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A Descriptive and Qualitative-Quantitative Analysis of the Spelling of L1 Spanish-English Speaking Elementary Students

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**A Descriptive and Qualitative-Quantitative Analysis of the Spelling of L1 Spanish-English
Speaking Elementary Students**

by

Tiffany M. Ziegler-Wolf

A Thesis

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

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Abstract

This is a descriptive and qualitative analysis of the most prevalent spelling errors in Spanish L1 Students spelling in the English language. The present study also does have qualitative method mixed in since the amount of spelling tokens and errors in each location and spelling stage has been quantified. This thesis posed the questions (1) how did the errors pattern among participants? (2) How did the errors pattern within the onset, nucleus, and coda? (3) How did errors pattern within the spelling stages? (4) What can teachers do to help? These questions framed pedagogical approaches that are being proposed to help teachers of this population of students. Studies in developmental spelling have outlined that vowels are difficult for students to spell. As children age they are more equipped to deal with spellings of vowels. Similarly, the within word pattern stage was the most difficult. This was followed by the coda and the spelling stage of syllable juncture. Finally, the onset of the word and the phonemic and derivational stages resulted in few errors. Discussion of data is listed by spelling stage and analysis is approached from aspects of historic language change, phonology, morphology and orthography as applicable. Pedagogical strategies consist of direct study of the internal structures of the words. It is recommended that the examination of these words should be done in the context of text study.

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Chapter 1: Introduction

This thesis is concerned with Spanish and English spellers and their spelling choices. Data on student spelling was collected from the months of April 2016 to June 2016. Students' ages ranged from young arrivals in country to heritage Speakers of Spanish. Heritage speakers use Spanish in the home. Language abilities vary in accordance to the amount of use in the home. Exposure and use of English language from childhood, in schooling, and in the greater community could mean that these students had a phonological inventory similar to monolingual English speakers (Beheney, Gass, Plonsky, 2013; Cook & Singleton, 2014). This thesis described the spellings of students who fell along a continuum of bilingual abilities. This is done to improve diagnosis and repair of the spelling errors of Spanish and English speaking students. In addition, teachers including the present author will benefit from developmentally appropriate practices to give clear indicators of what types of words students at each age should be spelling.

There were five students total. The participants were two second-grade students, one fourth-grade student, and two fifth-grade students. Since these students were minors, the IRB at Saint Cloud State University gave approval for this work. Errors in spelling were taken from in-class work samples. Spelling error tokens were collected from these samples. Stage models of developmental spelling ground the description and discussion of data. Phonological descriptions assisted to explain the choices of spellers, as "The mispronunciation of words leads to misspellings" Beers, J (1980). This was a descriptive analysis of the most prominent spelling errors found in the data. The errors were organized by consonant deletions in the onset and coda. Vowel errors found in the nucleus were discussed. Epenthesis, or the insertion of sounds into a word, was addressed. Orthographic information signaled by <e> affected the nucleus and coda in spellings. For this reason the onset, nucleus, and coda cannot always be used to classify errors.

The organization of data deviated as needed to accommodate different types of word formations. Spelling stages were used to align student errors to a developmental framework. Student errors provided focus for pedagogical implications to help students become better spellers.

Teachers know students need help spelling, but do not have the tools to diagnose the errors their pupils are making. Skilled instruction takes place when teachers know how to guide students through the different spheres of knowledge necessary in order to spell. Teachers will benefit from having instruction catered to their needs based on a developmental model. Principles of orthography, morphology, and phonology always add more support to developmental spelling stages. Armed with a schema to outline what students should be able to do, the needs of students can be evaluated and remedied. For this reason, spelling acquisitional stage models are used. Stages of spelling development guide educators with clear benchmarks indicating how students should be spelling.

Qualitative and quantitative analysis was used to frame the analysis of spelling. This was done to discern needs for spelling intervention. Instruction did not change at the time of data collection. Students maintained their normal routine. Spellings were collected in the context of a meaningful reading and writing environment linked to the weekly theme of the curriculum for each grade level. There were three total points for each word token collected. Only word tokens containing errors were collected. The onset, nucleus, and coda generated one point each if a misspelling was found. In addition pools of data were categorized by guidelines given in developmental spelling stages.

For the total errors collected per student and grade level errors collected did not trend upwards or downwards in correspondance to grade level. The nucleus was the location of the most errors committed. The coda was ranked second with the errors it collected. The least errors

were found in the onset. The spelling developmental stages were used to find trends in data. Not all errors clearly fit into these stages. Those that did not fit were addressed on their own accord. Errors that fit into spelling stages trended as follows: The within words stage had the most errors collecting seventy error tokens. Syllable juncture stage had thirty-four errors. Finally, meaning derivation and phonemic stage had eighteen and eleven errors respectively. The information gleaned from this study will reframe how educators think about student misspellings. It is crucial to look at misspellings in a positive light. Students use the language or languages they speak to make a hypothesis on how to spell words Selinker (1992). Installing a language to speak about words allows students to explain and be self aware of their word-forming hypothesis

Tendencies found in data had many subcategories. One of area was miscues due to the syllable structure of words. The structures <CVCC> and <CVCe> were challenging for students and patterns that were known in the <CVCe> structure were transposed over the <CVCC> structure. Phonemic exchanges due to similar vowel qualities were an issue at hand in the phonemic stage. This was in the nucleus of the word. In syllable juncture many misspellings were found when a word called for dropping and doubling. Pronunciations with allophonic variations seemed to influence the spelling of past tense and plural inflections. Derivations using comparative and superlative endings were challenging. These endings also call for dropping and doubling. The use of apostrophes and words influenced by historic changes were addressed as well. Students reversed graphemes of similar visual quality. These misspellings are addressed to meet the needs of the population in this present analysis. Most of all students who come from a background of regular orthography where mappings from phoneme to grapheme are consistent need to know how to use many layers of information found in the English orthography. They must have a way to name and repair the word structures. This thesis is a pursuit of the analysis of

spelling errors to help educators help students who spell coming from a Spanish-English language background. Implications for each category of spelling were given to help teachers to assist students to become more proficient spellers.

Chapter 2: Review of Literature

Spelling is influential to the learner. Spelling supports reading and literacy. Forming words helps the learner make a visual form of the sound that they are producing. The manipulation of sounds to create words has, in addition, been found to help a student remember and recall words faster. For this reasons it is an area that must not be overlooked pedagogically. Spelling has been noted as an important piece of a student's learning and literacy acquisition by the following scholars; Henderson & Templeton (1986); Ehri & Wright (2007); Ehri, Taylor & Wilce (1987); Cooke, Slee, & Young (2014). In spelling students need to pull apart sounds that create words, and then put them back together. Blending and segmenting is supported by literacy experts as an element that supports a child's foundational literacy Cooke, Slee & Young (2014). It is uncontroversial that that a link exists between reading and spelling. Working with how sounds and how they map to letters raises awareness of sound properties as they create words. It is the process of word decoding that gives so much help. As Wright and Ehri (2007) stated, "spelling instruction operates behind the scenes to strengthen decoding skills" (6). In addition to this Aro (2006) stated, "letters may draw the child's attention to the sounds of spoken words and the bisual symbols anchor the phonemes perceptually (538)." Spelling lags behind reading with one informing the other. Given the points listed above spelling and linking maintain a relationship that if nurtured equally, benefits students. It is maintained by the experts listed above that spelling is an area in need of deep analysis for the sake of facilitating student growth and literacy.

Spelling is made up of knowledge drawn from multiple areas. Spelling is built from phonological information, and how the phonemes match to the written system. Next the student must consider different patterns in spelling that may match to one phoneme. Orthography guides the study of how letters and sounds link to create words. In addition to phonology and

orthography there is morphology. This involves attaching word parts to change meaning and syntax Larsen & Nippold (2007). The three aforementioned areas are part of the inner workings of a word. Naming features and patterns in word formation will help students build a language to repair word structures. This language will be transferred to instruction to guide teaching and learning. Data collected from students will frame this analysis to relate to a specific population of elementary EL students. The key ideas underscored will be that linguistic elements that form words must be named to guide a discussion of words and repairs of misspelled words, any second or additional languages a student knows must be used to guide them. The disciplines of phonology, morphology and orthography will add to descriptions.

From here forward, it will not be that students spelled a word right or wrong, rather they will be on a continuum, somewhere between the misspelled word and the target form Selinker (1992). A second or other language can be used to build on strategies learners have Corder (1994). Kuder and Rajiv (2016) said, “capitalize on the knowledge each student has of the Spanish language” (p.103). Derivational affixes draw from a great amount of Latin borrowings. Spanish and English language Spellers will benefit from studying word meaning derived from Latin affixes. Students need language to uncover and be self aware of their own word formation hypotheses. Information can be found that branches from similar language foundations. This will give students what they need to gain ground while spelling.

A student’s strategies of word making can be explained mostly within the disciplines of Orthography, Phonology, and Morphology. Orthography is positioned first in the design of this study. It is the analysis of how phonemes map to written elements Goswami (2006). The relations between phonological mappings and graphemes are explained in greater depth using phonology. Hayes (2009) stated, “the goal of phonology is to understand the tacit system of rules that the

speaker uses in apprehending and manipulating the sounds of her language” (p.1). This area will be included second. Morphology is the branch of linguistics that studies the structure of words Bauer, Lieber & Plag (2013). This will be included last. Orthography, phonology, and morphology work together, and at times overlap. One expert observed an overlap in phonology and morphology stating “there are many interactions, often complex, between phonological form and morphological structure” Hayes (2009, p. 103). Explaining issues of morphology necessitates drawing from phonology. Orthography may account for phonological and morphological choices. Phonology, morphology and orthography are all relevant disciplines that drive the meaningful discussion of words. These three areas contribute to the analysis of words in stage theoretic designs.

Theory of Learning

Spelling deserves equal attention during literacy instruction. The building blocks of a word must be named to begin describing how words work. This must not be done in isolation. Meaningful contexts support the study of words Cramer (1998). Teachers must align strategies they have in teaching words to best practices outlined by research. Word forms and the underlying structures that drive their spellings will guide student explanations. As Fillmore & Snow (2000) said “Understanding complexities in English orthography can help teachers take sensible approaches to teaching” (p.27). The following text will outline elements germane to spelling instruction in the classroom.

Teachers may resort to ineffective spelling techniques like memorization and copying spelling lists. This is due to their lack of knowledge of the structures that create words. Teachers who are skilled at spelling may teach in isolation, when it is important that they share best practices in teaching spelling. Other educators care about spelling and see students need help but

do not know where to start. It is imperative to students that teachers be placed on a uniform track in the scope and sequence of teaching spelling.

Spelling of students past the age of first and second grade has become less of an instructional focus. This issue has been brought up in research of monolingual spellers. Cramer (1998) suggested that by the later years of elementary school, principles of spelling such as derivational meaning are “often neglected in spelling instruction” (p.11). Reading instruction may be the focus creating an imbalance for time dedicated to spelling. This pedagogical focus falls short since other areas exist, like spelling, where students need help (Bahr-Huntley et. al. 2015). Teachers who are not trained how to teach spelling rely on outdated methods like making students memorize spelling lists. This is done without drawing students’ attention to patterns found in spelling and it will hinder students’ learning (Allen & Zutell, 1988; C, Beers 1980; Drum et. al. 1996; Gentry & Henderson, 1985; Henderson & Templeton, 1986). Elements that describe the make up of a word should be infused into instruction. This will give teachers the tool to uncover layers of word formations and explain them to students. Teachers can see what skills students have built from, and what must come next.

Spelling must be taught in the context of a literacy rich classroom environment. Words may be collected from the context of stories read in the classroom. A recommendation given by Bear & Templeton (1998) was to “pull words from live contexts, examine them and put them back” (p.223). Furthermore, Bear & Templeton (1998) said, “examine shades of sound, structure, and meaning. We do not just teach words we teach students processes and strategies for examining and thinking about words as they read and write” (p.223). The implication is clear; spelling instruction can be woven into a reading lesson. Knowing what words are made up of will allow students to see patterns and formulas. Figuring out the formulas themselves will motivate

students to explore words like young detectives. Spelling should be at the forefront of instruction in every classroom. Reading and spelling may be taught in tandem. This should be done connecting to a professional community, where nobody teaches alone. Sharing best practices should be done on a regular basis.

Orthography

Learners approach spelling in systematic ways. This can change as a result of the orthographic structure they are using. There are two categories in orthography. There are deep orthographies and shallow orthographies. The learner approaches spelling differently depending on the type of rules that guide their language. People have to redesign how they think of spelling to manage a new or unfamiliar spelling system. Orthographies are a result of many elements. The concentration of this chapter will be to explain what orthography is and how spellers use strategies among deep and shallow orthographies. Language change and irregular sound to spelling mappings are discussed. The main issues of this section are language borrowing, multiple correspondences between graphemes and phonemes, and allophones.

Experts who want to learn more about how young children spell, or how bilinguals form words use knowledge from the discipline of orthography. As defined by Coulmas (2003) Orthography is “the standardized variety of a given, language-specific writing system. The term spelling is used interchangeably” (p.35). Orthographic systems vary across world languages. They may be shallow, where the phoneme is a clear match to the written form. Orthographic systems like English are deep, also known as opaque (Caravolas, 2006; Hualde, 2005; Goikoetxea, 2006). Differences in these systems affect the ways students approach spelling.

The organization of orthography drives strategies learners have while they spell. This is the reason that Spanish speaking students may want to spell words how they sound, or

phonetically. The same issue is relevant for young spellers. Children at early elementary ages spell using the strategy that the sounds of the word should be written phonetically Bear and Templeton (1998). When a written element cannot be construed from its phonological information, it challenges learners whose strategy is to spell close to the phonemic surface level of a word.

Borrowing and language change affect orthographies. In addition, opaque systems have consonant and vowel phonemes with many written representations. Historic change has played a role in creating complex words “the process of language borrowing and change produced by speakers of a language cause a written system to differ from its spoken system” Coulmas (2003 p.102). Vowels have been greatly affected. According to Coulmas (2003) “vowels changed significantly in the Great Vowel Shift from Old English (OE) to Modern English (ME)...[e:], [i:], and [u:] became respectively, [i:], [ai], and [au]” (p. 186). The spelling of [i] in current orthography is irregularly spelled as a result of this change. “For instance [i:], is spelt <ee> in some words such as <deed> and <greed> but <ie> in others such as <grief> and <thief>” (p 186). The consonant <s> and its variations result in part to changes stemming from Germanic and Romance languages “Old French also used <c> to spell <s>” (p.397). Borrowing words from French results in the rule that “[s] is spelled <c> before <e>, <i>, and <y>” (Cummings, 1988, p.397). Languages shift as a result of the changes in the populations that use them. Over time pronunciation shifts especially affecting vowels. All of these elements contribute to the complexity of an orthographic system. In English many shifts of pronunciation have not been reflected in spelling.

Each alphabet has its own collection of consonant and vowel phonemes, and graphemes. Phonemes or spoken units of sound match to letters, the visual representation of sounds. The

written representation of an alphabet can match to multiple phonemes. This creates the issue of irregular mapping in orthography. Davis et.al. (2009) noted that there are fewer Spanish consonants in comparison to English. In their work they listed “18 consonants in Spanish and 24 consonants in English” (p.259). “Spanish has five vowels. English has eleven” (p.260). Beginning with 24 consonants means multiple phonemic and allophonic matches will follow. Phonemes may link to many graphemes. What is more one grapheme may represent many different phonemic choices. The multiple linkages to graphemes and phonemes are illustrated by examples given by Coulmas (2003) He demonstrated the many choices spellers have from sound to spelling showing the post-alveolar fricative [ʃ] has ten graphemes. The grapheme <a> has ten different representations all with different pronunciations. For instance, <a> can be written as <cake>, with the pronunciation [eɪ], the word <arm>, is pronounced with the vowel phoneme [ɑ], likewise in the word <many> has [ɛ] as the vowel sound. Finally, <all> carries a different pronunciation once more, which is [ɔ] (p.186). The post-alveolar fricative [ʃ] maps to a consonant and many clusters. To name a few, there is <sugar> with <s>, also <sch> like in <schist>, and <ss> as found in the word <issue> (p.187). It is clear how the spelling system of English may challenge young learners or those who come from a different and much more regular orthographic background.

Allophonic variations play a part in spelling. Plural allomorphy results in more than one phonemic choice to spell a word. Allomorphs are sound variations found in the pronunciation of plurals. The word <bags> is spelled with the grapheme <s> to indicate more than one. Due to the voiceless consonant phoneme [g] preceding the <s> it is devoiced and pronounced as <z> Brinton, Celce-Murcia & Goodwin (2010). This process changes sound but not word meaning. It can cause children to spell words like <bags> as <*bagz>. Allomorphs are found in predictable processes in the past tense. This establishes the need for teachers and students to find predictable

patterns to reckon with the many spelling choices presented to them. Patterns will guide choices through many types of information found in words and how they link to the correct spelling.

Teachers must be sensitive to the needs of students. They should know how language background and orthographic mappings affect how kids solve the puzzle of spelling a word. Historic language change affects words. Insight as to what vowels and consonants have multiple correspondences, and why they have them leads to lessons that have anticipated challenges. The orthographic system has many mapping choices. It contains predictability within its forms. This can be used to guide instruction. Orthography and its principles guide awareness that leads to informed instructional practices.

Critical Period

Research relating to adult bilinguals differs in comparison to child language learners. Students in the present study are learning English as a simultaneous or sequential language. These children occupy their own place in academic linguistic research. In the words of Beheney et. al. (2013) in child language acquisition “the rules developed do not necessarily correspond to the rules of adult language” (p.116). The critical period is a theory that attempts to explain the difference between adult and child language acquisition. This applies to the present study. This analysis has students from aged third to fifth grade.

It is argued by Patrowski (1994) that there is strong evidence pointing to a critical period for phonological acquisition. Exact age points vary. The ranges of a proposed critical period stretch from 18 months of age to puberty. Children who are exposed to the phonology of a second language system at an earlier age are theorized to achieve more native-like pronunciation Paradis (2007). The “Conrad Phenomenon” is used to illustrate this point. Conrad, a native speaker of Polish-English, struggled as a speaker giving presentations. He had a very heavy accent, due in

part to the fact that he acquired English as an adult. This is relevant to the present study. All students participating in this thesis are acquiring English simultaneously or sequentially before the age of puberty. Students, in theory, will have similar phonological inventories when compared to English monolingual speakers. English is the medium of communication in schools and most contexts outside the home.

Critical Period and Phonology

The critical period of language acquisition underscores the fact that the age a student learns a second or other language will have an influence on their abilities. Since students in the present study are in their elementary years of schooling they may learn differently than monolinguals. In theory children who acquire a language before puberty achieve native like pronunciation. Children in this analysis are in third to fifth grade. This in theory positions these subjects to have increased sensitivity to English phonology. A necessary antecedent to the outlaying of phonology will be to look carefully at the argument that age is a factor leading to the increased ability to acquire language.

There are arguments outside of the scope of phonology that explain the students' the capacity to learn a second or other language. Birdsong (n.d) described additional intricacies of language learning. He argued language learning it is not as simple as a linear progression with age neatly corresponding to advancing linguistic structures. "Motivation, integration to the target society, short-term memory, and cognition as the student ages all add to the complexity of this argument" Birdsong (n.d, p.13). It is not just age and maturation. External factors influence language acquisition. Some day if experts can pinpoint ages where students are sensitive to specific linguistic elements it will still not be that easy. Confounding this would be issues like motivation, and short-term memory like listed above.

Studies on phonological processes of young children shed light on the issue of age and acquisition. It is known that children exposed to the phonological system of English were found to achieve native like pronunciation abilities in a short period of time. Three groups of bilinguals in the categories of English only, Spanish, and finally, English and Spanish advanced toward native like pronunciation in a period of about eight months. Common processes like cluster deletions decreased as children were exposed to the English Davis et. al. (2009). The argument results in a bookend of sorts. On one hand it is known that adults who try to acquire language usually struggle greatly, or fail (Birdsong, n.d; Paradis, 2007) on the other hand students who begin to learn a language including its phonological system at a young age tend to catch up quickly, with the resolution of most Spanish influenced processes like cluster reductions improving with age Davis et. al. (2009). The issues of age and acquisition sets no clear parameters as to what is to be expected of age and how target linguistic structures are affected by it. This gives weight to considering L1 structures in the framework of this analysis. No clear boundaries exist to say age is absolutely or absolutely not a factor at a given time.

Phonology

Major issues linked to phonology will begin with consonant and vowels. English has more consonant phonemes than Spanish. Similarly English has more vowel phonemes than Spanish. Spanish speakers have phonemes that do not exist in English. English speakers have phonemes that do not occur in Spanish. Place and manner features are conceptualized differently between English and Spanish. Vowel phonemes are described differently in English and Spanish. In addition consonants and vowels that are meaning bearing or have allophonic variants differ between Spanish and English. These issues are relevant to spellers since distinctions like tense and lax are used in the doubling of consonant phonemes in English. Allophonic information that

varies can challenge spellers working with plural inflections. The most influential processes driven by L1 and L2 phonology will be addressed below.

Consonants and Vowels

The consonant inventory between Spanish and English has many similarities and some differences. English has 24 consonants and Spanish has 18 consonants. English and Spanish both have [b], [p], [d], [t], [g], [k], [m], [n], [l], [tʃ], [s], [f], [j], [w]. Despite the fact the languages share these phonemes they differ in some places of articulation. Spanish consonant phonemes that are not found in the English consonant phoneme inventory are [x], [ɲ], [ɾ], [r] Davis, Gildersleeve-Neumann, Kester, Peña (2009). This is coupled with the fact that some English phonemes are not contrastive in Spanish. These phonemes are [v], [z], [h], [θ], [ð], [ʃ], [ʒ], [dʒ], [ŋ], [ɹ] Davis et. al (2009). Contrastive phonemes play a significant role in spelling. Noncontrastive phonemes in one language will influence listening perception in a new language where that same phoneme now is distinct and calls for the person to pick up on its semantic or morphological cues. Contrastive allophones play a role in morphology Brinton Celce-Murcia, Goodwin (2010). The difference between [bagz] and [bagz] is significant for a speaker of English. Spanish speakers would not be bothered by the exchange of the final phoneme [s], and [z]. The difference in perception of these two will have its affect on spelling and morphology as shown later on page 28 of this thesis.

Consonant phoneme charts categorize sounds with differing places of articulation. This can be seen in Table 1 below. Place features for NAE, or North American English are bilabial, labiodental, dental, alveolar, palatal, velar and glottal (Brinton, Celce-Murcia, Goodwin, 2010, p. 61). Place features given by Hualde (2005) are bilabial, labiodental, interdental, dental, alveolar, prepalatal, velar, and glottal (p. 52). The distinction of prepalatal is missing in the English manner

features of articulation. Additionally in manner feature categories the approximate is located between the fricative and affricate categories. The phoneme [ð] is housed in the approximate category in Spanish, where it is a fricative in NAE. Spanish has more phonemes in the lateral category. This feature category is listed as liquids in English. Finally the rhotic category has the trill phoneme [r]. These variations illustrate at the foundational phonemic level that the conceptual space differs. The most basic elements of a word are produced in distinct ways in the spoken language of English and Spanish. Table 1 below is a description of Spanish consonant phonemes and English consonant phonemes.

Table 1. Spanish and NAE Consonants

Main Consonant Sounds of Spanish								
Place of Articulation								
	Biliabial	Labiodental	Interdental	Dental	Alveolar	Prepalatal	Velar	Glottal
Plosive								
voiceless	/p/			/t/			/k/	
voiced	/b/			/d/		/j/	/g/	
Fricative								
voiceless		/f/	/θ/		/s/	/ʃ/	/x/	/h/
voiced		/v/			/z/	/ʒ/		/ɦ/
Approx.								
voiceless								
voiced	/β/		/ð/				/ɣ/	
Affricate								
voiceless						/tʃ/		
voiced						/dʒ/		
Nasal								
voiced	/m/	/ɱ/	/ɲ/	/ɳ/	/n/	/ɲi/	/ŋ/	/ŋ/
Lateral								
voiceless								
voiced			/l/	/ɭ /	/l/	/li/	/ʎ/	
Rhotic								
tap					/r/			
trill					/r̄/			

CLASSIFICATION OF NAE CONSONANT PHONEMES							
Manner of Articulation	Place of Articulation						
	Bilabial	Labiodental	Dental	Alveolar	Palatal	Velar	Glottal
Stop							
voiceless	/p/			/t/		/k/	
voiced	/b/			/d/		/g/	
Fricative							
voiceless		/f/	/θ/	/s/	/ʃ/		/h/
voiced		/v/	/ð/	/z/	/ʒ/		
Affricate							
voiceless					/tʃ/		
voiced					/dʒ/		
Nasal							
voiced	/m/			/n/		/ŋ/	
Liquid							
voiced				/l/ (/r/)	/ɹ/	/ʎ/	
Glide							
voiceless	(/hw/)						
voiced	/w/				/y/		

(Brinton, Celce-Murcia, Goodwin, 2010 p. 61; Hualde, 2005, p. 52)

Units of sound that signify meaning differ between world languages. This is a significant issue in spelling since these sounds map to graphemes. In English the sounds [t] and [d] are “in contrast with each other” (Hayes, 2009, p. 20). Contrastive sounds signify the difference between words. Hayes (2009) pinpointed this issue with the words “<time> [taɪm]-<dime> [daɪm]-<lime> [laɪm], they are a minimal triplet” (p.20). The initial phonemes are “distinct” and signify the words are separate in meaning Hayes (2009). English and Spanish both:

Use voice as a distinctive feature...limited to the obstruents...Spanish lacks contrast between voiced and voiceless fricatives and affricates with the same place of articulation. (Hualde, 2005, p. 51)

Spelling is linked to phonology, stress placement and sociolinguistic setting of a conversation. The first issue at hand is differing phoneme contrasts. They effect the realization of

<s> on plural endings. Plurals and their allophonic realizations in English conceivably will be an issue for Spanish spellers since no distinction is made between the voiced English fricative [z] and the voiceless fricative [s] in Spanish Hualde (2005). Retention of <s> is primed in other ways. The speaking context and stress placement informs a Spanish speaker's decision whether to retain it. The phoneme <s> is maintained as a result of sociolinguistic context, for instance in a formal speech it will be pronounced. The <s> is omitted in informal speech. In addition Spanish speakers may eliminate the final <s> in polysyllabic words Hualde (2005). The phonemic realizations of <s> as well as stress and context of the speaker are realized in spoken Spanish.

A large number of consonant phonemes between Spanish and English are the same. Some consonant phonemes differ. Earlier it was shown Spanish consonants who do not have an equal match in English are [x], [ɲ], [r], [r̄] Davis, Gildersleeve-Neumann, Kester, Peña (2009). Certain phonemes are not shared between languages. Conceptual space phonemes occupy differs. The place and manner features in speech are slightly different when comparing Spanish and English. Furthermore, phonemes that bear meaning vary between Spanish and English. In light of these issues the phonemic level will be beneficial to study. It will provide working conceptualizations of the foundational pieces of a word.

Vowels in Spanish and English vary the most. The English inventory has eleven vowel monophthongs and three vowel diphthongs Brinton, Celce-Murcia, Goodwin (2010) establish that "these phonemes occupy the high, mid, and low positions on the vowel chart or quadrant. High, mid, and low "denotes raising and the lowering of the tongue and jaw in the mouth or oral cavity." English has a tense and lax distinction. Tense vowels are articulated with more muscle tension than the lax vowels" (p. 116-117). In Spanish there are five vowel phonemes. Hualde (2005) illustrated they are organized by "high, mid, and low" classifications and this is

“depending on whether the tongue is raised, in neutral position, or low Hualde (2005). The Spanish vowels fall around the edge of the quadrant forming a triangle shape. It can be seen in Table 2 that schematic space vowels occupy is different between Spanish and English.

Table 2. Spanish and English Vowels

Spanish Vowels					
	Front		Central	Back	
High	i			u	
Mid	e			o	
Low			ɑ		
English Vowels					
	Front		Central	Back	
High	i	ɪ		ʊ	u
Mid	e	ɛ	ʌ		o
Low	æ		ɑ		ɔ

(Hualde, 2005; Brinton, Celce-Murcia, Goodwin, 2010)

Adjacent vowels are similar in the amount of sound that they produce. They are found close to each other on the vowel quadrant. This is illustrated with the pair [ɛ], <bet> and [æ] <cat>.

Monolingual spellers during early acquisition and bilingual spellers exchange adjacent vowel phonemes due to their similarities Brinton, Celce-Murcia, Goodwin (2010). The difference in the types of sounds produced between these two inventories will mean students may choose the next best thing. If they cannot conceptualize a phoneme in the L2 they will pick the closest choice in the L1. Allen and Zutell (1988) said, “Spellings...though incorrect indicate that children often proceed in quite systematic, reasonable, and phonologically predictable ways” The way phonemes are spelled is conceptualized by the sound quality they produce.

Exchanges in spelling due to phonological processes can be a result of L1 environments. Phonological processes affect monolinguals. Phonemes are influenced by nearby environments Koffi (2014). The issues raised in the previous discussion have their effect on spellers.

Phonological processes can be explained as word formulas. How this can be done in active instruction is addressed in the discussion of errors. Processes of word formation will show students they are on a process toward the correct formation. Students can see they may have missed a step during spelling, but performed two other steps correctly. This leaves behind the binary and unhelpful classification of spellings being right or wrong.

Morphology

Individuals wanting to assist students in spelling must be aware of the basic functions of morphology. Focus is on inflection, derivation, and the allomorph. Rules that govern plural allomorphs will be discussed. A brief outline will illustrate morphemic elements and their descriptions. Subcomponents that effect morphology are allomorphs, inflection, derivation, and negation. These elements follow predictable patterns. The first member to be discussed is the morpheme.

The basic unit of meaning is a morpheme. It can be attached to a base word. The morphemic ending changes meaning and syntax. A morpheme as defined by Bauer, Lieber & Plag (2013) as “any phonological (or graphemic) element of a word-form which has function or meaning in the construction of a word” (p.13). Prefixes attach to the beginning of a word.

Suffixes are connected at the word’s ending. To give an example of this Cummings (1988) shows:

The complex word *repainted* obviously contains three elements—a prefix, a base, and a suffix: *re* + *paint* + *ed*. The base *paint* is the word’s semantic core, the starting place for describing what the word is being used to mean in a given utterance. The prefix and suffix add semantic content to that core, the prefix *re-* adding the content “again,” and the suffix *-ed* adding “in the past.” (p.32)

The prefix and the suffix of the word are not able stand on their own in a sentence. They must always be attached to a lexical base. Word elements that may not stand-alone are “bound.”

Elements that can stand by themselves are “free.” (Cummings, 1988; Bauer, Lieber & Plag,

2013). Words that are free can stand alone through the process of “clipping” Cummings (1988). The word form <pro> has been clipped from the word professional (36). It can be included with a verb like <pro surfer> to mean someone is a professional surfer. It indicates they are at a high level of knowledge and skill in this sport. This adds to the bank of word knowledge needed in the classroom.

Morphology is complex in its internal structures. Morphological elements may be terminative or non-terminative. Consider the word <competing>. “The final *e* is deleted in a word such as *competing* (com+petē)ing) because + pete is a terminative base” (p.38). On the other hand non-terminative bases are not permitted word finally. An example of this is “metall+, which is a co-element to the free, and therefore terminative, metal. The bound, non-terminative metall+ must be assumed to explicate such complexes as metalloid, metallic, and metallurgy” Cummings (1988, p. 38). Students may retain or omit consonants word internal clusters. Knowledge of the aspects listed above may help spellers make repairs of miscues forming internal clusters.

Inflectional and Derivational each form their own organizations of rules. These rules are significant to the analysis of spelling. According to Bauer, Liber & Plag (2013) inflections are more regular and change the word’s part of speech. Systematic rules in pronunciation affect the spelling of derivations. Derivations are complex, they occur at the word’s base. They add information about meaning and change the word’s part of speech. They are influenced by changes like borrowing Bauer, Liber & Plag (2013). The two affix types will be discussed below. They will be framed in light of specific issues participants had.

Inflectional morphology involves attaching word parts that change the syntax of a word. “Making plurals, past tense formation, and the progressive tense are all functions of inflectional morphology” Larsen & Nippold (2007). Phonological processes affect plural and past tense

formations. Plural <s> goes through processes of assimilation. The coda will take on the properties of the nucleus to match it. In regular plural nouns the ending may be pronounced [s] or [z] Bryant, Deacon & Nunes (2006). Predictable environments govern the changes that take place word internally Brinton, Celce-Murcia, & Goodwin, (2010) display the rules that guide plurals:

- (1) When the noun or verb ends in a sibilant consonant (i.e., /s, z, ʃ, ʒ, tʃ, dʒ/), the inflection has an epenthetic /ɪz/or /əz/.
- (2) When the noun or verb ends in a voiced nonsibilant sound, the inflection involves progressive assimilation and is realized as /z/.
- (3) When the noun or verb ends in a voiceless nonsibilant consonant, the inflection also involves progressive assimilation and is realized as /s/.
- (4) Contractions like <does> follow the same pronunciation rules (p. 397).

Interestingly, past tense formation is conditioned in ways that are similar. Voicing distinction primes the changes that take place, however this time among alveolar consonants <t> and <d>. Epenthesis results in an additional vowel sound, but again with alveolar consonants in the conditioning environment.

- (1) When the verb ends in /d/ or /t/, the ending takes an epenthetic (i.e., extra) vowel and is realized as /ɪd/or /əd/.
 - (2) When the verb ends in a *voiced* sound other than /d/, the ending undergoes progressive assimilation and is pronounced as /d/.
 - (3) When the verb ends in a *voiceless* consonant other than /t/, the ending also undergoes progressive assimilation and is pronounced as /t/.
- (Brinton, Celce-Murcia, Goodwin, 2010, p 399)

Similarities and slight differences in the rules of these two inflectional processes may be easy to connect for students and teachers if they are presented together. Note the differences in pronunciation in the tense [s]/[z] and [t]/[d]. These differences in pronunciation were called allophones in the discipline of phonology. Morphologically these same distinctions are termed allomorphs. In both cases they are not meaning bearing, but may be salient to the speller depending on the structure of their language. These elements might trigger phonological

spellings. Inflectional morphology involves rules of phonological change. The first instance of this is found in the past perfective tense, and pluralization.

The progressive tense triggers consonant doubling. This is a significant principle during spelling. The progressive affix is used to show the time an action occurs and continues to occur with no completion. Some items have regular inflections like in <hang> + <ing> to make <hanging>. The <-ing> ending is associated with consonant doubling. The word <running> can be written out as a formula, <run> + <n> + <ing>. The rule that is well known among spellers is double the consonant and attach the suffix <-ing>. There is more to add to this rule. Cummings (1988) stated if a suffix “starts with a vowel...twinning does occur...if a suffix begins with a consonant it may not double” Cummings (p. 163). The vowel nucleus is informative whether twinning will occur or not. Lax vowels signal consonant doubles. Information from multiple areas of the word must be considered to form the progressive tense. Geminate consonants and the suffixes that trigger them will be discussed in more detail in the discussion of derivational morphology.

Negation changes the meaning of a verb root. It is a common principle used in spelling. Negation is listed under inflections in Bauer and colleagues (2013). This principle is where the word <not> is placed in front of a verb. They are spelled with the inflectional suffix <nt>, spelled <n't>, according to Bauer, Lieber & Plag (2013). An example of this is can be found using the auxiliary form of a verb “There **have not been** any drugs here for ages” is rendered “There **haven't been** any drugs here for ages” (p. 86). In addition negation is employed while adding the suffix <n't> on to the verb form “to be.” Illustrations of this are <could not> is rendered <couldn't>, additionally <do> in negated form is <don't> Bauer, Lieber & Plag (2013). The

placement of the apostrophe indicates the contracted form of the verb. Care must be taken in how to place the apostrophe. This area is significant in the discussion of child spelling.

Derivational morphemes change the meaning of a word. Their spelling can be obscured by language borrowing from Germanic, Latinate, and French influences Bauer, Liber & Plag (2013). Derivational inflections are added to a base word resulting in a change of pronunciation and meaning. Cues to a word's spelling is linked to meaning. The sequential patterning of letters in spelling solidifies the word's meaning at this time. To clarify, <beautiful>, <beauty> and <beautify> can be studied together, the root words signify the same meaning. Note the same spelling up to the point of the affix.

Morphemes in the derivational class that are influenced by borrowing can be difficult to describe. Historic elements of change influence word complexity. Each historic change is unique to the language background it comes from Cummings (1988) Sources of English borrowings are Germanic, French, Greek, and Latin. Spanish speakers especially benefit from the study of Latinate elements. Cognates or shared words between Spanish and English come from a shared source, which is Latinate roots Bauer, Lieber, & Plag (2013, p. 36). Derivational affixes change of meaning and syntax.

Derivational morphemes provide meaning when attached to a word. In addition they change the way a word is pronounced. Adding the derivational morpheme to a word results in sound change that is not always reflected in spelling. The word <inform> has the pronunciation [ɪnɔ̃]. It changes to [eɪ] when the noun suffix <-tion> is added deriving <information>. Furthermore the suffix <-tion> renders phonetic spellings from young or inexperienced spellers. The information in this ending does not give much help as to the pronunciation or spelling of the word. The <-tion> ending changes a verb into a noun like when <inform> is changed to

<information>. The use of this affix results in variations in vowel phonemes that do not show up in the word spelling. It changes a word's part of speech from a verb to a noun.

Phonemic and syntactic change is an issue again in the adjective suffix. The adjective suffix carries phonemic information that is linked to multiple spelling choices. The adjective suffix <y> presents multiple choices due to its connection to the front vowel phoneme [i]. It is a suffix that changes a noun into an adjective. Some of these noun to adjective derivations are: “<bone> + <y> to make <boney>, also there is <shake> + <y> to make <shakey>” (Bauer, Liber & Plag, 2013, p. 52). The connection of this derivation to some bases is relatively straightforward. The coda of these derivations is pronounced [i]. This phoneme is linked to multiple choices in spelling. This may be spelled <ie>, like <weird> and <ey> as in <key>. Students attempting to spell this ending will have many choices to pick from that, to them, will phonetically make sense. If not prepared students may make spelling exchanges with clusters that contain the correct phonemic information, but are incorrect spellings.

Comparing and contrasting is accomplished using comparative and superlative affixes. They contain meaning that attaches to a word upon inflection. Additionally, these suffixes follow predictable patterns. Comparative and superlative affixes are spelled using <-er> and <-est> respectively. The suffix <-er> means more and the suffix <-est> means most (Brinton, Celce-Murcia & Goodwin, 2010, p. 404). They are attached to an adjective, for instance <tall> + <er> = taller. Suffixes can be exchanged to change the meaning in a root word.

Comparative and superlative endings undergo structural changes. Some of these are consonant doubling, and <y> changing to <ie> word internally before the final inflection. The <-er> and <-est> endings are argued to trigger consonant doubling by Boland and Treiman (2017). A simple formation of this word type is <big> + <-er> making the word <bigger>. Simple

formulas guide the process of this variety of word. “Adjectives and adverbs of one syllable take the inflectional ending as do two-syllable adjectives with a final –y suffix (pronounced as unstressed /i/)” (Brinton, Celce-Murcia & Goodwin, p. 405). Examples of how words with final <y> take the comparative and derivational suffix are: <noise> + <y> is spelled <noisy>. Similarly the superlative form follows the rule with <noisy> + <i> + <-est> rendered <noisiest>. Consciousness raising of these rules will be necessary for teachers and students to achieve high levels of spelling accuracy. Naming the parts of the morphological structures given underpins strategies to go about forming a word. The names of these elements guide students to the appropriate word location. Comparing and contrasting, negation, inflection and derivation follow patterns that can be anticipated. The ways these words are formed can be broken into step-by-step pieces.

Chapter 3: Developmental Spelling Stages

How children learn to spell is indicated by key elements mastered as they age. It has been argued that children learn to spell using a continuum of word features that increase in complexity. It is posited that student's ability to spell with increased sophistication is correlated with maturational development. The discussion of spelling stages will first be linked to their foundation in child cognitive development. Children's ability to attend to increasingly complex syllable shapes is linked to stages of cognitive development. Errors children make have been studied and linked to tasks Piaget used to examine cognitive development. The following chapter exemplifies how a child's spelling changes as they grow in age and cognition. It is has been correlated with developmental spelling stages Zutell (1980). The purpose of this section is to show how developmental spelling stages align to cognitive developmental research.

Jerry Zutell (1980) hoped to find a link between Piaget's theories of cognitive development and increasingly sophisticated tasks during spelling. He studied the developmental spellings of 60 school children in grades one through four. He sought to study the qualitative changes of word formations from incorrect to correct form. Error analysis was his method of word study. Types of knowledge needed to spell words were aligned to Piagetian tasks. Singer (1978) gives Piaget's stages of development. They are: Sensory Motor, which includes children ages zero to two years old. Preoperational stage involves ages two through seven years old. Concrete Operations spans from ages seven to eleven. Formal Operations us from ages eleven to sixteen (chapter 2). The confluence of spelling stages with Jean Piaget's developmental norms gives a strong basis for educators to use stage models to conceptualize instruction. Zutell (1980) used developmental spelling stages and aligned them to Piaget's stages of cognitive development. Zutell (1980) used the frameworks that were constructed up to that point to align spelling and

child cognitive development. Strong correlations were found linking cognitive capacity to abilities in navigating increasingly complex spelling patterns.

Conservation tasks show how children reason. Preoperational and concrete operational thinkers schematize differently. Piaget's tasks show how children are able to conceptualize information at different ages. An example of a Piagetian task is where two beakers capable of holding the same volume of liquid are presented to a child. One beaker is tall and skinny, and the other is short and fat. When you pour water from the short and fat container to the tall and skinny container the preoperational child thinks the volume of water has changed (Zutell, 1980; Singer, 1978). "The child is centered, or focused on one aspect of the task. He focuses on either the height or the weight, but not both elements at one time. He is not cognitively able to consider more than one aspect at a time" Zutell (1980). Preoperational students presumptively might center on word elements and not more than one element at a time.

The operational child takes on the same task in a different way. This child can combine features like height and width of the beaker. This is called decentering. Zutell (1980) adds, "the child can mentally recreate the changes that happened in the task and know that nothing has been added or taken away" (p.57). This supports that the operational child will be able to take on complex words forms. He or she could attend to multiple changes that can happen in orthography, phonology, and morphology.

Zutell (1980) hoped to examine not just the words themselves, but what children can do at different times in their development. He wrote, "Learning depends not only on the stimulus, but on the structure or system the learner has available to process it" (56). Movement through developmental stages was paired with data collected from children's spelling. In a summary of his findings Zutell (1980) said there were:

Particularly high correlations between the first and easiest spelling category, the short vowel category, and the decentration variables suggest that the qualitative difference between preoperational and operational thinking is the most important for spelling at the time when the child first moves from a letter name strategy to more abstractly based relational structures. (p.63)

The work done by Zutell (1980) makes the point that a child is only able to take on the spelling structures they are cognitively equipped to handle. This same realization will be shown in the discussion of developmental spelling stages. As stages progress, so does the complexity of the features children are expected to use in spelling. Participant data will show that word elements of increasing complexity are more difficult to spell. This is found in spellings of words that contain vowels with multiple correspondences and orthographic markers. His findings establish the need for spelling instruction to align with a child's capacity to form words. Spelling develops gradually from simple to more complex spelling. Zutell's (1980) analysis sets up developmental stages of spelling next to a well-received cognitive model. This means developmental stages of spelling are a sound model to base instructional choices. Stage models are used in this study to categorize and describe the choices of elementary Spanish and English spellers.

This thesis is concerned with Spanish and English speakers and their spelling choices. It will seek to describe spelling errors in the areas of the onset, nucleus and coda of a word, when this organization is possible. The structure of words creates a need for different ways to categorize errors. In addition these descriptions will be embedded in knowledge drawn from developmental stages of spelling (Henderson, E., 1980; Henderson, E., Templeton, 1986; Cramer, 1998; Ganske, 1999). Findings will be used to determine priorities and pedagogical approaches for Spanish and English speaking spellers using the English system of orthography and its many sub elements. In addition, work described above will be done to seek appropriate teaching strategies to assist Spanish-English spellers to improve spelling. Implications will be aligned along the framework of

developmental spelling stages. Monolingual spelling research will provide elements that were difficult for Spanish spellers in English orthography.

Chapter 4. Research Questions and Methodology

The following research questions will guide the analysis of words collected. (1) How did errors pattern among the participants? (2) How did errors pattern within the onset, nucleus, and coda of the word? (3) How did errors pattern within spelling stages? (4) What can teachers do to help spellers improve? Stated again, the core concern of this study is to design instruction for bilingual Spanish-English spellers in elementary school.

This is a qualitative and quantitative mixed design analysis of the errors of Spanish-English speaking elementary aged students. Quantitative analysis of data provides a focus point to begin the description of what is seen in data. Qualitative study allows insight into how Spanish and English speaking students schematize. Qualitative method was appraised by Bahr-Huntley et. al. (2015) who said:

Qualitative analysis is pertinent because discerning patterns of misspelling can enhance understanding of student's phonological, orthographical, and morphological knowledge. Second, broader insight into misspellings can lead to individualized instruction and interventions for all students. (p.1590)

The purpose of using spelling stages is to pool data using models that go to great lengths to describe what spelling should look like in active instruction. Consequently, spelling stages are used to provide focus. The highest amount of errors will guide a discussion around what teachers can do to help students become better spellers. The stages used in this analysis are taken from Cramer (1998). In his work stages of spelling acquisition are summarized in a succinct manner that is further added to in this analysis by the work of Henderson & Templeton (1986), and Ganske (1999). Cramer's stages are used in this first mention of developmental stages due to their firm arrangement, where elements in other stage theoretical research are more diffuse. His stages

summarize and give credit to other experts in the field. Cramer (1998) lists the following stages for spelling development:

Prephonemic: The distinguishing characteristic of this stage is the absence of true alphabetic writing. There are no systematic connections between letters and sounds...children scribble, draw, make wavy cursive like lines, and write letters usually in random order.

Phonemic: Children make systematic connections between letters and sounds that represent true alphabetic writing. This stage marks the beginning of writing that can be read by the writer and the writer's audience.

Patterns within words: Children learn the patterns to which letters and sounds correspond within single syllable words. Children add sight words to their spelling repertoire, which proves the foundation for understanding more complex patterns within words.

Syllable Juncture: Children learn the structural principles that govern spelling at the point where syllable meet their juncture. The most common juncture occurs when suffixes and inflected endings are added to words. Junctures also occur within words. Three patterns are significant: dropping, doubling, and changing.

Meaning Derivation: Children learn that words related in meaning are often related in spelling in spite of changes in sound within the related word or derived form. This is a significant spelling principle, although it is often neglected in spelling instruction. (p.10-11)

Data on student spelling was compiled from the months of April 2016 to June 2016.

Classroom instruction maintained its usual routine during data collection. A total of 193 word tokens were gathered. They were subdivided using a spreadsheet. Three points were possible for one word token. A point was given for a correct onset, nucleus, or coda. The classification system for these errors can be found in Appendix A on page 84. Total errors were aggregated for the onset, nucleus and coda. Errors that could not be coded were left blank.

Descriptors from spelling stage theory guide the qualitative side of this analysis of student misspellings. Errors are categorized into spelling stages per the work of (Henderson, E., 1980; Henderson, E., Templeton, 1986; Cramer, 1998; Ganske, 1999). These experts have designed 5

general stages of development aligned with word features. The stages begin with simple sound to letter correspondences and outline a continuum of word knowledge that ends with derivational inflections. Some conflicts exist in the outlines of developmental spelling. Stage models are designed as teaching tool, lacking the clear-cut edges of an assessment tool Ganzke (1999). In spite of this trends are established. This study will be transparent in saying blurred lines exist in classifying data into stages. Nonetheless most stages are agreed upon. They sort most of the data in such a way where patterns can be seen. This will create a clear focus for pedagogical implications. Some errors fit into more than one category. In the case of <rainy> it was spelled <*rany>. The biggest issue this speller has is with the long vowel within word pattern <ai> mapped to the phoneme sound [eɪ]. It has the adjective suffix <y>. Therefore it is placed in the derivational stage. It has been discussed that although spellers are in a particular stage of spelling, they still call on information from other levels. In the case of <rainy> the speller is attempting to form a derivational ending, with the within word pattern <ai>. It is typical for students to use more than one level of information while spelling Ganske (1999). It would be conceivable that errors would also seem to belong in more than one stage. This study will strive to place the words into the stage that they belong in considering the whole word, and the misspelling.

Some elements are not addressed or are unresolved in the discussion of developmental spelling. The work of K. Ganske's (1999) Developmental Spelling Assessment (DSA) seeks to add more guidelines for placing words into stages. See appendix C for this assessment. Her tool is meant to give words in oral dictation where students spell what they hear. Assignment of student errors uses stages two through five. These stages are letter name stage (phonetic), within word pattern stage (patterns within words), syllable juncture, and derivational constancy (meaning

derivation). The stages given by Ganzke (1999) are listed outside of parenthesis. Stages given by Cramer (1998) are listed inside of parenthesis.

Most agree upon what types of feature categories that exist in each spelling stage. There are some areas that do not align. Ganzke (1999) lists a number of syllables for the words located in each stage of spelling development. Previously syllabic amounts were assigned inconsistently. The phonemic and within word stages are for monosyllabic words. Syllable juncture designates words of two syllables. Derivational constancy calls for two or more syllables Ganzke (1999). Monomorphemic words contain blends, diagraphs, and vowel pairs for example in student data for the within words stage we have the word <listen>. These monomorphemic words may be polysyllabic. There is no joining of an inflection to a base. These polysyllables occur in the within words stage. This goes against Ganzke (1999) who said within words stage must contain monosyllables.

Another slight discord happens during the discussion of inflectional affixes. Henderson and Templeton (1986) stated students should study inflectional affixes at the end of the within words stage. Ganzke (1999) lists these types in syllable juncture stage. Coding in this analysis will go with the recommendation of Ganzke (1999) who places inflections in syllable juncture stage.

Geminate consonants presented an issue during coding. Multiple prescriptions are given on how to deal with geminates. Doublets located in monosyllables were placed in the within words stage in Henderson and Templeton (1986). They said, "Syllable juncture stage includes the role of the vowel in the single morpheme word (310)." The words they used to illustrate this point were <rabbit> and <hotel> (310). The words <stuff> and <sniff> have final doublets triggered by the vowel. This same word type could rightfully be placed in the derivational constancy stage

with the addition of the suffix <ful> deriving the word <skiff> + <ful> = <skiff-ful>. Boland and Treiman (2017) established that derivational morphemes are “doublet encouraging.” For this reason geminates could rightfully be placed in stages falling from within words through derivational constancy. These word types will be addressed in their own section.

It should be stated at this time, the disagreements that arise are placed into clear groups for the purpose of coding. At no time does this study wish to hold educational professionals into a space where a student is ready to study a word type but does not since they are not in that stage yet. The ambiguities are cleared up only for the purpose of a clear analysis of data. Teachers must not hold a student back because a word type is not neatly packaged within a stage.

Stage models come with support and criticism. O’Sullivan (2000) puts stage models to the task saying students may draw from multiple stages while spelling. Phase theory has positioned its young spellers in kindergarten in first grade as reliant on phonemic knowledge only. This is not completely accurate either. The need to deviate from one word falling into one spelling stage is supported by the work of O’Sullivan (2000). She challenged the typical notion of phase theory stating that “students can be in more than one stage at a time” (p.10). For example spellers use phoneme knowledge in the phonemic stage all the way through development to complex derivations. The implication is clear that students cannot be put tightly into stages in their development. It is intuitive then, that their errors follow this pattern.

Chapter 5: Participants and Findings

Participants were five elementary aged students enrolled in EL programming. The students were in the following grade levels: two were in grade five, one was in grade four, and two students were in grade three. These students fall onto a continuum of bilingual abilities. No data was collected about the time that these students arrived to country, or whether they were born in the United States. This limitation as well as the fact no screening was done for the participant's level of literacy will be addressed in the implications section of this thesis. This thesis is a mixed design analysis of student data for the purpose of improving pedagogical strategies to teach spellers of diverse linguistic backgrounds. Spelling stages are introduced following a description of errors that pattern in the highest concentrations. The nucleus of the word and the within word patterns stages resulted in the most error tokens. Interestingly, within word patterns have many to one letter to phoneme correspondences. This is a hallmark of deep orthography. Spellers with strategies in spelling coming from a shallow orthography would be challenged with the multiple mappings of an opaque system of spelling. The second area that was difficult was the coda of the word and the syllable juncture stage. The onset, along with the stage of derivational constancy, and phonetic stage did not result in many errors.

Findings were aggregated by the total errors each participant produced. Total error amounts were calculated by their location in the word. Errors are placed into developmental stages to provide a framework of focus for implications. Research questions are (1) how do errors pattern among the participants? (2) How do errors pattern within the onset, nucleus, and coda of the word? (3) How do errors pattern within spelling stages? (4) What can teachers do to help spellers improve? The amount of errors collected through April 2016 to June 2016 is shown in Table 3 below.

Table 3. Error Totals

Student 1		Student 2		Student 3		Student 4		Student 5	
Grade	5	Grade	5	Grade	4	Grade	2	Grade	2
Errors	25	Errors	46	Errors	26	Errors	123	Errors	39
Total Errors: 259									

The first question that was posed was (1) how did errors pattern among the participants? Table 3 is an aggregate of the findings listed in Appendix A. There were a total of 193 word tokens collected. The students in this study committed 259 errors. These errors are listed in order from highest amount to lowest amount. Student four made 123 spelling errors. Student two made 46 errors. Student five had 39 misspelled words. Student three came in with 26 misspellings. Student one formed the least errors. This person misspelled 25 times during the data collection period. The two participants in grade five differed in the amount of errors committed. Participant one had twenty-five errors. Participant two made 46 errors. The student in grade four had 26 misspellings. The students in grade two made 123 and 39 errors respectively. Table 4 ranks students by error amount. The lesser amount of errors is listed first and the higher amount of errors is listed last. Grade levels and amount of errors within them had no pattern from lowest to highest or highest to lowest. Table 4 on page 44 gives a visual element to respond to question one, how did errors pattern among spellers.

Table 4. Rankings

Grade	Student	Amount of Errors
5	1	25
4	3	26
2	5	39
5	2	46
2	4	123

Table 5 below shows how many errors were found in the beginning, middle, and ending positions of the word. To address the second question: (2) how did errors pattern within the onset, nucleus, and coda of the word? Learners suffered the most miscues in the nucleus. The coda was the second to the most challenging. The onset presented the least amount of misspellings.

Table 5. Locations

Location	Student 1	Student 2	Student 3	Student 4	Student 5	Totals
Onset	3	5	3	16	4	31
Nucleus	9	24	15	64	19	131
Coda	13	17	8	43	16	97

Student errors are placed into spelling stages. Table 6 shows how students' errors fell into the developmental spelling frameworks. It was noted earlier students make use of strategies from more than one stage at a time. Students in this study made errors that seemed to fall into more than one spelling stage. Consonant doubles are placed in their own group and are not placed within a spelling stage. The most errors fell into the patterns within words stage. It had 70 total errors. The next highest category was syllable juncture, which collected 34 misspellings. Meaning derivation had 18 errors. Finally, the phonemic stage had eleven errors.

Table 6. Developmental Stages

Phonemic	Patterns Within Words	Syllable Juncture	Meaning Derivation
Total: 11	Total: 70	Total: 34	Total: 18

The lack of phonemic data suggests that students may be moving out of this category. Similarly, meaning derivation had a few errors. This stage is defined as a time where “Children learn that words related in meaning are often related in spelling in spite of changes in sound within the related word or derived form” Cramer (1998, p. 22). Adolescents and adults “continue to acquire

derivational forms as they read and write” according to Larsen & Nippold (2007, p. 22). One could surmise patterns in data fell heavily into the middle stages since that is the level of developmental ability of this population. Data patterned in a type of bull’s eye for the stages of within words and syllable juncture. The word nucleus and patterns within words stage are the two highest areas of student need. Syllable juncture stage and the word coda are the second to the highest area of student need. The phonemic stage, meaning derivation stage, and the word onset collected few errors. These errors will be discussed in the next chapter under the guidance of spelling stages.

Chapter 6: Discussion of Spelling Errors

The purpose of this review of literature is to give teachers access to the language pieces to name and diagnose breakdowns in student spelling. This begins with cognitive development and stages of development for the structures contained in words. Students master key elements in spelling as they grow in age and cognition. Stage models were strongly correlated with Piaget's stages of cognitive development Singer (1978); Zutell (1980). The design from these developmental structures linked to spelling facilitates the discussion of data. Morphology, phonology and orthography always have a role in this discussion. Phonology plays a heavy role in the first stage and continues into the later stages of developmental spelling. The last question (4) what can teachers do to help spellers improve is addressed after the description data relevant to each stage. A condensed view of stage models will be discussed first followed by more details in the explanations of each stage as descriptions relate to student data.

There are five stages of spelling development that frame this analysis. These were mentioned earlier as given by Cramer (1998). These stages frame the analysis of spelling errors of spellers. They also are done with the work of other professionals in the area of developmental spelling.

Prephonemic: The distinguishing characteristic of this stage is the absence of true alphabetic writing. There are no systematic connections between letters and sounds...children scribble, draw, make wavy cursive like lines, and write letters usually in random order.

Phonemic: Children make systematic connections between letters and sounds that represent true alphabetic writing. This stage marks the beginning of writing that can be read by the writer and the writer's audience.

Patterns within words: Children learn the patterns to which letters and sounds correspond within single syllable words. Children add sight words to their spelling repertoire, which proves the foundation for understanding more complex patterns within words.

Syllable juncture: Children learn the structural principles that govern spelling at the point where syllables meet-their juncture. The most common juncture occurs when suffixes and inflected endings are added to words. Junctures also occur within words. Three patterns are significant: dropping, doubling, and changing.

Meaning derivation: Children learn that words related in meaning are often related in spelling in spite of changes in sound within the related word or derived form. This is a significant spelling principle, although it is often neglected in spelling instruction.
(p. 10-11)

Stage models are beneficial because they give features of what students are capable of spelling along with their age range and development. English monolingual spelling stages begin with preschool aged children, and go through later elementary ages. Not every stage has an age assignment.

Forward movement through each level is correlated with cognitive growth, ability to master more complex spelling, and the student's chronological age. These models imply advancing movement through stages. A qualification needs to be added to stage theoretic thinking. O'Sullivan (2000) says:

Children move towards standard spelling more or less rapidly, always depending on their experiences and teaching – the stages within this process are far from being invariable or discrete.... children needed to integrate different kinds of knowledge – phonetic, visual, structural and semantic – in order to develop effectively as spellers. (p. 10)

J. Richard Gentry (2000) challenges phase theory as well. He said, "Spelling competence should be expected to increase with age, but a range of spelling abilities might be displayed at any given age" (p.319). The work of O'Sullivan (2000) and J. Richard Gentry (2000) ascertains that errors in the present study ought to fall into multiple categories. These experts show the design stage theories are backed by different levels of knowledge resulting in learners using different strategies depending on the type of word at hand. Word analysis begins with thematic units in a reading curriculum. Challenging word items must be targeted in a themed reading and writing unit. The

teacher will demonstrate a strategy that focuses on word structural elements. Students are given a period of time to practice within the context of a literacy rich environment. Once the student has looked closely at the processes specific to a word at hand, the word is placed back into its meaningful environment. Bear and Templeton (1998) said, “Pull words from live contexts, examine them and put them back (p.223).” This settles well into the theory of learning that aligns with context driven word analysis. Specific guidance as to how word analysis should look in active instruction is delineated once again by Bear and Templeton who say:

“Examine shades of sound, structure, and meaning. We do not just teach words we teach students processes and strategies for examining and thinking about words as they read and write” (1998, p. 223). The implications of this analysis hopes to underscore the examination of processes unique to each word, naming their features and activities in such a way they may be applied to the classroom. Stages have different characteristics, therefore different types of words in them. Each word stage will necessitate slightly different strategies in examining words. Teachers should engage themselves in the study of how to name word parts and processes that affect them. Naming and diagnosing word parts is then transferred to instructional design.

Phonemic Stage: Discussion of Data and Implications

The phonemic stage presents an array of features that students must know in order to correctly form a word. The first stage will be narrowed into topic specific to participant data. The participant data for the onset, nucleus and coda will be presented first. Following participant data will be an explanation brought forth from relevant literature. Spelling faults in the onset of the word were exchanges of graphemes of similar visual qualities. The nucleus had exchanges in phonemes that contained sounds that were perceptibly close. The coda had omissions of letters that carried no phonemic information.

This discussion will begin with the presentation of relevant data of the errors students created. Exchanges were made in the onset position of the word. These exchanges were as follows: <*zee> for <see>, and <*bo> for <do>. Following the work of O'Sullivan (2000) children can use strategies spanning multiple developmental stages in their spelling. The word <tomorrow> was spelled <*twomorrom>. This word is far beyond the phonemic stage of spelling. The exchange of <m> and <w> are in the coda and not the nucleus of the word. It is notable that the <w> and <m> are of a similar shape and seemingly flipped the opposite direction in spelling. The issue of this final exchange makes this error fit into the categories listed above, due to the theoretically visual nature of these miscues.

The nucleus was the site for exchanges that were of similar sound quality. The coda resulted in omissions of letters that carried no sound information. First the nucleus will be discussed. Following this will be the coda. Vowels in the nucleus are influenced by sound properties; more specifically how much sound they produce can cause students to exchange them. Participant data aligns with this issue. The phonemes that were incorrect were perceptibly close in the amount of sound they produced. The words <*wint> in exchange for <went>, along with <*lit> when the student meant to spell <let> are illustrations of this. Other exchanges in the nucleus were found. These were similar in position, but the perceptual distance of the phonemes involved in these exchanges were further away. These errors were <*jast> for <just>, in addition to this was, <*dag> for <dog>. In a study with Spanish-English spellers it is important to consider developmental research as well as take into the account the role of the phoneme in the choices spellers make. The coda resulted in elision of letters that had no phonemic property. These were silent letters or letters that contained orthographic information. Examples were: <*caa> for <can> also, <*tha> for <the> and finally, <*ar> for <are>. In all, the students were seemingly accurate

in the onset and coda position of the word in the phonemic stage. This can be seen by few errors falling into these locations. The coda in the phonemic stage accrued more errors than the other two location sites of the word. This falls into place with the rest of the data in this analysis. Many errors are collected in the nucleus site across stages.

Evidence of Phonemic Stage Errors in the Onset

The onset position of the word and the errors found therein will be discussed first in concurrence with literature relevant to their explanation. One position taken to explain errors of this type is that those letters that sound the same may confuse the learner. Exchanges may result from poor awareness of how letters and sounds work together. The visual shape of the word also can play a role in errors; students may have a poor memory for how a letter appears.

Students reversed letters in the initial word position. Multiple reasons may explain why a student spells this way. It is suggested that there is a “confusion effect....strings [that] are confusable [are] made up of rhyming consonants: B, C, D, G, P, T, V, Z Bryant & Goswami, (1990, p.81). The letters exchanged by participants rhymed in the case of and <d>. Interestingly <*zee> and <see> rhymed, but any further explanation to this end would be highly suppositional. It will be noted in the implications section that taking a video or audio recording of what students are thinking during spelling, or immediately after they spell a word would be helpful.

Cramer (1998) surmised letter reversals could be linked to immature visual remembering. The letters <z> and <s>, as well as and <d> visually may look the same to a young speller. A third argument could be positioned to account for these errors. That is poor phonemic awareness causes students to exchange letters in this way Bryant & Goswami (1990). Another area that could be addressed in further analysis is the child’s ability to store units of information in their

working memory and how it affects spelling as they manipulate new words for the first time. In sum, it could be argued students are working on their strategies to differentiate between letters that visually appear the same. Students also may need strategies to work with letters that rhyme like and <d>. Cartoon characters could be made out of the letters. A story could be made out of them to explain their differences. An example is is a man with a big belly, which visually sticks out in the front. The letter <d> could be made into a dog with a tail to help a student remember. This could be embedded into a small story or sentence next to the visual to assist the student's memory.

Evidence of Phonemic Stage Errors in the Nucleus

The nucleus was a site for exchanges in the student's data. It has been established that vowels of similar quality will be exchanged in a systematic way by spellers Beers, J (1980); Brinton, Celce-Murcia & Goodwin (2010). It also has been shown Spanish does not have lax vowel sounds. These are the main issues to be further explained in light of the data at hand. Not all errors may be readily explained. Some exchanges in the nucleus portion of the word were made resulting in phonemes that would not be perceptibly close. This could be explained perhaps by the fact a student was rushing. Once again, it would be useful to interview a student as they are spelling to have insight into their meta-analytic approaches.

J. Beers (1980) outlined common trades students make in the nucleus of the word. They are "<a> for <e>, <*gat> for <get>, and <i> for <e>, <*wint> for <went>, finally <e> for <i>, like <*mes> for <miss> (p.38). Phonemes that have similar sound quality are exchanged. Pairs of adjacent phonemes, or those that sound similar can be studied in a way to raise a student's awareness in their sound distinctions and how they are mapped to a grapheme. Inventories of sounds between world languages vary. This is the case of Spanish and English. The Spanish

vowel system does not distinguish between tense and lax vowels. In fact Spanish does not have the lax vowel sounds. [ɪ], [ɛ], [æ], [ʌ], [ʊ] (Salcedo, 2010). It may be a challenge for students to spell the <CVC> structure that only permits these vowel types. Based on the discussion of J.Beers (1980) and Salcedo (2010) the nucleus of a word will likely be an area students have difficulty spelling.

Minimal pair drills will sensitize students to slight variations in phonemic information. The jaw, mouth, and tongue positions can raise student awareness about the production of vowels. How to go about teaching this is framed with the question (4) what can teachers do to help spellers improve? Vowels are grouped into perceptual space based on how they are “formed in the oral cavity or the mouth” (Brinton, Celce-Murcia, & Goodwin, 2010). Minimal pairs drills help students practice words that are close in the amount of sound they produce (Brinton, Celce-Murcia, & Goodwin, 2010). Phonemes were exchanged in the nucleus of the words above. Vowels that vary slightly may be practiced to assist the student to hear the correct sound, then link that sound to the appropriate letter, and finally the word. The pairs <bit> and <bet>, <mit> and <met> will be helpful for students to study based on findings in student data. The teacher can say the word prompting students to point to its written form. Next, students can spell the words after the teacher says them. Students should be shown the difference in how their jaw, tongue and chin are positioned when forming vowel sounds. For instance students can practice the phoneme [ɪ], noticing how “the tongue is high and front, the jaw is slightly lower than <iy> and lips are relax slightly parted and spread” The position of [ɛ] contrasts a bit “the tongue is mid front and centered, open wider than <ey> and the lips are slightly spread” Brinton, Celce-Murcia, & Goodwin, (2010, p.125). Students may use a mirror or watch the teacher to see the difference.

Minimal pair words can be placed into sentences. The words <mit> and <met> are minimal pairs whose nucleus sound can be confused by students. This is because of their adjacent phoneme qualities <mit> has the vowel phoneme [ɪ] word internally, <met> has the vowel phoneme [ɛ] in the coda. These pairs can be made into sentences and placed on word cards. Students can draw a picture to link meaning to pronunciation practice. Words like <the> and <and> can be placed onto an alphabetized word list. Each word has its own job within a sentence. The word <the> is an article that demonstrates a noun is coming. This can be shown to students that this word has its work to do in a sentence and that is point to nouns. The word <and> is a coordinating conjunction. Students can be shown this word has a job that is to connect ideas.

Minimal pair drills help student's awareness of slight differences in vowels. The way the tongue and jaw are positioned while forming vowels may help students feel the difference between minimal pairs. Sounds that differ slightly can be practiced using the vowel quadrant as a visual to show students how the sounds are close in the quantity of sound they produce. Minimal pair drills can be performed and those words should be placed into meaningful sentences. Words may necessitate the remembering of their letter sequences. These can be function words like <the> and <and>. These words do have a specific function within a sentence that can be shown to students. Kids enjoy silly pictures to help remember things, the words <the> and <and> could be personified wearing hard hats doing a job, the word <the> in its hard hat could point to a noun along with the description that it is an article and that is its job to point to a noun.

Evidence of Phonemic Stage Errors in the Coda

The coda is the final area to be discussed. This word position is influenced by the fact that letters in the coda do not carry phonemic information. Together with this is the fact that orthographic remnants impact spellings in the final position. Structural changes in orthography

over time mean that students can no longer rely on sound to spell words. This may explain some of the challenges seen in the coda position of the word. It can be said that students spelling in the coda position of the word in the phonemic stage are seemingly accurate spellers. Not many examples of this type were gleaned from data in this study.

The coda position in the phonemic stage was misspelled. Historic remnants add to the opacity of spellings. This means students must rely on orthographic information to spell words that have changed through the history of the English language. This validates the work of O'Sullivan (2000) who said spellers use multiple types of knowledge as they form words. The final errors had structures that are not making use of the phonemic level of information. The influence of language history shapes the word final <e>. It carries no phonemic information. In the case of <are> the <e> was historically pronounced with the schwa sound [ə]. The final <e> is now silent according to Cummings (1988, P.149). Likewise <the> has been around since Middle English. Its opacity stems from historic changes. The final <e> in the word <the> ensures the labiodental phoneme [ð] is voiced Cummings (1988). Like <are>, the word <the> cannot be taken apart with phonemic strategies.

During the phonemic stage students use one to one correspondence from sound to letter. Words will also necessitate remembering of letter strings. Students must work with spelling words that have gone through structural changes. The result is these words cannot be encoded on their sound alone. As a result of this a strategy to help learners is that words have a specific function. The word <the> is a determiner and can be used to point to a noun. This can be drawn with a picture to remember the words "job." To this end a learner can remember a word by its sequence of letters and its function. The same can be done with <and> whose job is to connect ideas. A picture can be decided upon by the class on how to illustrate this. Then this word is also

remembered as a result of its job or function and students will hopefully not resort to trying to spell it phonetically.

Within Words Stage, Epenthesis, and Deletion: Discussion of Data and Implications

This section will discuss patterns of data that have fallen into the area of within words, as well as epenthesis and deletion. The within words stage is a time where multiple grapheme correspondences come into play with varying matches to phonemes Henderson & Templeton (1986). Similarly a phoneme can match to many grapheme choices. Epenthesis is the insertion of sounds to make a syllable constituent or pair of constituents easier to pronounce Koffi (2014). Along these same lines deletion is also a phenomenon that occurs to help speaker ease the pronunciation of a word Koffi (2014). These processes affect spelling due to its close relationship to our phonological system. The main issues in data to be presented are the effect that more demanding syllable structure places on students, orthographic markers that do not carry phonemic information, variant sound correspondences and spellings, <r> controlled vowels, and the relationship of spelling to meaning. In addition to this phonological processes affecting monolingual English speech affect spellings of the participants in this study. Some additional data that fits more into an “other” category will be presented. Students made reversals on endings of a similar letter sequence. This issue will also be included at this time.

Evidence of Within Words Stage Errors

The first cluster of data brought up will be the syllable patterns of <CVCe> and <CVCC>. The <C> stands for consonant and the <V> stands for vowel. The <e> is the orthographic marker. This marker carries no phonemic information and is an indicator that causes sounds to change in the word. This structure proved difficult for participants and they made

interesting choices and exchanges concerning these patterns. To illustrate some of these issues, <wack> is spelled <*wake> and <make> is spelled <*macke>. In addition to this the orthographic <e> in <voice> and <there> is omitted. The following visual shown in Table 7 further demonstrates choices students made. It also solidifies visually that the students found a challenge while working with this syllabic structure.

Table 7. Within Word Syllable Structures

Syllable Pattern	Location	Word	Target
CVCC/CVCe	-----	<*ther>	<there>
	-----	<*voic>	<voice>
	-----	<*houes>	<house>
	-----	<*becaues>	<because>
	-----	<*lik>	<like>
	-----	<*wake>	<wack>
	-----	<*twin>	<twine>
	-----	<*mada>	<made>
	-----	<*macke>	<make>
	-----	<*shack>	<shake>
	-----	<*tack>	<take>
	-----	<*hop>	<hope>
	-----	<*mad>	<made>
	-----	<*bande>	<band>
	-----	<*blacke>	<black>
	-----	<*wake>	<wack>

There were 16 instances where errors were made in the syllable structures <CVCC> and <CVCe>. A variety of miscues were pooled into Table 7. These spanned from missing orthographic <e> to the addition of an orthographic <e> at the end of a <CVCC> structured word. Student data seems to conclude that students in this analysis have difficulty grappling with orthographic markers and spelling outside of direct phoneme to grapheme correspondences.

Many to one correspondences between the grapheme and phoneme challenged students.

This is shown by participant data. Homophone pairs that were misspelled showed this. It was also

shown in the spellings of vowel diagraphs that have multiple representations. In participant data <hey> was spelled <*hay>. The high front vowel [i] shows that students are not sure whether to use <ee> or <ea> to appropriately spell the word. It has been concluded by Cramer (1998) that words that are spelled similarly have a similar meaning. Students at present are emerging in their ability to use this in their spelling repertoire.

Vowels that were <r> controlled, epenthesis, and phonological processes that affect native English speakers purportedly affected the spellings of students. The word <first> was spelled as <*firts>. It is shown in the benchmarks given for the within words stage of spelling that <r> controlled vowels present a challenge to students. It is unclear why an additional <r> is included in this word. Prompting students to think out loud as they spell, as it is being recorded would have been beneficial for unusual cases like this. This will be addressed in further in the limitations section. The word <small> was spelled with an epenthetic <e> and written as <*esmall>. This cluster is resyllabified due to the lack of <s> nasal clusters in Spanish Hualde (2005).

Phonological processes that regularly affect the English language affected the spelling of the class of alveolars in the environment of a nasal. The word <strands> was spelled as <*strans>. The word <found> was attempted and the result was <*foud>. Letters that carry no phonological information are not always spelled. In student data the word <listen> was spelled <lisen>.

Finally, data brought up the issue of the endings <es> and <se>. Examples of misspellings of these endings were <*holse> for <holes>, also there is <*cors> for <course>, in addition <*voic> for <voice>, as well as <*dose> for <does>. There is also <*houes> for <house>, and <*becaues> for <because>. At last is the spelling <*gose> for <goes>. The reversals of these endings occurred multiple times which necessitates they be addressed.

The following will be a discussion of the student data presented above. To follow will be implications for teaching. The within words stage emphasizes the principle that more than one spelling can be used for a particular phoneme. Students may switch out orthographic spellings that have the same or a similar phonemic spelling. The phonological information as a result of these spellings exchanges may be correct, but the orthographic information is incorrect. Students should be comfortable working with short vowel mappings. This positions them to work with vowel patterns found in more complex syllable shapes Henderson and Beers (1986). The patterns <CVCe> and <CVCC> call for a different vowel sound in the nucleus of the word. Compound words, vowel diagraphs and homophones are exemplars of spelling at this time. Ganzke (1999) outlined single syllables belong in this stage. The (VCe) pattern, <r> influenced vowels, common long vowels, complex consonant units like <dge> in <bridge> additionally; vowels, diagraphs, and diphthongs are elements of within word patterns. The focus of this discussion will be on the elements that challenged students in this study.

In addition to diagraphs and diphthongs more demanding syllable structures took a toll on student spellings. The silent marker found in the <CVCe> shaped words. It was a repeated source of student miscues. In addition to this the <CVCC> structure was spelled incorrectly multiple times. The final <e> that is not pronounced but is used to insulate graphemes is omitted. Phoneme sounds [eɪ], [aɪ], [i], and [au], are spelled with multiple grapheme choices. The phoneme [æ] is formed when incorrect syllable combinations occur. The phoneme [eɪ] actually is needed. See <*shack> for <shake>, for the most part students navigate the nucleus portion of the word well. The syllable structure namely the <CC> ending as well as the orthographic <e> was an issue in spelling. In addition to this architecture and the demand it presented are variant correspondences in spellings within the word. In the case of <voice> which is a <CVVCe> structured word, there

is the rule of the soft <c>. This rule states that the letter <c> is pronounced <s> before <i>, <e>, and <y> Cummings (1988). The letter <e> renders no phonemic information. The student leaves it off thinking he or she has accounted for all of the sounds necessary. Phonemically the <e> in many cases carries no information. Another way it can be used as an orthographic marker is that “it indicates that the initial [ð] be a voiced phoneme” Cummings (1988, p. 159). It is shown in Table 7 below the students struggle with the <e> as a marker of orthographic information.

Multiple choices presented in graphemes that might link to phonemes causes confusion. That means students can make substitutions that are orthographically incorrect, but phonemically the sound is correct. The phoneme [ai] presents two different spelling possibilities the word <like> with the shape CVCe, and <igh> like in <tight>. The <igh> is a complex consonant unit with a vowel. Similarly, [ei] can be spelled <rain> with <ai>, and <they> with <ey>, and with the syllable pattern <CVCe> as in <wake>. These words show how the same sound can be formed in many different ways with alphabetic spellings.

Students in the present study show they need more support to develop their own within word strategies. Student data calls for instructional focus on spellings using the diphthong [ai], the glide [ei], and the high front vowel [i]. Spelling is linked to meaning at this stage. A <meet> is a place where swimmers compete, and a <meeting> is where people come together. The <ee> vowel team is linked to the semantic value of the word. The <ea> vowel pair is not semantically linked to this pair you cannot have a <*meating>. The principle of meaning that links to vowel pairs can be addressed early. This is an idea that will follow into later stages. The principle that meaning links to vowel pairs can be addressed early. This is an idea that should be well supported, as it is also a principle in later stages.

Letters were inserted into locations where they did not belong in student data. One instance of this was found in an <s> nasal cluster. This is an issue concerning the fact that <s> nasal clusters are not permitted syllable initially in Spanish. The other student spelling issue was an <r> controlled vowel. Phonological processes normally found in English also accounted for issues presented in data. The words <strands> and <found> are affected by a process of English pronunciation whereby after a nasal “[d] is very short and frequently deleted” Bybee (2001, p.76). In the case of <listen> and the deletion of <t>, it is affected by the fact that <t> is a silent consonant Brinton, Celce-Murcia, Goodwin (2010, p. 437). It is not pronounced so the speller may leave it out. The word <found> was written without the <n>. According to J. Beers (1980), a nasal can be deleted when it is part of a blend in spelling. Processes affecting consonant and grapheme constituents affected spelling in student data. In addition to this a Spanish phonologically process seemingly drove a student’s addition of <e> onto a nasal cluster.

A pattern of reversed endings emerged in student data. Orthographic information is confused with information that marks plural and third person words. The words <es> and <se> are reversed. It will be helpful for students to know the functions of these endings to resolve this. The issue at present begins with the discussion of its orthographic components. This is followed by the plural and third person endings that were confused with the orthographic endings. Some rules in place to explain and then remedy these issues will be outlined. The first is that “silent final <e> is regularly used to avoid ending a terminative base with a single <s> that is immediately preceded by a consonant, a vowel diagraph, or an unstressed vowel unigraph Cummings, (1988, p.148). This accounts for some of the errors at hand above. The third person like in <goes> and <does> is indicated by the <es> ending. The word <holes> is a plural noun. All three of these are pronounced with the allomorphic sound [z] due to voicing assimilation to

match the nucleus of the word with the coda or ending. Students should be taught that <es> is a letter sequence to indicate plural. It is added to the third person as well. The difference between <se> and <es> should be delineated and explained in terms of their grammatical and orthographic functions. The ending <es> is plural, and added to the third person. Orthographic information is indicated by <se>. The <e> insulates the <s> since it is not allowed to end the word in this environment.

Varying vowel spellings were challenging to students in this stage. Clusters with <n> and <d> were reduced because of normal phonological processes in the English language. Clusters where one consonant is not pronounced were spelled as they sound. The orthographic marker <e> challenged student spellers. It was found with the <se> ending. Students may have confused this ending with the plural <es> ending. Syllable shapes challenged students, <ck> endings in CVCC syllable patterns they were mixed with strategies of the <CVCe> syllable shape.

Within words is a time where students learn multiple word patterns can be used to spell one phoneme. Sequences of words can affect meaning, like those found in homophone pairs <meat> and <meet>. The <e> presents a special challenge. It can act as a marker for orthographic information. It is used as a marker for the long vowel. Vowel patterns must be studied like in the misspellings of <meat> and <meet>. The <ea> and <ee> in the nucleus of this word carries semantic information with it, which attaches these spellings to different meanings. The <ea> like in the word <meat> means something that can be eaten and words spelled like it will hold a similar meaning.

Vowel patterns can be studied “A small number of vowel patterns yields a large number of words” Cramer (1998, p. 21). In addition to these patterns draw students’ attention to which patterns link to semantic information. Teachers can provide categories for students to do word

sorts. For instance headwords can be given on a “t” chart with headwords, where <met> with the internal phoneme [ɛ] and <meet>, with the nucleus [i] are the focus. Students can find words that have these patterns while reading. They also may practice making new words with these patterns.

Words that are collected may be placed in a word target section of a journal and can be used later for word sorting Cramer (1998). Studying word patterns should be done with students positioned to analyze patterns and make conclusions. “Word patterns are more useful than rules. Word patterns may come first, and then overlay the rule to spark inquiry” (Bear & Templeton, 1998, p. 230). Students may be presented with the pairs <goes>, <holes>, and <does> and discuss about they know about them so far. Students may be able to say the words <goes> and <does> are an action. They may know <holes> is more than one <hole>. Put these word targets into sentences students can deduce their parts of speech. While comparing <do> and <go> you add <es> to make things an action and <es> is a plural marker. The previous words mean that the teacher must instruct learners on the use of the third person. Meaningful word study is done within the reading curriculum. Students must have the desire to pull apart words and see what different endings and attachments do to the meaning and function of the word. Analytical skills will help students pull apart the structures on their own after practice.

Syllable Juncture Stage: Data and Implications:

Plural and past tense affixation is an area where miscue data was gathered. The students were less effective in their ability to produce correct target forms in the plural inflection. The plural inflection is a challenge. The environments of this spelling type can produce three different phonemic outcomes. These three allophones are [s], [z], and [ɪz] or [əz]. Similarly the past tense morpheme <-ed> has three allophones. They are [d], [t], and [ɪd] or [əd] Brinton, Celce-Murcia, Goodwin (2010). The speller has three phonemes to represent one grapheme. Hearing derivational

endings pronounced three different ways confuses the speller. In addition to allophonic variations, <r> controlled words are presented now in data with words that are more difficult. These issues are the main concerns of the present data. Furthermore the genitive form resulted in small pools of data due to student's non-target choices. Finally, a strategy students adhered to was to avoid the inflection altogether. Data will be presented to demonstrate these specific issues. Implications to assist learners will follow.

Evidence of Syllable Juncture Stage Errors

Patterns associated with affixation might be associated with the multiple allophonic representations associated with the final grapheme <s>. In addition to this students made non-target choices in how they placed the apostrophe. Student data that displays this is where a student spells <cares> as <*car's>, and <makes> as <*mack's>. The students who made these errors may need further support with within word patterns. In addition they must add correct information to show the appropriate form of inflection. Finally, it is clear the students are not sure how to show possession. The strategy of some students has been to avoid affixation completely. The words <*apple>, <*keep>, and <*beside> were supposed to be <apples>, <keeps>, and <besides>. Students might avoid affixation if they lack confidence in how to attach the ending. The words <*gose>, <*clos>, and <*volcanos>, were close to target form. They were supposed to be <goes>, <clothes>, and <volcanoes>. The genitive form and avoidance of the inflectional ending cluster into smaller data portions. Nonetheless, they have presented themselves as relevant to the discussion concerning student needs.

Allophones in the past and plural inflection follow systematic environments. These may be taught to students so that in hearing the past tense pronunciation they may know that the ending for this is not randomly assigned. This will assist with the spelling of these endings. It has

been established how pronunciation is linked to spelling. The following visual will present the issues of the plural inflection. Students avoided the past tense inflection altogether. Metathesis, or reversals of letters Hayes (2009) are found in the table below in the case of <*blose>, where the student meant to spell <blows>. The variant spelling of [i] is seen in the spelling of <*trys> as <tries>. This shows a student is grappling with multiple grapheme to phoneme correspondences as well as the inflectional ending. Interestingly the epenthetic [ɪ] that is found in [ɪz] is deleted in <peaches>, it is spelled <*peachs>.

The students were accurate in that no plural inflection was spelled with a final <z>. Avoidance is found in relation to this ending. Apostrophes occur where they are not necessary. There is one case of metathesis, also a reversal from <d> to . Table 9 illustrates what has been discussed in student data.

Table 8. Syllable Juncture and Plural Inflections

Place/Manner Feature	Location	Word	Target
-s/z allophone	Coda	<*apple>	<apples> [z]
	-----	<*keep>	<keeps> [s]
	-----	<*beside>	<besides> [z]
	-----	<*blow>	<blows> [z]
Apostrophe placement	-----	<*car's>	<cares> [z]
-s/z allophone		<*try>	<tries> [z]
	-----	<*mack's>	<makes> [s]
	-----	<*look's>	<looks> [s]
	-----	<*do's>	<does> [z]
/ɪz/or /əz/	-----	<*peach>	<peaches> [ɪz]
/ɪz/or /əz/	-----	<*change>	<changes> [ɪz]
	-----	<*live>	<leaves> [z]
	-----	<*hole>	<holes> [z]
	-----	<*go>	<goes> [z]
		<*clothes>	<clothes> [z]
		<*volcano>	<volcanoes> [z]

The past participial ending <-ed> follows a similar pattern as the plural <s>. The way it behaves similarly is in that it also has three allophones. These are predictable in the environments they are found. This can be used to remedy miscues learners have concerning its spelling. The issues surrounding this inflection is the avoidance of the <-ed> ending altogether. The <d> at times is included without the <e> preceding it. The grapheme <t> is in place in lieu of the <-ed> ending in the case of <supposed>, it was spelled <*suposte>. Theoretically this could be conditioned by the pronunciation of this ending. Additionally <missed> spelled as <*misset> seems to follow in this same pattern. A metathesis, or letter reversal Hayes (2009) was produced in the spelling of

<pouted> as <*potede>. Table 10 below further delineates the issues brought forth by student data.

Table 9. Syllable Juncture and Past Tense Inflections

Past Tense Inflectional Morphemes Place/Manner Feature	Location	Word	Target
Target form past tense allomorph [d]/[t] [+voice] alveolar plosive	Coda	<*clird>	<cleared> [d]
	-----	<*organize>	<organized> [d]
	-----	<*colde>	<called> [d]
	-----	<*mistreat>	<mistreated> [ɪd]
	-----	<*use>	<used> [d]
	-----	<*listen>	<listened> [d]
	-----	<*call>	<called> [d]
	-----	<*suposte>	<supposed> [t]
	-----	<*prowld>	<prowled> [d]
	-----	<*misset>	<missed> [t]
	-----	<*potede>	<pouted> [ɪd]

In the case of the syllable juncture stage, within word patterns have hopefully been firmly established by this time. Students need a solid foundation in the multiple sound to letter patterns present in monosyllabic words to begin to take on additional pieces that are added to the word, in this case an inflectional affix. Allophonic variations are found in the spellings of the past tense and plural inflections. In spite of these, students were mostly accurate in the spellings of the past

tense, that is, the plural ending that is pronounced with the phoneme [z] was not spelled with <z>. Students were mostly accurate in their spellings of the past tense <-ed> ending. Occasionally substituting the <t> for the <d> or <-ed> ending

A major issue of the present stage is how spellings behave at the juncture of the syllable. “A syllable juncture is a place within a word where syllables meet,” Cramer (1998, p. 22). Features of this stage are outlined by Ganzke (1999) who said polysyllables with <r> controlled vowels will challenge spellers. In addition to this is how morphemes are added to base words. These elements will be discussed in light of what teachers can do to remedy erroneous hypothesis in word formation.

Adding morphemes to base words means children are spelling with multiple elements in a word. Students and teachers need a common understanding of what to call word elements. The reference found in Table 11 below is to help give a start to the language that describes words. As with any classroom tool, it will be added to as it is used to fit the needs of the classroom. Teachers may add these pieces at their digression. This table may be used to “hunt” for target word pieces as the class scans a story, looking for word elements within the context of a text.

This table can be posted visibly in the classroom. It could be taped into student journals as a tool for their reference that may be brought to class and resource rooms. This normalizes the tools that different educational professionals use that work with one student. This is only a start. Additional cells can be added to this tool, as students need to know more word elements. Students may even take ownership of this table. Students may spontaneously add their own elements without teacher direction.

Table 10. Syllable Juncture and Morphology Terms

Base	The word's semantic core	<re>+<paint>+<ed>
Affix	Elements that can be placed at the beginning and ending of a word. It can change syntax or meaning.	<re>+<paint>+<ed>
Prefix	An element attached to the beginning of a word to change meaning. It is bound. It cannot stand-alone and have meaning.	<re>+<paint>+<ed>
Suffix	An element attached to the end of a word to change inflection or meaning. It is bound. It cannot stand-alone and have meaning.	<re>+<paint>+<ed>
Phoneme	Sound differences that distinguish words.	
Allophones	Sounds that are perceptibly different but to not distinguish words.	
Morpheme	A unit of meaning.	
Grapheme	A written parallel to spoken language phonemes Cummings, (p. 207) Kid Friendly Definition: A letter in the alphabet meant to represent a sound.	

(D.W. Cummings, 1988 p. 32-33, Brinton, Celce-Murcia, Goodwin (2010); Bryant, Deacon, Nunes, (2006).

The language outlined above is a starting place to remedy misspellings. It is difficult to make repairs if you do not know what to call the places that need to be fixed. Table 11 above demonstrates basic vocabulary to start naming elements in need of help.

Spellings are affected by allophonic variations. Starting with the plural affix <-s>. "In regular plural nouns the ending may be pronounced [s] or [z], but it is always spelled <-s>." Bryant, Deacon, Nunes, (2006, p. 605). The plural <-s> undergoes assimilation in pronunciation. That is, the coda phoneme goes through processes to match the voiced/voiceless property of the phoneme that precedes it Brinton, Celce-Murcia & Goodwin (2010). In the case of <*trys> and <tries> the graphemes <ie> adjacent to the plural <-s> are voiced. They make the phoneme sound

[aɪ], therefore the pronunciation of this word will be [z]. The unvoiced alveolar fricative [s] becomes pronounced as a voiced alveolar [z] in the spelling of this word. The phonological rules stated in the literature review are visited again (Brinton, Celce-Murcia, Goodwin, 2010, p. 395):

- (1) When the noun or verb ends in a sibilant consonant (i.e., /s, z, ʃ, ʒ, tʃ, dʒ/), the inflection has an epenthetic /ɪz/or /əz/.
 - (2) When the noun or verb ends in a voiced nonsibilant sound, the inflection involves Progressive assimilation and is realized as /z/.
 - (3) When the noun or verb ends in a voiceless nonsibilant consonant, the inflection also involves progressive assimilation and is realized as /s/.
- Contractions like <does> follow the same pronunciation rules (p. 397).

These rules are systematic in the pronunciation of the three different allophones for the plural inflection. Two cases of progressive assimilation occur. One is where a voiced sound is on the end of a word; therefore the ending is assimilated or made the same to be voiced. The noun or verb can also assimilate in its ending lose its voiced quality so that the final inflection matches the previous environment. An additional sound is added in the environment of a sibilant consonant. Then the additional [ɪ] in [ɪz] is added or [ə] for [əz]. The rules take on a similar feel when you examine the environments that prime the three different endings for the past participle. The rules are:

- (1) When the verb ends in /d/ or /t/, the ending takes an epenthetic (i.e., extra) vowel and is realized as /ɪd/or /əd/.
 - (2) When the verb ends in a *voiced* sound other than /d/, the ending undergoes progressive assimilation and is pronounced as /d/.
 - (3) When the verb ends in a *voiceless* consonant other than /t/, the ending also undergoes progressive assimilation and is pronounced as /t/.
- (Brinton, Celce-Murcia, Goodwin, 2010, p 399)

Similar to the rules of the plural <-s>, there is an epenthetic sound, and two assimilations. One assimilation is voiced the other is not voiced. This time the epenthesis takes place in the environment of a voiced or voiceless alveolar consonant. Progressive assimilation takes place with the phoneme [d]. The ending becomes voiced to match the quality of the preceding

phoneme. The progressive assimilation for voiceless consonants occurs to match the quality the unvoiced consonant that comes before it. It is clear at this time the allophonic variations of these two inflectional endings follow predictable rules.

Predictable rules found in pronunciation can be employed to help learners see patterns in how they say words and subsequently spell them. It could be brought to the learner's attention that a morpheme looks one way on the page, for instance <-ed> is always spelled the same way. Attention must be drawn to the three different pronunciations. This can be done in the context of a story the teacher creates to address this issue in a text. Students may pursue a text with a story about someone's morning routine. This would target the past perfective tense. Students can underline the <-ed> endings found in a text. Pupils can consult pronunciation rules to discuss the different ways it is pronounced in this live context in spite of the exact same spelling. This is an activity for older students, younger students just simply must know it is always spelled <-ed> no matter how we say the ending. They may be able to understand how three different pronunciations follow this ending. Grades that are younger will not be able to take in the pronunciation rules as listed above. The pedagogical remediation listed above is as suggested by Brinton, Celce-Murcia, Goodwin (2010), who put pronunciation rules into live contexts to draw learner's attention to rules in live contexts, including in songs.

Allophonic realizations of the past tense, and plural inflections influenced spellings. Students will benefit from knowing what they did right within the structure of the word. In the word <*prowld> the student should be commended for having the spelling mostly correct. Just one error occurs in the coda with the use of the suffix <-ed>. The sound [d] and its grapheme are included. The <e> that carries no sound must also be in this affix. Categorization of right or wrong is a blunt edged method in comparison to the fine details that can be provided in naming

word elements. Showing students the steps of creating the word that were correct and what is left over for mastery is the most helpful. Steps to create words can be outlined in ways where students can access word processes in the form of student friendly strategies. It is the position of this thesis that the errors mentioned in this chapter be addressed in this way.

Meaning Derivation and Morphology: Data and Implications:

This stage had errors generalizing around deletions that are arguably the result of regular phonological processes of English speakers. Vowels that have multiple choices as seen at the within words patterns stage are presented again, with added difficulty in applying a derivational suffix. Multisyllabic words add to the complexity of spellings as students are taking on longer words. Words spelled with consonant doubles result in students not making the target word form. The greatest amount of data pools around the suffixes <-y>, <-er>, <-tion>, and <est>. The endings <er> and <est> might encourage internal constituents to double Boland & Treiman (2017). Multiple syllables in a word, suffixation, and internal structural variations due to vowel diagraphs, variant sound and letter choices, and doubling were found to challenge students.

Evidence of Derivational Stage Errors

Participants deleted consonants that resulted in the environment of a cluster. Interestingly, <e> was added to the coda position of a word adding unneeded information but not changing the pronunciation. Words that were supposed to be doubled resulted in omissions of geminates. Multiple correspondences involving vowel phonemes and their graphemes were spelled incorrectly. Table 11 below illustrates these main issues.

Table 11. Derivations

Morphemes (Derivational)			
-y	Coda	<*rany>	<rainy>
	-----	<*poiny>	<pointy>
	-----	<*saltey>	<salty>
-tion	-----	<*informaation>	<information>
	-----	<*moshin>	<motion>
	-----	<*imajination>	<imagination>
-misc <er>	-----	<*charecter>	<character>
-misc <er>	-----	<*flowers>	<flowers>
-misc <er>	-----	<*afther>	<after>
	-----	<*mixes>	<mixers>
-misc <er>	-----	<*mater>	<matter>
-misc <er>	-----	<*beter>	<better>
Comparative (superlative)	-----	<*bigest>	<biggest>
-est			
-misc <er>	-----	<*charecter>	<character>
-misc <er>	-----	<*flowers>	<flowers>
-misc <er>	-----	<*afther>	<after>

The discussion of the crux students face in the more difficult derivational stage will follow. This begins with altered structures as a result of time, language use, and contacts of different civilizations Cummings (1988); Coulmas (2003). The word <flower> has come from old English. Words of this type used to be spelled with <ou> like in <flour>. The <ow> spelling was adapted later. Changes were made to prevent confusion between graphemes in the old English Script Cummings (1988). The differences of spellings as in <flower> and <flour> was “adapted in the eighteenth and nineteenth centuries” Cummings (1988, p. 304). This is one example of why we have the ending <er> that is it is the remnant of a structural change in English orthography. In addition to this <er> can be added to a stem to change its meaning and syntax. While examining the word <teacher> one must pull out the ending to explain its meaning <-er> means “one that

does,” Cummings (1988, p.166). Therefore it can be taught that the formula <teach>+<er>= one that teaches. The <-er> ending may be a derivational suffix, or the result of historic language change. Students must know that these two cases may apply and the difference between them. The meaning derivation of “one who” would not apply to the case of <flower> as it may not be explicated as <flow>+<er>=one that does flow. Exceptions to meaning based rules are meaningful to students. Teachers can briefly explain to students these rules. People who formed rules in the history of our language wanted to make spellings more clear. The spelling of <flour> and <flower> were too easily confused so the users of the orthographic system at that time did something to assist spellers. This cannot be confused with the comparative suffix <-er>.

Joan Bybee (2001) found that regular phonological processes affect phonemes in speaking. For ease of articulation consonants in clusters may be deleted. The elimination of consonant clusters makes a speaker able to produce their utterance or word more quickly. The first issue that was found in spelling was theoretically produced as a result of normal English pronunciation. The word <pointy> was reduced to <*poiny>. Therefore an alveolar consonant was reduced in the environment of a nasal Bybee (2001) states this process occurs regularly in spoken English. In addition to this Brinton, Celce-Murcia, Goodwin (2010) assert that phonemes that are not pronounced are left out in spelling. It is easily seen how phonemes that are not pronounced may be omitted in spelling.

The words <information>, <motion>, and <imagination> are words brought up as pertinent issues in student data. The <-tion> ending makes verbs into nouns. For example <imagine> can be made into the noun <imagination>. Word meaning is indicated by the root word and its spellings, <imagine>, <imagination>, and <imaginative> roots are studied beginning with the root <image> or mental picture, also to think something is so (www.dictionary.com). The

derivatives of this word <imagination>, <imaginative> and <image> are all different parts of speech. Imagination is a noun, imaginative is an adjective, and image is a noun (www.dictionary.com). These can be studied based on their root meaning, then placed into sentences. It will be useful to have students see how they may be placed into sentences as different affixes are attached. It is shown again in data that students rely on spelling strategies that use phonemic one to one mappings. This is even in this last stage of meaning derivation or derivational constancy. The words <*moshin> and <*imajination> are phonemic spellings. The speller of the word <*imajination> relies partially on a phonemic strategy. This person needs re-teaching of the rule “<j> is <g> before <e>, <i>, and <y>” (Cummings 1988, p. 417). The two endings in spelling <-tion> and <-sion> render one pronunciation [ʃən]. The <-sion> spellings can have two different pronunciations [ʃən] and [zən]. An activity to sort words by pronunciation is given in table 12 below.

Table 12. -tion and -sion

-tion = /ʃən/	-sion = /ʃən/	-sion = /zən/

(Brinton, Celce-Murcia, Goodwin (2010), p. 433)

It is recommended by Brinton and colleagues to have students sort words according to pronunciation in the case of the <-tion> and <-sion> endings. This will help students link the correct spelling patterns to their pronunciations. This can be done while reading or working on writing in the classroom. The table can be kept in the student’s notebook and used to collect this ending type in a meaningful context.

The issues that come up during derivational constancy are similar in Spanish and English. Derivational affixes in Spanish can change the part of speech like they do in English. The

derivational constancy stage relies on the meaning of the word root, and the meaning of the affix that is attached. In English and Spanish the derivational affix causes shifts in sound while the meaning of the word is retained. Derivations in English and Spanish should be shown to students. The main principles of these spellings should be listed (1) attach suffix to root word (2) the suffix changes the part of speech (3) the root retains its meaning (4) changes in sound occur. Go through these steps as you show students examples in English and Spanish.

This principle may be used to benefit spellers who speak Spanish and English. Findings in a study by Llombart, Huesca (2017) indicate heritage learners of Spanish might rely on meaning strategies (p.19). This stage is heavily reliant on the meaning of roots and affixes. The following forms could be used to facilitate student's knowledge of derivations in Spanish and transfer the skill to English. The words <peligro> and <silencio> mean *danger* and *silence respectively*. These words are both nouns (www.spanishdict.com). When you add the derivational ending <-oso> in Spanish to the two words they are <peligroso> and <silencioso> Llombart, Huesca (2017). The <oso> ending has changed these words to adjectives (www.spanishdict.com). Derivations in Spanish follow a similar pattern where they rely on attaching an affix to a root word. The root word retains its meaning. In addition shifts in sound occur in Spanish derivations. The derivation changes the word's syntax. The following tool in Table 13 can be used to help students see consonantal and vowel shifts in derived forms in Spanish.

Table 13. Morpho-Phonological Structure Span/Eng

	Consonant Shift		Vowel Shift	
	Base Word	Derived Word	Base Word	Derived Word
Spanish	ocho [tʃ]	octavo [k]	fuerte [we]	fortalecer [o]
English	eight [t]	eighth [θ]	strong [ɔ]	strengthen [ɛ]

(Curinga, 2014, p.17)

Teachers may use schematic devices such as this one to assist students in capitalizing off any first language knowledge they have and using it to grow a second or sequential language. English orthography and its spellings can be outlined in strategic ways to help students form a correct strategy in spelling. The issues related to spelling in this section followed previous patterning in student data, where more than one phoneme to grapheme link in spelling, orthographic but silent information found in <e> and doubles created errors in student data. In addition, derivational endings and their attachments to a base words come from language change. Derivational endings also contain meanings. It will be helpful for students to know which derivational endings contain meaning information. Student should be shown exceptions to rules like in <flower> and <teacher>. Spanish and English follow similar processes during derivation. The steps that are similar in the process of creating derivational endings should be shown to Spanish-English spellers.

Miscellaneous and Geminates: Discussion of Data and Implications:

Consonant diagraph misspellings formed a collection of errors best categorized as miscellaneous. They are miscellaneous since the errors can belong to multiple stages. Therefore they were a challenge to categorize into a specific chapter for discussion. These errors span across the locations of the onset, and the nucleus. Table 14 gives a visual illustration of this pattern spanning through simple to more complex words. The diagraph and miscellaneous category had cluster reductions; these involved the silent consonant of the diagraph. In addition to this diagraphs were eliminated completely. Geminates resulted in errors. The consonant double was reduced to only one member of the pair in the medial and final positions.

The data that was mined for its production of errors with diagraphs will be addressed first. The <th> diagraph was attempted five times. Out of those times the <t> was omitted only one

time. Out of the <th> diagraph pair the <h> was left off twice. The rest of the words that called for <th> to be included left this diagraph off completely. The <wh> diagraph was a source of misspellings. The <h> in this cluster was left off three out of the three misspellings. Table 14 demonstrates the issues presented above. The issues of deletion of these clusters are presented. It is also seen where students seemed to avoid consonant diagraphs altogether. Additionally the silent consonant of the pair is left off in some of these instances.

Table 14. Errors of Diagraphs and Miscellaneous

Place/Manner Feature	Location	Word	Target
<h> grapheme is deleted			
<th> [ð].	onset	*tir	there
<wh>	onset	*wat	what
<wh>	onset	*witch	which
<wh>	nucleus	*kartwil	cartwheel
<th> [θ]	nucleus	*birday	birthday
<th> [ð].	nucleus	*clos	clothes
<th> [θ]	nucleus	*somting	something
<th> [θ]	nucleus	*helh	health

The diagraph <th> has two phoneme sounds linked to the written representation of the letters <t> and <h>. The sounds that are paired with this spelling are the voiceless interdental fricative [θ], and the voiced interdental fricative [ð]. The voiced interdental is signaled by final orthographic <e> Cummings (1988). Students spelling with <th> need to know the spelling is linked to two phoneme sounds. With the inclusion of final <e> the <th> is pronounced as voiced. Silent consonant letters are omitted in the spellings of students. This is a monolingual issue. Therefore it

might be presumed that bilinguals would also find words where phonemes are not pronounced to be a challenge.

Variant choices may have caused misspellings of the diagraph <th>. Students who have multiple spellings that map to one phoneme or one letter have more possible-spelling candidates to choose from. This is the case with <th>. It has two phonemes to choose from and one spelling. The spelling follows predictable rules. They are found in specific environments. The diagraph *th* represents [θ] initially in lexical verbs such as *to think, to threaten, to thank*; initially and finally it occurs in common nouns, adjectives, adverbs, and prepositions: *bath, path, throat, threat*...it also occurs in proper nouns: Theodore, Thelma, Garth, Thorpe. Brinton, Celce-Murcia, Goodwin (2010, p. 509)

The phoneme [θ] is found in the words <birthday>, <something> and <health>. Which are common nouns and <something> may be a noun or pronoun depending its use in a sentence. The parts of speech where this phoneme is found in <th> spellings can be listed as a rule or strategy to check as it is placed in a writer's notebook, or on the classroom wall. The phoneme [ð] has its own parts of speech and locations in which it is permitted these are listed by Brinton, Celce-Murcia, Goodwin (2010):

The diagraph *th* followed by the vowel letter represents /ð/ in function words such as *the, this, although, that, then, thus*. It occurs medially in nouns such as *mother, brother, lather, bother, heathen*, and finally in some plural nouns such as *baths, paths*. It occurs in verbs before a final silent e: *bathe, teethe, loathe*. (p.510)

The words <there> and <clothes> are words that have this phoneme within them. The word <there> is a pronoun, perhaps grouped in “function words” as the previous author lists other pronouns in this area, which were “this, and that.”

Implications for the classroom are to teach the predictable elements that can be found while spelling the <th> diagraph and its phonemes. For older students in fourth and fifth grade you may collect predictable places where these spellings have been found. List the rules that predict where

the different phonemes may be found and note exceptions. Smaller children can be taught to try the voiced and unvoiced sound of this phoneme when they see the grapheme <th>.

The diagraph <wh> is a residual element from changes in language over time. The words that begin with <wh> are pronounced as [wh] or [hw]. These choices stem from changes in pronunciation. Cummings (1988) noted it is “pronounced with the /hw/...only the spelling of *hw* is given for the spelling ‘wh’, but it is understood that in all such cases many speakers replace *hw* with plain *w*” (p.458-459). In the case of <cartwheel>, <which> and <what> the spellers delete <h> completely. These spellers are likely influenced by the plain <w> pronunciation of these spellings leaving out the silent consonant letter <h>. Since these words are pronounced with the plain <w> no [h] sound is present, therefore spellers do not include it graphemically.

Consciousness should be raised for students that there are two letters that represent one sound. Do not forget the silent <h> as you spell the diagraph.

Geminates, or consonant doubles were an area where students had difficulties spelling. This might be in part that one consonant in the geminate represents the phonemic information packaged in that portion of the word. The second grapheme argued to be a visual element Boland & Treiman (2017). The consonants that were involved in doublings were <f>, <p>, <m>, <n>, <t> in word medial position. They were <f>, and <l> in the final portion of the word. Table 15 below gives further illustration to this data.

Table 15. Errors of Consonant Doubles

Error	Target
trafic	traffic
flaped	flapped
stuf	Stuff
hapy	happy
swiming	swimming
diforent	different
begining	beginning
shoping	shopping
mater	matter
beter	better
snef	sniff
tels	tells

Interestingly, the <ic> ending was said to discourage doublings by Boland & Treiman (2017).

There was a case where the <ic> ending was linked to a word that calls for doubling <traffic> was spelled <*trafic>. Cummings referred to the <-ic> ending as one that is “non-regular” (174). This non-regular ending still carries the other indicator of doubling, which is the lax vowel. Word final consonants that represented one phoneme sound after a lax vowel were found in student data <stuff> was spelled <*stuf>, and <tells> was spelled as <*tels>. In addition to this, there is <sniff> that was rendered <*snef>. The student left the double consonant off in final position and swapped a fairly close fairly front unrounded vowel, for its neighbor an open mid front unrounded vowel (www.yorku.ca). In addition <traffic>, <flapped>, <happy>, and <beginning> were spellings where doublets are omitted in the middle of the word. In the case of <different> it is a “slightly different pattern of doubling where the stress falls onto the prefix of the word” Cummings (1988, p. 168) The word <different> is doubled in the “base+ fer combination” (ibid). This is a unique set of words found in Cummings (1988). Just one of these happens in student data.

Doubling words follows a predictable set of rules in most of these cases. Students need to know the formula that a lax vowel triggers a double. In addition, with consonants that say one sound in the coda students need to remember to spell two consonants. Case and point, the word <*snef> is spelled as <sniff> and has two consonants even though <f> produces one sound. The spellings brought up in this section are influenced once more by multiple correspondences in sound to grapheme matches. The <th> grapheme is spelled with two phonemes. Historic changes cause these spellings to deviate from how they are pronounced. This was found in the pronunciations of the <wh> graphemes. Doubles use multiple pieces of information to trigger information. These elements are lax vowels and the information contained in suffixes, whether they are vowels or consonants. Vowels found on the beginning of prefixes promote consonant doubles. Students must draw from multiple types of information during spelling. Students may not be cognitively ready to handle spellings with multiple elements that intertwine. It is important for teachers to spell out patterns found in spelling while being sensitive to the linguistic and cognitive needs of each student.

Chapter 7: Conclusion and Limitations

Participant's misspellings resulted in part from the developmental capabilities available to them. That is, words with more than one challenging feature caused students to misspell. These errors fell predominantly on the following stages and locations. The spelling stage that was the most difficult for students was patterns within words, which collected 70 errors. Second, the Syllable Juncture stage had 34 errors. The Meaning Derivation and Phonemic Stages only collected 18 and 11 errors respectively. The stage of Patterns Within Words and Syllable Juncture are marked by multiple grapheme to phoneme correspondences. In addition to this they make use of orthographic markers that do not always carry phonemic information. This was to a large extent why students misspelled.

Data presented the most errors in the nucleus of the word. We will proceed in caution in saying that really it was the vowel that was a challenge to spellers and it is located in the nucleus. The coda was ranked behind the nucleus of the word. This location had 97 errors. The onset only had 31 total errors. This aligns with what has been established in the review of literature. Vowels have multiple correspondences in their spellings. This is a challenge to spellers due to their age and inexperience in the English orthography. Spellers who come from a first language in a shallow orthographic system like Spanish will be challenged as well. Spellers from the Spanish orthographic system will be less equipped strategically to spell in the English orthographic system. In Spanish a very regular relationship exists between graphemes and their sounds. In English this is not the case. Multiple choices exist graphemically for one phoneme. One grapheme can map to many phonemes. Morphological influence on spelling seemed to heavily shape data and draw misspellings in the coda. This was in a large extent to the allophones that exist in the pronunciation of these endings.

Students must draw from multiple areas to be able to spell words. These areas are phonology, morphology, and orthography. These disciplines explain the inner parts of words and the information that students use in order to spell. Orthographically students come with different strategies depending on their language background. Effects of how spellings map to sounds are seen in the morphology and larger units of spelling like consonant clusters. Spelling is affected by phonology since the basic perceptual system between English and Spanish does not line up perfectly. These pieces drove spellers to make misspellings due to their hypothesis of spelling.

Students had the most errors in the areas of syllable juncture and within word patterns. This may be because the phonemic stage is a spelling stage for students just beginning to learn how to spell. The Derivational constancy stage did not collect many errors. This could be since students in this study are edging toward this level, however not attempting enough spellings in it so few data tokens exist in this study at this level. Few misspellings were collected from this stage. This suggests the level of most of these students falls primarily in the syllable juncture and the within words stages.

The major areas students needed help in were driven by the within word patterns. This area had 70 errors. The participants were challenged by the many to one mapping of the phoneme to graphemes like consonant clusters. Students found long vowel patterns and their multiple representations in spelling to be difficult. They chose spellings that matched the phoneme sound, however were not using the correct spelling sequence of the word. The syllable structures <CVCe> and <CVCC> were challenging to students. The Syllable juncture stage had 34 errors. Issues of inflection resulted in student misspellings. This is because multiple processes are happening in these words. Doubling was a difficult since students attend to the vowel phoneme, the structure of the syllable, and then must assign the correct affix. Affixes like past tense and

plural were assigned spellings that were a result of the three possible allomorphs that is pronounced at the end of the word. Phonology and allophony and their processes play a role in words that are spelled differently than they are pronounced.

Misspellings followed patterns that can be named and taught in class. Students and teachers will benefit from a common language to make repairs. Students will eventually learn the intricate patterns words follow. They will learn names to diagnose what is happening while spelling. They will be able to form their own hypothesis and make repairs. Spelling can be guided by rules that are predictable stemming from the phoneme to the forms found in derivational constancy. If educators take part in naming the parts of words it helps spellers in their class. If spellers learn the process that can be named in word formation, this knowledge can be used to guide students through the structures of word formation. Students who are taught how to name and diagnose structures will eventually take this knowledge and use it independently, or to help classmates. This creates a rich environment for word study.

Using language and processes to speak about spelling allows students to see gradations in their hypothesis toward the correct form. Words are no longer correct or incorrect, gradations of correctness emerges. Students can celebrate even if they spelled something wrong. They still made a smart mistake for example by spelling and including the correct allophonic ending, even though it may be different from the actual spelling. Students are wise in the errors they create. Misspellings are seldom random and follow hypotheses students have from experiences in their own language and sequential languages learned. Experiences in the classroom can be cultivated to help students repair common patterns in misspellings. It is the hope that those who read this paper are instilled with enough word knowledge to begin to take part in studying and teaching structures of words to students while teaching in a literacy rich context. Words deserve to be studied, pulled

out of context like the gems that they are, and placed back into the context after a student has been deeply acquainted with them and their unique processes.

Work in the area of spelling must by the nature of the spelling system consist of many layers. The main issues addressed in this analysis are based on phonology, morphology, and orthography. The descriptions of spellings are also expanded upon with the use of developmental spelling stages. This is one small piece of the entire scope of spelling. This thesis could not include the great scope of issues pertinent to spelling. Limitations are found because of the great amount of area in research you need to cover to do topics in spelling any justice. The first limitation is in the present study research for monolingual spellers was heavily relied upon. Any additional work in this area should include strategies for how linguistically diverse students approach the challenging formations that arise in spelling. Another issue to be explored is how the level of literacy affects ones ability to spell. In addition the size of vocabulary of each participant might affect his or her ability to be an accurate speller. No data was taken on the depth of the participant's vocabulary knowledge. These topics could lead future work on this topic.

The process of spelling acquisition is based on an array of knowledge and processes. Issues that were not addressed in the study are not excluded due to lack of importance. It is quite the opposite. Spelling is a multidimensional issue. Covering all the areas that are foundational in a spelling study is truly exhaustive. The first element that should be considered in future study is the effect of frequency on the acquisition process Ellis (2002); Kessler & Treiman (2001). The distribution of large word elements like the rime has patterns that are found repeatedly in the English language. Endings that are repeated multiple times in different words or families help students since they get to see these rime patterns many times as they read. This facilitates learning due to multiple exposures Ellis (2002). Word elements like families are found in common

elementary words. The repetition of familiar word forms assist learners since they can work with them multiple times in meaningful contexts. Likewise, phonemes can be found in calculable patterns. The exposures of these sounds and how they link to the grapheme can have a positive effect on learning Kessler & Treiman (2001). Additional work to describe the spellings of bilingual students should account for the effect of how often word forms and combinations of phonemes in adjacent syllables occur. It is in the nature of human beings young and small to look for patterns in their environment. This is true of the language acquisition process. Connectionist and usage-based theories speak to the importance of repetition of language structures and the effect on this repeated information as a facilitator of learning Ellis (2002). Furthermore “in connectionist models, each repetition increases the strength of the connections between the relevant feature” (147). This has caused researchers to look deeper into phonological distributions of the syllable and neighborhood densities of the rime. The phonological distributions that have a high occurrence could assist participants making judgements like those found in word and nonword recognition tasks.

There is a disproportionate amount of work on Spelling and Orthography done in English in comparison to other world languages. No spelling stages exist to my knowledge that outlines the developmental characteristics of words for Spellers of other languages. Irregularities of grapheme to phoneme correspondences are in place. Comparative analysis has been done on the phonemic, morphological and orthographical level. What spellers can do as they grow in age along a continuum is missing from the standpoint of world languages. One missing element shown by Usha Goswami (2006) is “the effect of dense neighbours has been argued to...predict advantages in phonological processing...such predictions have so far been tested only in English (468)”. It was greatly missed in this analysis that there was not something comparable to the

structures presented in spelling stages to assist teachers of Spanish speakers. This calls for more work to be done in the area of developmental spelling and Spanish speakers. Other languages besides Spanish could be included in this gap of information.

Tools are needed to diagnose Spanish-speaking spellers along a continuum of learning. Further work is warranted that covers the developmental milestones of spellers as an assessment through world languages who are elementary aged. It has been established that students coming from an opaque orthography are equipped to learn a spelling system faster. What does “faster” mean as far as stages of development. How can we gauge what “fast” and “slow” acquisition means among world languages? It would be useful to see how spelling features might be presented as a diagnostic tool in Spanish spelling and orthography along a continuum. The English spelling stages were not a clear-cut diagnostic tool. Work could be done to sharpen the lines between developmental stages in English and the features that fall in them. From this basis tools like this could be included to support spellers in other languages, based on the empirical foundation of tools that were first presented in English.

The amount of words a person knows has an effect on how they spell. A large vocabulary will facilitate learning in that the person has been exposed to a breadth of words. Jusczyk posited the size of one’s vocabulary has an effect on their ability to spell. Children and adults differ in the amount of words they have been exposed to (1998). The effect of literacy skills on the child’s ability was not measured at this time. Skills a child has gained in native and second language literacy will have significant effect on how spelling is acquired. This was not measured in this study. Finally, students who are first second and third generation spellers will be at varying levels of linguistic abilities. This study did not distinguish between these statuses therefore cannot describe the differences between these subgroups.

In light of the many limitations that were presented the current analysis went through great lengths to describe the challenges a focused group of students had in English orthography. A detailed illustration of how to help spellers in this small population sample was addressed. Teachers can begin to assist spellers with the findings in this thesis. Hopefully this will spark a desire for these professionals to read more information that is helpful to spellers of diverse linguistic backgrounds, and maybe they will add to this pocket of research.

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Appendix A: Student Spelling Error Index

Student 1 5 th	Error	Target	Onset	Nucleus	Coda
	nomle	normal			1
	evry	every		1	
	ran	rain		1	
	helpping	helping		1	
	call	called		1	1
	mad	made			1
	blacke	black			1
	perents	parents	1		
	stuf	stuff			1
	themselvs	themselves			1
	soud	should		1	
	suposte	supposed		1	1
	caa	can			1
	trafic	traffic		1	
	sher	sure		1	
	moshin	motion			1
	bracking	breaking		1	
	prowlde	prowled			1
	potede	pouted		1	1
	flaped	flapped		1	
	where	were	1		
	foot	food			1
	gose	goes			1
Totals			3	9	13
Total Errors	25				
Student 2 5 th	Error	Target	Onset	Nucleus	Coda
	creazy	crazy			1
	tha	the			1
	al	all			1
	hapy	happy		1	
	peaple	people		1	
	beautifu	beautiful			1
	flowers	flowers		1	
	esmall	small	1		
	lasts	lots		1	1
	ive	live	1		
	chese	cheese		1	
	cokie	cookie		1	
	stranberry	strawberry		1	
	spagetti	spaghetti		1	

	birthay	birthday		1	
	mi	me			1
	boul	bowl		1	
	mixes	mixers			1
	fores	forest			1
	birday	birthday		1	
	twomorrom	tomorrow		1	1
	peachs	peaches			1
	lik	like			1
	straberry	strawberry		1	
	jely	jelly		1	
	mangnet	magnet		1	
	ar	are			1
	healh	health			1
	swiming	swimming		1	
	en	and	1		1
	glirs	girls		1	
	minnesota	minnesota		1	
	flowers	flowers		1	
	vegetables	vegetables		1	
	apple	apples		1	1
	keep	keeps			1
	firts	first		1	
	seeds	seeds		1	
	produc	produce			1
	lives	leaves		1	
	beanches	branches	1		
	change	changes			1
	afther	after		1	
Totals			5	24	17
Total Errors	46				

Student 3 4 th	Error	Target	Onset	Nucleus	Coda
	perswade	persuade			1
	witch	which	1		
	inclueing	including			1
	ther	their			1
	thay	they			1
	midle	middle			1
	twelv	twelve			1
	where	were	1		
	sibeling	sibling			1
	chines	chinese			1

	tite	tight		1	
	volcanos	volcanoes			1
	sience	science	1		
	detal	detail		1	
	ther	there			1
	charecter	character		1	
	tortois	tortoise			1
	techers	teachers		1	
	memorie	memory			1
	diforent	different		1	
	lisen	listen		1	
	to	too			1
	diffrent	different		1	
	cuple	couple		1	
	organize	organized			1
	beleve	believe		1	
Totals			3	15	8
Total Errors	26				

Student 4 2 nd	Error	Target	Onset	Nucleus	Coda
	voic	voice			1
	crocadile	crocodile		1	
	foud	found			1
	thay	they		1	
	hay	hey		1	
	bigest	biggest		1	
	kower	water			
	Baddy	Buddy		1	
	chrodel	trouble	1	1	1
	dear	bear	1		
	bady	baby		1	
	thir	there		1	
	don'sit	doesn't		1	1
	jast	just		1	
	pritend	pretend		1	
	imajination	imagination		1	
	dag	dog		1	
	siley	silly		1	1
	tir	there		1	
	sush	such			1
	enterain	entertain		1	
	havage	having		1	1
	outside	outside	1		

hir	her		1	
pirttay	party		1	1
wack	wake			1
begining	beginning		1	
snef	sniff		1	1
clird	cleared		1	1
flower	flower		1	
wint	went		1	
shoping	shopping		1	
misset	missed			1
twine	twin		1	
meet	meat		1	
jintik	gigantic	1	1	1
writeing	writing		1	
moster	monster		1	
owt	out		1	
fliped	flipped		1	
enaph	enough		1	1
dieing	dying		1	
informaation	information		1	
about	about		1	
teells	tells		1	
somthing	something		1	
somting	something		1	
zee	see	1		
pictar	picture			1
yanr	yarn			1
mada	made			1
foom	from		1	
youse	use	1		
macke	make			1
strans	strands			1
clos	clothes		1	1
stran	strands			1
close	clothes		1	1
bo	do	1		
holse	holes			1
stuf	stuff			1
rany	rainy		1	
poiny	pointy			1
britly	brightly		1	
fogetfol	forgetful	1		1
saltey	salty			1
condof	kind of	1	1	

	meney	many		1	1
	retion	written			
	faer	far		1	
	bo	do	1		
	mackeing	making		1	
	gronaps	grown ups		1	1
	thay	they		Identical X2	
	wons	one's	1		1
	meany	many		1	
	mack	make			1
	mairred	married		1	
	cors	course		1	1
	colde	called		1	1
	boe's	does	1		
	mater	matter		1	
	frind	friend		1	
	beside	besides			1
	car's	cares			1
	mack's	makes			1
	bont	dont	1		
	thier	their		1	
	lit	let		1	
	nathing	nothing		1	
	tack	take			1
	thig	thing			1
	hop	hope			1
	daseball	baseball	1		
	ricked	wrecked	1	1	
	bay	by		1	
	beter	better		1	
	looke's	looks			1
	firese	fierce		1	1
	scery	scary		1	
	cuase	because	1		
	unpprove	unapprove		1	
	mistreat	mistreated			1
	garbig	garbage			1
Totals			16	64	43
Total Errors	123				

One error
not able
to code

Student 5	Error	Target	Onset	Nucleus	Total
	maine	mane		1	
	meat	week			
	beek	beak		1	
	beem	beam		1	
	cheet	cheat		1	
	beed	bead		1	
	floa	flow			1
	britly	brightly		1	
	shack	shake			1
	trys	tries		1	1
	bon't	don't	1		
	tails	tails		1	
	dall	ball	1		
	dose	does			1
	staf	stuff		1	1
	blose	blows		1	1
	bays	boys		1	
	tels	tells			1
	wat	what	1		
	aer	are		1	
	wacks	wakes		1	1
	thay	they		1	
	britely	brightly		1	
	use	used			1
	lik	like			1
	bande	band			1
	pepl	people			1
	or	are			
	there	they're		1	
	houes	house			1
	becaues	because			1
	childre	children			1
	cartweel	cartwheel		1	
	corect	correct		1	
	listened	listen			1
	icsept	except	1		
	fowed	found		1	
Totals			4	19	16
Total Errors	39			Total	259

Appendix B: Student Errors by Spelling Stage

Phonemic	*error	Target	
	Caa	can	1
	tha	the	1
	al	all	1
	ar	are	1
	dag	dog	1
	wint	went	1
	zee	see	1
	lit	let	1
	sush	such	1
	jast	just	1
	bo	do	1
Total			11
Within Words	*error	Target	
	ran	rain	1
	mad	made	1
	blacke	black	1
	soud	should	1
	where	were	1
	esmall	small	1
	chese	cheese	1
	boul	bowl	1
	lik	like	1
	health	health	1
	glirs	girls	1
	firts	first	1
	seeds	seeds	1
	lives	leaves	1
	witch	which	1
	ther	their	1
	thay	they	1
	twelv	twelve	1
	where	were	1
	tite	tight	1
	ther	there	1
	lisen	listen	1
	to	too	1
	voic	voice	1
	foud	found	1
	thay	they	1
	hay	hey	1
	thir	there	1
	hir	her	1
	wack	wake	1

owt	out	1
twine	twin	1
meet	meat	1
yanr	yarn	1
youse	use	1
macke	make	1
strans	strands	1
clos	clothes	1
holse	holes	1
faer	far	1
thay	they	1
cors	course	1
frind	friend	1
their	their	1
thig	thing	1
hop	hope	1
firese	fierce	1
maine	mane	1
beek	beak	1
beem	beam	1
cheet	cheat	1
beed	bead	1
floa	flow	1
britly	brightly	1
shack	shake	1
tals	tails	1
dose	does	1
blöse	blows	1
bays	boys	1
wat	what	1
thay	they	1
lik	like	1
bande	band	1
there	they're	1
houes	house	1
becaus	because	1
icsept	except	1
gose	goes	1
about	about	1
fowed	found	1
		70

Syllable Juncture

*error	target	
nomle	normal	1
prowlde	prowled	1
potede	pouted	1
evry	every	1

perents	parents	1
birthay	birthday	1
twomorrom	tomorrow	1
peachs	peaches	1
mixes	mixers	1
apple	apples	1
keep	keeps	1
change	changes	1
afther	after	1
cokie	cookie	1
fores	forest	1
volcanos	volcanoes	1
sibeling	sibling	1
detal	detail	1
oatside	outside	1
havage	having	1
clird	cleared	1
writeing	writing	1
something	something	1
mackeing	macking	1
mistreat	mistreated	1
beside	besides	1
use	used	1
cartweel	cartwheel	1
listened	listen	1
trys	tries	1
childre	children	1
themselvs	themselves	1
misset	missed	1
pepl	people	1
Total		34

Derivational Constancy

*error	Target	
saltey	salty	1
rany	rainey	1
britly	brightly	1
moshin	motion	1
beautifu	beautiful	1
mangnet	magnet	1
produc	produce	1
cuple	couple	1
chines	chinese	1
perswade	persuade	1
science	science	1
tortois	tortoise	1
beleve	believe	1
informaation	information	1

	fogetfol	forgetful	1
	unpprove	disapprove	1
	enterain	entertain	1
	pictar	picture	1
Total			18

Consonant Doubles	esmall	small	1
	colde	called	1
	trafic	traffic	1
	flaped	flapped	1
	call	called	1
	suposte	supposed	1
	stuf	stuff	1
	hapy	happy	1
	swiming	swimming	1
	diforent	different	1
	midle	middle	1
	bigest	biggest	1
	siley	silly	1
	begining	beginning	1
	shoping	shopping	1
	fliped	flipped	1
	mater	matter	1
	beter	better	1
	snef	sniff	1
	staff	stuff	1
	tels	tells	1
	jely	jelly	1
	corect	correct	1
Total			23

Appendix C: Spelling Inventory DSA (Developmental Spelling Analysis)

Developmental Spelling Analysis Feature Listing With Exemplars		
Stages	Feature	Exemplars (single syllable)
Letter Name Stage		
A	Initial and final consonants	<u>cut</u> , <u>map</u>
B	Initial consonant blends and digraphs	<u>ship</u> , <u>glad</u>
C	Short vowels	<u>hop</u> , <u>wet</u>
D	Affricates	<u>jet</u> , <u>chin</u>
E	Final consonant blends and digraphs	<u>bump</u> , <u>fish</u>
Within-word pattern stage		
F	Long vowels: vowel-consonant-e (VCe)	<u>ripe</u> , <u>frame</u>
G	R-influenced vowel patterns	<u>girl</u> , <u>clear</u>
H	Other common long vowels	<u>steep</u> , <u>tight</u>
I	Complex consonant units	<u>bridge</u> , <u>scrub</u>
J	Abstract vowels: digraphs and diphthongs	<u>frown</u> , <u>shook</u>
Syllable juncture stage		
K	Doubling and e-drop with “ed” and “ing”	<u>clapped</u> , <u>taping</u>
L	Other syllable juncture doubling	<u>pilot</u> , <u>shallow</u>
M	Long vowel patterns in the stressed syllable	<u>compete</u> , <u>contain</u>
N	R-influenced patterns in the stressed syllable	<u>termite</u> , <u>sturdy</u>
O	Unstressed syllable vowel patterns	<u>solar</u> , <u>fountain</u>
Derivational Constancy Stage		
P	Silent and sounded consonants	<u>condemn</u> , <u>hasten</u>
Q	Consonant changes (alternations)	<u>electrician</u> , <u>disruption</u>
R	vowel changes (alternations)	<u>inspiration</u>
S	Latin-derived suffixes	<u>grievance</u> , <u>inedible</u>
T	Assimilated (absorbed) prefixes	<u>irresistible</u> , <u>suppress</u>