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

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Despite their motivational appeal to learners, innovative and technologically advanced computer simulation games targeting native English speakers frequently remain beyond the competence of ESL learners as independent didactic tools. Guided by Chapelle's (2001) criteria for determining CALL task appropriateness, this paper illustrates how the popular authentic simulation, The SIMs, can be adapted to enhance vocabulary learning through supporting materials. Adult ESL learners completed a five-week unit, experiencing different conditions of supplemental materials while completing tasks using The SIMs. The participants received mandatory supplemental materials in one condition, voluntary access to supplemental materials in the second, and no supplemental materials in the third. The results indicate a statistically significant increase in vocabulary acquisition for the first condition. Student feedback suggests the supplemental materials were beneficial for successful task completion. Thus, how authentic computer simulation tasks are structured and supported appears to have a considerable bearing on the appropriateness of the task.

Keywords: simulation games, ESL, vocabulary development, computer-assisted language learning

1.   INTRODUCTION

In an article summarizing software used in Computer Assisted Language Learning (CALL) environments, Healey (1999) proposes the use of the simulation game SimCity to teach reading to English as a Second Language (ESL) learners. However, she does not elaborate upon this or give any substantive evidence of support. Some research supports Healey's view by exploring the use of computer simulations in the language classroom. For example, Schwienhorst (2002) discusses the interactive and autonomous learning potential, while

Carrier (1991) proposes a cooperative approach to incorporating simulations in ESL. Willing (1988) and Balajthy (1984) look specifically at computer simulations and literacy development 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 report on empirical, classroom-based research on how the simulations can be used or even the effect of computer simulations on learning. All of these studies 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 none address how can they be used effectively, whether they are appropriate for ESL instruction, what the limitations are, and if computer simulations support reading instruction and vocabulary acquisition? This study considers computer simulation games as potential learning tools that, following Healey's (1999) suggestion, 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 instruction.

2. RELATED WORK

Consideration of computer simulations in second language literacy encompasses the joining of research areas concerned with vocabulary development, simulations, and computer simulation tasks in the language classroom.

2.1 Vocabulary Development in the Language Classroom

Ellis (1999) states that "vocabulary development is . . . a major aspect of learning a new language." (p. 33) Gass & 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 Several researchers (i.e. Zahar *et al.* 2001; Nation & Waring, 1997) 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. 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 & Waring, 1997).

While there is broad consensus regarding the need to acquire vocabulary, some controversy revolves around the best way of teaching 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), distinguishing two distinct parts of vocabulary instruction: explicit teaching and incidental learning. Various studies demonstrate research in favor of both types of vocabulary learning. For example, 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. Chun & Plass (1996), though, argue against the research on incidental vocabulary acquisition by pointing out flaws in the research supporting incidental vocabulary acquisition. Their study indicates that the incidental, contextual vocabulary learning produces lower vocabulary acquisition than decontexualized vocabulary word list learning. Chun & Plass (1996) concede, though, that the contextualized vocabulary learning may induce deeper learning of the vocabulary. This leads to more current studies that similarly conclude that vocabulary instruction should include both the incidental and intentional learning. Zahar *et al.* (2001) and Hill & Laufer (2003) support using direct vocabulary instruction or tasks to enhance vocabulary acquisition. The current debate and research hinge upon finding the balance between incidental and explicit vocabulary instruction. One consistent finding from the current research, though, is that vocabulary items should be embedded in a rich context (see Qian, 1996; Decarrico, 2001; Gass & Selinker, 2001; Read, 2000; Nagy, 1997). One technique that has been used in language classrooms in order to introduce and practice vocabulary in distinct contexts has been simulations.

2.2 Simulations in the Language Classroom

Simulations, founded on the idea that "activity and situations are integral to cognition and learning" (Brown *et al.,* 1989, p. 1), 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 (Crookall, 2002; Jones, C., 1986; Higgins & Johns, 1984). 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. Thus, a simulation includes a model of real life and requires action by the participants.

There are several proposed benefits of using simulations in the classroom, including the promotion of higher level thinking, cognitive processing, and active involvement. Strickland *et al.* (1987), Schwienhorst (2002), Rieber (1996), and Thurman (1993) discuss the cognitive stimulation and depth

of processing potential of simulations. In addition, 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 *et al.,* 1987). 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 are a unique didactic tool in that they closely tie knowledge with active involvement. In the language environment, the language presented is representative of the actual activity and situations in which the language is produced. According to Brown *et al.* (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, 1982; Bork, 1981). The experiences and the language are connected within the cultural bounds of usage.

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). 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) did not result in statistically significant differences 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) refers to Randel *et al.* (1992) comparison of simulation games and conventional instruction. 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, and the increasingly elaborate computer-based simulations add to this debate, which has shifted from a comparative approach to investigations into how to best make use of simulations.

2.3 Computer Simulations in the Language Classroom

Computer simulation games not only enhance certain aspects of simulations, but they also capitalize upon the computer's ever-increasing capabilities (Strickland *et al* 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 *et al* 1987). Computers also allow for individualization of the simulation (Reigeluth & Schwartz, 1989). Rising & 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.

Despite the enthusiasm for incorporating computer simulations in the classroom, educators have been urged to proceed with some caution. 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. Several researchers have proposed guidelines for evaluating software (i.e., Healey & Johnson, 1997; 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 language learner will be discussed later.

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 *et al.,* 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 *et al.,* 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 *et al.,* 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), in advocating one potential framework for evaluating tasks, 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. This paper examines the Electronic Arts computer game, The SIMs (The SIMs, 2000), in light of these criteria.

Language Learning Potential
Language learning potential refers to whether or not an activity includes a focus on form. An authentic computer simulation, in and of itself, is quite limited in this criteria as 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.

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.

In addition to matching the linguistic level of the student, computer simulations may also raise other issues concerning learner fit. For example, the SIMs is rated for teen to adult usage only, thus is not appropriate for young learners, native and non-native alike. Similarly, 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.

Meaning Focus
Chapelle's (2001) third criterion is that learners should use the target language to accomplish something. 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. 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. 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 psuedo-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

Table 1 Criteria for CALL Task Appropriateness Comparison to The SIMs

Criteria for CALL task appropriateness	The SIMs	The SIMs with supplemental materials, as used in this study
Language Learning Potential	No focus on form	Specific vocabulary, grammar, and cultural features made salient through pre-task activities
Learner Fit	Appropriate for teens and adults	Intermediate-advanced language learners (informed by linguistic analysis of text)
Meaning Focus	Focus of the task is to create and maintain characters.	Focus of the task is to create and maintain characters. Additional instructions provide more specific tasks for each day.
Authenticity	A popular game outside of the classroom; Focused on life activities (marriage, children, work, etc); U.S. culture	Remains authentic; purpose-driven interactions with classmates
Positive Impact	Highly motivational, based on sales records. Learning impact unknown.	Evaluated through quizzes and questionnaires
Practicality	Computer and software	Software and two computers for each group (one for the game and one for supplemental materials)

the participants. 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.

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 1 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.

Consequently, simulation games primarily targeting native speakers 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?

3. METHOD

3.1 Participants

Eighteen intermediate adult ESL learners from a variety of language backgrounds who were studying at a major U.S. research university participated in this study. All participants were placed into a required ESL reading class based on their English Placement Test scores. Appendix A outlines the biographical makeup of the participants and their roles during the study.

3.2 Materials

The SIMs

The SIMs (The SIMs, 2000), an interactive computer simulation, a 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 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 (http://thesims.ea.com/). 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; The SIMs, 2000).

The Website

Each day's instructions and station designations were given through a website. The website contained pages with instructions for specific tasks that the participants were to complete in The SIMs for each day, as well as any access to supplemental materials. The webpages for Station 1 included vocabulary lists and exercises, grammar descriptions and exercises, and cultural notes. The webpages for Station 2 included a link to an on-line dictionary, grammar explanation, and cultural notes. The webpages for Station 3 included no supplemental material. See Appendix B for a flowchart of the various navigation paths available through the website.

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 2). 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. 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 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 day one occurred in the creation of The SIMs family and the process of moving the family into a house. Once selected, the words were placed in a table for each day, along with their definitions (from the Longman Online Dictionary), possible synonyms and antonyms, and contextual occurrences in The SIMs.

Vocabulary exercise

Once the words from The SIMs were compiled, a matching vocabulary exercise was created using Hot Potatoes 6.0 (Arneil & Holmes, 2004), 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 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.

Grammar features

The grammar foci were informed by research focused on determining the proficiency level appropriateness of given grammatical forms and a concordance search, using MonoConc Pro (2000). First of all, The SIMs sample was tagged using a grammatical tagger (Biber, 1988). The tagged text underwent preliminary

Table 2 SIMs Lexical Item Classification

Word List	# of words in Sims sample	% of words from SIMs sample
1-1000 (K1 Words)	3580	69.39%
1,001-2,000 (K2 Words)	413	8.01%
Academic Word List	300	5.82%
Off Word List	866	16.79%

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 narrowed the grammatical feature foci for the study to gerund and infinitives, modals, and prepositions because these three grammatical features occurred fairly frequently, were connected to the communicative tasks of the simulation, and were appropriate for intermediate language learners. The selection for which day to use a particular grammatical feature was made based on the commonality of the feature in specific tasks in the simulation.

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. 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 of phrases taken from The SIMs simulation.

Cultural notes

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

Offline Materials
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

Pre-Project Survey

The purpose of the pre-project survey was to collect data concerning the participants and their familiarity and attitudes toward technology.

Post-Project Survey

The post-project survey was intended as a reflection about the participant's entire experience with The SIMs.

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 day's activity. They consisted of both vocabulary and grammar sections.

Questionnaires

During the study, students individually completed questionnaires focused on the events of each day. The questionnaire completed by participants varied according to the station they were assigned to during the day'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.

3.3   Procedure

The SIMs project was incorporated into the curriculum of an intact university academic litercy class for international students. The class met once a week for fifty minutes throughout the 15 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 and were comprised of at least one male and one female. 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.

Following the procedures outlined by Jones (1982), each member of the group had an assigned role – manager, controller, and recorder – which rotated each day, The Manager managed the computer containing the instructions and supplemental material and was to direct the group in the day's tasks. 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 day and how the group completed the assigned task for the day. The summary was turned in at the conclusion of the day.

Each group sat together at one of six assigned computer stations (see Figure 1). 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. Using a Latin rectangle design (see Appendix D), each group experienced each of the three conditions: Station 1 with structured supplemental materials, Station 2 with optional supplemental materials, and Station 3 with no supplemental materials. Appendix
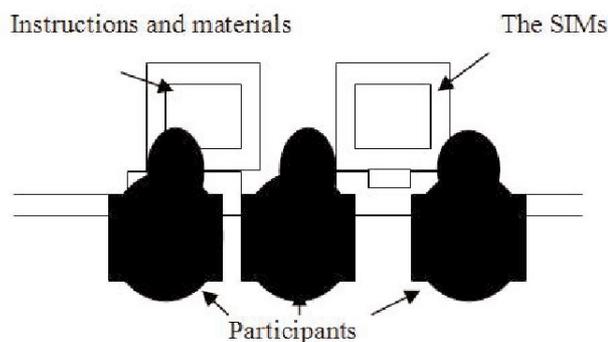

Figure 1 Sample Station Arrangement

C summarizes the order and occurrence of each part of the study. Table 3 summarizes all of the data gathering methods used and their functions in the study.

4.   ANALYSIS AND RESULTS

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. The second research question was answered by an analysis of three specific questionnaire items. The final item on the post-project survey formed the means for answering the final research question.

Table 3 Data Gathering Tools

	Method	Data obtained
	Pre-test scores	Data on linguistic knowledge used to group students according to proficiency
Independent Variables	Pre-project survey	Data about learner's computer literacy and language background. Used to group students according to their computer familiarity and intermix various linguistic backgrounds
	Access to materials	Station 1-explicit vocabulary, grammatical, and cultural instruction
		Station 2-More learner control, choice to use supplemental material
		Station 3-No supplemental material
Dependent Variables	Post-test scores	Data on overall linguistic gain throughout the days
	Quizzes	Data on student knowledge of vocabulary and specific grammatical features highlighted during the day
	Questionnaires	Data on learner perceptions about the supplemental materials and the simulation in general
		Data on student overall impressions of The SIMs and the different supplemental materials
	Post-project survey	
Other	Discussion	Data clarifying perceptions of The SIMs, group work, and suggestions

Table 4 Total Average Quiz Scores by Day

Total Average Quiz Scores	Day 1		Day 2		Day 3		Overall	
	M	SD	M	SD	M	SD	Mean	SD
Total Score	11.44	2.08	15.78	2.54	14.06	1.10	13.76	2.18
Vocabulary	6.61	1.97	8.06	1.14	7.22	0.50	7.30	0.73
Grammar	4.83	1.24	7.72	1.82	6.78	1.03	6.44	1.47

Table 5 Total Average Quiz Scores by Station. Note. n=18. k=20 questions/day. station 1=mandatory, explicit materials; station 2=optional materials; station 3=no materials

Station	Station 1		Station 2		Station 3		Overall	
	M	SD	M	SD	M	SD	Mean	SD
Total Score	15.53	2.72	13.11	3.28	13.00	4.70	13.76	2.18
Vocabulary	7.88	2.48	6.61	1.62	6.89	0.58	7.30	0.73
Grammar	6.53	1.07	6.50	1.88	6.11	1.00	6.44	1.47

4.1 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. In order to compare the effect of the different stations on the quiz scores, a correlation analysis using a t-test followed by a Tukey-Kramer post-hoc test compared the quiz scores of each student in each of the stations.

Tables 4 and 5 summarize the quiz scores for all of the groups by day and also by station. Students in station one, receiving the explicit vocabulary and grammar activities, outperformed the students in stations two (optional supplemental materials) and three (no materials) on the daily quizzes. Day one resulted in the lowest average quiz scores and day two displayed the highest average quiz scores.

A t-test revealed overall statistically significant differences. The Tukey-Kramer post-hoc test, suggests that there is a statistically significant difference between the total, overall quiz scores for station one and station two (p=.004) and station one and station three (p=.003). However, there is not a statistically significant difference between the station two and station three scores (p=.975). 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=.035) and stations one and three near significance (p=.069), but there is no significant difference between the scores for station two and station three (p=.887).

4.2 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 participants had three options for their responses-not at all, somewhat, and a lot. 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.

In station one the students were told explicitly to complete the vocabulary, grammar, and culture activities prior to beginning the simulation task. 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 station two, in which the students simply had access to a dictionary, grammar explanation, and cultural notes, but were not told explicitly to use them. Questionnaire responses to the supplemental materials can offer some additional insights concerning participant perceptions of the materials. Interestingly, only one group reported using the supplemental materials in station two,

Table 6 T-test of Total Quiz Scores

Stations Tested	DF	Tvalue	Pr>|t|	Adj P*
1 vs. 2	8	4.68	0.002	0.004
1 vs. 3	8	4.91	0.001	0.003
2 vs. 3	8	0.23	0.821	0.970

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

Table 7 T-Test of Vocabulary Quiz Scores

Stations Tested	DF	T value	Pr>|t|	Adj P
1 vs. 2	8	3.11	0.015	0.035
1 vs. 3	8	2.64	0.030	0.069
2 vs. 3	8	-0.47	0.650	0.887

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

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.

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.

4.3 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 the material was the most helpful). The ratings from all participants were averaged, and the averages are displayed below in Table 8. Overall, the vocabulary activity was rated the most helpful by participants, and the grammar explanations rated the least helpful.

5. DISCUSSION

5.1 Research Question #1

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 tested 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 (i.e., with optional access to the supplemental materials) 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 9 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

Table 8 Reported Helpfulness of Supplemental Materials

Supplemental Material	Vocab. Activity	Grammar Activity	Cultural notes	On-line dictionary	Grammar explanations	Summary
Average Response	5.12	4.53	3.88	4.06	3.82	4.00
SD	1.45	1.12	1.62	1.34	1.42	1.32

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

Table 9 Comparison of Quiz Averages for Groups C and F in Stations One and Two

	Station 1	SD	Station 2	SD
Group C	13.67 (Day 3)	0.58	7.67 (Day 1)	1.15
Group F	12.00 (Day 1)	0.00	14.67(Day 3)	0.58

something with new words, such as look them up in a dictionary, improves retention of the words.

5.2 Research Question #2

The second question, do students perceive the supplemental materials as helpful in understanding and completing the simulation, 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.

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 day three, 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 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.

5.3 Research Question #3

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 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.

5.4 Limitations

The results of this study, though promising for the use of supplemented authentic simulation games in the language classroom, must be approached with some trepidation. To this effect, the following

cautions of the study are raised.

One caution in interpreting the data 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 day two, for example, the link for the Hot Potatoes vocabulary activity did not work properly, so two groups of students were unable to complete the entire activity on that day. Surveying the results of both the station one quiz and questionnaire for both of the groups on day two, however, does not indicate unusual or inconsistent data.

6.   DISCUSSION

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. One group had very focused, metalinguistic discussions throughout the course of the day 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 was the most helpful.

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 days.

7.   FUTURE TRENDS

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.

Further research may consider ways the supplemental materials might 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. Studies could also target the use of the simulation game in other aspects of second language acquisition, i.e. oral and written skills, and ascertain the magnitude of communicative language and student perceptions encouraged by the simulation task. A sampling of the communication between members of one group of students in this study indicates increased interaction, particularly in regards to metatalk, while completing The SIMs activity. Further study of the interactions between students during a simulation task could be another avenue of determining the value and usefulness of simulation tasks in second language acquisition.

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 not 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.

8.   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 and a basis from which future studies may draw.

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APPENDIX A: PARTICIPANT PROFILE
Participant profiles

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

APPENDIX B
Website Flow Chartcontextual richness. *The Canadian Modern Language Review*, 57(4). 541-563.
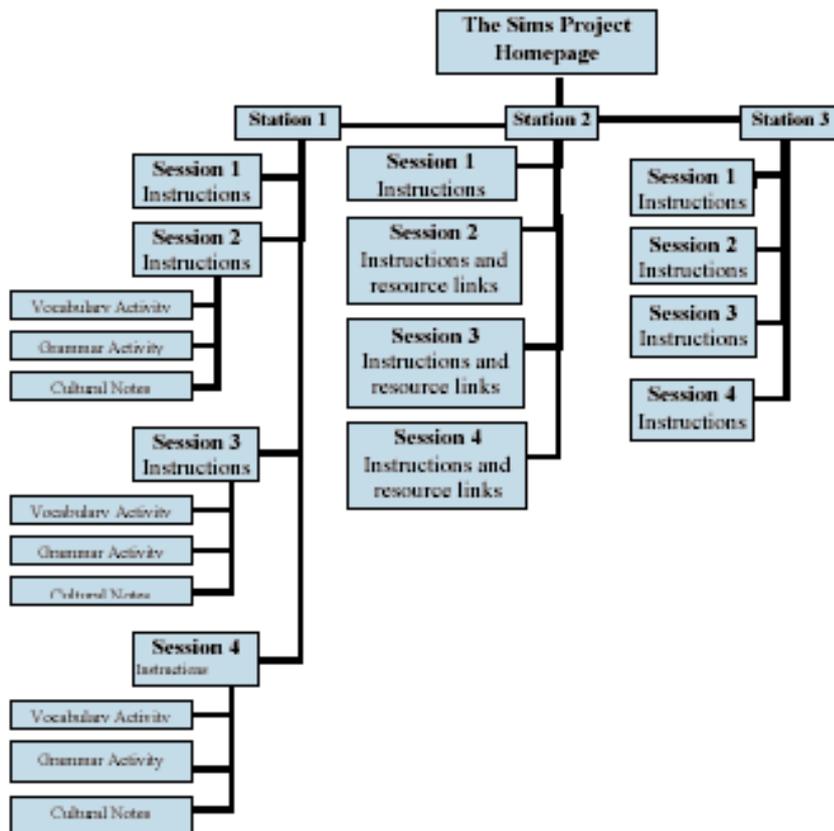
APPENDIX C: RESEARCH DESIGN SUMMARY
TABLE C.1 Research Design

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)

Station	1	2	3
Groups	A, F	C, E	B, D
Supplemental Material	Instructions	Instructions	Instructions
Post-activity	None	None	None

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

Station	1	2	3
Groups	A, F	C, E	B, D
Supplemental Material	Instructions Grammar activity-infinitives & gerunds Cultural notes Vocabulary list	Instructions Grammar review-infinitives & gerunds Link to specific 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)

Station	1	2	3
Groups	B, E	A, D	C, F
Supplemental Material	Instructions Grammar activity-modals Cultural notes Vocabulary list	Instructions Grammar review-modals Link to specific 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 4: Continue Sims game (November 19)

Station	1	2	3
Groups	C, D	B, F	A, E
Supplemental Material	Instructions Grammar activity-prepositions Cultural notes Vocabulary list	Instructions Grammar review-prepositions Link to specific 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

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

APPENDIX D: COUNTER-BALANCE DESIGN

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.

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.

TABLE G.1 Latin Rectangle Design

	Session 2	Session 3	Session 4
Group A (high)	1	2	3
Group B (middle)	3	1	2
Group C (low)	2	3	1
Group D (high)	3	2	1
Group E (middle)	2	1	3
Group F (low)	1	3	2

Note. 1=Station 1 (mandatory, explicit materials). 2=Station 2 (optional materials). 3=Station 3 (no materials)