The SIMs meet ESL:
Incorporating authentic computer simulation games into the language classroom

by

Megan René Broberg

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS

Major: Teaching English as a Second Language/Applied Linguistics
(Literacy in English as a Second Language)

Program of Study Committee:
Volker Hegelheimer (Major Professor)
   Roberta Vann
   Viviana Cortes
   Denise Schmidt

Iowa State University
Ames, Iowa
2004
Graduate College
Iowa State University

This is to certify that the master's thesis of
Megan René Broberg
has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
# TABLE OF CONTENTS

LIST OF FIGURES vi

LIST OF TABLES vii

ABSTRACT viii

CHAPTER 1. INTRODUCTION 1
   Historical Context 2
   The Present Study 3

CHAPTER 2. LITERATURE REVIEW 5
   Vocabulary Development in the Language Classroom 5
      What Needs to be Learned 5
      Explicit or Implicit Instruction 6
      Contextually Embedded Vocabulary 7
   Simulations in the Language Classroom 8
      What are Simulations? 8
      Benefits of Using Simulations 8
      Simulations and Culture 9
      Simulations and Motivation 10
   Computers and ESL Literacy 11
      Computer Literacy 11
      Computers and Motivation 12
      Computers and Simulations 12
   Computer Simulations in the Language Classroom 13
      Selecting Software 13
      How to Use the Software 13
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Room Arrangement</td>
<td>67</td>
</tr>
<tr>
<td>F</td>
<td>Research Design Summary</td>
<td>68</td>
</tr>
<tr>
<td>G</td>
<td>Counter-Balance Design</td>
<td>70</td>
</tr>
<tr>
<td>H</td>
<td>Raw Scores</td>
<td>72</td>
</tr>
<tr>
<td>I</td>
<td>T-Test</td>
<td>76</td>
</tr>
<tr>
<td>J</td>
<td>Pretest and Post-test</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>Acknowledgments</td>
<td>85</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>SIMs Screen Shot, SIMs Creator</td>
<td>20</td>
</tr>
<tr>
<td>3.2</td>
<td>SIMs Screen Shot, A House</td>
<td>20</td>
</tr>
<tr>
<td>3.3</td>
<td>SIMs Screen Shot, Some Disasters</td>
<td>20</td>
</tr>
<tr>
<td>3.4</td>
<td>Sample Station Arrangement</td>
<td>27</td>
</tr>
<tr>
<td>B.1</td>
<td>Website Flow Chart</td>
<td>47</td>
</tr>
<tr>
<td>E.1</td>
<td>Room Arrangement</td>
<td>67</td>
</tr>
</tbody>
</table>
LIST OF TABLES

TABLE 2.1. Criteria for CALL Task Appropriateness Comparison to The SIMs 17
TABLE 3.1. SIMs Lexical Item Classification 22
TABLE 3.2. Data Gathering Tools 29
TABLE 4.1. Summary of Analysis 31
TABLE 4.2. Total Average Quiz Scores 32
TABLE 4.3. Average Quiz Scores for the High Level Group 33
TABLE 4.4. Average Quiz Scores for the Middle Level Group 33
TABLE 4.5. Average Quiz Scores for the Low Level Group 34
TABLE 4.6. Comparison of Quiz Averages for Groups C and F in Stations One and Two 35
TABLE 4.7. Station One Reported Usefulness of Supplemental Materials 36
TABLE 4.8. Station Two Reported Usefulness of Supplemental Materials 37
TABLE 4.9. Group F, Station Two Reported Usefulness of Supplemental Materials 38
TABLE 4.10. Reported Helpfulness of Supplemental Materials 39
TABLE A.1. Participant Profile 46
TABLE C.1. Vocabulary Profile 48
TABLE C.2. Vocabulary Words 49
TABLE F.1. Research Design 68
TABLE G.1. Latin Rectangle Design 70
TABLE H.1. Pretest and Post-test Scores 72
TABLE H.2. Station One Quiz Scores 73
TABLE H.3. Station Two Quiz Scores 74
TABLE H.4. Station Three Quiz Scores 75
TABLE I.1. T-Test of Total Quiz Scores 76
TABLE I.2. T-Test of Vocabulary Quiz Scores 76
TABLE I.3. T-Test of Grammar Quiz Scores 76
ABSTRACT

Despite their motivational appeal to younger adult learners, innovative and technologically advanced computer simulation games targeting native speakers of English (e.g., *The SIMS*) frequently remain beyond the lexical, syntactic, and cultural competence of English as a second language (ESL) learners to be used as independent didactic tools. Consequently, successful integration of computer simulation games into the CALL classroom demands the careful planning of tasks and the creation of supporting materials (Garris, et al, 2002, Carrier, 1991, Crook, 1993).

Guided by Chapelle’s (2001) criteria for determining CALL task appropriateness—language learning potential, learner fit, meaning focus, authenticity, positive impact, and practicality—this paper illustrates how one authentic computer simulation game, *The SIMs*, can be adapted to meet these guidelines and enhance vocabulary learning through appropriate supporting materials. The creation of the supplemental materials used in this study was preceded by the methodical gathering of the lexical items, syntactic patterns, and cultural information encountered in *The Sims* and informed by a detailed corpus-based analysis.

As part of a required reading class, eighteen intermediate adult ESL learners completed a five-week unit in which they experienced three distinct conditions of supplemental materials while completing tasks using *The SIMS*. Using a counter-balanced design, the participants received mandatory vocabulary, grammatical, and cultural information in one condition, voluntary access to a dictionary, grammar description, and cultural information in the second condition, and no supplemental materials in the third condition. The results indicate a statistically significant increase in vocabulary acquisition for the first condition. Student feedback further suggests that the supplemental materials were beneficial for successful task completion. Thus, how authentic computer simulation tasks are structured and supported appears to have a significant bearing on the appropriateness of the task. In addition, the study supports the conclusions that teachers are instrumental in the language classroom in order to provide the necessary support to enhance learning during CALL tasks.
CHAPTER 1. INTRODUCTION

In an article summarizing software used in CALL environments, Healey (1999) proposes the use of the simulation game SimCity\(^1\) to teach reading to ESL learners. She does not elaborate upon this beyond saying that there are two types of reading skills: those that help learners find information and those that help learners enjoy reading. She suggests the use of SimCity to assist in the development of the latter skill. Some research supports Healey’s view by exploring the use of computer simulations in the language classroom. For example, Schwienhorst (2003) discusses the interactive and autonomous learning possible with virtual reality software in the ESL classroom, while Carrier (1991) proposes a cooperative approach to incorporating simulations in ESL. Willing (1988) and Balajthy (1984) look specifically at computer simulations and reading during the infancy of computer simulations, but neither specifically focuses upon ESL reading. Though these studies address the use of computer simulations in the classroom, none conduct empirical, classroom-based research on how the simulations can be used or even the effect of computer simulations on learning. All of these studies certainly point toward the benefits that seem to naturally emerge with the use of authentic computer simulations, such as the motivational appeal of such games, but how can they be used effectively? Are they appropriate for ESL instruction? What are the limitations? Who would this type of activity appeal to? How do computer simulations support reading instruction and the development of vocabulary? As Lockman (2003) urges, “To be more effective, our educators need to seriously examine computer games to find out how they quickly teach easily bored kids very complex lessons.” (p. 1)

Though Lockman refers to learning in general, this same gap in research applies to ESL. This study takes into consideration both Lockman’s (2003) suggestion that computer games have potential as learning tools, but lack evidence to this effect and Healey’s (1999) suggestion that computer simulation games can be used in the ESL literacy classroom. The principal goal in this study is to closely investigate three potential task conditions, defined by varying access to supportive materials, during a computer simulation task in ESL literacy.

---

\(^1\) SimCity and The SIMs are registered trademarks of Electronic Arts Inc.
instruction. Specifically, the study attempts to discern what effect, if any, each task condition has on vocabulary acquisition and, simultaneously, learner perceptions of the task.

This chapter will place this study of computer simulations in an historical context, showing that views and uses of computer simulations have changed with the development of technology. Additionally, the chapter will not only outline the potential of using authentic simulations, like The SIMs, in the language classroom, but also question their usage in the classroom, especially as an all-in-one tool, giving way to the study conducted for this thesis.

**Historical Context**

Prior to the advent of the technological age, simulations were organized around “real-life” roleplays (Orback, 1979). The use of computers as modes for instructional simulations really began in the mid-late 1980s. At this time, several researchers (i.e. Reigeluth and Schwartz, 1989, Alessi, 1988, Gredler, 1986) attempted to classify various instructional computer simulations. Reigeluth and Schwartz (1989) divided computer simulations used for instruction into three categories: procedural, process, and causal. All of the simulations analyzed directly related to a specific educational concept, like, adding fractions, photosynthesis, and the law of demand. Thus, the primary goal of the simulations was to apply, acquire, or assess knowledge, particularly with concepts denoting change. The simulations discussed by Reigeluth and Schwartz (1989) are highly controlled. For example, when a simulation is used for acquiring information, according the Reigeluth and Schwartz (1989), the learner maintains a passive role of observing the change occurring in the simulation. The simulations promote learner control over some aspects, however those are limited to environmental factors like the number of players, difficulty level, and length of play. In the same vein of thought, Alessi (1988) describes computer simulations used for different academic purposes, and, again, learner control and options are limited. Outcomes in the simulation, for the most part, follow the laws of nature, and are predictable.

The nineties displayed some advancement in computer simulations as educational tools. Furthermore, second language teaching began to show interest in developing computer simulations as didactic tools. Chapelle (2001) reports on a task involving a microworld computer program, similar to the application simulations discussed by Reigeluth and Schwartz (1989), that was developed in the early 1990s (as described by Chun and Brandl,
This activity, however, also failed to meet the growing communicative goals promoted at the time. The language used in both the microworld activity and the simulations reported by Carrier (1991) for language teaching lacked authenticity, and furthermore, the researchers did not report on the impact of the activity on learning. Rieber (1996) also highlights several simulations used in the classroom in the nineties to teach scientific and mathematical concepts. The screen snapshots provided by Rieber show simplistic graphics of geometric shapes and minimal figures. The computer simulations of the 1990s displayed a more centralized focus on the learner, but were just beginning to take advantage of technological possibilities.

As technology was refined and learner autonomy, authentic language, group work, communicative competence and motivation increased as foci for language instruction, the demand in CALL materials has been for computer tasks that address these issues (Crookall, 2002, Halleck 2002). Schwienhorst (2002) extends this demand by explaining reasons for using simulations in the language classroom to meet the constructivist-based goals above. He advocates the use of simulations and virtual reality because the learner is actively involved. This displays a shift of views concerning appropriate uses of computer simulations in the classroom, specifically the language classroom. Many of the simulations of the 1980’s did not require active participation by the learner and they limited the control of the learner. As the constructivist approach to education has swept the field, more emphasis has been placed on the student, maintaining that education should be student-centered. In order to make language instruction student-centered, a communicative model encourages tasks to be appealing, motivating, and requiring active student participation (Celce-Murcia, 2001). Thus, developing instructional tasks that are highly motivating and actively involve students has been the predominant goal in education, and therefore, a catalyst for this study.

**The Present Study**

Based on the current communicative approach to language teaching, tasks should be authentic, appealing, promote fluency, and place the teacher in the role of a facilitator (Celce-Murcia, 2001). Hence, using computer simulation games in the language classroom is attractive. The games seem highly motivating for some students and students are presumably actively involved (Lockman, 2003). The potential benefits of using authentic computer
simulation games, like The SIMs, are furthermore positive because they use authentic language and have proven graphic appeal as shown by their high sales (Culvert, 2003, "@Home & @Play", 2003), but without empirical evidence, these benefits are largely uncertain. Furthermore, both simulation and computer research indicate that the support and guidance provided by the instructor are crucial to the success of the simulation or software. For example, Chapelle (1998) includes in a list of seven criteria for developing effective multimedia CALL tasks that "(t)he linguistic characteristics of target language input need to be made salient." (p. 23) Chapelle also states that "(l)earners should receive help in comprehending semantic and syntactic aspects of linguistic input." (p. 24) How much more important are these for authentic simulation software? Authentic materials are without the pre-written activities and teacher guides often provided with educational materials and thus provide additional concerns for use in the classroom. From this investigation, ESL practitioners may gain insight into the instructor-provided support necessary for successful implementation of authentic computer simulations in the ESL literacy classroom.

This thesis establishes a basis for the study and follows by discussing the resulting research. In order to do this, chapter two opens by placing this study in the crux of different facets of language teaching research. The third chapter outlines the materials and procedures used in the study followed by an examination of the results in chapter four. The final chapter concludes by summarizing the results and major implications of the study, as well as critical perspectives of this study and future research.
CHAPTER 2. LITERATURE REVIEW

Consideration of computer simulations in second language literacy encompasses the joining of a variety of areas of research and debate. The assembling includes studies concerned with vocabulary development, simulations, computers, second language literacy, computer assisted language learning tasks, student motivation, and social ethics. The following literature review attempts to summarize and focus an immense amount of research that interweaves the aforementioned components such as to inform and direct the current study.

Vocabulary Development in the Language Classroom

What Needs to be Learned

Ellis (1999) states that “vocabulary development is . . . a major aspect of learning a new language.” (p. 33) In explanation of this claim, Gass and Selinker (2001) point out that vocabulary errors are often the most serious and common errors committed by language learners. Thus, vocabulary teaching and learning becomes a crucial part of second language acquisition. However, how much vocabulary does a second language learner need to acquire? Zahar, Cobb, and Spada (2001) argue that a 3,000-word minimum is necessary for learners to be able to read texts and acquire a meaningful amount of vocabulary independently. This is a minimal number since out of the 54,000 word families in English, the average educated native speaker knows 20,000. However, only 3-5,000 word families seem absolutely crucial as a basis for comprehension and only 2-3,000 word families are used productively in speaking and writing (Nation and Waring, 1997). Nation and Waring (1997) state that the 3,000 word-minimum allows a learner to know approximately 95% of a text, which is necessary in order to easily learn unknown words from context. Depending on the goals of the learner, however, this 3,000-word minimum may not be sufficient. For example, an academically—oriented learner may need to know the 836 word families from the University Word List, in order to achieve just 86% comprehension of the vocabulary used in academic texts (Nation and Waring, 1997).
Explicit or Implicit Instruction

Knowledge of the necessary vocabulary for learners leads to another dilemma since it is clear that learners, especially those pursuing academic interests need a substantial English vocabulary, how should learners acquire vocabulary? Decarrico (2001) states “... that a well-structured vocabulary program needs ... [to] include explicit teaching together with activities providing appropriate contexts for incidental learning.” (p. 286) In this statement, Decarrico (2001) points out two very distinct parts of vocabulary instruction: explicit teaching and incidental learning. Ellis (1999) further delineates these parts of vocabulary instruction to show that the explicit teaching, or intentional learning, focuses upon the graphological aspects of a word, whereas incidental learning focuses more on the meaning. He points out that studies do show that incidental vocabulary development may take place through extensive reading tasks, but counters this with research indicating that actual retention of word meanings is low with incidental learning. The following studies illustrate this debate over incidental and intentional vocabulary acquisition. Newton (1995) provides a summary of research in favor of incidental vocabulary acquisition, particularly when there are repeated exposures to the vocabulary, generative use of vocabulary, and the involvement of negotiation of meaning. The study by Newton (1995) further supports the incidental vocabulary acquisition through communicative tasks. Chan (1996), though, argues against the research on incidental vocabulary acquisition by pointing out flaws in the research supporting incidental vocabulary acquisition. His study indicates that the incidental, contextual vocabulary learning produces lower vocabulary acquisition than decontextualized vocabulary word list learning. Chan (1996) concedes, though, that the contextualized vocabulary learning may induce deeper learning of the vocabulary. This leads to more current studies that conclude with similar implications that vocabulary instruction should include both the incidental and intentional learning. Zahar, Cobb, and Spada (2001) demonstrate research in favor of reading a natural text in order to build vocabulary. However, they acknowledge that the amount of reading that would be necessary to even reach the 3,000-word minimum would be extremely large. Therefore, they advocate as an alternative reading supplemented by direct vocabulary instruction or enhanced instruction. Hill and Laufer (2003) indicate support for using tasks which require the learner to do some
function with the unknown word, such as looking up the words in a dictionary. The current
debate and research hinge upon finding the balance between incidental and explicit
vocabulary instruction. One thing that comes out of the current research consistently,
though, is that vocabulary items should be embedded in a rich context.

**Contextually Embedded Vocabulary**

Though Qian’s (1996) study indicates that learning vocabulary in context produces
lower retention, he states that “... the context in which words are presented can provide
some additional linguistic, semantic, or sociolinguistic knowledge of the target words...,” all
of which are necessary for complete understanding of a word (see Gass and Selinker, 2001
and Nagy, 1997). Read (2000) points out the social aspect of vocabulary and insists that the
social and cultural context play an important role in a word’s meaning. Decarrico (2001)
advocates the use of contexts that are rich enough to give clues to the meaning of a word and
that students should have multiple exposures to the word. Nagy (1997) provides a rationale
for this by contending that there are two major reasons for teaching words in context: a
word’s meaning at a given situation is dependent upon the context and contexts provide
vocabulary knowledge that can well-exceed that of explicit instruction.

In summary, research indicates that a non-native speaker of English needs to acquire
a substantial, working vocabulary in order to have a basic comprehension level of texts, but
much of the necessary vocabulary attainment is driven by the goals and purposes of the
learner. In order to acquire the needed vocabulary, current research appears to indicate that
instruction should include a context-rich mixture of explicit instruction and implicit learning.
One technique that has been used in language classrooms in order to introduce and practice
vocabulary in distinct contexts has been simulations.

**Simulations in the Language Classroom**

Simulations have been used in the language classroom for years in a variety of forms.
The use of simulations coincides with the communicative classroom movement and desire to
utilize authentic, purposeful language in the classroom. The development of simulations in
the language classroom can be traced by examining what constitutes a simulation, the
benefits of using simulations in the language classroom, how simulations relate to culture,
and the impact of simulations on student motivation.
What are Simulations?

The connection of simulations with the communicative movement is due to the inherent components present in all simulations.

A “simulation” has been defined as:

-“... any learning activity which seeks to model some aspect of ‘real-life’ target behaviour in some way” (Jones, C., 1986)

-an “ ‘intervention model,’ a representation of a process during which one can intervene and change some of the values which affect the process.” (Higgins & Johns, 1984, p. 63)

-something which “... involve[s] modeling aspects of a world—either experimental or an imaginary world designed for pedagogical purposes.” (Bork, 1981, p. 105)

-a tool that “... provide[s] a relatively realistic language-using environment for learners to practice their new language.” (Crookall, 2002, p. 273)

According to Gredler (1986), a simulation includes a realistic setting in which the student is presented with a problem, the student executes a series of inquiries, decisions, and actions, and the student receives information about ways the situation changes based on the decisions and actions. Carrier (1991) adds that there must be cyclical attempts at solving the problem set. Based on all of these definitions of “simulation” we can summarize that a simulation must include a model of real life and it must require action by the participants.

Benefits of Using Simulations

There are several proposed benefits of using simulations in the classroom, including the promotion of higher level thinking, cognitive processing, and active involvement. The development of higher level thinking, as produced by simulations, leads to critical thinking. Strickland, Feeley, & Wepner (1987) state that since users must make decisions about the situations presented in the simulations, they use “the higher level reading skills of prediction, generalization, and hypothesis testing.” (p. 96). In addition, simulations often require users to make decisions and defend their decisions, thus utilizing evaluative and analytical thinking.
The use of simulations has also been connected with the cognitive theory as a way to promote higher cognitive engagement and develop schemata and mental models (Schwienhorst, 2002; Rieber, 1996; Thurman, 1993). Thurman (1993) details further that simulations can promote cognitive processing, use of appropriate cognitive structures, and focus attention on relevant parts of information (p. 76).

In addition to the relationship between simulations and the cognitive theory, simulations also have links to other heuristic theories. Simulations take language from the "real-world" and actively involve the students in reading to learn about the situation and problems presented (Schwienhorst, 2002; Strickland, Feeley, & Wepner, 1987), characteristics of both the constructivist and communicative approaches. Furthermore, the simulation activities are learner-centered and learner-controlled (Jones, 1982) and language is used as a means to communicate, making them "critical tools for improving [communication] skills . . ." (Nemitcheva, 1995, p. 70) Simulations thus correspond in multiple ways with both constructivist and communicative theories through student-centered, active involvement using authentic language.

**Simulations and Culture**

Simulations are a unique didactic tool in that they closely tie knowledge with active involvement. Simulations are founded on the idea that "activity and situations are integral to cognition and learning" (Brown, Collins, & Duguid, 1989, p. 1). In the language environment, the language presented is representative of the actual activity and situations in which the language is produced. According to Brown, Collins, & Duguid (1989), languages are an index to the world and are "inextricably a product of the activity and situations in which they are produced." (p. 1) If reading is considered as "an interactive, sociocognitive process involving a text, a reader, and a social context . . .," then good reading instruction involves a meaningful text, actively involves the reader, and places the reading within a clear social context (Ediger, 2001, p. 154). Simulations offer a way to do this. The authentic language in a simulation is placed into a context in which it would actually be used. Simulations allow students to have experiences and use language that may be difficult to otherwise do within the confines of the classroom (Schwienhorst, 2002; Carrier, 1991; Jones,
Despite the enthusiasm for the cultural context involved in simulations, some oppose the reasoning that this is a positive consideration. For example, Zaid (1999), contends that culture is not essential for language learning, particularly in an EFL situation. He debates the idea that language is inextricably tied to culture. Such teaching, he proposes, fosters cultural shock, degradation of the native culture, and even the institution of a third culture that neither fits in the L1 or L2 culture. He agrees that culture is an important aspect of language learning, but Zaid does not believe it should be the driving force behind language teaching.

Despite this contention, other researchers (i.e. Melby, 2003, Schwienhorst, 2002, Edigar 200, Carrier 1991) maintain the importance of culture in language teaching and some assert that simulations can bring context to language learning. This debate remains unsettled.

Simulations and Motivation

From a teacher’s perspective, certainly there are several reasons for using simulations. If we look at simulations from a student perspective, there is also a good reason for using simulations, namely the motivational appeal. Motivation, according to Orbach (1979), consists of a need and readiness. Simulations are similar to games, and they share the same intrinsic motivational appeal as games (Griffiths, 1996; Balajthy, 1984; Higgins & Johns, 1984; Jones, 1982). For example, simulations create an intrinsic desire or need and then create an environment to satisfy the need. As Lockman (2003) reports about this type of “contextual learning,” “(f)rustration is balanced against rewards to maintain a competitive interest in progressing.” (p. 1) One reason for this is that students are role-playing in the simulation and have less fear of making a mistake (Schwienhorst, 2002; Nemitcheva, 1995). Simulations also appeal to a variety of students in a variety of different ways (Orbach, 1979). The importance of motivational appeal should not be downplayed. High motivation has a high correlation with reading achievement (Willing, 1988). Due to this, several researchers have emphasized the importance of student appeal and attitudes when choosing academic software (i.e., Griffiths, 1996; Reigeluth & Schwartz, 1989; Bork, 1981).

Though motivation is significant, learning through simulations is not well documented. A study by Druckman (1995) actually showed that there was no significant
difference between learning achievement in classrooms that used conventional techniques and classrooms that used games as teaching devices. Though, the games affected attitudes toward learning, they did not greatly change the learning that occurred. Druckman (1995) quotes the results of a study by Randel, Morris, Wetzel, and Whitehall (1992) in which simulation games and conventional instruction were compared. The results indicated that 56% of the comparisons showed no difference between the two methods, 39% favored games, and 5% favored traditional methods (p. 181). Thus, the effectiveness of simulation games on learning is still unsettled.

The motivation contingent with simulations has reached new arenas of research and practice as technological advancements bombard education. Technology, and computers in particular, is changing the face of education and the tools embraced and needed in education.

Computers and ESL Literacy

Computers are now an integral part of our society. Used for school, work, and play, computers constitute an inescapable entity in the world. Therefore, instruction, particularly literacy instruction, is increasingly called upon to reflect this change in society.

Computer Literacy

Computer literacy creates an entirely different aspect to the term “literacy.” As stated by Costanzo (1994), “... computers are altering the way many of us read, write, and even think. It is not simply the tools of literacy have changed; the nature of texts, of language, of literacy itself is undergoing crucial transformations.” (p. 11) Computers offer new ways of presenting texts, different ways of interacting with the reader, and a way of giving the reader more power (Costanzo, 1994; Tuman, 1992).

The importance of computer literacy is especially salient when looking at adult literacy. In an essay discussing literacy instruction for adults, Weinstein (2001) states four themes or purposes for language and literacy among adults. These purposes include access to information, a voice to express ideas and opinions with confidence, independent action, and a bridge to the future. Computer literacy can meet each of these four purposes, especially since the advent of the Internet. Technology is a vital part of the future, and the ability to use technology can open up many opportunities. It was estimated that by the year 2000 nearly 2/3 of the work force in the United States was in information services, as
opposed to the 10% in 1920 (Tuman, 1992). If most adult literacy education is for employment, job training, and retraining, it only seems logical that computers should be an essential part of this education (Weinstein, 2001).

**Computers and Motivation**

The prevalence of computers seems to suggest their motivational power and instructional possibilities. For example, computers can create interactive, student-focused learning environments (Griffiths, 1996; LeBlanc, 1994; Tuman, 1992; Greenfield, 1984). Coordinately, computer games are engaging, demand choices, develop coordination, foster competition, and use tactical and strategical skills (Griffiths, 1996). Computer games are particularly appealing to males because of the content, visual, and spatial skills used in computer games (Griffiths, 1996). Thus, by using computer games in the classroom, instructors may be able to motivate students who otherwise struggle in traditional academic settings.

Griffiths (1996) connects this computer appeal with language teaching by stating that computers are an "... integral part of modern language teaching in the United States ..." as a "... motivating device, a means for providing comprehensible input, and a catalyst for communicative practice and the negotiation of meaning." (p. 44) Computers are often communicative in that students must read for necessary information, not just because they have been told to read (Jones & Fortescue, 1987). They also require the ability to interpret and respond appropriately (Higgins & Johns, 1984). In essence, this ability to interpret and respond correctly requires language learners to "... select and organize their own learning resources [and] become more aware of the linguistic structures or their target language and their learning process." (Schwienhorst, 2002, p. 197) Using these motivating and communicative elements of computers, computer simulations have entered the technological scene.

**Computers and Simulations**

Computer simulation games not only enhance certain aspects of simulations, but they capitalize upon the computer’s capabilities (Strickland, Feeley, & Wepner, 1987). Benefits of computer simulations include the ability of the computer to present scenarios in real time and give instantaneous feedback (Jones, G., 1986). Students are able to make predictions,
take action, and immediately see the consequences (Reigeluth & Schwartz, 1989; Strickland, Feeley, & Wepner, 1987). Computers also allow for individualization of the simulation (Reigeluth & Schwartz, 1989). Rising and Cedar (1995) contend that the computers enhance simulations "by providing necessary input, which permits the conversation to progress and allows for the practice of natural communication. This communication practice is recognized as being essential for second-language (L2) learners." (p. 195) Thus, computer simulations can combine both the benefits of simulations and the benefits of computers.

**Computer Simulations in the Language Classroom**

Prior to even using computer simulations, or computer software in general, in the language classroom, instructors need to determine what software to use and how the software should be used.

**Selecting Software**

Several researchers have proposed guidelines for evaluating software (i.e., Healey & Johnson, 1998; Jones & Fortescue, 1987; Geoffrian & Geoffrian, 1983) and simulations (i.e., Thurman, 1993; Reigeluth & Schwartz, 1989; Alessi, 1988; Balajthy, 1984; Jones, 1982). The importance of evaluating the software before usage is closely tied to learner variables. That is, the program or activity should be appropriate for the learner (Griffiths, 1996; Reigeluth & Schwartz, 1989; Bork, 1981). The issues involved in determining the appropriateness of the software for a learner will be discussed later.

**How to Use the Software**

There are several consistent findings concerning the use of computer simulations in the language classroom. First of all, several researchers concur that the use of the simulation should consist of three basic parts: briefing, execution, and de-briefing (Garris, Ahlers, & Driskell, 2002; Balajthy, 1984; Higgins & Johns, 1984; Jones, 1982,). Another basic agreement is that students should work in small groups during the simulation (Carrier, 1991; Brown, Collins, & Duguid, 1989; Balajthy, 1984). Finally, the simulation needs to be incorporated into the curriculum. It should be part of the lesson, meet literacy goals, be supported with contextual support, and have clear goals (Crook, 1996; Thurman, 1993; Carrier, 1991; Jones & Fortescue, 1987; Bork, 1981). An important point to keep in mind when using a computer simulation is that "[w]e must temper our enthusiasm for the gaming
approach with the knowledge that instructional games must be carefully constructed to provide both an engaging first-person experience as well as appropriate learner support.” (Garris, Ahlers, & Driskell, 2002, p. 461) As with computer games, “... the problems may rest not with the technology but with the way it is implemented and evaluated.” (Druckman, 1995, p. 182). These cautions concerning the implementation of computer software raise many questions. Just how can these programs be implemented effectively? What constitutes “appropriate learner support”?

Chapelle (2001) lists six criteria for computer assisted language learning (CALL) task appropriateness: language learning potential, learner fit, meaning focus, authenticity, positive impact, and practicality. Examining authentic computer simulation games in light of these criteria creates a foundation for developing appropriate tasks.

**Language Learning Potential**

Language learning potential refers to whether or not an activity includes a focus on form. Thus, highlighting linguistic features and/or modifications in interactions or output is included as a way of meeting the criteria. An authentic computer simulation, in and of itself, is quite limited in this criteria. For example, the SIMs is designed such that a person should react to the pop-up messages on the screen. These reactions typically include the manipulation of a character. However, due to the graphic, as well as verbal, cues provided with the game, it is presumably possible that one could play the game without reading the pop-up messages. In addition, there is not an explicit focus on the form because the game was created for native speakers as a form of entertainment, not for learning.

**Learner Fit**

This criterion focuses on whether or not the activity is appropriate to the level of the student. The SIMs is rated for teen to adult usage only. The game is not appropriate for young learners, native and non-native alike. Because of some of the adult themes running through the game, it may also be offensive to some adults. In addition, the game is highly tied to American culture, which raises issues of cultural imperialism. Some ESL learners may find the game to be an imposition of United States culture—values, social orders, and concepts.
Linguistically speaking, approximately 77% of the words used in The SIMs are from the K1 and K2 lists (the 2,000 most frequent English words). Many researchers encourage language teachers to teach these two thousand high frequency words because they account for about 80% of what is read or heard (Decarrico, 2001). Decarrico (2001) points out, however, that some students with goals such as university study should also learn words from the Academic Word List and develop strategies to deal with low-frequency words. A comparison of The SIMs text to various genre of text (see Appendix C), reveals that the high frequency word concentration in The SIMs is most similar to the language of professional science texts. Almost 17% of the SIMs text is classified as “Off-list” words (meaning they are not found in the K1, K2, or Academic Word Lists), which is almost three times as many as newspaper text. Hence, the game would probably be very challenging for beginning language learners and it would not focus solely upon the K1 and K2 words, which would be high instructional priority for beginners. Since over 20% of the words used in The SIMs are either from the Academic Word List or are Off-List Words, presumably, the best target language learning audience would be intermediate to advance learners, probably with a large desire or need to attain a high level of vocabulary and fluency.

Meaning Focus

Chapelle’s (2001) third criteria is that learners should use the target language to accomplish something. In a computer simulation game, as previously stated, the majority of the language is issued through pop-up texts that are used to spark the player to manipulate their character in some way. The focus of the SIMs is to help your character maintain a level of contentment. Helping the character meet physical and social needs does this. In essence, the simulation game is focused on what the player does and not on language forms at all.

Authenticity

The activity should correspond with activities outside of the classroom. The term “authentic computer simulation game” is used to describe computer simulation games, like The SIMs, that were not created specifically for ESL purposes. Thus, it is an activity in which native speakers are the target audience. The SIMs may also be viewed from a different perspective of authenticity. The game focuses upon the lives of the characters, who
eat, socialize, work, play, and rest in a pseudo-reflection of American life. Thus, the very situations faced by the characters are to be similar to situations in real-life.

Positive Impact

This criterion looks at the effects of the activity on the participants. As has already been described, computer simulation research indicates that the simulations have a large motivational appeal. Authentic computer simulations have proven their graphic and situational appeal through high software sales (see Lockman, 2003). Research on the positive impact of computer simulations on second language acquisition, however, is lacking. Something might be very motivational and fun, but if it has no impact on learning, then using it in the classroom seems highly questionable.

Practicality

This criterion is concerned with the ease of implementing the CALL activity. The necessity of computer hardware and software for computer simulation games does restrict their potential in the classroom. Due to copyright policies, multiple copies of the simulation would be needed in order for entire class participation. In addition, a computer lab with adequate computer hardware is required. For schools and regions with limited access to computers and/or funds for software, the applicability of computer simulations is nullified.

Realizing the limitations of a computer simulation game, creates several concerns. Based on Chapelle’s (2001) criteria for CALL task appropriateness, The SIMs, in and of itself, is not appropriate for use as a CALL task. It does not provide much language learning potential, the linguistically-fit audience is vague, and the positive impact largely unknown for this particular game and audience. Therefore, the problem becomes if and how can it be made appropriate? If Healey (1999) is correct that authentic computer simulations can be used for ESL reading instruction, how can they be used, and what effect do they really have on second language acquisition? Table 2a outlines how The SIMs alone and The SIMs with the supplemental materials used in this study compare to Chapelle’s (2001) criteria.

Similar questions formed the basis for the BYU electronic film review project (Melby, 2002). The researcher based his study on several assumptions: "student success is strongly influenced by student interest . . . , even if a film is interesting, simply watching it in VHS or DVD from start to finish without learning helps is not a very effective means of
improving listening comprehension . . .” (p. 172). Melby maintains that “(t)hese assumptions are based on widely-accepted belief in the importance of maintaining student interest . . . (p. 172) and the well-known notion of ‘comprehensible input’ developed by Krashen (1982). Thus, in order to retain student interest and make films more effective as didactic tools, Melby created a model by providing vocabulary, cultural, and grammar notes to supplement the films.

TABLE 2.1
Criteria for CALL Task Appropriateness Comparison to The SIMs

<table>
<thead>
<tr>
<th>Criteria for CALL task appropriateness</th>
<th>The SIMs</th>
<th>The SIMs with supplemental materials, as used in this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Learning Potential</td>
<td>No focus on form</td>
<td>Specific vocabulary, grammar, and cultural features made salient through pre-task activities</td>
</tr>
<tr>
<td>Learner Fit</td>
<td>Appropriate for teens and adults</td>
<td>Intermediate-advanced language learners (informed by linguistic analysis of text)</td>
</tr>
<tr>
<td>Meaning Focus</td>
<td>Focus of the task is to create and maintain characters.</td>
<td>Focus of the task is to create and maintain characters. Additional instructions provide more specific tasks for each session.</td>
</tr>
<tr>
<td>Authenticity</td>
<td>A popular game outside of the classroom; Focused on life activities (marriage, children, work, etc); U.S. culture</td>
<td>Remains authentic; purpose-driven interactions with classmates</td>
</tr>
<tr>
<td>Positive Impact</td>
<td>Highly motivational, based on sales records. Learning impact unknown.</td>
<td>Evaluated through quizzes and questionnaires</td>
</tr>
<tr>
<td>Practicality</td>
<td>Computer and software</td>
<td>Software and two computers for each group (one for the game and one for supplemental materials)</td>
</tr>
</tbody>
</table>
In the same way and with the same assumptions, it seems logical to state that simulation games need support in order to be part of an appropriate language learning task, this study aims to discover what constitutes "appropriate" support for authentic computer simulation games. In addition, the study examines the effect the combined supportive materials and simulation game may have on second language development. Thus, the following research questions provide the foci for the study:

1. Does receiving explicit vocabulary instruction prior to completing a computer simulation task enhance vocabulary acquisition?
2. Do students use the supplemental materials? If so, do they perceive the materials as helpful in understanding and completing the simulation?
3. After experiencing three conditions of supportive material, which supplemental materials do students perceive as being the most helpful? Which are the least helpful?
CHAPTER 3. MATERIALS AND PROCEDURE

The goal of this chapter is to outline the components and processes used in the study. The chapter will begin by describing the participants of the study. The next section will discuss each of the materials used in the study, leading to a description of the procedure used. The chapter will conclude by explaining the data analysis in order to answer each of the research questions.

Participants

The participants for the study included 18 intermediate adult ESL learners from a variety of language backgrounds. Eight of the participants were female and ten were male. At the beginning of the study, ages of the participants ranged from 18-35 years old and amount of time spent in the United States ranged from two months to four years (Appendix A gives a detailed profile of the participants). All of the participants were currently studying at a major U.S. research university. Based upon the results of an English Placement Exam administered upon their arrival at the university, the participants were placed into an academic reading class. The study was conducted during the regular class meeting time, which consisted of fifty minutes once a week. All but one participant were present for the entirety of the study.

The participants were placed into groups of three based on their responses to a pre-project survey and pre-test. The pre-test results, after a comparison to current classroom achievement, in case of anomalies, were used to determine the ability levels of the participants. The participants with the six highest scores were categorized as “high,” the next six scores as “middle,” and the lowest six scores as “low.” From this division, the six participants in each level were divided into groups of three. Thus, two high level, two middle level, and two low level groups were created. Each member in each of the groups spoke a different first language than their other group members. In addition, there was at least one male and one female in each group.

Materials

The materials used in this study can be divided into several categories: key task components, supplemental materials, pre and post project assessments and data gathering
instruments. The task necessities consisted of The SIMs software and the project website. The supplemental materials included the entire vocabulary, grammar, and cultural information and activities used prior and during the task. The pre and post project assessments included pre and post-tests, pre and post surveys, and a post-project discussion. The data gathering instruments included objective evaluations (quizzes) and subjective evaluations (questionnaires). See Appendix D to see the paper-based materials.

Key Task Components

The SIMs

The SIMs is an interactive computer simulation created by Will Wright in 2000. It is currently the best-selling PC game, with over 6.3 million copies shipped worldwide (Calvert, 2003; Fox, 2002). According to Fox (2002), The SIMs “has become a cultural phenomenon. Its worldwide appeal spans hard-core gamers, casual computer users, and even gaming’s most elusive group of consumers, women.” The game requires users to organize and manage

FIGURE 3.1. SIMs Screen Shot, SIMs Creator

FIGURE 3.2. SIMs Screen Shot, A House

FIGURE 3.3. SIMs Screen Shot, Some Disasters
a neighborhood of 10 houses. Users create the characters who live in the houses, build houses, follow career paths, shop, and, in essence, try to keep their neighborhood happy (About The SIMs, 2003). Players must satisfy the needs of the characters and react to things that occur to their characters. The simulation attempts to simulate life—the decisions of life, the balances of life, the fight against time, etc (Samuel, 2003; Q&A with Will Wright, 2003; Will Wright, 2000). See Figures 3.1, 3.2, and 3.3 for sample screen shots from The SIMs.

Website

Each session’s instructions and station designations were given through the website designed for the project. The website contained webpages with instructions for specific tasks that the participants were to complete in The SIMs for each session, as well as any access to supplemental materials. A flowchart in Appendix B shows the various navigation paths available through the website.

Supplemental Materials

Using the supplemental materials of the electronic film review project (Melby, 2002) as a model, materials were created that addressed vocabulary, grammar, and cultural features of the text. Each of the materials was made based on an analysis of The SIMs text. The process used to analyze the text for each of the linguistic features above is recounted, followed by a description of the activities and materials created.

Vocabulary list

The vocabulary words were chosen by a careful analysis of The SIMs text. First, 5,159 words from the game were written down by the researcher, along with the portion of the game from which the text came. Using the Compleat Lexical Tutor (Cobb, 2003), the words were sorted into frequency lists established by Cobb (see Table 3). The K1 Words consist of the 1,000 most frequent words in English and the K2 Words are the second most frequent 1,000 words. Each of the 5,159 words in The SIMs sample was then listed according to the number of occurrences in the sample.

From the sample, words for the vocabulary list were selected. See Appendix C for a list of the thirty vocabulary words. Only words from the Academic Word List and the Off-list Word list were used, due to the assumption that the participants probably would have already had exposure to most of the K1 and K2 words. The words chosen occurred more
than once in the sample (except for "carpool" which only occurred once, but was an essential concept used repeatedly during the game) and were deemed important for comprehension of the text.

The thirty words selected were divided into three lists of ten words each based on their occurrence in the game. For example, the words selected for session two occurred in the creation of The SIMs family and the process of moving the family into a house. On session three, the words focused on words used in the description of occupations for The SIMs and words used in interactions between The SIMs, since those were the two foci for the session. The session four words came mainly from the store catalog because the participants were required to purchase from the catalog on that session.

Vocabulary teaching techniques (such as in Fotos, 2001) promote the use of new vocabulary in rich contexts and allow students to have multiple exposure to the new items. For this reason, once selected, the words were looked up in the Longman Online Dictionary. The Longman dictionary definition was recorded, along with any possible synonyms and antonyms of each word. In addition, a concordance search of The SIMs sample, using MonoConc Pro, found examples of each word’s usage in the game. The definitions, examples of usage, and synonyms/antonyms were placed on a vocabulary chart for each session.

Vocabulary exercise

Once the words from The SIMs were compiled, a matching vocabulary exercise was created using Hot Potatoes, an online quiz generator. The task required students to match a definition with the selected vocabulary word using a pull-down option menu. The rationale

| TABLE 3.1 |
| SIMs Lexical Item Classification |

<table>
<thead>
<tr>
<th>Word List</th>
<th># of words in Sims sample</th>
<th>% of words from SIMs sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1000 (K1 Words)</td>
<td>3580</td>
<td>69.39%</td>
</tr>
<tr>
<td>1,001-2,000 (K2 Words)</td>
<td>413</td>
<td>8.01%</td>
</tr>
<tr>
<td>Academic Word List</td>
<td>300</td>
<td>5.82%</td>
</tr>
<tr>
<td>Off Word List</td>
<td>866</td>
<td>16.79%</td>
</tr>
</tbody>
</table>
for providing the vocabulary exercise was to give participants yet another exposure to the vocabulary items prior to beginning the simulation task.

On-line dictionary

The on-line dictionary used for The SIMs project was The Online Longman Dictionary. This dictionary was chosen due to the easy navigation and clear explanations.

Grammar features

The grammar foci were informed by research including proficiency level appropriateness of given grammatical forms and a concordance search, using MonoConc Pro. First of all, The SIMs sample was tagged using a grammatical tagger (Biber, 1988). The tagged text underwent preliminary perusal for frequently occurring tags. Concurrently, ESL textbooks and online materials were examined to find common grammatical topics discussed at an upper-intermediate proficiency level. Once the number of grammatical features was narrowed to the most frequently recurring features, a formal concordance search was performed, to look at the text more purposefully. The resulting searches revealed that many of the commands used in the simulation use either a gerund or infinitive (85 infinitive occurrences and 23 gerunds). Modals were another frequent occurrence in the sample, occurring 83 times, often to encourage the participant to address a need of the character. Prepositions were extremely frequent with 462 occurrences in the sample text, particularly with the moving and positioning of items and characters. Thus, these three grammatical features occurred fairly frequently, were connected to the communicative tasks of the simulation, and were appropriate for intermediate language learners, and, therefore, were selected for use in the project. The selection for which session to use a particular grammatical feature was made based on the commonality of the feature in specific tasks in the simulation. The gerunds and infinitives were the focus on session two because much of session two was spent with the simulation giving directions. Modals were chosen as the session three focus since the participants were given advice by the computer for what The SIMs should do to be content. The final session focused on the prepositions since one of the tasks for that session was to make purchases in the store catalog and this would require the movement of objects (i.e. furniture) and prepositions are often used in describing locations.
Grammar description

Once the grammar features were selected, links on the project website were made to the corresponding GrammarBytes (Simmons, 2003) grammar description of the feature. Each of the descriptions gave a brief explanation of the grammar element followed by several examples showing its different usage.

Grammar exercise

Like the vocabulary exercises, the grammar exercises were created using Hot Potatoes online quiz generator. The exercises consisted of ten multiple-choice items in which the participants needed to select the correct verb form (or modal or preposition) to fill in the blank. The multiple-choice items were selected from The SIMs sample, using the concordance search as a means for finding appropriate examples.

Cultural notes

The cultural notes were selected based on the tasks for each session. In session two, the task included the creation of the characters and part of this involves determining their personalities, and the program links each personality to a zodiac sign. Hence the cultural notes for session two are about the zodiac signs, what they are and what they may mean. On session three, the task is to find a job and interact with other characters. On this session, the cultural notes include an explanation of the different career tracks used in The SIMs and an explanation about carpooling. The last session is focused on making purchases and meeting friends. Thus, on this session, the cultural focus is on consumer culture, service jobs, pizza, catalog shopping, and the telephone as an important link to society.

Pre and Post Project Assessments

Pre-test and Post-test

The pre-test was used to place students into groups at relatively the same proficiency level. The post-test was identical in content to the pre-test, but the individual test items were randomly rearranged. Both tests contained a vocabulary and a grammar section. The vocabulary section consisted of three sections: matching, multiple choice, and short answer. The matching section had two parts: one with seven items and the other with eight items. Participants were provided with more possible vocabulary items than definitions, but there was only one correct response for each definition. The first part focused upon verbs and the
second part focused upon adjectives and a few nouns. The grammar section consisted of two sections: fill-in-the-blank and verb transformation. The fill-in-the-blank section provided participants with a bank of 17 prepositions and modals with which to complete the blanks in the 20 given statements. For some of the statements, multiple words could be used and, thus, any of the possible words were accepted during the study. The verb transformation activity presented participants with ten statements. Each statement contained a blank where the verb should be. An acceptable verb (in present, singular, base form) for each statement was given in parenthesis. Participants were to change the verb so that it fit grammatically into the statement, using either a gerund or infinitive form.

Pre-Project Survey

The purpose of the pre-project survey was to collect data concerning the participants and their familiarity and attitudes toward technology. Participants were asked to record their gender, age, native language, and the amount of time they have been in the United States. The second part of the survey consisted of twelve items. The first two items inquired about the learners' familiarity with computers. Items 3-11 were statements, ranging from computer usage (including specifically a statement about prior usage of The SIMs) to computer attitudes. Students circled a response to each statement along a continuum from strongly disagree to strongly agree. The last item asked the participants to rank six different uses of the computer, indicating which ones they spend the most time doing on a regular basis.

Post-Project Survey

The post-project survey was intended as a reflection about the participant's entire experience with The SIMs. Participants recorded their opinions (from strongly disagree to strongly agree) about seven statements dealing with different aspects of the project (working in groups, enjoyment, clarity, affect on reading). Items 8-10 were short answer questions dealing with the same aspects, but allowed for participants to elaborate. The final item asked participants to rank the usefulness of each of the supplemental materials (1 meaning "this was the least helpful" and 6 meaning "this was the most helpful")

Post-project Discussion

In summation of The SIMs unit and in order to “debrief” (Garris, Ahlers, & Driskell, 2002), the participants took part in an informal discussion about the simulation, the stations,
and their overall perceptions of the unit. The discussion was videotaped for future reference and clarification, if necessary.

Data Gathering Instruments

Weekly Quizzes

In format, the quizzes were shortened versions of the pre-test. The quizzes focused on the specific vocabulary and grammatical features highlighted during the session’s activity. They consisted of both vocabulary and grammar sections. The vocabulary section, like in the pre-test, was divided into matching, multiple choice, and short answer items. The words, though the same words as the pre-test, were placed into different sections of the quiz. That is, if the word “interact” was in the matching section on the pre-test, it was not in the matching section on the weekly quiz. The grammar section of the quizzes was specific for each session. On session two, the grammar focus was infinitives and gerunds, on session three, it was modals, and on session four, it was prepositions. The format of the grammar quiz was identical to the parallel item on the pre-test. However, completely different sentences were used for the fill-in-the-blank and verb transformation items.

Questionnaires

During the study, students individually completed questionnaires focused on the events of each session (Note: There was not a questionnaire for session one as all participants, presumably, had equal treatment and the questionnaires are specific for each treatment). The questionnaire completed by participants varied according to the station they were assigned to during the session’s activity. All of the questionnaires were designed to be answered quickly. Hence, they were no longer than ten questions, and for the most part, participants needed only to circle a response (“not at all,” “somewhat,” or “a lot”) to the given statements. The last two statements were the same for each station and were followed by short answer questions to elicit more specific data. These last two statements inquire what participants learned from The SIMs on the given session and whether the activity was enjoyed. Other than the last two questions, though, the items varied by station. The Station One questionnaire dealt specifically with each of the supplemental materials (vocabulary, grammar, and cultural notes) and whether the participant used the materials and whether they
were helpful. The questions for Station Two were similar to the questions in Station One, but were made specific for Station Two by inquiring about the usage of the online dictionary and grammar explanation, as well as the cultural notes. Station Three participants had a shorter five-item questionnaire, which asked about any confusion during The SIMs activity.

Procedure

The SIMs project was incorporated into the curriculum of a university academic reading class for international students. The class met once a week for fifty minutes throughout the 16 weeks of the semester. The SIMs project took place at approximately the last third of the semester. Though no grade was assigned based on the project, the participants were expected to be present and participate each week.

The participants were divided into six groups (A, B, C, D, E, F) of three students each based on the pre-project survey and pre-test. The groups were created based on proficiency levels, as determined by pretest scores and prior performance in class. In addition, the groups were created such that the three students in each group each had a different language background than their other group members in order to minimize the L1 spoken during the activity. Those who had the top six scores on the pretest were assigned to either group A or D. The participants with the lowest six pretest scores were placed in group C or F. The remaining middle-scoring participants made up groups B and E.

Each member of the group had an assigned role, following the procedures outlined by Jones (1982), which rotated each session. The Manager managed the computer containing the instructions and supplemental material and was to direct the group in the session's tasks.

FIGURE 3.4. Sample Station Arrangement
The SIMs Controller controlled the computer that contained The SIMs game. The Recorder wrote down a summary of the major events that occurred to the characters during the session and how the group completed the assigned task for the session. The summary was turned in at the conclusion of the session.

Each group sat together at one of six assigned computer stations (See Figure 3.4). The group remained at the same station throughout the project. Each computer station consisted of two computers—one for The SIMs game and one for the instructions and supplemental materials. Appendix F summarizes the order and occurrence of each part of the study.

The study took place in a computer lab equipped with one Macintosh computer, one monitor computer and 15 IBM computers. The stations were designed to give each group maximum space possible within the lab. Appendix B shows the room arrangement, location of each group, and the order in which each group progressed through the stations. Table 3.2 summarizes all of the data gathering methods used and what it was used for in the study.

Analysis

In order to address the three research questions, the analysis of the data consisted of three distinct components: an analysis of the quizzes, an analysis of the questionnaires, and finally, an analysis of the post-project survey responses. The first research question was addressed through a descriptive and inferential analysis of the weekly quizzes, based on the Latin rectangle design used in the study (see Appendix G). The second research questions was answered by an analysis of three specific questionnaire items. The final item on the post-project survey instituted the basis for answering the final research question.

Research Question #1

The first research question examines the acquisition of vocabulary, as displayed by the weekly quizzes. The quiz totals for all group members were averaged to create a group mean score for each session and for each station and, subsequently the grammatical and vocabulary sections of the quiz were averaged. A correlation analysis using a t-test followed by a Tukey-Kramer posthoc test compared the quiz scores of each student in each of the
<table>
<thead>
<tr>
<th><strong>Method</strong></th>
<th><strong>Data obtained</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test scores</td>
<td>Data on linguistic knowledge used to group students according to proficiency</td>
</tr>
<tr>
<td>Independent Variables</td>
<td></td>
</tr>
<tr>
<td>Pre-project survey</td>
<td>Data about learner's computer literacy and language background. Used to group</td>
</tr>
<tr>
<td></td>
<td>students according to their computer familiarity and intermix various linguistic</td>
</tr>
<tr>
<td></td>
<td>backgrounds</td>
</tr>
<tr>
<td>Access to materials</td>
<td>Station 1-explicit vocabulary, grammatical, and cultural instruction</td>
</tr>
<tr>
<td></td>
<td>Station 2-More learner control, choice to use supplemental material</td>
</tr>
<tr>
<td></td>
<td>Station 3-No supplemental material</td>
</tr>
<tr>
<td>Dependent Variables</td>
<td></td>
</tr>
<tr>
<td>Post-test scores</td>
<td>Data on overall linguistic gain throughout the sessions</td>
</tr>
<tr>
<td>Quizzes</td>
<td>Data on student knowledge of vocabulary and specific grammatical features</td>
</tr>
<tr>
<td></td>
<td>highlighted during the session</td>
</tr>
<tr>
<td>Questionnaires</td>
<td>Data on learner perceptions about the supplemental materials and the simulation</td>
</tr>
<tr>
<td></td>
<td>in general</td>
</tr>
<tr>
<td>Camtasia</td>
<td>Data on student usage of materials</td>
</tr>
<tr>
<td>Post-project survey</td>
<td>Data on student overall impressions of The SIMs and the different supplemental</td>
</tr>
<tr>
<td></td>
<td>materials</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Videocamera</td>
<td>Data on student interactions</td>
</tr>
<tr>
<td>Discussion</td>
<td>Data clarifying perceptions of The SIMs, group work, and suggestions</td>
</tr>
</tbody>
</table>
stations. After an overall quiz score comparison, this analysis also divided the scores into the appropriate vocabulary and grammatical portions of the quizzes.

**Research Question #2**

In order to investigate the usefulness of the supplemental materials to the completion of the simulation task, the responses to items 4, 5, and 6 of the questionnaires for stations one and two were analyzed. Item four on both questionnaires asked if the vocabulary activity, or online dictionary in station two, was helpful in completing the SIMs task. Item five asked the same question, but referred to the grammar activity and item six inquired into the usefulness of the culture activity in completing the simulation. The number of like responses was tallied for each group. This allowed for an overall comparison of responses for each of the items by all of the participants. It also allowed for a more specific comparison of responses by proficiency level and by session in the station.

**Research Question #3**

The last section of the post-project survey asked participants to rate the helpfulness of each of the materials used in the project (1=least helpful, 6=most helpful). This item was included in order to ascertain which supplemental materials were the most helpful to the participants, and thus, answer research question #3. The responses were averaged to give an overall impression of each of the supplemental materials.
CHAPTER 4. RESULTS AND DISCUSSION

Using the weekly quizzes, the weekly questionnaires, and the post-project survey, the three research questions were addressed. Table 4.1 summarizes the analysis used to answer each of the research questions.

Research Question #1

Participant performances on weekly quizzes are used to observe the effects of each station on language acquisition, specifically vocabulary acquisition. If participants were presented with pre-activity materials, which explicitly pointed out specific words, would they have better retention of the vocabulary words, and thus, perform better on the quizzes? Or, is it possible that simply by completing the simulation task, participants would unintentionally acquire vocabulary?

TABLE 4.1.
Summary of Analysis

Research Question #1
Does receiving explicit vocabulary instruction prior to completing a computer simulation task enhance vocabulary acquisition?
- Descriptive Statistics: Comparison of quiz scores-overall and by group level
- Inferential: T-test comparison of stations (as measured by quiz scores)

Research Question #2
Do students use the supplemental materials? If so, do they perceive the materials as helpful in understanding and completing the simulation?
- Comparison of questionnaire responses in station one and station two

Research Question #3
After experiencing three conditions of supportive material, which supplemental materials do students perceive as being the most helpful? Which are the least helpful?
- Comparison of post-activity survey responses
TABLE 4.2
Total Average Quiz Scores

<table>
<thead>
<tr>
<th></th>
<th>Session</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Total Score</td>
<td>11.44</td>
<td>15.78</td>
<td>2.54</td>
<td>14.06</td>
<td>1.10</td>
<td>13.76</td>
<td>2.18</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>6.61</td>
<td>1.97</td>
<td>8.06</td>
<td>1.14</td>
<td>7.22</td>
<td>0.50</td>
<td>7.30</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>4.83</td>
<td>1.24</td>
<td>7.72</td>
<td>1.82</td>
<td>6.78</td>
<td>1.03</td>
<td>6.44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Station</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Total Score</td>
<td>15.53</td>
<td>13.11</td>
<td>3.28</td>
<td>13.00</td>
<td>4.70</td>
<td>13.76</td>
<td>2.18</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>7.88</td>
<td>6.61</td>
<td>1.62</td>
<td>6.89</td>
<td>0.58</td>
<td>7.30</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>6.53</td>
<td>1.07</td>
<td>6.50</td>
<td>1.88</td>
<td>6.11</td>
<td>1.00</td>
<td>6.44</td>
</tr>
</tbody>
</table>

*Note.* n=18. k=20 questions/session. station 1=mandatory, explicit materials; station 2=optional materials; station 3=no materials.

Table 4.2 summarizes the quiz scores for all of the groups by session and also by station. Based on this table, when students were in station one and received the explicit vocabulary and grammar activities, the quiz score averages were higher than the scores from either station two (optional supplemental materials) or station three (no materials). Session two resulted in the lowest average quiz scores and session three displayed the highest average quiz scores.

Tables 4.3-4.5 summarize the mean weekly quiz scores for each of the six groups. The scores of the low level groups yielded the most complex data. Group F (see Table 4.5), which had one of the lowest scores in the pretest, performed with the highest average vocabulary quiz score overall. Whereas Group C, also with the lowest scores on the pretest, consistently had the lowest scores on the quizzes.
### TABLE 4.3
Average Quiz Scores for the High Level Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Session</th>
<th>2</th>
<th>SD</th>
<th>s</th>
<th>3</th>
<th>SD</th>
<th>s</th>
<th>4</th>
<th>SD</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Total Score</td>
<td>13.67</td>
<td>1.15</td>
<td>1</td>
<td>16.00</td>
<td>1.00</td>
<td>2</td>
<td>14.00</td>
<td>2.65</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>8.67</td>
<td>1.15</td>
<td></td>
<td>7.33</td>
<td>0.58</td>
<td></td>
<td>7.00</td>
<td>2.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>5.00</td>
<td>0.00</td>
<td></td>
<td>8.67</td>
<td>1.15</td>
<td></td>
<td>7.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Total Score</td>
<td>12.33</td>
<td>4.51</td>
<td>3</td>
<td>15.67</td>
<td>1.15</td>
<td>2</td>
<td>15.67</td>
<td>1.53</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>6.33</td>
<td>2.52</td>
<td></td>
<td>7.33</td>
<td>1.53</td>
<td></td>
<td>7.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>6.00</td>
<td>2.00</td>
<td></td>
<td>8.33</td>
<td>0.58</td>
<td></td>
<td>8.67</td>
<td>1.15</td>
<td></td>
</tr>
</tbody>
</table>

*Note. n=18. k=20 questions/session. s=station (station 1=mandatory, explicit materials; station 2=optional materials; station 3=no materials)*

### TABLE 4.4
Average Quiz Scores for the Middle Level Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Session</th>
<th>2</th>
<th>SD</th>
<th>s</th>
<th>3</th>
<th>SD</th>
<th>s</th>
<th>4</th>
<th>SD</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Total Score</td>
<td>12.33</td>
<td>2.31</td>
<td>3</td>
<td>18.67</td>
<td>1.53</td>
<td>1</td>
<td>14.00</td>
<td>0.00</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>6.00</td>
<td>1.00</td>
<td></td>
<td>9.67</td>
<td>0.58</td>
<td></td>
<td>7.67</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>6.33</td>
<td>1.53</td>
<td></td>
<td>9.00</td>
<td>1.73</td>
<td></td>
<td>6.33</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Total Score</td>
<td>10.67</td>
<td>3.06</td>
<td>2</td>
<td>18.33</td>
<td>1.15</td>
<td>1</td>
<td>12.33</td>
<td>0.58</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>6.00</td>
<td>2.65</td>
<td></td>
<td>9.33</td>
<td>0.58</td>
<td></td>
<td>6.67</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>4.67</td>
<td>0.58</td>
<td></td>
<td>9.00</td>
<td>1.00</td>
<td></td>
<td>5.67</td>
<td>1.15</td>
<td></td>
</tr>
</tbody>
</table>

*Note. n=18. k=20 questions/session. s=station (station 1=mandatory, explicit materials; station 2=optional materials; station 3=no materials)
### TABLE 4.5

Average Quiz Scores for the Low Level Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Quiz Scores for the Low Level Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Session</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>Total Score</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
</tr>
<tr>
<td>F</td>
<td>Total Score</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
</tr>
</tbody>
</table>

*Note.* n=18, k=20 questions/session. s=station (station 1=mandatory, explicit materials; station 2=optional materials; station 3=no materials)

A t test (see Appendix H), followed by a Tukey-Kramer post-hoc test, suggests that there is a statistically significant difference between the quiz scores for station one and station two (p=0.002) and station one and station three (p=0.001). However, there is not a statistically significant difference between the station two and station three scores (p=0.821). This trend continues with a comparison solely of the vocabulary sections of the quizzes. Again, there is a significant difference between stations one and two (p=0.015) and stations one and three (p=0.030), but no significant difference between the scores for station two and station three (p=0.650). The grammar section of the quiz varies less significantly. The difference between stations one and three approaches statistical significance (p=0.147), but there is no significant difference between stations one and two (p=0.445) and stations two and three (p=0.445).

Returning to the research question, does explicit vocabulary instruction prior to the computer simulation task enhance vocabulary acquisition? The data suggests that, yes, explicit vocabulary instruction prior to the simulation tasks does affect vocabulary acquisition, as measured by performance on weekly quizzes. There was a statistically significant difference between the quiz scores after participants completed station one, in
which explicit vocabulary instruction occurred, and the quiz scores after completing stations two and three, in which there was no explicit vocabulary instruction. This can be expected since the supplemental materials in station one highlighted the exact words and grammar points that were present on the weekly quizzes. Thus, having the explicit exposure to the words gave participants in station one the benefit of prior exposure to the vocabulary and grammar points. Though it was anticipated that the participants in station two and station three would encounter the vocabulary and grammar points while completing the simulation task, it was impossible to wholly control for that occurrence.

Furthermore, though evidence is limited, the data suggests that even accessing the optional materials may help increase quiz scores. The only group, Group F, who made use of the supplemental materials in station two scored twice as high as their proficiency level equivalents (Group C) did in station two. Whereas, when both of these groups used the required materials in station one, they had relatively equal scores on the quizzes. See Table 4.6 for a summary of quiz averages for Groups C and F. If accessing the materials did improve the quiz scores, then this would confirm the results by Hill and Laufer (2003) indicating that simply doing something with new words, such as look them up in a dictionary, improves retention of the words.

TABLE 4.6.
Comparison of Quiz Averages for Groups C and F in Stations One and Two

<table>
<thead>
<tr>
<th></th>
<th>Station 1</th>
<th>SD</th>
<th>Station 2</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>13.67 (Session 4)</td>
<td>0.58</td>
<td>7.67 (Session 2)</td>
<td>1.15</td>
</tr>
<tr>
<td>Group F</td>
<td>12.00 (Session 2)</td>
<td>0.00</td>
<td>14.67 (Session 4)</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Research question #2

The second research question addresses the helpfulness of the supplemental materials for completing the simulation task. Recall that in station one, the students were told explicitly to complete the vocabulary, grammar, and culture activities prior to beginning the simulation task. However, in station two, the students simply had access to a dictionary, grammar explanation, and cultural notes, but were not told explicitly to use them.
Items 4, 5, and 6 on the questionnaire for station one asked participants if the vocabulary activity, grammar activity, and cultural notes, respectively, were helpful in completing the simulation task. The responses for station one are summarized on Table 4.7. The participants had three options for their responses—not at all, somewhat, and a lot. The table shows a tabulation of the number of responses for each of the three items. For example, on session four, one person in the high level group indicated that the vocabulary activity was “not at all” helpful in completing the simulation task. On that same session, another person of the high level group indicated that the vocabulary activity helped “a lot.”

To summarize the station one questionnaire responses toward the helpfulness of the supplemental materials, it appears that the supplemental materials encouraged a variety of responses. Overall, the materials appeared to be helpful since the majority of participants (94% for vocabulary, 82% for grammar, 88% for culture) reported that the materials were “somewhat” or “a lot” helpful.

A similar analysis of the station two supplemental materials can offer some additional insights concerning participant perceptions of the materials. In this station, participants had access to vocabulary, grammar, and cultural material, but were not required to use them. The questionnaire items 4, 5, and 6 were essentially identical to the ones for station one. The responses are summarized on Table 4.8.

### TABLE 4.7

Station One Reported Usefulness of Supplemental Materials in the Completion of Simulation Task

<table>
<thead>
<tr>
<th>Response</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
<td><strong>High</strong></td>
<td><strong>Middle</strong></td>
<td><strong>Low</strong></td>
</tr>
<tr>
<td>Session</td>
<td>2 4 3 3 2 4</td>
<td>2 4 3 3 2 4</td>
<td>2 4 3 3 2 4</td>
</tr>
<tr>
<td>Vocabulary activity</td>
<td>1</td>
<td>2 1 2 2 2 3</td>
<td>1 1 1 1</td>
</tr>
<tr>
<td>Grammar activity</td>
<td>1 2</td>
<td>3 1 3 1 2</td>
<td>1 2 1</td>
</tr>
<tr>
<td>Cultural notes</td>
<td>1 1</td>
<td>3 1 1 1 2 1</td>
<td>1 1 1 2 2</td>
</tr>
</tbody>
</table>

*Note: n=17.*
TABLE 4.8.
Station 2 Reported Usefulness of Supplemental Materials in the Completion of Simulation Task

<table>
<thead>
<tr>
<th>Station 2: Optional supplemental materials</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Not at all</td>
<td></td>
<td>Somewhat</td>
<td></td>
<td>A lot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td>High</td>
<td>Middle</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online dictionary</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grammar explanation</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural notes</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. n=18.*

Interestingly, only one group reported using the supplemental materials in station two, but more groups answered that the materials were “somewhat” or “a lot” helpful. Looking only at the responses for group F (the only group who actually reported using the materials) the analysis is a bit different (see Table 4.9).

Group F, who used the online dictionary twice, reported that the online dictionary was “somewhat” helpful for completing the simulation task. Two of the members in Group F stated that the grammar and culture explanations were “somewhat” helpful whereas one member said they were “a lot” helpful.

Returning to the research question, do students perceive the supplemental materials as helpful in understanding and completing the simulation? This question becomes complex to answer. For example, in station one, all but one participant found the vocabulary activity to help with the task (71% “somewhat” and 24% “a lot”). The significance of this is slightly tainted, though, when looking at the station two data. In station two, participants had optional access to an online dictionary, but only three participants reported using the dictionary. However, 50% of the participants said that the online dictionary was “somewhat” helpful in completing the simulation task. The same trend occurred for the grammar and
TABLE 4.9.

Group F, Station 2 Reported Usefulness of Supplemental Materials in the Completion of Simulation Task

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Somewhat</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online dictionary</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grammar explanation</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cultural notes</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Note. n=3.

cultural notes supplemental material. This raises the question of whether or not the participants fully understood the questionnaire item and/or the term “somewhat.”

Based solely upon the general responses, the questionnaire results seem to indicate that the supplemental materials were useful for completing the task. However, these numbers must be read with caution since misunderstandings, the order of participating in the stations, and the level of the participant may have some bearing on their responses. In addition, personal non-linguistic factors might be involved. The one participant on session four, for example, who reported that the materials did not help at all was the only person who stated on the pre-project survey that she had previously played The SIMs. Her familiarity with the game could have profoundly impacted her perceptions of the materials.

Questionnaires allow for limited, subjective data that must be scrutinized with some skepticism. The major point that appears to emerge from the data is that the participants did not deem the supplemental materials worthless. Though there may be an element of observer’s paradox and/or nonlinguistic elements involved, this conclusion seems quite well supported by the evidence available.

Research Question #3

In order to assess the overall helpfulness of all of the supplemental materials, and hence draw a conclusion concerning the most helpful materials for task completion, the final item on the post-project survey asked participants to rate the helpfulness of all of the materials (A rating of one means the material was not helpful at all and a rating of six means
TABLE 4.10.
Reported Helpfulness of Supplemental Materials

<table>
<thead>
<tr>
<th>Supplemental Material</th>
<th>Vocab. Activity</th>
<th>Grammar Activity</th>
<th>Cultural notes</th>
<th>On-line dictionary</th>
<th>grammar explanations</th>
<th>summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Response</td>
<td>5.12</td>
<td>4.53</td>
<td>3.88</td>
<td>4.06</td>
<td>3.82</td>
<td>4.00</td>
</tr>
<tr>
<td>SD</td>
<td>1.45</td>
<td>1.12</td>
<td>1.62</td>
<td>1.34</td>
<td>1.42</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Note. n=18. 1=least helpful, 6=most helpful.

the material was the most helpful). The ratings from all participants were averaged, and the averages are displayed below on Table 4.10.

According to the data, the vocabulary activity was the most helpful of the supplemental materials with an average rating of 5.12. The least helpful materials seemed to be the cultural notes (average 3.88) and grammar explanations (average 3.82). Since most participants did not use the online dictionary and grammar explanation, one might expect those to be the lowest. Therefore, why some participants who did not use the online dictionary rated the dictionary at a 5 or 6 in terms of usefulness (six meaning very useful) is left to speculation. Some reasons might be that students did not understand the item on the survey, did not think carefully before answering, or meant that the online dictionary would have been helpful.

Combined with the results of the weekly questionnaire, it appears that the vocabulary activity was the most helpful of all of the supplemental materials. This is also confirmed by short answer responses on the post-project survey. One question inquired if the simulation task helped participants improve their reading skills and if so, how it helped. Fifteen out of 18 participants stated that they gained vocabulary. The logical conclusion, thus, is that the simulation task, along with the supplemental materials, seems to promote some vocabulary development. The retention and scope of the vocabulary learned is something that mandates further testing. The results of the post-test (See Appendix H) and videotaped interactions offer some insight into this, but that extends beyond the scope of this thesis.
The results indicate that supplemental materials used for an authentic computer simulation task do affect task effectiveness. Not only do certain supplemental materials make linguistic features salient, thus enhancing the language learning potential of the task, but also they provide support that improves the learner perceptions, and, hence appropriateness of the task.
CHAPTER 5. CONCLUSION

The effectiveness of authentic computer simulation games in the ESL classroom has not been widely explored. As a result, the present study provides groundwork for future explorations into the use of authentic computer simulation games in language teaching. The study allows us to draw a few conclusions about the effectiveness of such games, despite the limitations of the study, and a basis from which future studies may draw.

Implications

The materials created to supplement the simulation game in this study were formed in light of Chapelle’s (2001) CALL task appropriateness criteria. The goal of the vocabulary, grammar, and cultural activities was to make the language features of the game salient and appropriate to the learner, following the model set forth by Melby (2002) which consisted of vocabulary, grammar, and cultural activities to enhance video based tasks. The explicit instruction of the language features has been shown to increase the language learning potential of the task (Chapelle, 2001). The informed selection of language features through the use of corpus linguistic methodology was intended to provide support that would make the game appropriate for intermediate level language learners. The participants provided concurrent feedback by regularly completing questionnaires that targeted their perceptions of the tasks and supplemental materials. By this means, the positive impact of the task on learners was ascertained. The data collected from observations, quizzes, and questionnaires during the study allows for several insights into the use of authentic computer simulation game use in the language classroom.

First of all, it appears possible for practitioners to target and focus upon linguistic features by using the computer simulation games. However, determining the linguistic features to focus upon should be informed by careful research of the linguistic elements involved in the simulation. Despite the careful research, in a simulation game like The SIMs, the majority of the control belongs to the learner. Hence, it is challenging and quite impossible to prepare students for all of the linguistic features they will encounter during the
course of the game. For example, during this study, anecdotal evidence revealed that one group accessed an online dictionary, even though they were in station three in which no supplemental materials were provided. One of the words this group looked up was “bladder,” which was not one of the words on the vocabulary list for that session. Another group had very focused, metalinguistic discussions throughout the course of the session observed. The majority of their discussions centered on lexical items, as words such as “handyman,” “soccer,” and “strict” were discussed extensively. Though these words were not on the instructor-prepared materials, the observation evidence indicates that participants were learning words that went beyond the scope or preparation of the instructor.

Secondly, if an instructor would like to promote the acquisition of particular vocabulary, explicit, mandatory instruction prior to the simulation task is vital. Though these activities subtract from the time spent engaged in the simulation game, this study indicates that it does not profoundly impact student perception of the task. When the students received the explicit vocabulary instruction, they performed significantly better on the vocabulary section of the quiz. Furthermore, they indicated that the materials were helpful in assisting them to complete the simulation task.

Thirdly, the participants indicated that The SIMs mostly assisted them in vocabulary acquisition, as opposed to other reading sub-skills, such as grammar development. Out of all of the supplemental materials, the participants decidedly claimed the vocabulary activity as the most helpful. With this in mind, more research could certainly refine the pre-task vocabulary instruction and investigate ways to enhance the vocabulary acquisition of participants during The SIMs tasks.

A final implication of this study is that it confirms that computer simulation games are highly appealing to students and promote communicative language when used in a group setting. Almost all of the participants reported the game was enjoyable and they learned something from it during each of the three sessions. More research, though, must be completed in order to ascertain the magnitude of communicative language and student perceptions encouraged by the simulation task.
Limitations

One major caution that arises from this study is the interpretation of the data. For example, although the quizzes were hypothetically equivalent in difficulty and the pilot test seemed to confirm this, some differences might have been present. Looking at the quiz data for all of the levels and stations, session three clearly produced the highest quiz scores overall. Session two, however, consistently produced the lowest quiz scores. This could be due to the level of difficulty of the quizzes and/or the fact that participants did not know expectations or formats for the quizzes on session two, hence, they were not as prepared for the quiz. To highlight this, when the scores are broken down into vocabulary and grammar sections, the difference in the grammar scores by session display a great leap from session two (gerunds and infinitives) to session three (modals). Either the difficulty or lack of preparation for the session two quiz could cause the stark contrast. One of the assumptions made by the Latin Square design is that the order has no effect. This assumption should be taken into account when interpreting the results of the study.

Another caution in interpreting the data, as previously mentioned, is the lack of reliability of self-reported data. As shown earlier in the discussion, all but one group reported not using the optional materials in station two, yet on the same questionnaire, some of these same participants also stated that the materials were “somewhat” helpful. This certainly raises concern as a researcher. The implication of this is that researchers need to make every effort to ensure that participants understand each item and word when using a self-reporting data-gathering instrument.

Another caveat to this study and, in general, using authentic computer simulations in ESL is the close cultural connectivity of The SIMs and similar simulations. The SIMs is largely culturally based, as is seen by the capitalistic goals and daily routines of the characters, and this could have severe impact upon its acceptance by learners. Gass and Selinker (2001) assert that if learners acculturate and accept the social factors of the second language, then they will have a greater propensity to learn. However, if they resist that acculturation and a greater distance exists between the language learner and the target language culture, learning will be hindered. This carries great implications for using The SIMs in the classroom. If students perceive the game as imposing United States culture upon
them, the game may lose its effectiveness and even build resentment. On the opposite side, however, if students are interested in U.S. culture, they might be highly motivated by the game. This, too, carries caveats since the game holds the danger of containing some stereotypes and misrepresented cultural variables.

In addition to the above more global limitations, the actual experimental process of this study also experienced some glitches, which could have affected the data. On session three, for example, the link for the Hot Potatoes vocabulary activity did not work, so two groups of students were unable to complete the entire activity on that session. Surveying the results of both the station one quiz and questionnaire for both of the groups on session three, however, does not indicate unusual or inconsistent data. On session four, the major researcher was ill and was unable to be present at the final session or post-project discussion. These factors may have had some bearing on the data.

**Future Research**

Despite the complexity and glitches, this study examines a fascinating unknown realm within the ESL field. Not only does the study evaluate the effectiveness of authentic simulation games, but it does so within the context of a real classroom. Both components are exciting additions to the TESL field and should be expanded.

Moreover, simply the data gathered from this study offers many opportunities for further exploration and contributions to the ESL field. For example, an analysis of the videotapes and screen captures alone could expand the thesis conclusions. What trends occur in the dialogs among the groups? Are there patterns in the interactions? Who initiates the use of the supplemental materials? Do the roles each person is assigned affect their interaction in the group? Do the supplemental materials affect communication between group members? How long do the mandatory, supplemental materials take participants to complete and how does this affect the simulation task? In expansion of this thesis one might question how the supplemental materials be enhanced or changed to better assist students. Another option is to develop a means of getting students to access optional materials, like an online dictionary. For example, only thirty words were selected from the 5,000 word text for this study, so additional materials could use more of the words in order to expand the online materials. Studies could also target the use of the simulation game in other aspects of second
language acquisition, i.e. oral and written skills. Another option for further research would be to place the supplemental materials and The SIMs on the same computer and require participants to toggle back and forth. The possibilities for further research are broad considering the limited access to studies using the authentic simulation games.

In addition, ESL practitioners should be made aware of the potential of computer simulation games in order to capitalize on the technological and educational advances surrounding them. Just as Chapelle (2003) urges practitioners to be well informed of the latest technologies in order to better understand their students and the profession, this study encourages a stronger link between practitioners and technological advances. If The SIMs is able to meet ESL, is it not also possible for more of these popular computer games to be made accessible to ESL classrooms? Should software publishers and curriculum developers be approached about this possibility?

This study is not a closing to the debate over the effectiveness of authentic computer simulation games by any means. It is an opening that contains many possibilities for confirmation and expansion of the aforementioned conclusions. This study indicates that how an instructor structures the task can have a significant bearing on what students gain from a computer simulation game. Thus, the role of the instructor is crucial and computer simulation games in no way provide a substitute for ESL practitioners. As the simulation tasks and supplemental materials are refined and further developed, The SIMs may not only meet ESL, it may also develop a deeper, more far reaching relationship.
APPENDIX A: PARTICIPANT PROFILE

TABLE A.1.

Participant profiles

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender</th>
<th>Age</th>
<th>Native Language</th>
<th>Time in U.S.</th>
<th>Pre-test</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>A (High)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>28</td>
<td>Chinese</td>
<td>1.2 years</td>
<td>45</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>35</td>
<td>Korean</td>
<td>3 months</td>
<td>47</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>14</td>
<td>M</td>
<td>19</td>
<td>Japanese</td>
<td>5 months</td>
<td>45</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>45.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D (High)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>25</td>
<td>Japanese</td>
<td>2 years</td>
<td>43</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>10</td>
<td>F</td>
<td>19</td>
<td>Polish</td>
<td>2 months</td>
<td>42</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>15</td>
<td>M</td>
<td>23</td>
<td>French</td>
<td>1 year</td>
<td>29</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>38.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B (Middle)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>24</td>
<td>Arabic</td>
<td>1.5 years</td>
<td>42</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>22</td>
<td>Japanese</td>
<td>1 year</td>
<td>40</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>11</td>
<td>F</td>
<td>18</td>
<td>Chinese</td>
<td>3 months</td>
<td>37</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>39.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E (Middle)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>20</td>
<td>Korean</td>
<td>4 months</td>
<td>41</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>19</td>
<td>M</td>
<td>26</td>
<td>Thai</td>
<td>1.5 years</td>
<td>41</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>20</td>
<td>F</td>
<td>19</td>
<td>Norwegian</td>
<td>1 year</td>
<td>39</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>40.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (Low)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>M</td>
<td>26</td>
<td>Arabic</td>
<td>4 years</td>
<td>32</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>25</td>
<td>Korean</td>
<td>1 year</td>
<td>34</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>25</td>
<td>Chinese</td>
<td>1 year</td>
<td>34</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>33.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (Low)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>F</td>
<td>18</td>
<td>Catanese</td>
<td>3 months</td>
<td>44</td>
<td>Controller</td>
<td>Manager</td>
<td>Recorder</td>
</tr>
<tr>
<td>17</td>
<td>M</td>
<td>23</td>
<td>Urdu</td>
<td>2.5 months</td>
<td>36</td>
<td>Manager</td>
<td>Recorder</td>
<td>Controller</td>
</tr>
<tr>
<td>18</td>
<td>M</td>
<td>22</td>
<td>Korean</td>
<td>1.17 years</td>
<td>41</td>
<td>Recorder</td>
<td>Controller</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>40.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B: WEBSITE FLOW CHART

FIGURE B.1. Website Flow Chart
APPENDIX C: VOCABULARY

Vocabulary Comparison

Using the Compleat Lexical Tutor, developed by Cobb (2003), the text from The SIMs was divided into word lists. K1 Words are the 1,000 most commonly used English words, K2 words are the second most commonly used English words, AWL is the Academic Word List, and the Off-list includes any words not found on the above three lists. The lists from The SIMs was compared to text from a variety of different genres in order to determine the appropriateness of the text. Table C.1 displays the percentages of words from each of the text genres as they fit into the word lists.

TABLE C.1.
Vocabulary profile (Compleat Lexical Tutor)

<table>
<thead>
<tr>
<th></th>
<th>The Speech</th>
<th>Speech (2)</th>
<th>Newspaper</th>
<th>Science</th>
<th>Literature</th>
<th>Professional Spoken English</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1 Words</td>
<td>69.39%</td>
<td>90.43%</td>
<td>89.55%</td>
<td>83.41%</td>
<td>63.60%</td>
<td>81.23%</td>
</tr>
<tr>
<td>K2 Words</td>
<td>8.01%</td>
<td>1.54%</td>
<td>4.18%</td>
<td>5.85%</td>
<td>6.28%</td>
<td>4.33%</td>
</tr>
<tr>
<td>AWL</td>
<td>5.82%</td>
<td>4.63%</td>
<td>0.70%</td>
<td>4.39%</td>
<td>18.41%</td>
<td>1.08%</td>
</tr>
<tr>
<td>Off-list</td>
<td>16.79%</td>
<td>3.40%</td>
<td>5.57%</td>
<td>6.34%</td>
<td>11.72%</td>
<td>13.36%</td>
</tr>
</tbody>
</table>
**Words Chosen for the Study**

The following table lists the vocabulary words that were chosen for the study. They are listed alphabetically according to the session in which they were targeted.

TABLE C.2.
Vocabulary Words for Each Session

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>bulldoze</td>
<td>car pool</td>
<td>classic</td>
</tr>
<tr>
<td>customize</td>
<td>career</td>
<td>decorative</td>
</tr>
<tr>
<td>garment</td>
<td>charisma</td>
<td>deluxe</td>
</tr>
<tr>
<td>interact</td>
<td>compatible</td>
<td>depressed</td>
</tr>
<tr>
<td>logo</td>
<td>creativity</td>
<td>durable</td>
</tr>
<tr>
<td>mode</td>
<td>energy</td>
<td>elegant</td>
</tr>
<tr>
<td>pan</td>
<td>flirt</td>
<td>exquisite</td>
</tr>
<tr>
<td>panel</td>
<td>hygiene</td>
<td>fidelity</td>
</tr>
<tr>
<td>wardrobe</td>
<td>logic</td>
<td>incredible</td>
</tr>
<tr>
<td>zoom</td>
<td>tickle</td>
<td>unique</td>
</tr>
</tbody>
</table>
APPENDIX D: PAPER-BASED MATERIALS

The following displays each of the paper-based materials used in the study: pretest, post-test, pre-project survey, post-project survey, weekly quizzes, and weekly questionnaires.

- **Pretest**-60 items
- **Post-test**-60 items
- **Pre-project survey**-12 items
- **Post-project survey**-11 items
- **Weekly quizzes**-One for each of the major study sessions (session two, session three, and session four); 20 items each
- **Weekly questionnaires**-One for each station (station one, station two, station 3); 10 items each for stations one and two, 5 items for station 3)
Pre-test

Vocabulary

Section 1: Matching
Directions: Write the letter of the word next to its definition. Note: You will not use all of the words in the right-hand column.

A.

___ 1. to move quickly between a picture that is close and detailed and one that is distant.

___ 2. to move and follow the thing that is being filmed

___ 3. to rub someone’s body gently with your fingers in order to make them laugh

___ 4. to behave towards and talk to someone as though you are sexually attracted to them, but not in a very serious way

___ 5. to destroy a building

___ 6. to change something to make it more suitable for you

___ 7. to have an effect on each other and work together

B.

___ 1. able to have a good relationship

___ 2. not changing something when you are producing it again in a different form

___ 3. extremely beautiful and very delicately made

___ 4. staying in good condition for a long time even if used a lot

___ 5. something that is better quality than other things of the same type

___ 6. something important or special and remains popular a long time

___ 7. pretty or attractive, but not always necessary or useful

___ 8. extremely good or extremely large

A. interact

B. bulldoze

C. logo

D. customize

E. pan

F. assemble

G. panel

H. zoom

I. flirt

J. tickle

K. mode

A. incredible

B. fidelity

C. charming

D. compatible

E. classic

F. durable

G. cozy

H. decorative

I. deluxe

J. dynamic

K. phenomenal

L. exquisite
Section 2: Multiple Choice
Directions: Complete each sentence with the most appropriate word. Circle your word choice.
Example: The _______ game ended when John took her queen.
A. soccer  B. backgammon  C. chess  D. checker

1. There are many different _______ of travel, such as, boat, car, and airplane.
   A. modes  B. genres  C. obstacles  D. customs

2. His hat contains the company _______.
   A. mascot  B. mode  C. logo  D. address

3. The pilot checked the control _______ before taking off.
   A. table  B. panel  C. pan  D. graphic

4. I looked in her closet, and she has a very large _______.
   A. storage  B. stripe  C. flock  D. wardrobe

5. The _______ will arrive at the house in ten minutes to take Ben to work.
   A. carpool  B. shuttle  C. drive share  D. bus

6. He may not be the most skilled person in the election, but he might win since he has _______.
   A. exquisiteness  B. superiority  C. charisma  D. boredom

7. The artist displayed _______ in her latest, innovative piece.
   A. charm  B. constructivism  C. tradition  D. creativity

8. She washes her hands a lot. She must have very good _______.
   A. hygiene  B. filthiness  C. mirrors  D. compatibility

Section 3:
Give a definition or synonym (a word with almost the same meaning) for each of the following words.
Example: display—show (synonym) or to place something where people will see it (definition)

1. unique ____________________
2. garment ____________________
3. career ____________________
4. energy ____________________
5. logic ____________________
6. depressed ____________________
7. elegant ____________________
Grammar

Section 1: Fill-in-the-blank
Directions: Select the most appropriate word from the box to fill in the blank. You may use words more than once and some words may not be used at all.
Example: If I want to be healthy, I should eat good food and exercise regularly.

of in for on by at
can will might should may would
with into could from ought

1. I saw the cat sleeping _________ the couch.
2. I don't have enough money to buy lunch. _________ you lend me a couple of dollars?
3. My husband is _________ his way home now.
4. Professor Villa, we've finished our work for tosession. _________ we leave now, please?
5. By eleven o'clock _________ the evening, I am in bed.
6. _________ you help me?
7. I have a headache. _________ you buy some aspirin for me?
8. I swim _________ the school pool.
9. _________ you like some more tamales?
10. Look at those clouds. It looks like it _________ rain.
11. It's way past my bedtime and I'm really tired. I _________ go to bed.
12. She doesn't work _________ night.
13. Your father is arriving in Texas _________ five o'clock in the evening.
14. Tom was born _________ a Monsession.
15. Keeping a diary of purchases _________ also be helpful.
16. Please look _________ me. I'm talking to you.
17. I'm looking _________ my car keys. I can't find them.
18. How much does he charge _________ a haircut?
19. When _________ dinner be ready?
20. Have you decided _________ a name _________ the baby yet?
Section 2: Verb tense
Directions: Complete the following sentences with the correct form of the verb in parenthesis.

For example: I want you ______ to go ______ home. (go)
I remember ______ meeting ______ the Queen in London. (meet)
I am going to save time ______ by eating ______ at Burger King. (eat)

1. I will improve ______ every session. (practice)
2. I could go on ______ all night. (dance)
3. When the girls got tired ______ they went to sleep. (talk)
4. Julie and her friends went to the movie ______ the latest romantic comedy. (see)
5. Todd hopes to win the approval of his father ______ a good baseball player. (become)
6. Would you go to the store ______ some milk. (buy)
7. Would you mind ______ me the time? (tell)
8. To avoid ______ the pie, Cherie checked it often while it baked in the oven. (burn)
9. The dogs were taught ______, ______, and ______ on command. (stand, sit, bark)
10. A big screen TV is best ______ football games. (watch)
# Post-test

**Vocabulary**

**Section 1: Matching**

Directions: Write the letter of the word next to its definition. *Note: You will not use all of the words in the right-hand column.*

A.

1. to destroy a building  
   ____

2. to change something to make it more suitable for you  
   ____

3. to rub someone’s body gently with your fingers in order to make them laugh  
   ____

4. to move quickly between a picture that is close and detailed and one that is distant  
   ____

5. to behave towards and talk to someone as though you are sexually attracted to them, but not in a very serious way  
   ____

6. to have an effect on each other and work together  
   ____

7. to move and follow the thing that is being filmed  
   ____

---

B.

1. extremely beautiful and very delicately made  
   ____

2. something that is better quality than other things of the same type  
   ____

3. extremely good or extremely large  
   ____

4. able to have a good relationship  
   ____

5. not changing something when you are producing it again in a different form  
   ____

6. something important or special and remains popular a long time  
   ____

7. staying in good condition for a long time even if used a lot  
   ____

8. pretty or attractive, but not always necessary or useful  
   ____
Section 2: Multiple Choice
Directions: Complete each sentence with the most appropriate word. Circle your word choice.
Example: The ________ game ended when John took her queen.
A. soccer  B. backgammon  C. chess  D. checker

1. The pilot checked the control ________ before taking off.
   A. table  B. pan  C. panel  D. graphic

2. He may not be the most skilled person in the election, but he might win since he has ________.
   A. superiority  B. charisma  C. exquisiteness  D. boredom

3. There are many different ________ of travel, such as, boat, car, and airplane.
   A. customs  B. genres  C. modes  D. obstacles

4. She washes her hands a lot. She must have very good ________.
   A. hygiene  B. filthiness  C. mirrors  D. compatibility

5. The ________ will arrive at the house in ten minutes to take Ben to work.
   A. carpool  B. bus  C. drive share  D. shuttle

6. The artist displayed ________ in her latest, innovative piece.
   A. creativity  B. constructivism  C. charm  D. tradition

7. His hat contains the company ________.
   A. mascot  B. address  C. logo  D. mode

8. I looked in her closet, and she has a very large ________.
   A. stripe  B. flock  C. storage  D. wardrobe

Section 3:
Give a definition or synonym (a word with almost the same meaning) for each of the following words.
Example: display—show (synonym) or to place something where people will see it (definition)

1. energy ________
2. garment ________
3. logic ________
4. career ________
5. elegant ________
6. depressed ________
7. unique ________
Grammar

Section 1: Fill-in-the-blank
Directions: Select the most appropriate word from the box to fill in the blank. You may use words more than once and some words may not be used at all.
Example: If I want to be healthy, I should eat good food and exercise regularly.

<table>
<thead>
<tr>
<th>of</th>
<th>in</th>
<th>for</th>
<th>on</th>
<th>by</th>
<th>at</th>
</tr>
</thead>
<tbody>
<tr>
<td>can</td>
<td>will</td>
<td>might</td>
<td>should</td>
<td>may</td>
<td>would</td>
</tr>
<tr>
<td>with</td>
<td>into</td>
<td>could</td>
<td>from</td>
<td>ought</td>
<td></td>
</tr>
</tbody>
</table>

21. I don't have enough money to buy lunch. ______ you lend me a couple of dollars?

22. Professor Villa, we've finished our work for tosession. ______ we leave now, please?

23. My husband is ______ his way home now.

24. She doesn't work ______ night.

25. By eleven o'clock ______ the evening, I am in bed.

26. ______ you help me?

27. I have a headache. ______ you buy some aspirin for me?

28. Look at those clouds. It looks like it ______ rain.

29. Have you decided ______ a name ______ the baby yet?

30. ______ you like some more tamales?

31. Tom was born ______ a Monsession.

32. It's way past my bedtime and I'm really tired. I ______ go to bed.

33. I saw the cat sleeping ______ the couch.

34. Your father is arriving in Texas ______ five o'clock in the evening.

35. Keeping a diary of purchases ______ also be helpful.

36. When ______ dinner be ready?

37. Please look ______ me. I'm talking to you.

38. I'm looking ______ my car keys. I can't find them.

39. I swim ______ the school pool.

40. How much does he charge ______ a haircut?
Section 2: Verb tense
Directions: Complete the following sentences with the correct form of the verb in parenthesis.

For example:  
I want you ___ to go ___ home. (go)
I remember ___meeting___ the Queen in London. (meet)
I am going to save time ___by eating___ at Burger King. (eat)

1. When the girls got tired ___ they went to sleep. (talk)
2. I could go on ___ all night. (dance)
3. A big screen TV is best ___ football games. (watch)
4. The dogs were taught ___ , ___ , and ___ on command. (stand, sit, bark)
5. Todd hopes to win the approval of his father ___ a good baseball player. (become)
6. I will improve ___ every session. (practice)
7. Would you mind ___ me the time? (tell)
8. To avoid ___ the pie, Cherie checked it often while it baked in the oven. (burn)
9. Would you go to the store ___ some milk. (buy)
10. Julie and her friends went to the movie ___ the latest romantic comedy. (see)
Pre-project Survey

Gender: M or F
Age: _______
Native Language: _______
Time in the U.S. _______

Computer Attitudes and Familiarity:

1. I own a computer. (circle one) yes no
   If yes, what kind of computer do you own? (circle all that apply)
   DOS/Windows Mac PC laptop
2. How would you rate your overall level of computer experience? (circle one)
   No experience
   a little experience/somewhat comfortable
   fairly experienced/comfortable
   quite experienced/very comfortable
   lots of experience/extremely comfortable
   (circle the number that most closely matches your response to each statement)

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

3. I enjoy using a computer in the classroom.
4. I enjoy using a computer at home.
5. I have had a class in a computer lab.
6. I spend over three hours a session using a computer.
7. I spend over six hours a session using a computer.
8. I am very confident using a computer.
9. I have previously played games on the computer.
10. I have had a lot of experience playing computer games.
11. I have previously played the simulation game The Sims.

12. How much time do you spend on the computer doing the following? (rank the following from "1" to "6" according to how much time you spend doing the activity—1 meaning "I do this the least or not at all" and 6 meaning "I do this the most")

   ______ Searching the Internet
   ______ Chatting/emailing
   ______ Using a word processing application (like Microsoft Word)
   ______ Using another application (like Microsoft Excel, Macromedia)
   ______ Playing games
   ______ Other
Post-project Survey

Gender: M or F
Age: __________
Native language: __________
Time in the U.S.: __________

Project I.D. number: __________

<table>
<thead>
<tr>
<th>Agree</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I enjoyed playing the Sims.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I enjoyed working in my group.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I liked having a specific role in my group each session</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I would like to spend more time doing this activity.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. The instructions for each session were clear.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. This activity is helpful for improving my reading skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I would like to do more activities like this to improve my reading skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

8. What was your favorite part of this activity? Why?

9. What was your least favorite part of this activity? Why?

10. If you thought this activity was helpful for improving your reading skills, how was it helpful? What did you learn?

11. Did you think the accompanying activities were helpful (rank the following from "1" to "6" according to how helpful the following materials were as you played the Sims and took the quizzes—1 meaning "This was the least helpful" and 6 meaning "This was the most helpful")

   ____ Vocabulary activity
   ____ Grammar activity
   ____ Cultural notes
   ____ Link to an on-line dictionary
   ____ Grammar explanations
   ____ Summary of each session's activities
   ____ Other ________
Session 2 Quiz

Section 1: Matching
Directions: Write the letter of the word next to its definition. Note: You will not use all of the words in the right-hand column.

1. ___ piece of clothing  
   A. panel 
2. ___ small design  
   B. logo 
3. ___ the clothes that someone has  
   C. charisma 
4. ___ a board where the controls of a  
   D. mode 
5. ___ machine are located  
   E. garment 
6. ___ manner or way  
   F. hygiene 
   G. wardrobe

Section 2: Multiple Choice
Directions: Complete each sentence with the most appropriate word. Circle your word choice.

1. Many computer games require the user to ______ with the computer.
   A. logic  
   B. focus  
   C. detail  
   D. interact
2. The video camera ______ to show the entire view of the landscape.
   A. panned  
   B. zoomed  
   C. focused  
   D. depressed
3. The video ______ to show the smallest details of the flower.
   A. zoomed  
   B. paneled  
   C. panned  
   D. interacted

Section 3:
Directions: Give a definition or synonym (a word with almost the same meaning) for each of the following words.

1. bulldoze ____________________
2. customize ____________________

Section 4:
Directions: Complete each sentence with the correct form of the verb in parenthesis.
For example: I want you to go _____ home. (go)
   I remember _____ the Queen in London. (meet)
   I am going to save time by eating _____ at Burger King. (eat)

1. Did you remember _____ the letter? (mail)
2. I'm not used _____ up this early. (get)
3. I regret _____ Mary about the wedding. (tell)
4. Look, it's starting ___________. (rain)
5. She practiced her speech ____________ in front of a mirror. (speak)
6. I remember ____________ the President in Washington D.C. (see)
7. I used ____________ to the movies a lot. (go)
8. Mrs Jones, I regret _____ you that your credit limit has been exceeded. (inform)
9. Stop __________ this terrible noise at once! (make)
10. I wanted to help you ____________ food for the dinner. (buy)
Session 3 Quiz

Section 1: Matching
Directions: Write the letter of the word next to its definition. Note: You will not use all of the words in the right-hand column.

- able to use your imagination
- reasonable thinking
- power
- charm
- able to have a good relationship

A. energy
B. compatible
C. charisma
D. fidelity
E. creativity
F. hygiene
G. logic

Section 2: Multiple Choice
Directions: Complete each sentence with the most appropriate word. Circle your word choice.

I think she likes him because I saw her __________ with him.
A. flirt
B. tickle
C. carving
D. fight

The mother __________ the feet of her baby to make him laugh.
A. accessed
B. ignored
C. tickled
D. scrubbed

It is very important in the health profession to have good __________.
A. fidelity
B. moods
C. hygiene
D. compatibility

Section 3:
Directions: Give a definition or synonym (a word with almost the same meaning) for each of the following words.

career

car pool

Section 4:
Directions: Complete the following sentences with the most appropriate word from the box. You may use some words more than once and some you may not use at all.

<table>
<thead>
<tr>
<th>can</th>
<th>will</th>
<th>might</th>
<th>should</th>
<th>may</th>
<th>would</th>
<th>could</th>
<th>ought</th>
</tr>
</thead>
</table>

1. The weather forecaster predicted that it ________ snow tomorrow.
2. Our experiment confirmed that oil ________ float on water.
3. ________ you do me a favor, please?
4. After years of study, I ________ read Greek.
5. You ________ do this assignment because it will help you on the test.
6. I promise that I ________ talk to you on Sunsession.
7. You are doing much better, so I think you ________ go home tomorrow.
8. Who ________ give me a pencil?
9. If the weather is nice, I ________ go to the park tomorrow.
10. I wish I ________ go to the party, but I have to work.
Session 4 Quiz

Section 1: Matching
Directions: Write the letter of the word next to its definition. *Note: You will not use all of the words in the right-hand column.*

- distinctive ____________
- extremely good or large ____________
- very beautiful and graceful ____________
- pretty or attractive, but not always necessary or useful ____________
- very unhappy ____________

A. depressed
B. decorative
C. elegant
D. classic
E. incredible
F. deluxe
G. unique

Section 2: Multiple Choice
Directions: Complete each sentence with the most appropriate word. Circle your word choice.

The car show displayed many ________ models.
A. wardrobe  B. classic  C. dull  D. elegant

Her wedding gown was ________! Did you see the amazing beadwork?
A. exquisite  B. plain  C. classic  D. creative

Did you buy the ________ version of the software? It has better graphics.
A. compatible  B. primary  C. deluxe  D. incredible

Section 3:
Directions: Give a definition or synonym (a word with almost the same meaning) for each of the following words.

durable ______________________

fidelity ______________________

Section 4:
Directions: Complete the following sentences with the most appropriate word from the box. You may use some words more than once and some you may not use at all.

of in for on with by from over at into about through

1. I went to Vancouver ________ my car.
2. I went downtown ________ the bus.
3. I was born ________ 1978.
4. I’ll call you ________ 7.30.
5. The party is ________ Thrusession.
6. Thank you ________ your kindness.
7. Many people are fond ________ music.
8. Mr. Sherwood is staying ________ a hotel.
9. He has appeared ________ TV many times.
10. A sudden illness prevented her ________ attending the meeting.
Questionnaire
Station 1

Circle the option that most closely reflects your opinion.

1. My group completed the vocabulary activity.  yes  no
2. My group completed the grammar activity.  yes  no
3. My group read the cultural notes.  yes  no

4. The vocabulary activity helped us to understand and play The Sims.
   Not at all  Somewhat  A lot

5. The grammar activity helped us to understand and play The Sims.
   Not at all  Somewhat  A lot

6. The cultural notes helped us to understand and play The Sims.
   Not at all  Somewhat  A lot

7. The vocabulary activity helped us to complete the quiz.
   Not at all  Somewhat  A lot

8. The grammar activity helped us to complete the quiz.
   Not at all  Somewhat  A lot

9. I learned something new from playing The Sims tosession.
   Not at all  Somewhat  A lot
   If you learned something, what did you learn? ________________________________

10. I enjoyed tosession’s activity.
    Not at all  Somewhat  A lot
    Why? ________________________________________________________________
Circle the option that most closely reflects your opinion.

1. My group used the online dictionary. yes no
   If yes, about how many times did you use it? ________

2. My group looked at the grammar explanation. yes no

3. My group read the cultural notes. yes no

4. The online dictionary helped us to understand and play The Sims.
   Not at all Somewhat A lot

5. The grammar explanation helped us to understand and play The Sims.
   Not at all Somewhat A lot

6. The cultural notes helped us to understand and play The Sims.
   Not at all Somewhat A lot

7. The dictionary helped us to complete the quiz.
   Not at all Somewhat A lot

8. The grammar explanation helped us to complete the quiz.
   Not at all Somewhat A lot

9. I learned something new from playing The Sims tosession.
   Not at all Somewhat A lot
   If you learned something, what did you learn? ________________________________

10. I enjoyed tosession’s activity.
    Not at all Somewhat A lot
    Why? ____________________________________________________________________
Questionnaire
Station 3

Circle the option that most closely reflects your opinion.

1. I saw words I did not know while playing The Sims tosession.
   Not at all  Somewhat  A lot

2. I read sentences I did not understand completely while playing The Sims tosession.
   Not at all  Somewhat  A lot

3. I was a little confused while playing The Sims tosession.
   Not at all  Somewhat  A lot

4. I learned something new from playing The Sims tosession.
   Not at all  Somewhat  A lot
   If you learned something, what did you learn? _____________________________________________

5. I enjoyed tosession’s activity.
   Not at all  Somewhat  A lot
   Why? _____________________________________________
APPENDIX E: ROOM ARRANGEMENT

Group A
1. Station 1
2. Station 2
3. Station 3

Group B
1. Station 3
2. Station 1
3. Station 2

Group G
1. Station 3
2. Station 2
3. Station 1

Group F
1. Station 1
2. Station 3
3. Station 2

Group E
1. Station 2
2. Station 1
3. Station 3

FIGURE E.1. Room Arrangement
APPENDIX F: RESEARCH DESIGN SUMMARY

TABLE F.1.
Research Design

Pre-test—2 components: a vocabulary section and a comprehension section. Both vocabulary and text for the comprehension section will come directly from the game.

Pre-project Survey—age, language background, computer usage, experience with The SIMs

Session 1—Complete Sims tutorial  (October 29)

<table>
<thead>
<tr>
<th>Station</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>A, F</td>
<td>C, E</td>
<td>B, D</td>
</tr>
<tr>
<td>Supplemental Material</td>
<td>Instructions</td>
<td>Instructions</td>
<td>Instructions</td>
</tr>
<tr>
<td>Post-activity</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Session 2—Create a family with 3 people  (November 5)

<table>
<thead>
<tr>
<th>Station</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>A, F</td>
<td>C, E</td>
<td>B, D</td>
</tr>
</tbody>
</table>
| Supplemental Material | Instructions  
Grammar activity-infinities & gerunds  
Cultural notes  
Vocabulary list | Instructions  
Grammar review-infinities & gerunds  
Cultural information  
Link to on-line dictionary | Instructions |
| Post-activity | Turn in summary  
Take quiz  
Short questionnaire | Turn in summary  
Take quiz  
Short questionnaire | Turn in summary  
Take quiz  
Short questionnaire |
### Session 3—Continue Sims game (November 12)

<table>
<thead>
<tr>
<th>Station</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>B, E</td>
<td>A, D</td>
<td>C, F</td>
</tr>
<tr>
<td><strong>Supplemental Material</strong></td>
<td>Instructions Grammar activity-modals Cultural notes Vocabulary list</td>
<td>Instructions Grammar review-modals Link to specific cultural information Link to on-line dictionary</td>
<td>Instructions</td>
</tr>
<tr>
<td><strong>Post-activity</strong></td>
<td>Turn in summary Take quiz Short questionnaire</td>
<td>Turn in summary Take quiz Short questionnaire</td>
<td>Turn in summary Take quiz Short questionnaire</td>
</tr>
</tbody>
</table>

### Session 4: Continue Sims game (November 19)

<table>
<thead>
<tr>
<th>Station</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>C, D</td>
<td>B, F</td>
<td>A, E</td>
</tr>
<tr>
<td><strong>Supplemental Material</strong></td>
<td>Instructions Grammar activity-prepositions Cultural notes Vocabulary list</td>
<td>Instructions Grammar review-prepositions Link to specific cultural information Link to on-line dictionary</td>
<td>Instructions</td>
</tr>
<tr>
<td><strong>Post-activity</strong></td>
<td>Turn in summary Take quiz Short questionnaire</td>
<td>Turn in summary Take quiz Short questionnaire</td>
<td>Turn in summary Take quiz Short questionnaire</td>
</tr>
</tbody>
</table>

**Post-test**—2 components: a vocabulary section and a comprehension section. Both vocabulary and text for the comprehension section will come directly from the game.

**Post-project Survey**—overall impressions about the game, the use of materials, preferences
A Latin rectangle, or incomplete Latin square, experimental design was implemented for several reasons. Neter, Kutner, Nachtsheim, and Wasserman (1996) state that advantages of a Latin square design include:

1. The use of two blocking variables often permits greater reductions in the variability of experimental errors than can be obtained with either blocking variable alone.
2. Treatment effects can be studied from a small-scale experiment
3. It is often helpful in repeated measures experiments to take into account the order position effect of treatments . . .

(p. 1209)

Thus, by using the design, the number of data collected from each station was maximized, since all eighteen participants experienced each condition. This assisted in minimizing the effects of individual student variables and the order in which the participants experienced the treatments. The two blocking variables for this study were the session of the treatment and the groups. Table 3.3 shows the basic design of this study.

**TABLE G.1.**
Latin Rectangle Design

<table>
<thead>
<tr>
<th></th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A (high)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Group B (middle)</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Group C (low)</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Group D (high)</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Group E (middle)</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Group F (low)</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note. 1=Station 1 (mandatory, explicit materials). 2=Station 2 (optional materials). 3=Station 3 (no materials)*
However, there are several limitations in using Latin square designs as given by Neter, Kutner, Nachtsheim, and Wasserman (1996). In order to have a complete Latin square, the number of blocking variables should equal the number of treatments. The design in this study was an incomplete Latin square, or Latin rectangle (Mead, 1990), due to the fact that there were six groups, but only three different treatments. The design also makes some rather major assumptions. The Latin square design assumes that there are no interactions between the blocking variables and treatments or between the two blocking variables. The degrees of freedom are also limited when only a few treatments are studied. In addition, the randomization necessary for the design is rather complex.

Despite these limitations, though, the design was selected because it maximized the data on each station. Since each participant completed each station, all participants contributed input for the usefulness of each station. In addition, because the stations were completed in different orders, the order effect was minimized. A statistical analysis of the data revealed that there was no significant order effect. A final benefit of using the Latin Square design was that it also lessened the effects of non-linguistic factors. Since each participant was allowed to demonstrate the effectiveness of each station, personality and motivational factors were essentially identical for all three stations.
## APPENDIX H: RAW SCORES

### TABLE H.1.

Pretest and Post-test Scores

<table>
<thead>
<tr>
<th>ID</th>
<th>Group</th>
<th>Group level</th>
<th>Gender</th>
<th>Time in U.S.</th>
<th>Total</th>
<th>Vocab</th>
<th>Gram</th>
<th>Total</th>
<th>Vocab</th>
<th>Gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>18</td>
<td>45</td>
<td>21</td>
<td>24</td>
<td>45</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>47</td>
<td>23</td>
<td>24</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>5</td>
<td>44</td>
<td>18</td>
<td>26</td>
<td>41</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>2</td>
<td>M</td>
<td>18</td>
<td>42</td>
<td>18</td>
<td>24</td>
<td>46</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>40</td>
<td>17</td>
<td>23</td>
<td>44</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>3</td>
<td>42</td>
<td>15</td>
<td>27</td>
<td>46</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>48</td>
<td>32</td>
<td>15</td>
<td>17</td>
<td>38</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>12</td>
<td>34</td>
<td>14</td>
<td>20</td>
<td>35</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td>3</td>
<td>F</td>
<td>12</td>
<td>29</td>
<td>9</td>
<td>20</td>
<td>35</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>24</td>
<td>43</td>
<td>17</td>
<td>26</td>
<td>42</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>10</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>2</td>
<td>42</td>
<td>19</td>
<td>23</td>
<td>45</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>15</td>
<td>D</td>
<td>1</td>
<td>M</td>
<td>12</td>
<td>45</td>
<td>21</td>
<td>24</td>
<td>46</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>4</td>
<td>41</td>
<td>17</td>
<td>24</td>
<td>41</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>19</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>17</td>
<td>41</td>
<td>14</td>
<td>27</td>
<td>39</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>20</td>
<td>E</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>41</td>
<td>16</td>
<td>25</td>
<td>43</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>13</td>
<td>F</td>
<td>3</td>
<td>F</td>
<td>3</td>
<td>38</td>
<td>14</td>
<td>24</td>
<td>39</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>2.5</td>
<td>34</td>
<td>12</td>
<td>22</td>
<td>41</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>14</td>
<td>36</td>
<td>13</td>
<td>23</td>
<td>41</td>
<td>19</td>
<td>22</td>
</tr>
</tbody>
</table>

| Mean | 39.78 | 16.28 | 23.50 | 42.06 | 18.67 | 23.39 |
| Median | 41.00 | 16.50 | 24.00 | 41.50 | 19.00 | 23.00 |
| Mode | 42.00 | 17.00 | 24.00 | 41.00 | 19.00 | 25.00 |
| Standard Deviation | 4.94 | 3.48 | 2.55 | 3.99 | 2.93 | 2.12 |
| Variance | 24.42 | 12.09 | 6.50 | 15.94 | 8.59 | 4.49 |

*Note. Time in the U.S. is reported in months*
<table>
<thead>
<tr>
<th>ID</th>
<th>Group</th>
<th>Group level</th>
<th>Gender</th>
<th>Time in U.S.</th>
<th>Session</th>
<th>Vocab</th>
<th>Gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>18</td>
<td>2</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>2</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>5</td>
<td>2</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>2</td>
<td>M</td>
<td>18</td>
<td>3</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>3</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>3</td>
<td>3</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>48</td>
<td>4</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>12</td>
<td>4</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td>3</td>
<td>F</td>
<td>12</td>
<td>4</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>24</td>
<td>4</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>2</td>
<td>4</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>D</td>
<td>1</td>
<td>M</td>
<td>12</td>
<td>4</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>4</td>
<td>3</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>19</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>17</td>
<td>3</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>E</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>3</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>13</td>
<td>F</td>
<td>3</td>
<td>F</td>
<td>3</td>
<td>2</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>2.5</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>14</td>
<td>2</td>
<td>12</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>15.53</td>
<td>7.88</td>
<td>6.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>15.00</td>
<td>8.00</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>13.00</td>
<td>10.00</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.67</td>
<td>2.39</td>
<td>2.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>7.14</td>
<td>5.74</td>
<td>7.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Time in the U.S. is reported in months
TABLE H.3.
Station Two Quiz Scores

<table>
<thead>
<tr>
<th>ID</th>
<th>Group</th>
<th>Group level</th>
<th>Gender</th>
<th>Time in U.S.</th>
<th>Session</th>
<th>Total</th>
<th>Vocab</th>
<th>Gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>18</td>
<td>3</td>
<td>15</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>5</td>
<td>3</td>
<td>17</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>2</td>
<td>M</td>
<td>18</td>
<td>4</td>
<td>14</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>4</td>
<td>14</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>48</td>
<td>2</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>12</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td>3</td>
<td>F</td>
<td>12</td>
<td>2</td>
<td>9</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>24</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>2</td>
<td>3</td>
<td>17</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>D</td>
<td>1</td>
<td>M</td>
<td>12</td>
<td>3</td>
<td>15</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>4</td>
<td>2</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>19</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>17</td>
<td>2</td>
<td>8</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>E</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>2</td>
<td>14</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>13</td>
<td>F</td>
<td>3</td>
<td>F</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>2.5</td>
<td>4</td>
<td>15</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>14</td>
<td>4</td>
<td>15</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vocab</td>
<td>13.11</td>
<td>14.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Gram</td>
<td>6.61</td>
<td>7.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Mean</td>
<td>6.50</td>
<td>7.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.32</td>
<td>1.94</td>
<td>1.92</td>
</tr>
<tr>
<td>Variance</td>
<td>11.05</td>
<td>3.78</td>
<td>3.68</td>
</tr>
</tbody>
</table>

*Note.* Time in the U.S. is reported in months
TABLE H.4.
Station Three Quiz Scores

<table>
<thead>
<tr>
<th>ID</th>
<th>Group</th>
<th>Group level</th>
<th>Gender</th>
<th>Time in U.S.*</th>
<th>Session</th>
<th>Total</th>
<th>Vocab</th>
<th>Gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>18</td>
<td>4</td>
<td>11</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>1</td>
<td>F</td>
<td>3</td>
<td>4</td>
<td>16</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>1</td>
<td>M</td>
<td>5</td>
<td>4</td>
<td>15</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>2</td>
<td>M</td>
<td>18</td>
<td>2</td>
<td>11</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>2</td>
<td>11</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>B</td>
<td>2</td>
<td>F</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>48</td>
<td>3</td>
<td>14</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3</td>
<td>M</td>
<td>12</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>C</td>
<td>3</td>
<td>F</td>
<td>12</td>
<td>3</td>
<td>17</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>24</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>D</td>
<td>1</td>
<td>F</td>
<td>2</td>
<td>2</td>
<td>12</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>D</td>
<td>1</td>
<td>M</td>
<td>12</td>
<td>2</td>
<td>12</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>4</td>
<td>4</td>
<td>13</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>E</td>
<td>2</td>
<td>M</td>
<td>17</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>20</td>
<td>E</td>
<td>2</td>
<td>F</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>F</td>
<td>3</td>
<td>F</td>
<td>3</td>
<td>3</td>
<td>18</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>2.5</td>
<td>3</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>3</td>
<td>M</td>
<td>14</td>
<td>3</td>
<td>18</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean 13.00 6.89 6.11
Median 12.00 7.00 6.00
Mode 12.00 9.00 5.00
Standard Deviation 2.95 2.03 1.68
Variance 8.71 4.10 2.81

Note. Time in the U.S. is reported in months
APPENDIX I: T-TEST

TABLE I.1.
T-test of Total Quiz Scores

| Stations Tested | Estimate | Standard Error | DF | T value | Pr>|t| | Adj P* |
|-----------------|----------|----------------|----|---------|-------|-------|
| 1 vs. 2         | 2.222    | 0.475          | 8  | 4.68    | 0.002 | 0.004 |
| 1 vs. 3         | 2.333    | 0.475          | 8  | 4.91    | 0.001 | 0.003 |
| 2 vs. 3         | 0.111    | 0.475          | 8  | 0.23    | 0.821 | 0.970 |

*Note. Adj P=Tukey-Kramer Post-hoc value*

TABLE I.2.
T-Test of Vocabulary Quiz Scores

| Stations Tested | Estimate | Standard Error | DF | T value | Pr>|t| | Adj P |
|-----------------|----------|----------------|----|---------|-------|-------|
| 1 vs. 2         | 1.833    | 0.590          | 8  | 3.11    | 0.015 | 0.035 |
| 1 vs. 3         | 1.556    | 0.590          | 8  | 2.64    | 0.030 | 0.069 |
| 2 vs. 3         | -0.278   | 0.590          | 8  | -0.47   | 0.650 | 0.887 |

*Note. Adj P=Tukey-Kramer Post-hoc value*

TABLE I.3.
T-Test of Grammar Quiz Scores

| Stations Tested | Estimate | Standard Error | DF | t value | Pr>|t| | Adj P |
|-----------------|----------|----------------|----|---------|-------|-------|
| 1 vs. 2         | 0.389    | 0.484          | 8  | 0.80    | 0.445 | 0.712 |
| 1 vs. 3         | 0.778    | 0.484          | 8  | 1.61    | 0.147 | 0.298 |
| 2 vs. 3         | 0.389    | 0.484          | 8  | 0.80    | 0.445 | 0.712 |

*Note. Adj P=Tukey-Kramer Post-hoc value*
APPENDIX J: PRETEST AND POST-TEST

The post-test was administered five weeks after the pretest. It had identical items as the pretest, but presented each item in a different order. The purpose of the pretest and post-test comparison was to see if the students retained the vocabulary and grammatical points presented to them during the simulation activity. Table I.1 displays the average pretest scores, post-test scores, and gain scores from the pretest to the post-test for each group of participants. The greatest score gains from the pretest to the post-test occurred in groups B, C, and F. The remaining groups A, D, and E showed little, if any, change from the pretest to the post-test. Group D and E had slight gains on their vocabulary scores, however, groups E and F actually averaged negative gains on the grammar portion of the tests. Generally speaking, the post-test scores averaged a gain of over two points, with the greatest gain occurring in vocabulary scores and a slight decrease in grammar scores.
TABLE J.1.
Average pre- and post-test scores and gains from the pretest to the post-test

<table>
<thead>
<tr>
<th>Group</th>
<th>Test Scores</th>
<th>Pretest</th>
<th>Post-test</th>
<th>Gain/Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Score</td>
<td>45.33</td>
<td>45.33</td>
<td>0.00</td>
</tr>
<tr>
<td>A (High)</td>
<td>Vocabulary</td>
<td>20.67</td>
<td>20.67</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>24.67</td>
<td>24.67</td>
<td>0.00</td>
</tr>
<tr>
<td>D (High)</td>
<td>Vocabulary</td>
<td>19.00</td>
<td>19.67</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>24.33</td>
<td>24.67</td>
<td>0.33</td>
</tr>
<tr>
<td>B (Middle)</td>
<td>Vocabulary</td>
<td>16.67</td>
<td>20.00</td>
<td>3.33</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>24.67</td>
<td>25.33</td>
<td>0.67</td>
</tr>
<tr>
<td>E (Middle)</td>
<td>Vocabulary</td>
<td>15.67</td>
<td>18.00</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>25.33</td>
<td>23.00</td>
<td>-2.33</td>
</tr>
<tr>
<td>C (Low)</td>
<td>Vocabulary</td>
<td>12.67</td>
<td>15.33</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>19.00</td>
<td>20.67</td>
<td>1.67</td>
</tr>
<tr>
<td>F (Low)</td>
<td>Vocabulary</td>
<td>13.00</td>
<td>18.33</td>
<td>5.33</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>23.00</td>
<td>22.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>Mean</td>
<td>Vocabulary</td>
<td>16.28</td>
<td>18.67</td>
<td>2.39</td>
</tr>
<tr>
<td></td>
<td>Grammar</td>
<td>23.50</td>
<td>23.39</td>
<td>-0.11</td>
</tr>
</tbody>
</table>

*Note.* n=18, k=50/test
REFERENCES


System 14(2), 179-186.


ACKNOWLEDGEMENTS

I would like to thank statistician Justin Recknor and Professor Mack Shelley of Iowa State University for their invaluable assistance in sorting through the study design and massive amount of data. I would also like to thank Professor Douglas Biber of Northern Arizona University and Assistant Professor Viviana Cortes of Iowa State University for their assistance in tagging the text from The SIMs. In addition, I am deeply indebted to Dr. Volker Hegelheimer for his unwavering enthusiasm for the study, his encouragement, and his generous advice and expertise on the topic.

As this thesis is a culmination of many years of education and intellectual growth, I would like to acknowledge my mother for her support, her sacrifices, and her love. I would also like to thank Erin, my kindred spirit, and Matthew, my soulmate, for their love, advice, and encouragement. Finally, I thank my Father, who has promised to continue the good work He began.