

An Investigation of Developmental Spelling
in ESL and Non-ESL Kindergarten Children

by

Megan Brigid Keilty
B.A., McMaster University, 2006

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF ARTS

in the Department of Educational Psychology and Leadership Studies

© Megan Brigid Keilty, 2010
University of Victoria

All rights reserved. This thesis may not be reproduced in whole or in part, by
photocopy or other means, without the permission of the author.

An Investigation of Developmental Spelling
in ESL and Non-ESL Kindergarten Children

by

Megan Brigid Keilty
B.A., McMaster University, 2006

Supervisory Committee

Dr. Gina Harrison, Supervisor
(Department of Educational Psychology and Leadership Studies)

Dr. John Anderson, Departmental Member
(Department of Educational Psychology and Leadership Studies)

Supervisory Committee

Dr. Gina Harrison, Supervisor
(Department of Educational Psychology and Leadership Studies)

Dr. John Anderson, Departmental Member
(Department of Educational Psychology and Leadership Studies)

ABSTRACT

The current study investigated developmental spelling in a group of English as a second language (ESL) and non-ESL children. The purpose was to determine if a measure of developmental spelling differed between a group of ESL and non-ESL kindergarten children, and further, what linguistic and literacy skills were related to developmental spelling for each group.

The results from 37 ESL and 40 non-ESL children revealed that the groups did not differ on a measure of developmental spelling, and that the predictors of developmental spelling included syntactic knowledge (Syntax Construction) and phonological processing (Sound Matching) for both groups, and Letter Identification for the non-ESL group only. The results revealed many similarities between the groups in their English spelling development. Some differences emerged, however, including phonological processing (Non-word Repetition) being related to developmental spelling for the ESL group only, and Letter Identification being related to developmental spelling for the non-ESL group only.

TABLE OF CONTENTS

PRELIMINARY TABLES

A. Title page.....	i
B. Supervisory committee.....	ii
C. Abstract.....	iii
D. Table of contents.....	iv
B. Tables.....	vi
C. Figures.....	vii
D. Acknowledgements.....	viii

CHAPTER 1: INTRODUCTION1

A. Rationale.....	1
B. Statement of the Problem.....	1
C. Objectives of the Research.....	2

CHAPTER 2: REVIEW OF THE RELEVANT LITERATURE4

A. Introduction.....	4
B. Prerequisite skills for the development of spelling	4
a. Phonological Processing	4
b. Reading.....	6
c. Oral Language.....	7
d. Alphabet Writing.....	7
C. Theories of spelling development in the English language.....	8
a. Stage model of spelling development	10
b. Further development of the stage theory.....	11
D. Beyond the stage model	13
E. Research on spelling development for the ESL population.....	15
F. Summary of the background research and overview of the present study.....	18

CHAPTER 3: METHODOLOGY20

A. Methods.....	20
B. Participants.....	21
C. Measures	22
a. Developmental Spelling.....	23
b. Linguistic Measures	25
i. Phonological Processing	25
ii. Receptive Vocabulary.....	26
iii. Syntax.....	26
c. Literacy Measures: Reading.....	27
i. Word Reading	27
ii. Letter Identification.....	27
d. Literacy Measures: Writing.....	27
i. Spelling.....	27
ii. Writing Fluency.....	28

D. Procedure.....	28
E. Analyses.....	28
CHAPTER 4: RESULTS	30
A. Results	30
a. Was there a difference between groups on developmental spelling?.....	32
i. Results of the test of differences.....	32
ii. Results of the item analyses.....	33
B. What linguistic and literacy skills were related to developmental spelling for each group?.....	35
i. Correlates of developmental spelling.....	36
ii. Predictors of developmental spelling	38
C. Review of the results	41
CHAPTER 5: DISCUSSION.....	43
A. Discussion	43
a. Was there a difference between groups on developmental spelling?.....	43
b. Contribution to the stage model of spelling development.....	44
c. What linguistic and literacy skills were related to developmental spelling for each group?.....	45
i. Similarities between the ESL and the non-ESL groups.....	45
ii. Differences between the ESL and the non-ESL groups.....	49
B. Conclusion	51
REFERENCES	54

TABLES

Table 1. <i>Scoring System Devised by Morris and Perney (1984)</i>	page 24
Table 2. <i>Descriptive Statistics for Developmental Spelling and the Linguistic and Literacy Measures</i>	page 31
Table 3. <i>Correlations among Developmental Spelling and Other Variables</i>	page 37
Table 4. <i>Linguistic and Literacy Predictors of Developmental Spelling for the Non-ESL Group</i>	page 40
Table 5. <i>Linguistic and Literacy Predictors of Developmental Spelling for the ESL Group</i>	page 41

FIGURES

Figure 1. *Spelling error frequency distributions displayed by group*.....page 34

Figure 2. *Average item score by group*.....page 34

ACKNOWLEDGEMENTS

This thesis project would not have been possible without the guidance and support of my supervisor, Dr. Gina Harrison. I would like to thank Dr. Harrison for providing me with the opportunity to be a part of her research project, and for allowing me to find a piece of her research upon which to focus my thesis. I would also like to thank Dr. Harrison for her ongoing commitment to the quality of this thesis.

I would like to thank Dr. John Anderson for his guidance in the writing process, especially regarding the statistical analysis. Thank you also to Dr. Alison Preece for being a part of my committee.

I cannot overlook the support of my colleague Keira Ogle, who was always there to provide clarification on a topic, to provide motivation to keep working, and of course to share a laugh with. Encouragement and support also came from my partner Doug Csima, my parents Kim Blatz and Pat Keilty, and my family.

I would also like to thank Dr. Brian Harvey, Dr. Allyson Hadwin and my step-father John Blatz for their time and consideration when reviewing and editing various versions of this thesis. Finally, I would like to thank Dr. Karin Humphreys for her guidance and encouragement to pursue graduate studies.

Chapter 1: Introduction

Rationale

The current study investigated developmental spelling in a group of English as a second language (ESL) and non-ESL kindergarten children. Decades of research has yielded a relatively concrete understanding of how literacy develops in young native English-speaking children. Due to Canada's continuing growth as a multi-cultural country, however, literacy development in children who are ESL requires a similar level of understanding. Schools faced with the responsibility of ensuring that ESL students are obtaining an education that will provide the necessary skills to operate and thrive in the Canadian educational and employment systems must understand the differences in how literacy develops in the various student populations they serve. The understanding of how literacy develops in different populations is required for the development of proper teaching materials and strategies to help develop fundamental literacy skills in ESL students.

Statement of the Problem

In order for teachers to meet the needs of their ESL learners, they need to be informed by research about the best practices for linguistically diverse students. While the understanding of literacy development as a whole is not as clear for ESL learners as it is for English-speaking learners, recent research in the area of reading development for ESL learners (Chiappe, Siegel, & Gottardo, 2002; Chiappe, Siegel, & Wade-Woolley, 2002; Lesaux & Siegel, 2003; Lipka & Siegel, 2007), has made great progress and must be acknowledged as a substantial, and growing, body of research. One significant contribution from this research is the finding that regardless of language background,

ESL students develop similarly in their reading skills and are not at risk for reading difficulties as a result of their ESL status. Further discussion on this topic will appear later in the thesis.

Current gaps in the research on literacy development for ESL learners, however, were identified in The Report of the National Literacy Panel on Language-Minority Children and Youth (August & Shanahan, 2006). As part of this report, Geva (2006) discusses the present lack of research on the developmental foundations of spelling skills in ESL learners. Specifically, it is unclear how spelling skill in a second language (L2) develops, especially within the context of the progression through important developmental spelling stages. Understanding how ESL children from diverse language backgrounds become progressively better spellers in their L2, and whether this progression is similar to that of non-ESL children is an important consideration for teachers. Specifically, teachers need to be informed whether instructional material developed for non-ESL students is appropriate for ESL students, or whether alternative instructional approaches are necessary.

Objectives of the Research

In response to the need for more research on ESL literacy development, especially for the development of L2 spelling, the current study examines spelling in a fairly large group of ESL and non-ESL kindergarten children. Specifically, this study addresses (1) whether ESL and non-ESL kindergarten children differ on a measure of developmental spelling, and (2) how the children's performance on the measure of developmental spelling is related to their performance on other linguistic and literacy

measures. The findings will help inform early literacy instructional approaches, especially for spelling, within linguistically diverse classrooms.

Chapter 2: Review of the Relevant Literature

Introduction

Developmental spelling refers to the period of time when children are developing an understanding of the letter-sound relationships and writing conventions in their language(s). To understand developmental spelling in children, it is first necessary to describe the prerequisite knowledge required for the development of spelling. The current chapter, therefore, will begin by discussing these necessary skills. Following this, the chapter will review models of spelling development to provide a theoretical background to the concepts explored in the current research. Within this section, the current theories of spelling development for English-speaking learners will be presented first, followed by a review of the literature that addresses English spelling development for ESL learners.

Prerequisite skills for the development of spelling

Phonological processing. Steffler (2001) discusses the three types of important information for spelling: phonological, orthographic, and morphological information. Steffler also describes what each of these types of information involves. Phonological information involves the relationship between sounds, known as phonemes, and letters, known as graphemes. What makes English relatively difficult is that it does not have a one-to-one relationship between grapheme and phoneme; one sound can be represented by a number of different letters. Steffler provides the example of the sound /k/, which can be represented by the graphemes: *k*, *c*, *ck*, or *ch*.

Orthographic information involves the understanding of the rules and conventions that comprise the English spelling system, or, in other words, what letters

are allowed to pair with other letters, and at what position in the word. For example, the pairing *ck* never appears at the beginning of an English word; however, it does appear in the middle and at the end of English words. And finally, morphological information involves the meaning of words and how different parts of words are related to each other. For example, adding an *s* to the end of a noun makes that noun plural. In addition to phonological, orthographic, and morphological information, Caravolas (2004) adds that alphabetic awareness, which is the knowledge that letters of the alphabet represent the sounds of spoken language and corresponding written language, is essential to spelling skill.

When considering the cognitive variables that predicted beginning speller's ability to learn letter-sound relationships, Caravolas, Hulme, and Snowling (2001) found that beyond IQ, memory, and even reading, the two skills that best predicted spelling skill were phoneme awareness and letter-sound knowledge. This result is confirmed by Treiman (2000), who discusses phoneme awareness and letter knowledge as comprising the alphabetic principle. These findings appear to be consistent across languages, including Turkish (Oney & Durgunoglu, 1997), German (Wimmer, Landerl, Linortner, & Hummer, 1991), and French (Bruck, Caravolas, & Genesee, 1996).

Comeau, Cornier, Grandmaison, and Lacroix (1999) extended these findings to students learning a second language. The authors showed that phonological processing was important to literacy in both L1 and L2, and, if present in the first language, phonological processing could be transferred to the second language. On a similar note, and of particular relevance to the current study, are the findings of Chiappe and Siegel (1999). This study is particularly relevant because their ESL group was also comprised

of Punjabi-speaking children. Chiappe and Siegel found that word recognition and phonological processing discriminated between the poor readers and the average readers, but that these skills did not discriminate between the ESL and non-ESL groups. Regardless of ESL status then, skill in phonological processing and word recognition discriminated between poor and average readers.

Reading. Another important skill in the development of spelling is reading. Ehri (2000) discusses the close relationship between reading and spelling. The results from this study suggest that correlations between the two skills are typically quite high ($r = .70$). Ehri suggests that this is because the two skills utilize the same resources, including knowledge about the alphabetic system, and memory for the spellings of specific words. In the area of ESL research, Wade-Woolley and Siegel (1997) studied the spelling performance of a group of 79 grade two children, consisting of both ESL and native English-speaking children. Their research measured how two factors contributed to spelling performance: reading ability, defined as single word-level reading, and ESL status. It was assumed that strong readers and native English-speaking students would perform better than poor readers and ESL students, respectively. Wade-Woolley and Siegel were correct in their hypothesis about reading ability: strong readers outperformed poor readers in spelling.

The results for the ESL children, however, were not consistent with the authors' hypotheses for this group; the ESL children performed similarly to the native English-speaking children. Regardless of ESL status, therefore, ability in English reading correlated closely with English spelling ability. The current research will contribute to

this area by providing more information about which early literacy skills are the best predictors for success in early spelling for ESL children, as well as for non-ESL children.

Oral language. The relationship between oral language and spelling has also been examined by research investigating the development of spelling skills for individuals with speech-language impairment (SLI) (Snowling, Bishop & Stothard, 2003; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). This research showed that language impairment often resulted in later literacy-based difficulties and disabilities indicative of a strong relationship between oral language ability and spelling development. Other research has also shown the importance of oral language to reading ability (Hoover & Gough, 1990), which has been discussed as having a connection to spelling. What is currently unclear is the relationship between developmental spelling and English language ability for ESL children. The present study will examine the relationship between oral English proficiency and spelling skill in a group of young ESL children.

Alphabet Knowledge. Another important skill to the development of spelling involves knowing the letters of the alphabet. As mentioned above, Caravolas, Hulme, and Snowling (2001) discussed knowledge of letters, and their associated sounds, as being predictive of early literacy. Strickland and Shanahan (2004) also discussed letter knowledge as being a contributor to early spelling development, and later spelling success. Beyond knowing and being able to identify the letters of the alphabet, the ability to write the letters of the alphabet has been shown to be predictive of spelling success (Berninger, Yates, Cartwright, Rutberg, Remy, & Abbott, 1992).

To review, the skills necessary for proper development of spelling skill include phonological processing, reading, oral language, and alphabet knowledge. This chapter will now shift from discussing the skills necessary for spelling, to a review of the theoretical background necessary for the understanding of developmental spelling. The review will begin by discussing theories of spelling development for English-speaking learners, followed by a discussion of the research that applies to ESL learners.

Theories of spelling development in the English language

According to Treiman (1993), the traditional view of spelling development indicated that children learned to spell through rote memorization. This view remained steadfast until the work of Read (1971) changed the direction of the field. Inspired by Chomsky and Halle (1968), Read suggested that children did not learn to spell by memorizing every word, but rather approached spelling with an implicit knowledge of the sounds of English, which allowed them to learn patterns linking the sounds they were hearing and the letters they were writing. Read then attempted to provide evidence for this claim by investigating how twenty pre-school children categorized sounds. Common errors were found in the early spelling attempts of the children, and were categorized into such groups as: vowels, affrication (e.g., the sound made by /ch/ or /j/ in front of /r/ in such words as ‘truck’ or ‘dragon’), flaps (e.g., the sound made by the double [t] in ‘butter’), nasals (e.g., /m/, and /n/), and syllabic segments (e.g., the situation in which the vowel preceding [r], [l], [m], or [n] is eliminated when they occur at the end of a word or between two consonants).

Read found that the children were only able to grasp the connection between spelling and letter sounds for the vowels that ‘sound their own name’ (i.e., [a] as in day,

[e] as in eagle, and [i] as in tiger), and that the children relied on these few vowel letters to represent all other vowels sounds. Read also found a common representation of [t] and [d] before the letter [r], as [ch] and [j], respectively. Thus, it appeared that children were relying on phonological information to spell this letter combination and were disregarding the conventional spelling. Another letter combination for which the children attended to the phonological information more than the conventional spelling was the flap (i.e. the [t]s in 'pretty' and 'letter'). While the flap in 'pretty' and 'letter' is spelled with two [t]s, the resulting sound appears more like a [d], which is what was represented in the children's invented spellings.

Another frequent occurrence that Read found was the omission of nasals (letters [m] and [n]) when they occurred before a consonant (i.e. 'bumpy'). A final common error that Read found was the elimination of the vowel preceding the consonants [r], [l], [m], or [n], when those consonants occurred at the end of the word or between two consonants (i.e. 'tigr' for tiger, and 'wagn' for wagon). Read concluded from these common errors that instead of approaching spelling empty-handed, children begin to spell with an established understanding of English phonology that can be seen in their attempts at invented spelling.

A significant amount of research was conducted following Read's seminal work in the attempt to provide evidence to suggest that children were equipped with an early understanding of English sounds, which is illustrated in their early spelling attempts. This implicit knowledge of sounds and translation into print is fundamental to developmental spelling, and is what the current research attempts to investigate in the ESL population.

Stage models of spelling development. Guided by Read's (1971) insight into the unconscious mind of the young speller, a number of studies were dedicated to following and categorizing the developmental journey of the early speller. To describe this journey, a stage model of spelling development was developed (Beers & Henderson, 1977; Bissex, 1980; Gentry, 1978; Gentry, 1982). While the stage model quickly became the accepted model of spelling development, the details surrounding those stages remained up for debate. For this paper, the stage model developed by Gentry (1978) will be presented, as Gentry provides perhaps the most in-depth descriptions of the stages based on data from Beers (1974), Beers and Henderson (1977), and Gentry (1977).

Gentry (1978) stated that spelling skill results not from memorization, but rather from the mastery of strategies obtained while moving through the various developmental spelling levels. These stages were said to occur between kindergarten and grade two, when formal spelling instruction becomes part of the curriculum. Gentry mentioned that children move through five stages on their way to creating correct spelling forms. During the first stage, children use the 'deviant strategy', which presents as illogical strings and random letters. During the second stage, the children are said to use the 'pre-phonetic strategy'. While children in this stage are able to create some letters, many letters and essential features of the word are missing. Therefore, the majority of messages created by children in the second stage are undecipherable by the reader.

The third stage is referred to as the 'phonetic' stage. It is during this stage that children develop the connections between the sounds they hear when words are spoken and the letters of the alphabet. The spellings created during this stage reflect this linking of oral sounds to letter sounds. Their knowledge of letter sounds is limited to letters that

sound like their names. Their spelling is therefore limited, as the children are only able to represent in writing sounds that match the letter names. During the fourth stage, the ‘transitional stage’, the children develop an understanding of most of the rules of English orthography, and apply them the majority of the time. Gentry notes that the key to moving from the invented spelling, seen in the phonetic stage, to the conventional spelling, seen in the transitional stage, is exposure to conventional English orthography through experience with instructed reading and writing. This exposure, Gentry notes, allows children to view the letter-sound patterns and morphological aspects of the English language.

During the fifth and final stage, children are said to be using the ‘correct strategy’. This strategy simply states that the child has developed the ability to use the correct lexical form when writing. According to Gentry, the key to transition through the stages is exposure to print through reading and writing practice in school.

Further development of the stage theory. The stage model discussed in Gentry (1978) will provide the theoretical background for the current research, however, more recent work has updated the stage model, and the following section will review some of these developments. For example, some research has suggested that, perhaps, the confines of the stages are not as clear cut as once held. While investigating whether knowledge of the names of letters influences the acquisition of spelling, Treiman (1993) found that the ‘letter name strategy’ was used more frequently for particular sounds, depending on the phonological properties of the name. Specifically, Treiman found that the letter name strategy was used more often for the sounds /r/ and /l/, and less often for

/s/ and /t/. This refines the ‘phonetic stage’ presented in Gentry (1978), which posits that children adopt the letter name strategy for all letters.

Similarly, in a study determining if performance on a spelling test could predict later success in reading for grade one children, Morris and Perney (1984) expanded the pre-phonetic stage in Gentry (1978) into two sub-stages. The pre-phonetic stage is marked by the production of only some correct letters with many missed or erroneous letters. Morris and Perney developed a specific scoring system that allocated 1 point for assumedly less advanced attempts with the correct beginning consonant only (e.g. the word is ‘back’ and the child produces ‘B’ or ‘Bxxx’) and 2 points for assumedly more advanced attempts with the correct beginning and ending consonants (e.g. the word is ‘back’ and the child produces ‘BK’ or ‘BxxK’).

Nunes, Bryant, and Bindman (1997) also extended the stage model of spelling development, with a focus on the development of morphological skill in spelling. Nunes and colleagues suggested that a developmental sequence in the acquisition of phonetic and morphological spelling strategies occurs between the ages of 6 and 10. Studying the use of the ‘-ed’ morpheme, Nunes and colleagues posited that children in the first stage of spelling do not spell the endings of words systematically. They suggested that children in the second stage use a phonetic spelling strategy, followed by the third stage, in which the children use a strategy to note and incorporate exceptions to the phonetic strategy (i.e., they begin to understand that –ed is used to represent the final /d/ and /t/ sound), without fully understanding the grammatical basis of the spellings. The fourth stage was said to occur when there is a full understanding of the grammatical basis for some of the patterns that do not correspond with the phonetic spelling strategy (e.g., they

understand the significance of the ‘-ed’ morpheme and use it properly to represent past verbs). Finally, the fifth stage occurs when there is understanding about the exceptions that exist for the grammatically-based rules learned in the fourth stage.

While the specifics of the stage model are still up for debate and continue to be developed, there seems to be an agreement that children progress through a series of skills required to become proficient at spelling. The stage model remains the most supported model of spelling development to date and, therefore, provides the theoretical background for the current research.

Beyond the stage model. While support for the stage model of spelling development remains strong, current research suggests that there is more to spelling development than stage theories suggest. Treiman (2000) comments that while stage theory does provide a general overview of how spelling develops in children, it does not account for the simultaneous use of phonological, orthographic, and morphological information. Treiman recommends that an alternative theory of spelling development should consider that the child may use strategies from multiple sources at any point in development when attempting to spell.

In a paper critically examining the stage model of spelling development, Varnhagen, McCallum and Burstow (1997) concluded that developmental stages are not an accurate way of describing children’s spelling development. This conclusion was reached after Varnhagen and colleagues investigated the developmental progression of words with silent *-e* and past tense *-ed* in elementary school children from grades one through six. They found that instead of progressing through the five stages mentioned above, the children progressed right from phonetic to correct spelling. Varnhagen and

colleagues suggest that instead of statically progressing from one stage to another, children use different strategies based on the complexity of the word. Varnhagen and colleagues support a more recursive view of spelling developmental, such as the Overlapping Waves view developed by Rittle-Johnson and Siegler (1999).

The Overlapping Waves model proposed by Rittle-Johnson and Siegler (1999) was originally developed to explain the development of arithmetic skills in children. The model suggests that rather than developing in a sequential fashion, children show gradual change. It holds that children approach the task of spelling with a variety of strategies, depending on the complexity of the word and the skill level of the student. For example, beginning spellers use different strategies for words with which they are familiar (i.e., direct retrieval), versus words with which they are not familiar (i.e., the more procedural strategy of sounding out words).

While Rittle-Johnson and Siegler (1999) and Varnhagen, McCallum and Burstow (1997) provide an interesting alternative account for spelling development, their youngest participants were in grade one. Thus, the authors may be taking for granted a certain degree of spelling development that has already occurred in pre-school and kindergarten. Their suggestion that children approach spelling with a variety of strategies that are applied depending on the complexity of the word may be, therefore, ignorant of the stages of spelling development through which the children have already passed. Perhaps a better model of spelling development would combine these theories with a stage-type model. Such a model would suggest that children develop early spelling skills in a stage-like fashion and then once these skills are established, they are able to approach different words with their range of skills, depending on their comfort

and the complexity of the word. While there is potential in these more recent theories, the current study will use the stage model of spelling development as its theoretical background.

The preceding sections of this chapter have reviewed the predominant theory of spelling development, namely the stage model. While there are many versions of the stage model, the current study has presented that of Gentry (1978). In this model, children progress through five stages before becoming proficient spellers. More recent research suggested that the original stage models were too broad, contributing more detailed accounts of one or more particular stages (Morris & Perney, 1984; Treiman, 1993; Nunes, Bryant, & Bindman, 1997). And some research has refuted the stage model altogether, suggesting alternative theories of spelling development. One such theory was the Overlapping Waves model (Rittle-Johnson & Siegler, 1999). This model suggested that instead of moving through successive stages, children apply strategies depending on the complexity and their familiarity of the word. As mentioned, the stage model will be used as the theoretical background for the current research. One goal of the current research is to determine if the ESL children follow a similar progression through developmental stages as non-ESL children.

Research on spelling development for the ESL population

Figueredo (2006) noted that ESL learners approach English spelling with an additional resource: their first language (L1). To investigate the involvement of this ‘additional resource’, Figueredo (2006) conducted a review to investigate the influence L1 has on participants’ English spelling. Figueredo reported two main findings: that there is both negative and positive transfer of L1 to spelling in English for ESL students,

and that as ESL learners acquire more knowledge of English spelling, they rely less on their L1.

Liow and Lau (2006) also examined the influence of ESL children's L1 on their English spelling development. Liow and Lau investigated the orthographic, phonological, and morphological awareness of ESL children using a forced-choice spelling task addressing knowledge of flaps (/d/ or /t/ in water). The participants from this study were 6-year old children from three different home-language backgrounds: L1-English, L2-Mandarin; L1-Mandarin, L2-English; and L1-Bahasa Malaysia, L2-English. Liow and Lau found that the children with home languages other than English often approached spelling with different kinds of metalinguistic awareness, which refers to the ability to consciously analyze and reflect on language (Karmiloff-Smith, Grant, Sims, Jones, & Cuckle, 1996). This awareness allows ESL children to objectify the English language, identifying patterns not only within the English language, but also between their L1 and the English language. Specifically, the L1-English children were able to optimize their performance by combining their orthographic and phonological awareness. The L1-Bahasa Malaysia children showed evidence of using their phonological and syllable awareness, less orthographic awareness, and no morphological awareness. And for the L1-Mandarin children, visual-orthographic skills appeared to be relied on more than both phonological and morphological awareness.

Liow and Lau (2006) concluded that ESL learners may approach English spelling with different skill sets, depending on the sounds and early text that they are exposed to in the home. It must be noted, however, that the status of ESL does not hinder ESL learners in acquiring English spelling. Rather, research has suggested that spelling

performance in both L1 and L2-English is related more to reading ability and less to the characteristics of the L1 (Geva, Wade-Woolley, & Shany, 1993; Wade-Woolley, & Siegel, 1997).

Of particular importance to the current research, Wang and Geva (2003) found that Chinese ESL and non-ESL children follow a similar pattern of spelling development when using a measure of developmental spelling that follows the stage model. The participants from this study included 35 Chinese ESL children and 37 native English speaking children, with a mean age of 6 years, 4 months. The children were presented with 16 high frequency words and asked to spell each word. The responses were then scored as either correct or incorrect, as well as being scored for their developmental level. To do so, Wang and Geva used a scale that was based on the number of phonemes that the child represented as well as the level of orthographic representation. Wang and Geva concluded that the developmental trajectories were similar for the Chinese ESL and non-ESL children. The current research attempts to replicate the findings from Wang and Geva with a sample of predominantly Punjabi ESL and non-ESL kindergarten children, to see how the developmental spellings of young ESL children compare to the spellings of their monolingual English-speaking counterparts, as well as to ESL children's oral language proficiency.

There have been results, however, to suggest that in the early stages of spelling development, some language backgrounds can cause negative transfer to acquiring English spelling. Wang and Geva (2003b) investigated the impact of L1 on English spelling skill for a group of Chinese ESL learners using a dictation task that presented both real words and pseudowords (e.g. "bim"). Wang and Geva found similar ability in

performance on the spelling task that used real words, but found negative transfer in the pseudoword spelling task for the Cantonese ESL children, who performed more poorly than the L1 English children. Wang and Geva discuss how Cantonese children, who are taught to read and write in Chinese, have learned to employ a whole-word, visual, and rote strategy to spelling. When faced with a task that requires phonological processing, children from a Chinese L1 have a difficult time carrying out the phoneme to grapheme conversion, which, in the case of this experiment, resulted in poorer performance than the English L1 children. Similar results have been found for university students who are ESL (Holm & Dodd, 1996). Wang and Geva do report that by the end of grade 2, difficulties in spelling sounds for which the Chinese ESL students are not familiar appear to subside leaving the ESL students at par with their native English speaking peers.

In summary, the above literature indicates that ESL children may rely on different skill sets to develop English spelling, depending on their L1. The literature also suggests that these different skill sets may result in some challenges when approaching English spelling at first, but that those difficulties subside by grade 2 when the ESL learners appear to be on par, or ahead, of their English-speaking peers. Finally, the above-reviewed literature suggests that, on the whole, ESL and non-ESL children tend to follow a similar pattern of spelling development. Whether this is the case in young pre-literate ESL children remains to be examined in the present study.

Summary of the Background Research and Overview of the Present Study

The previous chapter has presented the research that reviews the prerequisite skills for spelling; including orthographic and morphological understanding, phoneme awareness and alphabet knowledge (which comprise the alphabetic principle), oral

language skills, and reading. These skills have been shown to be important not only for English speaking children, but also for those learning English as a second language. The current research contributes to this literature by providing more evidence for the linguistic and literacy skills that are related to developmental spelling for a group of ESL and non-ESL kindergarten children, as well as determining the predictors for developmental spelling for both groups.

To situate this research in theory, the previous chapter presented the stage model of spelling development (Gentry, 1978). While adaptations have since been made to the stage model, it remains the most widely-used model of spelling development, and Treiman (2000) has acknowledged it as providing a general overview of how spelling develops. This model helps to interpret and compare the developmental spelling samples in the current research. This research contributes to the shortage of research that looks at developmental spelling in ESL learners by comparing developmental spelling scores from a group of ESL and L1 English kindergarten children using a scoring system that follows the stage model of spelling development.

To review, the purpose of the current research is to address (1) whether developmental spelling differs between ESL and non-ESL kindergarten children, and (2) how developmental spelling is related to children's performance on other linguistic and literacy measures. The current research helps to determine whether differentiated English spelling instruction is necessary for ESL learners in the kindergarten classroom.

Chapter 3: Methodology

Methods

The current study was based on a larger longitudinal study examining the relationships among oral English proficiency and reading, spelling, and writing development in ESL and non-ESL Canadian kindergarten children. The objective of the current research was to compare the ESL group and the non-ESL group in terms of their level of developmental spelling in English, and to determine what linguistic and literacy skills were related to developmental spelling for each group. To accomplish this, the current research compared the developmental spelling scores for a group of ESL and non-ESL learners using a scoring system that follows the stage model of spelling development. Applying both groups' misspellings to the same model is justified, as past research (Wang & Geva, 2003) has suggested that both ESL and non-ESL children follow a similar pattern of spelling development. The current research investigated the relationship that these scores have with skills that have been shown to play an essential role in spelling skill: reading, phonological processing, knowledge of the alphabet, handwriting fluency, and oral language.

To conduct this investigation, the developmental spelling scores were calculated by applying the scoring criteria from Morris and Perney (1984) to spelling errors made on the Wide Range Achievement Test – Third Edition (Wilkinson, 1993; WRAT-3). The calculated developmental spelling scores from both the ESL and non-ESL groups were then compared to each other to determine if developmental spelling was similar between groups. Consideration was then given to how the developmental spelling scores related to the scores on the following: the Reading subtest scores from the WRAT-3, the

Sound Matching and Non-word Repetition subtest scores from the Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999; CTOPP), the raw scores from the Alphabet Identification task, the Alphabet Writing Fluency subtest scores from the Weschler Individual Achievement Tests – Second Edition - (The Psychological Corporation, 2002; WIAT-II), the Receptive Vocabulary scores from the Peabody Picture Vocabulary Test – Fourth Edition (Dunn & Dunn, 2007; PPVT-IV), and the Syntax Construction scores from the Comprehensive Assessment of Spoken Language (Carrow-Woolfolk, 1999; CASL).

Participants

From an initial sample of 69 ESL and 58 non-ESL children from the larger study, the developmental spelling scores of 37 ESL, and 40 Non-ESL children were included in the study. Only those participants who had produced five misspellings on the WRAT-3, which was the maximum number of errors collected, were included in the current study. The rationale for only considering those children with five misspellings is that a total developmental spelling score (total of scores for five items) was used to compare individuals and groups, and thus, the children were required to have an equal amount of responses to develop a fair comparison of total scores. The reason that not all children produced five misspellings (or five responses of any kind), for the most part, was that the task was too challenging for some children and thus, they discontinued the test before a ceiling was achieved. For those children who completed the task, the most common number of incorrect responses was five, and thus the reason why this particular number of misspellings was chosen for comparison across groups. This inclusion criterion resulted in the analysis of 385 misspellings.

The children were from 12 different kindergarten classes in seven elementary schools within the Abbotsford School District in Abbotsford, BC. The children were from middle-class neighbourhoods. The ESL group was comprised of children (21 boys; 18 girls) whose first language was not English and who were receiving ESL services within the school in kindergarten. In Abbotsford, the majority of children in this group speak Punjabi as their L1. Specifically, only five of the ESL children had first language backgrounds outside of Punjabi: one Korean, one German, two Spanish, and one Vietnamese. The non-ESL group was comprised of children (22 boys; 19 girls) who speak English as their first language. The mean age of the non-ESL group was 68.6 months, and the mean age of the ESL group was 67.6 months.

Measures

As part of the larger study, a collection of cognitive, linguistic, and literacy measures were administered. The present study concerns the analyses of students' performance only across the linguistic and literacy measures, as these measures are most relevant to the analysis of developmental spelling. The linguistic measures provide information about the children's skills in phonological processing, receptive vocabulary, and syntax. The literacy measures provide information about the children's skills in word-level reading, letter knowledge, and writing fluency.

It is important to note that all measures were administered in English and that only raw scores were used. The reason for only using raw scores, as opposed to standard scores, was that not all measures have included ESL children in their norms and, therefore, it would not be appropriate to apply the norms to the current sample of children.

Development Spelling Measure. The scoring system from Morris and Perney (1984) was used to obtain a measure of developmental spelling for the children in the current study by applying the system to the children's responses on the WRAT-3 Spelling task. An outline of the scoring system is presented in table 1 on the following page. The scoring system assigned scores based on the sophistication of the strategy used when attempting to spell unfamiliar words, resulting in a higher developmental spelling score associated with a more sophisticated strategy-use. This scoring system was chosen for the current study because it is age and ability appropriate for the current sample and highlights aspects of spelling that are of interest to the current study (i.e., developmental spelling). Also, the theoretical foundations of the scoring system in Morris and Perney were consistent with the current research; both being guided by the stage model of spelling development. Finally, the scale also proved to be a reliable tool, with an inter-rater reliability coefficient of .93.

Table 1

Scoring System Devised by Morris and Perney (1984)

Score	Description
0 points	A random letter string (back = ORAI) or a spelling in which the beginning consonant is inappropriate (back = K; mail = AL)
1 point	Beginning consonant only is represented correctly ('back' = B or Bxxx)
2 points	a) beginning and ending consonants are correctly represented ('back' = BK or BxxK), or b) the beginning consonant and appropriate vowel are present, but the ending consonant is not there or inappropriate ('back' = BA or BApp)
3 points	Phonetic stage spelling apparent, indicating that the child is able to "sound his/her way through the word" representing, a) beginning and ending consonants plus appropriate long vowel letter name ('mail' = MAL; 'feet' = FET), or b) beginning and ending consonants plus appropriate letter-name substitution for the short vowel ('dress' = JRAS; 'stick' = SEK).
4 points	Transitional stage spelling indicating an emerging awareness of the basic orthographic patterns in monosyllabic words (CVC, CVCe, CVVC); a) beginning and ending consonants plus correct short vowel representation ('dress' = DRES; 'stick' = STIC), b) beginning and ending consonants plus an attempt to mark the long vowel ('mail' = MALLE; 'feet' = FETE). Also must include both letters in a beginning consonant blend ('dress'; DRES = 4 points, DES = 3 points);
5 points	A correct spelling.

As the current study was conducting an error analysis, none of the spelling attempts being considered would have achieved a score of 5 for correct spelling, and thus only scores 0-4 from the measure were employed. Therefore, each of the five misspellings was allocated a score between 0-4, as outlined above in the description of the scoring system. All five misspellings were then combined to produce a total developmental spelling score for each child. An example of this process would include the dictated words ‘cake’, ‘took’, ‘bust’, ‘center’, and ‘slight’; and the child’s written response of ‘cac’, ‘tvc’, ‘bus’, ‘sentr’, and ‘sllt’, respectively. In this hypothetical situation, the child would score the following: 3 for ‘cac’, 2 for ‘tvc’, 2 for ‘bus’, 3 for ‘sentr’, and 2 for ‘sllt’, making a total score of 12. A mean score was then calculated for each language group.

Linguistic Measures

Phonological Processing. The Sound Matching and Non-word Repetition subtests from the Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999; CTOPP) were used to measure the individual’s ability to match sounds, and to repeat non-words that range in length from 3 to 15 sounds, respectively. In the Sound Matching task, the participant is required to listen to a word, followed by three more words. The task for the first 10 items is to respond as to which one of the three words has the same initial sound as the first word. The task for the second 10 items is to respond as to which one of the three words has the same final sound as the first word. In the Non-word Repetition task, the participant listens to made-up words, and is required to repeat the word exactly as they heard it. Test-retest reliability for ages 5-17 across both subtests is .77-.93 and internal consistency for ages 5-8 across both subtests ranges

from .77-.90. The test manual also reports adequate content, construct, and criterion-relation validity. An example of the type of item from the Sound Matching task includes, “Which word starts with the same sound as map? Man, tape, or cop?” An example of the type of item from the Non-word Repetition task includes the examiner saying “tilshon”, followed by the participant repeating “tilshon”.

Receptive Vocabulary. The PPVT-IV was used to measure the receptive vocabulary of the participants. This is an individually administered standardized test. In this test, the participant is required to point to a picture, from an array of four choices, which corresponds with a verbally presented word. Test-retest reliability for ages 2-60 ranges from .92 to .96. The internal consistency for ages 2-60 ranges from .89 to .97. The test manual reports adequate content validity and convergent validity. An example of this type of task would include, “Show me the picture that shows tying a shoe”, requiring the child to point to the picture of the child tying their shoe.

Syntax. The Syntax Construction sub-test of the CASL was used to measure the participant’s understanding of oral expression of words, phrases, and sentences. This is an individually administered standardized test. In this test, participants are required to provide a word, phrase, or sentence that is semantically or grammatically compatible with a picture and verbal stimulus presented by the experimenter. Internal reliability for this subtest for ages 3-19 ranges from .79-.92. Test-retest reliability for this subtest for ages 5 to 17 ranges from .66 to .85. The test manual reports adequate construct and criterion-related validity. An example of the type of items from this test would include, “The boy lost his key. Where was it?”, requiring the participant to respond where the key was found, for example “on the car seat”.

Literacy Measures: Reading

Word Reading. The Reading subtest from the Wide Range Achievement Test – Third Edition (Wilkinson, 1993; WRAT-3) was used to measure basic academic skills necessary for reading. This is an individually administered standardized test. The participants are required to read capital letters and pronounce words from a grade list. The manual reports adequate validity, with reliability coefficients reported in the upper .80s and .90s. The internal consistency of the items on the WRAT-3 ranges from .85 to .95. Examples of the type of words in the reading sub-test are “out”, “why”, “prize”, “persuade”.

Letter Identification. The Letter Identification task, based on Lesaux and Siegel (2003) was an informal measure created to test the participant’s knowledge of alphabet letters. This is an individually administered informal test. Participants are presented with an 8x11 laminated sheet of paper that contains 26 lowercase letters, with a font size 36, randomly arranged into 4 columns and 7 rows. The examiner randomly selects 12 letters, and asks the participant to point to each letter. Participants were given a score out of 12 for correct responses.

Literacy Measures: Writing

Spelling. The Spelling subtest from the Wide Range Achievement Test – Third Edition (Wilkinson, 1993; WRAT-3) was used to measure basic academic skills necessary for spelling. This is an individually administered standardized test. The participants are required to write letters and single words from dictation. The manual reports adequate validity, with reliability coefficients reported in the upper .80s and .90s. The internal consistency of the items on the WRAT-3 ranges from .85 to .95. Examples

of the type of dictated words for the spelling sub-test include, “to”, “hint”, “house”, “pneumonia”.

Writing Fluency. The Alphabet Writing Fluency sub-test from the Weschler Individual Achievement Tests – Second Edition (The Psychological Corporation, 2002; WIAT-II) was used to measure skill in written expression and writing fluency. This is an individually administered standardized test. Participants are required to write as many letters of the alphabet as they can within 15 seconds. The internal reliability for ages 5-8 is .87, and the test manual reports adequate content, construct, and criterion-relation validity.

Procedure

All tasks were administered individually in counterbalanced order across three blocks (the first block included phonological and language tasks, the second block included early literacy tasks, and the third block included a non-verbal reasoning test) with a fixed order of presentation within each block. Testing was held in a quiet room in the school and each child participated in testing for approximately 45 minutes in total.

Analyses

There were two phases of analyses responding to the two research objectives of the study. The first phase, which investigated whether there was a difference between groups on the measure of developmental spelling, used an independent samples t-test and item analyses. The second phase of analyses, which investigated what linguistic and literacy skills were related to developmental spelling, conducted separate correlation analyses and regression analyses for the ESL group and the non-ESL group to highlight

what skills were important for each group. The results of these analyses are displayed in the following chapter.

Chapter 4: Results

Results

The results are organized in a way that responds to each of the research questions of the current study. To review, the current research investigated (1) whether ESL and non-ESL kindergarten children differ on a measure of developmental spelling, and (2) how the children's performance on the measure of developmental spelling is related to their performance on other linguistic and literacy measures. This section, therefore, will begin with the presentation of the children's performance on the linguistic and literacy measures from the larger study, and the developmental spelling measure from the current study. Following this, a presentation of the item analyses and test of differences will be presented to respond to the first question of the study. Finally, the results of correlation analyses and regression analyses will be presented to respond to the second question of the study.

Table 2

Descriptive Statistics for Developmental Spelling and the Linguistic and Literacy Measures

Measure	ESL ^a		Non-ESL ^b	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Developmental Spelling	6.38	3.90 (0-15)	7.73	4.89 (0-17)
CTOPP Sound Matching	9.95	4.53 (1-18)	11.03	5.29 (1-19)
CTOPP Non-word Repetition	6.84	2.41 (2-12)	8.76	2.61 (2-14)
PPVT-IV	77.27	18.10 (42-115)	106.78	15.73 (73-145)
CASL Syntax Construction	10.31	4.91 (2-19)	17.43	4.67 (2-26)
WRAT-3 Reading	16.41	1.98 (12-20)	18.23	6.03 (7-36)
WIAT-II Alphabet Writing Fluency	3.81	1.94 (0-9)	2.33	2.22 (0-10)
Letter ID	11.68	0.78 (8-12)	11.78	0.53 (10-12)

Notes. CTOPP=Comprehensive Test of Phonological Processing; PPVT-4=Peabody Picture Vocabulary Test – 4th edition; CASL=Comprehensive Assessment of Spoken Language; WRAT-3=Wide Range Achievement Test – 3rd edition; WIAT-II=Wechsler Individual Achievement Test – 2nd edition; Letter ID=Letter Identification. Range appears in parentheses.

^a*n* = 37. ^b*n* = 40.

Table 2 displays the means, standard deviations and ranges for the literacy and language measures from the larger study, as well as the measure of developmental spelling from the current study. Not surprisingly, the Non-ESL group had a higher mean for both of the oral language measures (CASL and PPVT-IV), with similar variability between groups for the PPVT-IV results, and slightly greater variability in the Non-ESL

group for the CASL results. The reading measure was also slightly different between the two groups, with a greater overall mean for the Non-ESL group, but with greater variability in scores. All other measures, including the developmental spelling measure, are quite similar between groups. The results of further analyses are described in the following sections.

Was there a difference between groups on developmental spelling?

Results of the test of differences. The first step in answering whether there was a difference between groups on developmental spelling was to conduct a test of differences between the mean developmental spelling scores for the ESL and non-ESL group. Prior to conducting the test of differences, however, it was necessary to ensure that the data fit the assumptions of a *t*-test. These assumptions were, in fact, met as the scores in each group were normally distributed, the scores under investigation were continuous, and there was equal variance between groups (Brace, Kemp, & Snelgar, 2003). The means and standard deviations for the developmental spelling scores from the ESL and non-ESL groups are presented in Table 1. An independent samples *t* test revealed that the developmental spelling score was not significantly different between the ESL and non-ESL group, $t(75) = 1.33, p = .188$ (two-tailed).

Now, the result of the test of differences indicated that the groups were at a similar level of developmental spelling. To be more specific, however, the result of the test of differences indicated that the groups are at a similar *level of sophistication* in their approach to the spelling of unfamiliar words. It is also important to determine if the two groups were also at a similar *level of difficulty* in their developmental spelling. A rationale for including this analysis follows.

As described in the methods section, the current study conducted an error analysis applying the scoring criteria from Morris and Perney (1984) to the incorrect responses from the WRAT-3 spelling task from the larger study. The error analysis resulted in developmental spelling scores for each child from which a mean developmental spelling score for each group was determined. One concern with this analysis was that it overlooked possible differences in level of difficulty of the items from which the scores were being produced between groups.

While the question of the current research is whether spelling develops similarly between ESL and non-ESL groups, implying that the focus is on the manner in which spelling develops and not rate of development, to provide a proper comparison between groups it is important to also consider the level of difficulty each group had reached in their spelling attempts (i.e. at what level of difficulty did their errors begin, and thus at what level of difficulty did this research apply the scoring criteria) to ensure the two groups were also at similar levels of difficulty in their spelling. This was an important analysis because the WRAT-4 spelling task, from which the error analysis was conducted, gets progressively more difficult throughout the task. To accomplish this, item analyses that looked at the frequency for items and associated scores for each group were conducted to determine if there were any differences in scores between groups at the item-level.

Results of the item analyses. The first step in the error analyses was to determine error frequencies for each item, and compare those frequencies between groups. The results showed that error frequencies had a similar trend between the ESL and non-ESL

groups, with frequency discrepancies not exceeding three for any item (see Figure 1 below).

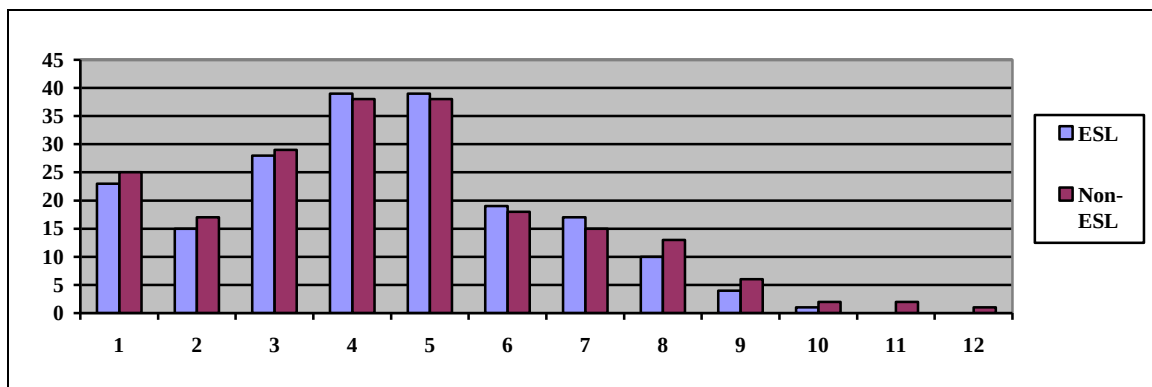


Figure 1. Spelling error frequency distributions displayed by group.

Average scores for each item were also determined and compared between groups to investigate whether particular items resulted in different scores between groups. This relates to the research question of whether spelling develops similarly between ESL and non-ESL children as it investigates whether there were particular words that resulted in different strategy-use between groups. Again, the results were similar, with differences between groups only seen for item 7, with the Non-ESL group achieving a higher score, and items 11 and 12, which were not representative of the group as a whole, as they were based on only a few scores produced by children from the Non-ESL only group (see Figure 2 below).

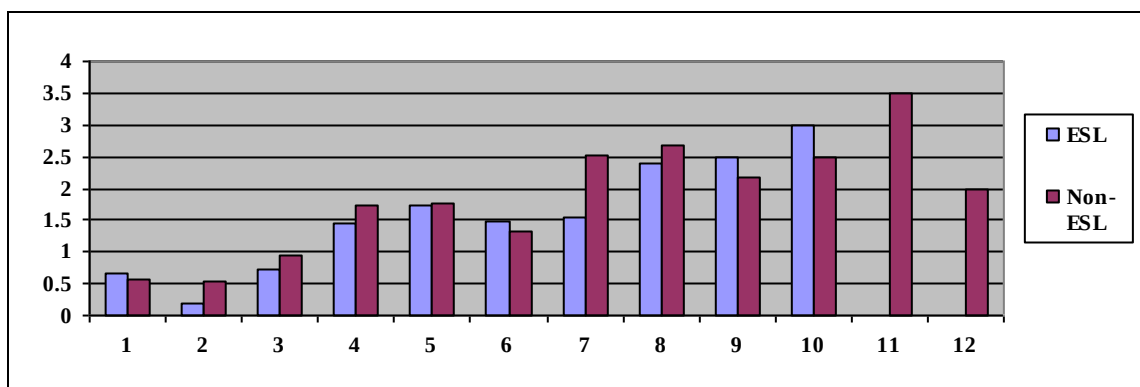


Figure 2. Average item score by group.

Another interesting finding was noticed when conducting the item analyses. To review, the scoring system from Morris and Perney (1984) allocates scores from zero to five depending on the child's strategy-use evident in their misspelling. It was noticed that the majority of children had item scores from successive levels, as opposed to having scores from, for example, the first and the fourth levels. As well, it was noticed that those children who had scores from the more advanced levels, rarely had scores from the early levels; for example, those children with scores of three and four for their misspellings rarely also had a score of one. The implications of these findings will be discussed later on in the discussion section of the paper.

The item analyses revealed that the ESL and non-ESL groups were at a similar *level of difficulty* in their spelling, which adds to the result of the test of differences that the two groups were at a similar *level of sophistication* in their spelling. The results of these analyses, then, have responded to the first research question of the current study by revealing that the ESL and non-ESL group were similar in their developmental spelling in both level of difficulty and level of sophistication. The following sections investigate the second research question of what linguistic and literacy skills are associated with developmental spelling.

What linguistic and literacy skills were related to developmental spelling for each group?

To further contribute to the understanding of how spelling develops in ESL and non-ESL children, the relationship among developmental spelling and other linguistic and literacy measures was also investigated for the current sample of ESL and non-ESL kindergarten children. To accomplish this, correlation analyses were conducted to

display the relationships among developmental spelling and the other linguistic and literacy measures. Further, regression analyses were conducted to go beyond investigating what skills were related to developmental spelling, and to determine what linguistic and literacy skills predicted developmental spelling. Practically, these final analyses give insight into what skills are important to the development of spelling for ESL and non-ESL students, which helps to inform teachers and parents about the skills that are essential in ensuring success in spelling for a linguistically diverse group of children.

Correlates of Developmental Spelling Correlation analyses were conducted separately for the ESL and non-ESL groups to determine what linguistic and literacy variables were related to the developmental spelling measure, and to reveal if there were any differences between the groups. Correlation analyses were appropriate for the current study as the data were normally distributed, and the variables were measured on a continuous scale (Brace, Kemp, & Snelgar, 2003). The results of the correlation analyses for the ESL and non-ESL groups are shown in Table 3 on the following page.

Table 3

Correlations among Developmental Spelling and Other Variables

	Developmental spelling	
	ESL ^a	Non-ESL ^b
Linguistic Skills		
Phonological Processing		
Sound Matching	.558**	.622**
Non-word Repetition	.453**	.295
Oral Language		
Receptive vocabulary	.453**	.408**
Syntax Construction	.504**	.578**
Literacy Skills		
Word Recognition	.628**	.586**
Letter Identification	.235	.331*
Alphabet Writing Fluency	-.093	.301

^a $n = 37$. ^b $n = 40$.

* $p < .05$, ** $p < .01$.

For the ESL group, all but the Alphabet Writing Fluency and Letter Identification measures correlated significantly with the developmental spelling measure. The results for the non-ESL group revealed that all measures were correlated with developmental spelling, except for phonological processing – Non-word Repetition, and Alphabet Writing Fluency.

Predictors of Developmental Spelling. Separate hierarchical regression analyses were conducted to determine the linguistic and literacy measures that were predictive of developmental spelling for the ESL and non-ESL groups. Conducting separate regression analyses determined whether those skills were different for the ESL and the non-ESL group. Regression analyses were appropriate for the current sample of children as there is a linear relationship between the independent and dependent variables, the dependent variable is measured on a continuous scale, the independent variables are measured on continuous scales, and the number of participants are at least five times the number of independent variables in the regression (Brace, Kemp, & Snelgar, 2003). For both regression analyses, the entry of variables into the analysis was guided by theory and strength of correlation.

For both groups, the two oral language measures were entered first. The rationale was the descriptive statistics revealed that the two groups differed in their levels of English oral language, and, knowing this, the current research investigated what skills above and beyond oral language contributed to the measure of developmental spelling for each group. In other words, the analyses investigated what skills contributed to unique variance in developmental spelling once the variance from the oral language measures were accounted for. The strength of correlation determined the order of entry for the oral language measures, with syntactic knowledge (as measured by the CASL) entered first and receptive vocabulary (measured by the PPVT-4) entered second for both groups.

Following the oral language measures, the phonological processing measures were entered. The rationale, based on the literature reviewed earlier, revealed the great contribution of phonological processing to spelling (Steffler, 2001; Treiman, 2000) even

more than reading (Caravolas, Hulme, and Snowling, 2001). Again, for the ESL group, the order of entry for the phonological processing measures was determined by the strength of the correlations. Finally, the remaining literacy skills (Word Reading, Letter Identification, and Alphabet Writing Fluency) were entered according to the strength of correlations.

The first analysis examined the linguistic and literacy predictors of developmental spelling for the non-ESL group. The variables were entered one step at a time in the following order: Syntax Construction (CASL), receptive vocabulary (PPVT-IV), phonological processing – Sound Matching (CTOPP: SM), Word Recognition (WRAT-3), and Letter Identification. This analysis, shown in Table 4 on the following page, indicated that the children's performance on the Syntax Construction subtest of the CASL predicted 32% of the variance on the developmental spelling measure ($F_{3,36} = 16.41, p < .001$). The inclusion of the CTOPP Sound Matching measure resulted in an additional 17% of variance being explained (R^2 change = .169), and the inclusion of the Alphabet ID measure resulted in an additional 6% of variance being explained (R^2 change = .057).

Table 4

Linguistic and Literacy Predictors of Developmental Spelling for the Non-ESL Group

Step variable	R^2 explained (%)	Beta	t
CASL	31.6	.469	3.786*
CTOPP: SM	+16.9	.343	2.661*
Letter ID	+5.7	.281	2.378*
Total variance explained	54.2		

Note: CASL=Comprehensive Assessment of Spoken Language; CTOPP SM = Comprehensive Test of Phonological Processing, Sound Matching; ID=Identification.

* $p < .05$.

The second analysis examined the linguistic and literacy predictors of developmental spelling for the ESL group. The variables were entered one step at a time in the following order: Syntax Construction (CASL), receptive vocabulary (PPVT-IV), phonological processing – Sound Matching (CTOPP: SM), phonological processing – Non-word Repetition (CTOPP: NR), and Word Recognition (WRAT-3). This analysis, shown in Table 5 on the following page, revealed a similar result to that of the non-ESL group, with the exception of Letter Identification being predictive for the non-ESL group only. This regression revealed that the ESL children's performance on the Syntax Construction subtest of the CASL predicted 23% of the variance on the developmental spelling measure ($F_{2,34} = 13.75$, $p < .001$). The inclusion of the CTOPP Sound Matching measure resulted in an additional 18% of variance being explained (R^2 change = .183).

Table 5

Linguistic and Literacy Predictors of Developmental Spelling for the ESL Group

Step variable	R^2 explained (%)	Beta	t
CASL	23.2	.382	2.891*
CTOPP: SM	+ 18.3	.456	3.448*
Total variance explained	41.5		

Note: SM: Sound Matching.

* $p < .05$.

The results of the regression analyses are interesting with Syntax Construction and phonological processing (Sound Matching) predicting developmental spelling for both the ESL and the non-ESL groups, and Alphabet Identification contributing additional variance for the non-ESL group only.

Review of the Results

The results revealed that the ESL children performed less well on the oral language measures compared to the non-ESL children. The ESL children performed better than the non-ESL children, however, on the Alphabet Writing Fluency measure. For all other measures, including the phonological processing measures, Word Reading, and Letter Identification, the ESL and non-ESL groups performed similarly. The results also revealed that there was not a significant difference between the ESL and non-ESL groups on the measure of developmental spelling. A more in-depth analysis of the items used to determine the level of developmental spelling confirmed that there were no differences between the groups. Thus, both groups achieved similarly in terms of developmental spelling performance.

The correlation analyses revealed that for the ESL group, all measures but Letter Identification and Alphabet Writing Fluency were related to developmental spelling. For the non-ESL group, all measures but phonological processing (Non-word Repetition) and Alphabet Writing Fluency were related to developmental spelling. Finally, the regression analyses found that Syntax Construction and phonological processing (Sound Matching) were predictive of developmental spelling for both the ESL and non-ESL groups, with Letter Identification contributing additional variance for the non-ESL group only.

Chapter 5: Discussion

Discussion

The current study responded to the need for research on literacy development in ESL learners that focuses on the area of English spelling. More specifically, the purpose of the current research was to determine if developmental spelling was similar between a group of ESL and a group of non-ESL kindergarten students, and further, to determine what linguistic and literacy skills were related to developmental spelling for ESL and non-ESL children. The discussion of the results will follow a similar format as the results section, responding to the research questions in queue.

Was there a difference between groups on developmental spelling?

In response to the first research question of the current study, a test of differences found that there was not a significant difference between the ESL and non-ESL groups on the measure of developmental spelling, using the scoring system from Morris and Perney (1984) that follows the stage model of spelling development. This result provides support for previous research that has found a similarity between ESL and non-ESL children in reading and spelling (Leseaux & Siegel, 2003). And further, the current results support the finding that spelling development follows a similar pattern for ESL and non-ESL children (Wang & Geva, 2003). Wang and Geva studied Chinese ESL children, and therefore the current research adds to their results by finding similar results for a group of Punjabi ESL and non-ESL kindergarten children. The lack of difference in developmental spelling between groups is encouraging as it suggests that ESL status does not hinder ESL children in their English spelling development.

Contribution to the stage model of spelling development. As discussed, the current research was grounded in the stage model of spelling development and the scoring system used to determine the developmental spelling scores was based on the stage model. This model suggests that children progress through stages in which they develop the skills necessary for spelling. Recent research (Wang & Geva, 2003) that used a stage model found that ESL and non-ESL children have a similar developmental trajectory for spelling. The current research confirms their claim, as the stage model proved to be appropriate for our ESL sample of kindergarten children as well.

The current literature review also presented research (Varnhagen, McCallum & Burstow, 1997) that criticizes the stage model, suggesting that alternatives are necessary. Using a stage model to track the spellings/misspellings of children from grades one to six, Varnhagen and colleagues found that their sample of children generally progressed right from the phonetic level to the correct level. The findings of the current study conflict with those of Varnhagen and colleagues, as the item analyses revealed that items from all levels of the stage model emerged from the current sample of children.

As mentioned in the results, another interesting finding from the current sample was that the majority of children had developmental spelling items from successive levels, as opposed to having items from disconnected levels, or only one level; for example, having items from levels two and three, as opposed to items from levels one and four, or level one only. This suggests that the children were progressively moving through the stages, and not randomly acquiring skills, or confined to one stage after another in their development. Together, these additional findings lend support to the

stage model of spelling development, and, importantly, not only for English-speaking (non-ESL) children, but for ESL children as well.

These findings give more insight into early spelling development for ESL and non-ESL children, and extend such work as Varnhagen, McCallum and Burstow (1997). Varnhagen and colleagues, and Rittle-Johnson and Siegler (1999) suggest that children approach spelling of unfamiliar words with differing strategies depending on the complexity of the word, as opposed to moving through stages. For both of these studies, however, the youngest children studied were in grade one. Therefore, the current findings contribute to those of Varnhagen and colleagues and Rittle-Johnson and Siegler by suggesting that before the children are able to select strategies depending on the complexity of the word, perhaps they progress through such stages as those proposed by Gentry (1978) to acquire the necessary skills and strategies.

Finally, it must be re-emphasized that these findings refer to both the non-ESL children *and* the ESL children. Therefore, the current study adds to the literature by providing more evidence to suggest that both English-speaking (non-ESL) and ESL children progress through stages in early spelling development.

What linguistic and literacy skills were related to developmental spelling of each group?

Similarities between the ESL and the non-ESL groups. The results of both the correlation analyses and the regression analyses respond to the second question of the current study. The results for both analyses revealed similarities between groups. The results of the correlation analyses contribute to the body of literature on the importance of phonological processing to spelling by finding that phonological processing (Sound Matching) was associated with the developmental spelling for the current sample,

supporting the research of Steffler (2001), and Treiman (2000) for English-speaking children, and Comeau, Cornier, Grandmaison, and Lacroix (1999) that extends the finding to include ESL children.

The results also contribute to the literature on the importance of oral language in spelling development (Snowling, Bishop & Stothard, 2003; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998), by finding a correlation between developmental spelling and syntactic knowledge and receptive vocabulary. The current research results are also consistent with the literature that has found a connection between word reading and spelling not only for English-speaking monolingual children (Ehri, 2000), but ESL children as well (Wade-Woolley and Siegel, 1997), by finding a correlation between developmental spelling and Word Recognition for both the ESL and the non-ESL groups.

A final similarity between the groups was that the measure of Alphabet Writing Fluency did not correlate with developmental spelling for either the ESL or the non-ESL group. This finding conflicts with that of Berninger, Yates, Cartwright, Rutberg, Remy, & Abbott (1992) who found that the ability to write the letters of the alphabet was predictive of spelling. It is important to note here, however, that Berninger and colleagues' measure referred to conventional spelling, not developmental spelling. The current findings suggest, then, that different skills may be important at different points in the acquisition of spelling skill. The Alphabet Writing Fluency task addresses the speed at which a child is able to accurately produce letters from the alphabet. For alphabet writing fluency to be related to success on a conventional spelling test makes sense, as children who have spent more time writing letters have most likely also had more time making spelling attempts, and becoming proficient spellers. When measuring

developmental spelling, however, skill in such areas as phonological processing and understanding of letter-sound connections are more important.

The results of the correlation analyses informed the regression analyses and interestingly, the predictors that contributed the most (for the non-ESL group), and all (for the ESL group), of the variance in the developmental spelling measure were found to be the same for the ESL and non-ESL children. These predictors included the measure of phonological processing (Sound Matching) and the measure of syntactic knowledge (Syntax Construction). This finding reveals that phonological processing (Sound Matching) and syntactic knowledge (Syntax Construction) were predictive of developmental spelling for all children in the current study, despite ESL children's less well-developed oral English language skills. This finding emphasizes a general theme of similarity between the ESL and non-ESL groups in terms of their literacy development. This theme of similarity can also be found in the research on reading development in ESL students (Chiappe, Siegel, & Gottardo, 2002; Lesaux & Siegel, 2003; Lipka, & Siegel, 2007), which suggests that phonological processing is the best predictor of success in reading, despite ESL status.

The result of phonological processing being predictive of developmental spelling was anticipated, as there is an established research base that supports the connection between phonological processing and both spelling and literacy development in general (Steffler, 2001; Caravolas, Hulme, and Snowling, 2001; Treiman, 2000; Comeau, Cornier, Grandmaison, and Lacroix 1999). There is less research, however, on the connection between syntactic knowledge and spelling. In fact, in a chapter dedicated to a discussion on the relationship between syntactic understanding and literacy development,

Scott (2004b) comments about being puzzled regarding the lack of research and discussion on the connection between syntactic abilities and literacy development. Considering this lack of research, the unique contribution of the measure of syntactic knowledge (CASL Syntax Construction) to the variance of developmental spelling found in the current research, for both non-ESL and ESL children, is an important contribution to the literature on literacy development.

As referenced in the literature review presented earlier, there is some research discussing the importance of morphosyntactic knowledge to spelling (Steffler, 2001). Additionally, in a longitudinal study (Plaza & Cohen, 2004) Plaza and Cohen measured morpho-syntactic skill in grade 1 participants by listening to sentences and deciding whether or not they were grammatically correct, and then correcting any mistakes. Plaza and Cohen then administered the following in grade 2: a pseudo-word spelling task, a word spelling task, and a text dictation task. Using hierarchical regression analyses, Plaza and Cohen revealed that morphological/syntactic skill was the third predictive skill for spelling skill, after phonological processing skill, and naming speed.

There is also similar research that discusses the connection between syntactic knowledge and reading (Catts, Fey, Zhang & Tomblin, 1999). Catts and colleagues found that a measure of expressive and receptive vocabulary and grammar resulted in additional variance (13.8%) in reading comprehension after the variance from phonological awareness and rapid naming had been accounted for. The results of the current research, then, provide support for both Catts and colleagues and Plaza and Cohen (2004) that syntactic skills are predictive of and important to developing literacy, in particular, developmental spelling. The current research also reveals the importance

and influence of syntactic knowledge to developing spelling for children as young as kindergarten. And further, the results of the current research contribute to the literature by making the connection between syntactic knowledge and developmental spelling for both English speaking (non-ESL) and ESL children.

Differences between the ESL and the non-ESL groups. There were a few differences between the ESL and non-ESL groups that surfaced in the correlation and regression analyses. The results of the correlation analyses showed that phonological processing (Non-word Repetition) was related to developmental spelling for the ESL group only. The Non-word Repetition task required the children to repeat non-words of various lengths that followed English orthographic rules. A possible explanation for this result is that members of the ESL group have not fully mastered the sound system of the English language. The cognitive demands of interpreting unfamiliar English sounds, therefore, may interfere with remembering longer strings of English sounds, giving an advantage to the English-speaking children and to those ESL children for whom the sounds of the English language are familiar. This result is consistent with research by Wade-Woolley and Siegel (1997) that found a significant difference between an ESL and a native-English speaking group on a sound mimicry measure, which is similar to the Non-word Repetition task in the current study.

Another difference between groups was found in the correlation analyses for the Letter Identification measure. Research has asserted the importance of alphabet knowledge to spelling (Strickland & Shanahan, 2004), yet the results of the current study found that Letter Identification was only related to developmental spelling for the non-ESL group. This difference in the correlation analyses was echoed in the regression

analyses. As discussed, the two strongest predictors of developmental spelling for the non-ESL group were the same as the predictors for the ESL group: syntactic knowledge and phonological processing. Letter Identification, however, surfaced as a third predictor for the non-ESL group only. This third predictor only contributed an additional 6% of the variance, but nevertheless, resulted in a difference between the groups. Referring back to Table 2, both of the groups did very well on the Letter Identification task, but knowledge of letters was only predictive for the non-ESL group. This may be a result of the non-ESL children having more exposure to the English alphabet during their early years, whereas the ESL children may not have experience with the English alphabet until they enter school. It is an interesting finding, worthy of further investigation.

Conclusion

To review, this research has responded to the need for more research on spelling development in ESL children, specifically focusing on the developmental nature of spelling for ESL children. The research set out to respond to two questions: whether a measure of developmental spelling would differ between ESL and non-ESL kindergarten children, and further, what linguistic and literacy skills were related to developmental spelling for each group. The current research found that the ESL and non-ESL group did not differ on the measure of developmental spelling and further, that predictors of developmental spelling were similar across groups, including syntactic knowledge (Syntax Construction) and phonological processing (Sound Matching). A third, unique predictor was found for the non-ESL group, however, namely Letter Identification. This research has also confirmed that phonological processing (Sound Matching), receptive vocabulary, and Word Recognition were related to developmental spelling for both the ESL and non-ESL children in the study, and that Alphabet Writing Fluency was not related to developmental spelling for either group. It has also found, however, that phonological processing (Non-word Repetition) was related to developmental spelling for the ESL children only, and that Letter Identification was related to developmental spelling for the non-ESL children only.

One limitation of the current study involved the selection criteria for the sample of children studied. As explained in the methods section earlier, the developmental spelling score relied on the children having equal numbers of misspellings. Due to considerations regarding the level of ability of the children from the larger study (discussed above), not all children produced equal numbers of misspellings. In fact,

some children were not able to produce any spelling attempts at all. Due to these conditions, the sample of children for the current study did not include all of the children from the larger study. If the current project allowed more time and a larger scope, it would be interesting to investigate the profile of the students who were not included in the current study; in particular, those students for whom no spelling attempts were produced.

On a similar note, it is important to highlight that the results of the current study were able to explain 54% of the variance in the developmental spelling measure for the non-ESL group, and 42% of the variance for the ESL group. A limitation of the current study, then, involves the amount of variance left to be accounted for on the developmental spelling measure for both groups. The remaining variance, which may be explained by external factors (e.g., early literacy practices at home, etc.) is important to a full understanding of what skills are important to the development of spelling, and as such, is worthy of further investigation.

Another limitation of the current research involved the method of investigating spelling strategy-use. The current research used an error analysis to determine the strategy-use and associated development level for the children. Recent literature (e.g., Harrison, 2007; Steffler, Varnhagen, Friesen, & Treiman, 1998; Rittle-Johnson & Siegler, 1999), however, has suggested that self-report strategies and real-time observations provide a more comprehensive assessment of spelling strategy-use in children.

The findings of the current study provide support for the opinion that ESL and non-ESL children follow similar developmental paths in their spelling. This information

is of interest not only to the research community, but also to educators of linguistically diverse classrooms. What the research offers educators is insight into the similarity between ESL and non-ESL children in their development of spelling. From the results, it is clear that similar skills are predictive of developmental spelling for all of the children, despite ESL children's less-well developed oral English language skills. In particular, abilities in syntactic knowledge (Syntax Construction) and phonological processing (Sound Matching) were predictive of developmental spelling for both groups. Focusing on these important skills for all children, regardless of their language backgrounds, will therefore be important early spelling instruction in culturally diverse kindergarten classrooms. The difference between groups on the predictive nature of Letter Identification must also be noted. Further research would help explain this difference.

References

- August, D. & T. Shanahan, T. (2006). *Developing Literacy in Second-Language Learners: Report of the National Literacy Panel on Language-Minority Children and Youth*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Beers, J. W. (1974). *First and second grade children's developing orthographic concepts of tense and lax vowels*. Unpublished doctoral dissertation, University of Virginia.
- Beers, J. W., & Henderson, E. H. (1977). A study of developing orthographic concepts among first graders. *Research in the Teaching of English*, 11, 133-148.
- Berninger, V., Yates, C., Cartwright, A., Rutberg, J., Remy, E., & Abbott, R. (1992). Lower-level developmental skills in beginning writing. *Reading and Writing: An Interdisciplinary Journal*, 4, 257-280.
- Bissex, G. L. (1980). *GNYS AT WORK A child learns to write and read*. Cambridge, MA: Harvard University Press.
- Brace, N., Kemp, R., & Snelgar, R. (2003). *SPSS for Psychologists – Second Edition*. Philadelphia, PA: Lawrence Erlbaum Associates Inc.
- Bruck, M., Caravolas, M., & Genesee, F. (1996). A longitudinal study of early literacy acquisition in English- and French-speaking Canadian children. Unpublished raw data.
- Caravolas, M. (2004). Spelling Development in Alphabetic Writing Systems: A Cross-Linguistic Perspective. *European Psychologist*, 9, 1, 3-14.

- Caravolas, M., Hulme, C., Snowling, M. (2001). The Foundations of Spelling Ability: Evidence from a 3-Year Longitudinal Study. *Journal of Memory and Language*, 45, 4, 751-774.
- Carrow-Woolfolk, E. (1999). *Comprehensive Assessment of Spoken Language*. Circle Pines, MN: American Guidance Service.
- Catts, Fey, Zhang, & Tomblin (1999). Language Basis of Reading and Reading Disabilities: Evidence from a Longitudinal Investigation. *Scientific Studies of Reading*, 3, 4, 331-361.
- Chiappe, P., & Siegel, L. S. (1999). Phonological Awareness and Reading Acquisition in English- and Punjabi-speaking Canadian Children. *Journal of Educational Psychology*, 91, 1, 20-28.
- Chiappe, P., Siegel, L. S., & Gottardo, A. (2002). Reading-related skills of kindergartners from diverse linguistic backgrounds. *Applied Psycholinguistics*, 23, 95-116.
- Chiappe, P., Siegel, L. S., & Wade-Woolley, L. (2002). Linguistic Diversity and the Development of Reading Skills: A Longitudinal Study. *Scientific Studies of Reading*, 6, 4, 369-400.
- Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York, NY: Harper & Row.
- Comeau, L., Cormier, P., Grandmaison, E., & Lacroix, D. (1999). A Longitudinal Study of Phonological Processing Skills in Children Learning to Read in a Second Language. *Journal of Educational Psychology*, 91, 1, 29-43.
- Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test-Third Edition*. Circle Pines, MN: American Guidance Service.

- Ehri, L. C. (2000). Learning To Read and Learning To Spell: Two Sides of a Coin. *Topics in Language Disorders*, 20, 3, 19–36.
- Figueredo, L. (2006). Using the known to chart the unknown: A review of first-language influence on the development of English-as-a-second-language spelling skill. *Reading and Writing*, 19, 873–905.
- Gentry, J. R. (1977). *A study of the orthographic strategies of beginning readers*. Unpublished doctoral dissertation, University of Virginia.
- Gentry, J. R. (1978). Early spelling strategies. *The elementary school journal*, 79, 2, 88-92.
- Gentry, J. R. (1982). An analysis of developmental spelling in GNYS AT WRK. *The Reading Teacher*, 36, 192-200.
- Geva, E. (2006). Second-language Oral Proficiency and Second-language Literacy. In D. August, & T. Shanahan, *Developing Literacy in Second-Language Learners: Report of the National Literacy Panel on Language-Minority Children and Youth* (pp. 123-139). Mahwah, NJ: Lawrence Erlbaum Associates.
- Geva, E., Wade-Woolley, L., & Shany, M. (1993). The concurrent development of spelling and decoding in two different orthographies. *Journal of Reading Behaviour*, 25, 383-406.
- Harrison, G. L., Krol, L. (2007). Relationship between L1 and L2 word-level reading and phonological processing in adults learning English as a second language. *Journal of Research in Reading*, 30, 4, 379-393.
- Holm, A., Dodd, B. (1996). The effect of first written language on the acquisition of English literacy. *Cognition*, 59, 119-147.

- Hoover, W. A., & Gough, P. B. (1990). The Simple View of Reading. *Reading and Writing: An Interdisciplinary Journal*, 2, 127-160.
- Karmiloff-Smith, A., Grant, J., Sims, K., Jones, M., & Cuckle, P. (1996). Rethinking metalinguistic awareness: representing and accessing knowledge about what counts as a word. *Cognition*, 58, 197-219.
- Kwong, T. E., & Varnhagen, C. K. (2005). Strategy Development and Learning to Spell New Words: Generalization of a Process. *Developmental Psychology*, 41, 1, 148–159.
- Lesaux, N., & Siegel, L. S. (2003). The Development of Reading in Children Who Speak English as a Second Language. *Developmental Psychology*, 39, 6, 1005-1019.
- Liow, S. J., & Lau, L. H. (2006). The Development of Bilingual Children's Early Spelling in English. *Journal of Educational Psychology*, 98, 4, 868–878.
- Lipka, O., & Siegel, L. S. (2007). The Development of Reading Skills in Children With English as a Second Language. *Scientific Studies of Reading*, 11, 2, 105-131.
- Morris, D., & Perney, J. (1984). Developmental Spelling as a Predictor of First-Grade Reading Achievement. *The Elementary School Journal*, 84, 4, 440-457.
- Nunes, T., Bryant, P., & Bindman, M. (1997). Morphological Spelling Strategies: Developmental Stages and Processes. *Developmental Psychology*, 33, 4, 637-649.
- Öney, B., & Durgunoglu, A.Y. (1997). Beginning to read in Turkish: A phonologically transparent orthography. *Applied Psycholinguistics*, 18, 1–15.
- Plaza, M. (2003). The Role of Naming Speed, Phonological Processing and Morphological/Syntactic Skill in the Reading and Spelling Performance of Second-Grade Children. *Current psychology letters*, 10, 1.

- Plaza, M., & Cohen, H. (2004). Predictive influence of phonological processing, morphological/syntactic skill, and naming speed on spelling performance. *Brain and Cognition* 55, 368–373.
- Read, C. (1971). Pre-school children's knowledge of English phonology. *Harvard Educational Review*, 41, 1, 1-34.
- Rittle-Johnson, B., & Siegler, R. S. (1999). Learning to spell: Variability, choice, and change in children's strategy use. *Child Development*, 70, 2, 332-348.
- Roth, P. L., & Switzer, F. S. III. (1999). Missing Data: Instrument-level Heffalumps and Item-level Woozles. *Research Methods Forum*, 4.
- Schwab, D. P. (2005). *Research Methods for Organizational Studies*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Scott, C. (2004b). Syntactic contributions to literacy. In A. Stone, K. Apel, & E. Silliman (Eds.), *Handbook of language and literacy: Development and disorders* (pp. 340–362). New York: Guilford Press.
- Snowling, M. J., Bishop, D. V. M., & Stothard, S. E. (2003). Is Preschool Language Impairment a Risk Factor for Dyslexia in Adolescence? *Journal of Child Psychology and Psychiatry*, 41, 4, 587-600.
- Steffler, D. J. (2001). Implicit Cognition and Spelling Development. *Developmental Review*, 21, 168–204.
- Steffler, D. J., Varnhagen, C. K., Friesen, C. K., & Treiman, R. (1998). There's more to children's spelling than the errors they make: strategic and automatic processes for one-syllable words. *Journal of Educational Psychology*, 90, 3, 492-505.

- Stothard, S. E., Snowling, M. J., Bishop, D. V. M., Chipchase, B. B., & Kaplan, C. A. (1998). Language-impaired Preschoolers: A Follow-up Into Adolescence. *Journal of Speech, Language & Hearing Research*, 41, 2.
- Strickland, D. S., & Shanahan, T. (2004). Laying the groundwork for literacy. *Educational Leadership*, 61, 74-77.
- The Psychological Corporation (2002). *Wechsler Individual Achievement Test-Second Edition*. Toronto, ON: Harcourt Canada
- Treiman, R. (1993). *Beginning to spell: A study of first-grade children*. New York, NY: Oxford University Press.
- Treiman, R. (2000). The Foundations of Literacy. *Current Directions in Psychological Science*, 9, 3, 89-92.
- Treiman, R., & Bourassa, D. C. (2000). The Development of Spelling Skill. *Topics In Language Disorders*, 20, 3, 1–18.
- Varnhagen, C. K., McCallum, M., & Burstow, M. (1997). Is children's spelling naturally stage-like? *Reading and Writing: An Interdisciplinary Journal* , 9, 451–481.
- Wade-Woolley, L., & Siegel, L. (1997). The spelling performance of ESL and native speakers of English as a function of reading skill. *Reading and Writing: An Interdisciplinary Journal*, 9, 387–406.
- Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (1999). *The Comprehensive Test of Phonological Processing*. Austin, TX: ProEd.
- Wang, M., & Geva, E. (2003). Spelling acquisition of novel English phonemes in Chinese children. *Reading and Writing An Interdisciplinary Journal*, 16, 325–348.

- Wang, M., & Geva, E. (2003b). Spelling performance of Chinese children using English as a second language: Lexical and visual–orthographic processes. *Applied Psycholinguistics*, 24, 1–25.
- Wilkinson, G. S. (1993). *The Wide Range Achievement Test-Third Edition*. Wilmington, DE: Wide Range Inc.
- Wimmer, H., Landerl, K., Linortner, R., & Hummer, P. (1991). The relationship of phonemic awareness to reading acquisition: More consequence than precondition but still important. *Cognition*, 40, 219–249.