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Using Hypertext and Case-based Explanation to Help Learners

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Encountered in Native Speech Examples

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ABSTRACT

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Three hypertext implementation strategies were evaluated against one another and against a control group to determine which best supported the language learner. Each version was also applied to four languages with diverse grammatical structures. These included Mandarin Chinese, Japanese, Portuguese, and Spanish. Language students were tested to determine how useful each strategy was in facilitating rapid and accurate explanation of grammatical structures embedded in native speech examples. Speed and accuracy were also measured as respondents applied a targeted grammar structure to construction of their own unique sentences. With respect to the four different languages, results were also analyzed to judge whether the hypertext strategies were viable for each language. The strategy iteration that directed learners to a more detailed and specific explanation was deemed to be more successful than those with generalized explanations in assisting language learners. Moreover, the strategies seemed to provide the same relative benefit across the tested languages, suggesting they are portable and applicable even to non-researched languages. Variance in outcomes among languages within this study focus was also strongly correlated to the degree of difference in grammatical structure between a tested language and English – the learners' typical native language.

Keywords: hypertext, case based explanation, language strategy, grammar, portability

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Chapter 1: Introduction

Background

Over the last few decades, second language acquisition (SLA) has emerged as an important field of study, a development that has no doubt been influenced by the number of individuals seeking to learn new languages increasing each year. These increases are being driven in part by the growing global interdependence and connectivity. This condition enables people all over the world to instantaneously connect with others, irrespective of distance (Friedman, 2007). Technological advances have also facilitated inexpensive travel, which most often requires hours rather than the days and weeks once needed to reach similar destinations.

There are numerous theories for describing how adult learners acquire grammar comprehension while learning a second language. Most of them lie between two polar opposite paradigms—natural grammar learning and formal grammar instruction.

For those ascribing to methods based upon the natural grammar learning end of the spectrum, grammar learning is intrinsic and natural, much like what a child experiences while learning grammar forms without explicit instruction. Researchers in this camp do not believe that formal language instruction is necessary and view the process of second language acquisition as an unconscious learning process. Proponents cite gaps between knowledge of language rules and the inability of the learner to apply these rules as evidence supporting the argument that formal language instruction is neither needed nor helpful. In fact, it easily becomes a stumbling block to the learner. Additional evidences of this reasoning include children and adults who use grammar forms properly, yet cannot articulate the rules governing their use (Doughty & Long 2003; Krashen & Pon 1975; Krashen, 1981; Lightbrown & Spada, 1999). These methods are compatible with the learning theories of the cognitivist movement. These scholars believe that

knowledge is situated within context and experience. Learning takes place more efficiently, especially with regard to difficult and complex tasks, if it is embedded in authentic activity (Bredo, 1994; Lave & Wenger, 1991).

The other end of the spectrum suggests stripping grammar from its context and directly teaching rules for its application in new situations. Advocates of this approach adopt the positivist position that knowledge stripped from context and reduced to its most basic elements is more easily transferred and applied to new situations. Scholars at this end of the spectrum would argue that adult learners are inherently different than children, therefore formal grammar instruction is necessary; they assert that language cannot be learned on a subconscious level, and the research posits that intentionally noticing grammar will help speakers to spontaneously integrate it into their own speech (DeKeyser, 2007, 1988, 2003; Ellis, 2002; McBride & Seago, ; Robinson, 1995; Schmidt, 1990). In summary, a simplified way to define this continuum is to label each end as either *explicit* or *implicit* grammar knowledge (DeKeyser, 2007, Ellis 2002, 2008).

Most researchers agree that language acquisition may accurately be defined as *the ability to use language structures automatically*. None would disagree that exposure to a multitude of native speech examples is paramount to acquiring and internalizing grammatical structures. Most current research would also support the notion that formally-learned grammar structures may be automatically implemented. Therefore, some degree of explicit grammar instruction will benefit the learners by increasing the pace at which they acquire a new language (DeKeyser, 2007).

Debate continues on what the correct balance of natural language learning and formal language instruction is and the most effective method of teaching each. Many of the most notable of these language teaching methods are shown in Figure 1.

Despite their inherent differences, these methodologies usually overlap to some degree when they are applied. Rather than being absolute and mutually exclusive theoretical positions, they instead represent different emphases in the development of instructional strategies. Moreover, none of these strategic variations is based on what may be termed a global learning theory. Instead, each is based on local theories describing how language should be taught. In fact, the norm is for most language teachers and learning institutions to employ an eclectic combination of instructional strategies assembled by picking and choosing among the various methods they are familiar with. This developmental process is governed by learner needs and an informed understanding of what each method has to offer the student (Brown, 2007).

The two most generally accepted approaches in use today are communicative language teaching (CTL) and its descendant, task-based language teaching (TBLT) (Brandl, 2008). The theoretical basis for both CLT and TBLT is to create a learning environment that simulates real-world communication in authentic situations. Grammar is taught specifically as a means of equipping students to generate their own unique language as they perform within context of an unrehearsed situation. CLT also redefined the roles of teachers and students. The teacher acts as a resource in the learning process—rather than the source of learning thus bringing the student to carry the burden of learning.

In a further refinement, TBLT focuses upon carefully organized series of tasks the learner must perform. The objective of these tasks is to move beyond simple repetitive practice of language forms and to engage the learners in genuine problem solving activities (Brown, 2007).

Moving to a New Context-of-Use Language Learning Environment

The administrators of the Provo Missionary Training Center (MTC) of the Church of Jesus Christ of Latter-day Saints, which instructs each year an average of 23,300 students to

Spectrum of Beliefs about Grammar Acquisition for Second Language Adult Learners

Natural Language Learning (Implicit Knowledge)

Formal Grammar Instruction (Explicit Knowledge)

Description: Grammar learning is intrinsic and natural, much like what a child experiences while learning grammar forms without explicit instruction. The production of language is automatic without understanding or even being aware of language structures.

Description: Grammar acquisition is explicit knowledge of grammar rules and structures of a language. This conscious awareness helps the learner to construct meaningful phrases in the production of their own speech.

Natural Approach: language structures are acquired by providing the learner with large amounts of comprehensible input.

Communicative Language Teaching: language is developed through communication. Grammar instruction is used to communication not an end in itself.

Grammar Translation Method: direct grammar instruction is given to students along with vocabulary and direct translations to memorize.

Language Immersion: grammar is learned as students are given instruction for the language and other subjects in the target language.

Task-Base Grammar Instruction (Descendant of CLT): grammar is introduced and its explanation limited to helping the student accomplish a specific meaningful task.

Learning by Teaching: learners take the role of the teachers and teach grammar formally to each other.

Audio-lingual Method: students learn grammar patterns as teachers lead classes through pattern drills and intensive conversation. No text books are used.

The Direct Method: over time increasingly more difficult questions and answers in the target language are used by the teacher and practiced by the students. As sessions progress the grammatical structures used by the teacher become increasingly more complex. Grammar book are introduced in later session.
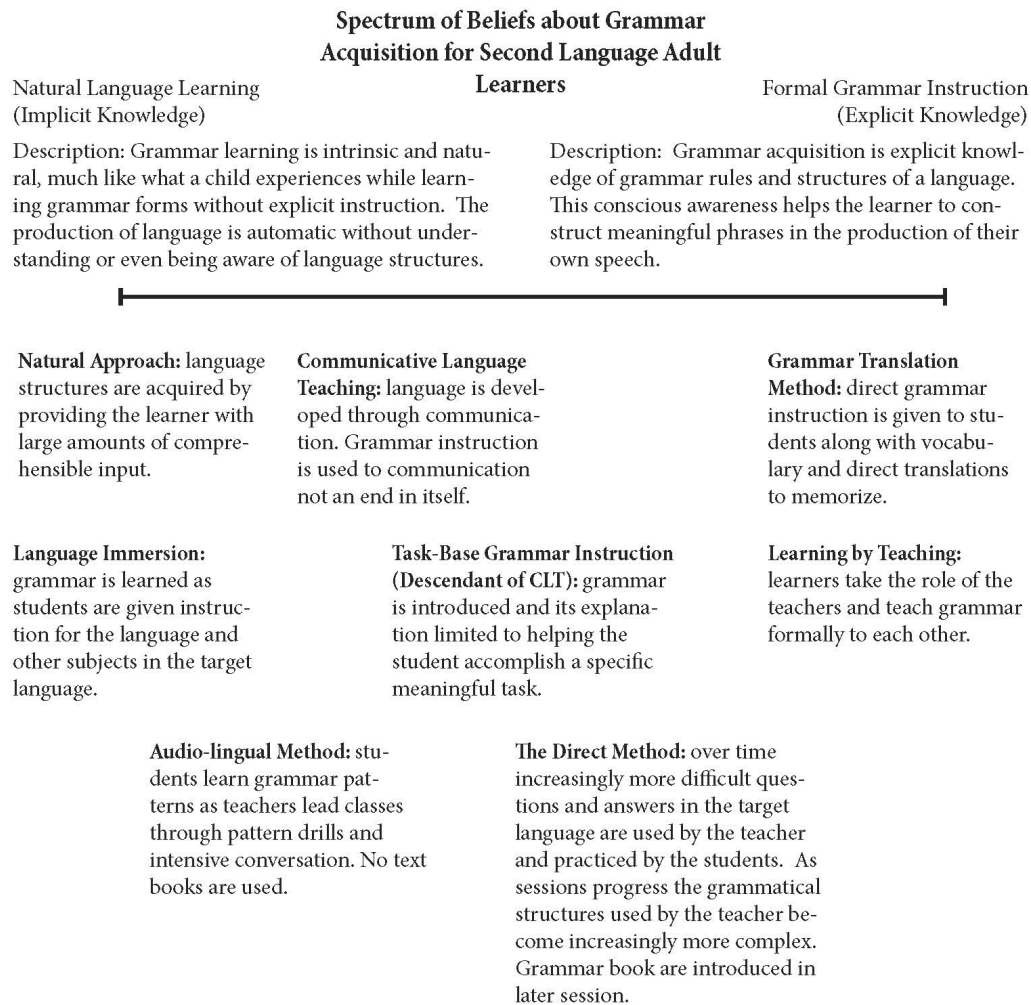
Figure 1. Second Language Acquisition (SLA) Grammar Methods. This figure shows a map of theoretical positions in SLA grammar methods.

learn 46 different languages, desired to make a transition from a grammar-driven approach to a context-of-use driven language learning environment. Under the old system the institution employed many of the principles and techniques used in communicative language teaching (CLT), but fell short because opportunities given to students for real communication were too infrequent. Under the old system, language learners were given a grammar text as well as a vocabulary and phrase book. A specific set order of grammatical topics guided teachers' introduction of each grammar principle over the course of the missionary's MTC stay. Under this system, grammar rules were explained, examples provided, and then missionaries practiced the rule. Phrases were most often learned sequentially as laid out in the grammar book or according to a schedule pre-determined in the curriculum syllabus.

The new context-of-use driven learning environment more-closely represents a CTL approach as described by Graham and Perry in their 2007 paper:

> The Communicative Language Teaching (CLT) approach is learner-centered and emphasizes the use of language for communication in real-life situations. A syllabus using this approach is designed around the real-world tasks that a learner needs to perform in the target language, rather than around grammatical features.
>
> In CLT, the role of the instructor is different from that of traditional teaching methods. In the traditional classroom, the teacher is the focus and is solely responsible for the content of the course and the motivation of the learners. In CLT, the teacher serves as a facilitator, allowing learners to share responsibility, set goals, and take charge of their own learning.
>
> CLT also emphasizes that language is developed through communication. In particular, grammar instruction is used as a tool to improve communication, not as

an end in itself. CLT also stresses the proper use of language in a range of social situations. Thus, learners must be exposed to authentic example texts taken from real-life situations, and teachers must create realistic opportunities for learners to use that language in the classroom (Graham & Perry, 2007, pg. 8).

Administrators at the MTC sought to create a learning environment that mirrored the experiences that would be encountered by missionaries once they left for field service. It also provided meaningful opportunities for communication on a daily basis. This aided these young men and women as they prepared for daily teaching engagements, despite their abbreviated language preparation. In order to provide contextualized activities to the missionaries, teachers' time in direct language instruction was reduced by two-thirds. This provided them the time to assume the role of an individual who is learning about the Church. In this effort, teachers usually model someone they had either taught on their mission or who they currently know.

Topics for these experiences changed daily within the new system, because each person taught requires the same basic lessons but also has different individual questions and needs. These differences necessitate different sets of vocabulary and grammatical principles. Therefore, missionaries complete a daily preparation regimen to help them complete language study decisions. The cycle includes planning, personal study, companion study, and language study.

Each day, missionaries plan for the next day's appointments. This includes identifying the needs of an individual who desires to learn about the teachings of the church and what they plan to share during the meeting. Using their native language, the missionaries then study relevant gospel topics in their materials and further refine their teaching strategy. Companions then share what they have learned and thought about with each other during companionship

study. The teaching plan is subsequently revised and concepts are practiced with one another. This, too, is primarily accomplished in the missionaries' native language.

Once the missionaries are in agreement and satisfied as to what they will share, they identify vocabulary words, phrases, and grammar with which they are unfamiliar but are need to learn to accomplish their communicative objective. These learning needs are then included in the companionships' plans for language study time. Vocabulary and phrase needs are most easily identified by missionaries because the communicative context itself makes them visibly stand out. For this reason, the missionaries' phrase book is organized by common missionary task and the lesson principle.

An illustration of this preparation cycle centers upon missionaries teaching a male individual. This investigator invites missionaries into his home because he feels like they have something that could help to strengthen his family. During daily planning, missionaries decide to teach this person how the gospel blesses families. Each member of the companionship then spends personal study reading scriptures and thinking about experiences from their own lives related to how the gospel blesses families. Later, in companionship study, the missionaries decide to share a brief description of how the gospel can bless families. As part of the lesson, the missionaries plan to read a scriptural story about a brother who understood and acted upon the gospel—frankly forgiving his brothers for a serious offence. Subsequently, during language study, they identify six phrases from their Phrase Book they would like to learn. Ten vocabulary words are also selected for study when the missionaries recognized they needed them for the days' activity.

The described daily preparation cycle holds many implications for language training efforts. First, it provides opportunities for authentic language reception and production within a

real-world context of use. Grammar study is used as a means to facilitate communication rather than as an end in and of itself. Second, motivation for learning in the example came from the anticipated teaching appointment rather than teachers or a syllabus. This implies that learners should be increasingly self-driven and directed. Third, vocabulary, phrases, and grammar explanations needed to be accessed in a dynamic, non-linear way because of the variation in the language needs of each missionary. Reduced levels of teacher-facilitated direct grammar instruction under the new system meant that the missionaries needed to have a way to access answers to their questions about grammar structures or how to relate a concept in the new language. This requirement partially created the problem to be solved. Finally, missionaries learning native speech examples developed questions involving the grammar structures within the target language examples they were studying. However, they lacked a way to find answers to their inquiries, which also contributed to the missionaries' lack of desire to study and learn target language examples. Ultimately, the MTC Design Team, who were tasked with creating materials for this change in learning environment, needed a way to both help learners notice unfamiliar or misunderstood grammar structures within the native speech examples and help them access relevant explanations about why words take specific forms.

While transforming the grammar-driven course of study to a context-of-use-based curriculum, two theoretical bases were selected to inform the instructional strategy used to enhance the missionaries' language learning materials. First, case-based explanation (CBE) provided the learning theory underpinning creation of the instructional material. Second, the technological theory of hypertext was implemented in service of CBE. Where the learning rationale focused upon providing explanations to learners as they engaged the material, the technological theory was used to facilitate the connection of student to explanation.

During an initial pilot study, a set of Spanish-language materials was created through a series of three design revision cycles. Throughout each creative cycle, care was exercised in the application of CBE and hypertext theoretical positions. This added discipline to the construction of the instructional frameworks. During the course of each cycle, improvement in measured outcomes was carefully noted. These materials took the form of a vocabulary and phrase book and a grammar book. The former contained native speech examples, organized by missionary task and learning principle, while the latter was comprised of comprehensive explanations and rules for major grammar structures. The grammar book also contained additional examples and exercises (complete with answers) that missionaries could use to practice and self-assess comprehension.

The evolution of the materials consisted of multiple iterations of each resource. Over time, the relationship of these two books changed. First, the grammar book was supported by the phrase book that provided vocabulary and native speech examples. This relationship changed as the phrase book gained importance and the grammar book evolved to function as the supporting material. At this juncture, the vocabulary and phrase book became an entry point to the supporting text.

Specifically, three general hypertext mechanisms evolved during the pilot study. In the first version native speech examples were connected to extensive grammar explanations (2-3 pages long). The student was required to read through the grammar section to find the answer to their specific question. It was difficult for students to find an answer with this version. The second version linked a specific grammar explanation provided at the bottom of the same page the native speech example was found. Within the specific explanation students were linked to the extensive grammar explanations in version 1. This resulted in missionaries finding their specific

answers more quickly but they weren't in the context of the more general principle and the size of the book increased by 25%. The third version linked native speech examples to specific sections within the more extensive grammar explanation of version 1. This resulted in providing a little decrease in time to find an explanation but a deeper understanding of the grammar principle without the need for greater development. These changes were influenced by and reflect principles found in the literature surveyed for this project.

The superscripts were used to link learners to the exemplar in the Vocabulary and Phrase Book to grammatical explanations with in the Grammar text. These incorporated superscripts helped attract the attention of the learner by helping them notice an important grammar pattern that may help them more easily organize the current exemplar (Chandler, 1993; Schank & Selfridge, 1977).

The development team chose to tag specific grammatical forms within the speech examples that a beginning language learner would find most helpful. Therefore, the tagging selections were made with a focus on relevant activities the missionaries would encounter early on in field service. These tasks and activities included prayer, learning, testifying, and developing relationships with investigators. These tasks were specifically tagged with the grammatical forms identified for beginning learners. Because the pilot materials were intended to provide dynamic access even after the a missionary became more proficient in the language, the team also focused on tagging grammar forms most learners would have questions about—without regard to prior language exposure. This approach was based on research completed by Schmidt (1990), which investigated how to best help learners notice grammatical forms (Schmidt, 1990). From this early effort, the learners reported that the tagging helped them "understand what it is that they are practicing" (McBride and Seago, 1999, pg. 185). Because a

decision was made to create grammar materials for all of the languages taught at the MTC's,

there was a desire to conduct a thorough study of the different versions of hypertext instruction

and test them across languages with varying grammatical constructions. The purposes and

questions of this study are summarized below.

Statement of Purpose

The purpose of this study was twofold:

1. To determine to what extent the findings of the preliminary pilot study can be replicated

    in a larger sample of missionary trainees who are learning the Spanish language.

2. To determine to what extent the results of the pilot study in the Spanish language

    generalize to missionary trainees who are learning the Portuguese, Japanese, and

    Mandarin languages.

Research Questions

This study focused on investigating three research questions:

1. How do the three in-context and just-in-time hypertext application strategies compare in

    terms of improving missionary trainees' ability to—

    a. provide, in their own words, an explanation of the targeted grammatical structure,

        and

    b. demonstrate the ability to generate a new language example, which incorporates

        the targeted principle?

2. To what extent do the three hypertext strategies differ in terms of the average amount of

    elapsed time missionary trainees take to—

    a. provide, in their own words, an explanation of the targeted grammatical structure,

        and

b. demonstrate the ability to generate a new language example, which incorporates

the targeted principle?

3. To what extent do the answers to Research Questions 1 and 2 differ among missionary

trainees who are learning Spanish, Portuguese, Japanese, and Mandarin Languages?

Chapter 2: Literature Review

Four different bodies of literature are summarized and reviewed in this chapter. The first two served as the theoretical basis of the pilot study upon which this research is based. They included: (a) case based explanation (CBE) and hypertext theory. A third body of literature concerns the portability of instructional strategy and is unique to this study. The fourth body of literature reviewed concerns second language acquisition (SLA). Each literary theme is reviewed in this order beneath the headings listed: SLA, CBE, Hypertext, and Portability of Strategy.

Introduction to the Literature Search and Collection Methodologies Utilized

Three primary strategic approaches were utilized to gather the relevant support for this research project. First, a number of basic searches were conducted within databases and the internet. Various combinations of relevant key words including "hypertext," "grammar learning," and "case-based explanation" were used to locate relevant research and literature with varying degrees of success. The second method consisted of a thorough review of the literature collected in the primary search. Most of the papers included relevant references to additional research that proved useful in providing context and theoretical support to this current work. Finally, discussions with and interviews of experts in the field of second language acquisition yielded additional resource material for this project. All of these methodologies are further detailed in Appendix A.

Fundamental Premises Underlying Language Learning

The materials for the present research were developed with two underlying premises in mind: (a) that the learner is an agent and that learning is best accomplished when students make choices for themselves, and (b) that an individual's knowledge is imbedded within a context and is gained and transforms over time with accumulated experience.

Students learn efficiently when responsible for their own learning. The first underlying premise of the research that governed the creation of the language materials in the pilot study assumes that learners learn most effectively when they are responsible for making their own learning choices rather than following a predefined path. As outlined in the work completed by Scardamalia and Bereiter (1994), a learner requires more than simple externally-provided guidance within a learning environment. Schank's explanation-based paradigm (1994) is also based on the notion that learning is informed by participation within a meaningful context. In the view of these scholars, a learner who experiences expectation failure becomes an active learner and must take an active part in seeking resolution on the reason for the failure. Instead, they must make conscious decisions about what to study and how these activities are facilitating (or hindering) progression toward learning goals (Yanchar, 2011).

Knowledge accumulates and is transformed through experience. The second premise in the pilot materials is that knowledge is obtained through experience and changes over time as additional exposures to language use accumulate within the mind. Firth and Wagner (2007) assert that "language—as a social and cultural phenomenon—is acquired and learned through social interaction" (Firth & Wagner, 2007). Bush takes this a step further and adds that humans are "constantly monitoring and re-evaluating the world around (them), organizing new information into knowledge as [they] go" (Bush, Melby & Lewis, 2010). The design of the research materials depended on the principle of helping students notice and find answers to explanation questions for grammar forms within native speech examples, so as to expand their understanding of grammar patterns in the language.

The Role of the Mind in Language Learning

To understand how language learning occurs, one can view language theories in terms of the degree to which they rely upon automatic or innate processing versus the operation and utilization of general cognitive abilities. From either perspective, grammar plays a critical role in a language learners' mental organization of language knowledge.

Theories in language acquisition. The first school of thought posits that language patterns are innate or inborn, leading to advocacy of instructional theories that deemphasize explicit grammar instruction while focusing on exposing students to large numbers of native speech examples. Known as representational nativists, advocates believe the human mind contains a language acquisition device (LAD). This device or faculty is defined as a biological center containing inherited linguistic representations that need only to be linked to the particular language being learned (Chomsky, 1975; Pinker 1998). According to the theory, exposure to linguistic representations solidify these innate language patterns in the mind of the learner. This position is highlighted by Krashen's visit to the US Air Force Academy where he received a brief overview of language instruction tools embodied in video clips. His recommendation was simply to "not worry" about anything but creating additional videos for the students to watch (Bush et al., 2010). In other words, his feedback devalued the instructional helps tied to the video presentation that would provide the learner with help through annotations on form and meaning within the video clips.

Theorists from a second school of thought alternatively argue from a language usage-based perspective. They dismiss the existence of an inherited *language faculty* and believe that language acquisition occurs as the result of a general cognitive skill development through repeated experience with exemplars. These are simply defined as examples of language used in

context. Each of these contributes to linguistic schemas, which are in essence language patterns or scripts that develop and evolve over time in the mind of the language learner (Chandler, 1993; Ellis, 2002). Each encounter constitutes an exemplar, which is stored along with other occurrences, and it is from that reservoir of exemplars that patterns develop (Bush et al., 2010). The frequency of encounters with exemplars of similar character is described by Ellis (2002). He asserts that these encounters with linguistic patterns happen in multiple ways including hearing, seeing, using, and writing. More frequent active encounters with these linguistic components through different methods and situations allow learners to more easily remember them (Ellis, 2002).

The usage-based school of thought asserts that knowledge of language patterns grows as a result of experience using and interpreting the language. Over time, this base of experience is increased and modified as a result of new experiential input. Like the first paradigm, this view also attaches significant value to the use of examples in language learning. Usage-based theorists posit that language acquisition and usage carries far beyond syntax and it is deeply linked to contextual experiences encountered by the learner which provide meaning on the concept level as morphosyntactic and phonological levels. There is evidence to support this view. For example, application of the metaphor *throw the book at them* illustrates a linguistic schema that would prove difficult for representational nativists to explain within the boundaries or their paradigm. This, because strict syntactic interpretation means literally taking a book and throwing it at someone while in this case most likely means that someone needs to be chastised for something (Bush, 2012).

Abbot-Smith and Tomasello (2006) also argue that there are problems with theories assuming that humans have innate syntactic categories. They alternatively suggest that

permanent abstract schemas emerge over time based on a hybrid usage-based view of learning, fundamentally asserting that language acquisition results from a learner being exposed to a large number of exemplars. Each one includes many different pieces of information and the degree of a subject's understanding is closely connected to phonological, lexical, and distributional properties of the language involved. These authors suggest "every utterance a child hears and processes has lasting effect on linguistic representations" (Abbott-Smith & Tomasello, pg. 283, 2006). Yet the importance of context is also supported in helping the child with the capturing and processing of these utterances.

Schank and Selfridge (1977) also attack representational theories as being handicapped due to inadequate meaning representations and processes. This criticism was leveled because they sought to outline and describe the prerequisites for usable artificial intelligence while using the linguistic development of young children as a model for their efforts. Ultimately, their goal was to create a learning machine, which could replicate the language learning processes of children under 3 years old. Schank and Selfridge outlined the developmental stages related to language learning in children and proposed that children at age 1.5 begin to construct conceptualizations including more than one referent word relationship within a single sentence. Children begin with very basic recognition of objects and actions and then advance to more complicated rule-informed conceptual structures between ages 1 and 2. And, as they are exposed to linguistic input in context begin to make associations. (Schank & Selfridge, 1977)

The Schank team also emphasized the importance of repetition in exposure to contextual linguistic representations when trying to accomplish some learning objective. The repeated reoccurrence of patterns helps the learner to create rules, which begin to govern communication. Eventually, young learners begin to predict what something means based on more than just the

exact words. Observing syntax and morphemes within an example provide critical context with which to better judge meaning. This highlights intelligence and learning because the brain processes examples and uses them to construct patterns without being explicitly told how to do it, enabling development of scripts. Trying to automate the language processing of young children was the essence of the learning machine creation project (Schank & Selfridge, 1977).

Representational nativists assert that language learning ability is innate and do not value explicit grammar instruction (Krashen, 1981). The process of explaining grammar principles would seem to have little value if the grammar rules exist genetically in a language faculty and all a learner must do is fill in slots in the faculty as we are exposed to language. Although all theorists from the usage-based school don't subscribe to explicit grammar instruction, the school of thought still leaves room for it. For example, Schank doesn't place significant value on grammar instruction. In fact, in his work on language learning programs, explicit grammar instruction is deemphasized or proscribed. (Schank, 1998).

Importance of grammar explanation in SLA. If grammar patterns emerge over time and act as critical aids in the mental organization and script retrieval process, then grammar instruction may help the language learner organize and categorize language they experience.

In contrast with the theorists above, many researchers believe grammar instruction is critical in SLA. For example, Schmidt (1990) said that it is impossible to learn a language subliminally and exposure to grammatical forms is likely necessary in the adult language learner. Mills (2000) also argued that noticing linguistic forms is critical for learning and expanding grammatical understanding in learners.

Language learning is described by Ellis (2002) in these terms: "structure regularities of language emerge from learners' lifetime analysis of the distributional characteristics of the

language input and, thus, the knowledge of a speaker/hearer cannot be understood as an innate grammar, but rather a statistical ensemble of language experiences that changes slightly every time a new utterance is processed." To further the point, Ellis continues by stating "ultimately, everything we know is organized and related in some meaningful way or other, and everything we perceive is affected by our perceptual apparatus and our perceptual history. "Language reflects this embodiment and this experience" (Ellis, p. 65).

As individuals receive exposure to language applied in context, their mind organizes the instructional material into new meaningful patterns to be retrieved quickly and employed again in the future. This is in part because our minds possess limited attention and perception capabilities (Anderson & Lebiere, 1998). These constraints drive the human mind to organize events into schemas that contain automated scripts (Schank, 1994). Chandler discusses schemas (Chandler, 1993) in his paper. These schema's help us to organize the information we accumulate in terms of syntactic representations and linguistic categories.

In the current study we describe scripts as learner-designed grammar patterns or schemas created, based upon experience and exposure to exemplars. These scripts allow individuals to understand events to which they have been exposed and also those they may experience in the future. By building these scripts, the learner equipped with a sort of pre-built response tool. This eliminates the need to constantly create new responses and allows learners to exert manageable levels of attention in understanding either new or unfamiliar experiences for which a learner lacks a script (Abbott-Smith & Tomasello, 2006). Importantly, these patterns and schemes are modified according to the new exemplars, which are captured and processed (Chandler, 1993). This parallels Schank's notion of scripts, which are *pulled up* and modified (Schank, 1995, Schank 1999).

The scripts are created by organizing accumulated information in meaningful ways. However, the mind can't efficiently develop a reference framework without having a sufficient number of contextual examples (Bush, 2012). Accordingly, the more exposure we have to specific 'concepts that connect', (indices or hooks according to Schank) the more intelligent we become (Schank, 1977, 1994, 1998). Individuals who can recall relevant information more rapidly may be more intelligent because they can access the necessary information without encumbering limited human mental faculties by unnecessarily and continuously processing large amounts of new information (Anderson, 1989). Language rules, or grammar, provide one way for our minds to organize incoming information. For example, if someone is exposed to many instances of things in the past tense they begin to associate the concept of past tense with word forms used to express this time frame, they begin to create a pattern from these exemplars (e.g. wanted, served, ate, loved, skipped, cried, rode, etc.) Subsequently, the mind associates the suffix *ed* with the past tense and when the person is searching for some action in the past tense the pattern of adding an *ed* to the end of the action word can be over-generalized by the student. This appears to be true, despite the fact that there are form exceptions to the learned pattern. Therefore, when we attempt to communicate in the past tense and don't have an internalized exception, we simply retrieve this rule/pattern and add the suffix. Sometimes, this results in incorrect grammatical forms or over-generalization of the grammar pattern such as: *I **goed** to the store.* (Rumelhart & McCelland, 1986; Chandler, 1993).

If the mind deals with language by organizing exemplars into meaningful patterns that can be retrieved to efficiently process increasing amounts of input and output, and we believe that grammar explanation can help the student of a new language organize incoming tokens into meaningful patterns, then we need a way to expose the learner to language examples as well as

provide them support in organizing the exemplars in meaningful ways to be employed without over-generalization.

Options for Improving Second Language Learning

A combination of Schank's theory of case-based explanation and hypertext strategy offers a possible option for improving second language acquisition by providing exemplars of language structure and helping learners to access answers to their learning questions as they arise.

Cased Based Exposure to Exemplars. The theory of case-based explanation provides a model for how learning may happen. It began taking-shape in the late 1970s and 1980s, when Roger Schank initiated his work with a narrowly-targeted focus on the interpretation of sentences within the natural language processing (NLP) field. Sentence interpretation represented a fundamental obstacle to researchers in the field of artificial intelligence (AI) at that time. During the development of their techniques, Schank and his partners recognized that "the key to building a computer that will understand language is building a computer that understands the world that language describes" (Schank et al. pg. xiv, 1994). Therefore, being able to understand narratives is not a language issue. Rather, it is an explanation issue. As noted by Schank's team: "The difficult part of understanding stories is developing creative hypotheses about why the events that the story describes took place" (Schank et al., pg. xv., 1994). Therefore, *explanation* became the central emphasis of the theory. Within context, it is defined as the process by which individuals make sense of the world around them. Explanation was characterized by these researchers as being inextricably connected with the broader concept of understanding. The latter is the ability to mentally process experiences in terms of the cognitive frameworks an individual possesses.

Schank described the *explanation process* in his 1994 work as a set of eight steps described in Table 1. The application of an abbreviated set of these precepts to second-language learners is apparent especially to those who are learning in context.

First, students are constantly faced with anomalous situations as they study new grammatical forms. While CBE was originally focused upon improving artificial intelligence capabilities, this new application has transplanted the theory into the fresh context of second language acquisition (SLA). Instead of learners relying entirely upon their individual cognitive frameworks to process new information, this effort seeks to promote learning by offering enhanced explanations. Explanations and the question of how to best make them available to students became the thrust of this current work.

Table 1

Schank's (1994) Explanation Process.

STEP	ACTION
Step 1	Find an anomaly.
Step 2	Establish the explanation goal that underlies the anomaly.
Step 3	Establish the explanation question that is active.
Step 4	Find an expression pattern that relates to the question.
Step 5	Check the causal coherence of the pattern as applied to the anomaly: If it is coherent—go to step 6. If it is incoherent—either find a new pattern or tweak the current pattern.
Step 6	Take explanation and establish whether it can be generalized beyond the current case by reminding.
Step 7	If a reminding is found, find the breadth of the generalization to be formed.
Step 8	Reorganize memory using the new generalized rule.

A failed expectation initiates a learning opportunity. Second, explanation goals and questions are mentally derived each time one of these circumstances comes into view. And third, suitable expression patterns serve to direct the learner to the appropriate self-maintained or externally-provided explanations. These represent the "cases" that are integral to Schank's theory and serve to bridge the to-be-explained event with the necessary answer. In turn this makes the ultimate learning outcome possible.

At the heart of CBE is a central premise that the understanding is inherently dependent upon the ability to create or seek explanations. In fact, Schank notes that "understanding can be seen to be no more than, and no less than explanation" (Schank et al.,1994). Since understanding is explanation, it is reasonable to expect that explanations will come easier to the learner if resources that can be used to find explanations are provided. Would expect that linking information resources to materials where learning anomalies occur should significantly enhance student outcomes.

The discovery-question-explanation paradigm applies well to the mental progression of language students trying to decode a particular phrase. Now that the students have an explanation question, they need a mechanism to connect them with an answer to their explanation question. Once this model was integrated within early versions of the textbooks, the difficulty involved with linking students to explanations became an important hurdle.

Hypertext linking of student's form questions to explanations. Hypertext provides a mechanism for connecting the learner with an answer to an explanation question. The etymological basis for the term *hypertext* is simply described. The prefix hyper- comes from the Greek prefix *υπερ-* and means *over* or *beyond*. Text is derived from the Latin term "textere" (to weave), denoting a network of coherently and cohesively interlocked units of speech (Ensslin,

2006). Hypertext began with Vannevar Bush during and following World War II. Using available technology he attempted to create a machine called MEMEX, which would consolidate all knowledge, making it accessible from a single resource. Bush had been instrumental in initiating the Manhattan project, which led to the technological advances behind atomic energy usage and ultimately the atom bomb.

The term is often used interchangeably with *hypermedia*. Despite its frequent application within a digital context, Ted Nelson coined both terms in 1963 and noted that *hypertext* has become the generally accepted word for branching and responding text. Defined this way, hypertext has application to printed text as well as the more commonly described contexts of computer and web-based environments.

Hypertext usage and implementation signifies a change from linear, structured and hierarchical forms of learning materials to decentralized and nonlinear formats (Spiro, 1990). Duff (2000) suggested that repetition must be "relevant to the learners—a form of negotiation of messages and texts—and not merely a mechanical or rote parroting of structures that does not ultimately enhance students' proficiency in the target language." Effective hypertext implementation promotes this relevance and offers a way to deal with written learning materials. Fundamentally, the term is central to a mechanical theory of information linking. It offers a means by which to direct a learner from the point where he discovers an anomalous situation to an appropriate message or resource. "It signifies the surmounting of the old linear constraints of written text" (Wikipedia, 2011). It also helps "establish the necessary form-meaning connection" (DeKeyser, 2007). Within SLA environments, hypertext can be seen as analogous to grammar in that both highlight relationships between concepts (McBride & Seago, 1997).

Hypertext provides a means which allows learners to explore information and ultimately gain knowledge in ways which were previously unattainable. It can connect a learner with a question to a needed explanation and benefits the student almost instantaneously. McBride & Seago (1997) and later McBride & Seago and Seago (1999) provided insight into the value of hypertext innovation within the language-learning environment. The innovation allows learners to efficiently follow linkages to additional information related to the object of inquiry (McBride & Seago, 1997; McBride & Seago, 1999). Some researchers in the SLA field have stated "hypertext systems have been seen as representations of human memory which allow the integration of new information by restructuring prior knowledge" (McBride & Seago, 1999, pg. 185). This reflects the position outlined above in how the mind deals with language and how CBE describes learning. CBE describes the need for indices connected scripts so the mind can retrieve them when the need arises (Schank, 1994). These indexes are created as we make associations between concepts and the current case at hand. They then serve as labels for each case and act as retrieval system. This allows the learner to make these cases useful. Hsieh (2005) defines indexing as the process of assigning titles and labels to experiences so that they may be "filed" and "stored" for later use. According to Hsieh (2005), a good index includes not just the "what," but also the "why" and the "how" (Hsieh, 2005). Within this research effort, hypertext performs the function of index or label current case. Finding ways to intelligently and effectively integrate the explanatory process (through hypertext) into SLA study materials provides the basis for this work. Hypertext serves as a mechanical notation scheme to connect grammar structures used in native language exemplars within the vocabulary and phrase book and grammar explanations.

Within a hypertext environment, many learners lose themselves in the sea of available information, especially those with little prior knowledge on a subject (Rasch & Schnotz, 2009). Many students often forget their original query as they search through massive explanations. This principle was observed in research completed by Rasch and Schnozt (2009), where they conducted testing which gave students open access under one condition and a restricted hypertext environment in another. They found that students who studied within a traditional learning environment showed no decrease in their ability to acquire new knowledge versus those who studied in a hypertext learning environment with complete and open access to the internet. Nevertheless, the study did show that in a hypertext learning environment with restricted access to the internet there was significant learning improvement among male sixth-grade students. Their findings pointed to better learning outcomes within this restrictive hypertext environment, indicating that perhaps *less was better* when providing learners access to information through hypertext mechanisms (Rasch & Schnozt, 2009).

McBride & Seago (1997) conducted a study that found that explanations in a grammar learning environment should be able to help students much like a tutor does. In other words, answers should be concise, focused, and limited—much like a tutor's response to questions. This reinforces the idea of restricting available information as a means of helping the learner.

Portability of Language Learning Strategies

Because languages express the same concepts often using very different grammatical structures, there was a question about whether or not the hypertext strategy would work across varied languages. Just because the hypertext strategy appeared to be helpful to English speakers learning Spanish, it might not be as useful to an English speaker learning Mandarin. In order to

determine if there was any theoretical direction or research precedence involving the portability

of language learning strategies, a literature search was conducted.

For this study we used Oxford's (1990) definition of language learning strategy, which

applies to the hypertext strategy employed in the pilot materials. Oxford defines language

learning strategies as "operations employed by the learner to aid the acquisition, storage,

retrieval, and use of information as well as specific actions taken by the learner to make the

learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable

to new situations" (Oxford, p. 8). This definition was used in the survey of the literature. This

section describes the differences among the languages included in the study and reviews

important principles from the language strategy literature, which apply to the current study.

Fundamental differences in the tested languages. Every language uses different

grammatical structures to express similar concepts. This is partially caused by language

evolution in terms of their grammatical constructs. As generations of people look for ways to

express their ideas and feelings, they end up manifesting them using different mechanisms of

expression. The result is that grammar changes within a language over time (Chomsky, 1975).

Language consists of five basic elements including syntax, morphology, phonology,

semantics, and pragmatics (Gass & Selinker, 2001). Languages have linguistically similar

aspects along with different weightings of each of these elements. Two of the most basic

linguistic elements relating to our study are morphology and syntax (Borer & Wexler, 1978).

Morphology is the rule set which governs word composition in a given language. It is comprised

of morphemes (Spencer & Zwicky, 1998). Free morphemes are verbs, adjectives, adverbs, nouns

(like house, car, etc.) that carry meaning by themselves. Therefore, you can say the word *house*

and it means something by itself. Alternatively, bound morphemes like *the* or *and* can't convey

meaning independently. In other words, you couldn't say *and* by itself and expect it to make any sense to a listener. Other examples of bound morphemes also include prefixes, suffixes and infixes. In contrast to the examples above, syntax is the rule set that governs the makeup of a sentence and provides meaning through word order (Borer & Wexler, 1978).

Each language includes both of these elements, but in a variable mix (see Figure 2). Moreover, syntax and morphology tend to be balanced across languages. This means if there is greater morphology in a given language then there is also a lower proportion of syntax. For example, Mandarin relies heavily on phonology and syntax to convey meaning whereas Spanish relies heavily on morphology (Grainger, 2005). In our pilot of the Spanish materials, grammar tags have proven helpful in Spanish because it seems logical to identify words which have been declined for case, like in English when *he* is the direct object and changes to *him*, or when verbs are conjugated verbs, for example. Nevertheless, will grammar tags be of equal utility to learners of languages like Mandarin, which is rich in syntax and morphologically poor? Simply put, will referencing individual words be effective within languages that rely more-heavily upon sentence structure and word order to convey meaning?

Another critical area of distinction is whether a given language is *analytically* or *synthetically*-oriented. The current language practitioners are more interested in the differences between synthetic and analytical languages and the portability of instructional approach. Analytical languages rely on context and sentence structure to provide additional meaning. Therefore, nouns and verbs don't change form. Instead, they rely on articles within a phrase. These languages rely more upon syntax than morphology. An example is provided by the following Mandarin phrase: *Wǒmen qíqiú nín bāngzhù wǒmen xuéxí Zhōngwén*. Translated, this literally means *We ask thee to help us to learn Mandarin.* The word order, subject, verb object,

Scale of the Degree of Morphology
within a Language

Analytic Languages
(Isolating)

Synthetic Languages
(Fusional)

Morphologically Poor

Morphologically Rich

Mandarin   English   Japanese   Spanish   Russian

Portuguese   German

Figure 2. Scale of Morphology. This figure illustrates the level of morphology within different

languages. Spanish and Portuguese are more morphologically rich than Mandarin or Japanese.

This helped to determine which languages to use in the study.

and subject verb object (SVOSV) in the sentence are very important in conveying the meaning of the sentence. Synthetic languages are more morphological than syntactical. This ultimately means that word order is less important to more-morphological languages. In this context, words carry grammatical meaning because prefixes, suffixes, infixes etc. are synthesized into them. In Russian (heavily synthetic language), a verb like *читал*, which comes from the word *читать* (to read) carries with it four meanings: (a) *чита* means the non-completed act of reading, (b) the *л* ending signifies past tense, (c) the *л* ending also signifies a singular, and (d) masculine subject. Another illustration involves the Spanish word *leimos*, which comes from the verb *leer* (to read). This word has the following meaning incorporated: (a) *le* means to read, (b) the *i* signifies the completed past tense, and (c) the *mos* indicates that *we* completed the action.

Above we have described how different the languages are grammatically which are included in the study and have shown the possibility that the hypertext innovation might work differently within this group of language. Unfortunately, there was little research found that directly related to the concept of language strategy portability from the same native language to different target languages. The largest group of literature available focuses on strategies for learning English as a second language or different native languages all learning the same target language. There is another group of literature that focuses on the portability of strategy between language learners at different levels of language proficiency. There are a handful of papers dealing with instructional strategy modification based upon learning environment distinctions. A few principles gleamed from this survey of literature that may impact the portability of our hypertext strategy are included below.

Language-driven differences in the difficulty of learning grammar structures. In the literature on English SLA, the difficulty inherent with learning English grammar varies for

learners with differing first-languages. Clark (1998) found that the difficulty of learning a new language depends upon the level of similarity between the native language and new languages with regard to the way grammar is expressed (Clark, 1998).

Language proficiency and language strategy use. Rather than focusing on the strategy itself, a great deal of the literature centers on applying a given language strategy focus on the individual learner. For example, past work shows that the use of strategies changes according to learner proficiency. As learners become more proficient in a language, the strategies they use to learn it change (Naiman, 1975). This principle may have application in our study because prior experience, with language study affect which hypertext strategy is most effective. The literature on hypertext also shows that prior language knowledge effects how much a hypertext intervention benefits a learner (Rouet, 2009; Tsui & Nicholson, 1999).

Tsui and Nicholson conducted a study on how hypertext could help English-as-a-Second Language (ESL) teachers' access resources to help improve their teaching competency and enrich their knowledge. The researchers found that explanations need to be practical and include the "why" and the "how" in addition to the "what." They employed questionnaires to determine which kind of explanation was the most helpful and found that this kind of resource (as described previously) is the most helpful to beginning teachers. This finding was interesting, because previous study results suggested it was students with prior knowledge who worked most-successfully with this type of tool. Why were beginning teachers, with less accumulated knowledge, more apt to find this type of resource material useful? Deficiencies in the materials provided to more-experienced teachers may explain the inconsistency (Tsui & Nicholson, 1999). This principle is important for the kinds of explanation most helpful for the targeted audience.

Learning processes in primary versus second language acquisition. Another related area of emphasis is the learning of additional languages. "In the instance of primary language learning, children (students) learn phonology more quickly and completely than second language learners" (Baker & Baker, 2011). Research shows there are differences in difficulty encountered by children learning their first tongue. Clark describes differences in first language acquisition between children who are learning synthetic languages as opposed to analytic. Languages which are synthetic are much more difficult for children to acquire than languages which are more analytically oriented. This might have application to results observed in our study because Mandarin is an analytic language whereas Japanese is a synthetic language. Spanish and Portuguese fall somewhere in between. It might be expected that Mandarin might be the easiest to learn and that Japanese would be the hardest (Clark, 1998).

Strategy use across languages. There is little extant work that examines the transportability of an instructional strategy from one language to another. Within the context of this research effort, it means applying English-to-Spanish-based strategies to learning the Portuguese, Japanese, and Mandarin languages. Grainger (2005) confirms the lack of research in this area in his paper.

In general terms it can be stated that there is very little research on the impact of the target language and its relationship to the choice of learning strategies. Most research has been confined to Indo-European languages. This has limited our understanding of the processes used to learn non-Western orthographic languages. There can be no doubt that structural properties and functional categories are different between Japanese and European languages" (Grangier, 2005).

The lack of research in this area may be representative of the eclectic approach to language learning that exists in the field of SLA. Here, teachers generally apply learning strategies in a way that is anticipated to best meet the needs of the student (Brown, 1989; Lee & VanPatten, 1995).

However, the lack of research on language learning strategy portability may also arise because each language contains grammatical structures, which are dramatically different across languages. Significant hurdles appear when students study languages whose structure is very different from the format of their native tongue. To illustrate, it would be easier for a native Spanish-speaking student to learn another language with similar morphology (like Portuguese), than it would be to learn a language with a greater emphasis on syntax (such as Mandarin). The current study focuses on students who are English speakers (morphologically poor language) who are studying other languages with varying levels of morphological content. These include Mandarin (morphologically poor), Japanese (morphologically average), Portuguese, and Spanish (morphologically rich). In essence, the search of the literature failed to uncover either support or refutation aimed at the transportability of language instructional strategy. This research seeks to answer the question of the portability of language instructional strategies across languages.

Chapter 3: Method

Setting

The Missionary Training Center (MTC) provides a good environment for second language acquisition (SLA) research efforts. The significant volume of volunteer missionaries, about ten thousand each year, attending the facility and the expedited language instruction process combine to create a good laboratory for the study of language learning. The MTC provided a controlled learning environment suitable for the study. Each learner had a consistent educational experience leading up to testing. To facilitate this, identical classroom settings were maintained. Each group utilized the same curriculum and language learning materials as well.

Description of the Population

Full-time, volunteer missionaries from the Church of Jesus Christ of Latter-day Saints provided the subject base for this study. At the time, this group was generally comprised of single men aged nineteen to twenty-one and single women aged twenty-one to twenty-three. These young volunteers agreed to serve for two years and one and one-half years respectively. They were unpaid and typically expected to provide for their own living expenses.

Many of these missionaries were assigned to serve in countries or regions where a foreign language is spoken. This required the missionaries to rapidly learn as part of the language immersion programs housed within Missionary Training Centers (MTC). New missionaries spent ten to twelve weeks in an assigned MTC facility, engaging in language learning for nine hours a day. They participated in a blended learning environment, where computer software supplements classroom instruction.

Upon arrival, missionaries were assigned to a subgroup called a *district*. Districts were assigned based upon language program or missionary service area designation. This process

segments missionaries for organizational and learning purposes. The large number of missionaries attending the various MTC's as well as their explicit goal of rapid second-language acquisition made these volunteers excellent resources for this study.

Selection criteria for study participants. Subjects were selected from the total population of missionaries in the Provo Missionary Training Center who reported for training from July through September 2012. Missionaries assigned to the Spanish, Portuguese, Japanese, and Mandarin training areas were included in the selection process. Most missionaries who entered on this date were selected for participation in the study. Spanish-learners were an exception because of the large number of missionaries already attending the MTC. Therefore, for Spanish, district groups were randomly selected from the missionary population at the MTC. Missionaries within selected districts were asked if they would be willing to participate in the study, but had the opportunity to opt out if desired. A total of nine missionaries from the participating districts elected to be excluded. To make up for participant shortfalls, additional incoming districts of missionaries were invited to the study.

Selected participants. Using the process described, a total of 240 participants assigned to one the four languages studied were selected and included in the study. Two hundred and forty assessments were administered to each of the specific groups noted below. After completing adjustments for participants who chose not to use the materials during the trials, the largest group included in any one of the comparisons was 213.

There were 60 participants for each language and 60 for each treatment group. The missionaries studying each language were divided into four groups of 15, one control and three treatment groups. Missionaries from each district were distributed across either the control or one of the treatment groups. A district typically included 10 missionaries. Missionaries' prior

language knowledge was assessed and used as a covariate in the study to determine if there any differences observed in dependent variables were influenced by the version of the materials or a subject's prior language study.

Adjustments to the selected group. The study was primarily concerned with the ability of missionaries to locate explanations they seek to questions about grammar structures using the four versions of the hypertext strategies in the pilot materials. Therefore, there was a significant group of respondents who were excluded from the compilation of results. While there were 240 total participants in the study, the factors described below led to a measurable decreased in the actual participant scores used. As noted, this number was never higher than 213 for any of the groups.

Most were omitted because the student chose not to use the materials to answer any of the questions on the test. This may be because they already knew the answers to the test questions and had no need to look up an answer. Or, they simply chose not to use the materials for some other reason. Every missionary who answered questions on the test yet didn't reference the materials while answering them was excluded as well.

The number of missionaries who failed to provide any meaningful data because they chose against using the materials to answer even a single question was 27. This group was comprised of 12 missionaries from the control group, four from the Version 2: Page-Specific group, six from the Version 1: Chapter group, and five from the Version 3: Chapter Section group. Only three of the 27 had less than three or more years of foreign language study in school. One of them was a non-English speaking native. Therefore the English explanations in the book were probably not useful to her. There was also one missionary who was a native Spanish speaker assigned to learn Portuguese. This led to a similar conclusion. As shown in Table 2, the

included total also fluctuated across the groups because some students had errors in scores for one part of a question or excluded certain tasks in the totals.

Table 2

Number of Missionary Participants and Nonparticipants by Dependent Variable

	Dependent Variable			
Group	Explanation Correct	Explanation Time	Sentence Correct	Sentence Time
Number of Missionaries who used the hypertext instruction	212	213	208	209
Number who did not use hypertext instruction	28	27	32	31
Total	240	240	240	240

Of the languages tested, Spanish only had one missionary who didn't use the materials. Mandarin Chinese had 2, Japanese had 5, and Portuguese had 18. It is not clear why the Portuguese missionaries were at least three times as likely not to use the materials as learners of the other languages. It is also not surprising that there were more in the control group who didn't seek help from the materials because they didn't have grammar tags to help them locate an answer. In contrast, those with access to the full grammar tags were provided the easiest route to a short explanation and had the fewest missionaries who did not use the materials.

The average number of questions answered by missionaries who used the materials varied significantly across groups. On average, the number of questions answered by students who reported using the materials was nearly twice as high for the Version 2 and 3 groups (7.09 and 5.64 questions respectively) as it was for the control and Version 1 groups (3.30 and 3.59 questions respectively) for the 23-question test (Figure 3).
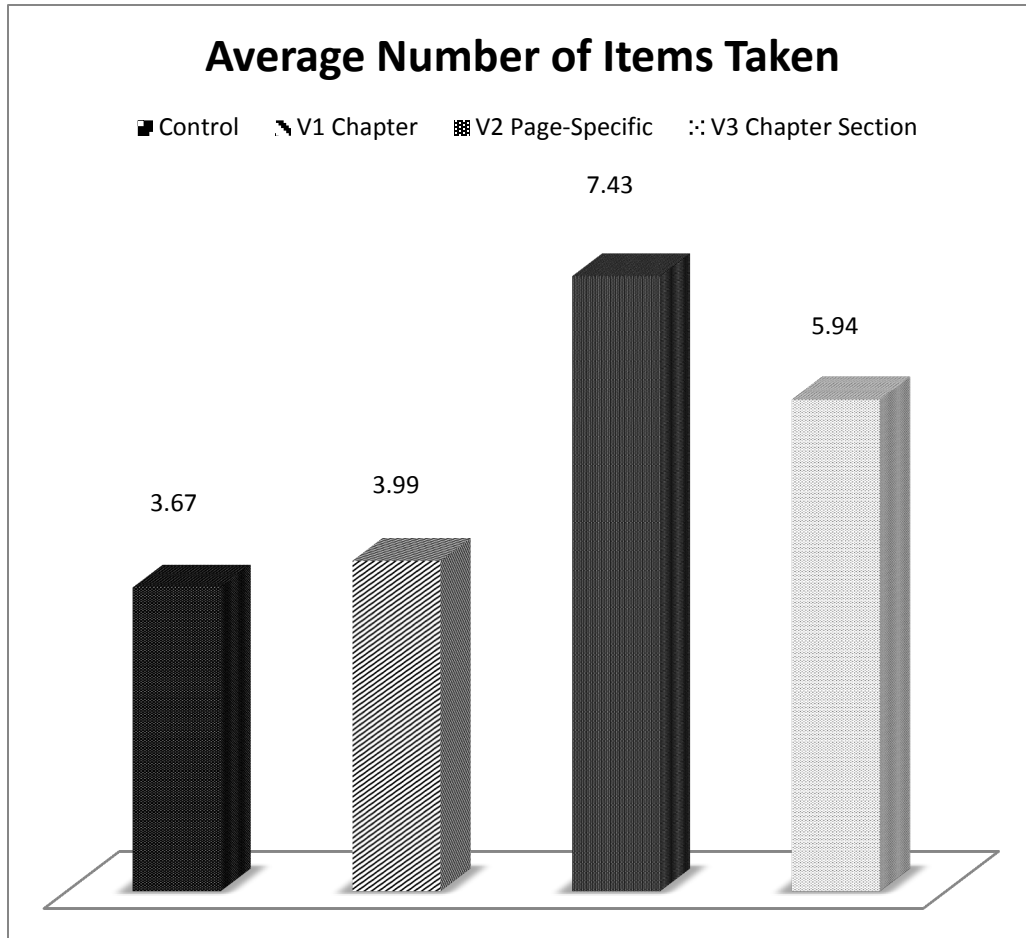
Figure 3. Average number of items taken by missionaries in different test groups. It is not surprising that the missionaries in V2 and V3 that had the easiest access to specific explanations used the hypertext strategy more than those who didn't have access or had access to massive explanations they had to search through for a specific answer.

Materials Creation Prior to the Current Study

The following section outlines the creation of the three versions of hypertext instruction materials tested in the current study. The three iterations of hypertext implementation evolved during a design-based research project conducted by Packer (2010) during which Spanish-language materials were created and piloted over a two-year span. This section is included to describe how and why each of the versions evolved and how the hypertext mechanism assists learners. It ultimately provides a basic orientation to each of the material versions used in the current study.

During the design-based research project, materials for the current study were created, dependent variables were identified, and measurements processes were developed. Results describing which version of hypertext instruction was most useful were also derived from this initial pilot. Version 3, the final version of piloted hypertext materials was deemed by the Design Team to be the most effective at assisting the learner. This finding helps frame the unexpected conclusion of the current study.

Material design process. Repeated modification and redesign of the learning materials emphasized a use-in-context focus and effectively moved the emphasis away from linear grammar instruction. The primary aim was to place learners in contact with native speech examples that were contextually situated with relevance to common learner-involved activities. For instance, context was included with regard to specific tasks, communication-involving interactions, and goals. These activities also provided context for material in the texts. Learning tasks were also incorporated which directed students to read native speech examples and subsequently produce their own unique communication. These tasks were integrated with the goal of students being able to produce their own novel speech in an accurate and timely manner.

The result of this project was the creation and evolutionary development of two textbooks. Nevertheless, as students implemented the Grammar and Phrase Books, they frequently encountered unfamiliar words and phrases. Verb conjugations, idioms, noun and verb inflections all acted as the learning anomalies described by CBE. A method for linking the learner to a principle (or explanation) needed to be employed.

Materials without hypertext. Prior to any enhancement of the materials, missionaries used the books separately. Early versions of these materials consisted of three separate notebooks – one for vocabulary, one for phrases, and one for grammar. Students studied them independently – at different times throughout the day. The Grammar Book was intended to be reviewed from cover to cover, in a linear fashion. Therefore, when missionaries encountered an unexpected form or developed a question, they were helpless unless a language instructor was available. Most missionaries chose not to use the Phrases Book as part of their language study because the information was too complex and contained unfamiliar grammar forms. As a result, the missionaries didn't understand these structures and were unable to use them in the production of their own unique speech. Version 0 combined vocabulary and phrases into one smaller book and the grammar explanations were enhanced with additional examples, activities, and visual design in a second book. See Table 3 and Figure 4**.**

Three material hypertext treatments. Three versions of hypertext instruction were added to the materials successively. Native speech examples and linked explanations to grammar structures were integrated within the texts. Grammar tags were formatted as superscripts in each case. The different versions of the grammar tags were placed within the grammar structures across native speech examples.

Table 3

Version 0 (Control No Hypertext Strategy)

	Description of Printouts			
Notebooks	Physical Form	Changes to Content	Strengths	Weaknesses
Vocabulary & Phrases	These two were kept in the same 5" X 7" spiral-bound notebook.	• Grammar forms within phrases tagged to the explanations in the now-separate grammar book	• Vocabulary and phrases located together by topic • Small compact size trainees could take with them anywhere to study	• Learner had no access to explanations other than for specific questions about grammar forms in the native speech examples
Grammar	The grammar portion was separated into a 7" X 9" spiral-bound notebook.	• Redesigned print layout for each grammar explanation • Added activities which allowed missionaries to practice grammar forms and helped them apply forms during their daily routine	• Improved print layout • Grammar form practice and application opportunities within activities	• Complex grammar explanations

The researchers concluded that hypertext helped overcome problems with prior

knowledge, irrelevancy, and low interactivity (Mao et al., 1996). First, students with differing

levels of prior knowledge could use the same study materials while only selecting links to

explanations, which suited their individual needs. Second, the explanations in the grammar book

became more relevant because with grammar tags they were now accessible in the moment

needed. Finally, the phrase book was now used interactively with the grammar book in a way

that was previously impossible.

Figure 4. Version 0 of the printout for Spanish Software includes two books. The Grammar Book included new print design and activities for practice and application.

Version 1 (Chapter grammar tags). Cased-based explanation and hypertext influenced this version by attempting to create an anomaly for the learner requiring him to formulate an inquiry question. Indexing then provided a way for the explanation to be readily accessed. This change was largely based upon the premise that explanations should include other use-case examples, the why and how (rather than just what), and practice activities and assessments (Hsieh, 2005; Mao, 1996; Schank, 1997; Tsinakos, 2004). Hypertext provided the means for accessing explanations.

The first version employed grammar tags in the form of number superscripts and were added to the native speech examples within the Vocabulary and Phrase Book. These tags referenced a chapter number within the Grammar text as shown in Table 4 and Figure 5. As missionaries studied a phrase and came across an unfamiliar grammar structure, they could now follow a tag to a general explanation housed in the Grammar Book to get an answer to their inquiry. This innovation pointed learners in the right direction. Nevertheless, missionaries were often overwhelmed by the amount of information they had to sort through in order to find the specific answer they were looking for.

Version 2 (Page-specific grammar tags). Literature describing CBE and hypertext influenced this version by inspiring the introduction of the concept of limited access to information (Rasch & Schnotz, 2009) and providing help, much like a tutor would (McBride & Seago, 1997). The Design Team accomplished this by pointing the second-generation grammar tags to new context-specific explanations in the form of footnotes on each page of the Vocabulary and Phrase Book (VP). These explanations also contained references to chapters in the Grammar Book that missionaries could follow if they desired further explanation. This change increased the missionaries' speed and accuracy in correctly understanding and creating

unique grammar forms. Three negative results of the change also came to light. First, most

students didn't use the grammar book to seek further explanation. Second, the modifications

increased the size of the VP Book by 25%, driving development and production costs

significantly higher. Third, it became apparent that the included explanations were so specific to

the particular context and case that missionaries had difficulty applying them to their own

language production see Table 5 and Figure 6.

Table 4

Version 1 (Chapter Hypertext Strategy)

		Description of Printouts		
Notebooks	Physical Form	Changes to Content	Strengths	Weaknesses
Vocabulary & Phrases	These two were kept in the same 5" X 7" spiral-bound notebook.	• Grammar forms within phrases tagged to the explanations in the now separate grammar book • Verbs tagged to a new appendix with exemplary conjugation patterns	• The missionary could lookup up explanations for unexpected grammar forms within the native speech examples • Missionaries had examples of conjugations for every verb within the book	• Learners struggled to access the right portion of the explanation they needed and got lost in the breadth of the general explanation • Needed a way to get specific help for understanding unexpected forms much like a tutor would provide
Grammar	The grammar portion was separated into a 7" X 9" spiral-bound notebook.	• Redesigned print layout for each grammar explanation • Added activities to allow missionaries to practice grammar forms and help them apply forms during their daily routine	• Improved print layout • Grammar form practice and application opportunities within activities	• Complex grammar explanations
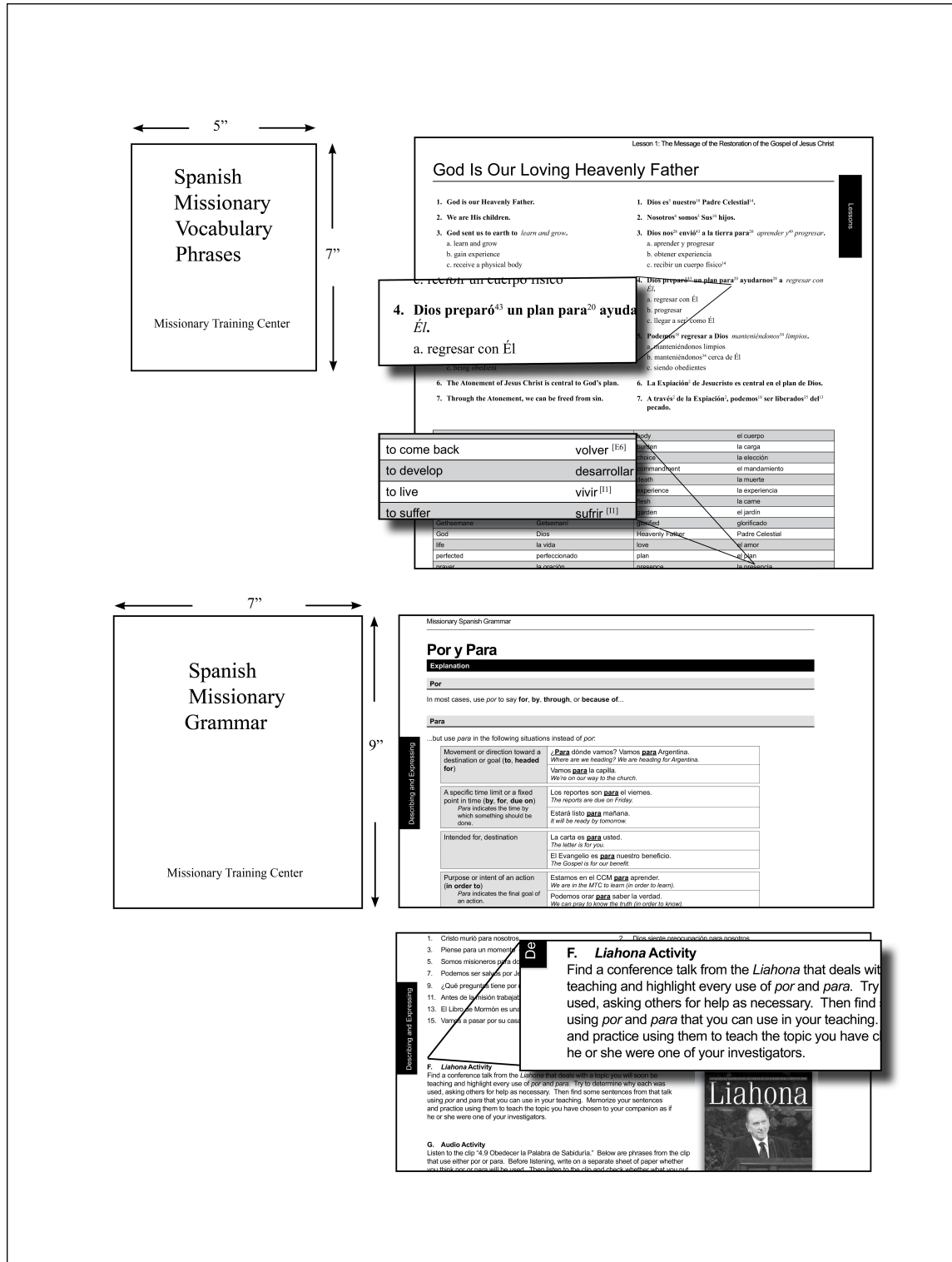
Figure 5. Version 1.0 of the printout for Spanish Software includes two books. Footnotes with number corresponding to chapters in the Grammar Book have been added to the in the Vocabulary and Phrase book. The Grammar Book included new print design and activities for practice and application.

Table 5

Version 2 (Page-Specific Hypertext Strategy)

	Description of Printouts			
Notebooks	Physical Form	Changes to Content	Strengths	Weaknesses
Vocabulary & Phrases	5" X 7" Spiral- bound notebook	• Removed footnotes to grammar note book and replaced them with footnotes to specific grammar explanations at the bottom of each page.	• The missionary could more quickly find specific explanations for unexpected grammar forms within the native speech examples without having to read through extraneous content in the explanations within the grammar text.	• Redundancy in grammar explanations • Increased book size by 25% • Grammar forms within the book were no longer connected to the grammar book where missionaries could see additional examples or use the activities to practice the forms
Grammar	7" X 9" Spiral-bound notebook	No changes	N/A	N/A

5"

Spanish Missionary Vocabulary Phrases

Missionary Training Center

7"

Lesson 1: The Message of the Restoration of the Gospel of Jesus Christ

God Is Our Loving Heavenly Father

1. God is our Heavenly Father.
2. We are His children.
3. God sent us to earth to *learn and grow.*
   a. learn and grow
   b. gain experience
   c. receive a physical body

4. **Dios preparó[11] un plan para[12] ayudarn** Él.
   a. regresar con Él
   c. being obedient

1. Dios es[1] nuestro[2] Padre Celestial[3].
2. Nosotros[4] somos[5] Sus[6] hijos.
3. Dios nos[7] envió[8] a la tierra para[9] *aprender y[10] progresar.*
   a. aprender y progresar
   b. obtener experiencia
   c. recibir un cuerpo físico[14]

Dios preparó[11] un plan para[12] ayudarnos[13] a regresar con
   regresar con Él
   progresar
   llegar a ser como Él
Podemos[14] regresar a[15]Dios manteniéndonos[16] limpios.
   manteniéndonos limpios
   manteniéndonos[17] cerca de Él
   siendo obedientes

6. The Atonement of Jesus Christ is central to God's plan.
7. Through the Atonement, we can be freed from sin.

6. La Expiación[15] de Jesucristo es central[19] en el plan de Dios.
7. A través[21] de la Expiación, podemos[22] ser liberados[23] del[24] pecado.

Atonement	la Expiación	body	el cuerpo
bone	el hueso	burden	la carga
child	el hijo	choice	la elección
clean	limpio	commandment	el mandamiento
cross	la cruz	death	la muerte
earth	la tierra	experience	la experiencia

1. *Ser* is used here because there is a relationship between us and God (5).
3. This adjective goes after the noun (*Padre*) and agrees in number; *Celestial* has the same form for masculine and feminine (14).
5. *Ser* is used here because there is a relationship between us and God (5).
7. This is a direct object pronoun; it goes before the verb because the verb is conjugated (28).
9. *Para* is used here because the meaning is **in order to** (20).
11. This is a regular preterit verb; the preterit is used because the action was completed (36).

2. This possessive agrees with *Padre Celestial* in number and gender (10).
4. Using *nosotros* here shows emphasis (4).
6. The possessive agrees with *hijos* in number; *su* has the same form for masculine and feminine (10).
8. This is a regular preterit verb; the preterit is used because the action was completed (36).
10. This conjunction means **and** (45).
12. *Para* is used here because the meaning is **in order to** (20).

10. This conjunction means **and** (45).
12. *Para* is used here because the meaning is **in order to** (20).
14. This is a verb + infinitive; the first verb (*podemos*) is conjugated and t

7"

Spanish Missionary Grammar

9"

Missionary Training Center

No Significant Changes

Figure 6. Version 2 of the Software Printouts. This version includes footnotes and explanations on the same page. No significant changes were made to the grammar book during this version.

Version 3 (Chapter section grammar tags). CBE and hypertext influenced this version by allowing access to additional examples in context (Specht, 1998). This change facilitated the offering of more than merely a set of rules (Cunningham, 2003) and allowed the student to determine how generalizable the explanation was to additional cases (Schank, 1994).

The last iteration of this materials version allowed missionaries to access increasingly specific explanations within the context of the more generalized ones. To accomplish this, explanations within the Grammar Book were divided into smaller, more specific use case explanations by adding a letter to the outside margin of the page. For example, the grammar tags in the VP Book consisted of a number/letter —— a number for the chapter and a letter for the specific portion of the chapter with the specific explanation relating to the tagged grammar structure. This allowed learners to see specific explanations of specific use cases in the context of the greater, more-generalized explanations. Therefore, students could now continue their pursuit of an answer to their inquiry if the specific reference did not satisfy it see Table 6 and Figure *7*.

Testing results for the pilot, involving Version 3, showed that students accessed the correct explanations nearly as accurately and quickly as in the earlier, page-specific version. Yet, they were able to apply grammar structures more accurately and quickly in their own unique language production. Ultimately, the third iteration of the materials was deemed highly satisfactory because there was no practical difference between how long it took the missionaries to find an explanation to their question in Version 2 and 3. Version 3 showed better results in terms of accuracy when the missionaries created their own sentences using the targeted grammar principle. In fact, it was so successful in one language application that we became interested in how portable the hypertext instruction strategy would be across diverse language structures.

Table 6

Version 3 (Chapter Section Hypertext Strategy)

	Description of Printouts			
Notebooks	Physical Form	Changes to Content	Strengths	Weaknesses
Vocabulary & Phrases	5" X 7" Spiral-bound notebook	• Added tags that referenced specific portions of the grammar explanations within the grammar notebook. • Added letters to the numbered footnotes so that learner can go straight to the explain for form • Added specific explanations to the bottom of each page for grammar principles not found in grammar note book. • Moved the grammar list to the inside of the front cover.	• The missionary could lookup up explanations for unexpected grammar forms within the native speech examples. • Missionaries had examples of conjugations for every verb within the book.	• Redundancy in grammar explanations • Increased book size by 25% • Grammar forms within the book were no longer connected to the grammar book where missionaries could practice forms and see other examples.
Grammar	7" X 9" Spiral-bound notebook	• Divided and labeled Grammar explanations into smaller more specific sections • Added the lesson number at the top of the lesson so that learners could easily access them. • Added examples at the beginning of the lessons of the principle used in other gospel contexts	• Improved print layout • Activities were added for form focused practice and application to daily regime	• Complex grammar explanations
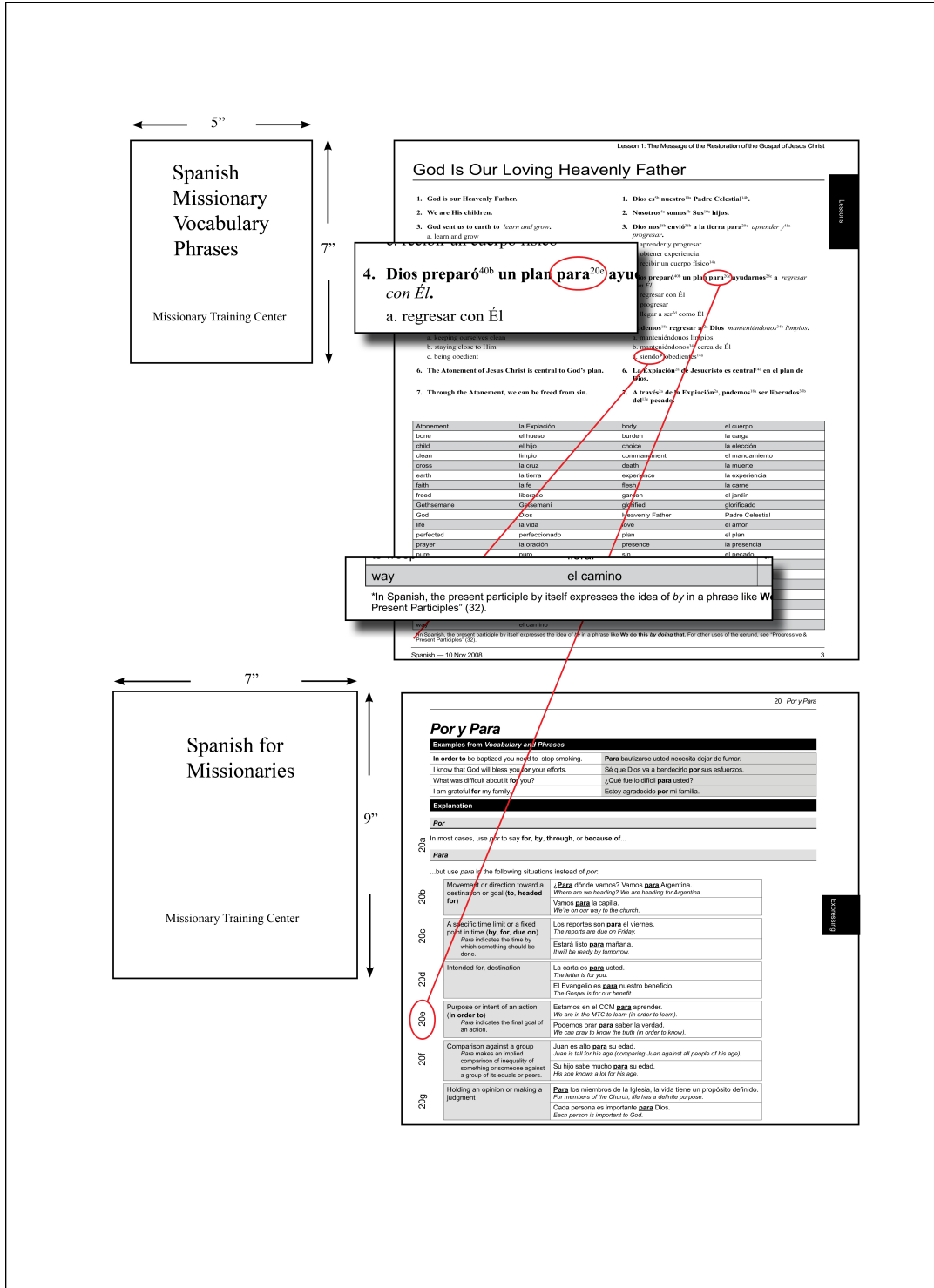
Figure 7. Version 3 of the Software printouts. Includes number letter footnotes to specific section of the overall grammar explanation in the grammar notebook as well as page specific footnotes to grammar explanations at the bottom of each page for which there are not explanations in the notebook.

Test-Validation of Hypertext Implementation. A pilot test was conducted using the Spanish-language materials. The results of the test are illustrated in Table 7. Missionaries' average ability to offer a correct explanation for a given grammar form was ninety-one percent for Version 4.0 of the materials. It required an average just exceeding two minutes to generate their explanations. The missionaries' ability to apply the grammar principle within a newly generated sentence was forty-five percent and they could create their own illustrative sentence example within one and one-half minutes. It took missionaries seventeen seconds longer to generate explanations having used Version 3.0 versus previous iterations. However, accuracy didn't significantly decrease, falling by less than one percent.

Table 7

Results of the timed 23-question grammar assessment for Spanish Pilot.

	Version		
Task	Version 1.0	Version 2.0	Version 3.0
Explain the grammar form			
% of missionaries who gave the correct explanation for the grammar form	49.10%	91.30%	90.70%
Average number of minutes taken to generate an explanation	2.87	1.46	2.13
Use the grammar form to create new sentence			
% of missionaries who were able to generate their own sentence correctly using the grammar principle	23.60%	51.30%	45.30%
Average number of minutes taken to generate a new sentence using the same grammar principle	1.69	1.61	1.35

The 17 second increase in locating explanations appeared to be tolerable considering it took forty-five seconds longer for missionaries to do the same using Version 1.0. In addition, prior versions helped a much smaller percentage of respondents to find a suitable answer in the first place. It appeared that the additional signposts helped missionaries access needed grammar explanations more quickly. In fact, results were similar to those driven by Version 2.0, which employed page-specific footnotes.

As noted, there were significant gains in decreasing the amount of time it took for missionary to generate a new example sentence in Version 3.0. This decrease in time can in part be attributed to the additional example phrases from the Vocabulary and Phrase Book having been added to the grammar explanations. The development team observed that five of the fifteen missionaries who took the assessment used sentence examples taken from the phrases added to each section of the grammar text.

We expected the strategy to be transportable because this instructional strategy was based on the CBE learning theory, which should not be limited by variance between languages. This is because CBE is focused on explaining the learning process. Additionally, the concept is supported by research in the field of hypertext tools. These assist students in accessing needed information.

Nevertheless, some impediments to application of the strategy across languages were also anticipated. First, the differences in the symbolic systems used in different languages might create a stumbling block for the learner because many languages like Mandarin Chinese utilize different systems of writing than the Romantic tongues. These significant distinctions may cause grammar tagging to become less effective. Second, grammatical structures vary across languages. For example, Spanish relies on case and verb conjugation that change word forms.

Whereas languages like Mandarin Chinese rely on both sentence structure and word combinations to convey meaning. Variances in word form are easier to effectively tag than sentence structure and word combinations. In fact, the latter may not be possible.

Research Design

This research program was designed to compare Versions 0, 1, 2, and 3 of the hypertext instruction applied to the Japanese, Mandarin, Portuguese and Spanish languages. A total of 240 participants were included in this study. There were eight groups of 15 missionaries involved. The participants were divided by language and hypertext strategy version. There were a total of 60 missionaries for each of the four languages and 60 missionaries for each of the four treatment groups included in the study.

Independent variables. This study is designed to assess the effects of simultaneously varying two independent variables with four levels of each. Hence, a 4 x 4 factorial design was used.

Version of hypertext instruction. The first independent variable refers to the type of hypertext explanation presented in the instruction given to trainees. The four types of hypertext instruction vary in terms of specificity and accessibility of the information provided. These four different types of hypertext instruction were created during a design-based research study (Packer, 2010). A brief description of the versions of hypertext is included below, for a detailed description of the versions of hypertext materials and a summary of the process used in their creation see Appendix A.

To ensure each of the participants had a common set of explanations, each of the four versions of language materials that were given to trainees included the same grammar book (See Appendix H). In versions 1, 2, and 3 of the instructional materials, the native speech examples

were identical. The same grammar structures with these speech examples were tagged in each of the versions; however, the hypertext instruction given for each of the three versions was different see Figure 8.

1. *Version 0: Control.* In this version the missionaries had access to the grammar explanations as an entire grammar book. The only connection between the grammar and vocabulary and phrase books were the example speech patterns taken from the vocabulary and phrase book at the beginning of each chapter of the grammar text.

2. *Version 1: Chapter hypertext instruction*. The numerical hypertext in this version was coordinated with the chapter number in the grammar book where the trainee could access a comprehensive explanation of the general grammar structure.

3. *Version 2: Page-specific hypertext instruction*. The page-specific hypertext pointed trainees to a very brief explanation for a specific grammar form on the bottom of the page in the vocabulary and phrase book, which included a numerical reference to the chapter in the grammar book.

4. *Version 3: Chapter section hypertext instruction*. The alphanumeric hypertext used the number to point missionaries to a chapter in the grammar book and the letter lead them to the specific section within the chapter where a specific explanation for the grammar structure could be found.

The trainees within each missionary district were randomly assigned to one of these four treatment conditions under the direction of the researcher prior to participating in the study.

   Target language. The second independent variable refers to the specific language, which the participating trainees are learning. The four levels of this variable include (a) Spanish,

Versions of Hypertext Treatment

Version	Vocabulary and Phrase Book Example (Japanese)	Explanation Discription
Control No Hypertext	4. **God prepared a plan for us to be able to** *return to Him*. a. become like Him b. progress 4. **Kamisama wa watashitachi ga** *go-jibun no mi-moto ni modoru* **koto ga dekiru yōni, aru keikaku o yōi sare mashita.** a. go-jishin ni nitamono to nareru b. seichō suru	Trainees were not pointed to specific explanations within the grammar book, but were give the grammar book to reference.
Version 1 Chapter Hypertext	4. **God prepared a plan for us to be able to** *return to Him*. a. become like Him b. progress 4. **Kamisama wa**[7] **watashitachi ga**[7] *go-jibun no*[1] *mi-moto ni*[8] *modoru*[4] **koto ga dekiru**[22] **yōni**[25]**, aru keikaku o**[1] **yōi sare**[12]**mashita**[6]**.** a. go-jishin ni[8] nitamono to[9] nareru[22] b. seichō suru[4]	The numerical hypertext in this version coordinated with the chapter number in the grammar book where the trainee could access a comprehensive explanation of the general grammar structure.
Version 2 Page-Specific Hypertext	4. **God prepared a plan for us to be able to** *return to Him*. a. become like Him b. progress 4. **Kamisama wa**[21] **watashitachi ga**[22] *go-jibun no*[23] *mi-moto ni*[24] *modoru*[25] *koto ga dekiru*[26] **yōni**[27]**, aru keikaku o**[28] **yōi sare**[29]**mashita**[30]**.** a. go-jishin ni[31] nitamono to[32] nareru[33] b. seichō suru[34]	The page-specific hypertext pointed trainees to a very brief explanation for a specific grammar form on the bottom of the page in the vocabulary and phrase book which included a numerical reference to the chapter in the grammar book.
Version 3 Chapter Section Hypertext	4. **God prepared a plan for us to be able to** *return to Him*. a. become like Him b. progress 4. **Kamisama wa**[7a] **watashitachi ga**[7b] *go-jibun no*[1b] *mi-moto ni*[8a] *modoru*[4a] **koto ga dekiru**[22a] **yōni**[25a]**, aru keikaku o**[1b] **yōi sare**[12c]**mashita**[6a]**.** a. go-jishin ni[8a] nitamono to[9a] nareru[22b] b. seichō suru[4c]	The Alphanumeric hypertext used the number to point missionaries to a chapter in the grammar book and the letter lead them to the specific section within the chapter where a specific explanation for the grammar structure could be found.

Figure 8. Description of the Versions of Hypertext Treatment

(b) Portuguese, (c) Mandarin, (d) Japanese. This second independent variable is a blocking or stratifying variable. Therefore, trainees were randomly assigned to a level of this variable Instead, their assignment to a specific language had been previously determined by the language spoken in the region of the world to which they were called to serve.

Covariates. Because the trainees' prior experience learning the targeted language can affect the results of missionaries' ability to understand and use grammar principles, this will be identified in the missionaries before they take the 23-question grammar test. Three covariates were used in this study: (a) number of years previously spent studying the mission language, (b) number of years spent studying any language, (c) trainees' prior knowledge of grammar structures within their mission language.

Dependent variables. The success of the hypertext instruction will be assessed in terms of the trainees' ability to perform two tasks.

1. Explain grammar structures observed within samples of native speech.

2. Use grammar structures to create unique speech samples.

The trainees' ability to perform each of these tasks were operationally defined in terms of accuracy and speed. Hence, four dependent variables will be assessed. (See Figure 9.)

1. The accuracy of the explanations generated by the trainees.

2. The speed with which the explanation is generated.

3. The accuracy of the examples cited by the trainees.

4. The speed with which the examples are generated.

Instruments and Administration

The following instruments were used to measure learning outcomes (or the dependent variables) and collect data: The 23-Question Grammar Assessment measured the dependent

variables, the Language Grammar Assessment measured prior language knowledge, and the

Prior Language Study Questionnaire was used to collect information on how much previous

experience respondents had learning their assigned-mission or another second language. Each is

described in further detail below.

23-Question Grammar Referencing Assessment. In order to accurately assess the

dependent variables, students were asked to complete a timed, 23-question grammar assessment.

A specimen copy of this instrument is displayed in Appendix B. On the paper-based exam, each

of the 23 questions referenced a native speech example from one of the four versions of language

materials provided. Respondents were asked to compose a correct explanation describing why

the highlighted grammar structure was being used and subsequently produced their own

unique (and correct) example of the grammar structure in use as displayed in Figure 10. Students

within a group were provided the identical grammar text with different versions of the

Vocabulary and Phrase Book. Three treatments employed some type of hypertext instruction and

the control group was not.

Each missionary was asked to use a stopwatch widget installed on the lab computer that

they was used to time themselves to the nearest hundredth of a second during the test. They used

the spacebar on their individual computer to start and stop this stopwatch. For each question, the

missionaries recorded two times, one for each task: (a) the time it takes them to write and

explanation for the tested grammar structure and (b) how long it takes them to generate their own

unique sentence using the sought-after grammar structure. For each task within a question there

was a checkbox provided so that the trainee could indicate whether or not they referenced the

grammar materials either to seek an explanation or confirm their own idea in completing that

task. This was very important to our study because if a missionary didn't reference the materials
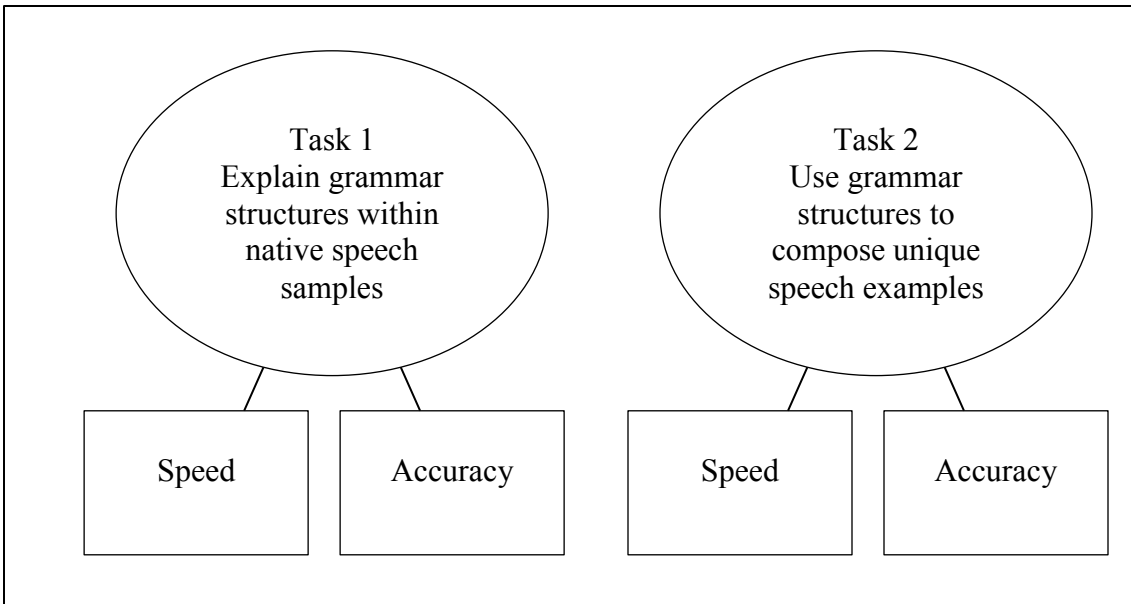
Figure 9: Dependent Variables. Speed and accuracy accomplishing the two tasks of explaining grammar examples and composing unique speech examples using the grammar structure will be measured.

using the grammar tags, we disregarded their answers in our analysis. This study measured differences in hypertext strategies that connect the learner to an answer they seeking.

The exam was paper-based to eliminate potential biases created by student inefficiency in data entry, equipment inconsistency, and different writing systems. In order to provide a control for the wide range of vocabulary proficiency represented in the subject group, students were allowed to use English words if necessary to form their own use cases. Additionally, incorrectly applied grammar forms, which were not part of the question focus, did not count against the students. Each test was evaluated by speakers fluent in the target language. These graders are also qualified language instructors who were familiar with the learning materials. If it were possible to find one person to grade all of the tests we would have pursued that course. However, because three different people were used to grade the answers to the 23-question grammar test, errors were introduced in the outcomes of the scores between languages in terms of inter-rater reliability. To help reduce this variation, a key was created by each of the graders and then each provided a rationale for their grading.

Language Grammar Assessment (LGA). In order to measure previous knowledge of grammar structures within the mission language, trainees were administered a 50-question language grammar assessment. This is a multiple-choice assessment that has been used at the MTC for 20 years to measure a trainee's comprehensive grammar understanding. The test is computer administered and was computer scored. However, a server error destroyed more than half of the respondent data. This reduced the sample size of missionaries with LGA scores to 127. Analyzing this as a covariate, it was difficult to gain any statistical insight due to the reduced sample size. Therefore, when completing the final comparisons the LGA was excluded.

Figure 10. Example 23-Question Grammar Referencing Assessment. This instrument measured the dependent variables.

Fortunately, this comprised a redundant portion of the study because information on previous language study had already been gathered.

Prior Language Study Questionnaire. This questionnaire was given to each trainee upon entry into the Missionary Training Center. (see Appendix I.) Missionaries self-reported how many years they studied a foreign and whether they studied their mission language previously. This information was used as covariates in the statistical model. The missionaries complete this questionnaire on a computer and results were automatically tabulated and recorded.

The questionnaire was completed by all 240 study participants to report any prior language study. In the questionnaire, all previous language study was self-reported by the participants. The questionnaire asked missionaries to report prior language study involving any second language including their assigned-mission language. For an example questionnaire see Appendix I. Questions included the number of years studied in grade school, high school, and college level. In high school, 192, or 80% of the respondents reported having previously studied a language for an average of 2.32 years. Of this subset, 100 (or 42%) had previously studied their assigned mission language.

Forty-four missionaries (18%) had taken a language course in college for a period averaging 1.41 years. Thirty-one (13%) had completed collegiate level courses in their assigned mission language. Missionary trainees who were called to learn Japanese or Mandarin were much more likely to have studied their mission language at the college level. Previous students of Mandarin Chinese totaled 22% and Japanese learners comprised 23%. Spanish and Portuguese learners made up only 5% and 2% of the subgroup respectively.

In addition, 13 missionaries reported fluency in a native language other than English. Only two of these were missionaries who lived outside the United States when they were called to serve as missionaries. Specifically, these were two female missionary trainees from the Philippines who had been assigned to learn Japanese.

Procedures

The Missionary Entrance Questionnaire was administered to the trainees upon arrival at the MTC. The trainees took the Language Grammar Assessment at the end of their sixth week in the MTC. The 23-Question Referencing Assessment was administered during the sixth and seventh week of a trainee's MTC attendance. This allowed the missionaries sufficient time to acquire a foundation of vocabulary so that generating their own unique speech examples was possible. In pilot tests trainees in earlier weeks spent most of their time looking up vocabulary words rather than trying to apply targeted grammar structures.

Adjustments made during the study. During the administration of the study adjustments to the scoring plan, how the 23-Question Grammar Referencing test was timed, and a few other language-specific adjustments were made. These adjustments are summarized in this section.

Modifications to the scoring plan. During the pilot we learned that when grading the exams, granting partial credit for an answer based on the explanation and sample accuracy would be important. In scoring the 23-question grammar reference test, a similar approach was utilized. The criteria for receiving credit for accuracy in understanding the targeted grammar structure was as follows. A score of '0' was assigned for incorrect responses, '.5' for partially correct answers which did not show an understanding of the specific use of the grammar pattern, and '1' for correct answers which demonstrated an understanding of the specific use of

patterns within the phrase. Accuracy in creating a specific grammar example was given grade of '0' when incorrect, '.5' when correct but derived by simple manipulation of the example phrase or from an example in the Grammar Book, and '1' when correct and created using a unique sentence including the targeted grammar principle.

Timing the 23-Question Grammar Referencing Test. MTC computers are reimaged each evening and software updates are completed. The timer widget used initially to time this the 23-Question Grammar Referencing Test would only reinstall on a few computers in each lab, so we began having learner's self-time using Apple's iPod Touch music players. This caused a small amount of confusion. For example, in one of the first test groups a Japanese-assigned missionary started the timer when he began completing his answer rather than when he began reading the question. Nevertheless, this was corrected by adding a descriptive protocol about timing when orienting the missionaries to the assessment.

Many missionaries required more than the 50 minutes allotted to complete the test. So missionaries were encouraged to concentrate on first completing the responses they knew would require referencing materials for answers. They were then asked to use the rest of the time to finish the questions they felt they already comfortably knew. Results were improved because of this emphasis. Ultimately, some missionaries didn't finish the entire test in the allotted time, leaving some questions unanswered in the process.

Language-specific observations. The Japanese Grammar Book didn't have the chapter number at the top of the page like the Portuguese, Mandarin Chinese, and Spanish books. This meant that missionaries couldn't simply flip through the top of the book to find the number of the chapter. Instead, they had to review the table of contents or search for the first page of the chapter—which proved to take more time.

The same grader reviewed the Spanish and Portuguese test results, which deviated from the original plan to have a unique grader for each of languages. However, a grader who spoke both Spanish and Portuguese at the same level of proficiency was chosen in combination with the other two.

Observations made during test administration. Pilot tests were administered on a limited basis to improve the overall process and adjustments were made. However, with the large number of study respondents, we also discovered many irregularities related to various test takers that required additional modifications to specific data collection and use. For example, three Mandarin Chinese-assigned missionaries in one district opted out of the study. One of the Mandarin-speaking sisters in the control group also informed us that she had dyslexia explaining this may be a reason for her lower score. Her test was flagged so that we could determine if it was an outlier.

Other anomalies were also identified among test-takers. Question 12 on the exam was difficult for one sister to understand. The missionary thought there was a mistake, but in reality her understanding of the question was lacking. Another of the missionaries had a cast on his writing hand, which slowed his completion of the exam. It also seemed there were always three or four missionaries who needed help understanding exactly how to use their specific version of the materials. It is also interesting to note that at the end of each testing session there were missionaries who said that they were amazed that they had been in the MTC for weeks without realizing how helpful the instructional books were. One ancillary benefit was that the assessment helped missionaries to learn how to use the materials effectively. Up to the administration of the test, they had not been told how to use the books and had never implemented them in their MTC-based studies.

Feedback from graders of the 23-Question Referencing Assessment. As noted, three graders were used to review the tests. The Portuguese and Spanish tests were both graded by the same person. Each was trained on the purpose for the materials and the grading criteria before beginning. Specific comments from graders in each language are described below.

Spanish and Portuguese grader feedback. While grading the Portuguese and Spanish assessments, this reviewer failed to find or notice any irregularities in the results. His only comment was that some missionaries had written that they couldn't find certain information in the books. Nevertheless, other missionaries apparently had no difficulty locating needed explanations as evidenced by their responses.

Also, while determining the efficacy of the grammar tags was not the focus of the study, the tests provided direction for improving both the books and tags. For example, while grading, it was determined that some of the tags could be better placed to help missionaries locate information more easily. In one instance, results showed that some of the grammar explanations could be clarified based on incorrect missionary responses.

Mandarin grader feedback. Feedback from this grader also addressed the test construct. The Mandarin grader reported that the referencing test assessment was "generally adequate" in measuring the effectiveness of the different methods of referencing used to clarify language and grammar in one missionary resource with explanations from a different language material resource. Overall, the questions were deemed by the reviewer to be straightforward and relevant. However, there were also several questions, which the missionaries consistently answered incorrectly. Concerning these, there were several types. From the researcher's observations, there was only one question (Question #1) included in the test which was answered incorrectly

because of ambiguous instructions. Clarification will be added to this question in later iterations of the assessment.

Other questions may have been answered incorrectly because missionaries answered the first part of the question while failing to read and respond to the second portion (Question #6 is a good example). Perhaps a note could be made at the beginning of the test to encourage missionaries to read all parts of the questions listed. It doesn't seem that the errors were due to poor wording or lack of clarity in the question itself. It seems that one other question was answered incorrectly on a consistent basis due to an unclear explanation in the reference materials (Question #17).

This combined with a number of responses that were technically correct, but very awkwardly worded, led the researcher to believe that additional clarifications can and should be made to the reference materials (specifically the Grammar text provided to missionaries). Findings will also be applied to classroom instruction in order to facilitate the production of increasingly authentic missionary language. However, that effort remains beyond the scope of this research effort.

Japanese grader feedback. Feedback from this grader was also based largely upon the questionnaire itself. This included a description of three grammatical errors in the English questions, which many of the missionaries noticed. Yet these didn't appear to affect the overall understanding of the question or the grammar structure targeted. Sometimes missionaries simply copied the vocabulary or phrase contained in the question when constructing their own sentences. Switching out or adding a couple of elements was done to make the response appear unique. These sentence formulations were given partial credit.

Analysis

To answer the hypotheses implied in the research questions, we tested a series of three *a priori* orthogonal contrasts. The use of these planned comparisons instead of an omnibus *F*-test provided greater statistical power and also helped to control the family-wise error rate. Since the sum of the contrast coefficients in each row of Table 8 equals zero, and since the sum of the cross products of the coefficients also equals zero, each pair of *a priori* comparisons is orthogonal. We used .05 as the tolerance for error in testing each null hypothesis.

Previous knowledge of the mission language, years of language learning experience, and years of experience with the mission languages were included in the model as covariates to estimate to what extent each of these variables influence the results.

Table 8

Study A Priori Orthogonal Contrast Comparisons

	Control	Version 1 Chapter	Version 2 Page-Specific	Version 3 Chapter Section	Sum
Comparison 1					
Ψ_1	0	0	-1	1	0
Ψ_2	0	-1	0.5	0.5	0
Crossproduct	0	0	-0.5	0.5	0
Comparison 2					
Ψ_2	0	-1	0.5	0.5	0
Ψ_3	-1	0.3333	0.3333	0.3333	0
Crossproduct	0	0.3333	0.1667	0.1667	0
Comparison 3					
Ψ_1	0	0	-1	1	0
Ψ_3	-1	0.3333	0.3333	0.0001	0
Crossproduct	0	0	-0.3333	0.3333	0

Chapter 4: Results

Our desire in this study was to determine which of the three hypertext strategies best helped missionaries most accurately and quickly understand a grammatical structure they didn't understand before and then apply it in their own sentence. Our underlying assumption was that any version of hypertext instruction would be better than none. However, we needed to determine if there was variation in how effective these hypertext strategies were in application across languages with varied grammatical structure. We were also worried that prior language knowledge and study might influence the missionary's ability to understand and use targeted grammar structures. In turn, this would drive differences in test results rather than the version of hypertext instruction used.

We further hypothesized, because of the results in the Spanish pilot, that Versions 2 and 3 would provide similar results in the time it took to locate an explanation for a targeted grammar structure. We surmised that Version 3 would be superior in helping missionaries more accurately explain and use targeted grammar structures. It was supposed that Versions 2 and 3 would be significantly better than Version 1 because they contained more specific (similar to those a language tutor would provide) explanations than Version 3.

The analysis of the results from this inquiry is organized below in three sections. First, a priori orthogonal contrasts where different material versions were compared against one another are described. Second, impact of the independent variables on performance is organized according to the various dependent variables. Finally, influences the covariates made to research outcomes are described.

Differences Among Independent Variables

The orthogonal contrasts employed were chosen because they allowed us to plan the specific comparisons we wanted to complete. Because of this foresight, the contrasts provided stronger statistical inferences. These contrasts were designed to compare the data means of each version of hypertext instruction against the other versions independently or in combination. For each of these contrasts, our Team was interested in identifying differences between versions as to their benefit in improving missionary performance in the four dependent variables, (a) accuracy in explanation, (b) time required for explanation, (c) accuracy in creating a sentence, and (d) time required to create a sentence.

For Contrast 1, we were interested in knowing which of the specific versions of hypertext instruction was the best (anticipated to be Version 2 or 3) at improving performance in the four categories. Contrast 2 was designed to compare the performance outcomes derived from the more general explanations found in Version 1 with the more specific explanations found in Versions 2 and 3. Contrast 3 explored the variance in performance outcomes driven by any version of hypertext instruction when compared to a control group who had the materials but no hypertext mechanism to help them access it.

Three a-priori orthogonal contrasts of the data were run using the GLM procedure in SAS for the comparisons. Contrast 1 compared the means of Version 2 and Version 3 which both referenced more-specific explanations. Contrast 2 compared the combined means of Version 2 and Version 3 with the mean of Version 1; this compared specific explanations in Version 1 and 2 with the more general explanation in Version 1. Contrast 3 compared the combined means of Version 1, 2, and 3 with the mean of the control group. Only the first and third comparisons returned statistically significant results (See Table 9).

Table 9

Grammar Referencing Test Results

Task	Measure	V1 Chapter		V2 Page-specific		V3 Chapter Section		Control	
		M	SD	M	SD	M	SD	M	SD
		Combined (*n* = 197)							
Explain the Grammatical Form	Average Score	*.61	0.29	*.71	0.25	*.62	0.29	*.53	0.30
	Average time in seconds	*113.82	54.13	**76.12	43.23	**116.79	54.05	*146.28	83.51
Use Grammatical Form	Average Score	.65	0.27	.7	0.26	.63	0.32	.59	0.35
	Average time in seconds	51.33	26.14	48.65	28.6	61.45	51.25	67.73	60.12
		Japanese (*n* = 55)							
Explain the Grammatical Form	Average Score	.5	.3	.78	0.23	.60	0.36	.45	0.38
	Average time in seconds	*155.31	84.08	**87.38	0.26	**131.62	58.8	*188.49	105.5
Use Grammatical Form	Average Score	.55	.24	.73	54.66	.66	0.32	.67	0.38
	Average time in seconds	72.74	15.49	55.84	0.32	81.64	80.31	112.75	94.96
		Mandarin (*n* = 53)							
Explain the Grammatical Form	Average Score	.77	0.18	.89	0.11	.69	0.15	.66	0.23
	Average time in seconds	101.87	32.3	67.01	28.15	115.43	49.65	137.25	83.7
Use Grammatical Form	Average Score	.79	0.19	.87	0.18	.74	0.22	.66	0.28
	Average time in seconds	51.18	30.23	48.64	20.31	52.77	22.39	50.39	20.84
		Portuguese (*n* = 44)							
Explain the Grammatical Form	Average Score	.53	0.32	.51	0.26	.44	0.35	.51	0.27
	Average time in seconds	*106.79	39.78	*87.25	61.9	*124.69	73.52	*158.31	80.76
Use Grammatical Form	Average Score	.49	0.35	.56	0.21	.35	0.32	.43	0.43
	Average time in seconds	*44.78	20.08	*43.85	25.3	*74.42	56.55	*50.55	36.91
		Spanish (*n* = 56)							
Explain the Grammatical Form	Average Score	.6	0.29	**.61	0.24	**.69	0.22	.49	0.31
	Average time in seconds	*98.58	26.72	**67.36	19.58	**99.31	32.08	*123.85	54.35
Use Grammatical Form	Average Score	.7	0.24	0.58	.19	0.73	0.29	.54	0.32
	Average time in seconds	38.84	23.33	46.22	27.33	41.99	18.4	56.85	35.98

Note. * represents a statistically significant difference contrast 3 , and ** represents a statistically significant difference contrast 1 and 3.

Contrast 1. This contrast compared the two versions of hypertext instruction, which directed missionaries to specific explanations. Version 2 (Page-Specific) was compared against Version 3 (Chapter Section). The rationale for comparing these two versions was that while Version 2 and 3 are similar in explanation specificity, Version 3 leads the missionary directly to a specific portion of the chapter within the Grammar Book allowing learners to see a specific explanation within context of a broader one. Also, Version 2 includes references to the Grammar Book at the bottom of the Vocabulary and Phrase Book pages. However, it was observed in the Spanish pilot that in many cases a learner was satisfied with shorter explanations and didn't require the more-detailed explanation. Version 2 is also 25% larger in page number than Version 3 and would therefore be more expensive to develop and print.

For the combined language sample, Version 2 helped missionaries most quickly provide an explanation for the targeted grammar principle with a statistical significance of $p = .0006$. This difference between the two versions averaged 40.67 seconds per explanation. This is a practical difference in learning efficiency. If missionaries reference 10 explanations they save themselves more than four minutes and become more efficient in their learning as measured during a 15 minute session of their language study using Version 2 of the hypertext instruction. Contrast 1 highlighted statistical difference between the explanation times required across the data set means of all the languages and specifically Spanish and Japanese, whereas Portuguese and Mandarin did not when the contrasts were run alone. This may be due to the smaller sample size of Portuguese and the tight grouping of scores in Mandarin. If we had conducted another comparison between Version 1 and Version 2 we would likely have had results similar to Contrast 1.

Contrast 1 also showed a statistical difference among Spanish participants. Version 2 helped missionaries to achieve mean scores of M = .78 verses M = .60 for Version 3-using missionaries. However, there was no statistically significant difference when all the languages were combined or among any other individual language.

      Contrast 2. This contrast compared hypertext instruction in Version 1 against the average effect of Version 2 and Version 3. There were no statistical differences among any of the dependent variables for this contrast. Version 1 materials were designed to send students to a general explanation of the grammar pattern. Yet missionaries often forget the underlying questions as they encounter large amounts of information in the explanations. Therefore Versions 2 and 3 restrict explanations to specific application for unique use cases within the native speech example. It was assumed, based on data from the pilot study, that Versions 2 and 3 would provide very similar outcomes among all of the dependent variables and would both generate significantly different results than Version 1. Nevertheless, Version 1 and 3 unexpectedly provided the closest mean scores rather than Versions 2 and 3.

      Contrast 3. This Contrast provided evidence that any of the treatment types were more beneficial at helping learners more quickly locate answers to their explanation question than the control version (no hypertext strategy). It demonstrated a statistical difference in means for all of the languages combined in explanation accuracy with p =.0285 and the time it took them to find and write out the explanation $p = <.0001$ for the targeted grammar principle. When run separately, each constituent of the combined set provided the same results with the exception of Mandarin, which was not statistically different in this area. Portuguese, when compared independently, generated a statistical

difference in how long it took missionaries to use the grammar structure to create their own sentence. Explanation accuracy of grammar structures was increased when any version of the hypertext instruction was used. This was true across all of the tested languages. Yet none of the languages created a similar variance when contrasts were run for each individual language. Some of these findings are most likely explained by the quadrupling in sample size when the individual language results are all combined. Also of interest, Portuguese showed a statistically significant variance in time required to create a sample sentence. For these participants, Version 3 caused respondents to use even more time than members in the control group. There is no obvious explanation for this observation and it warrants further investigation. The specifics of these results are shown in Table 10 and will be further detailed in the discussion on dependent variables.

Differential Performance on the Various Dependent Variables

This section describes the results of the study organized by each of the four dependent variables. It is helpful because it details the results from all of the versions of hypertext rather than only those included in a specific version-to-version comparison.

Results relevant to each of the two tasks and four dependent variables are reported below. The only statistically significant anomaly was found in the explanation task. This included both how accurately the missionaries were able to answer the questions as well as how quickly they located and were able to explain the targeted grammar structures. As noted previously, all versions of the hypertext instruction were better at helping missionaries more quickly find an answer to their explanation question than using none of the materials. Version 2 (Page-Specific) proved itself the best of the hypertext instruction strategies at helping missionaries find answers most quickly. It is also

Table 10

Contrast Results of the Language Grammar Test by Language

Dependent Variable	Contrast 1 Page-Specific vs. Chapter Section			Contrast 2 Chapter vs. Page-Specific/Chapter Section			Contrast 3 Control vs. All Treatments		
	Mean Square	F Value	Stat Sig	Mean Square	F Value	Stat Sig	Mean Square	F Value	Stat Sig
All Four Languages Combined (n = 197)									
Explanation Score	0.96	1.34	.2486	0.914	1.27	0.2612	0.3507	4.87	*.0285
Explanation Time	42618.44	12.34	*.0006	9680.467	2.8	0.0957	73246.702	21.21	*<.0001
Sentence Score	0.071	0.88	.3488	0.006	0.08	0.7842	0.156	1.94	.1651
Sentence Time	4984.086	2.87	.0919	246.911	0.14	0.7065	5233.832	3.01	.0842
Japanese (*n* = 53)									
Explanation Score	0.061	0.84	.364	0.034	0.47	0.4963	0.15	2.07	.1568
Explanation Time	6706.959	6.08	*.0172	2883.805	2.61	0.1124	7382.502	6.69	*.0127
Sentence Score	0.08	1.08	.3038	0.023	0.31	0.5797	0.154	2.09	.1546
Sentence Time	78.044	0.11	.7448	322.508	0.44	0.5088	1383.046	1.9	.1744
Mandarin (*n* = 59)									
Explanation Score	0.001	0.02	.9026	0	0.01	0.9414	0	0	.9621
Explanation Time	11411.584	2.72	.1083	24.518	0.01	0.9395	13590.339	3.24	.0807
Sentence Score	0.219	2.14	.153	0.005	0.04	0.8344	0.014	0.14	.7147
Sentence Time	2899.641	1.92	1748	3.88	0	0.9599			
Portuguese (*n* = 53)									
Explanation Score	0.138	1.29	.2626	0.178	1.66	0.2036	0.274	2.56	.1163
Explanation Time	15716.387	2.48	.1221	10648.004	1.68	0.2013	34990.377	5.53	*.0232
Sentence Score	0.007	0.06	.8019	0.112	1.05	0.312	0.02	0.19	.6656
Sentence Time	9041.288	2.19	.1465	314.41	0.08	0.7841	27485.847	6.65	*.0134
Spanish (*n* = 56)									
Explanation Score	0.248	7.41	*.0091	0.01	0.3	0.5878	0.211	3.63	.063
Explanation Time	17243.504	5.51	*.0233	161.42	0.05	0.8214	18236.254	5.83	*.0198
Sentence Score	0.113	2.08	.1563	0.001	0.02	0.8888	0.172	3.17	.0816
Sentence Time	318.838	0.55	.4628	119.719	0.21	0.6521	0.623	0	0.974

Note. * represents a statistically significant difference .05.

interesting to note that the means of each treatment group were not statistically different from one another in relation to the task of creating a sample sentence using the targeted grammar structure.

Explain grammar structures with native speech examples. The first of the two tasks in the study was to have missionaries use materials to explain grammar structures within native speech examples. Version 2 was the most helpful in accomplishing this task among the test subjects. The results are summarized below in greater detail. Yet the data followed the same general pattern found in the explanation task, which produced statistically different means.

Number of correct explanations. The number of correct explanations comprised the first dependent variable. The accuracy of explanations generated by the trainees was measured, graded, and statistically analyzed. In Contrast 3, the combined treatment groups proved more useful than the control group in helping missionaries locate a correct answer to an explanation question $p = .0285$. The increase in accuracy amounted to a .08 to .18 increase in the average item score (out of a total of 1.0). Table 12 describes this finding. Contrast 1 showed that Version 2 (M =.71, SD = .24) was better at helping missionaries find the correct answer than Version 3 (M = .62, SD = .36) when all languages were combined at $p = .0285$. These results are also practically significant; they represent an increase in accuracy of at least 8% and up to 18% per question in learning. Over time and with missionaries referencing a dozen explanations a day, this represents a significant improvement in learning outcomes. Separate analyses were also run for each language. Spanish was the only language which highlighted a statistical difference favoring Version 3 as the most helpful to a missionary in creating a correct explanation. This difference was $p = .0091$, measured between Version 2 (Page-Specific) (M =.61, SD =.24) and Version 3 (Chapter Section) (M =.69, SD = 22). This amounted to a .08-

point gain in the average item accuracy. Results from the Spanish Version confirm findings

from the pilot study (Packer, 2010), but none of the other languages followed this pattern. The

other languages provided average scores, which were higher for Version 2 than for Version 3.

(See Figure 11)

Amount of time to explain a grammar structure. The speed with which the

explanations were generated was evaluated across the data set. In Contrast 3, the three treatment

groups combined were better than the control group in helping missionaries more quickly find

an answer to an explanation question. It took a missionary from M = 29.52 to M = 70.16s less to

find and write an explanation for a grammar structure than a learner in the control group, who

had the access to the explanation but not the hypertext innovation (Table 11).

Contrast 1, which compared the two hypertext innovations designed to direct learners to

specific explanations, demonstrated that Version 2 (Page-Specific) was superior to Version 3

(Chapter Section). Version 2 drove improvement in the time required by missionaries to explain

a given grammar structures averaging 40.64 seconds ($p =<.0001$) better than Version 3. When

the Contrasts were run separately for each language, Portuguese showed a statistical difference

in Contrast 1 but not in Contrast 3. This may be due to the reduced sample size or the many

Portuguese-assigned missionaries who didn't use the materials during the test. Generally, the

results follow the same patterns as the other languages as illustrated in Figure 11.

Japanese students required the most time of any of the four test groups to find

explanations to questions. However, this finding may be a result of either omitting the chapter

number from the top of each page in the Grammar text or simply the difficulty of the Japanese

grammar structure (Figure 12).

Table 11

Mean Score on the Explanation Production Task by Experimental Condition and Language

| | Experimental Condition | | | | | | | |
| | V1 Chapter | | V2 Page-specific | | V3 Chapter Section | | Control | |
Language	M	SD	M	SD	M	SD	M	SD
Japanese	.50	.30	.78	.26	.60	.36	.45	.38
Mandarin	.77	0.18	0.89	0.11	0.69	0.15	0.66	0.23
Portuguese	.53	.32	.51	0.26	.44	.35	.51	.27
Spanish	.60	.29	**.61	.24	**.69	.22	.49	.31
Combined	*.65	.32	**.71	.26	**.62	.36	*.53	.37

Note. * represents a statistically significant difference contrast 3, and ** represents a statistically significant difference in contrast 1 and 3.
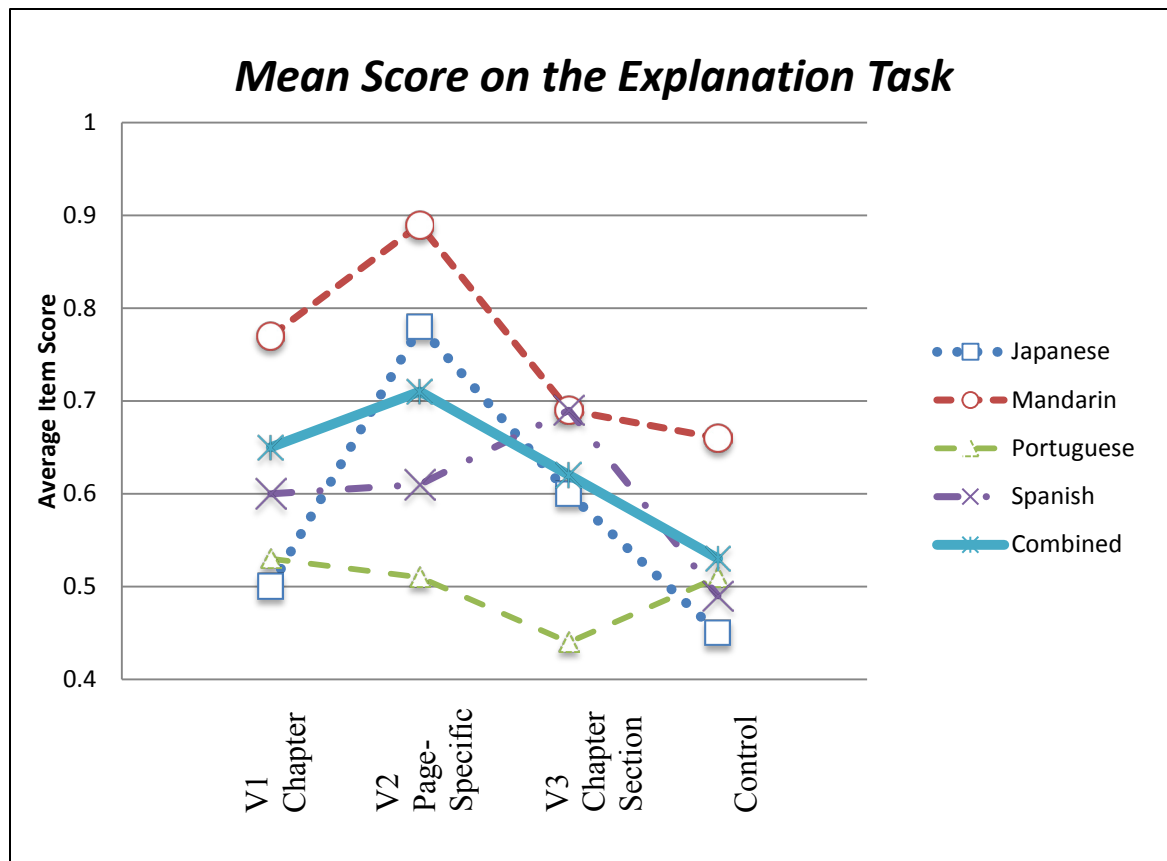
Figure 11. Mean Score on the Explanation Production Task by Experimental Condition and Language. Version 2 seems to be the version of the materials which helped missionary most accurately explain the grammar. The Spanish results show a higher mean score for V3 than for V2. Mandarin shows a higher average score than the other languages in for all groups. The Japanese shows the most drastic difference between V2 and the other groups.

Table 12

Mean Time in Seconds on the Explanation Task by Experimental Condition and Language

| | Experimental Condition | | | | | | | |
| | V1 Chapter | | V2 Page-specific | | V3 Chapter Section | | Control | |
Language	M	SD	M	SD	M	SD	M	SD
Japanese	*155.31	84.08	**87.38	54.66	**131.62	58.80	*188.49	105.50
Mandarin	*101.87	32.30	**67.01	28.15	**115.43	49.65	*137.25	83.70
Portuguese	106.79	39.78	**87.25	61.90	**124.69	73.52	158.31	80.76
Spanish	*95.58	26.72	**67.36	19.58	**99.31	32.08	*123.85	54.35
Combined	*113.82	54.13	**76.12	43.23	**116.79	54.05	*146.28	83.51

Note. * represents a statistically significant difference contrast 3, and ** represents a statistically significant difference in contrast 1 and 3.
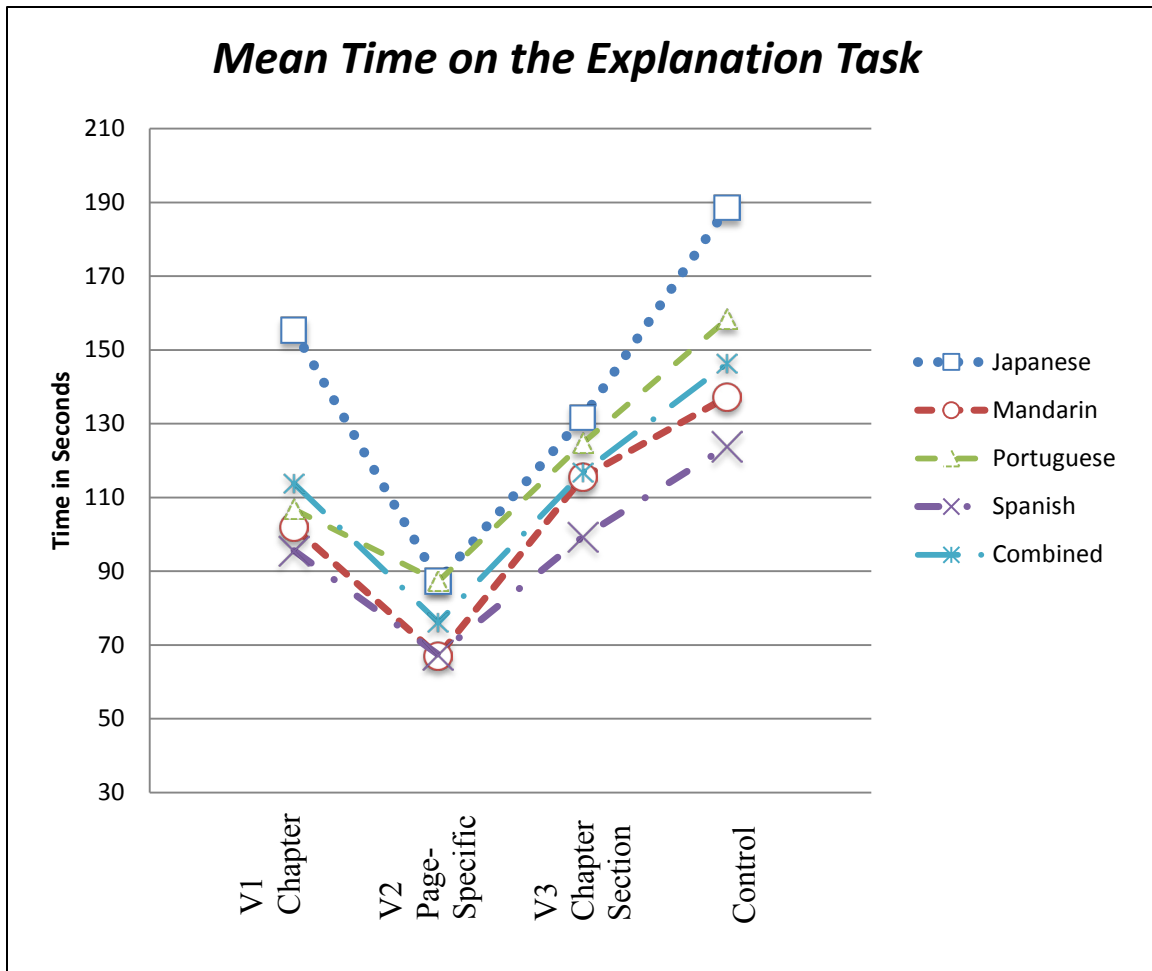
Figure 12. Time in Seconds Required to Explain the Targeted Grammar Structure. There is statistical significance between the control and all treatment groups and between V2 and V3. All of the languages follow the same patterns. It is not surprising that Japanese takes longer to understand and explain than the other languages because it is the most difficult of the study languages for an English speaker to learn. Mandarin fits this pattern in the opposite manner. It takes consistently less time to understand and explain because it is the easiest language (grammatically) for an English-speaker to learn.

Use grammar structures to compose unique speech examples. The second task missionaries were assessed on was their ability to compose their own unique speech example using the targeted grammar principle. Again, for this task it became apparent that Version 2 was superior at helping missionaries.

Number of correct sentences. The accuracy of the example sentences created by the trainees was evaluated. There were no statistical differences, for either test groups or languages, in the mean accuracy using the targeted grammar structure in a sentence (Table 13). Even without statistical differences in the analysis, there were two findings of interest. All of the other languages followed the same pattern in accuracy found in the explanation task, highlighting Version 2 as the iteration of hypertext which produces the highest accuracy scores. However, the accuracy score for Spanish differed from the other languages when considered independently, and correlated with observations from the pilot. (Figure 13). Spanish language averages showed that there were higher levels of accuracy for missionaries who used Version 3 of the materials rather than Version 2. Also of interest, Mandarin-speaking missionaries scored higher on this part of the test than learners speaking any other language.

Amount of time to create a sentence using grammar structure. The speed with which, the examples were generated by respondents was tracked and evaluated. When results from each of languages were compared, there were no meaningful statistical differences between the mean times required to use the targeted grammar structure in a sentence see Table 14. However, there was a slight difference in sample construction time found for the Portuguese language. A statistical difference ($p = .020$) arose in Contrast 3 when run solely with the Portuguese language data set. This was the only language where the time required to create a sample was significantly lower than with V3.

Table 13

Mean Score on the Sentence Production Task by Experimental Condition and Language

| | Experimental Condition | | | | | | | |
| | V1 Chapter | | V2 Page-specific | | V3 Chapter Section | | Control | |
Language	M	SD	M	SD	M	SD	M	SD
Japanese	.55	.24	.73	.32	.66	.32	.67	.38
Mandarin	.79	.19	.87	.18	.74	.22	.66	.28
Portuguese	.49	.35	.56	.21	.35	.32	.43	.43
Spanish	.70	.24	.58	.19	.73	.29	.54	.32
Combined	.65	.27	.70	.26	.63	.32	.59	.35

Table 14

Mean Time in Seconds on the Sentence Production Task by Experimental Condition and Language

| | Experimental Condition | | | | | | | |
| | V1 Chapter | | V2 Page-specific | | V3 Chapter Section | | Control | |
Language	M	SD	M	SD	M	SD	M	SD
Japanese	72.74	15.49	57.05	43.99	81.64	80.31	112.75	94.96
Mandarin	51.18	30.23	48.64	20.31	52.77	22.39	50.39	20.84
Portuguese	44.78	20.08	43.85	25.30	74.42	56.55	50.55	36.91
Spanish	38.84	23.33	46.22	27.33	41.99	18.40	56.85	35.98
Combined	51.33	26.14	48.65	28.50	61.45	51.25	67.73	60.12
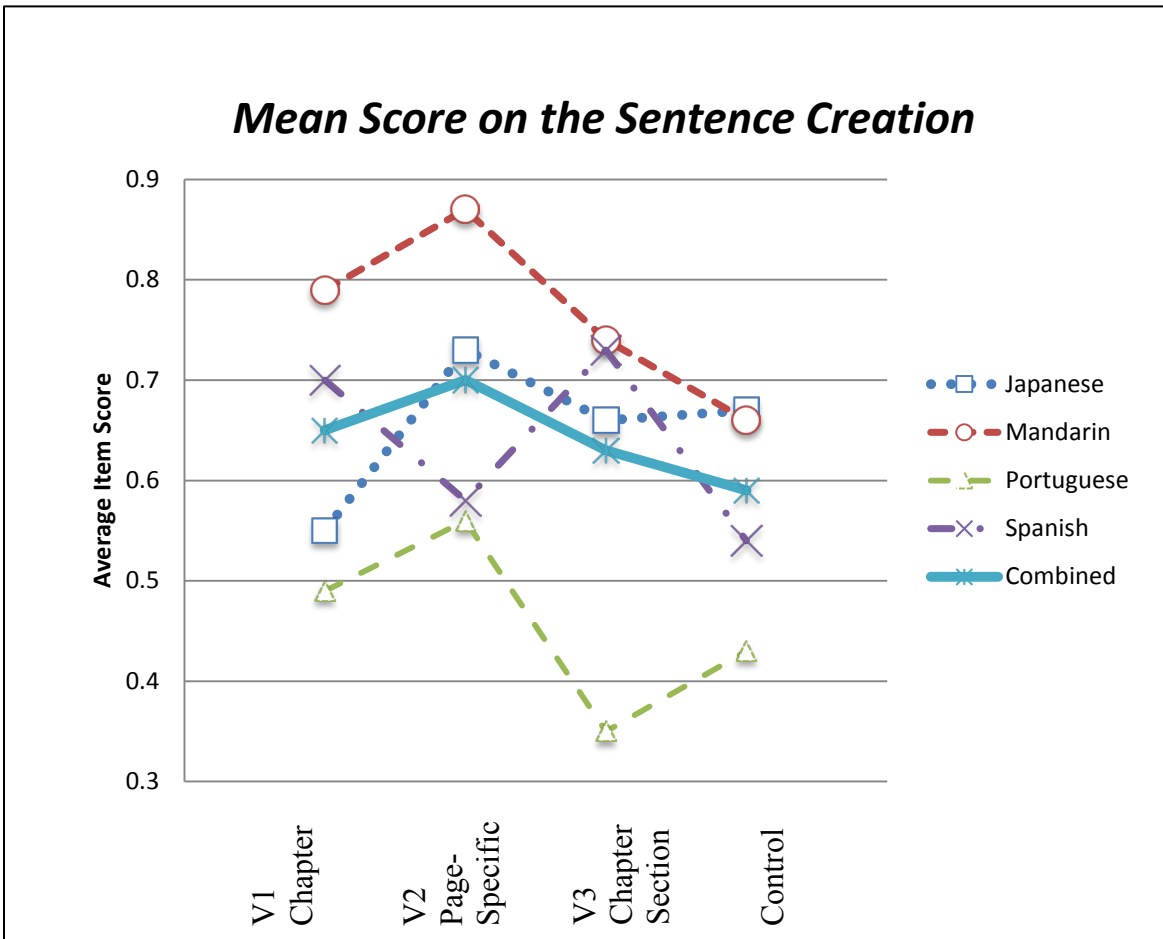
Figure 13. Accuracy in Using the Targeted Grammar Structure. There is no statistical significance in the differences between the groups but the all of the languages follow the same pattern. Mandarin scored the highest, which should be expected because it has the easiest grammar structures for English natives to learn among the language.

We had expected Portuguese results to mirror the Spanish results because the languages are so similar. It was an anomaly perhaps explained by the relatively small sample sizes in Portuguese. The relative poor performance of Portuguese participants compared to other languages and the uncommon number of respondents who didn't use the materials during the test may suggest a cultural issue within the Portuguese missionary training community.

Another interesting data point in the analysis was that Japanese-assigned missionaries once again took the longest time to formulate examples of the targeted language structures in a sentence. This time, the missing chapter number on the top of the page was not responsible for slowing the missionaries down, suggesting that Japanese is the most difficult of the languages for English-speaking missionaries to explain and use.

Spanish learners who used V3 generated their example phrases most quickly. Missionaries using V2 took longer than those employing the other two versions. This was not the case with the other languages. This was not a statistically significant observation, and doesn't reflect the results of the Spanish pilot (Figure 14.) It seems that this may also be an anomaly within the data.

Role of Covariates in Study

The three covariates used in this study were (a) number of years previously spent studying the assigned-mission language, (b) number of years spent studying any language, and (c) trainees' prior knowledge of grammar structures within their mission language as measured by the LGA.

Prior knowledge as measured by the Prior Language Study Questionnaire. The only statistically-significant difference among the covariates in a data set from this Questionnaire was captured in the Japanese language version (see Appendix J2). Japanese missionaries who had
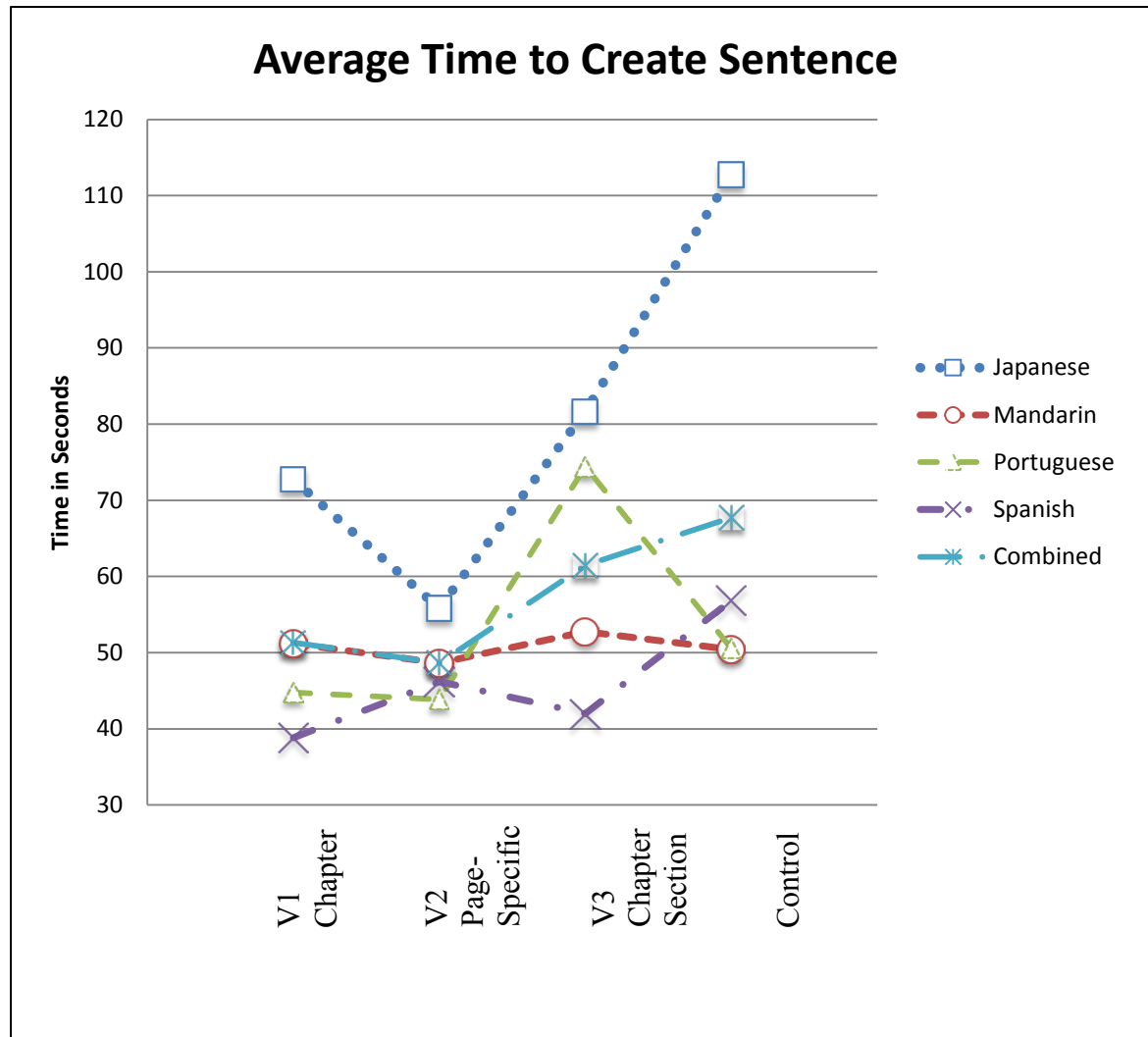
Figure 14. Time in Seconds to Create a Sentence Using Targeted Grammar Structure. No statistical significance in the difference between the groups but they all follow similar patterns. Japanese took the longest among the groups which would have been expected because Japanese is the most grammatically complex of the languages tested

studied a language in high school also had enhanced ability to correctly explain a targeted

grammar principle $p = .0281$. An even stronger significance was demonstrated if the student had

studied Japanese with a $p = .010$, and correctly used the grammar principle in a sample sentence $p

= .025$. This relationship held only among those who had studied Japanese in high school. For

those who had taken any other language in high school, the result was not statistically significant

but remained notable at $p = .073$. Study participants who were learning Japanese on average had

taken more years of high school language than any other language group. This substantial prior

experience with language study may have been important to all of the missionaries, but possibly

mattered most to those assigned Japanese because it is the most grammatically complex of the

tested languages.

Prior knowledge as measured by the Language Grammar Assessment. Prior

knowledge as measured by the LGA didn't create a statistical difference, but this is possibly due

to the reduced sample size after some results were lost due to a server crash. Much of the effect

of a missionaries' prior knowledge was cut out of the study because those who already knew the

answer to a test question didn't need to reference the materials. Non-use of the materials, in turn

self-selected, these respondents for exclusion from the analysis. The only data included in the

analysis were those instances when the missionary referenced the materials because they needed

help beyond their own prior knowledge to find an explanation for a grammatical structure.

Chapter 5: Discussion

This section includes separate discussions of each of the three research questions, implications for each relevant body of research, and suggested future research topics.

Reflections on Findings

The first two research questions necessitate evaluation of the four languages combined and how the treatment groups compare based on the four, study dependent variables. The third question compares the different study outcomes across the tested languages.

Differences in ability to correctly explain and use a targeted grammar principle. Version 2 (Page-Specific) of the hypertext strategy best helps missionaries correctly explain the targeted grammar structures. The differences between treatment groups were both statistically significant and practically important. This finding was surprising. It was anticipated that Version 3 and Version 2 would create very close outcomes because they both provide specific explanations. However, the results from Version 1 (Chapter) and Version 3 (Chapter Section) generated the most closely-aligned outcomes in relation to this question. Version 2 was significantly better at facilitating a learner's ability to find and explain a grammar anomaly in their own words. Moreover, any version of the hypertext intervention was better than the control group at facilitating more rapidly-produced and correct explanations. It is important to note the frequency at which missionaries chose to use the different material versions. This is relevant because it may indicate that the more accessible and convenient a hypertext intervention is, the more likely it will be used by learners. Missionary trainees who used Versions 2 and 3 were nearly twice as likely to access the materials during the test than those using Version 1 or the control group. This supports findings from the pilot study and literature that suggests that students do not like to wade through lengthy explanations to find an answer.

As noted above, all versions of the hypertext instruction were better at helping the learner find more correct answers than the control group. Even the missionaries from the control group whose data was included in the study had accessed the explanations within the Grammar text. Control group members used the index or table of contents to find their explanations. Now that the difference in response results amongst groups has been highlighted, a determination must be made as to whether the variance is meaningful. In the affirmative, there was a significant increase in the missionary's accuracy level. This ranged from 4% at the low-end to 18% at the extreme across test group comparisons. The increase was recognized in the scores of missionaries who used Version 2 (Page-Specific) of the materials. From an application standpoint, the finding suggests learners should use this version to assist in preparation for daily missionary activities.

Japanese returned the greatest score increases between versions. Missionaries who used Version 2 had scores ranging 18% to 33% higher on average than those who used other versions of the Japanese hypertext instruction. This may point to Version 2 as being more helpful to languages with more difficult grammar structures for English speakers to learn.

Differences in average time to explain and use targeted grammar principles. The results demonstrated that any version of the hypertext instruction is better than none. And Version 2 was the most helpful of any of the treatment groups. As with the accuracy assessments, Version 2 (Page-Specific) helped the missionaries most quickly generate an explanation for the targeted grammar principle. This appears logical because the missionaries were provided the easiest access to explanations in V2.

One thing that was surprising in these results was the distance between the two versions of the hypertext that pointed missionaries to specific explanations. Version 2 was significantly

better than Version 3 in helping missionaries quickly locate explanations. In the pilot we saw evidence that missionary trainees were satisfied with the brief answer at the bottom of the book page in Version 2 and often elected not to proceed to the Grammar Book containing the more general explanation. This allowed them to modify their understanding of a grammar pattern with the new exemplar, but failed to put it into a more general grammar pattern or allow the missionary to see how far they could generalize (Abbot-Smith & Tomasello, 2006). For this reason, we felt the need for a different, improved hypertext mechanism. This was implemented into Version 3 by breaking the chapters into smaller sections and directing missionaries there. This allowed better access to more concise and specific explanations within the context of the more generalized ones. In addition, it seemed at the time this served to keep the material production and printing costs at reasonable levels.

The results of the pilot, which was concerned with only Spanish, showed that there was a little increase in the time required by missionaries to provide an explanation while using Version 3. Nevertheless, this increase was minimal. Moreover, an increase in the measured response accuracy and a decreased time required for missionaries to create their own sentences using the targeted grammar structure was also observed in the pilot study.

The difference between Version 2 and Version 3 found in the current study is practically different and indicates that Version 2 is superior for helping explain specific uses of grammar in the Vocabulary and Phrase Book. On average, there was a 40.67s difference in the time required to explain the targeted structure. To put this in context, a 40.67s decrease in time required to find an explanation becomes important when one realizes that a learner may look up dozens of these examples each day during language study time.

The results of the analysis for differences in the average time it took a missionary to use targeted grammar principles were not statistically significant. The differences in means tend to support the general pattern for the explanation task data that indicates Version 2 is the best hypertext strategy. Version 2 appears to be the most helpful overall, facilitating the most quick and accurate use of the targeted grammar structure.

Analysis of each of the language groups failed to identify any statistical difference in terms of the sample means, but similar data patterns emerged among all the languages except Spanish. Version 2 clearly helped the most in expediting the learners' use the targeted grammar structures. This difference in speed amounted to between 2.68 seconds and 19.08 seconds, and represented a gain over the treatment and control groups. This seemingly minor improvement may lead to a significant gain in learning efficiency when compounded over an entire course of study.

Differences in results among Spanish, Portuguese, Mandarin, and Japanese. The strategy appears to be portable across language with different grammatical structures. Individual language comparisons show a consistent pattern of means across the treatment and control groups. Notable differences in means were mostly anticipated due to the degree of difficulty an English-speaker faces in learning certain languages. This is promising, because it points to the utility of using the hypertext innovation in materials for each of the languages currently taught at the MTC.

The language with the greatest mean score for accuracy in explaining and using a targeted grammar principle was Mandarin. Mandarin students were also those who most quickly accomplished both of these tasks. This is most likely attributable to the relative simplicity of the Chinese grammatical structure for English speakers to learn. It is highly syntactic and relies more

on word order than on morphological changes, which prove more difficult to navigate for learners whose first language is English (Clark, 1998). If the test had measured oral or writing systems, we would expect the Mandarin scores to have been much lower than the other tested languages because Mandarin has much different phonetic and lexical systems from those used in English.

Japanese groups took the longest of any of the language groups to find and articulate a targeted grammar principle. Again, this is most likely explained by the increased difficulty in the grammar structure of the language. Moreover, a few seconds of the increased time could be explained by the need to review the table of contents rather than just thumbing through the top of the book. This was due to the lack of chapter numbers in the Japanese materials (which other languages materials had). However, it seems unlikely that this would account for all of the 25s increase observed in the experiment.

There was an observed increase in the amount of time it took to generate a sample phrase in Japanese versus the other test languages. However there was no significant decrease in accuracy in the sample creation. This is likely explained because of all of the languages tested, Japanese relies most heavily on both morphology and syntax.

The overall conclusion of the study is that the hypertext strategies work in similar ways across all languages, with Version 2 being the most helpful. The hypertext intervention seems to help in each type of the tested language structures (synthetic or analytic) at least as well as it did in the Spanish pilot study.

Implications

There are implications from this study that may apply to each of the bodies of literature surveyed. There are also practical implications for the development and use of hypertext

instruction within future versions of the MTC language training materials. These implications are discussed below.

Language learning. This study was concerned with exploring hypertext mechanisms that were designed to assist missionaries who were learning grammar in a non-linear learning environment. The materials include native speech examples (exemplars) and grammar explanations that would help them organize and learn grammar structures. Results indicate that the hypertext strategy from any of the versions works across all of the tested languages.

The study also indicated that significant language study experience gained at the high school level by Japanese students made a notable difference in helping missionary trainees understand new language patterns in Japanese. This could be explained by the existence of previously-created scripts in the mind of these learners. Rather than creating new schemas, missionaries could be simply modifying their pre-built frameworks of understanding when exposed to a new exemplar. This, too, is supported by the literature and affirms the notion that repetition is needed to solidify the grammatical structures (Chandler, 1993; Ellis, 2002).

Case-based explanation. Study findings validate the hypertext strategy implemented. This, in turn, is grounded in the theory of CBE. The basic premise is that as the learner encounters an unexpected grammar pattern they is able to use the hypertext innovation as a guide to the sought-after explanation. The level of detail included in each explanation mattered in this study. For this research, a more specific explanation improved results. The more general answers still improved the student likelihood of finding an explanation, but didn't work as well or as quickly. It could also be argued that those who had sufficient scripts in their mind (those who had more experience with language learning) were faster at coming up with an explanation because they could modify a script rather than create it from scratch.

Evidence of the notion that more case exposure leads to increased script building and modification was obtained. The Research Team plans to make revisions to the current explanation and tagging mechanisms based on the results of these assessments. Having used the materials with this many students, we also identified patterns in the exemplars that will increase clarity for the learner. These provide good example of Schank's model of understanding and script improvement based on new experience and exemplars.

Hypertext. Because Version 2 (Page-specific) use resulted in the most-improved ability to accurately describe a grammar form, it may offer support for those authors who stated that perhaps *less is better* within a hypertext learning environment. This because using hypertext to provide explanations much like a tutor would is the most helpful (Rasch & Schnotz, 2009). Also, the hypertext may have helped students notice grammar patterns and prompted them to search for an answer (McBride & Seago, 1999; Mills, 2000; Schmidt, 1990).

We expected that Version 3 (Chapter Section) would generate better results than it did because the literature describes the need for hypertext strategies to connect learners with more than just the "what." The "how" and the "why" also seemed important as the team designed the materials. It was thought that sending missionaries to specific explanations in the Grammar Book would offer them many additional examples of the grammar principle used in phrases as well as access to the more general principle. It was also believed that this would help them to create boundaries for the generalization of a grammar principle. However, although some of this may have taken place with the learners using Version 3, the experiment didn't directly address this. Rather, it showed that for helping a missionary find a specific answer to an explanation question involving a grammar structure, a very brief, easily accessed explanation was the most helpful.

Portability of language learning strategies. Literature describing the portability of language learning strategy from one language to grammatically different languages is not existent. Perhaps this is because language learning strategies are inherently portable, as found in this study. Whatever the application of the results entails, this study provides a foundational piece of evidence on which to build. It must also be pointed out that the relative results patterns observed between languages suggest that there is varying difficulty for an English speaker to learn grammatical structures which are either more different or similar to grammatical structures within their native language (Grainger, 2005).

Recommendations for Use

Version 2 (Page-specific) will be applied as the instructional hypertext template for additional language material development aimed at helping missionaries understand and use specific grammar structures within native speech examples. The in-depth grammar explanations embodied in Version 3 may not be necessary in this type of effort. If a further more in-depth explanation is needed, then a reference within the specific explanation may be implemented to facilitate a missionary finding a needed explanation within commercial text. Missionaries who used Version 2 found answers more quickly and demonstrated greater accuracy than those who used any other version of the materials. The difference was not just a few seconds as was observed in the pilot. Rather, the improvement was more than 40 seconds per question looked up by missionaries. In addition, respondents were at least 8% more likely to create an accurate explanation in their own words and to use the targeted grammar structure correctly in their own sentence.

For a majority of the languages taught at the MTC, there are only a handful of missionaries who learn those languages in a given year. Creating a Grammar text to go along

with the Vocabulary and Phrase Book requires more than 8 times the expense of alternatively adding the specific grammar explanations to the page bottoms in the VP book. The corresponding 25% increase in the size of the book does not significantly increase printing expenses when compared to the cost of producing and printing a stand-alone Grammar Book for these languages. Simply enhancing the current VP books with hypertext strategy and accompanying specific grammar explanations at the bottom of the pages in the VP book would result in a total savings of more than $800,000 over creating Version 3 of the materials.

Limitations

We cannot yet conclude that the missionaries' overall language learning capability has been improved as a result of the hypertext innovation. This study only measured the missionaries' exposure to a specific example of a grammar structure within a native speech example, the time taken to find an explanation for that specific case, and the time required to create a unique speech example using the targeted grammar structure. We know that the missionaries were more likely to use Version 2 and 3 of the materials in the testing environment. However, we don't know if they will choose to utilize them as they were intended in preparation for their daily activities.

Version 2 of the materials was better than the others for helping missionaries obtain and answer to the questions more quickly. We do not know to what extent study participants who used Version 2 of the materials used the explanations on the bottom of the page or the more extensive explanations in the Grammar Book. Missionaries only marked that they had used the materials and didn't differentiate between the two sources.

In relation to Schank's (1994) explanation process as outlined in Table 2, we have sought to analyze factors relevant to steps 1-5 with this research. However, we can't apply findings to

step 6 or any subsequent levels with the limitations of the current study. These steps are described: (a) Step 6 – Take explanation and establish whether it can be generalized beyond the current case by reminding. (b) Step 7 – If a reminding is found, find the breadth of the generalization to be formed, (c) Step 8 – Reorganize memory using the new generalized rule (Schank, 1994). We are also unsure if the missionary trainees have truly understood the specific-use case and put reasonable bounds on how broadly they can apply the specific case without overgeneralizing the principle (Abbot-Smith & Tomasello, 2006).

Recommendations for Future Research

The results of this test show that hypertext-based instruction is promising in helping language learners more quickly and accurately find explanations for grammatical structures found in native speech examples. However, the overall utility of these materials in increasing missionary language proficiency remains to be examined. Ultimately, the question of whether missionaries speak a language and understand the relevant grammar principles better as a result of the materials is unanswered. Does help provided with regard to organizing the grammar patterns in the materials facilitate the student's organization of other exemplars they encounter? Additional research needs to be conducted to measure missionary language proficiency for the intended use period of the materials, which is 0-6 months.

We need to determine if missionaries in the actual field of labor are choosing to use the native speech examples and hypertext instruction as part of their actual daily language study. Simple field observation of missionary's language study would help determine this.

There could also be work done to see if the success in Version 2 is due to the short explanation at the bottom of the page or if access to the more general explanation is important. If

the short explanation provides the missionary what they needs then the additional cost associated with the production of the large grammar text isn't necessary.

Although the hypertext strategy analyzed in this study was shown to be helpful for our language learners, it would be interesting to find out at what level of proficiency our hypertext strategy is most helpful. There exists a body of literature about the effective use of language learning strategies within different levels of language proficiency. This would help determine the best timing for the missionary to use this strategy. In the pilots of the 23-question grammar assessment, we observed that missionaries who didn't have a basic language foundation (vocabulary, etc.) struggled to understand and create their own sample sentences. This points to a need for at least a foundation of language knowledge to make the strategy helpful.

Another relevant step will involve moving the future efforts and learning materials into the digital realm. There it will be easier for missionaries to receive customized explanations without incurring prohibitive print cost increases. The reasoning behind using print initially was because missionaries lacked access to the computer program in the field. Nevertheless, we wanted them to be able to access the content in their field of labor. With the dramatic decline in costs for electronic devices and their increased availability, this will become more realistic (Friedman, 2007).

Lastly, since we began this study, we have completed these materials for native Portuguese speakers who are learning Spanish and for Spanish speakers who are learning Portuguese. It would be interesting to examine if the hypertext learning strategy returns similar results to those found in this study among missionary trainees who have a different native languages than English.

Conclusion

Version 2 of the hypertext instruction materials was the most helpful for learners in any of the languages tested. It was the solution that gave the learner the quickest access to tailored explanation about grammar structures they didn't understand. Version 2 also seems to help the language learner use the targeted grammar structures in creating their own sentence. Explanations about grammar structures linked to specific examples of that grammatical structure are best when they mirror what a tutor might say to a learner with a question rather than an extensive, general grammar explanation. Learners choose to use versions of the hypertext strategy that helped them find a specific answer to their inquiries. The outcomes seen in this area were consistent across all languages included in the study even though they greatly differed from one another among languages with differing grammatical structure.

References

Abbot-Smith, K., & Tomasello, M. (2006). Exemplar-learning and schematization in a usage-
  based account of syntactic acquisition. *The Linguistic Review*, *23*, 275-290. doi: DIO
  10.1515/TLR.2006.011

Anderson, J. R.& Lebiere, C. (1998). *The atomic components of thought*. Mahwah, New Jersey:
  Lawrence Erlbaum Associates.

Anderson, J. R. (2009). *Cognitive psychology and its implications*. Worth Publishers.

Baker, D., & Baker, S. (2011). In Gale Group (Ed.), *Second language acquisition*. Retrieved
  from http://www.education.com/referece/article/second-language-acquisition/

Borer, H., & Wexler, K. (1987). The maturation of syntax. *Parameter setting*, *4*, 123.

Brandl, K. (2008). Communicative teaching in action. (1st ed. ed.). New Jersey: Pearson
  Education Inc.

Brown, H. D. (2007). *Principles of language learning and teaching*. (5, illustrated ed.). Addison
  Wesley.

Brown, J. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1),
  32-42.

Bush, M. (2012, October 19). Interview by K. Packer [Personal Interview]. How the mind deals
  with language.

Bush, M., Melby, A., & Lewis, A. (2010). *Repetition in language learning: Avoiding collateral
  damage.* Unpublished manuscript, Brigham Young University, Provo, Utah.

Clark, R. E. (1998). Cognitive efficiency research on media: A rejoinder to Cobb. Unpublished
  manuscript.

Chandler, S. (1993). Are rules and modules really necessary for explaining language?. *Journal of Psycholinguistic Research*, *22*(6), 593-606.

Chomsky, N. (1975). *Reflections on language* (1st ed.). New York: Pantheon Books.

Cunningham, P. (2003). *The evaluation of the usefulness of case-based explanation*. Berlin, Heidelberg: Springer-Verlag.

DeKeyser, R. (2007). *Practice in a second language: Perspectives from applied linguistics and cognitive psychology*. Cambridge University Press.

Doughty, C. J., & Long, M. H. (2003). *The handbook of second language acquisition: Blackwell handbooks in linguistics*. (illustrated, reprint ed.). John Wiley & Sons.

Ellis, N. (2002). Frequency effects in language processing. *Studies in second language acquisition*, *24*(2), 143-188.

Ellis, N. C. (2008). Constructions, chunking, and connectionism: the emergence of second language structure In *The handbook of second language acquisition* (pp. 63-103). Retrieved from http://dx.doi.org/10.1002/9780470756492470756492.

Ensslin, A. (2006). Literary hypertext in the foreign language classroom: a case study report. *Language Learning Journal*, *33*(1), 13-21.

Firth, A., & Wagner, J. (2007). Second/foreign language learning as a social accomplishment: Elaborations on a reconceptualized SLA. The Modern Language Journal, 91(s1), 800-819.

Friedman, T. L. (2007). *The world is flat, a brief history of the twenty-first century*. (3 ed.). New York: Picador.

Gass, S. M., & Selinker, L. (2001). *Second langauge acquisition: an introductory course* (2nd ed.). Mahwah, NJ: Erlbaum.

Graham, C. R.; Parry. K. (2007, January 7). *The TALL Language System: An Integrated,*

   Research-Based Approach to ESL Instruction [White Paper]. Retrieved August 29, 2011,

   from www.getslearning.com/files/GETS_TALL_WhitePaper.pdf/

Grainger, P. (2005). Second language learning strategies and Japanese: Does orthography make a

   difference? *Science Direct, 33*(2). Retrieved from http://www.sciencedirect.com/science/

   article/pii/S0346251X05000205

Hsiao, T., & Oxford, R. (2002). Comparing Theories of Language Learning Strategies: A

   Confirmatory Factor Analysis. *Modern Language, 2*, 368-383.

Hsieh, W. (2005). The effects and processes of using different story-indexing strategies within a

   case library on college students' ability to solve ill-structured problems (Doctoral

   dissertation, Pennsylvania State University, 2005). *Dissertation Abstracts*, 284.

Krashen, S. (1981). Second language acquisition and second language learning. Oxford, UK:

   Pergamon Press.

Krashen, S., & Pon, P. (1975). An error analysis of an advanced esl learner: the importance of a

   monitor.*Working Papers of Bilingualism*, *7*, 125-129.

Lave, J. Wanger. (1991). *Situated learning, legitimate peripheral participation*. New York:

   Cambridge University Press.

Lee, J. F., & VanPatten, B. (1995). *Making Communicative Language Teaching Happen. Volume*

   1: Directions for Language Learning and Teaching. McGraw-Hill, Inc., 860 Taylor

   Station Rd., Blacklick, OH 43004-0545; toll-free: 800-722-4726.

Long, M. (1990). The least a second language acquisition theory needs to explain. *TESOL*

   Quarterly, 24(4), 649-666.

Mao, J. (1996). Enhancing explanations in knowledgebased systems with hypertext. *Journal of*

  Organizational Computing and Electronic Commmerce, 6(3), 239-268. McBride, N., &

  Seago, K. (1999). Grammar and hypertext: building blocks of adult second language

  grammar mediation through a hypertext package (the a to z of grammar) in relation to

  current theories of adult second language acquisition/learning and the structural features

  of hypertext systems. *ournal of Information Technology for Teacher Education*,*8*(2), 181-

  198.

McBride, N., & Seago, K. (1997). Bridging the gap: grammar as hypertext.*ReCALL*, *9*(02), 17-

  25.

Mills, D. (2000). Web-based technology as resources from form-focused langauge learning.

  Tesol Quarterly, 34(3), 605-615.

Naiman, N., Frohlich, M., Stern, H.H., &Todesco, A. (1978). The good language learner:

  Research in Education, 7 (pp. 285-288).Toronto, Ontario, Canada: Institute for Studies in

  Education.

Oxford, R. L. (1990). Language Learning Strategies: What Every Teacher Should Know.

  Boston: Heinle and Heinle.

Packer, K. B. (2010). *Connecting case-based explanation theory to second language acquisition:*

  Helping learners find explanations to unexpected grammar forms . Unpublished

  manuscript, Brigham Young University, Provo, Utah.

Pinker, S. (1998). Rules of language. *Mind readings: Introductory selections on cognitive*

  science, 77-92.

Rasch, & Schnotz. (2009). Interactive and non-interactive pictures and multimedia learning environment: effects on learning outcomes and learning effiency. *Learning and Instruction, 19*(5), 411-422.

Robinson, P. (1995). Review article: Attention, memory, and the "noticing" hypothesis. *Language Learning, 45*, 283-331.

Rollinghoff, A. (1998). Implementing word learning strategies into an interactive learning environment. *Calico Journal, 11*(2), 21-44.

Rouet, J. (2009). Managing cognitive load during document-based learning. *Learning and Instruction, 19*, 445-450.

Rumelhart, D. E., & McClelland, J. L. (1986). Parallel distributed processing: explorations in the microstructure of cognition. Volume 1. Foundations.

Scardamalia, M. (1994). Computer support for knowldege-building communities. *The Journal of the Learning Sciences, 3*(3), 265-283.

Schank, R. C. (1977). *Scripts, plans, goals, and understanding*. Hillsdale, NJ: Erlbaum.

Schank, R. C. (1994). *Inside case-based explanation*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Schank, R. C. (1995). *Tell me a story*. Evanston, IL: Northwestern University Press.

Schank, R. C. (1998). *Inside Multi-Media Case Based Instruction.* Lawrence Erlbaum Associates, Mahwah, New Jersey.

Schank, R. C. (1999). *Dynamic memory revisited*. New York: Cambridge University Press.

Schank, R. C. (1999). Learning by doing. *Instructional-Design Theories and Models, 2*, 161-181.

Schank, R. C., Selfridge, M. (1977). *How to learn/what to learn.* New Haven, Conneticut: Department of Computer Science, Yale University.

Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics,*
     11, 129-158.

Schmidt, R. (1995). Consciousness and foreign language learning: a tutorial on the role of
     attention and awareness in learning. *Attention and Awareness in Foreign Language*
     Learning, 9, 1-63.

Specht, M. (Speaker). (1998, June 20-25). *Empirical evaluation of adaptive annotation in*
     hypermedia [Television broadcast]. Freiburg, Germany: ED-Media/ED-TELECOM98
     World Conference on Educational Telecommunications.

Spiro, R. J. (1990). Cognitive flexibility and hypertext: Theory and technology for the nonlinear
     and multidimentional traversal of complex subject matter. In D. Nix (Ed.), *Cognition,*
     education, and multimedia: Exploring ideas in high technology (pp. 164-205). Hillsdale,
     NJ: Erlbaum.

Svenconis, D. J., & Kerst, S. (1995). Investigating the teaching of second-language vocabulary
     through semantic mapping in a hypertext environment.*Calico Journal*, *12*, 33-33.

Tsinakos, A. (2004). Empowering the employment of case-based reasoning in VLE: The case
     where SYIM meets Moodle. *Turkish Online Journal of Distance Education, 5*(4).
     Retrieved from http://www.google.com/url?sa=t&source=web&cd=1&sqi=
     2&ved=0CBYQFjAA&url=http%3A%2F%2Ftojde.anadolu.edu.tr%2Ftojde16%2Fpdf%
     2Fvolume5Number4.pdf&rct=j&q=issn%201302-6488&ei=wfVTTu
     39DO6osALEqIyvBw&usg=AFQjCNHil0dJdzFIftQo5fLPUjRo1-PcXw&
     sig2=ckBnoMw8QGwnGzQTwiypHA

Tsui, A. B., & Nicholson, S. (1999). A hypermedia database and english as a second language

teacher knowledge enrichment. *Journal of Information Techology for Teacher

Education*, *8*(2), 215-237.

Yanchar, S. C. (2011). Participational Agency. *Review of General Psychology, 15*(3), 277-287.

Appendix A: Literature Search and Collection Methodologies

Three primary strategies were utilized to gather the relevant support for this research project.

Database search. The literature was surveyed for CBE, hypertext, and grammar instruction theory within the context of SLA. Databases searched included: *CALICO Journal*, ERIC, Google, JSTOR, LLBA (CSA), and Informaworld. Of these, the most useful was the Google Search Engine. The Informaworld Database also contained three highly-relevant articles which combine *grammar learning* with *hypertext*. The search terms included: *hypertext*, *hyperlink*, *hypercard*, *index*, *appendices*, *case-based explanation*, *case-based reasoning*, *grammar*, *second language acquisition*, *language learning*, and *forms*. Employing any of these terms individually returned thousands of articles. However, searching with a combination of two of these terms typically returned 20 to 50 articles per request. In turn, a few of these would prove to be relevant to this project. Three search term combinations were also used. Yet, these failed to consistently return usable articles. See Figure 2 for summary of the three focal areas of the search.

Field experts. Since it was difficult to locate relevant articles, two experts in the field of SLA were consulted to help identify and locate key information that had not been uncovered through the database queries.

Bibliographies in key articles. A number of the resource pieces referenced additional articles. Where appropriate, these were included in this review. One example is a McBride and Seago (1999) paper referencing two additional articles that proved helpful in the analysis of hypertext usage in language instruction.
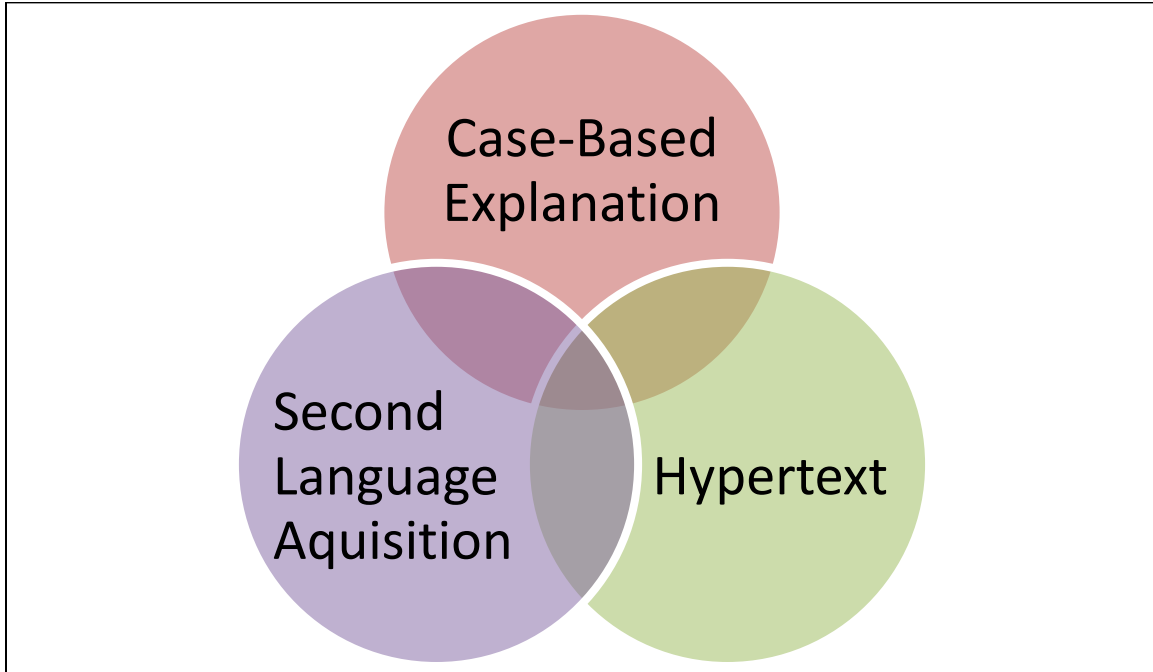
Figure 2. The Venn diagram highlights the literature areas searched and the regions of coincidence.

Criteria for inclusion. The broad pool of articles included in the reference list has been limited to those located through the use of the described methodologies. Each is relevant to the project and related discussion and focuses on tools and methodologies that provide an explanatory, well indexed, and metacognitive context. While some of the literature described two of the topics, none of the research selections incorporated all three of the concepts. In other words, there was little apparent overlap of these targeted topics within the body of literature. Therefore, landmark articles from each of the three main areas of research were also incorporated in this analysis**.**

Search Results

Specifically, 32 research papers are included in this review. Of these, five are focused solely on hypertext, 10 primarily on SLA theory, and three are centered on CBE. The majority of the writings combine more than one of the four literary themes within their scope. These details are summarized in Table 1, where articles are sorted first by topic, and then by year published.

Table A1

Summary of articles included in this review and the topics addressed

Article	Title	Hypertext	SLA	CBE
Anderson, 2009	Cognitive psychology and its implications.		X	X
Anderson & Lebiere, 1998	The atomic components of thought		X	
Brown et al., 1989	Situated cognition and the culture of learning		X	X
Brunstein & Krems, 2004	"Help to enhance for learning with Web based learning systems: the role of instructions"	X		
Bush et al., 2008	Repetition in language learning		X	
Chandler, 1993	Are rules and modules really necessary for explaining language?		X	
Cunningham2003	"An evaluation of the usefulness of case-based explanation"			X
DeKeyser, 2007	Introduction: Situating the concept of practice.	X	X	
Duff, 2000	Repetition in foreign language classroom interaction		X	
Ellis, 2008	Constructions, chunking, and connectionism: The emergence of second language structure		X	
Ellis, 2002	Frequency effects in language processing: A review with implications for theories of implicit and explicit language acquisition.		X	
Ensslin, 2006	"Literary hypertext in a foreign language classroom: a case study report"	X	X	
Firth & Wagner, 2007	On discourse, communication, and (some) fundamental concepts in SLA research			
Hsieh, 2005	"The effects and process of using different story-indexing strategies within a case library on college students' ability to solve ill-structures problems"			X
Jewitt, 2008	Multimodality and literacy in school classrooms	X		
Krashen, 1981.	*Second language acquisition and second language learning*		X	
Kolodner, 1993	"Case-based learning aids"	X		X
Long, 1990	"The least a second language theory needs to explain"		X	
Leu & Kinzer, 2000	"The convergence of literacy instruction with networked technologies for information and communication"			
Mao et al., 1996	Enhancing explanations and knowledge based systems with hypertext	X		X
Mills, 2000	"Web-based technology as a resource for form- focused language learning"	X	X	

(Table Continues)

Summary of articles included in this review and the topics addressed (Continued)

Article	Title	Hypertext	SLA	CBE
McBride &Seago, 1999	"Grammar and hypertext: building blocks of adult second language grammar mediation through a hypertext package (A to Z Grammar) in relation to current theories of adult second language acquisition/learning and the structural features of hypertext systems.	X	X	
McBride & Seago, 1997	"Bridging the gap: grammar as hypertext"	X	X	
Moss &Azevedo, 2009	"Learning with computer-based learning environments: a literature review of computer self-efficacy"	X		
Rasch & Schnotz, 2009	"Interactive and non-interactive pictures and multimedia learning environments: effects on learning outcomes and learning efficiency"	X		
Rouet, 2009	Managing cognitive load during document based learning	X		X
Rollinghoff, 1992	Implementing word learning strategies into An Interactive learning environment	X	X	
Scardamalia & Bereiter 1994	Computer support for knowledge-Building Communities	X		X
Schank et al., 1994	Inside case-based explanation	X		X
Schank, 1998	Inside multi-media case based		X	X
Schank & Selfridge, 1977	How to learn/what to learn		X	X
Schmidt, 1990	"The role of consciousness in second language learning"		X	
Specht, 1998	"Empirical evaluation of adaptive annotation in hypermedia"	X		
Svenconis & Kerst, 1995	Investigating the "Teaching of Second-Language Vocabulary through Semantic Mapping in a Hypertext Environment"	X	X	
Tourigny & Capus, 1998	"Learning summarization by using similarities"			X
Tsui & Nicholson 1999	A hypermedia database and English as a second language teacher knowledge enrichment	X		X

Appendix B: Example Page from the Japanese 23-Question Grammar Referencing

JAPANESE
Referencing Test Assessment

Grammar Book Used		
☐	**Question 1** Time:	a. Why is *yoni* used in the sentence 4 under "God Is Our Loving Heavenly Father"?
☐	Time:	b. Write your own sentence using *yoni* in the same way.
☐	**Question 2** Time:	a. Why is there a *wa* after kamisama in sentence 2 under "The Gospel Blesses Families"?
☐	Time:	b. Write your own sentence using *wa* in the same way.
☐	**Question 3** Time:	a. Why is *o* used in sentence 3b under "Heavenly Father Reveals His Gospel in Every Dispensation"?
☐	Time:	b. Write your own sentence using *o* in the same way.
☐	**Question 4** Time:	a. Why is *desu* used in sentence 1 under "The Savior's Earthly Ministry and Atonement"?
☐	Time:	b. Write your own sentence using *desu* in the same way.

Japanese Referencing Test Assessment   I

Appendix C: Example Directions for 23-Question Grammar Referencing Assessment

Using the References: Full Footnote

Each sentence in the phrases for the first lesson has footnote references to the bottom of the page. The references go in numerical order. The reference on the bottom of the page gives a short grammar explanation for the tagged word and then gives a reference in parentheses to the full lesson in the grammar book.

Example:

Dios nos[7] **envió**[8] **a la tierra para**[9] *aprender y*[10] *progresar***.**

The footnote for para is 9. We look at the bottom of the page and read the explanation:

    9. *Para* is used here because the meaning is **in order to** (20).

This tells why para appears in the sentence. It also has a reference to grammar lesson (20). In the table of contents for the grammar book, we look for the grammar lesson with (20) to the left and see the following:

This means that grammar lesson (20) is Por y Para and it starts on page 87. On page 87, you can learn more about para than what was in the original explanation.

Appendix D: Example VP page from Control Group

Lesson 1: The Message of the Restoration of the Gospel of Jesus Christ

God Is Our Loving Heavenly Father

1. God is our Heavenly Father.	1. Kamisama wa watashitachi no Ten no Otōsama desu.	1. 神様は私たちの天のお父様です。
2. We are God's children.	2. Watashitachi wa Kamisama no kodomo desu.	2. 私たちは神様の子供です。
3. God sent us to earth to *learn and grow*. a. receive a physical body b. gain experience	3. *Manabi, seichō suru* **tame ni, Kamisama wa watashitachi o kono chijō ni okurare mashita**. a. Nikutai o ukeru b. Keiken o tsumu	3. 学び、成長するために、神様は私たちをこの地上に送られました。 a. 肉体を受ける b. 経験を積む
4. God prepared a plan for us to be able to *return to Him*. a. become like Him b. progress	4. Kamisama wa watashitachi ga *go-jibun no mi-moto ni modoru* **koto ga dekiru yōni, aru keikaku o yōi sare mashita.** a. go-jishin ni nitamono to nareru b. seichō suru	4. 神様は私たちが御自分のみもとに戻る事ができるようにある計画を用意されました。 a. 御自身に似た者となれる b. 成長する
5. We can return to God by *keeping ourselves clean*. a. being obedient	5. *Mizukara o kiyoku tamotsu* **koto ni yotte Kamisama no mi-moto ni kaeru koto ga dekimasu.** a. Jūjun ni naru	5. 自らを清く保つことによって神様のみもとに帰ることができます。 a. 従順になる
6. The Atonement of Jesus Christ is the most important part of God's plan.	6. Iesu Kirisuto no Aganai wa Kamisama no keikaku no naka de mottomo taisetsu na mono desu.	6. イエス・キリストの贖いは神様の計画の中で最も大切なものです。
7. Through the Atonement, we can be freed from sin.	7. Aganai ni yotte tsumi kara kaihō sareru koto ga dekimasu.	7. 贖いによって罪から解放されることができます。

Atonement	aganai	贖い	body	karada	体
body of flesh	nikutai	肉体	body of flesh and bone	kotsuniku no karada	骨肉の体
burden	omoni	重荷	child	kodomo	子供
children	kodomotachi	子供達	choice	erabi	選び
commandment(s)	imashime	戒め	cross	jūjika	十字架
to cry, to weep	naku	泣く	death	shi	死
earth	chijō	地上	experience	keiken	経験
to face (a problem)	tachimukau	立ち向かう	faith	shinkō	信仰
to free, to release	kaihō suru	解放する	garden	sono	園
Gethsemane	Gessemane	ゲッセマネ	glorified	eikō ni michita	栄光に満ちた
God	Kamisama	神様	Heavenly Father (scriptures)	Ten no Onchichi	天の御父
honorific presence (i.e. God's)	mi moto	みもと	life (as in everyday life)	seikatsu	生活
life(time)	jinsei	人生	to live, to exist	ikiru	生きる
to live, to subsist	seikatsu suru	生活する	love	ai	愛
to love, beloved	ai suru	愛する	method, means	hōhō	方法
plan	keikaku	計画	power, strength	chikara	力

Japanese 1

Appendix E: Example VP page from V1 Chapter Group

Lesson 1: The Message of the Restoration of the Gospel of Jesus Christ

God Is Our Loving Heavenly Father

1. God is our Heavenly Father.

2. We are God's children.

3. God sent us to earth to *learn and grow*.
   a. receive a physical body
   b. gain experience

4. God prepared a plan for us to be able to *return to Him*.
   a. become like Him
   b. progress

5. We can return to God by *keeping ourselves clean*.
   a. being obedient

6. The Atonement of Jesus Christ is the most important part of God's plan.

7. Through the Atonement, we can be freed from sin.

---

1. Kamisama wa[7] watashitachi no[1] Ten no[1] Otōsama desu[2].

2. Watashitachi wa[7] Kamisama no[1] kodomo desu[2].

3. *Manabi*[34]*, seichō suru*[4] **tame ni**[43]**, Kamisama wa**[7] **watashitachi o**[1] **kono**[19] **chijō ni**[8] **okurare**[12]**mashita**[6].
   a. Nikutai o[1] ukeru[4]
   b. Keiken o[1] tsumu[4]

4. Kamisama wa[7] watashitachi ga[7] *go-jibun no*[1] *mi-moto ni*[8] *modoru*[4] **koto ga dekiru**[22] **yōni**[25]**, aru keikaku o**[1] **yōi sare**[12]**mashita**[6].
   a. go-jishin ni[8] nitamono to[9] nareru[22]
   b. seichō suru[4]

5. *Mizukara o*[1] *kiyoku*[29] *tamotsu*[4] **koto ni yotte Kamisama no**[1] **mi-moto ni**[8] **kaeru**[4] **koto ga dekimasu**[22].
   a. Jūjun ni naru[28]

6. Iesu Kirisuto no[1] Aganai wa[7] Kamisama no[1] keikaku no[1] naka de[8] mottomo taisetsu na[17] mono desu[2].

7. Aganai ni yotte tsumi kara[39] kaihō sareru[34] koto ga dekimasu[22].

---

1. 神様は私たちの天のお父様です。

2. 私たちは神様の子供です。

3. 学び、成長するために、神様は私たちをこの地上に送られました。
   a. 肉体を受ける
   b. 経験を積む

4. 神様は私たちが御自分のみもとに戻る事ができるようにある計画を用意されました。
   a. 御自身に似た者となれる
   b. 成長する

5. 自らを清く保つことによって神様のみもとに帰ることができます。
   a. 従順になる

6. イエス・キリストの贖いは神様の計画の中で最も大切なものです。

7. 贖いによって罪から解放されることができます。

English	Romaji	Japanese	English	Romaji	Japanese
Atonement	aganai	贖い	body	karada	体
body of flesh	nikutai	肉体	body of flesh and bone	kotsuniku no karada	骨肉の体
burden	omoni	重荷	child	kodomo	子供
children	kodomotachi	子供達	choice	erabi	選び
commandment(s)	imashime	戒め	cross	jūjika	十字架
to cry, to weep	naku	泣く	death	shi	死
earth	chijō	地上	experience	keiken	経験
to face (a problem)	tachimukau	立ち向かう	faith	shinkō	信仰
to free, to release	kaihō suru	解放する	garden	sono	園
Gethsemane	Gessemane	ゲッセマネ	glorified	eikō ni michita	栄光に満ちた
God	Kamisama	神様	Heavenly Father (scriptures)	Ten no Onchichi	天の御父
honorific presence (i.e. God's)	mi moto	みもと	life (as in everyday life)	seikatsu	生活
life(time)	jinsei	人生	to live, to exist	ikiru	生きる
to live, to subsist	seikatsu suru	生活する	love	ai	愛
to love, beloved	ai suru	愛する	method, means	hōhō	方法
plan	keikaku	計画	power, strength	chikara	力

Japanese   1

Appendix F: Example VP page from V2 Page Specific Group

Lesson 1: The Message of the Restoration of the Gospel of Jesus Christ

God Is Our Loving Heavenly Father

1. God is our Heavenly Father.

2. We are God's children.

3. God sent us to earth to *learn and grow*.
   a. receive a physical body
   b. gain experience

4. God prepared a plan for us to be able to *return to Him*.
   a. become like Him
   b. progress

---

1. **Kamisama wa**[1] **watashitachi no**[2] **Ten no**[3] **Otōsama desu**[4].

2. **Watashitachi wa**[5] **Kamisama no**[6] **kodomo desu**[7].

3. *Manabi*[8], *seichō suru*[9] **tame ni**[10], **Kamisama wa**[11] **watashitachi o**[12] **kono**[13] **chijō ni**[14] **okurare**[15]**mashita**[16].
   a. Nikutai o[17] ukeru[18]
   b. Keiken o[19] tsumu[20]

4. **Kamisama wa**[21] **watashitachi ga**[22] *go-jibun no*[23] *mi-moto ni*[24] *modoru*[25] *koto ga dekiru*[26] **yōni**[27], **aru keikaku o**[28] **yōi sare**[29]**mashita**[30].
   a. go-jishin ni[31] nitamono to[32] nareru[33]
   b. seichō suru[34]

---

1. 神様は私たちの天のお父様です。

2. 私たちは神様の子供です。

3. 学び、成長するために、神様は私たちをこの地上に送られました。
   a. 肉体を受ける
   b. 経験を積む

4. 神様は私たちが御自分のみもとに戻る事ができるようにある計画を用意されました。
   a. 御自身に似た者となれる
   b. 成長する

---

1. *Wa* is used here because it marks the subject *God*

2. *No* indicates possession here: God is *our* Feavenly Father

3. Here *no* allows a noun to modify a noun. When *no* is used, the noun 'heaven' becomes 'heavenly.'

4. *Desu* means *is* or *are*. '*Iesu Kirisuto wa sukuinushi desu*' translates to 'Jesus Christ is the Savior.'

5. See note 1.

6. See note 2.

7. See note 4

8. Here the ichidan verb *manabu* is put into BII. When a BII verb is followed by another verb it becomes a conjunction meaning *learn and grow* in this case.

9. *Suru* is an irregular verb. It is attached to certain nouns and makes those nouns verbs. *Seicho* means *growth*, whereas *seicho suru* means *to grow*.

10. *Plain form verb tame ni* means *in order to verb*.

11. See note 1.

12. *O* marks the object of a verb. In this case, *God sent us to the earth*. *Us* is the object of God's sending, so it is marked with *o*.

13. *Kono* is an adjective meaning *this*. It can be used with any noun. For example, *kono hon* means *this book*.

14. *Ni* is a directional marker. In the sentence, *God sent us to the earth*, *ni* means *to*.

15. The verb *okuru* is put in an honorifc form here because God is performing the action. The verb then becomes *okurareru* and is then conjugated to past tense masu form, becoming *okuraremashita*.

16. *BII mashita* is the past tense conjugation of the verb that ends a sentence. Another example would be *kare wa yomimashita*, meaning *he read*.

17. See note 12

18. *Ukeru* is an ichidan verb meaning *receive*. Conjugated into the past tense masu form it would become *ukemashita*.

19. See note 12.

20. *Tsumu* is a godan verb meaning *gain*. Conjugated into the past tense masu form it would become *tsumimashita*.

21. See note 1.

22. *Ga* introduces a topic (slightly different from a subject). In this sentence, *God*, the subject, prepared a plan so that *We*, the topic, could return to Him. *We* are not the subject, it is the topic becuase We does not perform the final verb of the sentenc.

23. See note 2.

24. See note 14.

25. See note 20.

26. *BIII koto ga dekiru* means *can verb*. In this case it means *can return*. Another example would be *shiru koto ga dekiru*, meaning *can know*.

27. *BIII yoni* means *so that verb*. In this case it means *so that we can return*. Another example would be *inoru yoni*, meaning *so that you pray*.

28. See note 12.

29. Here *suru* is used in its honorific form because God is performing the action. The honorific form of *suru* is *sareru*. See also note 15 and 9.

30. See note 16.

31. The objects of certain verbs like *niru*, to resemble, and *naru*, to become are usually marked with the particle *ni* instead of the particle *o*.

32. Sometimes the particle *to* is used with the verb *naru*, to become instead of the typical *ni*. This gives the sentence a more formal feel.

33. *Naru* is here put into its potential form BIV ru, which gives it the meaning of *can become*.

34. See note 9.

Appendix G: Example VP page from V3 Chapter Section Group

Lesson 1: The Message of the Restoration of the Gospel of Jesus Christ

God Is Our Loving Heavenly Father

Lessons

1. **God is our Heavenly Father.**

2. **We are God's children.**

3. **God sent us to earth to** *learn and grow*.
   a. receive a physical body
   b. gain experience

4. **God prepared a plan for us to be able to** *return to Him*.
   a. become like Him
   b. progress

5. **We can return to God by** *keeping ourselves clean*.
   a. being obedient

6. **The Atonement of Jesus Christ is the most important part of God's plan.**

7. **Through the Atonement, we can be freed from sin.**

---

1. **Kamisama wa[7a] watashitachi no[1b] Ten no[1b] Otōsama desu[2a].**

2. **Watashitachi wa[7a] Kamisama no[1b] kodomo desu[2a].**

3. *Manabi[34a], seichō suru[4c]* **tame ni[43a], Kamisama wa[7a] watashitachi o[1b] kono[19a] chijō ni[8a] okurare[12c]mashita[6a].**
   a. Nikutai o[1b] ukeru[4b]
   b. Keiken o[1b] tsumu[4a]

4. **Kamisama wa[7a] watashitachi ga[7b]** *go-jibun no[1b] mi-moto ni[8a] modoru[4a]* **koto ga dekiru[22a] yōni[25a], aru keikaku o[1b] yōi sare[12c]mashita[6a].**
   a. go-jishin ni[8a] nitamono to[9a] nareru[22b]
   b. seichō suru[4c]

5. *Mizukara o[1b] kiyoku[29a] tamotsu[4a]* **koto ni yotte Kamisama no[1b] mi-moto ni[8a] kaeru[4b] koto ga dekimasu[22a].**
   a. Jūjun ni naru[28a]

6. **Iesu Kirisuto no[1b] Aganai wa[7a] Kamisama no[1b] keikaku no[1b] naka de[8a] mottomo taisetsu na[17a] mono desu[2a].**

7. **Aganai ni yotte tsumi kara[39a] kaihō sareru[34a] koto ga dekimasu[22a].**

---

1. 神様は私たちの天のお父様です。

2. 私たちは神様の子供です。

3. 学び、成長するために、神様は私たちをこの地上に送られました。
   a. 肉体を受ける
   b. 経験を積む

4. 神様は私たちが御自分のみもとに戻る事ができるようにある計画を用意されました。
   a. 御自身に似た者となれる
   b. 成長する

5. 自らを清く保つことによって神様のみもとに帰ることができます。
   a. 従順になる

6. イエス・キリストの贖いは神様の計画の中で最も大切なものです。

7. 贖いによって罪から解放されることができます。

Atonement	aganai	贖い	body	karada	体
body of flesh	nikutai	肉体	body of flesh and bone	kotsuniku no karada	骨肉の体
burden	omoni	重荷	child	kodomo	子供
children	kodomotachi	子供達	choice	erabi	選び
commandment(s)	imashime	戒め	cross	jūjika	十字架
to cry, to weep	naku	泣く	death	shi	死
earth	chijō	地上	experience	keiken	経験
to face (a problem)	tachimukau	立ち向かう	faith	shinkō	信仰
to free, to release	kaihō suru	解放する	garden	sono	園
Gethsemane	Gessemane	ゲッセマネ	glorified	eikō ni michita	栄光に満ちた
God	Kamisama	神様	Heavenly Father (scriptures)	Ten no Onchichi	天の御父
honorific presence (i.e. God's)	mi moto	みもと	life (as in everyday life)	seikatsu	生活
life(time)	jinsei	人生	to live, to exist	ikiru	生きる
to live, to subsist	seikatsu suru	生活する	love	ai	愛
to love, beloved	ai suru	愛する	method, means	hōhō	方法

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Appendix H: Example Chapter from Japanese Grammar Book

Relative Clauses - Plain Form Noun

Introduction

Relative clauses (also known as "plain form nouns") are basically phrases or sentences within a sentence. In this lesson you will learn how to identify relative clauses, how to form them in Japanese, and when to use them.

Notice (finding and using relative clauses)

Look at the example sentences below. The relative clauses are in bolded red and underlined. What is a relative clause? How do you form it in Japanese? What does it modify?

Describing

Examples:

Shinken wa	**jitsuzai suru**	kennō	desu.
priesthood	*real*	*authority*	*is*

The priesthood is a real (existent) authority.

Kami wa	**kanzen na**	**eikō o**	**uketa**	o-kata	desu.
God	*perfect*	*glory*	*received*	*being*	*is*

God is a perfect and glorified being.

Tsumi towa,	**Kami no**	**imashime ni**	**han suru**	okonai	de aru.
sin	*God's*	*commandments*	*against*	*deeds*	*is*

"...Sin is disobedience to God's commandments..." ("Preach My Gospel," 61) (Lit. Deeds which are against...)

Ansokubi no	kōdō wa,	**Kami o**	**uyamai,**	**reihai suru**	ketsui no	araware	desu.
Sabbath Day	*actions*	*God*	*respect*	*worship*	*commitment*	*sign*	*are*

Our action's on the Sabbath day are a sign of our commitment to respect and worship God.

What did you discover about relative clauses, how they are formed, and what they modify?

Let's Talk About It

20a

In Japanese, a relative clause acts just like an adjective in modifying a certain noun. Adjectives are often attached to nouns in order to distinguish a certain noun you are talking about. For example, you can say "bring a *book*" (**hon** *o motte kite kudasai*) or "bring the *red book*" (**akai hon** *o motte kite kudasai*). The second sentence distinguishes a specific book. The same thing can be said about relative clauses.

A relative (relating to) clause (phrases) is a phrase or sentence which modifies the noun which follows it. You simply attach a phrase or sentence in plain form before a noun you want to specify. For example, in the second example sentence in the "No-tice" section above, *Kami wa kanzen na eikō o uketa o-kata desu*, you can take out the relative clause and the sentence would be *Kami wa o-kata desu* (God is a being)—a complete sentence in and of itself. However, to be more descriptive of what type of being He is, we add *kanzen na eikō o uketa* to indicate He is a being "*who is* perfect and glorified."

Here are a few more examples. See if you can tell how the relative clause modifies the noun that follows it.

Examples:

Seirei niwa	**watashitachi o**	**kiyomeru**	chikara ga	arimasu.
Holy Ghost	*us*	*sanctifying/cleansing*	*power/effect*	*has*

"The Holy Ghost has a sanctifying, cleansing effect upon us" (Japanese adapted from "Preach My Gospel," 65).

Hibi,	**tasuke o**	**hitsuyō to shite iru**	hitobito ni	te o	sashinobemasu.
daily	*help*	*in need*	*people*	*hand*	*extend*

Daily, we extend a hand to (those people) in need of help.

Fukuin no	dai ichi no	gensoku wa,	**Shu**	**Iesu Kirisuto o**	**shinjiru**	shinkō	desu.
gospel	*first*	*principle*	*Lord*	*Jesus Christ*	*believe*	*faith*	*is*

"The first principle of the gospel is faith [believing] in the Lord Jesus Christ" ("Preach My Gospel," 61).

Maishū,	**zōn rīdā ni**	**isshūkan no**	**hataraki**	**ni tsuite**	**hōkoku suru**	hitsuyō ga	arimasu.
every week	*zone leader*	*one week's*	*work*	*about*	*report*	*necessity*	*it is*

It is necessary to report to the zone leader every week about the week's work.

Note: In English, often we indicate a relative clause by the words like "*who*," "*what*," "*where*," "*when*," "*to*," "*which*," and "*that*." Look at the examples throughout this lesson to see if you can recognize these words being used in the English translations. This may aid you in knowing when you need to use a relative clause.

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20b

Note: The subject, if included, of a relative clause is always marked by the particle *ga*.

Examples:

Kakunin no	**gishiki ga**	**okonawareru**	Seisankai ni	kite	itadakemasu ka.
confirmation	*ordinance*	*is performed*	*Sacrament Meeting*	*come*	*will you*

Will you come to Sacrament Meeting where a confirmation is being performed?

... **watashi ga**	**anatagata ni**	**shimeshita**	watashi no	karada o	kinen shite,	kore o	okonai nasai.
I	*unto you*	*shown*	*my*	*body*	*in remembrance*	*this*	*shall do*

"And this shall [ye] do in remembrance of my body, which I have shown unto you" (3 Nephi 18:7).

Note: In some sentences which use relative clauses, the particle *no* is found in what might seem to be where particle *ga* should be to mark the subject. When particle *no* is used for the subject, the relationship between the **subject** of the relative clause with the noun that is being modified is emphasized. When particle *ga* is used for the subject of the sentence of the relative clause the **action** describing the relationship between the relative clause and the noun.

Describing

Examples:

Fukuin ni	**kyōmi no**	**aru**	tomodachi ga	imasu ka.
gospel	*interest*	*have*	*friend*	*is there*

Is there (Do you have) any friend who have interest in the gospel.

Anatagata no	**kakageru**	hikari towa,	watashi	de aru.
your	*raise*	*light*	*I*	*is*

"I am the light which ye shall hold up" (3 Nephi 18:24).

Senkyōshi no	**oshieru**	ressun wa	Kamisama	kara no	messēji	desu.
missionaries	*teach*	*lesson*	*God*	*from*	*message*	*are*

The lessons the missionaries teach are a message from God.

Kanashimu	mono to	tomo ni	kanashimi	**nagusame no**	**iru**	mono o	nagusameru.
mourn	*those people*	*together*	*mourn*	*comfort*	*need*	*those people*	*comfort*

"...To mourn with those that mourn; yea, and comfort those that stand in need of comfort..." (Mosiah 18:10)

Note: One final thought about relative clauses or "plain form nouns." As you study many different grammar forms, you may start to notice a trend. Many grammar forms (e.g., *toki, tame, kara,* etc.) are essentially nouns preceded with relative clauses. Thus the subject of phrases preceding the grammatical word (e.g., *toki ni* "when," *tame ni* "in order to," etc.) are marked with particle *ga*. We will not go into too much detail in this lesson, but here are a few examples of relative clauses using other grammar forms for you to think about.

Examples:

Samui	kara	sebiro o	kimashō ka.
Cold	*because*	*suit jacket*	*shall we wear?*

Shall we wear suit jackets because it's cold?

Inoru	toki ni	heian o	kanjimasu.
Pray	*when*	*peace*	*feel*

I feel peace when I pray.

Taniguchi san o	**tasukeru**	tame ni	nani o	shimashō ka.
Ms. Taniguchi	*help*	*in order to*	*what*	*shall we do*

What shall we do (in order) to help Ms. Taniguchi?

Sabaki ga	**aru**	node	sore ni	sonaenakereba narimasen.
judgment	*exists*	*because*	*that*	*must prepare*

Because there is a judgment we must prepare for (it/that).

Chijō ni	**kuru**	mae ni	Kamisama	to tomo ni	sunde imashita.
earth	*come*	*before*	*God*	*with*	*lived*

Before (we) came to earth, (we) lived with God.

Kamisama ga	**iru** nara,	nani o	o-negai shitai to	omowaremasu ka.
God	*if, let's say, exists*	*what*	*want to request*	*do you think? (hon.)*

If, let's say, God does exist, what do you think you would like to ask (request) of Him)?

Ichinichi ga	**owaru**	made (ni)	sanjū ko no	atarashii	tango o	oboetai desu.
one day	*finish*	*by the time*	*thirty*	*new*	*words*	*I want to remember*

I want to remember (memorize) 30 new words by the end of (this) day. (Lit. ...By the time this one day finishes)

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Activities (see answers on pp. 263-264)

Learn on Your Own

A.   Build the Sentence

Using the vocabulary words given, create the Japanese sentence that contains the meaning of the English sentence below. Think of this as an assisted translation activity. Sometimes the particles have not been provided. You may also need to conjugate the verb. Remember that each sentence will contain a **plain form noun**.

Example: *hi, yasumu, ansokubi, reihai suru, watashitachi, Kamisama*
                    The Sabbath is a day we rest and worship God.

Answer: Ansokubi towa watashitachi ga yasumi Kamisama o reihai suru hi desu.

1. de aru, motto mo, toku, jiai, ōi naru
          Charity Is the Greatest of All Virtues.

2. ataeru, Kamisama, imashime, hitotsu, kara, Junketsu no Rippō
          The Law of Chastity is one of the commandments that has been given from God.

3. Morumon Sho, kiroku, kodai no, Kamisama, Josefu Sumisu, chikara, hon'yaku suru, yogensha, shinjitsu no
          The Book of Mormon is an ancient, true record that the prophet Joseph Smith translated by the power of God.

4. junsui, Iesu Kirisuto, desu, motsu, Sukuinuishi, ai, jiai
          Charity is that pure love which our Savior Jesus Christ has.

5. gensoku, Iesu Kirisuto, shinjiru, dai ichi, desu, fukuin, shinkō
          Faith in the Lord Jesus Christ is the first principle of the gospel.

6. chijin, setsumei suru, ya, fukuin, dewa nai, yūjin, kyōkaiin
          We can explain the gospel to nonmember friends and others.

7. hito, kara, chijō, yogensha, desu, mesareta, to naru yōni, Kami, Kami, daihyōsha
          A prophet is a man called by God to be His representative on earth.

8. hito, ni yotte, ya, nayande iru, tasukeru, mazushii, jiai, hito, byōnin
          Charity includes giving to the sick, afflicted, and poor. (lit. "Through charity we ...)

9. yogensha, toshite, mesareru, hito, jinsei, keiken, iroiro, desu
          A prophet may come from various stations in life.

10. deshō, yogen, seibun, keiji, han suru, shinjitsu, de aru, ukenai, Shu, hito, ikanaru, naka, tamamono, koto, mo, iwareta, motsu

          If we truly have the gift of prophecy, we will not receive any revelation that does not agree with what the Lord has said in the scriptures. (lit. If it is a person that has the true gift of prophecy ...)

B.   Common Errors

Notice the part of the sentence in bold. Write down *why* it is wrong, and rewrite the sentence correctly. Check your answers with those listed in the back of the book.

(*Note*: The English translation given for each sentence is what the speaker was trying to say, not necessarily what the corresponding Japanese actually says.)

 1. Shu ni inoru toki ni, motto ***yurusu no kimochi** to ai suru kimochi ga ataeraremasu.
    When we pray to the Lord, feelings of forgiveness and love are given.

 2. Chiisa na koto ni omowareta imashime ni shitagatta kekka to shite shukufuku o ***ukeru keiken** ni, dono yōna mono ga arimasu ka.
    What kind of experiences have you had in which you received blessings as a result of keeping a commandment you thought was a small thing?

C.   Error Correction

Each sentence is either correct or has one error. Say the correct form to your companion or write it down on a separate sheet of paper. Check your answers. For any questions that you miss, write at least two sentences that you could use in your teaching today that use the correct form of the sentence.

1. Kami wa, jissai ni charenji o ukete iru anata o tasukeru to nozonde oraremasu.
2. Nikutai no nai rei dake no jōtai dewa watashitachi wa Kamisama no yōni iru wa fukanō deshita.
3. Daihaikyō towa kono chijō ni Kami no kennō o motsu shinjitsu no kyōkai ga nakatta jidai no koto o iimasu.
4. Watashi suteki kazoku no nozomi wa kataku itsu made mo musubu koto desu.
5. Sukuinushi Iesu Kirisuto wa kono chijō de ikita hitobito no naka de yuiitsu kanzen ni Kamisama no mi-kokoro ni shitagatta o-kata deshita.
6. Hontō ni kōfuku na seikatsu wa Sukuinushi no Aganai ga tayoru koto ni yotte motarasaremasu.

D.   Scripture Activity (~5 min.)

Read アモス3：7 and answer the following questions: (1) How many plain-form nouns used in the verse? (2) What are they? (3) What does each mean literally? (4) What are the actual corresponding phrases of each in the English scriptures?

E.   *Preach My Gospel* Activities (~20 min.)

1. Read *Finding through Your Own Efforts* on page 167 of *Preach My Gospel*. Now read through the Romanized version in *Watashi no Fukuin o Nobetsutaenasai*, pp. 184-185. Answer the following questions about the section. Then check your answers.

 1. What is the plain-form noun in the section heading?

 2. What does the Japanese section heading mean?

 3. How is the last phrase of the first paragraph, " ... the Lord will place such people in your path" translated into Japanese?

 4. What plain-form noun refers to "such people," and what does this Japanese phrase literally mean in English?

 5. What plain-form noun refers to "your path," and what does this Japanese phrase literally mean in English?

 6. How many plain-form nouns are in the second bullet point, and what are they?

 7. What are the Japanese phrases for the following? (see the first bullet point on p. 185 for Rōmaji, p. 167 for English)

 (a) people who have recently had a baby
 (b) people who have recently moved into the area
 (c) people who have experienced a death in the family

F.   Audio Activity (~25 min.)

Listen to the clip from the Japanese translation of President Uchtdorf's talk, "The Infinite Power of Hope." Look up unfamiliar words as needed.

 1. What is modifying the word *ketsumatsu* (i.e., what is the plain form phrase attached to this noun)? What does this plain form noun phrase mean?

 2. Here, *to iu koto* serves as a type of plain form noun. What does *to iu koto* refer to? (Hint: What precedes it?). Write the actual words that compose this plain-from noun phrase in Japanese (Rōmaji if desired), and the meaning in English.

 3. (a) How many different plain form phrases modify the word "*koto*" in the scripture President Uchtdorf shares at the end? (b) What are the phrases? (c) How are the verbs "*miru*" and "*kiku*" in that sentence conjugated? (d) In what base is the final verb conjugated to before the word "*koto*"? (e) What does that do to all the previous verbs in the other phrases that help make up the relative clause?

 4. What phrase in the Japanese scriptures corresponds to the English phrase "them that love Him [God]"? (1 Cor. 2:9)

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G.   Writing Activity (~15 min.)

Think of three of your investigators. Write one sentence that you can say to each investigator to help them understand a principle they may be struggling with (a total of three sentences, one for each investigator). Follow the grammar pattern in コリント人への第一の手紙 2:9 (see the answers for 3b-3e of Audio Activity in section F above). This verse uses three plain form verbs to describe one noun, conjugating the first two as linking (BI zu for negative, BII or Bte for positive), and conjugating the last verb for past/present tense as well. Feel free to use other adjectives and plain forms in addition to the three plain form verb phrases. For example, in teaching that *God is Our Loving Heavenly Father*:

Watashitachi ga fukanzen na noni, Kamisama ga [1]watashitachi no koto o, hitori-hitori ai shi, [2]ki ni kakete, [3]shukufuku shite kudasaru kanzen na **Ten no Otōsama** desu.
Even though we are imperfect, God is a perfect (honorific) Heavenly Father *who* [1]loves us, [2]cares for us, *and* [3]blesses us.

In the example above, each plain form phrase is numbered and underlined, while the noun being described is portrayed in bold. In the English translation, the word "who" is both underlined and italicized, because it represents what is happening with the last verb before the noun, conjugated in plain form. If being extremely technical, the word *Otōsama* (father), alone is the noun being described. Even "*Ten no*" (of Heaven; Heavenly) becomes an adjective that describes the noun. You may want to ask a native speaker to check your sentences before you actually use them.

Describing

Learn with Your Companion (~10 min.)

H.   Teach your companion a 3-5 minute lesson on the principle, *Heavenly Father Reveals His Gospel in Every Dispensation* in Japanese. Share Amos 3:7. Allow them to ask questions. Use at least two of the plain form noun instances from the verse to further explain the meaning to them.

Learn with a Native Speaker (~20 min.)

I.   Mogi

Before meeting with a native speaker, prepare what you will say to accomplish the task under the first bullet point on page 167 of *Preach My Gospel*. You may want to study the vocabulary and phrases from the Rōmaji version, and/or refer to the answers to section E. *Preach My Gospel* Activity, question 7, above. Ask an older, active church member (30 years and older) to help you with a *mogi*. Show them the first bullet point on page 167 of 私の福音を述べ伝えなさい. Ask them to act the role of the bishop, ward mission leader, or someone else who would be in attendance at ward council. Give them a few minutes to prepare. Act out the task. Ask for feedback to make it (1) more effective; and (2) more polite. Take notes. Repractice as desired.

Appendix I: Prior Language Study Questionnaire

Prior Language Study Questionnaire

Missionary ID:
Branch and District:
Mission Language:

1) How many years if any did you spend studying *any foreign* language?

   Language _____

   _____ Year(s)   Grade/middle School
   _____ Year(s)   High School
   _____ Year(s)   College

2) How many years if any have you spent studying *your mission* language?

   _____ Year(s)   Grade/middle School
   _____ Year(s)   High School
   _____ Year(s)   College

3) Have you ever lived in a foreign country where your mission language was spoken?

   Yes/No
   How Long (years)? _____

4) Did you grow up speaking a language other than English at home? Which language?

   Which Language?   _____

Appendix J: Prior Language Experience Results

Table J1

Prior Language study: All research subjects

	Studied Other Language			Studied Mission Language				
Language Study	Middle School	High School	College	Middle School	High School	College	Live Foreign	Other Native Language
Years	2.25	2.16	1.34	2.16	2.05	1.03		
Students	95	181	41	36	99	31	9	13
% of Students	40%	75%	17%	15%	41%	13%	4%	5

Table J2.

Prior Language study: Japanese research subjects

	Studied Other Language			Studied Mission Language				
Language Study	Middle School	High School	College	Middle School	High School	College	Live Foreign	Other Native Language
Years	2.16	2.24	1.11	5	2.3	1.07	4.25	0
Students	19	50	18	2	30	14	4	3
% of Students	32%	83%	30%	3%	50%*	23%	7%	5%

*Note: * Indicates group is statistically significant*

Table J3

Prior Language study: Mandarin research subjects

Language Study	Studied Other Language			Studied Mission Language			Live Foreign	Other Native Language
	Middle School	High School	College	Middle School	High School	College		
Years	2.68	2.22	1.14	3	1.97	1.08	3.4	0
Students	22	51	14	6	29	13	5	5
% of Students	37%	85%	23%	10%	48%	22%	8%	8%

Table J4

Prior Language study: Portuguese research subjects

Language Study	Studied Other Language			Studied Mission Language			Live Foreign	Other Native Language
	Middle School	High School	College	Middle School	High School	College		
Years	2.52	2.28	3	0	0	1	0	0
Students	23	36	5	0	0	1	0	4
% of Students	38%	60%	8%	0%	0%	2%	0%	7%

Table J5

Prior Language Study for Spanish Subjects

Language Study	Studied Other Language			Studied Mission Language			Live Foreign	Other Native Language
	Middle School	High School	College	Middle School	High School	College		
Years	1.87	1.95	1	1.79	1.98	1	0	0
Students	31	44	4	28	40	3	0	1
% of Students	52%	73%	7%	47%	67%	5%	0%	2%