

# Using the Web as Input and Discourse Interactions for the Acquisition of Vocabulary

MARCO ANTONIO MORA PIEDRA

Escuela Lenguas Modernas  
Universidad de Costa Rica

## Abstract

The purpose of this study was to examine the impact of Web multimodality plus dialogical interactions in the acquisition and retention of novel lexical items among EFL students. The lexical acquisition of 107 1<sup>st</sup>-year English majors at the University of Costa Rica was analyzed through Simultaneous Multiple Linear Regression. Treatment A group, exposed to multiple Web input and allowed to discuss their findings dialogically, was compared to an only-Web group and a Control group. The results of the regression were statistically significant [ $R^2 = .677$ ,  $F(3, 78) = 54.60$ ,  $p < .001$ ] and the unstandardized coefficients indicated that the marginal mean of the Web plus dialogue group (34.69,  $p < .001$ ) was statistically different to the Web-only and Control groups (-6.26,  $p = .047$ ; -24.40,  $p < .001$ ). The results of this study have pedagogical implications by informing practitioners about student preferences when integrating multi-modality into foreign language vocabulary acquisition and the intrinsic value of dialogical interactions in the construction of meaning.

**Key words:** Second Language Vocabulary Acquisition (SLVA), mental lexicon, multimodality, dialogical interactions, word frequency

## Resumen

Esta investigación pretende examinar el impacto que la multimodalidad que la Web y la interacción dialógica tienen en la adquisición y retención de vocabulario nuevo en estudiantes de inglés como lengua extranjera. Se analizó la adquisición léxica de 107 estudiantes de primer año de la carrera de inglés en la Universidad de Costa Rica por medio de una Regresión lineal múltiple/simultánea. El grupo experimental A estuvo expuesto a la Web y se le permitió dialogar usando las palabras bajo análisis. Este grupo fue comparado con el grupo B que solo tuvo acceso a la Web sin el aporte dialógico, y ambos se compararon con un grupo de control. Los resultados de la regresión fueron estadísticamente significativos [ $R^2 = .677$ ,  $F(3, 78) = 54.60$ ,  $p < .001$ ] y los coeficientes no estandarizados indicaron que la mediana marginal del grupo Web con diálogo (34.69,  $p < .001$ ) era estadísticamente diferente del grupo

que solo tuvo acceso a la Web y del grupo de control (-6.26,  $p = .047$ ; -24.40,  $p < .001$ ). Los resultados de este estudio tienen implicaciones pedagógicas claras al dar referencias a los docentes sobre las preferencias de los alumnos hacia ciertas modalidades de la Web en el aprendizaje de vocabulario en una lengua extranjera y sobre el valor intrínseco de las interacciones dialógicas en la construcción de significado.

**Palabras claves:** Adquisición de Vocabulario en una Lengua Extranjera (SVLA), léxico mental, multimodalidad, interacciones dialógicas, frecuencia de palabras

The present study addresses the acquisition of vocabulary in the context of English as a foreign language and with the ways in which learners interact orally to create lexical meaning. This usage-based model is clearly in line with an interactional perspective of language use.

In the current study, vocabulary acquisition is viewed mostly from an information-processing position with emphasis on cognitive perspectives. Such standpoint provides the epistemological framework for this work. The goal is to discover the ways in which foreign language learners construct meanings through their oral interactions when prompted by multiple Internet resources.

### Statement of the Problem

Words by themselves are the embodiment of oral and written communication. Indeed, words are the founding blocks of languages; that is why vocabulary learning is a fundamental part of linguistic development, and more than that, lexis is an intrinsic component in the acquisition and development of knowledge. It is a truism to state that language learners are seriously concerned with vocabulary

learning and certainly view vocabulary as key to the development of their language skills. Some researchers also consider vocabulary development critical for English language learners (ELL) (August, Carlo, Dressler, & Snow, 2005), and certain efforts have been made to improve the chances of ELL's academic success by improving their vocabulary either through direct instruction (Manyak & Bauer, 2009), the integration of technology (Sox & Rubinstein-Ávila, 2009), or the combination of computer-based instructional practices and strategies (Liu, Moore, Graham, & Lee, 2002). In contraposition, some experts in the area of Second Language Acquisition have divergent positions concerning the role of vocabulary in language learning, and second language researchers have, for the most part, focused their attention on the construction of theories of language development that depart from the basic word and deal more with syntactical elements, discourse, or phonology as more central to language learning and teaching (Zimmerman, 1997). In general, vocabulary learning has been linked with reading comprehension (Wallace, 2008), incidental learning through extensive reading (Horst & Meara, 1999; Webb, 2009), technology-enhanced reading environments

(Li, 2009), and even vocabulary development through online reading (Loucky, 2007). Vocabulary development through reading is an obvious and expected fusion; however, such emphasis has limited the role of vocabulary in other areas of language development and has led researchers to disregard the encompassing functions of words in the construction of meaning.

The present study not only deals with the teaching of English vocabulary in a foreign context (Costa Rica) but also tries to focus on the learning experiences of students and on their construction of knowledge through dialogical interactions. This work pretends to shed light on how learners construct meanings when acquiring lexical units.

### Research Questions

This study addressed three basic questions concerning vocabulary acquisition through dialogical interactions and students' construction of meaning of lexical items. The main questions can be stated thus:

1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, Google images, dictionary definitions, and translations of the terms) lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?
2. Considering students' learning styles, measured through the ATTLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

### Review of Literature

Gass (1988) upheld the position that linguistics placed the lexicon as secondary in Second Language Acquisition (SLA) research and that most studies were not concerned with the establishment of a "theory of the lexicon" but with descriptive aspects of it. Two decades later, the theoretical status of the lexicon has not varied significantly while the descriptive elements of the research in the field have grown exponentially. Zimmerman (1997) presents a historical overview of how vocabulary had been researched and studied up to the date of publication, and she offers a survey of vocabulary teaching methods (in Coady and Huckin, 1997) while Richards offers a similar account incorporating a historical overview of research and testing too (Schmitt, 2000). In the same line, Laufer (2009) includes an annotated bibliography of works (limited in scope) on vocabulary acquisition from 1982 to 2008. These efforts show that vocabulary acquisition studies have become prominent in applied linguistics. The topics range from frequency studies to Computer Assisted Vocabulary Acquisition (CAVA). However, as it is generally the case in SLA, the lack of a unifying theory makes connections among studies difficult to assess. The following literature review shows the wide range of topics in the

field and the differing perspectives in the studies.

The specific area of lexical learning has been labeled Second Language Vocabulary Acquisition (SLVA, Coady & Huckin, 1997). Many a paper has been written considering different perspectives on the most appropriate way to teach and learn vocabulary—topics range from input and form-focused activities to learning strategies (Laufer, 2009), and even the inclusion of minorities such as English Language Learners (ELL) (August, Carlo, Dressler, & Snow, 2005) and deaf populations (Cannon, Fredrick, & Easterbrooks, 2010).

### **The Influence of Cognition in SLVA**

Second language acquisition research has been dominated by cognitivist psychology in terms of “goals, methods, and constructs” (N.C. Ellis, 2006). Invariably, SLVA researchers have followed suit and included cognitivist elements into their studies. In fact, most research into vocabulary acquisition is slanted towards mentalist explanations. Consequently, many of the elements that cognitivism has brought into light serve as a basis for many of the principles developed in this study albeit from a more encompassing and eclectic position. Also, the principles outlined below (forms, memory, mental lexicon), although mainly important for cognitively oriented research, have some bearing in the students’ noticing and retention of lexical items.

**Focus on forms.** The study of vocabulary in terms of form-meaning connections shows the significant influence of the cognitive approaches in the field. This particular approach examines

cognitive elements such as attention and awareness in relation to input. Focus on form has also been viewed from a contrastive analysis and translation perspective (Laufer & Girsai, 2008) or in relation to the existing semantic content of students’ first language, mnemonic elements, or pedagogical implications (Deconinck, Boers, & Eyckmans, 2010; Maria J. de la Fuente, 2006; Jiang, 2002). VanPatten (2004) is one of the major advocates of the form-meaning connection approach that also includes among its basic tenets elements such as universals, input, output, and learners’ factors. However, even in cognitive perspectives the prevalence of meaning for learners is obvious. Actually, studies indicate that individuals are basically more concerned with extracting meaning from input than with form. Learners rely on lexical items to get meaning, and input processing is influenced by the constraints of working memory (VanPatten, 2004).

**The role of memory.** Insights from cognitive linguistics also offer some light into the role of memory in vocabulary acquisition. Cognitive Load Theory (CLT) explains learning in terms of the interaction between the task, learners’ prior knowledge, and learners’ cognitive architecture constraints, namely the WM [Working Memory] limitation (Pass, Renkl, & Sweller, 2004). Research on the connection between vocabulary and memory includes a variety of elements related to this construct: verbal working memory and verbal learning (Dittmann & Abel, 2010), phonological short-term memory and its effects on vocabulary learning (Gupta & Tisdale, 2009), implicit memory (Dong & Sun, 2011), audibility and pronunciation issues in relation to memory

(Rosenthal & Ehri, 2011; Stiles, 2011). The constructs of verbal working memory and verbal learning are certainly relevant for the present research so long as the oral component is emphasized in the development of dialogical interactions. Besides, though not directly analyzed, memory factors play a role in terms of long-term retention of vocabulary that will be measured with a posttest in this work.

**The mental lexicon.** One more prevalent construct, related to psycholinguistics, that guides research in vocabulary acquisition has to do with the way learners organize, associate, and access words in what has been labeled the mental lexicon. This basic construct constitutes one of the major attempts at theory in the field of SLVA (Zhang, 2009). The majority of studies on this area rely on the use of word association tests and on the premise of a mental representation of lexical units. In general, certain lexicosyntactic constraints guide researchers in their attempts to explain how learners make word associations. In this particular case, frequency of occurrence of the lexical items comes into play (Iyanaga, 2007; Rahimi & Haghghi, 2009; Takashima, 2003). Several studies on the lexicon have also shown similarities in the ways first language (L1) and second language (L2) learners organize vocabulary whose major difference is mostly quantitative rather than qualitative (Zareva, 2007). Moreover, an overview of the mental lexicon of children shows that the strategies used by L1 and L2 learners are comparable (Kielhofer, 1994). However, there seem to be discrepancies in the L1 developmental order of derivational suffixes in L1 learners compared to English as a

foreign language learners' mental lexicon (Iyanaga, 2007). Other studies on the subject show how L2 vocabulary learning and bilingual lexicosemantic representation are tied together (Barcroft & Sunderman, 2008; Ellis, 2008), try to figure out the role of the mental lexicon in languages other than English like Chinese, Japanese, and Spanish (Baralo Ottonello, 2001; Cui, 2009; Feng, 2009; Takashima, 2003), and view vocabulary learning and consequently the development of the mental lexicon as a continuum (Palmberg, 1987, 1988). However, and despite the wide array of studies on the mental lexicon, because of their uncertainty, educators have very little use of them for the development of L1 and L2 instructional materials (López Morales, 1992).

### **Input, Output, and (Oral) Interaction**

Sociolinguistic approaches to language acquisition prioritize interaction as a basic premise for the construction of knowledge based on the principle that language learning is a social and interactional activity. Initially, Ellis and Fotos (1999) make a concise analysis of the initial steps of interactional research in SLA:

Starting with the seminal work of Evelyn Hatch in the 1970's, 'interactionists' such as Long, Pica and Gass have gradually accumulated a range of theoretical arguments in support of the general claim that, while not strictly speaking necessary, interaction nevertheless constitutes the primary means by which language learners obtain data for language learning, both in the sense that interaction is how most learners obtain input and in the sense

that the input obtained through interaction works better for acquisition than input obtained in other ways. (p. ix)

As stated by Ellis and Fotos, for interaction to take place, certain conditions must be present being input and output central to the construction of knowledge within the interactional perspective. Later developments in sociological theory take interaction more generally as a social practice that promotes the creation of knowledge.

**I/O schemata in vocabulary.** Krashen (1985) is credited as the precursor of the Input Hypothesis. Besides, in the application of his hypothesis, he also emphasized vocabulary acquisition, particularly through reading (Krashen, 1989). Despite criticism to Krashen's theory, the role of input in language learning is still pervasive. In the particular case of vocabulary acquisition, several studies give credence to its importance. For instance, in all of the studies on the mental lexicon, linguistic stimuli serve as raw material for the subsequent development of learners' vocabulary. In this case, input (in the form of spoken or written language) promotes vocabulary acquisition. In fact, the auditory and visual processing of input fosters lexical growth (Bibic & Matic, 2009; Bowers & Vasilyeva, 2011; Collins, 2009; Goodman, Dale, & Li, 2008; Jimenez Catalan & Mancebo Francisco, 2008; Pawlina Pinto, 2009; Rott, 2007; Shintani, 2011; Sydorenko, 2010; Zeng & Wang, 2007). The richness of input is variably measured in terms of the variety of words used and their complexity. Input modality can vary as well. It can be originated in teachers' speech or in written and aural forms found in video,

audio recordings, captions, or stories. Evidently, in any sociolinguistic event, interaction takes place whenever speakers receive input from a specific source, thus its importance in relation to the acquisition of lexical terms.

At the other end, output becomes the explicit confirmation of language construction. Swain and Lapkin (1995) claim that the act of producing language is part of SL learning. They also claim that the dialectical interaction between input and output is plainly explained as dialogue: "As Swain and Lapkin (1998) have discussed, the concept of collaborative dialogue was extended from the output hypothesis (Swain, 1985, 1993, 1995)" (Kim, 2008, p. 114). This interrelation between input and output regularly results in vocabulary gains among individuals. A recent study in first language acquisition shows a positive correlation between maternal language output and the infant output in terms of word frequency patterns (H. Li & Fang, 2011). There are also positive effects of the relationship between input and production in the foreign language environment. Zeng and Wang (2007) point out that the dialectic relationship between input and output is essential for vocabulary gains in college ESL students. In the particular case of L2 students, research shows that negotiated interaction plus pushed output promote receptive and productive word retention, highlighting the role of output for lexical acquisition (Maria Jose de la Fuente, 2002). When contrasted, output seems to have more positive effects than input on vocabulary learning. Students learning Japanese, when exposed to an output condition retained more words than when exposed to the

input condition (Kitajima, 2001). Ellis and He obtained a similar result. They demonstrated that students exposed to modified output achieved higher vocabulary acquisition than the input groups, mainly because of the dialogic interactions that took place (Ellis & He, 1999; He & Ellis, 1999). Conversely, Shintani (2011) reports that in the case of production-based instruction that required students to produce output when compared to input-based instruction, both promote receptive and productive vocabulary gains.

Results on the role of input and output at times seem to be contradictory, however. One such study demonstrates that collaborative and individual output tasks make no difference in terms of gains of vocabulary knowledge (Nasajji & Jun, 2010). In other occasions, forced output (writing Spanish nouns) has no effect on word learning (Barcroft, 2006) or does not contribute to the retention of form-meaning connections (Rott, 2004). On the other hand, Browne (2004), through a quantitative study on the effectiveness of pushed output, concludes that regardless of language level, learners significantly increased the number of words learned. Considering these findings, the role of input and output on vocabulary acquisition seems to have more significant effects when combined than when analyzed individually (pushed output, for example). Such conclusion is valid for the organization of the material under investigation in the present research. As the intention is to prove that students experience short-term vocabulary gains, the lexical input comes directly from the web. Then this input serves as prompts for subsequent dialogical interactions (technically, input

plus pushed output) that promote the construction of meaning. This leads to the next section on the relationship between interaction and vocabulary acquisition.

**Interaction and vocabulary acquisition.** As stated before, language learning is social and interactional. From an early age, interaction plays a significant role in the development of language. For instance, interaction between mothers and their children suggests a relationship between certain maternal speech patterns and the child's semantic patterns (Ringler, Melillo, & Stienke, 1982). Michael Long (1981, 1983) is the major advocate of the Interaction Hypothesis that emphasizes negotiation of meaning as the source of "feedback, including correction (models), comprehension checks, clarification requests, topic shifts, repetitions, and recasts. This feedback draws the learner's attention to mismatches between the input and the learner's output" (Carroll, 2001, p. 291). In the case of second/foreign language learning, interaction and negotiation of meaning are essential components for lexical development (Coady & Huckin, 1997; Fuente, 2002). The positive effects of interactions in language development also translate to the second language environment in which explanations of lexical terms, elaborated collaboratively between learners and teacher, become relevant for the acquisition of words (Lauzon, 2008).

The interactional approach to language learning has led researchers to investigate the potential benefits of dialogical interactions for learners and to examine communicative meaning as a dialogical process (Arieux, 1993). In the particular case of the present

study, its interactional stance towards vocabulary learning is informed in research that emphasizes the situated elements of dialogical interactions. In this line, Noren and Linell (2007) have developed research that aims at developing “a theory of lexical semantics and situated sense-making which aims at explaining how meaning is constituted in and across contexts, in a dialogical interplay between lexical resources and aspects of situations (p. 387).” The present study gives precedence to context, interactions, and social characteristics of users as invaluable elements in the construction and retention of lexical meaning.

**Oral interaction.** One aspect of vocabulary learning that has been cursorily studied is the construct of oral vocabulary. Even though we all began developing our vocabulary through speech, once literacy is set, the written word takes preeminence over the spoken one. This preference is what Linell aptly calls “written language bias” in a namesake book (2005). From our beginning as knowers of oral representations to our posterior development as readers of the written signs, a whole process of decoding written signs must have been set into place. In the present research, my intention is to not only give prevalence to the search of meaning in the oral representations of language but also to take advantage of the written signs in an effort to facilitate the decoding of meanings in a subsequent interaction among learners. This relationship between oral and written representations of language has been previously researched. Hiebert and Kamil (2005) state the following in that respect: “Once a reader decodes a word, oral language plays the predominant part

in comprehension. In fact, Sticht, Beck, Hauke, Kleiman, and James (1974) showed that for younger readers, up to about Grade 3, reading comprehension and oral language comprehension were roughly interchangeable” (p. 3).

Studies on oral input and its influence on vocabulary acquisition are not as prevalent as those based on written texts. This may be due to the typical composition of oral communication: less lexical richness than written input, the pervasive role of context in oral communication, and in general, the ephemeral nature of the spoken word. Bowers and Vasilyeva (2011) are among the few researchers who have studied the positive role of oral input in formal situations. They found out that vocabulary growth was positively related to the frequency of teacher speech in general among preschool monolingual learners. However, Horst (2010) in a similar study, shows how teacher talk has little bearing on incidental vocabulary acquisition. Other L1 studies on mother-child language interactions see a connection between speech and vocabulary acquisition (Quiroz, Snow, & Zhao, 2010). In these studies, spoken word recognition seems to be correlated with lexical development. However, speech perception seems to be more predictive of vocabulary gains in the L1 than in the L2 (Cheung et al., 2010). The elements of oral interactions that promote lexical awareness and development are key to support my contention that oral interactions facilitate the construction of meaning and eventually the short-term retention of lexical items.

Finally, one area of oral speech that is more frequently studied is dialogue or conversation. Dialogues, because of their interactional qualities, certainly



promote the joint construction of meaning, and therefore, the development of semantic understanding among speakers. Researchers on this particular area favor a sociocultural theoretical perspective that emphasizes the notion of knowledge as dialogically constructed. One such study conducted by Swain, Brooks, and Tocalli-Beller (2002) emphasizes the relevance of collaborative dialogue in peer-mediated learning among second language learners. An important element in the previous study is the authors' warning to teach learners how and why to collaborate. Likewise, Purdy (2008) in her sociolinguistic analysis of conversations around texts during reading activities, suggests ways to structure meaningful conversations that directly benefit ELL students. Using a similar perspective, Qi (2001) determines that "meaning is culturally situated" so the learning and teaching of meaning is better achieved in collaborative dialogue. Brown, Sagers, and LaPorte (1999) assert that the use of oral dialogue journals is effective for vocabulary acquisition. What is clear is that oral speech, whether in dialogues, formal or informal conversations, or peer-to-peer collaboration positively influences lexical development in second/foreign language learners. That basic concept is essential in the development of the present work and its emphasis on dialogical interactions as the starting point for meaning creation.

### **The Web and Computer Assisted Vocabulary Acquisition**

A technological development that has created new forms of literacy and

caught the interest of educators, researchers and public in general is the World Wide Web (WWW). Vogel (2001) looks critically at some of the ways in which the World Wide Web can be used in the teaching and learning of languages. One of the aspects that has caused changes in pedagogy is the interactive capacity that Internet offers to its users. As students can be actively engaged in the learning process by the use of certain pedagogically sound interactive activities on the Web, this medium has created, according to some, a paradigm shift in the way education is conceived and the ways in which learning can take place. For some researchers like Salaberry (2001), the obvious benefits that the Web has brought to education in terms of interactivity and learner-centered approaches are far from being paradigmatic because these elements do not depend on the medium but on other factors.

Regardless of the factors, the Web, as it is commonly known, provides lots of resources for language learning. It contains enormous quantities of authentic material that can be used very effectively as sources of input in the language class. Bell and LeBlanc (2000) emphasize that authentic material from the Web is more effective than adapted material for use in English as second language contexts. Aside from authentic material, the Web also includes tools that could aid learners in their lexical development. Bell and LeBlank (2000) also point out the beneficial inclusion of glosses in the students' native language that are consulted more often than glosses in the target language. This finding is in accord with Gu's research findings (2003) that emphasize the importance

of the use of a bilingual dictionary that includes the students' native language. Yet if glosses are to be used, those annotations that include text and pictures are the most effective to promote retention of vocabulary among students, regardless of perceptual learning styles (Yeh & Wang, 2003). The inclusion of dictionaries, glosses, and definitional aids is of particular relevance in the present study.

Finally, in the present research, I uphold the assumption that learning is positively influenced by a multiplicity of media. Research in the area supports this assumption. Sydorenko (2010) states the following:

Multimedia, that is, a combination of print, audio, and imagery, has been argued to enhance input by making it more comprehensible (Plass & Jones, 2005). It has been shown that pictures and video can increase reading comprehension and listening comprehension (see Plass & Jones for a review). This supports Paivio's (1986, 1991, 2007) Dual Coding Theory, which states that a combination of imagery and verbal information improves information processing [...] A considerable amount of research has also been conducted on the use of multimedia for vocabulary learning. (p. 50)

Considering the significance of multimodality and its positive effects on learning, in this research, the use of Internet with links to definitions via dictionaries, thesauri, images, and a translator was included as a prompt for the introduction of the target words in the treatment groups.

Taking into account the aforementioned qualities of effective ways to

learn vocabulary, a pedagogically sound tool for the introduction of vocabulary should be structured following at least some of those patterns. In this case, the use of computers with access to Internet is the logical choice. Internet offers options for annotations or glosses in different languages, direct access to bilingual dictionaries and translators, contextual elements to promote inference of meanings, authenticity of material, and visual exemplars that could even include video in some occasions. Considering the purported pedagogical benefits of computers and the Internet in the teaching and learning of vocabulary in ESL, how can students most benefit from that resource in the appropriation of vocabulary?

## Methodology

### Participants

In order to analyze learners' construction of meaning in their encounters with novel lexical units, seven groups of English-as-a-foreign-language students participated in the study. This accounts for approximately 109 participants in total. This population consists of first-year college students enrolled in the first course of language learning in the English major. The course consists of 10 hours of regular class time plus 3 hours of language laboratory. Most students are recent high-school graduates whose ages range between 19 and 20. For the purpose of this study, one group was used to pilot the test and instruments, two groups were exposed to Treatment A (Online input + Dialogical interactions), two groups experienced

Treatment B (Online input + Individual work), and two groups were used as Control groups. All groups took the pre and post-tests and the biographical data survey.

### Design of the Study

This section will address the following research questions:

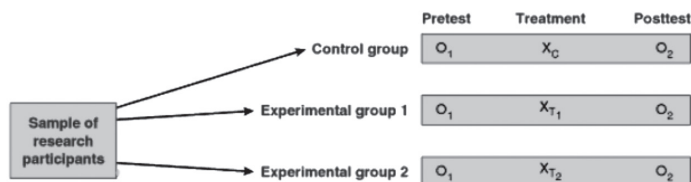
1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, images, dictionary definition, and translation of the term) lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?
2. Considering students' learning styles measured through the ATTLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

To answer question one, a Web page displaying links to different definitional resources for the target terms was created. Also, the pre and post-tests served as input for the statistical analysis that provided an answer to both questions. In the case of question two, the ATTLS survey provided the data for the subsequent analysis while question three was answered based on data gathered through a biographical survey.

**Procedures (Methodology).** This is a quasiexperimental pretest-posttest nonequivalent control group design in which participants were tested twice (Figure 1). Initially, they were given a pretest to measure the participants' vocabulary knowledge. A similar test was repeated two weeks after the intervention. Tests were numbered to keep confidentiality and students were aware of these procedures. Instructions for the tests were given in Spanish and the directions in the text were written in Spanish too. Consent forms were distributed, and the researcher emphasized that participation was voluntary and that in no way the scores and decision to participate or not would affect their grade in the course.

Students were presented with the test and through the use of an overhead projector, they were shown how to fulfill the task. The examples and operational issues were presented in Spanish and they included a familiar and an unfamiliar item to show them what to expect in the test. Once the pretest was taken, a group of students was presented with a corpus of target lexical units on a Webpage through multiple modalities (Google web search, images, dictionary definition, and translation of the term). These items served as prompts for subsequent group discussions in the next phase of the research. Groups were randomly assigned and sheets with comic strips were assigned to all the groups for discussion. All the groups were given instructions on how to go about the discussions and they were audio recorded for posterior analysis. An optional treatment group had the Web prompts but they worked individually in class with the comic strips. A third control group took both tests only.

**Figure 1**  
**Pre-test-post-test-control group design**



In this design, both the pretest and the posttest consist of an assessment of vocabulary knowledge using the VKS as the basic evaluation tool.  $T_1$  equals Treatment A (Multimodal presentation of vocabulary on a Webpage plus dialogical interactions prompted by the reading of comic strips) while Treatment B ( $T_2$ ) includes the Webpage with the lexical items plus individual work with the comic strips.

For the recollection of quantitative data the following procedures were followed:

1. The target vocabulary was chosen using Lexical Frequency Profiling to select lower frequency terms that were more unlikely to be encountered incidentally by students. Comic strips were used in order to provide appropriate linguistic context for the target vocabulary and to later serve as prompts for the initiation of dialogical interactions among students.
2. The chosen vocabulary plus some other terms students have surely encountered in their class (Textbook vocabulary) were included in a test that was distributed among a group of students to pilot the test.
3. Once the target vocabulary was chosen based on the results of the pilot test, a pretest was administered to

the six groups participating in the main data collection test.

4. Students were exposed to the target vocabulary through a Webpage that included the definitions through different modalities (Google Web search, Dictionary.com definitions, Google images, and Google Translate).
5. Students from Treatment A were randomly assigned to small groups of 5 members and provided with copies of several comic strips that included the target vocabulary. The comic strips were used as prompts for dialogue.
6. Students from Treatment B worked individually with the comic strips that included the target vocabulary in context.
7. Two weeks later, a posttest was distributed to all six groups for quantitative analysis.

Participants completed a biographical data survey that includes questions on their English learning background and language use. Additionally, students completed the Attitude toward Thinking and Learning Survey (AT-TLS) that assesses learning preferences. This survey was piloted to make sure that students fully understood the different items. These two surveys provided data for research questions 2 and 3:

2. Considering students' learning styles measured through the Attitude toward Thinking and Learning Survey (ATTLS), is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

### Measurement Instruments

The first measure taken was the determination of the students' vocabulary knowledge. This pretest baseline measure of knowledge was used to assess the participants' productive ability of vocabulary knowledge. Coming up with a single measure to determine vocabulary knowledge is illusory. For that reason, the concentration was mostly on performance without disregarding the importance of implicit or passive lexical knowledge. The test focused mainly on written forms due to limitations of time and resources. In order to be more inclusive, the test contains a section of productive vocabulary knowledge including the target lexical units. This test of productivity was chosen because of the epistemological position relating meaning of a word with its use. If students are able to use the term in a sentence, the connection to its meaning is more significant than the mere recognition of words.

The pretest was piloted prior to its implementation in the classroom. As a result of the pilot test, target items were chosen and later incorporated in

the assessment. In the tests, participants were prompted to use the Vocabulary Knowledge Scale (VKS) to indicate their knowledge of the target lexical items. The VKS was developed originally by T. Sima Paribakht and Marjorie Wesche (Paribakht & Wesche, 1993) and it evaluates learners' receptive and productive knowledge about specific lexical items. The VKS does this by assigning numerical scores (1 to 5) to lexical items. However, Wesche and Paribakht (1996) insist that these values are simply categorical and in no way represent interval values. Furthermore, Paribakht and Wesche (1997) point out that the VKS measures vocabulary acquisition and retention and is sensitive enough to reflect changes in lexical knowledge during brief instructional periods. Even though the scale is based on self-reports, it also requires students to substantiate their responses. These characteristics make the use of this scale particularly useful for the purposes of this study. Wesche and Paribakht (1996) report high correlations "between students' rating and their scoring on the same scale," and the test-retest reliability estimate (.89 for scores on 24 content words and .82 for scores on 8 discourse connectives) indicates "that the instrument can elicit acceptably reliable responses" (p. 180).

Now, concerning the basic vocabulary under scrutiny, a series of low-frequency words constitute the basis for providing the test-target lists of words. To facilitate the task of determining these lists, **Lexical Frequency Profiling (LFP)** was used. As the main interest is to trace the learners' lexical development from point A to point B, the *Vocabprofile's* frequency list feature helped the researcher determine the proportion of words, counts,

and families of words in the input text. What *Vocabprofile* does is to determine the proportions of frequent vocabulary and less frequent vocabulary in a specific text. By analyzing the text content with this program, the researcher can have a list of frequent vocabulary the students could encounter and also the less typical terms that they will be likely to find. In this way, a bank of lexical terms became available for comparative and evaluative purposes. Also, the use of particular forms is a reliable indicator of proficiency.

The Attitude toward Thinking and Learning Survey (ATTLS) developed by Galotti et al. (1999) was used as an instrument to assess ways of knowing. This instrument has acceptable internal reliability, and it was used to determine whether there are significant correlations between connected knowing (CK) or separate knowing (SK) and dialogical ways of constructing meaning. Learners with high connected knowing would hypothetically benefit more from dialogical interactions than separate knowers.

Finally, a survey was used to collect information on learners' language background knowledge and this information is useful as control against the posttest results.

### Data Analysis

A pre and posttest design was implemented to evaluate the inclusion of Internet and some of its applications as input in the learning of vocabulary in an English-as-a-foreign-language class. These applications, acting as linguistic input that provides definitions through different sources, together with the dialogical interactions constitute the treatment that is going to

be analyzed through the pre-test-post-test research design.

In a majority of pre-post-test analyses, data is analyzed comparing the treatments with respect to their post-test measurements. The statistical test of choice is generally an analysis of covariance (ANCOVA) in which the groups are compared in terms of change scores or gain scores. This procedure is the most appropriate choice under certain conditions according to Dugard and Todman (1995). Bonate (2000) also offers a comprehensive analysis of pre-test-posttest designs and summarizes the advantages and disadvantages of different statistical methods.

In the current work, as the research involves intact classes, randomization was just possible in terms of which of the 8 groups were selected but not in the random assignment of students to different groups. Considering that the condition or randomization is desirable in ANCOVA, that the present study could violate the assumptions of equality of sample sizes, and that some missing data was expected, the use of statistical analysis that is not affected by those conditions is evident. This prompted me to use Multiple Linear Regression (MR) in order to account for the different variables in the study and to control for the effects of pretest on the model. Another reason to use regression lies in the fact, stated by Keith (2006) that ANCOVA can be "conceived as a multiple regression analysis." In other words, "MR subsumes ANCOVA" (p. 155). He also states that "[o]ne potential advantage of using MR to analyze ANCOVAs is that it is possible to test for an interaction between the covariate and the treatment, whereas this is simply assumed

for most ANCOVAs” (p. 159). In sum, the major objective of the MR analysis in this work is to find out if there is a significant relationship between posttest results (Lexical acquisition and possible retention) and each of the two treatments (Multiple web input modalities plus dialogical interactions or web input without dialogues). To analyze the data, the *Statistical Package for Social Sciences* (SPSS) was used.

A survey to obtain participants’ background information was distributed. English-learning background, use of English (in academic or in authentic settings), and gender would be tabulated and analyzed in order to find out whether these elements have any bearing on vocabulary gain. This survey together with the data from the ATTLS provides the basic variables that serve as predictive or explanatory elements for vocabulary acquisition and retention. All these variables were included in the MR because it was expected that previous English knowledge, time spent using English, and learning styles (Connected/Separate Knowers) could have some bearing in the acquisition and possible retention of lexical units. What MR does is to determine whether the variables in the model have an effect on lexical acquisition (determined

by the posttest). More specifically, the aim is to find out which of the treatments has a stronger effect on posttest grades, while the other variables serve as control in order to improve the accuracy of my estimates of the effects of treatments on posttest grades.

In sum, the quantitative analysis of this work is designed to measure the degree to which students acquire and retain lexical items after a short-term treatment. To achieve this, the results in the posttest are used as the dependent variable in a Multiple Linear Regression model controlling for pretest results (Plus other independent variables like ATTLS results and biographical data). The results in this section are expected to serve as evidence of the importance of meaning creation activities in the long-term retention of lexical units. Table 1 offers a visual summary of the hypotheses, data sources, and the methods of analysis.

## Results

This section presents the most salient results ensuing from the analysis of the data. The general purpose of this analysis was to discover the ways in which foreign language learners

**Table 1**  
**Quantitative Hypotheses and Analytical Methods**

Hypotheses	Data sources	Methods of analysis
Hypothesis 1: Given the same amount of time devoted to the two treatments, learners will experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores.	Pre and posttests of vocabulary Surveys	Multiple Linear Regression

Hypothesis 2: Students who are connected knowers would obtain greater gains from dialogical interactions than separate knowers.	ATTLS Survey Results of posttest	Multiple Regression
Hypothesis 3: Students' individual characteristics and experience with English (English background knowledge, time devoted to English tasks, and language use) significantly affect test scores.	Biographical data survey Results of posttest	Multiple Regression

construct meanings through their oral interactions when prompted by multiple Internet resources. Specifically, all research questions were aimed at determining the ways in which input modality and foreign language learners' interactions have an effect on lexical acquisition and retention. The purpose was to explore how the use of multiple Internet resources plus/minus interaction (compared to a control group) influenced the acquisition and retention of new vocabulary, and to examine what variables better predict novel lexical acquisition based on students' achievement gains on a vocabulary posttest. The analysis included Simultaneous Multiple Linear Regression to account for the different variables in the study and to control for the effects of the pretest in the model. The variables were chosen based on what the literature presents as potentially affecting language progress, to name: language exposure and experience and learning preference in connection to gender.

### Sample Demographics

For the purposes of the study, the researcher used intact classes from the English major at the University of Costa Rica. A total of 175 students were initially enrolled in the different sections of the course LM-1001 (Integrated English I) in the first semester of 2012.

LM-1001 is an intensive English course for first-year English majors. From the 175 students enrolled, one group of 25 students piloted the vocabulary test and the ATTLS instrument. The remaining six groups participated in the treatment and control groups (Two groups for each treatment group and two for control). However, only 107 students completed all the procedures and their data were included in the final study. A total of 68 students (38%) either missed the pretest, the posttest or dropped out of the course.

All the students (100%) were English majors in their first year of studies. The slight majority of the sample was female (54.2%), while 45.8% were male students. Most of the participants' ages (67%) were between 18 and 20 years old and had been learning English for differing numbers of years. A detailed breakdown of the participants' demographics can be seen in Table 2.

### Research Questions

For the purpose of exploring the ways in which foreign language learners construct lexical meaning through dialogical interactions, this study included three research questions. The questions led to a quantitative analysis that relies on Simultaneous Multiple Linear Regression (MLR) using post-test results as the dependent variable



**Table 2**  
**Demographic Information of Participants (n=107)**

<b>Demographic Variables</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<i>Gender</i>		
Male	49	45.8
Female	58	54.2
<i>Age</i>		
18	29	27.1
19	20	18.7
20	18	16.8
21	7	6.5
22	8	7.5
23	3	2.8
24	6	5.6
25	3	2.8
26 and above	6	5.4
<i>Years learning English</i>		
0-5 years	38	40.0
6-10 years	27	28.0
11-15 years	29	30.0
16 years	1	1.0

Note: Totals may not be equal to 100% because of rounding and/or missing data.

and a series of predictors or independent variables that include grouping, language learning experience, time dedicated to practice, and ways of knowing (learning preference) in relation to gender. The following section includes the most significant results of the statistical analysis of the data.

### **Results by Research Questions**

The analysis of all quantitative data provided answers to the following questions and their corresponding hypotheses:

1. Do dialogical interactions prompted by multiple input modalities from the Web (Google Web search, images, dictionary definition, and translation of the term) lead to differential acquisition of target lexical units than only multiple modalities without the dialogical component?
2. Considering students' learning styles measured through the AT-TLS, is there a difference in the gains of target words depending on students' attitudes towards learning?
3. Do selected students' individual characteristics and context

(English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?

All analyses were conducted using a .05 level of significance.

**Research question 1.** The first question was based on the premise that given the same amount of time devoted to the two treatments, learners would experience different gains from each of the treatments (Web modalities plus dialogical interactions and multiple definitional input from the Web without the dialogical component) after controlling for pre-intervention scores.

Initially, the scores of the students' pretests and posttests were calculated for all groups (Table 3). The test, assessed through the VKS, had a minimum score of 30 and a

maximum of 150 points. The mean of the pretest for the Web plus Dialogue group was 61.89 (SD = 13.96) while the Web only group obtained a mean of 63.42 and a standard deviation of 13.46. The Control group had a mean of 57.90 (SD = 14.00) in the baseline test. In terms of the posttest scores, the mean of the Web plus Dialogue group was 84.47 (SD = 19.16). The posttest mean of the Web only group was 80.28 (SD = 15.37). The Control group mean was 56.81 (SD = 14.04). By analyzing both sets of means, scores increased after each treatment (gain of 22.58 in the Web plus dialogues group and a gain of 16.86 in the Web only group). The Control group showed a decrease between pre and posttest mean scores (1.09).

In order to test the first hypothesis that states that "given the same amount of time devoted to the two

**Table 3**  
**Test Results by Group**

Group		Pretest		Posttest		Difference
		Mean	SD	Mean	SD	
Web Multimodality with Dialogical Interactions		61.89	13.96	84.47	19.16	22.58
N	Valid	36		36		
	Missing	5		5		
Web Multimodality without Dialogues		63.42	13.46	80.28	15.37	16.86
N	Valid	33		29		
	Missing	1		5		
Control Group		57.90	14.00	56.81	14.04	-1.09
N	Valid	29		26		
	Missing	3		6		

*Note.* The total possible score was 5 (VKS level) x 30 (number of target words) = 150

treatments, learners would experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores,” a Multiple Linear Regression (MLR) was conducted to compare the groups’ marginal mean differences. The posttest scores were used as the criterion in the different iterations of the regression. The first multiple regression was used to show how the variable “Results of pretest” was related to posttest results and to compare treatment and control groups. This comparison was achieved within the MLR model by recoding all groups into dummy variables. The first multiple regression model with three predictors produced  $R^2 = .677$ ,  $F(3, 78) = 54.60$ ,  $p < .001$ , indicating that the independent variables accounted for 67% of the variance in posttest results. Table 3 presents the results of this multiple regression analysis (Model 1). Each of the predictor variables was statistically significant ( $p < .01$ ) with the exception of the Web group that was significant at the 0.05 level. As indicated in the table, the variable “Results of pretest” had a significant predictive ability, demonstrating that for every one-unit increase in pretest, there is a .82 increment in posttest results. Besides, the marginal mean in Treatment group B (Multimodality without dialogues: Variable “Web” in the model) was 6.26 units lower than the mean in Treatment group A (Web plus dialogues). This difference was significant (Treatment A, marginal mean = 34.69). In the case of the comparison between the Web plus dialogues group and the Control group, the latter had significantly lower scores (24.40) than

the Treatment A group. The difference in means between Web and Control is significant too. In fact, the Control group mean is -18.13 units with respect to the Web only group. These results indicate that as expected, pretests and posttests are significantly correlated and that there is a significant difference between treatments (Web only and Web plus dialogues groups) and between both treatment groups and the control group. The results allow us to reject the null hypothesis and to support the idea that there are greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores.

**Research question 2.** This question was also analyzed through the use of MLR. In order to find out whether students’ learning styles measured through the ATTLS produced a difference in the gains of target words, the means of the survey items referring to the two different constructs (Connected Knowing and Separate Knowing) were computed and used as variables within the multiple regression model. As the Control group did not fill out the ATTLS, it was left out of the model. Table 4 shows descriptive statistics on the variables in model 2.

As the major purpose of this study consisted in determining the extent to which dialogical interactions aided students in the acquisition and retention of lexical items mainly because of the meaning construction process that takes place in dialogue, it was hypothesized that, by applying a measure on ways of learning, I could come up with a categorization of students’ learning preferences. As such, students who

**Table 4**  
**Descriptive Statistics and Correlations**

Variable	Mean	SD	Correlation to Posttest
Results of pretest (N = 52)	63.17	13.88	.675*
Web (N = 52)			-.249**
ConnectedLearningScore (N = 52)	5.44	.843	-.215 <sup>ns</sup>
SeparateLearning Score (N = 52)	4.75	.827	-.205 <sup>ns</sup>

Note. \*  $p = .000$ , \*\*  $p < .05$ , ns = nonsignificant

were connected knowers would obtain greater gains from dialogical interactions than separate knowers who would benefit from alternative learning processes. In order to test the hypothesis, the scores of the ATTLS were included in the Multiple Regression Model used for the general analysis of the present data.

As it can be attested in Table 6 (Model 2), the results of the Multiple Linear Regression suggest that with four predictors, Web, Pretest, Connected Knowing, and Separate Knowing, the regression model was statistically significant:  $R^2 = .534$ ,  $F(4, 47) = 13.48$ ,  $p < .001$  (As the ATTLS was administered only to the Treatment Groups, the Control group is left out of the regression). In this case, as expected, a significant proportion of the total variation in posttest scores was predicted by pretest. In other words, a student's score on the pretest is a good predictor of their posttest grade as confirmed by the fact that the unstandardized slope (.825) is statistically different from 0 ( $t = 6.33$ ,  $p < .001$ ). This means that with every one unit increase in pretest, posttest scores will increase by approximately .83 units after controlling for Ways of Learning (Connected Knowing, Separate Knowing). Additionally, Treatment group B

(Web without dialogues) remained statistically significant and the marginal means suggests that those in the Web group had a score 8 units lower than those in the Web plus dialogues group. As a final remark, the two variables on Ways of Knowing were not statistically significant. Based on these results, the Connected and Separate Knowing measures appear to offer little additional predictive power beyond that contributed by the other two variables in the model.

Considering that the results on ways of knowing was not significant, that the ATTLS is a measure of learning preference in which both constructs are independent of each other, and that the measure has in some cases been related to gender specific preferences in ways of learning, it was relevant to include the gender variable in the model to notice any variation in the results. The inclusion of the gender variable in relation to both Connected Knowing and Separate Knowing scores as separate Dependent Variables produced the descriptive statistics provided in Table 5.

As it is shown in Table 5, the female group was slightly larger than the male group. Also, there was a slight difference in the means that showed that females did better in the connected

**Table 5**  
**Ways of Knowing and Gender Descriptives**

Gender	Connected Knowing		Separate Knowing	
	Mean	SD	Mean	SD
Male (N = 28)	5.13	1.16	5.01	.79
Female (N = 34)	5.49	.79	4.47	.78

knowing section of the survey (.36 difference in means) while males showed a slight gain in the separate knowing elements (.54 difference in means).

The relationship between gender and ways of knowing indicated what previous studies had already discovered: males tend to be more separate knowers while females prefer connected ways of knowing. However, when gender (Male coded as 1) was regressed on both constructs (Connected Knowing and Separate Knowing) separately, the regression results turned out to be non significant when the Male variable was regressed on the Connected Knowing variable (Model 3), but significant in the case of Separate Knowing ( $R^2 = .106$ ,  $F(1, 60) = 7.089$ ,  $p = .01$ ) which means that 9.1% of the variance in Separate Knowing can be explained by gender (Model 4). In fact, the marginal mean for males is .53 units higher than the mean for females in the Separate Knowing construct ( $t = 2.66$ ,  $p = .01$ ). These results show a relative advantage of male students in the separate knowing construct. Is this advantage significant? Is this difference in means significant with respect to the dependent variable (Posttest scores)? In order to test the level of significance, the difference in scores (change scores or simple difference scores) were computed and included in a One-Way Anova. The dependent variables used included

pretest and posttest scores, the Ways of Knowing variables (Connected Knowing and Separate Knowing), and the changescores variable (Posttest minus Pretest) analyzed with respect to gender and group. As some of the results in the Anova analysis showed significance, a post hoc test was computed to determine if the differences were significant. The Bonferroni test was used to compare each of the groups (separated by gender) with the pretest, posttest, ways of knowing, and the change scores. No significant differences were found between males and females with respect to the ways of knowing variable, disconfirming the hypothesis for this section.

**Research question 3.** This question was worded as follows: “Do selected students’ individual characteristics and context (English background knowledge, time devoted to English tasks, and language use) affect the appropriation and retention of vocabulary?” To answer the question, the scores of all the different variables accounting for English knowledge background, including language use, and time devoted to English language tasks were added and integrated into two separate variables, i.e. “English hours” (time spent on homework, exams, listening to others or to music, reading in English, watching video, talking to friends or tourists) and “Experience” that included time

living in an English-speaking country, using English abroad, and knowledge of an additional foreign language. It was hypothesized that students' individual characteristics and experience with language (English background knowledge, time devoted to English tasks, and language use) significantly affected test scores, in other words, that these variables would have a positive effect on lexical acquisition and retention.

A Multiple Linear Regression (model 5) was conducted to evaluate how well the English language variables predicted vocabulary acquisition and retention as measured in a posttest assessment. In this case, these two predictors (English hours and Experience) were added to the already tested model that controlled for Results of the pretest, the Web without dialogues group, and Control group. The linear combination of these measures was significantly related to the posttest measure; in other words, the overall multiple regression was statistically significant:  $R^2 = .67$ ,  $F(5, 76) = 31.96$ ,  $p < .001$ , indicating that the different variables accounted for 67% of the variance in posttests. Table 6 includes the relative strength of the individual predictors. Most of the coefficients showed positive integers: Intercept ( $B = 34.35$ ,  $p < .001$ ), Results of pretest ( $B = .816$ ,  $p < .001$ ), including English Hours, and Experience. The remaining unstandardized coefficients, on the other hand, were negative, and only three of the seven indices were statistically significant ( $p < .001$ ).

As expected, the pretest scores and the Control group remained statistically significant in the model. In the case of the former, this significance indicates that for every one-unit increase in pretest scores, a .81 increment in

posttest results occurred. In the case of the Control group, the significance in the results shows that there are statistically significant differences in the marginal means of the control group and Treatment A. In the case of Treatment B (Web without dialogues), its marginal mean remained 6.25 units below that of Treatment A but it was non significant ( $p = .53$ ). The control group remained 24 units below group 1 (Web plus dialogues). In the particular case of Treatment A, and as the regression included dummy coded variables, the intercept or constant refers to the expected mean value when all other variables are held constant. In the final model, the mean value for the reference group (Web plus dialogical interactions) was 34.35 while the mean values for the Web and Control groups were 28.11 and 10.01 respectively.

The regression equation with all five variables (Results of pretest, Web, EnglishHours, Experience, and Control) accounted for a significant amount of posttest results; however, time spent on English tasks and language experience were not statistically significant predictors, therefore disconfirming the basic hypothesis of this section but giving credence to the differences among groups (in terms of both treatments and also in relation to the Control group).

In sum, the statistical analysis of the data showed that the pedagogical intervention that included Web tools plus dialogical interactions was significant; in other words, the means in treatment A remained above those in the other groups in all models.

This quasi-experiment used a quantitative approach to try to figure out the ways in which students' collaborative efforts lead to the construction

**Table 6**  
**Multiple Linear Regression Results**

	<b>First model</b> Y = Posttest (std.err.)	<b>Second model</b> Y = Posttest (std.err.)	<b>Third model</b> Y = CK (std.err.)	<b>Fourth model</b> Y = SK (std.err.)	<b>Fifth model</b> Y = Posttest (std.err.)
(Intercept)	34.694* (6.247)	57.202** (18.457)	5.497* (0.168)	4.476* (0.136)	34.352* (7.856)
ResultsPretest	0.825* (0.94)	0.825* (0.130)			0.816* (0.101)
Web	-6.263** (3.689)	-7.922** (3.547)			-6.239 (3.147)
Control	-24.402* (3.326)				-24.296* (3.994)
EnglishHours					0.030 (0.341)
Experience					0.394 (1.723)
ConnectedLearn-Score		-1.699 (2.153)			
SeparateLearn-Score		-2.612 (2.168)			
Male			-0.358 (0.251)	0.537** (0.202)	
R-square	0.677	0.534	0.033	0.106	0.678
Adj. R-square	0.665	0.495	0.017	0.091	0.657
R.S.E	11.903	12.614	0.98164	0.79040	12.053
F	54.606 (p<0.001)	13.483 (p<0.001)	2.040 (p=0.158)	7.089 (p=0.010)	31.967 (p<.001)
Df	78	47	60	60	76

Note: CK = Connected Knowing, SK = Separate Knowing, \*p < .001, \*\*p < .05

of meaning and subsequently to the acquisition of novel lexical items. In particular, this study investigated the impact of the use of the Web as a springboard for lexical development and the effect of dialogues in the social construction of meaning.

The results supported the first hypothesis that given the same amount of time devoted to the two treatments,

learners will experience greater gains from the multiple Web modalities plus dialogical interactions than just from multiple definitional input from the Web after controlling for pre-intervention scores. The data produced after running a Simultaneous Multiple Linear Regression corroborate that there is a statistically significant difference in the marginal means of the Web plus

dialogue group, the Web only group, and the Control group. In the case of the second hypothesis that tried to establish a positive link between Ways of Knowing and the Dialogical Construction of Knowledge, the results disconfirm any significant relationship between the two constructs. In fact, students who are connected knowers do not seem to obtain greater gains from dialogical interactions than separate knowers. The results obtained through a MR showed lack of significance in the case of connected knowing and a One-Way Anova comparison of the difference between means produced non significant results. In addition, students' individual characteristics and experience with English (English background knowledge, time devoted to English tasks, and language use) did not show any statistical significance, disconfirming the third hypothesis that stated that such variables could affect test scores.

## Discussion

The results obtained through the analysis of the data indicate that there are statistically significant differences in the marginal means of the two treatment groups (Web plus dialogical interactions and Web only group). In other words, in the particular case of first-year language learners studying English at the University of Costa Rica, as a group, they seemed to show statistically significant gains in the acquisition and retention of novel lexical items when exposed to the definitions of the target words through multiple Web modalities and given the chance to talk about the words in subsequent

oral interactions. As a result of the analysis, it was found that the Web only group had marginal means that were 6.26 units below the Web plus dialogues group and that both treatment groups were significantly different from the Control group. Overall, this study provides additional support for the benefits of the Web as a source of definitional input and for the advantages of oral interaction in FL vocabulary acquisition.

I did not find, however, any explanatory power in the other variables included in the analysis. In this case, learning preference (Ways of Knowing) did not seem to have any effect on vocabulary acquisition as assessed in a posttest measure. Previous research on Ways of Knowing had determined that females consistently showed high CK and low SK preferences (Belenky, 1997; Galotti et al., 1999). By including both Connected Knowing and Separate Knowing in a regression model as dependent variables and regressing them on gender, only the Separate Knowing construct was significant in the case of males. However, research has shown that neither learning preference has been correlated with cognitive measures of performance, hence its non-significance in the recall of lexical forms in a posttest measure in the current study. Besides, Ryan and David (2003) showed that the Ways of Knowing construct was context-dependent and not intrinsically related to gender. The context in which the current research was conducted makes gender a non-salient feature, thus conditioning the results in the ATTLS.

Furthermore, the results also suggest that learners can and indeed construct meaning through collaboration.



The knowledge that learners collectively construct gives students the chance to benefit from the extra repetition of the terms during the oral interactions. This understanding is enhanced by the added benefit of recurring to code mixing to understand semantic elements, and the chance to get acquainted with other aspects of word knowledge such as pronunciation, morphological and syntactical features, and use in meaningful contexts.

As mentioned in the previous section, there is considerable research indicating the benefits of interaction in first and second language learning. This work adds to the literature by including a foreign language perspective and by integrating other aspects that are also beneficial for vocabulary acquisition such as the use of the Web and its multimodality capabilities in learning lexical meaning, and by providing a research analysis of students' interactions from a meaning-construction perspective.

### **Pedagogical Implications**

The findings in the current research have clear pedagogical implications. One of the most ubiquitous is the importance of viewing meaning as use. Under such premise, users and interactions should be at the forefront. One of the most evident implications of this work is the promotion of group or pair work in the foreign language classroom. Language is intrinsically linked to communication and in order to communicate, individuals should interact. To rely on teacher-centered perspectives in the classroom is to deny students the opportunity to be active

participants in the knowledge-creation process and to prevent them from becoming accountable for their own learning. Under this model, student-to-student interactions should be at the core of the educational experience, and educators should develop instructional tasks that take advantage of the learners' natural impulse to interact. Also, the implementation of tasks that promote the negotiation of meaning in the classroom seems to be a viable pedagogical intervention.

Also the findings in this work support the use of multimodality to increment the amount of input that students are exposed to. The use of multiple modes to present vocabulary makes input more comprehensible and students find them useful in their learning efforts. The Web is flexible enough to facilitate multimodal presentations that could eventually facilitate both teaching and learning in the classroom.

### **Suggestions for Further Study**

Undoubtedly, there is the need for more research to understand more fully how interaction works, how to better integrate collaborative activities into the classroom, and how to better tap on students' capability to co-construct knowledge and expand its potential. There is also a need for further research to identify the most effective way to highlight vocabulary definitions in the Web to increase comprehension. As students mentioned that Dictionary.com and Google translate were the most useful resources, it would be interesting to identify the elements that these pages contain that make them attractive to students.

Further research on the features that promote “real” long-term retention of meaning is necessary. Research should also be focused on the functions of multimodality and their effect on learning. It is also advisable to further analyze how learners’ aptitudes and attitudes affect vocabulary acquisition and to investigate some other variables that could affect vocabulary acquisition more directly. It would be interesting to investigate how the variables included in the current research would work with a larger sample and with the possibility of random assignment. In sum, the results confirm that vocabulary acquisition is enhanced through interaction and that input (in different modalities) is fundamental for lexical enhancement.

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