

ORTHOGRAPHIC SKILLS IN ENGLISH LANGUAGE LEARNERS AND  
STUDENTS WITH LEARNING DISABILITIES

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## ABSTRACT

This study investigates orthographic skills in students with learning disabilities (LD), English Language Learning (ELL) students and their typical-achieving, native-English speaking (TYP) peers to help in the differentiation of these groups, and ultimately improve LD assessment for linguistically diverse students. A repeated-measures ANOVA was conducted to compare the effect of Group Type (LD, TYP, ELL) on the orthographic skills of 108 children as measured by the Words Their Way Primary Spelling Inventory on three administrations over the course of a school year. There were statistically significant differences between groups with medium and large effect sizes in all spelling inventory measures: Feature Points, Words Spelled Correct and Spelling Inventory Stage scores. In each grade and administration, the students in the LD group consistently had the lowest means and students in the TYP group had the highest means. On the Words Spelled Correct measure, there was a triple interaction with a medium to large effect size between the three groups by grade and over time. This interaction showed that in Kindergarten, both ELL students and students with LD score significantly lower than the TYP group. ELL students made substantial progress and by spring of first grade, they had similar scores to those of the TYP group. The LD group continued to have significantly lower scores than both other groups in first and second grades. A comparison of spring stage scores indicated significant differences between the ELL group and the TYP group in the number of students that were on or above grade level. There was also a significant difference between the number of students with spring spelling stages on or above grade level in the LD and the TYP group. However, there was not an equivalent difference between the LD and ELL groups. An analysis of student progress over the course of the school year found the rates of improvement in all three groups to be comparable, though the group means are consistently ranked with the LD group underperforming

the ELL group and TYP group (LD <ELL <TYP). These important variations in how diverse students perform by grade and over time can inform both the instruction and assessment of students. In doing so, more well-designed pre-referral interventions can begin to correct problems of disproportionality of linguistically diverse students in special education.

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Orthographic Skills in English Language Learners and Students with Learning Disabilities

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## **CHAPTER 1**

### **Introduction**

The conflation of learning disabilities with learning characteristics that are typical for English language learners (Harry & Klingner, 2006) is a persistent and unresolved problem in special education. There is ample research highlighting the associated outcomes of disproportionality in special education, but little research on specific skills that may differ among English Language Learners and students with learning disabilities. One important window into how a child learns and adapts to both reading and writing in English has been through the measurement of orthographic skills. There is emerging evidence that children rely on orthographic skills when learning to read and spell in English (Vellutino, Tunmer, Jaccard, & Chen, 2007) and that there are distinct and important differences as well as similarities in orthographic skills among bilingual and native-English speaking children (Yeong, Fletcher, & Bayliss, 2014). This study seeks to better understand these differences and similarities by comparing spelling skills among students with learning disabilities, English language learners, and native-English speaking learners without disabilities. Spelling skills, as measured by the Words Their Way Primary Spelling Inventory and the Qualitative Spelling Checklist (Bear, Invernizzi, Templeton, Johnston, & Bear, 2016) were compared.

### **Context**

American students are more culturally and linguistically diverse than ever before and this trend is predicted to continue (Aud, Fox, Kewal, & Ramani, 2010). In the last 25 years, the fastest growing segment of the school-age population has been that of English language learning (ELL) students (Arias, 2008). Though there is ample evidence documenting the academic

underperformance of linguistically diverse children, there are major gaps in the literature pertaining specifically to their learning characteristics. There is, however, consensus in the literature that ELL students have poorer outcomes throughout their education. Beginning in early childhood, students that speak another language are less likely to receive early intervention and preschool services (Blanchett et al., 2009; Morgan, Farkas, Hillemeier, & Maczuga). Linguistically diverse children are similarly more likely to demonstrate lower levels of literacy upon entering school and slower growth throughout their school experience (Aud et.al 2010; Ehri, 2000). These outcomes are, in large part, a result of a lack of understanding of the educational needs of linguistically diverse students as well as a lack of appropriate assessment tailored to meet their specific style of learning (Klingner & Harry, 2006; Skiba et al., 2008; Sullivan & Artiles, 2011)

For many ELL students, academic difficulties are significant enough to warrant the need for special education services. Overall, students who are identified as being both ELL students and as having learning disabilities have more significant academic disadvantages than their native-English speaking peers with LD as well as their typically-achieving, ELL peers (Solari, 2014). However, a perennial difficulty in special education has been discerning the characteristics that are typical of ELL students from those traits associated with learning disabilities (Harry & Klingner, 2006). This is due, in part, to the fact that both types of students often perform poorly on academic tasks that contain high language demands (Abedi, 2006). Accordingly, ELL students are at risk of being misclassified with a learning disability. This is coupled with the difficulties in choosing how to best assess ELL students for special education. While testing in a student's native language is a right afforded to ELL students under the Individuals with Disabilities Act of 2004, it does not sufficiently ameliorate the problems related

to assessment of ELL students. A child who is learning English will likely experience language challenges in both their first and second languages. As a result, ELL students' developing language skills can cause them to be misconstrued as having low intelligence or an educational disability (Harry & Klingner, 2006).

This type of conflation of disability with cultural and linguistic differences has been a long-standing issue in the field of special education. It has been linked to disproportionality, including both underrepresentation and overrepresentation of Spanish-speaking, ELL students in certain special education categories. According to federal data, the four most common categories in special education (Emotional Disturbance, Cognitive Impairment, Specific Learning Disability and Language Impairment) have a national underrepresentation of students identified as Latino. However, at the state and local level, there are some areas with significant overrepresentation, namely in the LD category (Klingner, Artiles, & Mendez-Bartletta, 2006; Sullivan, 2011).

With the difficulties in using standardized assessments for ELL students in mind, many educators have turned to response to intervention (RTI) criteria as part of the special education identification process. RTI can support ELL students by providing them with academic support in increasing levels of intensity as needed (Donovan & Cross, 2002, Vaughn & Fuchs, 2003). However, RTI is not designed to differentiate the learning difficulties related to language acquisition from those that are typical in learning disabilities. Furthermore, RTI is guided by research based interventions and progress monitoring and, as such, is limited by the lack of research in differentiating ELL characteristics from those attributable to learning disabilities. Increased understanding of the academic characteristics of English language learners and native-English speaking learners with learning disabilities can help distinguish between academic

delays related to disability and those associated with second language acquisition.

Academic outcomes for students with LD and ELL students are often measured in terms of reading, but a growing body of literature points to the importance of writing to overall academic achievement (Graham, 1990). Written expression and spelling, specifically, have been a persistent difficulty for both ELL students and students with LD (Vaughn, Bos & Schumm, 2011). While there is a great deal of research addressing literacy, there is far less research centered on spelling within writing interventions, and most are practices have not been empirically validated for ELL students (Artiles, 2003). Further, there is scant literature comparing the academic characteristics of ELL students and those that have LD and even less that specifically focuses on writing, spelling and orthographic processes. Though it is common to think of reading as the primary focus among LD research, the impact of writing should not be underestimated. Studies have found spelling difficulty to be a strong link to dyslexia and other reading disabilities with spelling problems being comparable to those of reading (Berninger et al., 2001). Children with specific reading disabilities generally perform poorly on tasks related to printed word identification as well as spelling and phonological (letter-sound) decoding (Vellutino, Tunmer, Jaccard, & Chen, 2007). Spelling problems begin in childhood and persist into adulthood in individuals with learning disabilities such as dyslexia (Bruck, 1993; Lefly & Pennington, 1991). Moreover, poor spelling is correlated to difficulties in overall written composition in children with dyslexia (Berninger et al., 2001) and continues to be a significant challenge even when reading issues are resolved (Berninger, 2006). The reading and spelling skills of a child with a learning disability has been likened to those of a younger, typically developing reader (Moats, 1983; Vellutino & Scanlon, 1987).

In the overall population, written expression is one of the most common learning problems.

It is estimated that between 6.9 and 14.9 percent of the student population have documented difficulties in this area (Katusic, Colligan, Weaver & Barabarsi, 2009). Historically, spelling and other orthographic skills may have been overemphasized at the expense of higher order skills. However, there currently is an insufficient emphasis, with little or no explicit instruction in handwriting and spelling (Berninger et al, 2006). This is especially impactful for students that struggle with written expression.

To understand the importance of spelling, it is helpful to conceptualize writing as a cognitive tool. Tools allow individuals to do something more economically than would be possible without the tool. Spelling has been described as the code, or tool that writers need to express their ideas through text production. When the task of writing lacks automaticity, the cognitive effort required to use orthographic knowledge impacts the overall task. For example, younger children that lack automaticity in lower-level orthographic skills will often write less, devote less time to organization and planning of a product and have a lower quality product (Treiman & Kessler, 2014 pg. 7). There is a required amount of fluency in orthographic skills such as letter formation, spelling and punctuation that is necessary for children to write effectively (Treiman & Kessler, 2014 pg. 11; Graham, Berninger, Abbott, Abbott, & Whitaker, 1997). As orthographic skills develop, students can devote greater cognitive effort to higher order components of written expression such as planning, organization, and expression (McCutchen, 1996).

Additionally, children's word representations can be a window into how the child understands letters in words, their phonological awareness, orthographic knowledge and morphological patterns. In this way, writing is a tool that "freezes language" (Treiman & Kessler, 2014 pg. 6). Spelling can be used as an indicator of underlying skills that are a



foundational part of reading. Studies have demonstrated that orthographic knowledge is critical to mastering accuracy and fluency in both word identification and spelling (Vellutino, Tunmer, Jaccard, & Chen, 2007). Understanding orthographic skills through analysis of a child's spelling error patterns in spelling provide insight into decoding and word recognition processing (Ehri, 1997). Some studies have found spelling performance to be a better indicator of the quality of children's word representation than decoding skills (Perfetti & Hart, 2002; Barker, Torgesen, & Wagner, 1992).

Because spelling is a linguistic representation and, as such, is dependent on other linguistic skills, it can be a lens through which to look at a child's phonological, morphological semantic and orthographic knowledge (Moats, 1995). There is an abundance of literature pointing to the importance of phonological processing in predicting how a child will later read and spell (Ehri, 2000; Fowler, Liberman, & Feldman, 1995; Weiser & Mathes, 2011). However, there is emerging literature that points to phonological skills and orthographic skills both being a critical part of the early literacy skill set that predicts reading (Yeong, Fletcher, & Bayliss, 2014; Bailet, 1990). Studies have demonstrated that young children often use orthographic skills rather than relying solely on phonological skills (Yeong, Fletcher, & Bayliss, 2014). Students who have strong spelling skills exhibit similar strengths in their abilities to understand and manipulate language while poor spellers have difficulties in these areas (Bailet, 1990).

Conversely, students with learning disabilities generally experience difficulty mastering basic writing skills such as spelling, capitalization and punctuation which interfere with the overall writing output and quality (MacArthur & Graham, 1987). Graham (1990) demonstrated that a lack of automaticity in spelling, can detract from the writing composition processes held in working memory. Additionally, poor spelling, as it contributes to slower writing fluency, which

negatively impacts written content. This occurs when the student's writing does not keep up with their thoughts, and ideas are lost before they can be written.

While little research has been conducted on orthographic knowledge in ELL students (August & Siegel, 2006; Graham & Robert, 2010), there is evidence that cross-linguistic transfer is a common source of spelling errors for ELL students (Fashola et al., 1996; Cronnell, 1982, Zutell & Allen, 1988). Multiple variables affect spelling development and the ways in which ELL students access different orthographic strategies. Phonological, morphological and orthographic skills, along with the rate of spelling development, differs based on factors including the influence of language transparency in their first and second languages (Figueredo, 2006).

### **Statement of Purpose**

Given the difficulties, related to the underrepresentation and overrepresentation of linguistically diverse children in disability categories related to literacy, there is a need to differentiate patterns of spelling and orthographic skills related to second language acquisition from those associated with LD. The purpose of this study is to examine orthographic development through the measure of a spelling inventory, determining if there are differences in spelling patterns among ELL students, students with LD and native-English speaking, typically-achieving students.

### **Research Questions**

This study addressed the following research questions. 1) How do orthographic skills differ between the following groups of students: ELL students (ELL), native-English speaking typically-achieving students (TYP) and students with LD (LD) as measured by the number of correctly spelled words and feature points in the Words Their Way Primary Spelling Inventory?

2) Do these groups, ELL, TYP and LD, differ in terms of the rate at which they reach developmental spelling stages?

## Definition of Terms

### *English Language Learning (ELL)*

There is debate about the terms used to describe students who are learning English while speaking a different language at home. Some argue that the term *emergent bilingual* best characterizes the benefit of knowing more than one language rather than using a more deficit-based term such Limited English Proficiency (LEP) or English Language learner (ELL) (Garcia, 2009). The ELL or LEP categories also limit assessment accommodations for all children on the bilingual continuum and requires schools to exit children out of that category in 1 to 3 years (Garcia, 2009). However, there is much evidence that children take 5 to 7 years to develop academic-level skills in a second language (Hakuta, Goto Butler, & Witt, 2000). For the purposes of this study, the definition is limited to students who have met the criterion for, and receive English as a Second Language instruction. This criterion, as outlined by the New Jersey Department of Education regulation (N.J.A.C.6A:15-1.3(c)), involves evaluation using the WIDA-ACCESS Placement Test (W-APT) and having at least one other indicator.

For grades 1 and above, there are four components representing language domains of the W-APT. The tests are administered in the following order: Speaking, Listening, Reading, and Writing. The test is administered online and items increase in difficulty within each subtest. Students answer multiple choice questions and constructed response, performance-based questions. This assessment yields scale scores and English language proficiency level scores for the Speaking, Listening, Reading, and Writing subtests as well composite scores in the following areas: Oral Language (Listening and Speaking), Literacy (Reading and Writing), Comprehension (Listening and Reading). There is also an Overall Composite Score (a

combination of all four language domains) which indicates a student's language proficiency level with a score between 1 and 6.

Students in grades 1 through 12, who score below a proficiency level of 4.5 on at least one component of the W-APT and have at least one other indicator, are identified as limited English proficiency (N.J.A.C.6A:15-1.3(c)). This additional indicator, according to N.J.A.C.6A:15-1.3, may include the student's reading level in English, academic performance as well as the input of teaching staff. The indicators regularly include the reading comprehension level as demonstrated by the Fountas & Pinnell Benchmark Assessment System. Grades, curriculum based test scores and teacher input are also commonly used as additional factors.

There is a variation on these procedures for determining English proficiency in kindergarten-age children. According to N.J.A.C.6A15:1.10(c), the W-APT can be administered at any time to kindergarteners, but the Reading and Writing sections are only given during the second half of the year. For kindergarteners testing in the first half of the year, a score of a 5.0 oral language proficiency level or below and at least one other indicator is the criteria for receiving English as a Second Language Services. After January 1, a kindergarten student takes all four components (listening, speaking, reading, and writing). The student is required to score a 4.5 overall composite proficiency level or less as well as have multiple indicators in order to receive English as Second Language Instruction. The indicators for kindergarten students are the same as those for older students and generally include student's reading level in English, academic performance as well as the input of teaching staff.

*Learning Disabilities (LD)* For the purposes of this study, learning disabilities are defined according to the classification of Specific Learning Disability as defined by New Jersey Administrative Code 6A:14.

New Jersey Administrative Code (N.J.A.C. 6A:14) requires that the child study team include a school psychologist, a learning disabilities teacher consultant, and a school social worker. A speech and language pathologist is included on the child study team when the student is preschool age or when there are concerns involving language development. The school psychologist performs psychological evaluations and generally uses assessments such as the Wechsler Intelligence Scale for Children-Fifth Edition or the Woodcock-Johnson Tests of Cognitive Abilities-Fourth Edition. The learning disabilities teacher consultant administers achievements tests such as the Wechsler Individual Achievement Test-Third Edition, or the Woodcock-Johnson Tests of Achievement-Fourth Edition. These tests yield standardized scores in areas of reading, written expression, mathematics and oral language that correspond to the subcategories under the SLD classification subcategories in the N.J.A.C. 6A:14-3.4(h)4.

The administrative code states that the classification of Specific Learning Disability (SLD) is defined as a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. A specific learning disability can be determined when a severe discrepancy is found between the student's current achievement and intellectual ability in one or more of the following areas: (1) Basic reading skills; (2) Reading comprehension; (3) Oral expression; (4) Listening comprehension; (5) Mathematical calculation; (6) Mathematical problem solving; (7) Written expression; and (8) Reading fluency. The school district involved in this study does not use a specific discrepancy formula. However, among child study team members most use a discrepancy formula that involves a difference in intelligence scores and

achievement scores greater than or equal to 1 standard deviation. Additionally, the district does not use the severe discrepancy as the sole criterion in determining eligibility under specific learning disability. Classroom observation, informal assessments, functional performance and input from parents, teachers and therapists are all considered.

One subcategory of SLD that is classified somewhat differently than the others is that of dyslexia. The dyslexia subcategory, involves a comparison of oral language abilities, reading abilities and overall intelligence. Dyslexia is defined by the International Dyslexia Association (2010) as being “...*characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction.*” New Jersey adopted this definition into the state education code in 2014. To receive this classification, a student generally demonstrates a learning profile with average cognitive and listening comprehension scores with weaknesses in phonological processing, spelling, decoding, and word recognition (cite).

The district also uses Response to Intervention as a part of determining eligibility as indicated by N.J.A.C. 6A:14-3.4(h)6. iii. The primary prevention level involves high quality, differentiated instruction in the general education classroom delivered by the classroom teacher. Progress is monitored through weekly bench mark tests in math and language arts. Other assessments include the Fountas and Pinnell Benchmark Assessment and the Words Their Way Primary Spelling Inventory which are given three times per year. Students who are not meeting with success with this level of support, are entered into Tier 2 level of support. Every twelve weeks, staff reevaluate eligibility. At the tier two level of intervention, small group instruction is provided by a reading specialist or a math teacher who specializes in intervention. This

instruction is generally given 2-4 times per week for approximately 30-45 minutes per session. The instruction primarily involves using Leveled Literacy Instruction (LLI) and other evidence based methods of instruction. Progress is monitored through LLI assessments, and other repeated measures such as reading records, math fluency assessments and benchmark testing. Students who are not making progress with this level of intervention are referred to the Intervention and Referral Services Committee. This is a multidisciplinary committee that meets with the child's parent to devise a plan to support the child academically. This intervention plan is often a combination of evidenced based practices as well as more informal supports such as mentoring. Children who continue to make little progress with this intensity of intervention are moved to the tertiary level of intervention. This includes instruction using LLI for a frequency of 5 or more times per week for 45 minute sessions, individually or in a group of three or less. These sessions continue the LLI and other evidence based modes of instruction. If the child continues to make limited progress with this level of intense intervention, the Intervention and Referral Services Committee often refers the student for a child study team evaluation. The child study team administers standardized tests, observes the student in class and conducts staff and parent interviews. They also use the data gathered through the RTI process to decide about special education eligibility.

*Orthographic Knowledge:* For the purposes of this study, orthographic knowledge is defined as the information that is stored in memory that tells one how to represent spoken language in written form (Apel, 2011)

*Orthographic skills:* For the purposes of this study, orthographic skills is defined as abilities related to memory for specific visual spelling patterns that identify individual words, word parts, including knowledge of permissible letter patterns in words (Barker, Torgesen, & Wagner, 1992)



*Spelling Inventory:* A spelling inventory is defined as a list of words, with increasing difficulty, created to represent a variety of spelling features and patterns, and used to assess students' levels of spelling development (Bear, et al., 2016).

*Phonological:* The term, *phonological*, refers to sounds within words and includes not only phonemes but also larger sound units (Badian, 2001).

### *Heterogeneous groups*

ELL students are discussed as a single group but there are several factors that contribute to their heterogeneity. For instance, the level of literacy that an individual has in their primary language varies widely. For example, some students speak their primary language but have no literacy skills in it. There is evidence that students with higher levels of orthographic knowledge in their primary languages have an advantage in learning English as compared to students who are unfamiliar with any writing system (August & Shanahan, 2006).

## **CHAPTER 2**

### **REVIEW OF THE LITERATURE**

Orthographic development was initially studied in the early 1970s when Read (1971) and Chomsky (1971) proposed the notion that the spelling errors of young children could communicate the presence of deeper and less accessible cognitive processes. Since that time spelling development and its effects on other areas of learning have been widely explored in typically developing, non-ELL students. To provide a context for the current study, literature on spelling development was reviewed with a focus on the multilinguistic components of language that make up the larger spelling process. The present study further required an investigation of the literature on spelling processes for students with learning disabilities as well as ELL students. This literature review delves into current research to get at the crux of how spelling development differs among these diverse groups of students. Processes such as cross linguistic transfer and the role of orthographic depth in spelling are explored. A cursory look at the sound systems of Spanish and Vietnamese is given as these are the two languages spoken by the majority of the students in the present study. Additionally, a summary of the literature focusing on orthographic knowledge in students with learning disabilities is included. Lastly, an examination of different types of spelling measures illustrates the advantages and disadvantages of a variety of assessment methods for measuring spelling differences among these groups.

#### **Spelling Development Theory**

There is consensus among researchers that patterns and progressions occur in spelling development moving from phonological to orthographic and morphological writing features.

However, the details and linearity of this development is often debated. While there are differing opinions concerning exact details, researchers generally observe that spelling errors occur in a pattern that can be described in terms of progressive stages or as evolving problem solving strategies (Moats, 1995; Ehri, 2000). These spelling errors mirror and are driven by speech and language development (Moats, 1995; Hoffman & Norris, 1989). Certain types of spelling errors are predictably made by children as they progress from more concrete spelling approaches to spelling approaches that are more abstract. Spelling errors can generally be traced back to certain sources (Moats, 1995) such as not perceiving the sounds of a word correctly, incorrectly isolating phonemes, failure to recognize morphemes, inaccurate application of orthographic change rules or failure to memorize spelling structures that are atypical.

A great deal of research supports the theory that spelling develops hierarchically and sequentially through stages (Ehri, 1986; Gentry, 1982; Henderson, 1985) with the number and nature of the stages varying from study to study. As previously mentioned, this theory was introduced in Charles Read's seminal work (1971) as well as by Carol Chomsky's (1971), when they proposed the concept that there are universal strategies employed by young children with limited or no exposure to spelling. A close examination of writing in early childhood by Read (1971) and Chomsky (1971) revealed that children's writing included consistent logical patterning. In this way, Read (1971) and Chomsky (1971) demonstrated the importance of understanding how children think about spelling and why children make certain spelling errors. By understanding students' thinking towards spelling, one could assess their understanding of English's phonetic and orthographic systems. Read (1975) later theorized that children acquired orthographic knowledge through a developmental process involving both cognitive and linguistic progressions that occur in relatively common developmental sequence. He demonstrated how

invented spelling was more than just random, inconsistent spelling attempts. He suggested that his findings provided evidence of a child's developing knowledge of consistent letter and sound patterns. Read's work illuminated how young children apply systematic, categorical logic to spelling words (Read 1971; 1975). This ushered in a shift towards thinking about spelling as a linguistic process rather than a visual one. Prior to Read's work (1971), it was widely accepted that spelling was the reproduction of memorized letter patterns. His work reframed spelling as a process of representing speech and language sounds as written symbols.

### **Stage Theory**

The work of Chomsky (1971) and Read (1971, 1975) paved the way for later stage theorists to develop comprehensive models of orthographic development (Beers & Henderson, 1977; Moats 1995; Bear, et al., 2012). Henderson refined Read's model of spelling development (Henderson, & Templeton, 1986) and described the progression in terms of the following five stages: Emergent Spelling, Letter-Name Alphabetic Spelling, Within Word Pattern Spelling, Syllables and Affixes Spelling, and Derivational Relations Spelling.

The first stage, Emergent Spelling, is a description of the early writing attempts of children who are not yet reading. This typically occurs in children between the ages birth to five years of age. This stage is generally characterized as pre-phonetic (Bear, et al., 2012). Children in the early part of this stage are just beginning to discern that their ideas can be communicated by making marks on paper (Henderson & Bear, 1986). These marks may include circular scribbling, simple pictures, letter-like forms, and eventually, letters. As this stage progresses, children become adept at writing with directionality. They begin to learn some letters, often the letters of their name with limited understanding of the sounds represented by those letters. At

the end of the Emergent Spelling stage, children begin to write the most salient features of a word and omit less noticeable sounds (Bear, et al., 2012). For instance, the word surprise may be spelled *SPRZ*. Children may also be able to write a few familiar words from memory. A writing sample demonstrating the Emergent stage is shown in Appendix B, Figure B3.

The second stage, referred to the Letter Name- Alphabetic stage (Henderson, 1986) generally corresponds with formal literacy instruction and occurs between the ages of five and eight. At this stage, the name of an individual letter is influential as is the alphabetic principle in how children encode. In the early portion of this stage, children are more focused on consonant sounds and often write in a semi-phonetic manner omitting vowels, and using the first and last consonant sound. An example is writing *BR* for bear. This is a time where students are focused on the most prominent sounds in a word. As children progress to the middle of this stage, they refine their ability to hear and use sounds in words and know more frequently occurring short vowel sounds, though they continue to confuse them (Bear, et al., 2012). An example is writing *SED* for sad. At the late portion of the Letter Name- Alphabetic stage, children become more familiar with short vowel patterns such as in the words such as *cat* and *nut*. They also gain competence in consonant blends and digraphs such as in *spin* and *brat*. They continue to struggle at this stage with more complex pattern as well as with silent letters. It is common to see simple substitutions for more complex patterns such as writing *FOT* for fought. A writing sample showing orthographic skills typical of the Letter-Name Alphabetic stage is shown in Appendix B, Figure B4.

At the third stage, the Within Word Pattern stage, students have gained automaticity in letter sounds and short vowel patterns (Bear, et al., 2012). This stage typically occurs between the ages of seven to ten years. This stage is significant in that the child moves out of the

alphabetic phase of literacy which is present in the first two stages where writing is driven by the alphabetic principle. This is the idea that individual letters have corresponding singular sounds that can be encoded to represent words. At the Within-Word Pattern Stage, the shift is towards pattern recognition (Henderson, 1986). During this stage, it is discovered that English, with its orthographic depth, does not have one letter to represent every sound. Rather, the writer begins to use patterns to represent sounds. Early into this stage, children progress past the sound-symbol relationships of the previous stages. They begin to recognize that words can be divided into chunks and that there are letter patterns and clusters that represent sounds. There is more attention paid to less salient sounds such as in r-controlled words like *fur* and *bird*. This is a time where students begin to use long vowel patterns more accurately though substitutions continue to be common such as *FLOTE* for float, or *THROEN* for throne. A writing sample typical of the Within Word stage is included in Appendix B, Figure B5.

During the fourth stage, Syllables and Affixes stage, typically between the ages of 9 to 14, children have automaticity in the spelling of most patterned one-syllable words so their attention turns to more sophisticated ways of looking at words. They begin to analyze words by syllables as well as prefixes and suffixes. They become aware of patterns surrounding double consonants such as in the words *popping* and *little*. As children progress through this stage and into the next, the principle at work is that of meaning. Children learn that there are clusters of letters within words that form affixes to add certain meanings to words. This focus on meaning is mastered in the subsequent stage and final stage, the Derivational Relations Spelling stage. This stage generally begins in middle and high school and continues throughout adulthood. It is characterized by a mastery of the spelling of most words. Misspellings originate from confusing atypical spellings. Individuals have competency in understanding the Latin and Greek roots of

many words. A writing sample demonstrating the Syllable and Affixes stage is shown in Appendix B, Figure B3.

Stage theory has been criticized by those who postulate that orthographic development is better characterized as a continuous accumulation of strategies, rather than a progression through distinct phases (Ehri, 2014). The overlapping waves theory Varnhagen et al., (1997) puts forth that students vary in how they utilize phonological, morphological, and orthographic knowledge to spell. This theory purports that as students progress in their spelling ability, they vacillate between using more and less sophisticated strategies. As more developed and effective strategies emerge, lower level strategies are used less. This conclusion is based on the assumption that children think in a variety of ways and these ways of thinking compete with each other. The developmental arc of cognition is thought to involve small changes where less sophisticated ways of thinking recede as more advanced ways of thinking become prominent (Chen & Siegler, 2000). Further, as orthographic knowledge becomes more automatic, previously required skills are replaced with more refined ones. The overlapping waves theory considers that students do not consistently apply a skill within a developmental stage (Varnhagen et al., 1997). Rather, a student's knowledge and use of a strategy increases and decreases with a general progression.

Stage theorists counter this argument by accounting for certain lapses in continuity and concur that students draw from different strategies as they develop. They contend, however, that the overarching progression, in orthographic knowledge develops through the phases described by Henderson (1986) and others (Ehri, 2000; Bear et al., 2012; Helman et al., 2011). Stage theory does not maintain that there are hard lines on how students develop cognitive strategies. Instead, the stages indicate a general clustering of characteristics. Knowledge of these developmental phases can inform instructional decisions and help educators to support students

in their progression to more refined strategies.

### **Reading and Spelling Development**

While reading development has been widely researched, spelling development has been relatively understudied (Joshi & Aaron, 2005). Spelling difficulties often are considered unimportant, but can have detrimental effects on a student's overall writing process, reading ability and future job opportunities (Graham, 1999). Researchers have theorized that students' spelling skill progression corresponds with the stages of reading development (Bear et al., 2012; Ehri, 2000; Graham & Hebert, 2010). Evidence that spelling and reading share the same phonological and orthographic structures is observed in the congruence of the stages of spelling and reading development (Bear & Templeton, 1998). Romani, Olsen and DiBetta (2005) posit that these phonological and orthographic structures are used via two different pathways according to a dual-route model. One route utilizes indirect phonological, non-lexical processes such as phoneme-grapheme rules to decode and words. The other route, known as the lexical route, involves retrieving words as whole units. This is commonly seen in young children trying to use phonological strategies to spell and read words with irregular orthographic patterns.

There is a wealth of research showing strong relationships between reading skills and spelling performance (Berninger, Abbott, Nagy, & Carlisle, 2010; Bruck, 1993; Ehri, 2000). More specifically, formal instruction in spelling can have a positive impact on word attack skills and written compositions (Graham, Harris, & Chorzempa, 2002). Both reading and spelling abilities can be traced to phonological processes including the individual's ability to discriminate and manipulate sounds in words (Stanovich, Siegel, & Gottardo, 1997). These phonological skills are cognitively coded into mental representations. When individuals write words, their



choice of spelling can illustrate their phonological abilities, their mental representations as well as their ability to put those mental representations into writing. In this fashion, writing can be a window into the overall literacy process. The process of spelling, or encoding orthographic information, has been described as a conservative perspective on a child's overarching literacy skill as encoding is a production task rather than a recognition task (Williams, Walker, Vaughn, & Wanzek, 2016). Common reading and spelling errors cluster around certain developmental stages and reflect a developmental arc of learning to write and read words (Bear et al. 2008). In 2000, Ehri reinforced this idea that word reading development occurs with distinct spelling developmental abilities and follows a progression of developmental levels. These levels act as a map to guide educators through the continuum of early reading and writing development.

Spelling in this way leaves a "foot print" of the child's orthographic skills which indicate how far along the continuum they are (Gentry, 2004. p. 5). The strategies employed in these stages have been found to be linked to abilities in phonological knowledge or the processing of oral language/sounds (Abbott & Berninger, 1993; Berninger, Abbott, Thomson, & Raskind, 2001). Analysis of the spelling attempts of children provides important diagnostic information about their morphological and orthographical knowledge of words as it relates to reading and general word knowledge (Invernizzi, Abouzeid, & Gill, 1994). In other words, children move from using spelling strategies where they are attempting to master phoneme/grapheme relationships to ones where they are attempting to master spelling patterns. Eventually, they use strategies that attempt to master meaning, or attain a morphological understanding of spelling (Bear, et al., 2012).

Though this area continues to be understudied (Weiser & Mathes, 2011), there is evidence of a synergistic relationship between reading and writing. In 2008, Ritchey studied early

spelling skills as they relate to early reading skills in 60 students completing kindergarten. Spelling and letter-name fluency were moderately to strongly correlated with early reading skills including letter-sound fluency and phonological awareness. Early reading skills including reading to understand words, sentences, and paragraphs also had moderate to strong correlations to spelling. Similarly, Graham and Santangelo (2014) conducted a meta-analysis exploring the effect of spelling instruction on spelling, reading and writing in students with learning disabilities and their typically-achieving peers. They found that formal spelling instruction was effective in improving spelling, phonological awareness, reading achievement and spelling while writing. These findings were confirmed in a study analyzing the effects of spelling instruction on the reading and spelling performance of students with learning disabilities.

Comparatively, Weiser and Mathes (2011) found that direct encoding instruction raised both the reading and spelling abilities of students at risk of literacy failure (2011). Students who received explicit instruction in phoneme-grapheme relationships and word work activities with manipulatives such as letter tiles to manipulate letter-sound relationships in words showed significant improvements compared to the control group. Instruction was positively correlated with increases in knowledge of the alphabetic principle, better phonemic awareness, and higher scores on both reading and spelling measures.

### **Multilinguistic Nature of Spelling**

To better understand spelling development, it is critical to understand the linguistic foundation of written language. Every writing system is composed of three layers: phonology or sound, orthography or pattern, and morphology or meaning. These three components are interwoven in varied ways among languages to form a means for written expression. Research

on reading deficits in students with learning disabilities has long been centered on the phonological deficit hypothesis (e.g. Cornwall, 1992; Stanovich, 1997). This research supports the notion that students with LD struggle with decoding due to a deficit in phonological awareness and, as a result, rely on visual memorization of orthographic structures read unknown words. This is demonstrated in spelling patterns that reflect a high incidence of sensitivity to orthographic features and a low incidence of spelling patterns that reflect understanding of phonological features (Bourassa & Treiman, 2001). However, the phonological aspect of spelling is just one of three major linguistic components of spelling: phonological, orthographic and morphological awareness (Masterson & Apel, 2010).

To spell a word, an individual may use any one or a combination of these three components. Phonological aspects of spelling are those concerned with the discrimination, manipulation and use of knowledge of speech sounds to write words. Phonological awareness is strongly correlated to reading and spelling ability in young children. (Rack, Hulme, Snowling, & Wightman, 1994; Swanson, Trainin, Necochea, & Hammill, 2003). There is ample evidence to confirm that decreased phonological awareness as well as difficulty applying phonological strategies to decoding and encoding are linked to decreased spelling abilities (Shaywitz & Shaywitz, 2005; Friend & Olsen, 2008). There are different levels of phonological awareness, and children tend to progress from an understanding of word-level, to syllable-level, then phoneme-level skills (Ritchey, 2008). Phonological awareness deficits can interfere with learning and the use of grapheme–phoneme relationships to “sound out” and blend sounds together (Yeong, Fletcher, & Bayliss, 2014).

Orthographic awareness involves becoming familiar with the basic patterns of spelling. There are many basic vowel and consonant patterns that children learn including:

consonant–vowel–consonant or CVC (as in *pat*), consonant-vowel-vowel-consonant or CVVC (*rain*), and consonant-vowel-consonant- silent e CVCe (*fate*). As orthographic skills develop, children become aware that phonological strategies are insufficient with orthographic patterns such as *-ight* in *night*, *light* and *might*. Becoming familiar with these patterns involves forming a visual memory of how particular sounds interact in words. These visual representations, sometimes referred to as mental graphemic representation, can be accessed without the use of phonological strategies (Ehri, 2000; Masterson & Apel, 2010). As knowledge of these representations increases, patterns including positional rules and legal and illegal letter patterns can be mastered.

The third component of spelling, morphological awareness is the knowledge of the meaning of morphemes, or word parts that are associated with a particular meaning. Some researchers posit that the crux of spelling disabilities is the morphological deficit hypothesis (Fowler & Liberman, 1995; Carlisle, 1996). The morphological component of language is critical as the English writing system includes patterns that cannot be approached by phonemic strategies alone. In a review of many languages, English was considered to be at the exact midpoint on the continuum of languages which ranges from nearly completely phonemic such as Italian to almost completely morphemic like Chinese (Fowler & Liberman, 1995).

The morphological deficit hypothesis has it that some individuals can learn the simple phoneme-grapheme relationships required for the mastery of early stages of spelling ; however, they falter with words that have a morphological structure (Fowler & Liberman, 1995). Students with a deficit of morphological knowledge performed less accurately on spelling tasks where they were required to spell words with morphological structures (Carlisle, 1996). This makes sense as students with learning disabilities have particular difficulties in

phonological processing which involves isolating, manipulating, and blending sounds that are linked to graphemes. It follows, that students with learning disabilities would have a comparable difficulty with morphological units that similarly require isolation and manipulation (Fowler & Liberman (1995).

There is also evidence to support the idea that morphological knowledge holds more importance in word knowledge than previously thought. While phonological awareness decreases in importance after the early elementary years (Nagy, Berninger, & Abbott, 2006), morphological knowledge continues to be a critical part of word study and reading comprehension into later stages of literacy development (Berninger, Abbott, Nagy, & Carlisle, 2010). The addition of morphological interventions to a combination of phonological and orthographic interventions was linked to better scores in both spelling and reading comprehension than were phonological and orthographic interventions alone (Wolter & Dilworth, 2014). Additionally, morphological skills can help compensate for weak phonological skills. Morphological strategies can aid students in segmenting words into smaller decodable units, which can help with the reading of confusing sound-letter associations not decodable with orthographic-phonological pattern strategies alone.

### **Spelling in Students with Learning Disabilities**

Thirty seven percent of students receiving special education services in public schools fall under the classification of Specific Learning Disability (U.S. Department of Education, 2015). Though it is common to think of reading as the primary focus of educating students with learning disabilities, the impact of writing should not be underestimated. While students with learning disabilities struggle in many different content areas, the acquisition and mastery of

specific spelling skills can be especially difficult (Fletcher, Lyon, Fuchs, & Barnes, 2007; Vaughn, Bos, & Schumm, 2011). Though the majority of students with learning disabilities have problems with overall literacy, spelling deficits are some of the most common and most difficult to remediate (Cornwall, 1992; Bruck, 1988). There is ample literature demonstrating the difficulty that students with LD have spelling words that contain consistent sound-letter relationships as well as more complex, multisyllabic words (Bailet, 1990; Darch, Eaves, Crowe, Simmons & Conniff, 2006). Many students with LD have extreme difficulty in understanding the phonological component of the spelling, and how to manipulate and code the sounds of language into print (Good, Simmons, & Smith, 1998).

Research has tied spelling difficulties to learning disabilities in reading as both of these skill sets develop reciprocally and interdependently (Ehri, 2000; Moats, 2000). Lower performance in spelling is strongly linked to dyslexia and other reading disabilities with spelling problems being comparable to those of reading (Berninger et al., 2001). Spelling problems begin in childhood and persist into adulthood in individuals with learning disabilities such as dyslexia (Bruck, 1993; Lefly & Pennington, 1991). Moreover, poor spelling is correlated to difficulties in overall written composition in children with dyslexia (Berninger et al., 2001; Bruck, 1993) and continues to be a significant challenge even when reading issues are resolved (Berninger, 2008).

In 1992, Abouzoid differentiated spelling and reading errors that were linked to delays in phonological processing from those originating from a phonological skill deficit. The question was whether or not delayed orthographic development would follow the same stages of spelling development that occur in typically-developing children, albeit at a slower rate. The alternative hypothesis was that some learners would not demonstrate a delay, but instead would display word knowledge that would have an atypical progression. It was hypothesized that children with

learning disabilities would perform similarly to younger children thus showing that they were progressing through stages, but at a delayed rate. Additionally, the authors predicted that students with learning disabilities would show an atypical pattern and their progression would not increase with time and age. This was measured in two general categories- *naming* and *timing*. Naming corresponds to the accuracy of word knowledge (spelling, word recognition, and word recall). Timing refers to latency, or a slower response times.

The researchers found that errors related to naming and the accuracy of word knowledge stemmed from a general delay in the typical progression through the stages of spelling development. This meant that, overall, students would continue to improve with age and move through stages, albeit at a rate slower than their typically-achieving peers. Conversely, errors stemming from timing or slow response times correlated with a different pattern of spelling development. Students needing additional time to process tasks would not progress in a typical fashion and may have shown worsening of orthographic skills with age and stage. Additionally, the need for additional processing time would not diminish with age. In other words, the implication was that children demonstrating an overall delay would, given appropriate instruction, eventually move through the stages and learn to read and write as their typically-developing peers did. However, children who had issues with latency would require additional processing time that would not diminish with age.

The reading and spelling skills of a child with a learning disability has been often likened to those of a younger, typically-developing reader (Moats, 1983; Schwartz, 1983). The causality of this characteristic is less certain. A frequently used research design involves using spelling-level-match comparisons. In these studies, each child with learning disabilities and lower spelling achievement is compared to a younger, typically-achieving child. These ability levels

are generally determined based on standardized test scores.

In 1983, Moats conducted a spelling-level-match-comparison study comparing 27 fourth through eighth grade children with dyslexia to 27 typically-achieving children. The reading levels of children with dyslexia lagged their cognitive ability by the equivalent of two years. Additionally, their spelling achievement fell between grade equivalents of 2.6 to 3.6 as measured by the Stanford Dictated Spelling test. Error analysis was based on phonological accuracy and serial order confusions such as *nihgt* for *night*. The study found no significant differences in either of these areas. Moats explained that these results were likely related to the level of intervention that the students with dyslexia had received, especially in the area of phonological strategies. This was supported by a moderate correlation between phonological accuracy and remedial interventions.

This design, pairing children with LD with younger, typically-achieving children, has been used in several studies that have found a strong relationship between the use of phonological awareness intervention and improvements in phonological spelling accuracy (Wise, Ring, & Olson 1999). Since Moats conducted her study, there have been similar studies that have focused on orthographically-based spelling patterns (Bourassa & Trieman, 2003) as well as phonologically-based spelling patterns (Cassar, Treiman, Moats, Pollo & Kessler, 2005) in spelling-level-matched children. However, there have been mixed results in these studies.

Friend and Olsen (2008) studied phonologically-based spelling in children with and without learning disabilities. Participants consisted of 77 pairs of students- each comprising an older child with a spelling disability and a younger child with typical spelling achievement. Spelling ability was tested by identification of certain features including graphotactic-accuracy and phonological accuracy. Graphotactic-accuracy involved identification of syllable position,



and the existence of the spelling feature in English. As predicted the students without spelling disabilities scored significantly better in phonological awareness in both language-based measures and within-spelling responses. There was not a significant difference between the two groups in graphotactic accuracy or orthographic coding.

Similarly, Bruck and Treiman (1990) compared students with learning disabilities to typically-achieving younger children that were matched for spelling ability. The results indicated a phonological deficit in children with learning disabilities. Children with LD more frequently used spelling patterns that indicated deficits in both phonological and orthographic knowledge. This was demonstrated by the use of non-phonetic spelling patterns and spelling errors that were not features of English.

### **Spelling and Cross-linguistic Transfer**

Just as native-English speaking children progress through phases or stages of writing development (Ehri, 1997; Moats, 1995) so do children acquiring a second language. However, there is not yet consensus in the literature about how speaking English as second language affects spelling development. The rate at which ELL students acquire phonological, morphological and orthographic knowledge differs based on several factors including the influence of language transparency in their first and second languages (Figueredo, 2006). Cummin's (1979) interdependence hypothesis posits that an intrinsic part of learning a first language is the acquisition of certain metalinguistic knowledge and skills that can be drawn upon when working in a second language. He refers to these skills and knowledge as a common underlying proficiency (CUP). Researchers have found evidence to support the concept of CUP in the cross linguistic transfer of phonological awareness, word reading and spelling skills

(August & Shanahan 2006; Rubin & Carlan, 2005). The skills and strategies of CUP form a foundation for literacy development in both languages. The logic of the model is that the development of proficiencies in a child's first language (L1) benefit from their development in their other language (L2).

### **Orthographic Depth Hypothesis**

There are multiple variables that affect how CUP affects the learning of ELL students. According to the orthographic depth hypothesis (Katz & Frost, 1992), the depth of a particular orthography influences the rate at which the individual learns to decode and encode. The depth or the transparency of a language relates to how consistently phonemes and letters are mapped. This extent to which a language allows multiple variations between symbols and sounds, determines the difficulty of learning a language's orthographic and phonological patterns. English orthography is a complex and inconsistent rendering of spoken language. It often lacks one-to-one correspondence between printed letters and phonemes. Children learning a deep orthography such as English face a greater challenge than with shallow languages. Children who are more experienced in a shallow orthography may focus more on phonological strategies such as sound-symbol relationships at the expense visual processes. (Dixon, Zhao & Joshi, 2010). Because English has a deep orthography, many English words are not easily decodable and require memorization. In comparison, Spanish has a shallow orthography. In Spanish, phonological strategies can be used to spell many more single and polysyllabic words. There is significantly less need for strategies that involve visual memory of letter patterns (Helman, Bear, Templeton, Invernizzi, & Johnston, 2011).

Researchers have found mixed results regarding the ways in which cross linguistic transfer is demonstrated in written expression (Howard, Green & Arteagoitia, 2012; Dixon, Zhau &

Joshi, 2010; Zutell & Allen, 1988). On one hand, there is evidence in non-learning disabled students, cross linguistic spelling errors disappear without intervention as children get older. Howard, Green and Arteagoitia (2012) examined cross-linguistic transfer in ELL students specifically in terms of the Spanish-influenced spelling patterns present in Spanish–English bilinguals. Over a three-year period, 220 ELL participants in second to fourth grade were studied. The researchers concluded that the frequency of cross-linguistic spelling errors was low in second and third grades, and was almost completely diminished by fourth grade. The implications were that cross linguistic transfer is typically developmental, common among Spanish bilingual students, and does not require remediation.

Raynolds and Uhry (2010) investigated the spelling patterns of Spanish-speaking kindergarteners in comparison to their native-English speaking peers. They hypothesized that in comparison with English speakers, the Spanish-speaking children would show differences in their spelling with specific difficulty in the area of non-Spanish phonemes. They also predicted that their English vocabulary would be positively correlated with their accuracy in spelling English phonemes. The 19 Spanish-speaking kindergarteners attended a school with English-only instruction and had received no Spanish literacy instruction previously. Their data were compared to 19 monolingual English-speaking kindergarteners attending the same school. A variety of skills, including spelling, were measured with the Phonological Awareness Literacy Screening and the Peabody Picture Vocabulary Test III.

As predicted, English-only speakers scored higher in vocabulary tasks, and the ability to spell English phonemes was strongly correlated with greater vocabulary knowledge. However, there were no significant differences between the two groups in letter name identification tasks, letter sound identification tasks or phonemic awareness. There were, similarly, no significant

differences in the spelling of non-Spanish phonemes. The researchers suggested that this was a result of the monolingual English speakers scoring poorly and having similar difficulties as their Spanish-speaking peers, because the particular phoneme-grapheme relationships were still being acquired at their level of instruction. Contrastingly, there was a significant difference in the spelling of stop consonants at the ends of words represented by the letters P, B, T, D, K and G with English-only speakers scoring significantly better. These sounds are present in both languages but are phonetically different.

For monolingual and bilingual children alike, spelling requires several cognitive and linguistic processes including phonological awareness, graphophonemic knowledge, rapid naming, verbal working memory, and syntactic knowledge (Harrison, Goegan, Jalbert, McManus, Sinclair, & Spurling, 2016). In a study of 112 third grade children, Harrison et al. (2016) looked at how the aforementioned processes, as well as several other literacy indicators, differed between ELL children and monolingual children. There were not significant differences in rapid naming, phonological awareness, verbal short-term and working memory. The two groups also scored similarly on single-word spelling, text spelling, handwriting fluency and on writing quality indices. The ELL students scored lower on vocabulary, syntactic awareness and decoding fluency measures.

In 2010, Dixon, Zhou and Joshi similarly sought to use the assessment of spelling errors as a means to differentiate spelling errors of among different groups learning English as a second Language. Their sample of 285 children ages 66 to 79 months consisted of bilingual students divided into three groups according to their first language: 168 Mandarin Chinese (58.9%), 72 Malay (25.3%), and 45 Tamil (15.8%). Participants' spelling skills were measured using the Woodcock Language Proficiency Battery-Revised Dictation subtest (WLPB-R; Woodcock,

1991) and Letter-Word Identification subtest.

Dixon, Zhau and Joshi (2010) found that the Chinese group made more substitution errors and more transposition errors due to the lack of a phonological component in their L1, Mandarin. It is hypothesized that this is because Chinese requires more visual memory in spelling and less phonological knowledge, than either Tamil or Malay. Mandarin is logographic, as each character represents a syllable which may be a word or a part of a polysyllabic word. Therefore, semantic or orthographic strategies are used more frequently than phonological strategies. The authors suggest that children with Chinese L1 may perform better, especially when spelling high-frequency words where orthographic, rather than phonological strategies are required.

Howard et al. (2008) developed a longitudinal spelling assessment of Spanish-English bilingual students called the English Developmental Contrastive Spelling Test. It was designed to be an instrument to measure development over time, as well as a contrastive tool. By contrastive, the authors meant that the instrument would discern cross linguistic errors in spelling from those common to the English language spelling. The test consisted of real words and pseudowords. The use of pseudowords allowed researchers to observe isolated orthographic skills, as the student is unable to rely on prior memorization of a word's spelling. Each word in the English Developmental Contrastive Spelling Test was scored in three ways: 1) the response was correct if the spelling was exactly correct; 2) the response was legal if the spelling was incorrect but followed logical sound symbol relationships; and 3) the response was *incorrect* or *illegal* if the word was not correctly spelled and did not follow legal criteria. This evaluation was unique as it assessed both spelling development as well as cross linguistic influence. Common cross linguistic errors include short vowels, long vowels, and consonant digraphs (Fashola et.al, 1996; Zutell, & Allen, 1988). Common spelling miscues unrelated to language

transfer include double consonants, past tense spelling, and spelling involving a rhotic vowel also known as a vowel-r digraphs as in words like *north*, *car* and *water*.

Fashola, Drum, Mayer and Kang (1996) studied the spelling skills of children who spoke Spanish at home and compared them with those from English-speaking households. The researchers hypothesized that the Spanish-speaking students would have predictable errors influenced by Spanish rules of spelling. They specifically examined the spelling of eight English allophones that were predicted to be influenced by the application of Spanish spelling rules. They were as follows. 1) English words with spellings of *CC* and *CK* in the medial position would have those letters substituted with *c*, *k*, or *qu*. Examples include *socer* for *soccer* or *tiquet* for *ticket*. 2) The English words spelled with *H* would have that letter replaced with *J*, e.g., *jero* for *hero*. 3) The letters *SK* would be replaced with *sc* and *squ*, e.g., *bascet* would be written as *bascet* and *asking* would be written as *asquing*. 4) Letter *B* might be replaced with *v* as in *cavil* for *cable*. 5) The English spellings for *-all* is replaced with *oll*, *o*, or *al*. This can be seen in spelling errors like *woll* for *wall* and *sto* for *stall*. 6) The English spellings for *A* is replaced with *ei*, *ell* or *ey*. *Baby* would be written as *beibi* and *case* would be written as *cells*. 7) The English spellings for *OO* is replaced *o* and *u*. *Took* would be spelled as *tuk* or *tok*. 8) The English spellings for *EA* and *EE* are replaced with *i*. *Dreaming* would be written for *driming*. In these categories, more predicted errors were made by the Spanish-speaking children than the English-speaking children. Overall, Spanish-speaking students made four times more predicted errors than their English-speaking peers. The groups did not differ on non-predicted errors.

The authors contend that this pattern of predicted errors can be traced to a difficulty in forming correct orthographic or phonetic representations of the dictated words. Phonetic errors occur when the student cannot retrieve an appropriate grapheme from long term memory to

accurately represent phonetic information. Because they cannot access or do not have the correct grapheme, they instead use a similar known sound. For instance, “sh” is not a grapheme used in Spanish, so the student may instead use “ch” which is phonologically similar. Likewise, an orthographic error occurs when a child cannot access from long term memory a letter pattern common to English and, instead, retrieves one common in their primary language.

### **ELL in Stages of Orthographic Development**

For ELL students, the stages of orthographic development as outlined by Bear et al. (2012) can be affected by cross-linguistic transfer. The earliest stage of writing, emergent writing, involves children learning to recognize and write the letters of the alphabet. Children play with the sounds in letters and words. ELL students, in early childhood, begin emergent writing like their monolingual peers, but will bring to the process prior knowledge about the writing and sounds of their primary language (Helman, 2005). This will depend on the level of literacy that they have in their primary language. Some students may enter this stage with little exposure to print, and their emergent stage writing may be less letter-like (Helman et al., 2002, p. 80). Moreover, individuals whose primary written language is very dissimilar to English may take more time to start writing English letters in proper left-to-right directionality.

During the next stage, the Letter Name Alphabetic Stage, students apply the alphabetic principle, first to consonants, and eventually to correctly representing most short-vowel patterns, consonant digraphs, and consonant blends. ELL students may be exposed to some of the sounds in the phoneme/grapheme relationships for the first time (Helman et al., 2002, p. 109). Lack of familiarity with these sounds and difficulty with pronunciation may make progress in the stage somewhat slower. A common strategy utilized during this stage is to make spelling decisions

based on how sounds are articulated in the mouth (Nilsen & Nilsen, 2002). This includes the manner of articulation, or how air is forced through the mouth and nose. Because of confusion and substitutions around letter sound relationships, students at this stage more heavily rely on their sight word vocabulary or visual memory of a word structure rather than using phonological strategies (Helman et al., 2002, p. 118). It is also common for students to overemphasize some unfamiliar sounds. An example is the addition of an extra vowel in a consonant blend (*CALIP* for *clap*).

For ELL students, the third stage, Within Word Pattern, can pose certain challenges. Because of the orthographic depth of English, letters do not always have consistent one-to-one correspondence with sounds. Instead, during this stage, children discover that words can be divided into chunks and letter clusters to form patterns that represent sound. For ELL students that have literacy background in a shallow orthography, the complexity of vowel patterns can be very difficult to adapt to. If a particular sound does not exist in their primary language, discerning and then retaining how that sound is represented in orthographic patterns can be challenging (Helman et al., 2002, p. 157) For example, Vietnamese does not have r-influenced vowels, so pronouncing and perceiving an r-influenced pattern such as in words like *pair*, *hair* and *fair* is often difficult. For ELL students, this stage can also be complicated by a lack of familiarity with the morphological conventions they are learning in English (Helman et al., 2002, p. 187). They may particularly have difficulty with suffixes like adding *-s* to a word for pluralization or adding *-ed* to indicate past tense.

The Syllables and Affixes stage comes after students have a good working knowledge of patterned one syllable words. This stage is a transition from pattern or orthographic awareness to meaning. Children learn to analyze words by dividing them into the base word, prefixes and



suffixes. They learn that within words are clusters of letters that form affixes that add certain meanings to words. This knowledge culminates in the final stage, the Derivational Relations Spelling stage, where there is a mastery of the correct spelling of most words. Misspellings occur, but are simple confusions due to atypical spellings. There is a basic understanding of the Latin and Greek roots of words. For ELL students, this stage can be complicated by a lack of familiarity with the morphological conventions of English (Helman et al., 2002, pg. 201).

### *Characteristics of Vietnamese and Spanish Phonology*

For the purposes of this study, a brief introduction into the sound systems of Spanish and Vietnamese is given as one of these two languages is spoken by the majority of the students in the study. A cursory comparison of the basic phonological and orthographic structure of English, Spanish and Vietnamese can provide important insight into the spelling patterns of ELL students. With what is known about cross-linguistic transfer and predictable spelling errors, it is essential to have a good understanding of language differences among ELL students in order to assess their literacy needs (Klingner & Eppolito, 2014). Comparing the sound systems of students' primary and secondary language can aid in understanding how the ELL student perceives and uses particular sounds. The phonology and orthography of students' primary languages have important influences on how they learn to read and write. Spanish and English, for example, share approximately between 10,000-15,000 cognates (Helman & Helman, 2012). These are word parts that share similar meanings, pronunciations and spellings, and can be an important bridge between the two languages when ELL students are learning to spell. As a basis for comparison, English uses 27 letters to represent 44 different sounds. In English, sounds are classified as consonant and vowel sounds. Consonants generally have a 1:1 correspondence with their associated sound, while digraphs such as *ch*, *sh*, *th*, and *wh* are consonant pairs that

correspond to a single sound. The six English vowels have 15 different vowel sounds (Helman & Helman, 2012).

To begin, Vietnamese is an Austroasiatic or Mon–Khmer language which characterizes a large language family of Southeast Asia. The alphabet consists of 23 consonants and 12 vowels. Like English, the Vietnamese spelling system is an alphabetic orthography because all phonemes are represented by letters. The Vietnamese alphabet is phonemic, with one letter or a combination of letters representing each sound (Bilingual Education Office, 1994). It is a tonal language with six different tones represented by small markings over or under a vowel of a syllable. Each syllable has a tone and each tone changes the meaning of a word. English has intonation patterns in phrases and sentences. For example, intonation patterns can differentiate a question from a fact. It can also demonstrate emotion.

In Vietnamese, words are primarily monosyllabic. If more than one syllable is present, that syllable is usually a repetition of the first syllable (Bilingual Education Office, 1994). In Vietnamese, monosyllabic words are generally combined into phrases and compound words. The three major dialects of Vietnamese each come from different regions of Vietnam. There are only 16 sounds that are common to both Vietnamese and English (Hwa-Froelich, Hodson, & Edwards, 2002). In Vietnamese, six consonants are used in the final position: /p/ as in *sap*, /t/ as in *sat*, /k/ as in *sack*, /m/ as in *gram*, /n/ as in *tan*, and /ŋ/ as in *sang*. Moreover, there are very few consonant clusters in Vietnamese, so those can be especially confusing to Vietnamese speakers learning English. There are other phonemes in English that are not found in Vietnamese including j (as in *jump*) which is often confused with the /z/ sound, and v (as in *van*) which is often confused with /j./ Vietnamese speakers use fewer consonants and, as a result, may not voice the final consonants of English words (Bilingual Education Office, 1994). The

Vietnamese language has vowel patterns where two or more vowels follow each other in a word, and the vowels are spoken without pauses between them (Hwa-Froelich, Hodson, & Edwards, 2002).

Spanish is an Indo-European language. The sound system of Spanish is composed of 18 consonant sounds and five vowel sounds. In comparison, English is composed of 24 consonant sounds and 11 vowel sounds (Goldstein & Washington, 2001). English and Spanish share many sounds, but there are also distinctions. Learning the phoneme-grapheme relationships of these common sounds may be a good foundation when learning sounds that are not common to both languages (Helman, 2004). The following consonant sounds exist in both Spanish and English: p, b, t, d, k, g, m, n, f, s, w, y, ch and l. There are also common consonant clusters: pl, pr, bl, br, tr, dr, cl, cr, gl, gr, fl and fr (Helman, 2004). There are also many distinct English sounds that do not exist in Spanish which can cause predictable errors. An example is the /d/ as in *den* which is predictably substituted with a /th/ sound like *then*. The /r/ as in *rope* is often difficult to pronounce for Spanish-speaking ELL students and may be substituted with a rolling r. The /j/ sound as in *joke* may be replaced with a /ch/ sound like in the word *choke*. The /v/ sound as in *van* may be read as *ban*. /s/ and /z/ sounds also commonly confused. An s-blend, like in the word *special*, is not permissible in Spanish. As a rule, an E is placed before all s-blends, such as in the word, *Español*. Because of this, students may use that rule in English such as in spelling *esnake* for *snake*.

Vowel sounds in Spanish are much simpler than those in English (Foster, Altamiranda, & de Urioste, 1999). There are common long vowel sounds in both Spanish and English, a, e, i, o and u, as well as the short o in *top*. However, Spanish does not have the *schwa* sound as in the word *the* or the r-controlled sound in the word *her*. In terms of spelling vowel sounds, there are

40 ways in which vowels can be combined in English (Dalbor, 1997). Spanish does not have four of the short vowel sound, i.e., a, e, i, and u. In English, most syllables are considered closed and end in a consonant sound. Because Spanish has a predominantly open-syllable structure, Spanish-speaking students may omit final consonant sounds of words when writing and speaking (Helman, 2005).

In terms of orthographic patterns, the letter patterns permissible in Spanish differ to those in English. In English, the final letter of a word can be any consonant. In contrast, Spanish words more often end in vowels. There are only five consonants that are permitted to be the final letter of Spanish words (l, r, d, n and s). For Spanish-speaking ELL students the consonant sounds that end many English words are unfamiliar and may be an area for predicted errors.

Another important aspect of a sound system is its suprasegmental, or intonational components. These components are generally simpler in Spanish than in English. As a result, Spanish-speaking ELL students commonly have difficulty segmenting English words into syllables because English syllables are less distinct and harder to perceive (Fashola, Drum, Mayer, & Kang, 1996; Dalbor, 1997). Stress, which refers to the loudness of a syllable as well as the pitch and rhythm of syllables differs between Spanish and English. These differences can make the process of decoding words in English laborious (Helman, 2005) For instance, Spanish words frequently end with a stressed vowel sounds. However, in English, ending stressed vowels are generally followed by consonants such as in the words, *cow*, *toy* and *fall*. It is not surprising that a commonly predicted error of Spanish-speaking ELL students is to omit an ending consonant, such as writing *CO* for *cow*, *TOI* for *toy* and *FA* for *fall*. Additionally, Spanish does not have a structure that corresponds with the unstressed syllables, as in final syllables containing a consonant plus *-le*, such as in the words *little* and *cuddle* (Helman, 2005).

*Comparing Spelling Characteristics of Students with LD to those of ELL students*

Both ELL students and students with learning disabilities share a common struggle with written expression, specifically spelling, though its cause often differs (Vaughn, Bos, & Schumm, 2011). A better understanding of differences in writing is critical given the significant problem of over- and under-classification of diverse students in special education (Rueda & Windmueller, 2006). However, there is little research looking specifically at how to accurately differentiate between the learning characteristics of ELL students and students with learning disabilities, and even less literature that focuses on written expression and orthographic knowledge.

Multiple variables affect spelling development and how different strategies are accessed for both ELL students and students with LD. Klingner and Eppolito (2014) outline several distinctions between these two groups. They explain that while both may have difficulty with phonological skills, the students with LD have specific deficits related to perceiving sound differences and manipulating sounds. Although ELL students may show similar difficulties, theirs is likely rooted in a lack of familiarity with sounds that do not exist in their primary language. A certain degree of familiarity with phonemes is necessary for an individual to be able to differentiate between sounds, or to manipulate and segment sounds (August & Shanahan, 2006). This adjustment to L2 sounds that are absent in L1 can make learning phoneme-grapheme relationships more challenging.

In 2008, Siegel examined the relationships of morphological awareness to reading and spelling skills of children with dyslexia, children who were typical readers, and ELL students. The participants were sixth grade students divided into two groups: 309 ELL students and 929

students who had English as their first language. The researchers hypothesized that morphological awareness is decreased in children with dyslexia and that morphological awareness makes a significant contribution to reading and spelling achievement independent of phonological awareness or oral language skills. Students were given a variety of standardized and researcher-created assessments to measure a variety of literacy skills including reading (word reading, word reading fluency, reading comprehension), phonological, morphological and orthographic skills and written expression. The results indicated that morphological awareness was significantly linked to reading and spelling with a stronger correlation than phonological awareness or oral language skills. Significantly lower scores on the morphological awareness tasks were seen in individuals with dyslexia in contrast to their typically-achieving peers. When comparing morphological awareness in ELL students and the English L1 students no significant differences were observed.

### **Spelling Measures**

To effectively teach children to recognize and use orthographic patterns in words, educators need to pinpoint the spelling skills that are challenging and individualize spelling instruction based on that assessment (Darch, Kim, Johnson & James, 2000). However, the choice of assessment that best captures the nuances of an individual's orthographic skills has been debated. Spelling development is often measured through the analysis of spelling error patterns. Spelling errors are frequently classified as phonetic and non-phonetic (Apel & Masterson, 2010). In phonetic spellings, each phoneme in a word is represented by a letter. For instance, the word *love* could be spelled as *LUV* and *squirrel* could be written as *SKWIRL*. A non-phonetic spelling is a spelling attempt where not all phonemes are represented by letters or

they are represented with letters that would never be used to represent that particular phoneme e.g., *HAS* for *hands* or *CONP* for *cold*. This binary measure, phonetic versus non-phonetic, has been criticized as not being sensitive enough to pick up important information within a spelling error. Rather than measuring whether or not an error was phonetic in nature, some researchers have found it more productive to analyze why individuals with LD misspelled a word from a linguistic or orthographic standpoint. However, the majority of spelling measures do not provide this kind of analysis.

For instance, standardized tests spelling assessments often provide a series of scores including raw scores, percentiles, and age/grade equivalencies. Commonly used spelling assessments, such as those included in the Wechsler Individual Achievement Test–Third Edition and the Woodcock-Johnson Tests of Academic Achievement, are based on traditional spelling tests. Words are dictated and the child only gets credit for spelling the word perfectly. There are several disadvantages to these tests, but foremost this type of assessment yields little data about the linguistic aspects of spelling errors (Masterson & Apel, 2010). For example, if the dictated word is *chair* and the student's response is to spell it *chare*, this is much different than if the child spelled it as *hcur*. The first spelling error reveals that the student is aware of the orthographic pattern of the common with a silent e. The response of *hcur* indicates the student is unfamiliar with the /ch/ grapheme and the word's vowel sound. An improvement on the traditional spelling test format is one that measure a specific linguistic component. Standardized tests do not test the complete range or scope of a skill set. Rather items are generally designed using Item Response Theory which uses a statistical model to measure the quality of a test item. This is not meant to measure small incremental changes, but, rather, provide valid standardized scores (Calhoun, Greenberg, & Hunter, 2010). There are assessments that address the

phonological aspects of spelling such as the Spelling of Sounds subtest in the Woodcock-Johnson Tests of Achievement- IV, but lack information about orthographic or morphological features of spelling.

Another mode of assessment is to analyze spelling through writing. This often carried out in the context of a writing assignment assessed via a rubric. The advantage of this method is that it encourages the student to monitor and apply spelling knowledge to writing. However, it does not target all types of spelling knowledge and would be hard to gear to the specific assessment of a particular skill (Calhoun, Greenberg, & Hunter, 2010). A third method of spelling assessment is based on word recognition. Students are asked to select the correct spelling of a word from multiple choices (Calhoun, Greenberg, & Hunter, 2010). While this method gives an insight into a child's ability to detect spelling errors and correct spellings, it lacks a modality that would incorporate producing written words.

Qualitative spelling inventories are generally comprised of a series of word lists that are ordered according to grade level or a single list ordered in terms of developmental levels (Schlagal, 1989). Qualitative spelling inventories use words that represent specific linguistic features in words and increase in difficulty in a manner that follows general spelling development stages. Test items are not designed to measure every orthographic feature within a given developmental phase but as a sample of the most telling features in a stage (Bear, et al., 2012). One purpose of the inventory is to identify spelling patterns that the student is using and to reveal instructional needs (Invernizzi et al., 1994). The assessment can also determine a student's aptitude within the developmental continuum of word knowledge (Templeton & Morris, 1999). The results of these inventories may be expressed in terms of grade level or developmental level (Schlagal, 1992).



The Words Their Way Primary Spelling Inventory includes 26 words that correspond to different stages of spelling. The responses are analyzed using a point system to determine the student's stage of orthographic development. This staging is intended to not only assess the level of orthographic knowledge and improve writing and spelling instruction, but also to drive reading instruction. The inventory has been shown to be a reliable instrument and valid predictor of student achievement. Its psychometric properties are reviewed in more detail in Chapter Three.

The current study seeks to bridge the gap in the literature comparing orthographic knowledge in ELL students and students with LD. The Words Their Way Primary Spelling Inventory was chosen because it is rooted in developmental stage theory and, therefore, is best suited to answer the research questions regarding how spelling skills differ among ELL students, monolingual students and students with learning disabilities. This study compared these groups, not on a single data point but in terms of developmental stages. This gave information about how a student understands the phonological, orthographic, and morphological features of words. Understanding the differences and similarities of developmental stages among children with LD and ELL students can provide information that can help differentiate learning difficulties associated with LD and language acquisition.

## CHAPTER 3

### METHODOLOGY

#### Sample

A series of one-way, repeated measures and univariate ANOVAs was conducted to compare the effect of student type (ELL, students with LD and non-ELL/non-LD students) on orthographic development as measured by the Words Their Way Primary Spelling Inventory. The participants of this study consisted of 108 students ages 5 to 8 years of age. The participants comprised the following three groups: 1) English Language Learning (ELL) students, 2) students classified as having a Specific Learning Disability (LD) and 3) native-English speaking, typically-achieving (TYP) students. The students were also grouped by grade (K, 1 and 2). Each of these grade groupings had 36 students (12 in the students with LD group, 12 in the ELL group and 12 in the TYP group). This sample size was chosen by conducting a power analysis for conducting a repeated measures ANOVA for each one of the groups. Using an alpha of 0.05 and a power of 0.80, a sufficient sample size is 12 students per group (PASS 15 Power Analysis and Sample Size Software, 2017). The students came from five elementary schools in a suburb in southern New Jersey. Eighty-four percent of the students received free or reduced lunch. The racial makeup of the sample was as follows: 49% Hispanic, 13% Asian, 10% white, 25% Black and 6% Pacific Islander. Additional demographic information on primary language, special education placement, and lunch subsidy is included in Appendix A tables A1 and A2.

Students with LD included students receiving instruction in the general education classroom as well as self-contained public school settings. Twenty-two percent of the special education students in this study were in general education eighty percent or more of the school

day. Seventeen percent of the special education students in this study were in general education 40-80% of the school day. Sixty-one percent were in general education less than 40% of the school day. Of the students in the ELL group, 72% were primarily Spanish-speaking and 28% were primarily Vietnamese-speaking. All data was collected in a redacted form so that no personal identifying information was known by the author. Reliance on government entitlements, namely the number of students receiving free or reduced-cost lunches, were collected from each participating school's official website as a proxy for the income level of the sample.

These groups are defined as follows:

*ELL*- For the purposes of this study, the definition of ELL was limited to students who have met the criteria for and receive English as a Second Language instruction. These criteria, as outlined by the New Jersey Department of Education regulation (N.J.A.C.6A:15-1.3(c), involve evaluation using the Wida Access Placement Test (W-APT) and having at least one other indicator. This additional indicator could include the student's reading level in English, academic performance, and the input of teaching staff.

*SLD or Learning Disabilities (LD)*- For the purposes of this study, learning disabilities were defined as the classification of Specific Learning Disability as defined by New Jersey Administrative Code 6A:14.

*Typical (TYP)*- Students who do not receive special education services or English as a Second Language instruction or special education instruction. These students were chosen at random within the school district.

All of the students in the sample attended a school district in the southern New Jersey. At the time of the study, the school district educated about 5,000 students from Pre-Kindergarten through Grade 12. According to the New Jersey Department of Education, each of schools

participating in this study had approximately 3-400 students, with 20% of the students in the district classified as having had a disability. Among the schools, between 66% and 82% of the students were considered economically disadvantaged by the New Jersey Department of Education. This school district's students were estimated to be 35% Black, 40% Hispanic, 14% White and 10 percent Asian. Approximately 80 percent of families spoke English as their primary language, 12 percent speak Spanish as their primary language and 6 percent speak Vietnamese as their primary language. Approximately 20-22% of students scored sufficiently to have met or exceeded grade level expectations on the Partnership for Assessment of Readiness for College and Career (PARCC) testing.

### **Measures**

The Words Their Way Primary Spelling Inventory includes words specifically chosen to assess discrete orthographic features and patterns that correspond to different stages of spelling. The inventory comes in three different formats, Words Their Way Primary, Words Their Way-Elementary or Words Their Way- Upper Level Spelling Inventory which are given depending on the student's grade or developmental levels. For the purposes of this study, the Primary edition was used. This inventory is presented to groups of students in a manner similar to a traditional spelling test. The test is administered by a test proctor who states a given word to the students, uses the given word in a sentence, and then repeats the given word. Students write the words on a sheet of paper. As shown in Appendix B, Figure B1, the responses are analyzed using a point system to determine at what stage of orthographic development the student is. This staging is intended to not only assess the level of orthographic knowledge and improve writing and spelling instruction, but also to drive reading instruction. The Words Their Way Primary Spelling

Inventory can be scored three different ways. To begin, the assessment has four stages that are divided into subcategories indicating the “early”, “middle” and “late” portion of each stage. The student can earn points for correctly-spelled portions of words which are called Feature Points (FP). Students can also be scored on how many words are spelled completely correct which creates the Words Spelled Correct (WSC) score.

The following summary of the psychometric properties of the Words Their Way Spelling Inventory was reported by the Center for Research in Educational Policy (Sterbinsky, 2007). The psychometric properties of the Words Their Way Primary Spelling Inventory indicate that the inventory is a reliable and valid measure of student achievement. Reliability was analyzed by item discrimination, item difficulty, and internal consistency. The Cronbach’s alpha procedure indicated an overall reliability coefficient of .9341. Item discrimination was also analyzed to measure the extent to which an individual item can be used to differentiate between students with high or low total test scores. The item discrimination measure is an index in which lower numbers indicate that a particular item does not effectively differentiate between high and low performance. Conversely, higher numbers on the item discrimination index, indicate that higher and lower performers can be differentiated. The item discrimination index for the Words Their Way Primary Spelling Inventory ranged from 6.3 (for the word *fan*) to a high of 77.7 (for the word *shine*). Test items were then examined individually and each was analyzed to determine if deletion would improve the overall reliability index or coefficient alpha. No item was recommended for deletion.

Test-retest reliability is a calculation that defines the extent to which test scores are similar over time. Test-retest reliability estimates for the Words Their Way Primary Spelling Inventory ranged from .764 to .946. Predictive validity demonstrates relationships between test

scores and a future criterion such as a score on an established test. The predictive validity coefficients were created by comparing the Fall 2005 administration of the Words Their Way Primary Spelling Inventory as the predictor and the spring 2006 California Standards Tests as the criterion. Subsections of the California Standards Tests included: Reading Comprehension, Word Analysis, Writing Strategies and Written Conventions. The predictive validity coefficients were classified from .531 (Writing Strategies) to .726 (Word Analysis).

Concurrent validity demonstrates relationships between test scores and a measure that has previously been validated. The concurrent validity design used the spring 2006 administration of the Words Their Way Primary Spelling Inventory as the predictor and the 2006 California Standards Tests results as the criterion. All coefficients were significant at least at the  $p=.01$  level. For the validity coefficients ranged from .484 (Reading Comprehension) to .744 (Word Analysis).

The Qualitative Spelling Checklist is a systematic, diagnostic measure that can be used to analyze how students are applying orthographic knowledge in free writing (Bear, et al., 2016). As show in Appendix B, Figure B2, the checklist consists of 20 questions related to the student's progress through the developmental spelling stages. Orthographic patterns in the student's writing are rated as being used *consistently*, *often*, or *not at all*. It can be used with in isolation or as a part of portfolio assessment to document students' needs and growth over time (Bear, et al., 2016). It can also be used to discern the extent to which the student is generalizing the discrete skills measured in Words Their Way spelling inventory.

The authors, Bear, et al., (2016) caution that it should be used in conjunction with the spelling inventory because writing sample analyses have certain limitations. In some circumstances, writing samples may provide a higher estimate than a spelling inventory. Some

students may take less risks in their writing and choose to write only words they know how to correctly spell. Additionally, students may benefit from environmental print and use words that they can copy. Contrastingly, writing samples may be a lower estimate of orthographic skills than a spelling inventory. This may occur when students focus solely on writing ideas at the expense of attention to details such as spelling.

### **Procedure**

Data for the current study was analyzed from the test results of the Words Their Way Primary Spelling Inventory. The measure was administered in the winter and spring of 2015 as a part of the district language arts curriculum. Students were given the Words Their Way Primary Spelling Inventory as indicated in the Words Their Way administration procedures (Bear, et al., 2016). The names of the students were redacted from the test protocols and writing samples by school employees not involved in the current study.

Repeated measures ANOVAs were conducted to compare the differences in group type (ELL, LD and TYP), time of administration (winter, spring) and Grade (K, 1, 2) on orthographic development as measured by the Words Their Way Primary Spelling Inventory. The data was taken over the course of one year and, as such, comparisons made between grades are not longitudinal. These measures consisted of two dependent variables, Feature Points (FP) and Words Spelled Correct (WSC). Feature Points are scores on individual word parts. For example, in the word *lump*, students can get three points for correctly spelling word parts: *l*, *u*, and *mp*. For the word *float*, the following word parts are equal to three feature points: *fl*, *oa* and *t*. The Words Correct score is the ratio of words spelled completely correctly out of the number

of total words in the inventory. Descriptive statistics for a Fall administration of the Words Their Way Primary Spelling Inventory were provided for grades 1 and 2.

A univariate ANOVA was conducted to compare the effect of Group Type, Time of administration and Grade on whether the spring stage score was on/ above grade level. The Developmental Stage was derived from the Feature Points score on the Words Their Way Primary Spelling Inventory. The first stage in which a student made two or more errors was considered to be their developmental stage. To calculate if a student's spelling fell within a developmental stage that was on or above grade level, the students' Developmental Stage on the spring administration of the Words Their Way Primary Spelling Inventory was compared with the End-of-Year Spelling expectation outlined in the Words Their Way program (Bear, et al., 2016). Students were given a binary score to indicate if their developmental stage was on/above grade level. A comparison of the means of these binary scores (on/above grade level, below grade level) was conducted by Group Type (ELL, LD and TYP) and Grade (K, 1, 2).

Writing samples were analyzed using the Qualitative Spelling Checklist (Bear, et al., 2016). The purpose of the Qualitative Spelling Checklist was to identify the orthographic characteristics displayed in the spelling inventories and the extent to which the students were using orthographic knowledge in free writing. The checklist, consisting of 20 questions related to the student's progress through the developmental stages, yielded a developmental spelling stage (Appendix B, Table B2). Orthographic features are rated as being used *consistently*, *often*, or *not at all*. The stages were assigned numeric ratings for the purposes of inter-rater reliability with the earliest stage, Emergent- Early, receiving a rating of 1 and the latest stage, Derivational Relations- Late, receiving a rating of 12. The writing samples were scored by two raters and



these scores were averaged to create the spring stage score. Cohen's Kappa was employed to determine agreement between the two raters' scoring of stage on the spring stage score.

As was done with the spring stage scores, the writing sample stage scores were compared with the End-of-Year Spelling expectation outlined in the Words Their Way program (Bear, et al., 2016). Each stage score was converted to a binary score to indicate if their developmental stage was on/above grade level. A comparison of the means of these binary scores (on/above grade level, below grade level) was conducted by Group Type (ELL, LD and TYP) and Grade (K, 1, 2). A comparison of the means of these binary scores (on/above grade level, below grade level) was conducted by Group Type (ELL, LD and TYP) and Grade (K, 1, 2).

A Pearson Chi Square was computed to assess the relationship between the stage score derived from the spring administration of the spelling inventory and the stage score derived from the writing sample analysis. Descriptive statistics were provided to compare the writing sample scores and the spring stage score as well as the number of stages students progressed over the course of the school year.

## CHAPTER 4

### RESULTS

Repeated-measures ANOVAs were conducted to compare the effect of group type (LD, TYP, ELL) on the orthographic skills of children as measured by the Words Their Way spelling inventory in grades K, 1 and 2. Tests were administered in the winter and spring of the 2015-16 school year for students. Descriptive statistics for the fall administration were provided for grades 1 and 2. To analyze the means across age, grade, and time a series of repeated measures ANOVAS was conducted. Follow-up tests for significant main effects were computed using the Tukey procedure. Since repeated measures ANOVA requires complete data for all groups at all time periods, only the data for winter and spring will be analyzed. The data for stage scores derived from writing samples in the spring were analyzed by a univariate ANOVA. As before, a post hoc analysis using Tukey's multiple comparison procedure was conducted to compare spelling inventory stage means.

#### Research Question 1

How do orthographic skills differ among ELL students, native-English speaking, typically-achieving students and students with LD as measured by the number of correctly spelled words and features in the Words Their Way Spelling Inventory?

#### Words Spelled Correctly

The means for Words Spelled Correctly are presented in Table 4.1 and the ANOVA results in Table 4.2. The means for Fall are presented for descriptive purposes only.

Table 4.1

*Means for Words Spelled Correctly by Group Type, Grade and Time*

Group and Grade	(Fall)	Winter	Spring
ELL:	5.71	5.97	8.44
K	-	0.17	1.92
1	2.17	5.92	9.17
2	9.25	11.83	14.25
LD:	3.50	3.33	5.39
K	-	0.25	1.17
1	2.08	3.67	4.83
2	4.92	6.08	10.17
Typical:	7.25	8.14	11.64
K	-	1.25	5.92
1	6.58	9.92	10.92
2	7.92	13.25	18.75

Table 4.2

*Words Spelled Correctly for Winter and Spring by Group, Grade and Time*

Tests of Between Subjects Effects					
	<i>df</i>	MS	<i>F</i>	<i>P</i>	Partial $\eta^2$
Group Type	2	550.181	15.347	.000	.533
Grade	2	2027.764	56.563	.000	.237
GroupType*Grade	4	47.111	1.314	.270	.050
Error	99				
Within					
Time	1	386.671	47.165	.000	.323
Group Type*Time	2	9.949	1.241	.302	.024
Grade*Time	2	27.005	3.294	.041	.062
GroupType*Grade*Time	4	20.574	2.510	.047	.092
Error	99	8.198			

As shown in Table 4.2 there are significant main effects on the Words Spelled Correct measure for Group Type, Grade and Time, and significant interactions between Grade and Time, and Group Type, Grade and Time. Partial eta squared values are large for Group, Grade and

Time and medium to large for the significant interactions. Tukey post hoc tests were conducted for the main effects for Group Type and Grade. The analysis for grade indicated that the three grades were significantly different from each other ( $K < 1 < 2$ ). For Group Type, the results indicated that the TYP students did not differ from the ELL students, but that both groups had significantly higher scores than the LD students. The significant triple interaction is presented in Figures 1, 2, and 3.

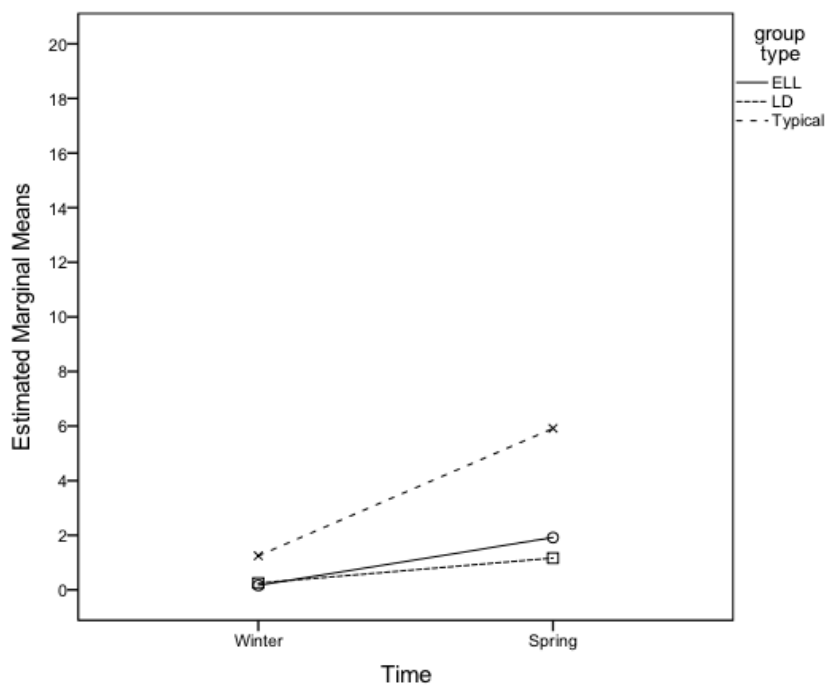


Figure 1. Kindergarten Words Spelled Correct by Group Type by Grade and Time

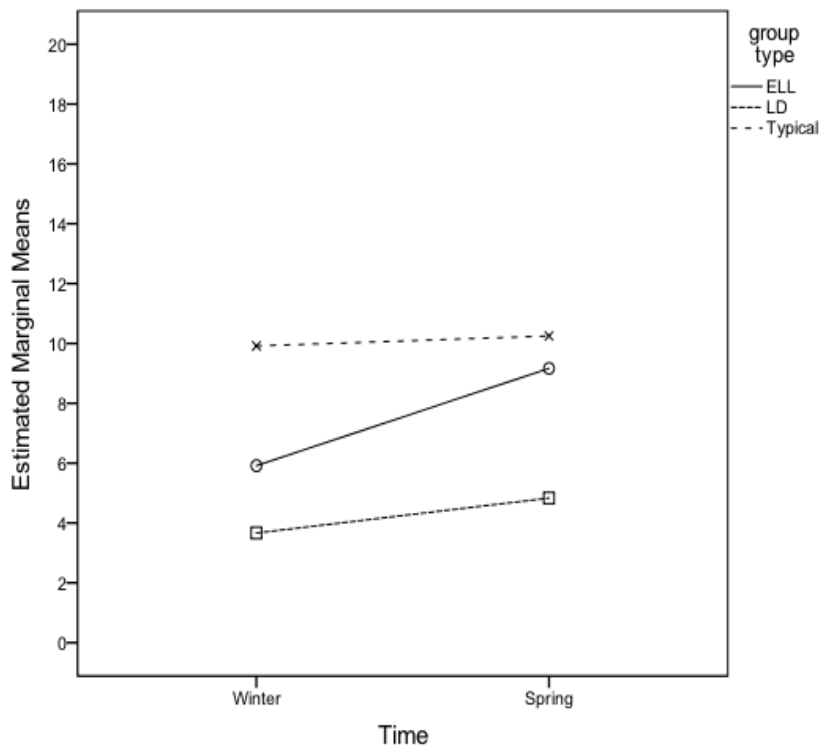


Figure 2. Grade 1 Words Spelled Correct by Group Type by Grade and Time

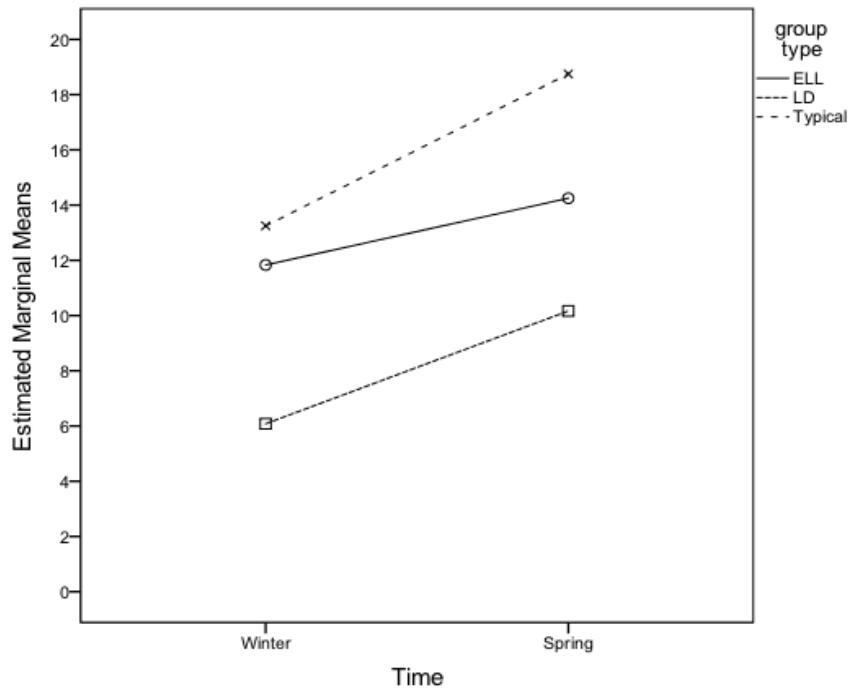


Figure 3. Grade 2 Words Spelled Correct by Group Type, Grade and Time

As shown in Figures 1, 2 and 3, all three of the groups increased over the course of the year. The greatest increase was for the typical kindergarten students.

Table 4.1 and Figure 1 show that Kindergarten students in the LD group and the ELL group have lower means in both winter and spring than students in the TYP group. Figure 2 shows that first grade ELL students and students in the LD group have lower winter means than the TYP group. However, students in the ELL group made more progress than their LD counterparts and finished the school year with a spring mean similar to that of the TYP group. The means from the first grade ELL and TYP groups are significantly higher than the LD group. Figure 3 illustrates that second grade winter mean scores of the ELL group and TYP group are higher than that of the LD group. The students in the ELL group and TYP group begin and end the school year with higher means than the LD group. The second grade LD group makes less improvement, progressing from a fall mean of 4.917 to a spring mean of 6.083.

### **Feature Points**

Table 4.3 contains the means for Feature Points by Group Type, Grade and Time.

Table 4.3

*Means for Feature Points by Group Type, Grade and Time*

Group and Grade	(Fall)	Winter	Spring
ELL:	25.38	23.53	30.94
K	-	5.00	16.42
1	16.25	26.50	33.67
2	34.50	39.08	42.75
LD:	18.79	17.17	22.28
K		9.33	9.67
1	12.17	34.33	23.25
2	25.42	42.83	33.92
Typical:	31.04	28.83	36.08
K		6.11	21.42
1	18.42	26.83	38.42
2	31.72	36.58	48.42

The repeated measures results are presented in Table 4.4.

Table 4.4

*ANOVA for Feature Points (FP) by Group Type, by Group Type, Grade and Time*

Tests of Between Subjects Effects					
	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial $\eta^2$
Group Type	2	2951.26	23.607	.000	.323
Grade	2	14714.00	117.699	.000	.704
Group Type*Grade	4	97.972	.784	.538	.031
Error	99	125.014			
Within					
Time	1	2346.963	111.105	.000	.529
Group Type*Time	2	29.755	1.409	.249	.028
Grade*Time	2	132.352	6.266	.003	.112
Group*Grade*Time	4	38.644	1.829	.129	.069
Error	99	21.124			

As shown in Table 4.4 all three main effects are statistically significant with a significant interaction between Grade and Time. As shown in Table 4.3, the mean for spring is higher than the mean for winter. The Tukey post hoc tests for the significant main effect for Group Type indicated that all three groups differed (LD < ELL < TYP); the Tukey test for Grade again

indicated that all means were significantly different from each other ( $K < 1 < 2$ ). A plot of the interaction between Grade and Time is presented in Figure 4.

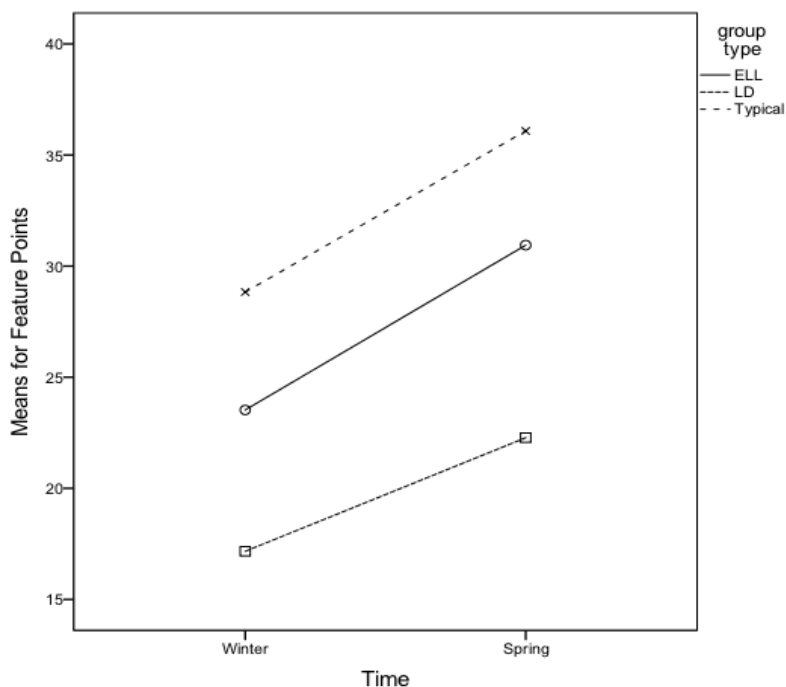


Figure 4. Feature points by Group Type, Grade and Time

## Research Question 2

Do ELL students, native-English speaking, typically-achieving and students with LD differ in terms of the rate at which they reach developmental spelling stages?

### Writing Samples

Writing Samples were analyzed for developmental stage using the Qualitative Spelling Checklist. Each stage score was converted to a binary score to indicate if their developmental stage was on/above grade level with the End-of-Year Spelling expectation as outlined in the Words Their Way program (Bear, et al., 2016). A comparison of the means of these binary



scores (on/above grade level=1, below grade level= 0) was conducted by Group Type (ELL, LD and TYP) and Grade (K, 1, 2). The means are presented in Table 4.5 and the ANOVA results in Table 4.6.

Table 4.5

*Means for Writing Sample Stage on Grade Level by Group Type and Grade*

Group and Grade	Stage in Spring
ELL:	.48
K	.30
1	.38
2	.30
LD:	.17
K	.13
1	.13
2	.29
Typical:	.61
K	.36
1	.70
2	.75

Table 4.6

*ANOVA for Writing Sample Stage on Grade Level by Group Type and Grade*

	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial $\eta^2$
Group Type	2	1.325	6.153	.003	.141
Grade	2	.253	1.174	.315	.030
Group Type*Grade	4	.138	.642	.634	.033
Error	99	1.713			

As shown in Table 4.6, both Group Type and Grade main effects are significant. Effect size for Group Type was large. As shown in Table 4.5, the means for TYP group are higher than those in the LD and ELL groups. The Tukey post hoc tests for the significant main effect for

Group Type indicated that the LD group differed from the TYP group. The LD group did not differ from the ELL group, nor did the ELL group differ from the TYP group.

Table 4.7 reports descriptive statistics of how many stages students progressed through over the course of the year. Most commonly, students progressed one or two stages (54.7%) over the course of the year. Approximately 23% did not progress at all and 24% progressed three or more stages. The highest level of non-progression/regression was in the LD group (33.4%) as compared to the ELL group (21.6%) and the TYP group (5.6%). The percentage of ELL groups and TYP groups that progressed three or more stages were higher (18.9%, 19.5% respectively) than the LD group (11.1%).

Table 4.7

*Descriptive Statistics of Progress through Stages*

Group Type		Regressed	Did not progress	Progressed one stage	Progressed two stages	Progressed 3 stages or more stages
ELL	Frequency	0	8	14	6	7
	Percent	0	21.6	37.8	16.2	18.9
LD	Frequency	2	10	14	6	4
	Percent	5.6	27.8	38.9	16.7	11.1
TYP	Frequency	1	5	5	14	11
	Percent	2.8	13.9	13.9	38.9	19.5
Grade K	Frequency	0	9	14	9	4
	Percent	0	25	38.9	25	11.1
1	Frequency	2	5	11	7	11
	Percent	5.6	13.9	30.6	19.4	30.6
2	Frequency	1	8	8	10	9
	Percent	2.8	22.2	22.2	27.8	25
Total	Frequency	3	22	33	26	24
	Percent	2.8	20.4	30.6	24.1	22.3

### Spring Spelling Inventory Stage

A univariate ANOVA was conducted to compare the effect of Group Type (LD, TYP, ELL) on the stage score of the spring administration of the Words Their Way Spelling Inventory score by Group Type and Grade in grades K, 1 and 2. These stage scores were, like the writing sample stage scores, converted to a binary score to indicate if their developmental stage was on/above grade level with the End-of-Year Spelling expectation as outlined in the Words Their Way program (Bear, et al., 2016). The means are presented in Table 4.8 and the ANOVA results in Table 4.9.

Table 4.8

*Means for Spring Stage Score on Grade Level by Group Type and Grade*

Group and Grade	Stage in Spring
ELL:	.25
K	.17
1	.33
2	.25
LD:	.06
K	.00
1	.08
2	.08
Typical:	.61
K	.58
1	.58
2	.67

Table 4.9

*ANOVA for Spring Stage Score on Grade Level by Group Type and Grade*

	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial $\eta^2$
Group Type	2	2.861	16.744	.000	.253
Grade	2	.028	.63	.000	.003
Group Type*Grade	4	.056	.325	.861	.013
Error	99	1.71			

As shown in Table 4.9, both Group Type and Grade main effects are significant. As shown in Table 4.8, the means for TYP group are higher than those in the LD and ELL groups. The Tukey post hoc tests indicated that both the LD and ELL groups differed from the TYP group. The ELL and LD groups did not differ from each other. Table 4.10 shows descriptive statistics comparing the writing sample stages and spring spelling inventory stages. Of the total sample, 45.2% had a higher stage score on the writing sample as opposed to the spring stage score. Twenty-nine percent had a lower score on the writing sample than on the spring stage score. Twenty-five percent had the same stage score on the writing sample and the spring stage score. In the TYP group, 57% scored better on the writing sample than on the spring stage score. Contrastingly, only 22% of the LD group scored better on the writing sample than on the spring stage score. Of the ELL students, 42% scored lower scores on the writing sample than on the spring stage score.

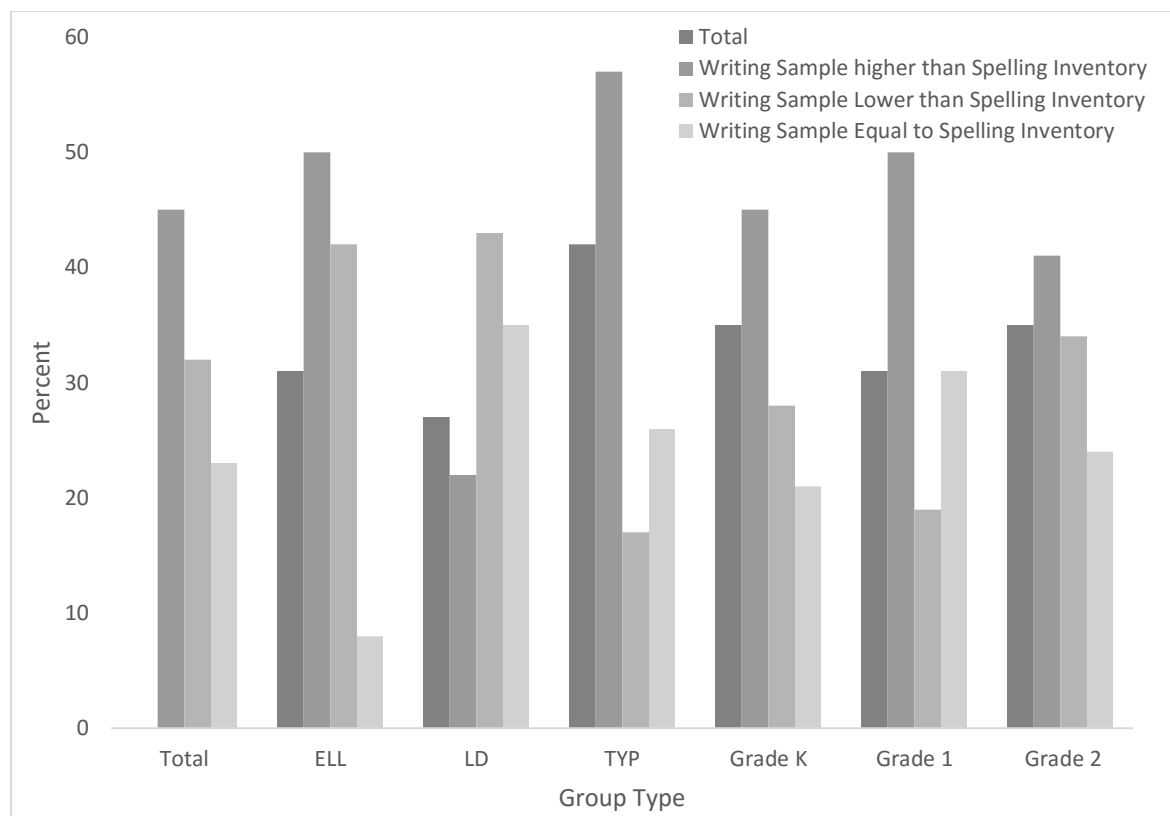


Figure 4.5

*A Comparison of Writing Sample Stage Scores with Spring Spelling Inventory Stage Score*

An analysis was conducted to ascertain if students were consistent in being on or off grade level for the stage score for the spring stage score and the writing sample stage score. These data are presented in Table 4.10.

Table 4.10:

*Grade Level Relationship between Writing Sample Stage Score and Spring Stage Score*

		Stage for Spring On grade level			
		No	Yes	Total	
Writing Sample on grade level	No	Count	43	8	51
		% within sample on grade level	84.3%	15.7%	100.0%
	Yes	Count	11	22	33
		% within sample on grade level	33.3%	66.7%	100.0%

A Pearson Chi-Square was computed to assess the relationship between the Spring stage score and the writing sample analysis stage score. The chi square computed on the data in Table 4.10 was significant (chi square = 22.681,  $p = .000$ , Cramer's  $V = .581$ ). Cohen's Kappa was conducted to determine agreement between the two raters' scoring of stage on the Spring stage score. There was moderate agreement between the two ratings, Kappa=.472 (See Table 4.11).

Table 4.11

*Symmetric Measures: Interrater Reliability Writing Samples Stage Scores and Spring stage score Stage Score*

		Value	Asymptotic Standard Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Sig.
Measure of Agreement	Kappa	.472	.061	11.857	.000
N of Valid Cases		84			

**Summary**

This study sought to outline specific differences and commonalities in the orthographic skills of students with LD, ELL students and typically-achieving, native-English speaking

students as measured by the Words Their Way spelling inventory. A repeated measures ANOVA was conducted to answer the first research question, how do orthographic skills differ by Group Type. The results indicated statistically significant differences between groups in all measures: Feature Points, Words Spelled Correct, writing sample stage and spring stage scores. A triple interaction was seen in Group Type by Grade and by Time for Words Spelled Correct with a medium to large effect size. Throughout grades K, 1 and 2 and different administrations (fall, winter and spring), the students in the LD group consistently had the lowest means and students in the TYP group had the highest means. However, the ELL group's progress differed by grade. In Kindergarten, ELL means are similar to LD means. In both winter and spring, ELL and LD means are significantly lower than TYP means. In first grade, ELL students start in fall with lower means than the TYP group, nearly identical to LD students. However, the ELL students make substantially more progress and mean scores in the spring of first grade, are more similar to the TYP group.

While there is confirmation of significant differences between groups, the analyses also demonstrated that the three groups had certain similarities. Firstly, there is not a statistically significant effect for Group Type by Grade or Group Type by Time in any of the measures. This indicates that the three groups, overall, follow a similar progression across the two data points, winter and spring as well as by grade. All three groups make progress between winter and spring, though the group means are consistently ranked with the LD group underperforming the TYP group. The position of the ELL group's means are more variable.

To answer the second question, do students in the three different groups differ in terms of the rate at which they reach developmental spelling stages, a univariate ANOVA was conducted. Comparisons of Group Type on the spring stage and the writing sample stage indicated statistical

significance with a large effect size. The post hoc analyses for both the writing sample stage and the spring spelling stage indicated that the LD group differed significantly from the TYP group. For both of these analyses, the LD group did not differ from the ELL group. The relationship between the ELL group and TYP group alternated. For the spring administration of the spelling inventory, the ELL groups differed from the TYP group. For the writing sample, the ELL group did not differ from the TYP group.

Descriptively, the percentage of ELL students and TYP students that progressed three or more stages was higher than the LD students. The greatest percentage of non-progression/regression was in the LD group. Descriptive statistics indicate that, most commonly, students progressed one or two stages over the course of the year. The highest level of non-progression/regression was in the LD group. Descriptively, TYP students had a higher percentage of students who performed better on the writing sample than on the spring stage score. A Pearson Chi-Square examining the relationship between the percentage of the sample with a writing sample stages and spring spelling inventory scores that were on /above grade level was significant.



## CHAPTER 5

### Summary

Disproportionality of linguistically diverse children in disability categories related to literacy has been a wicked problem going back to the beginning of special education. Since the ruling in *Diana v. the State Board of Education* (1970) found testing children in their non-native language to be a violation of the Equal Protection Clause, schools have been re-examining their rates of over-representation of Latino students in special education. That ruling gave educators an imperative to assess students in culturally responsive ways. Forty years later there continues to be both underrepresentation at the federal level and overrepresentation at certain state levels of Spanish-speaking students in the Specific Learning Disability category (Klingner, Artiles, & Mendez-Bartletta, 2006; Sullivan, 2011).

While disproportionality in special education has been extensively studied, there continues to be a need for research on specific skills that are distinct between ELL students and students with LD. This study differentiated the learning characteristics of these groups through the measurement of orthographic skills. This chapter presents the results of the study in relation to the research literature. Limitations are discussed and implications for practice and research are described.

The participants of this study were 108 students, 5 to 8 years of age, in kindergarten, first, and second grade classrooms. The participants comprised the following three groups: 1) English Language Learning (ELL) students, 2) students classified as having a Specific Learning Disability (LD) and 3) native-English speaking, typically-achieving (TYP) students. The students came from five elementary schools in a suburb in southern New Jersey. Eighty-four percent of

the students received free or reduced lunch. Of the students in the ELL group, 72 percent were Spanish-speaking and 28% were Vietnamese-speaking.

The analysis of overall orthographic development through the measure of the Words Their Way Primary Spelling Inventory, confirmed both differences and commonalities in spelling skills among the three groups. The results of the repeated-measures ANOVA demonstrated, overall, statistically significant differences between these groups on spelling inventory measures including Words Spelled Correct, Feature Points, and developmental spelling stages with medium and large effect sizes. On all measures, the LD group consistently underperformed the TYP group. This is supported by a consensus of previous research demonstrating that LD children are likely to have significant difficulties with spelling including the phonological components of spelling as well as more complex, multisyllabic words (Good, Simmons, & Smith, 1998, Bailet, 1990; Darch, Eaves, Crowe, Simmons & Conniff, 2006). The performance of the ELL group was more variable depending on grade, measure, and patterns of progress. In some areas, the ELL group was comparable to the LD group and, in others, the ELL group was more similar to the TYP group.

One factor in understanding the differences between groups, is the type of measure that was used. There are a variety of different orthographic measures and each has certain advantages and disadvantages (Calhoon, Greenberg, & Hunter, 2010). In the present study, some students had a higher spelling stage depending on the measure. Almost half of the participants had a higher stage score on the writing sample as opposed to the spring spelling inventory. This may be because a writing sample analysis allows students to choose words that they know how to spell correctly and omit more difficult words. The TYP group had the highest percentage of students who scored better on the writing sample than on the spring spelling

inventory. The majority of the students in LD and ELL groups had higher scores on the spring stage than on the writing sample.

Comparisons of Group Type on the spring stage and the writing sample stage indicated that the LD group differed significantly from the TYP group. For both measures, the LD and TYP groups were significantly different, but the ELL group's relationship to the other two groups varied. For both analyses, the LD group did not differ from the ELL group. However, the relationship between the ELL group and TYP group differed based on which measure was used.

Understanding patterns of progress in ELL and LD students can inform how educators interpret student performance and response to instruction. In the present study, students with LD begin with lower scores and make slower progress than their ELL and TYP peers in Kindergarten and first grade. In individuals with learning disabilities, such as dyslexia, spelling problems begin early in childhood and persist into adulthood (Bruck, 1993; Lefly & Pennington, 1991). There is also evidence that spelling difficulties in children with dyslexia continue to be a significant challenge even when reading issues are resolved (Berninger, 2008). The present study showed that though there were significant differences between the three groups when compared by Grade and Time, overall there was not a statistically significant effect for Group Type and Time in any measure. This indicates that the three groups all made progress. Rates of improvement were relatively similar, though the LD group had winter and spring means indicating the lowest achievement of the three groups. Descriptively, ELL groups and TYP groups progressed through more stages over the course of the year. The greatest percentage of non-progression/regression was in the LD group.

Previous studies confirmed that students with LD continue to improve with age and move through developmental spelling stages (Abuzoid, 1992, Solari, 2014). However, there were mixed results concerning the rate of increase, relative to that of typically-achieving, native-English speaking peers. Some studies demonstrate a rate of spelling improvement that grows parallel to typical groups with little or no narrowing of the achievement gap (Solari, 2014). Other studies found the rate of improvement in spelling for students with LD to be slower (Abuzoid, 1992) creating a larger achievement gap over time.

For example, in the triple interaction of Group Type by Grade and Time for Words Spelled Correct, the ELL group's progress differed from the other two groups by grade. Kindergarten ELL and LD means were both significantly lower than the TYP group in both winter and spring. In winter of first grade, ELL students, like the LD students, had lower means than the TYP group. However, the ELL students progressed more than the LD group and in the spring of first grade, the ELL group was more similar to the TYP group. The ELL group had almost closed the gap in scores and performed much like their typical peers. This rate of improvement was significantly different from their LD peers with a large effect size.

This trend is supported by previous studies that suggest for ELL students, lower spelling scores in early elementary years are typically developmental in nature (Jongejan, Verhoeven and Siegel, 2007, Lesaux & Siegel, 2003). Additionally, the research literature has shown general education students outperform their LD peers in spelling as well as other literacy skills (Solari, 2014). However, the ELL students are not as easily differentiated from their non-ELL peers. Young ELL children may demonstrate orthographic skills that initially appear atypical and could be misclassified as being an LD. The complexity of the relationship between the ELL group and

the other two groups underscores the difficulty of differentiating limited English proficiency from LD (Capps, 2005, Harry & Klingner, 2006).

### **Limitations**

A major limitation of this study stemmed from the inherent constraint in analyzing previously collected data that were not intended to address a particular research question. While the teachers in this study were trained on how to give the assessment and how to collect data in general, they were not specifically trained in collecting data for the purposes of this research. The collection methods for the writing sample included a broad writing prompt without guidelines such as a specific topic or time limit. It was not apparent to what degree the students edited and proofread their writing samples. Another inherent limitation of analyzing existing data is that the researcher who analyzed the data was not involved in the initial data collection process. Therefore, the researcher was not unaware of possible nuances that could affect the interpretation of specific variables in the dataset.

A second limitation of the study was related to the heterogeneity within the LD group. LD is a broad category with diverse abilities within the classification. The scope of the current study did not include an analysis of how different levels of severity within the LD group affected outcomes. In collecting only redacted data, additional information about participants' backgrounds could not be included in the analysis. For example, specific information about the students in the LD category such as cognitive functioning, social history, and standardized academic scores was not available. Similarly, the ELL group is heterogeneous with varying levels of exposure and competency in English. The ELL group included both Vietnamese and Spanish-speaking participants. Because an insufficient number of ELL participants comparisons

between Vietnamese and Spanish-speaking participants were not calculated. Additionally, information about the family's history in relation to acquiring English-speaking skills was not available. Lastly, the study did not include ELL students with LD. Information about this understudied group would be a valuable addition to the results of this study.

### **Future research**

The present study provides information about orthographic development in students with LD, ELL students and their typical-achieving, native-English speaking peers that had heretofore been largely absent from the literature. The intention behind the study was to aid in the differentiation of these groups, and ultimately improve classification procedures for linguistically diverse students. Education is trending towards greater use of research-based tools for both instruction and assessment. This is coinciding with increasing numbers of ELL students attending schools in the United States (Solari, 2014). Additionally, there is an ever-greater emphasis on pre-referral intervention and RTI. However, amid these trends, there is little research concerning the efficacy of commonly used interventions and assessments for ELL students (Orosco & Klingner, 2010). For RTI to be to be an effective means of identifying LD, assessment and progress monitoring for ELL students and students with LD needs to be comprehensively researched.

To do so, assessment should be investigated, not only to determine how different groups of students perform on specific measures, but what type of measure best captures what they have learned. Investigating the nuances of how different groups of students are most effectively assessed can lead to more informative measures and results.

Appropriate assessment in word study requires a deep knowledge of the orthographic development in ELL students and students with LD in comparison to their typical-achieving, native-English speaking peers. The present study demonstrated that there were important variations when groups of students were compared by grade, over time and with different measures. For instance, in the current study, the TYP group was more likely to have a higher score on a writing sample than on a spelling inventory. For ELL students and students with LD, the writing sample score tended to be lower than the spelling inventory.

These findings lead to several other questions that should be addressed in future research. What is the effect of different tiers of intervention on the orthographic skills of ELL students and students with LD? Which contextual factors contribute to group differences? How do different L1 orthographies affect the spelling skills in L2?

Another largely understudied area concerns the characteristics of ELL students that have LD. There is little research on how cross-linguistic transfer affects spelling and other literacy skills in ELL students with LD. The current study showed that for many ELL students, delays in orthographic skills are developmental in nature, however, less is known about students who do not improve adequately over time. What is the nature of these spelling difficulties for ELL students with LD? Are there different markers of these deficits over time and by grade? How should their response to instruction and pre-referral interventions differ from other groups?

A final area for future research is in the preschool experiences of ELL students and students with LD. The problem of underrepresentation of minority children in Early Intervention and early childhood special education receives significantly less attention than overrepresentation in later school years. This lack of services in a young child's life is correlated with long-term consequences into adulthood (McCormick et al, 2006; Reynolds,

Temple, Robertson, & Mann, 2001). Children being raised in households where a language other than English is primarily spoken are less likely to receive Early Intervention or early childhood special education than their English-speaking counterparts (Reynolds, Temple, Robertson, & Mann, 2001). The present study showed significantly depressed scores in the ELL and LD groups throughout the kindergarten year. An important factor to investigate is what type of preschool experiences preceded their introduction to writing in kindergarten.

### **Closing Remarks**

In closing, identifying LD is not a simple process, and there is not consensus concerning how to define specific learning disabilities. The process of LD classification, including the use of RTI, is limited by a lack of research on interventions and progress monitoring for culturally and linguistically diverse children (Garcia & Ortiz, 2008). The primary purpose of this study was to address this gap in the literature through an analysis of the differences and commonalities in orthographic skill development in students with LD, ELL students and their typically-achieving, native-English speaking peers. The results of the current study provide information on how ELL and LD students compare on orthographic tasks across grade and time using a common classroom spelling inventory. These three groups vary in rates of growth, by grade level and by spelling measure. Understanding these nuances of assessing orthographic skills in diverse students can inform instruction, intervention, and assessment.



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**APPENDIX A**  
**SUPPLEMENTARY DATA**

Table A1

*Demographics Total Group*

	ELL (n=36) %	LD (n=36) %	TYP (n=36) %	Total (n=108) %
<b>Gender:</b>				
Male	47.2	69.4	47.2	58.3
Female	52.8	30.6	52.8	41.6
<b>Grade:</b>				
K	33.3	33.3	33.3	33.3
1	33.3	33.3	33.3	33.3
2	33.3	33.3	33.3	33.3
<b>Group Type</b>				
ELL	33.3	33.3	33.3	33.3
LD	33.3	33.3	33.3	33.3
TYP	33.3	33.3	33.3	33.3
<b>Lunch Subsidy:</b>				
Free Lunch	83.3	66.7	72.2	74.5
Reduced Lunch	2.8	19.4	8.3	9.5
Full Price Lunch	13.9	13.9	19.4	17
<b>Race:</b>				
Hispanic	83.3	41.7	36.1	49
Asian	30.6	5.6	2.8	12.9
White	0	5.6	25.0	10.1
Black	0	44.4	33.3	25.9
Hawaiian native/ Other Pacific Islander	0	2.8	2.8	6.4

Table A2

Demographics pertaining to ELL group and LD group

<i>Demographics ELL Group</i>	n	%
Primary Language:		
Spanish	26	72.2
Vietnamese	10	27.8
<i>Demographics LD group</i>		
Placement in special education:		
80% or more in Gen ed	8	22.2
40-80% in Gen ed	6	16.7
Less than 40% in gen ed	22	61.1



## APPENDIX B

### TESTING MATERIAL AND WRITING SAMPLES

Figure B1

#### *Words Their Way Primary Spelling Inventory Feature Guide*

<b>Words Their Way Primary Spelling Inventory Feature Guide</b>											
Student's Name _____		Teacher _____			Grade _____			Date _____			
Words Spelled Correctly: _____ / 26		Feature Points: _____ / 56			Total: _____ / 82			Spelling Stage: _____			
SPELLING STAGES →	EMERGENT		LETTER NAME-ALPHABETIC				WITHIN WORD PATTERN			SYLLABLES AND AFFIXES	
	LATE	EARLY	MIDDLE	LATE	EARLY	MIDDLE	LATE	EARLY	Feature Points	Words Spelled Correctly	
Features →	Consonants		Short Vowels	Digraphs	Blends	Long Vowel Patterns	Other Vowels	Inflected Endings	Feature Points	Words Spelled Correctly	
	Initial	Final									
1. fan	f	n	a								
2. pet	p	t	e								
3. dig	d	g	i								
4. rob	r	b	o								
5. hope	h	p				o-e					
6. wait	w	t				ai					
7. gum	g	m	u								
8. sled			e		sl						
9. stick			i		st						
10. shine				sh		i-e					
11. dream					dr	ea					
12. blade					bl	a-e					
13. coach				-ch		oa					
14. fright					fr	igh					
15. chewed				ch			ew	-ed			
16. crawl					cr		aw				
17. wishes				-sh				-es			
18. thorn				th			or				
19. shouted				sh			ou	-ed			
20. spoil							oi				
21. growl							ow				
22. third				th			ir				
23. camped								-ed			
24. tries					tr			-ies			
25. clapping								-pping			
26. riding								-ding			
<b>Totals</b>	17	17	17	17	17	17	17	17	17	56	26

*Note.* Reprinted from *Words their way: Word study for phonics, spelling, and vocabulary*. Copyright 2012 by Pearson/ Allyn & Bacon.

Figure B2

## Qualitative Spelling Inventory

## Qualitative Spelling Checklist

Student \_\_\_\_\_ Observer \_\_\_\_\_

Use this checklist to analyze students' uncorrected writing and to locate their appropriate stages of spelling development. There are three gradations within each stage—early, middle, and late. Words in parentheses are examples.

The spaces for dates at the top of the checklist are used to follow students' progress. Check when certain features are observed in students' spelling. When a feature is always present check "Yes." The last place where you check "Often" corresponds to the student's stage of spelling development.

Dates: \_\_\_\_\_

Emergent Stage			
<i>Early</i>			
• Does the child scribble on the page?	Yes ___	Often ___	No ___
• Are letter-like forms arranged linearly?	Yes ___	Often ___	No ___
<i>Middle</i>			
• Are there random letters and numbers used in pretend writing? (4BT for ship)	Yes ___	Often ___	No ___
<i>Late</i>			
• Are key sounds used in syllabic writing? (/s/ or /p/ for ship)	Yes ___	Often ___	No ___
Letter Name—Alphabetic			
<i>Early</i>			
• Are salient sounds represented? (BD for bed)	Yes ___	Often ___	No ___
• Are blends and digraphs represented partially? (SP for ship)	Yes ___	Often ___	No ___
<i>Middle</i>			
• Are there logical vowel substitutions with a letter name strategy? (FLOT for float, BAD for bed)	Yes ___	Often ___	No ___
<i>Late</i>			
• Are some consonant digraphs and blends spelled correctly? (ship, when, float)	Yes ___	Often ___	No ___
• Are short vowels spelled correctly? (bed, ship, when, lump)	Yes ___	Often ___	No ___
• Is the <i>m</i> or <i>n</i> included in front of other consonants? (lump, stand)	Yes ___	Often ___	No ___
Within Word Pattern			
<i>Early</i>			
• Are long vowels in single-syllable words used but confused? (FLOTE for float, TRANE for train)	Yes ___	Often ___	No ___
• Are the most common consonant digraphs and blends spelled correctly? (sled, dream, fright)	Yes ___	Often ___	No ___
<i>Middle</i>			
• Are common vowel words spelled correctly, but some long vowel spelling and other vowel patterns used but confused? (SPOYL for spoil)	Yes ___	Often ___	No ___
<i>Late</i>			
• Are complex consonants spelled correctly? (speak, switch, smudge)	Yes ___	Often ___	No ___
• Are most other vowel patterns spelled correctly? (spoil, chewed, serving)	Yes ___	Often ___	No ___
Syllables & Affixes			
<i>Early</i>			
• Are inflectional endings added correctly to CVC and CVCC words? (rain <del>ing</del> , walk <del>ed</del> )	Yes ___	Often ___	No ___
<i>Middle</i>			
• Are inflectional endings added correctly to base words? (chew <del>ed</del> , march <del>ed</del> , shower)	Yes ___	Often ___	No ___
• Are junctures between syllables spelled correctly? (catt <del>le</del> , cell <del>ar</del> , carri <del>e</del> s, bott <del>le</del> )	Yes ___	Often ___	No ___
<i>Late</i>			
• Are unaccented final syllables spelled correctly? (bott <del>le</del> , fortun <del>ate</del> , civil <del>ize</del> )	Yes ___	Often ___	No ___
• Are prefixes and suffixes spelled correctly? (fav <del>or</del> , rip <del>en</del> , cell <del>ar</del> , color <del>ful</del> )	Yes ___	Often ___	No ___
Derivational Relations			
<i>Early</i>			
• Are most polysyllabic words spelled correctly? (fortun <del>ate</del> , confid <del>ent</del> )	Yes ___	Often ___	No ___
<i>Middle</i>			
• Are unaccented vowels in derived words spelled correctly? (confid <del>ent</del> , civil <del>ize</del> , categor <del>y</del> )	Yes ___	Often ___	No ___
<i>Late</i>			
• Are assimilated prefixes spelled correctly? (ill <del>iter</del> ate, corres <del>pond</del> , succ <del>eed</del> )	Yes ___	Often ___	No ___

Note. Reprinted from *Words their way: Word study for phonics, spelling, and vocabulary*. Copyright 2016 by Pearson/ Allyn & Bacon.

Figure B3

*Writing Sample featuring Writing in the Emergent Stage*

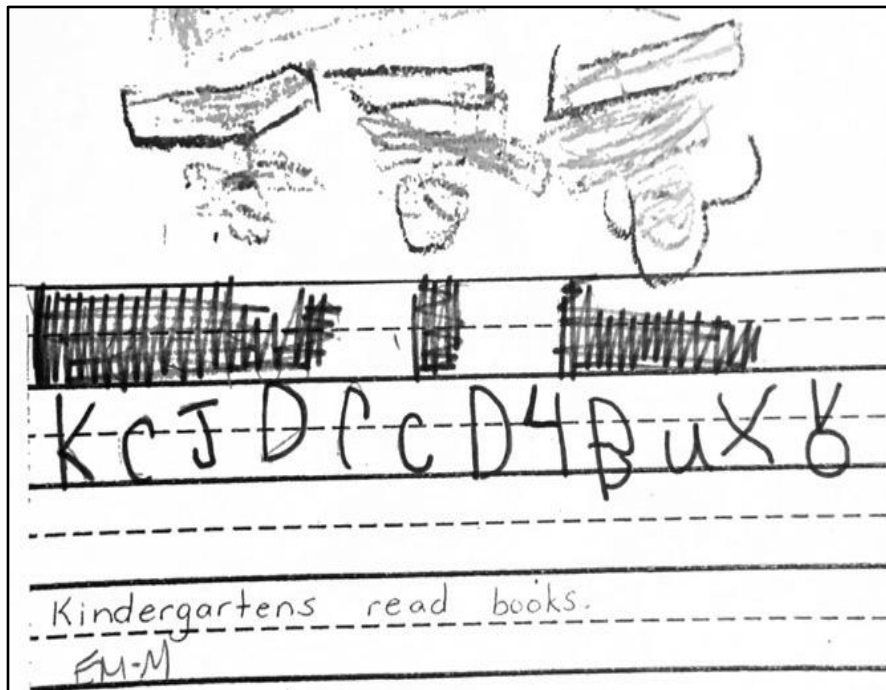


Figure B4

*Writing Sample featuring Writing in the Letter-Name Alphabetic Stage*



Figure B5

Writing Sample featuring Within Word Stage

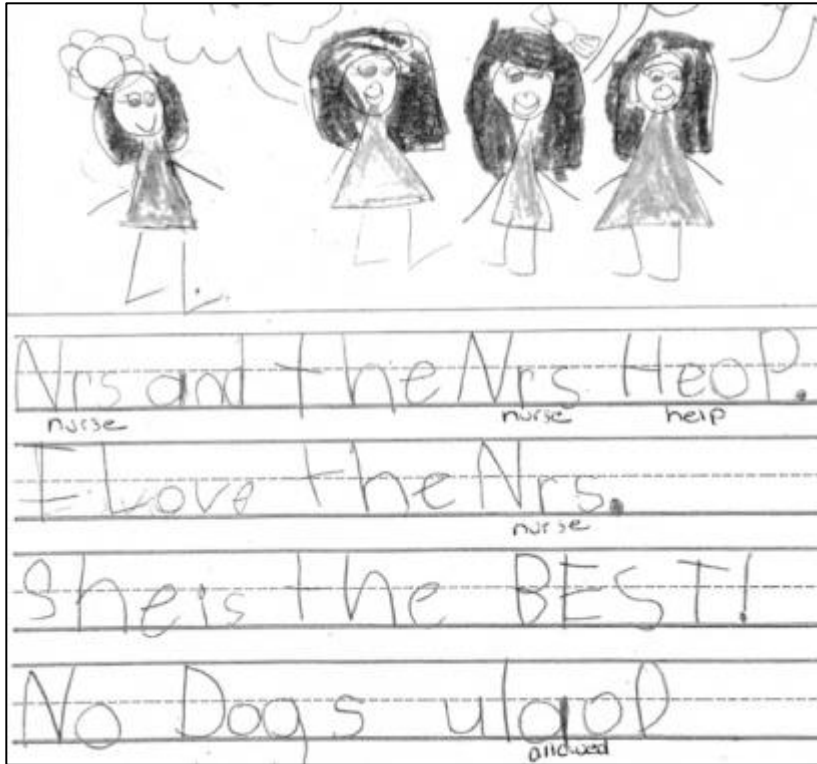


Figure B6

Writing Sample featuring Syllables and Affixes Stage

