL facilitator scheduled the students based on their daily classroom schedules to ensure that students did not miss instruction from their classroom teacher in the core content areas of reading, writing, and math.

## Instrumentation

The Nevada Department of Education requires that all identified non-native English speakers are assessed for levels of language proficiency upon entering their local

public school. The state of Nevada identified the Language Assessment Scales (LAS) (CTB Macmillan/McGraw-Hill, 1994) as the tool to determine the students' level of English proficiency in oral language, written language, and reading. Students were then assigned a coded label based on their scores obtained from this assessment that identifies them as Non English Proficient (NEP), Limited English Proficient (LEP), or Fully English Proficient (FEP). Students who earn a score in the range from 0-60 are designated as NEP. Students who earn a score in the range from 61-240 are designated as LEP. Students who earn a score in the range from 241-300 are designated as FEP.

The LAS was initially administered within three months of enrolling in a Nevada public school and is updated annually. All subjects had a language proficiency designation based on LAS scores prior to the beginning of the study. During the course of this study, the Nevada Department of Education adopted a newer version of the LAS called the LAS Links published in 2005 by CTB/McGraw Hill which was then administered at the end of the study to determine progress in language proficiency.

The LAS Links assessment comprehensively assesses the four major language domains of speaking, listening, reading, and writing. The Speaking test is individually administered by a trained examiner and consists of four subtests: Speak in Words, Speak in Sentences, Make Conversation, and Tell a Story. The examiner reads from the student book, points to illustrations, and asks questions and/or directs the students to respond to prompts. The Listening, Reading, and Writing Tests are administered to a group of students by a trained examiner and all items are in either a multiple choice or constructed response format. The Listening Test consists of three subtests: Listen for Information, Listen in the Classroom, and Listen and Comprehend. Scores from the Speaking and

Listening Tests are combined for an overall Oral score. The Reading Test consists of three subtests: Analyze Words, Read Words, and Read for Understanding. The Writing Test consists of four subtests: Use Conventions, Write About, Write Why, and Write in Detail. See Appendix I.

The LAS Links was selected as the assessment tool for this study instead of the assessment component of the ELLIS software program based on Chapelle's (2001) recommendation that empirical research demonstrating the language learning potential of a CALL activity needs to show that learners have improved in their target language that is focused on in the CALL activity, not necessarily on the CALL tasks themselves.

An open-ended interview was conducted with the ELL facilitator at the completion of the study to determine levels of satisfaction, ease of administration of the CALL program, and obstacles encountered throughout the study. The interview questions are provided in Appendix II.

## Instructional Program

The English Language Learners Instructional System (ELLIS) Kids Suite includes three levels: Zero, One, and Two. Level Zero focuses on basic vocabulary development with phonics-based beginning reading instruction. There are a total of nine lessons. Each lesson introduces an animated song followed by native-language-supported instruction that includes focus words, alphabet names and shapes, phonological and print awareness, and focus sounds and phonics rules. See Appendix III. These nine lessons include 30 hours of computer instruction.

Kids Level One and Level Two focus on vocabulary, listening, grammar, pronunciation and communication skills with native language support. Level One is set up around three themes: My New School, Meet My Family, and School Days. Level Two is also set up around three themes: International Week, The Accident, and Parent Night. Each theme consists of five lessons. For each lesson, the participant watches a full-motion video story prior to moving into the Skills Menu. See Appendix IV. The participants are given the freedom to complete the vocabulary, listening, grammar, pronunciation, and communication sections in any order. Each section has five activities. Participants are required to complete each activity within the section with 70% accuracy or better before the program allows them to move on to the next section. There is no limit to the number of times a participant worked on an activity within a section.

## Design and Procedures

### *Phase One: Planning*

The first phase of the study included a full day of training for the ELL facilitator who was responsible for the implementation and maintenance of the ELLIS program. This training was provided by staff employed by the ELLIS company. The focus of this training was on the hardware needed to run the program and on the management aspect of the software program. Permission for the study was obtained from the University of Nevada, Las Vegas Office for the Protection of Research Subjects. However, the ELLIS program was something that the school was implementing regardless of this study.

*Phase Two: Training*

This phase of the study focused on training for participants assigned to treatment groups A and B. An informational letter detailing the program was sent home with the participants. The ELL facilitator met with the designated participants by grade level for an initial training session. The training session provided the participants an overview and demonstration of the ELLIS program and then made sure that all participants were properly registered and able to log into the program. Then each participant completed the initial assessment that placed them at the appropriate instructional level in the program which was Essentials or Level One. There were no participants in this study that scored high enough on the initial assessment to place them in Level Two.

*Phase Three: Implementation*

The implementation of the ELLIS program occurred from October 2005 to February 2006. During the implementation phase, permission for the study was obtained from the University of Nevada, Las Vegas Office for the Protection of Research Subjects, and parent consent and student assent forms were sent home with the students. Only data from students with signed consent and assent forms were included in the study. Participants assigned to treatment groups A and B completed 45 minute sessions on the ELLIS program on alternating days throughout the study. Initially it was planned that participants would complete 40 sessions for a total of 30 hours of instructional time on the computer. However, due to participant absences from school, special programs in classrooms, and other disruptions that naturally occur in a public school, the participants averaged 19.65 hours of CALL instruction. During this phase, seven participants transferred to another school within Clark County and were exited from the study.

*Phase Four: Final Data Collection*

In February 2006, the LAS Links was administered to the remaining 71 participants by the ELL Facilitator. The test results were then submitted to the English Language Learner Department of the Clark County School District who then sent them to CTB McGraw-Hill to be scored. When the test results were returned to the school, test data were missing for 10 participants who then also had to be exited from the study. Data for the remaining 61 participants were analyzed to answer the research questions related to the effectiveness of the ELLIS software program.

## Treatment of Data

Research Question 1: Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners with disabilities? The Oral scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 2: Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners without disabilities? The Oral scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 3: Is the English Language Learners Instructional System effective for improving written language achievement among English language learners with disabilities? The Writing scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 4: Is the English Language Learners Instructional System effective for improving written language achievement among English language learners without disabilities? The Writing scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 5: Is the English Language Learners Instructional System effective for improving reading achievement among English language learners with disabilities? The Reading scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 6: Is the English Language Learners Instructional System effective for improving reading achievement among English language learners without disabilities? The Reading scores obtained from the LAS Links were entered into SPSS and then analyzed using an ANOVA at the .05 level of significance to determine

differences. Next, an ANCOVA at the .05 level of significance was used to adjust posttest oral language scores of the experimental group for pretest differences.

Research Question 7: Is there a difference in effectiveness between individual and paired instruction using the English Language Learners Instructional System? The Overall scores obtained from the LAS Links was entered into SPSS then analyzed using an ANOVA at the .05 level of significance.

Research Question 8: What is the level of teacher satisfaction with the use of the English Language Learners Instructional System? The qualitative data obtained from the open-ended interview was collected in a narrative format.

# CHAPTER 4

## RESULTS

The purpose of this study was to investigate the effects of the English Language Learner's Instructional System (ELLIS) on oral language, written language, and reading achievement among students with and without disabilities who are English language learners. Participants were randomly assigned to one of three groups. Treatment Group A included students with and without disabilities. These students received individual instruction on the ELLIS program. Treatment Group B included students with and without disabilities. These students received ELLIS instruction in student pairs. The third group of students was a control group and did not receive instruction using the ELLIS program.

Prior to the study, the Language Assessment Scales (LAS) (CTB Macmillan/McGraw Hill, 1994) was administered to all participants to determine their levels of language proficiency. The LAS measures oral language, written language, and reading achievement. At the completion of the study, the LAS Links (CTB Macmillan/McGraw Hill, 2005), an updated version of the LAS was administered to all participants. A .05 confidence level was used to evaluate statistical significance.

A total of eight research questions were answered in this study. This chapter is organized according to these questions. After a restatement of each question, the data

analysis procedures that were used to answer the question as well as the results obtained are reported.

## Research Questions and Related Findings

Question 1: Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners with disabilities?

Within the group of participants with identified disabilities, an analysis of variance (ANOVA) indicated the difference in oral language posttest scores of the experimental ($M$ = 471.67) and control ($M$ = 487.50) groups was not statistically significant, $F(1,10) = .57, p = .47$. Using an analysis of covariance (ANCOVA) to adjust posttest oral language scores of the experimental ($M$ = 476.50) and control ($M$ = 482.67) groups for pretest differences, the difference was not statistically significant, $F(1,9) = .15$, $p = .71$. Therefore, the ELLIS program did not appear to be effective for improving oral language achievement for ELL students with disabilities. Detailed information is provided in Tables 2 and 3.

Table 2

*Summary of ANOVA for Oral Language Achievement among ELLs with Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 471.67 | 50.51 | 6 |
| Control | 487.50 | 9.95 | 6 |

*Significant at the p<.05 level.

Table 3

*Summary of ANCOVA for Oral Language Achievement among ELLs with Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 476.498 | 11.256 | 6 |
| Control | 482.669 | 11.256 | 6 |

*Significant at the p<.05 level.

Question 2. Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners without disabilities?

Within the group of participants without disabilities, an analysis of variance (ANOVA) indicated the difference in oral language posttest scores of the experimental ($M$ = 524.94) and control ($M$ = 530.15) groups was not statistically significant, $F(1,47)$ = .24, $p$ = .63. Using analysis of covariance (ANCOVA) to adjust posttest oral language scores of the experimental ($M$ = 525.61) and control ($M$ = 528.308) groups for pretest differences, the difference was not statistically significant, $F(1,47)$ = .08, $p$ = .78. Therefore, the ELLIS program did not appear to be effective for improving oral language achievement for ELL students without disabilities. Detailed information is provided in Tables 4 and 5.

Table 4

*Summary of ANOVA for Oral Language Achievement among ELLs without Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 524.944 | 36.080 | 36 |
| Control | 530.154 | 18.902 | 13 |

*Significant at the p<.05 level.

Table 5

*Summary of ANCOVA for Oral Language Achievement among ELLs without Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 525.611 | 4.924 | 36 |
| Control | 528.308 | 8.207 | 13 |

*Significant at the p<.05 level.

Question 3. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners with disabilities?

Within the group of participants with disabilities, an analysis of variance (ANOVA) indicated the difference in written language posttest scores of the experimental ($M$ = 394.67) and control ($M$ = 382.33) groups was not statistically significant, $F(1,10) = .06, p = .81$. Using analysis of covariance (ANCOVA) to adjust

posttest oral language scores of the experimental ($M$ = 400.543) and control ($M$ = 376.457) groups for pretest differences, the difference was not statistically significant, $F(1,9) = .62, p = .45$. Therefore, the ELLIS program did not appear to be effective for improving written language achievement for ELL students with disabilities. Detailed information is provided in Tables 6 and 7.

Table 6

*Summary of ANOVA for Written Language Achievement among ELLs with Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 394.667 | 99.943 | 6 |
| Control | 382.333 | 69.249 | 6 |

*Significant at the p<.05 level.

Table 7

*Summary of ANCOVA for Written Language Achievement among ELLs with Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 400.543 | 21.664 | 6 |
| Control | 376.457 | 21.664 | 6 |

*Significant at the p<.05 level.

Question 4. Is the English Language Learners Instructional System effective for improving written language achievement among English language learners without disabilities?

Within the group of participants without disabilities, an analysis of variance (ANOVA) indicated the difference in written language posttest scores of the experimental ($M$ = 488.03) and control ($M$ = 500.00) groups was not statistically significant, $F(1,47) = .56, p = .46$. Using analysis of covariance (ANCOVA) to adjust posttest oral language scores of the experimental ($M$ = 487.40) and control ($M$ = 501.742) groups for pretest differences, the difference was not statistically significant, $F(1,46) = .89, p = .35$. Therefore, the ELLIS program did not appear to be effective for improving written language achievement for ELL students without disabilities. Detailed information is provided in Tables 8 and 9.

Table 8

*Summary of ANOVA for Written Language Achievement among ELLs without Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 488.028 | 50.154 | 36 |
| Control | 500.000 | 47.173 | 13 |

*Significant at the p<.05 level.

Question 5. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners with disabilities?

Within the group of participants with disabilities, an analysis of variance (ANOVA) indicated the difference in reading posttest scores of the experimental ($M$ = 423.17) and control ($M$ = 445.17) groups was not statistically significant, $F(1,10) = .28$, $p = .61$. Using analysis of covariance (ANCOVA) to adjust posttest oral language scores of the experimental ($M$ = 422.28) and control ($M$ = 446.06) groups for pretest differences, the difference was not statistically significant, $F(1,9) = .34$, $p = .57$. Therefore, the ELLIS program did not appear to be effective for improving reading achievement for ELL students with disabilities. Detailed information is provided in Tables 10 and 11.

Table 9

*Summary of ANCOVA for Written Language Achievement among ELLs without Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 487.399 | 7.825 | 36 |
| Control | 501.742 | 13.033 | 13 |

*Significant at the p<.05 level.

Question 6. Is the English Language Learners Instructional System effective for improving reading achievement among English language learners without disabilities?

Within the group of participants without disabilities, an analysis of variance (ANOVA) indicated the difference in reading posttest scores of the experimental ($M$ = 492.97) and control ($M$ = 505.69) groups was not statistically significant, $F(1,48) = .75$, $p$

= .39. Using analysis of covariance (ANCOVA) to adjust posttest oral language scores of the experimental ($M$ = 494.60) and control ($M$ = 501.20) groups for pretest differences, the difference was not statistically significant, $F(1,47) = .22, p = .64$. Therefore, the ELLIS program did not appear to be effective for improving reading achievement for ELL students without disabilities. Detailed information is provided in Tables 12 and 13.

Table 10

*Summary of ANOVA for Reading Achievement among ELLs with Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 423.167 | 87.719 | 6 |
| Control | 445.167 | 51.113 | 6 |

*Significant at the p<.05 level.

Table 11

*Summary of ANCOVA for Reading Achievement among ELLs with Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 422.278 | 28.699 | 6 |
| Control | 446.055 | 28.699 | 6 |

*Significant at the p<.05 level.

Question 7. Is there a difference in effectiveness between individual and paired instruction using the English Language Learners Instructional System?

Within the group of participants with and without disabilities, an analysis of variance (ANOVA) indicated the difference in overall posttest scores of the individual instruction ($M$ = 487.96) and paired instruction ($M$ = 504.44) groups was not statistically significant, $F(1,40) = .16, p = .69$. Therefore, there were no statistically significant differences between those students who received individual instruction on ELLIS and those students who received paired instruction on ELLIS. Detailed information is provided in Table 14.

Table 12

*Summary of ANOVA for Reading Achievement among ELLs without Disabilities*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Treatment | 492.972 | 46.867 | 36 |
| Control | 505.692 | 40.885 | 13 |

*Significant at the p<.05 level.

Table 13

*Summary of ANCOVA for Reading Achievement among ELLs without Disabilities*

| Group | Adjusted Mean | Standard Error | N |
|---|---|---|---|
| Treatment | 494.595 | 7.122 | 36 |
| Control | 501.200 | 11.924 | 13 |

*Significant at the p<.05 level.

Table 14

*Summary of ANOVA for Individual v. Paired Instruction*

| Group | Mean | Standard Deviation | N |
|---|---|---|---|
| Individual | 487.962 | 46.506 | 26 |
| Paired | 504.438 | 36.864 | 16 |

*Significant at the $p<.05$ level.

Question 8. What is the level of teacher satisfaction with the use of the English Language Learners Instructional System?

Results from the open-ended interview with the ELL teacher indicated overall satisfaction with the ELLIS program for meeting the language acquisition needs of English Language Learners with and without disabilities. She reported that the program was highly motivating and engaging to the students and felt it was instructional at their individual levels of language acquisition. For the students with disabilities, she reported some difficulties with the speaking portion of the program. These students required direct assistance to complete the sequence of "say, record, listen" in the pronunciation portion of the program. At times, she noticed that some of these students seemed to be randomly making choices within the program without taking the time to process the learning task.

The teacher found the administration of the program to be simple, but the set up was time consuming. The student information including name, gender, date of birth, primary language, fluency in English, and teacher name had to be entered into the

program. Then each student had to be assigned to a class and receive a personalized login. She experienced some difficulties getting the students proficient with logging into the program so she typed up cards with their names and login information they could refer to whenever needed. Once the students were logged in, she explained that it was very easy for the students to take the placement exam and then continue on through the program. At times, students attempted to skip activities, but the program would not allow them to continue until they completed the activities in sequence.

The primary obstacle encountered by the teacher during this study was the attendance of the students. It was difficult at times getting the general education teachers to release the students despite the established schedule for student participation. Also, when students were absent from school, it was difficult finding additional time upon their return to make up the time in the program. Despite the obstacles encountered, the teacher's overall satisfaction with the ELLIS program was high.

## Summary of Findings

Data analysis of the pretest scores from the LAS and posttest scores from the LAS Links resulted in answers to seven research questions related to the effectiveness of the CALL software program ELLIS for English language learners with and without disabilities. Data analysis from the open-ended interview with the ELL Specialist resulted in an answer to one research question related to the level of teacher satisfaction with ELLIS. Participants were assigned to one of three groups. Group A received individual instruction and group B received paired instruction on the ELLIS program.

Group C was a control group and did not receive instruction on the ELLIS program during the study. All three groups included students with and without disabilities.

Based on ANOVA and ANCOVA analyses, students with disabilities who received instruction using the ELLIS program and students with disabilities who did not receive this type of instruction made equivalent achievement gains in oral language, written language, and reading. The same results were found for students without disabilities. Based on ANOVA and ANCOVA analyses, students without disabilities made equivalent achievement gains in oral language, written language, and reading regardless of whether or not they received instruction using the ELLIS program. Based on an ANOVA analysis, students who received individual instruction and students who received paired instruction made equivalent gains in oral language, written language, and reading. Results from the teacher interview revealed that despite the lack of statistically significant results related to student achievement, there was a high degree of teacher satisfaction with the ELLIS program.

# CHAPTER 5

## DISCUSSION

The number of English Language Learners enrolled in the U. S. public schools is increasing dramatically. According to the U.S. Department of Education Office of English Language Acquisition, Language Enhancement, and Academic Achievement for Limited English Proficient Students, during 2000-2001, the enrollment of limited English proficient (LEP) students in U.S. public schools continued to increase both in numbers and as a percentage of total student enrollment. The results from the 2000-2001 *Survey of States' Limited English Proficient Students and Available Educational Programs and Services* indicated a total of 4,584,946 students. This represented approximately 9.6% of the total school enrollment of 44,015,482 students in Pre-Kindergarten through Grade 12. Over 67% of all LEP students were enrolled at the elementary level, and accounted for more than 11% of the total school enrollment. Over 44% of all LEP students were enrolled in Pre-Kindergarten through Grade 3 (Kindler, 2002).

According to the Elementary and Secondary School Civil Rights Compliance Report administered by the Office for Civil Rights and the U.S. Department of Education there were 357,325 special education students who were also LEP (SpEd-LEP) in grades K-12 in U.S. public schools during the 2000-2001 school year (Hopstock & Stephenson,

2003). This number represented 7.9 percent of the overall LEP student population. The distribution of SpEd-LEP students at the elementary level was 50.5%.

The trend of increasing numbers of LEP students enrolling in public schools is even more profound in the state of Nevada. The total enrollment of LEP students in Nevada went from 14,370 in 1993/1994 to 58,753 in 2003/2004, an increase of 325.1% (U.S. Department of Education Office of English Language Acquisition, 2004). The number of SpEd-LEP students was 3,188 in 2000 which accounted for 7.7% of all LEP students for Nevada (Hopstock & Stephenson, 2003).

Learning to use a second language (i.e., English) is challenging for most students, but is particularly challenging for students with disabilities. It takes about 5,000 hours of instruction in a second language to produce adequate fluency and literacy in that foreign language (Stern, 1983). According to Goodfellow (1994), it takes the equivalent of a 4-year full-time job for non-native speakers to be able to read a quality newspaper and another 13 years to become completely fluent in English. For those students with disabilities, the amount of time needed to be fluent in a second language would most likely be greater than for those students without disabilities.

Due to the increase in English Language Learners who attend U.S. schools and the many challenges they face, educators and researchers have been looking for effective and efficient instructional methodologies for assisting these students with their language and reading skills. Competence with both oral and written language as well as reading is needed to succeed in additional areas of the school curricula (e.g., science, social studies, mathematics). Even areas of the curriculum that typically are viewed as less academic (e.g., art, music, physical education) require understanding of language and at least

limited reading abilities.

Consequently, research related to instructional interventions for English Language Learners is very important. Effective instruction provided to elementary students who are learning English will provide a needed foundation for further success as they progress through the educational system. Researchers have noted the importance of early literacy intervention for any student who struggles in this area (Krashen, 1985; Sole, 1994). Undoubtedly, this also is important for English Language Learners. High quality intervention research designed to identify best practices for teaching language and reading to English Language Learners has the potential to result in better learning experiences that ultimately improve the quality of life within the school environment. Such research also has the potential to improve the quality of life for English Language Learners outside of school (e.g., community settings).

One area of intervention research of particular interest to researchers is the use of computer-assisted instruction (Niemiec et al., 1987; Niemiec & Walberg, 1987; Levin et al., 1985). Using computers to enhance student learning in public elementary schools first emerged in the 1980s (Niemiec & Walberg, 1989). After more than a decade devoted to investigating the effectiveness of this new tool and to the development of curricula-related software, a few researchers (Hunt & Pritchard, 1993; Willets, 1992; Cassidy, 1996; Miech, 1996) began to explore the possibilities of using computer-assisted instruction with students who are English Language Learners.

Initial research designed to investigate the effectiveness of computer-assisted language learning (CALL) at the elementary (Kang, 1995; King, 1985; Sun & Dong, 2004), secondary (Machado, 1997), and post-secondary (Allum, 2002; Torlakovic &

Duego, 2004; Tozcu & Coady, 2004) levels revealed positive outcomes. At the elementary level, CALL has the potential to improve written expression and reading comprehension (King, 1985) and second language vocabulary (Kang, 1995; Sun & Dong, 2004). At the secondary and post-secondary level, students who used CALL had higher oral language assessment and writing scores (Machado, 1997), made greater gains in vocabulary knowledge, reading comprehension, and reaction time (Tozcu & Coady, 2004), and significantly improved grammatical performance (Torlakovic & Duego, 2004).

Other researchers, however, obtained mixed findings in their studies related to the effectiveness of computer-assisted language learning (CALL). Allum (2002) had mixed findings in his research, and Stenson et al. (1992) found no significant differences between CALL groups and control groups. Results from Allum's (2002) study showed significantly greater gains in listening and written dialogue skills for the group who received classroom instruction. Both the classroom group and the group who received CALL instruction scored equally on the translation test of phrases. The CALL group showed significantly greater accuracy on the grammar test that focused on prepositional phrases dealing with locations. When Stenson et al. (1992) compared participants who completed CALL instruction in addition to regular classroom instruction to those participants who only received the classroom instruction, no significant differences were found between pre- and post-test scores for both groups.

One CALL intervention identified and tested through research was the English Language Learner's Instructional System (ELLIS). This software program showed promise for increasing student achievement when used as a CALL intervention (Luk,

1999; Nutta, 1998; Soo, 1997). This limited body of research exclusively involved post-secondary students. The current dissertation study was designed to investigate the effects of ELLIS on oral language, written language, and reading achievement among elementary students who are English language learners with and without disabilities. Additionally, levels of teacher satisfaction with CALL and the use of ELLIS were assessed. Findings related to each research question in this study are discussed in the subsequent section of this chapter. Next, conclusions drawn from these findings are shared. Finally, practical implications of the study are described and recommendations for future research are provided.

## Discussion of Findings

The first question to be discussed is: Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners with disabilities?

Data analysis related to this research question indicates there was no significant difference in oral language achievement between students with disabilities who received instruction using the ELLIS program and students with disabilities who did not receive this type of oral language instruction. There are several plausible explanations for this finding. It is possible that the ELLIS software resulted in some unanticipated difficulties for students with disabilities. For example, the implementing teacher reported that students with disabilities required more assistance with the "say, record, listen" feature of the program than students without disabilities. She reported that this speaking portion of the program required intervention on her part. Students needed to be shown how to

complete this part of the program. This direct intervening on the teacher's part took necessary time away from student practice. It is likely that students who needed teacher assistance had fewer opportunities to independently practice the oral skills within the program. Perhaps the amount of independent practice time was insufficient to increase oral language achievement.

Another factor that may have influenced the results related to using the ELLIS software with students with disabilities involves the format of the software. A common characteristic among students with disabilities is a high level of distractibility when too much information is presented at one time (Harvey, Weintraub, & Neal, 1984). These students are less able to attend selectively to relevant cues (Lovdahl, Brown, McIntyre, & North, 1986). Teachers frequently modify instructional materials (e.g., workbooks) to reduce the amount of clutter. This same phenomenon should be considered when selecting computer software (Okolo, Cavalier, Ferretti, & MacArthur, 2000). It is possible that parts of the ELLIS program provided too much content at one time on the screen page. Perhaps a plainer page design would have been more effective taking into consideration the students' disabilities.

Another plausible explanation for the apparent lack of program effectiveness involves the assessment procedures used in the study. Although the ELLIS program included instruction related to oral language and although the LAS Links assessment instrument measured oral language skills, the program and the assessment instrument were not directly aligned. For example, while using the ELLIS program students were required to repeat words and phrases included in the program. They were not required to generate new phrases such as explaining or describing something using their own words.

These latter tasks were, however, included in the LAS Links assessment instrument. Thus, the students were assessed on some tasks in which they did not receive explicit instruction. This type of generalization across unaligned tasks is problematic for students with disabilities (Ellis, 1986; Garner, 1990). Although Chapelle (2001) suggested that the effectiveness of computer-assisted language learning should be determined based on the student's improvement in the language being learned rather than on the specific computer tasks, in retrospect, it would have been interesting to administer a supplemental assessment instrument that closely aligned with the ELLIS program content. It may also have been wise to administer this assessment using a computer-based format to reduce difficulties associated with transfer to a paper-pencil format.

A final plausible explanation related to why students with disabilities who received the CALL intervention did not outperform those who did not receive CALL involves the service delivery model used. The students had to leave their general education class and walk to the computer lab. A common characteristic of many students with disabilities is difficulty with transitions. They have difficulty transitioning from one activity to another within the classroom and even more difficulty transitioning from one room to another (Miller, 2002). Researchers have noted that the equivalent of 1 day each week is lost to transition time (Paine, Radicchi, Rosellini, Deutchman, & Darch, 1983). Transitions result in lost instructional time due to both the actual transition and the time it takes students to refocus on their school work. The transition interruption may have been reduced in this study if students received the CALL instruction in their respective classrooms rather than another location in the school. Another transition related concern, that the implementing teacher noted, was there were times when the sending teacher had

to be prompted to remember to send the students for CALL instruction. Although conducting research within naturalistic school settings is challenging due these types of logistical concerns, it would be interesting to see if the outcomes improved if the instruction was provided in the students' regular classroom setting without the need for a room transition.

The second question to be discussed is: Is the English Language Learners Instructional System effective for improving oral language achievement among English language learners without disabilities?

Data analysis related to this research question indicates there was no significant difference in oral language achievement between students without disabilities who received instruction using the ELLIS program and students without disabilities who did not receive this type of oral language instruction. There are several plausible explanations for this finding. Although the implementing teacher reported the students without disabilities were more proficient using the "say, record, listen" feature of the program than their peers with disabilities, this program feature still required them to speak loudly enough to be recorded by the computer which for some could have been intimidating due to their lack of proficiency in English. Additionally, the program itself does not monitor whether the students use the record/play/listen feature so it is not possible to determine how much oral practice each student actually received.

As mentioned previously for students with disabilities, another possible explanation for the apparent lack of program effectiveness involves the assessment procedures used in this study. The ELLIS program required students to repeat words and phrases included in the program but did not require students to generate new phrases such

as explaining or describing something using their own words as required by the LAS Links. Administration of a supplemental assessment instrument that closely aligned with the ELLIS program content may provide different results.

Another reason for the lack of program effectiveness may have been the amount of instructional time needed on the program in order for a student to demonstrate increased achievement in oral language. Stenson et al (1992) concluded that sufficient practice is needed in order to show significant results in pronunciation through the use of CALL. Machado (1997) found that middle school students who received CALL instruction for 45 minutes daily for a total of 37.5 instructional hours scored significantly higher in oral language assessment than students in a control group. The students in this study received a total of 20 instructional hours. Perhaps there would be an increase in oral language achievement if the time students spend on ELLIS is extended beyond 20 hours.

Another plausible explanation related to why students without disabilities who received the CALL intervention did not outperform those who did not receive CALL involves the ELLIS program itself. In Machado's (1997) study where middle school students who received CALL intervention scored significantly higher in oral language assessment than students in a control group, *The Bilingual Writing Center* was used as the CALL treatment as opposed to the ELLIS program. The studies conducted that demonstrated the effectiveness of the ELLIS program for increasing student achievement included post-secondary students. It may be that the ELLIS program is more beneficial for post-secondary students whereas other CALL software programs are more beneficial for elementary students. Additionally, younger students who do not have a strong

foundation in their primary language may not benefit from CALL programs to the same degree as adult students who do have a strong foundation in their primary language.

A final explanation for the lack of apparent effectiveness of the ELLIS program in increasing the oral language acquisition for students without disabilities is the developmental nature of young children's bilingualism. The hypothesis of *critical period* suggests that there is shift from natural acquisition towards more conscious learning of a language at around the age of puberty (Lenneberg, 1967). It has even been suggested that the decisive change takes place at late as 15 years of age (Scovel, 1988). For this reason, students in this study may not have been developmentally ready for the formal language instruction provided by the ELLIS program and may have benefited more from experiencing the natural language in the classroom setting.

The third question to be discussed is: Is the English Language Learners Instructional System effective for improving written language achievement among English language learners with disabilities?

Data analysis related to this research question indicates there was no significant difference in written language achievement between students with disabilities who received instruction using the ELLIS program and students with disabilities who did not receive this type of language instruction. As noted in the findings for Question 1, the format of the software may have presented a problem. Students with disabilities display a high degree of distractibility when presented with too much information at one time (Harvey et al., 1984). It is possible that a plainer, less complex page design would have been more effective for students with disabilities.

Another factor that may have influenced the results of using the ELLIS program with students with disabilities is transitions. As previously discussed in the findings for Question 1, students with disabilities have difficulty transitioning from one activity to another within the classroom and even more difficulty transitioning from one room to another (Miller, 2002). The interruption of transitioning to the computer lab may have been reduced in this study if students received the CALL instruction in their respective classrooms rather than another location in the school. This would also alleviate the occasional problem of the general education teacher forgetting to send students during their scheduled lab time.

Another plausible explanation for the apparent lack of program effectiveness involves the assessment procedures and the lack of generalization of tasks for students with disabilities. Although many tasks within the program focused on vocabulary and grammar development, the tasks themselves did not require students to generate sentences or stories as required in the written portion of the LAS Links. Thus, the students were assessed on some tasks in which they did not receive explicit instruction. This type of generalization across unaligned tasks is problematic for students with disabilities (Ellis, 1986; Garner, 1990). It can be even more so in the area of writing. Even when students with disabilities were explicitly taught writing strategies that were used to write functional essays, they were unable to generalize these same strategies to narrative writing (Monroe & Troia, 2006). It would have been interesting to administer a supplemental computer-based assessment that closely aligned with the ELLIS program content to reduce difficulties associated with generalization of tasks.

A final factor that may explain why students with disabilities who received CALL intervention did not outperform those who did not receive CALL is the amount of time spent on the program. Writing strategy instruction research often is conducted over a period of several weeks, but students with disabilities need a prolonged period of intervention to achieve similar benefits (Wong, 2000). It is possible that students with disabilities need to spend more time using the ELLIS program than students without disabilities in order to make similar gains.

The fourth question to be discussed is: Is the English Language Learners Instructional System effective for improving written language achievement among English language learners without disabilities?

When the results of the LAS Links assessment were analyzed related to this research question, no significant difference was found in written language achievement between students without disabilities who received instruction using the ELLIS program and students without disabilities who did not receive this type of language instruction. There are a number of plausible explanations for this finding. As mentioned previously, many tasks within the ELLIS program focused on vocabulary and grammar development. However, the tasks themselves did not require students to generate sentences or stories as required in the written portion of the LAS Links. Therefore students were assessed on tasks in which they had not received explicit instruction.

Another possible explanation for the lack of significant differences between students without disabilities who received instruction using the ELLIS program and students without disabilities who did not receive this instruction is that more time may have been needed in order to see statistically significant results. In a study conducted by

King (1985) students who received CALL as a treatment 20 minutes per day for one school year scored significantly higher in written expression skills than students in a control group.

Another plausible explanation for the apparent lack of program effectiveness in the area of written language relates to the ELLIS program itself. Soo (1997) found that post-secondary students who used ELLIS as a CALL intervention showed no significant difference on the Structure and Written Expression section of an assessment tool than students in a control group. Machado (1997) found that middle school students who received CALL instruction for 45 minutes daily for 10 weeks scored significantly higher in writing than students in a control group. However, this study used *The Bilingual Writing Center* as the CALL treatment as opposed to ELLIS.

The fifth question to be discussed is: Is the English Language Learners Instructional System effective for improving reading achievement among English language learners with disabilities?

Data analysis related to this research question indicates there was no significant difference in reading achievement between students with disabilities who received instruction using the ELLIS program and students with disabilities who did not receive this type of reading instruction. Some of the same factors that have been discussed in the findings for Questions 1 and 3 have relevance here. Specifically, the format of the software may have presented too much information at one time which can be an obstacle for students with disabilities. It is possible that a plainer, less complex page design would have been more effective for these students. Additionally, transitioning to the

computer lab may have presented a problem for students with disabilities and impacted the amount of learning time.

Another plausible explanation for the apparent lack of program effectiveness in reading involves students with disabilities need for multiple opportunities for practice and specific comprehension instruction (Kim et al., 2006). In a review of meta-analyses of special education, Forness, Kavale, Blum, and Lloyd (1997) found that computer-assisted instruction (CAI) as an intervention shows promise in improving reading for students with disabilities. However, there was no available research related to the use of computer-assisted language learning (CALL) for students with disabilities. This may be because CALL does not offer the targeted, individualized practice on specific words and comprehension strategies that CAI provides.

A final factor that may have influenced the results related to using the ELLIS program with student with disabilities is the limited amount of supervision provided during instructional time throughout the study. As noted by the implementing teacher, some of the students with disabilities appeared to be randomly making choices within the program without taking the time to process the learning task. Students with disabilities should not be left to their own devices, but should receive assistance as needed in order to maximize the benefits of technology (Wissik and Gardner, 2000). Even though students completed 20 instructional hours, it was not possible in the public school setting and within the scope of this study to provide more individualized supervision. It would be interesting to see if students with disabilities improved reading achievement scores if additional supervision was provided.

The sixth question to be discussed is: Is the English Language Learners Instructional System effective for improving reading achievement among English language learners without disabilities?

Data analysis related to this research question indicates there was no significant difference in reading achievement between students without disabilities who received instruction using the ELLIS program and students without disabilities who did not receive this type of reading instruction. There are several plausible explanations for this finding. More time may have been needed in order to see statistically significant results. King (1985) found that students who received CALL as a treatment 20 minutes per day for one school year scored higher in reading comprehension than students in a control group. Perhaps if the CALL treatment in this study had been extended over the course of the entire school year, students would have demonstrated greater gains in reading.

Another plausible explanation related to why students without disabilities who received CALL intervention did not outperform those who did not receive CALL involves the age and language development needs of the students. Tozcu and Coady (2004) found that university students who received CALL instruction for 3 hours per week for 8 weeks scored significantly higher in reading comprehension than students in a control group. In a study using the ELLIS program with post-secondary students, Soo (1997) found that students using ELLIS as a CALL intervention improved significantly more than the control group in Vocabulary and Reading Comprehension. It is possible that the adults in these studies had reading skills in the primary language, whereas the elementary students in this study did not. As discussed in the findings for Question 2, it is possible that elementary students are not at the *critical period* in which formal

language instruction is most beneficial (Lenneberg, 1967; Scovel, 1988). This finding fits with Siraj-Blatchford and Sylva's (2004) discovery that effective language learning requires a balance of free play and more purposeful instructional interaction with adults. Therefore, it is possible that young children need face-to-face interaction with language in the natural context of the classroom for maximum language acquisition.

Although not a formal measure in this study, it is interesting to note that students in the Limited English Proficient (LEP) subgroup improved their performance on the Nevada Criterion Referenced Test (CRT) which is the state assessment given each spring to determine proficiency in reading. The LEP subgroup increased from 28.3% proficiency in the spring of 2005 to 31.8% proficiency in the spring of 2006. Additionally, the CRT scores for reading are combined with the writing scores from the Nevada Writing Proficiency Exam (NWPE) to determine whether the LEP subgroup met Adequate Yearly Progress (AYP) according to the *No Child Left Behind* Act of 2001. In 2005, these combined scores revealed that 26.09% of the LEP subgroup students met proficiency. In 2006, 32.98% of these students met proficiency. Based on this increase, these students met the criteria for making Adequate Yearly Progress. Other than the ELLIS program, there were no new curricular or instructional changes made during the 2005-2006 school year. This seems to reinforce the possibility that the LAS Links lacked curricular alignment with the ELLIS program. This instrument may have detected some of the progress students made particularly in the areas of reading and writing.

The seventh question to be discussed is: Is there a difference in effectiveness between individual and paired instruction using the English Language Learners Instructional System?

When the results of the LAS Links assessment were analyzed related to this research question, no significant difference was found between students with and without disabilities who received paired instruction using the ELLIS program and students with and without disabilities who received individual instruction on the program. Although peer tutoring where students work in pairs has strong research support for both students with and without disabilities (Fuchs, Fuchs, Mathes, & Simmons, 1997; Mortweet et al., 1999), There was no apparent advantage to paired instruction in this study. This may be a result of equal learning time for both students working in pairs and students working individually on the program. A challenge related to the implementation of this study was that there were no controls for which student within the pair was making most of the instructional decisions. Because individualized and paired instruction was equally effective in this study, further study would provide greater insight with regard to actual interaction between students in paired instruction. If the ELLIS intervention had been more effective, it would be easier to draw conclusions about individual and paired instruction.

The eighth question to be discussed is: What is the level of teacher satisfaction with the use of the English Language Learners Instructional System?

Data analysis related to this research question indicates that the level of teacher satisfaction with the ELLIS program was high. Despite the fact that there were no statistically significant differences between treatment and control groups with the ELLIS program based on results from the LAS Links assessement, the teacher was very favorable toward the use of this program. She rated the administration of the program to be simple, and found the program to be highly motivating and engaging for the students.

## Conclusions

The following conclusions are based on quantitative and qualitative data collected in this study.

1. Students with disabilities who received instruction using the ELLIS program performed similarly to students with disabilities who did not receive instruction using the ELLIS program in oral language, written language, and reading achievement.
2. Students without disabilities who received instruction using the ELLIS program performed similarly to students without disabilities who did not receive instruction using the ELLIS program in oral language, written language, and reading achievement.
3. Paired instruction on the ELLIS software program has similar effects on students as individual instruction.
4. Teacher satisfaction with the ELLIS software program is high.

## Practical Implications

Several important implications emerged from this study. First, teachers should avoid relying on ELLIS computer-assisted language learning as the sole means of acquiring English as a Second Language. Second, school personnel should look closely at the alignment of the CALL intervention with the assessment measure. As demonstrated in this study, many of the tasks students were asked to perform on the LAS Links assessment were very different from the tasks they had practiced during the CALL intervention. Third, when computer-assisted language learning is used, it should be

sustained over time for students to gain maximum benefit from the treatment. Fourth, students with disabilities will require small group CALL intervention with close supervision, and it may be best to provide the CALL intervention in their general education classroom to reduce problems encountered with transitions. Fifth, there should be careful consideration when selecting the CALL treatment. Specifically, students with disabilities will likely benefit more from a program that is simple in design but still engaging. Finally, skills learned on the computer need to be generalized to other learning mediums such as paper and pencil tasks. This may require direct instruction and well designed lessons from the teacher.

## Suggestions for Further Research

This study represents an initial contribution to literature that explores the effects of computer-assisted language learning for elementary students with and without disabilities. From the results obtained in this study, further research should be conducted to explore the use of CALL for elementary students with and without disabilities to determine whether treatment over a longer period of time would be beneficial. As mentioned previously in this study, it takes about 5,000 hours of instruction in a second language to produce adequate fluency and literacy in that foreign language (Stern, 1983). Students in this study received 20 hours of intervention. Further research is needed to determine whether additional time spent on CALL would be beneficial and what the optimal amount of time would be.

Additional research should be conducted with students with disabilities to investigate whether additional supervision and guidance would result in increased

language acquisition. This study was conducted in a computer lab setting with 10 computers and approximately 15 students working at any one time. Students were required to use headphones due to the volume of noise in the lab. This prevented the teacher from being able to accurately hear what the students were doing with the "say, record, listen" feature of the program. The CALL intervention may be more effective with students with disabilities in a smaller group setting of 3 to 5 students who can be carefully monitored by using the program without headphones allowing the teacher to provide immediate corrective feedback and determine the accuracy of the "say, record, listen" feature of the program.

Further research needs to be conducted to determine whether CALL is more effective when received in the students' general education classroom compared to a lab setting. In this study, students were required to transition from their regular classroom to a computer lab setting. Learning time was lost and there was the possibility that skills learned in the lab setting were not generalized into the general classroom setting. The problem of transitioning is even more profound for students with disabilities. The benefits of CALL may be improved when students receive the CALL intervention in their own classroom.

Future research should also be conducted to determine the effectiveness of CALL when combined with classroom lessons designed to generalize information learned during CALL sessions to classroom activities and experiences. This study provided students with CALL intervention as the only treatment. The CALL may be more effective when combined with lessons that are designed to apply the knowledge gained from the CALL interventions to academic tasks within the classroom.

APPENDIX I

LAS LINKS ASSESSMENT

| Language Domain | Subtest | Description |
|---|---|---|
| Speaking | Speak in Words | Student is shown a picture and asked to state what the picture is and what it is used for. |
| | Speak in Sentences | Student is shown a picture and asked to state what is happening in the picture. |
| | Make a Conversation | Student is asked to explain or describe a situation such as how to measure something. |
| | Tell a Story | Student is asked to tell a story about a series of pictures. |
| Listening | Listen for Directions | Student listens to directions and then selects an answer to a multiple choice question. |
| | Listen in the Classroom | Student listens to directions that he might hear in a classroom and then selects an answer to a multiple choice question. |
| | Listen and Comprehend | Student listens to a short passage and then answers four multiple choice questions about the passage. |

| | | |
|---|---|---|
| Reading | Analyze Words | Student is asked to complete multiple choice questions on word parts and meanings. |
| | Read Words | Student is asked to complete multiple choice questions on comprehension of word meanings. |
| | Read for Understanding | Student reads short passages and answers multiple choice questions about them. |
| Writing | Use Conventions | Student reads and answers multiple choice questions about writing conventions (e.g. Please pick up your trash and place it ___ the trash can. A) at, B) on, or C) in). |
| | Write About | Student is shown a picture and asked to write two things about each picture. |
| | Write Why | Student is asked to make a choice and write two reasons for making that choice. |
| | Write in Detail | Student is given a writing prompt and asked to write about it using details and examples. |

## APPENDIX II

## OPEN-ENDED INTERVIEW WITH ELL FACILITATOR

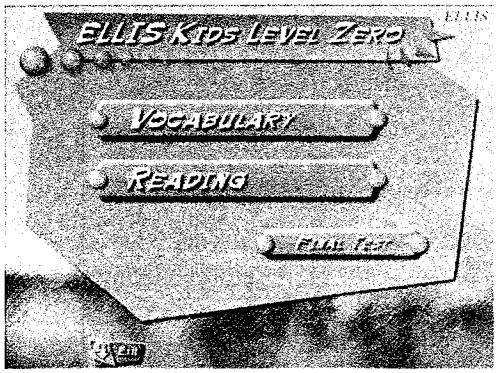
1. How satisfied were you with the ELLIS program overall for meeting the language acquisition needs of English Language Learners with and without disabilities?

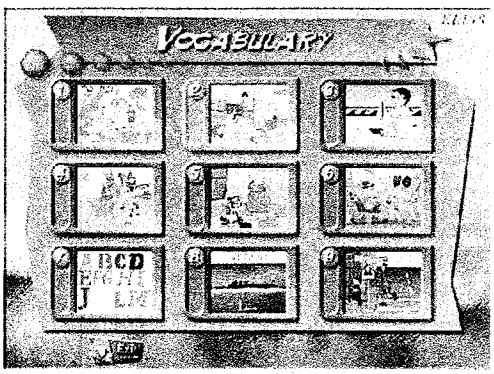
2. How easy was the administration of the ELLIS program?

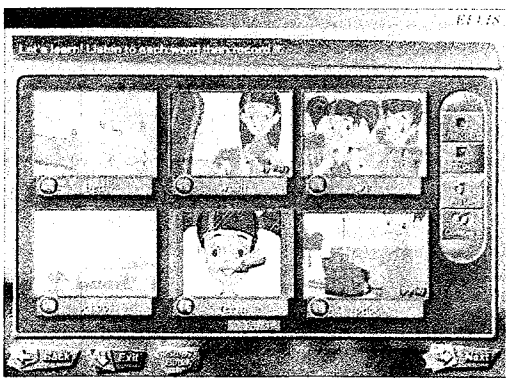
3. What obstacles (if any) did you encounter throughout this study?

# APPENDIX III

## ELLIS KIDS LEVEL ZERO

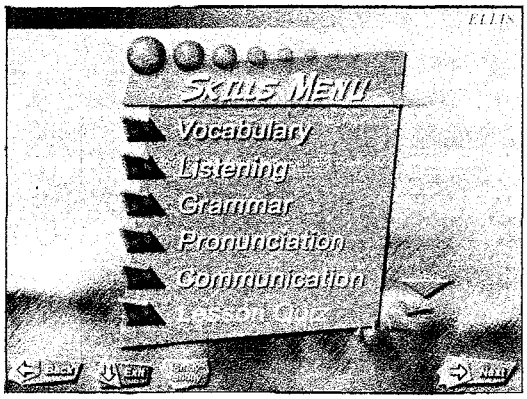


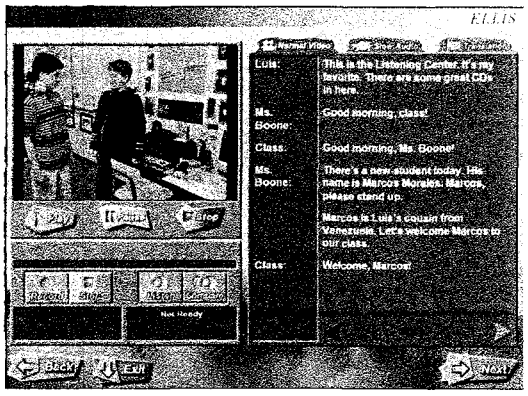



APPENDIX IV

ELLIS KIDS LEVEL ONE

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