國立交通大學

英語教學研究所碩士論文

A Master Thesis
Presented to
Institute of TESOL,
National Chiao Tung University
In Partial Fulfillment of the Requirements
For the Degree of
Master of Arts

台灣學童英語拼字錯誤探討：

音韻覺識與拼寫能力之關係研究

Beyond Spelling Errors: The Relevance of Phonological Awareness to Taiwanese EFL Children's Spelling

研究生：陳湘菱

Graduate: Hsiang-Ling Chen

指導教授：林律君 博士

Advisor: Dr. Lu-Chun Lin

中 華 民 國 九十九 年 七 月

July, 2010

論文名稱：台灣學童英語拼字錯誤探討：音韻覺識與拼寫能力之關係研究
校所組別：國立交通大學英語教學研究所
畢業時間：九十八學年度第二學期
指導教授：林律君博士
研究生：陳湘菱

中文摘要

本研究旨在探討台灣學童英語拼字錯誤，聚焦於音韻覺識與拼字能力之關係，有鑑於此，本研究有以下三個目的：(1) 檢視台灣學童的英語拼字表現是否因其音韻覺識程度而顯著差異；(2) 探究台灣學童之音韻覺識在其拼字能力上所扮演的角色；以及 (3) 分析台灣學童之英語拼字錯誤。

本研究的參與者為 33 位小學四年級學童，來自於新竹市某公立小學同一班級，在 33 名參與此研究的學童中，有 28 名完成所有階段的資料收集程序。資料收集的內容包含拼字能力測驗、音韻覺識測驗與讀寫能力測驗，當中，拼字能力測驗包括真字與假字聽寫測驗以及故事改寫活動；音韻覺識測驗則包含音素辨別、音素結合與音素操弄能力的測試；英文程度的評估則採用劍橋兒童英語認證（*Cambridge Young Learners English Test*）之閱讀與寫作項目測驗成績。真字與假字聽寫測驗以拼字之語音可接受度（phonological acceptability）為評分方式，除變異數、相關係數和回歸分析之計算外，本研究也探討拼字錯誤之類型與結構，以瞭解台灣學童拼字能力與其音韻覺識之相關性。

根據音韻覺識測驗的成績，研究對象被分為低、中、高三個不同音韻覺識程度之組別，結果顯示中程度與高程度的組別在真字與假字聽寫測驗之成績未呈現顯著差異，但兩組之得分皆顯著高於低程度組別。相關係數分析則指出所有的測量結果彼此呈現高度相關，驗證學童之拼字能力與其音韻覺識程度兩變項間有顯著性的正相關。層級迴歸分析結果顯示，音韻覺識測驗成績可有效預測真字與假字聽寫測驗之分數，然而，當考慮讀寫能力此一變項時，音韻覺識程度對於拼字能力則不具顯著預測力。

最後，本研究發現台灣學童常見的拼字錯誤類型為：半似原音拼字錯誤（semiphonetic spelling error）以及拼成他字的錯誤（another word correctly spelled），此外，從研究對象的拼字錯誤中，不難發現台灣學童在拼寫雙元音與子音串時，多以其他字母替換目標音而拼錯字的現象。值得注意的是，音韻覺識程度較低的學童，有較多的隨機拼字錯誤（random error pattern）、刪去母音拼字錯誤(vowel omission)、刪減複合子音拼字錯誤(consonant diagraph reduction)和拼字不完整的錯誤；音韻覺識程度較佳的學童，其拼字錯誤較少被歸類為隨機拼字錯誤之結構，儘管並不顯著，本研究並發現部分音韻覺識程度較高之學童在拼寫字尾齒槽音時有省略不寫的現象。

研究結果不僅發現台灣學童英語拼字能力明顯的個別差異，更指出除音韻覺識外，讀寫能力對拼字能力的發展也有重要影響，此外，本研究發現台灣學童可能使用類推的方法（analogy strategy）拼寫不熟悉字，以及他們拼寫雙元音、子音串與複合子音時，可能的拼字問題。結論指出音韻教學、讀寫活動在台灣學童拼字能力發展中應是相當有助益的，並強調自創拼字（invented spelling）及語音分析能力（phonological analysis ability）對其拼字能力習得之重要性。總結而言，本研究希望能說明台灣學童如何運用其語言知識拼寫英語單字，並且提供台灣英語教育者重要的教學啟示。

ABSTRACT

The present study focuses on the role of phonological awareness in English spelling of Taiwanese EFL children beyond early grade level. The primary purposes are: (1) to examine phonological awareness group differences in spelling performance; (2) to investigate the role of phonological awareness in spelling performance; and (3) to discuss the types and patterns of spelling errors.

To achieve these objectives, measures of spelling performance, phonological awareness, and literacy skills were administered to an intact fourth-grade class of 33 students in an elementary school in Hsinchu city, Taiwan. Among them, 28 students completed all testing procedures of the study. The children's spelling performance was gauged using a spelling dictation task and a story rewriting task. Three phonological awareness tasks were employed to tap the children's ability of phoneme identification, blending, and manipulation. To assess their command of literacy skills which served as proficiency baseline, the reading and writing subset of the *Cambridge Young Learners English Test* was presented. Spellings collected from the spelling dictation tasks were assessed mainly for phonological plausibility. In addition, spellings archived from both spelling tasks were analyzed and elucidated in terms of error types and patterns.

Based on the phonological awareness scores, the children were divided into three levels of phonological awareness groups (i.e., low, middle, and high). Significant group differences in spelling dictation scores were revealed except for those between the middle and high phonological awareness groups. Correlational analyses showed that the children's spelling performance was significantly associated with phonological awareness and literacy measures. Regression analyses demonstrated that phonological awareness alone predicted a significant amount of variance in spelling performance, whereas it became nonsignificant when literacy scores were

considered. With respect to spelling patterns, semiphonetic and another-word-correctly-spelled errors appeared to be the top two predominant misspelling types. Substitutions of vowel diagraphs and consonant clusters also occurred frequently in the children's spellings. The low phonological awareness group showed a tendency to make more random error patterns, incomplete responses, vowel omissions, and consonant diagraph reductions. In contrast, the high phonological awareness group made fewer random errors. The most salient but minor misspelling patterns observed in this group were omissions of final lenis consonants.

The results concerning group differences indicate that there was a noteworthy discrepancy in spelling achievement among Taiwanese EFL children. Although the correlational analyses ascertained that phonological awareness was associated with spelling performance even for EFL children, the regression findings imply that other than phonological awareness, literacy skills appear to play a more crucial role in EFL children's spelling. The analyses of the children's spelling errors not only suggest that EFL learners may draw on analogy strategies to spell unfamiliar words, but also pinpoint their difficulty in spelling vowel diagraphs (e.g., ee), consonant clusters (e.g., dr), and consonant diagraphs (e.g., ch). Comparison of spellings across different groups further underscores the extent phonological awareness was associated with the children's spellings, and even highlights the value of invented spellings (i.e, phonetic spelling attempts), teaching grapheme-phoneme representative skills, and phonological analysis instruction.

To conclude, this study may be of importance in providing a complete picture of what cognitive-functioning school-aged EFL children could rely on when learning to spell unfamiliar words, and in offering insights into spelling and phonological awareness instruction in EFL contexts.

ACKNOWLEDGEMENTS

Here, I would like to express my thanks to several people who helped me to complete this thesis. To being with, the first person that I would like to show my deep gratitude to is my advisor, Dr. Lu-Chun Lin. Every time when I had any questions concerning the thesis, she was always there with me. Not only did her support encourage me to exert myself to conduct this study, but her mentoring offered me many insights into how to refine my thesis. Dr. Lu-Chun Lin's enthusiasm for research in this field positively influenced my attitudes towards doing research. Without her specialty at literacy development and bilingualism, I would have not been able to finish this thesis. I want to show my appreciation for the Institute of TESOL in National Chiao Tung University as well. In this program, I greatly extended my knowledge and sharpened my thoughts, which no doubt prepared me for undertaking this study.

Next, I am very grateful to have the National Experimental Elementary School at Hsinchu Science Park participate in this study. My sincere gratitude also goes to my committees, Dr. Yu-Chih Sun from the National Chiao Tung University, and Dr. Rong-Lan Yang from the National Hsinchu University of Education. Their constructive comments and suggestions all made this study better. Furthermore, I want to thank writing consultants, Holli and Jennifer, from the Language Teaching and Research Center in National Chiao Tung University. Having writing consultations with them helped me to organize my thesis points in a clear way.

Lastly, I would like to offer my heartfelt thanks to Flora, the second rater of this study. I am also deeply appreciative of Tiffany, Alvin and Erin's preparation for the recordings of test items, together with Alice's useful feedback on this research. Special thanks go to my family and friends for their love and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

English is an international language in that it connects people from every corner of the globe. In Taiwan, learning English has become a national trend in the 21st century of globalization. English curriculum no longer started from junior high school; instead, it was adopted as one of the formal elementary school subjects based on the General Guidelines of Grades 1-9 Curriculum for Elementary and Junior High School (Ministry of Education, R.O.C., 2001). Accordingly, in the school year 2001, elementary schools in Taiwan began to initiate English instruction in the fifth and sixth grade. By the time of 2005, English curriculum has been extensively launched with a range from Grade 3 to Grade 6 in the elementary schools. Some cities like Taipei, Hsinchu, and Tainan even lower the grade of English instruction to Grade 1 or 2 to increase children's future competiveness. To maintain competitive edge, how to establish children's English skills has stood out as the major concern for the government, practitioners and parents in Taiwan.

Among these English skills, literacy skills play a crucial role because they are closely tied with children's academic achievement in English learning. Generally speaking, without literacy, it seems difficult for children to learn any school subjects. In addition, through reading and writing, children are able to engage in thinking and reasoning activities in which they argue for their own opinions and think of solutions for problems (Duffy & Roehler, 1993). This leads to the possibility that when children comprehend ideas from reading and express thoughts in writing, they progress in language learning. Considering the significance of literacy, a growing number of studies are available to provide theoretical and pedagogical implications for English reading and writing instruction.

In studying English literacy development, children's emergent writing, the development of spelling in particular, has received considerable attention (e.g., Bear & Templeton, 1998; Chang, 2002; Dildine, 1994; Figueredo, 2006; Hill, 1999; Korkeamaki & Dreher, 2000; Liow & Lau, 2006; Lundblade, 1994; Ouellette & Sénéchal, 2008; Read, 1986; Stuart, 1999; Wang & Geva, 2003). Chang (2002), among others, pointed out that the children who are at risk for spelling problem generally hold a negative attitude toward English learning. Read (1986) noted that "spelling involves segmentation, categorization and other cognitive processes applied to language". This notion implies that children's spelling ability is not about memory; instead, it pertains to various aspects of linguistic knowledge as well as cognitive abilities. Other researchers (e.g., Cataldo & Ellis, 1988; Clarke, 1988; Perfetti, Beck, Ball, & Hughes, 1987; Post, Swank, Hiscock, & Fowler, 1999) have presented evidence supporting that spelling achievement benefits language competence such as phonological awareness, reading ability and writing ability. Overall, numerous research has highlighted the value of the improvement in spelling ability to English learning.

Similarly, most parents and teachers in Taiwan also note the importance of spelling ability in English learning. Perfect spelling, for some parents and teachers in Taiwan, signifies children's success in English learning. On the other hand, spelling errors are thought of as their failure in English learning. To these parents and teachers, only rote memorization can lead to spelling success and only "correct" spellings can bring an achievement in English learning. However, substantial studies have implied that their conception of learning to spell may be mistaken. First, these parents and teachers' focus on facilitating perfect spelling may conceal the message that children's erroneous language output delivers. According to Richards (1971, 1974), errors in language learners in fact reflect their ways of exploring language in

the process of language acquisition. With regards to learning to spell, several researchers (e.g., Asselin, 2001; Bear & Templeton, 1998; Gentry, 1982; Treiman, 1993) have suggested that children's misspelling is an important indicator of their progress in learning to spell conventionally. Gentry (2000) further proposes that spelling errors show not only children's developmental stages of spelling, but also their growing knowledge of language such as phonological awareness and literacy skills. Simply stated, the overemphasis on perfect spelling could mislead us over the complete picture of students' spelling development.

Second, the process of learning to spell in English is much more complex (Lutz, 1986); therefore, it is apparent that rote learning is not the only way to develop successful spelling ability. Specifically, the inconsistent grapheme-phoneme correspondences in English may cause a great challenge in spelling. For example, there are about 14 ways to spell the sound *sh* (e.g., *shoe, sugar, ambitious*) (Bryson, 1990). How do children, especially for L2 learners, master these spellings only through memorization? Clearly, other than rote learning, explicit instruction of phonological awareness seems to be a more effective way of teaching spelling skills. In addition, to spell words, children need to draw upon differing linguistic knowledge like phonological, orthographic and morphological awareness (Apel, Masterson, & Niessen, 2004; Wasowicz, 2009). In this regard, spelling is considered an encoding process of the aforementioned knowledge, not a mechanical response trained by rote learning. So, instead of rote memorization, what factors contribute to spelling achievement? To tackle this question, it is necessary to look at the literature on the building blocks of spelling ability.

A wealth of studies has convincingly demonstrated the casual relationship between phonological awareness and spelling performance (e.g., Adam, 1990; Bradley & Bryant, 1983; Caravolas, Hulme, & Snowling, 2001; Jongejan, Verhoeven,

& Siegel, 2007; Lundberg et al., 1980; Plaza & Cohen, 2003, 2004 & 2006; Torneus, 1984). In addition to standard spelling, there is general agreement that spelling errors are also highly pertinent to phonological awareness of children (e.g., He & Wang, 2009; Hu, 2003; Kamii & Manning, 1999; Kamii, Long, & Manning, 2001; Liow & Lau, 2006; Masterson & Crede, 1999; Sutcliffe, Dowker, & Campbell, 1999; McBride-Chang, 1998; Ouellette & Sénéchal, 2008). On these grounds, we may reasonably conclude that enhancing phonological awareness can facilitate spelling achievement in children. In view of the major findings of the research on children's spelling, the present study examined the role of phonological awareness in spelling performance for Taiwanese fourth graders.

Purposes and Research Questions of the Study

It should be noticed that previous studies have focused primarily on the predictive power of phonological awareness to spelling performance in monolingual children instead of English as a second language (ESL) or English as a foreign language (EFL) children. Although there is research on L2 learners' spelling performance, emphasis has been on standard spelling, with scant attention given to spelling errors in relation to phonological awareness. Given the limitations of the previous studies, the aim of the present study is to yield evidence to the growing body of literature on how spelling errors reflect language development in EFL children. The research questions to be addressed in this study are as follows:

1. Do Taiwanese EFL fourth graders with different phonological awareness show significant different performance in spelling English unfamiliar words?
2. To what extent does Taiwanese EFL fourth graders' phonological awareness relate to and predict their spelling performance?

3. What types and patterns of spelling errors do Taiwanese EFL fourth graders make? How do the children with higher phonological awareness differ from those with lower phonological awareness in spelling error patterns?

CHAPTER TWO

LITERATURE REVIEW

Overview

The foci of the literature reviewed in this paper are threefold. First, the studies of spelling development in monolingual and bilingual children are presented. Following this section is the research concerned with the role of phonological awareness in spelling performance. The last part of the literature review discusses the topic of spelling errors. This section includes research examining the mechanisms under spelling errors and invented spelling, which are the main focus of this paper. This is followed by purposes and significance of the present study.

Spelling Development

Spelling Development in Monolingual Children

Notions about the phases of learning to spell in early native English speaking monolingual learners have been influenced by the characteristics of the English writing system and the nature of literacy development (Bourassa & Treiman, 2007). To obtain a complete picture of these notions, it is worthy to note the three prominent models proposed by Ferreiro (Ferreiro & Teberosky,1986), Ehri (1986) and Ellis (1994).

Even though Ferreiro and Teberosky made their claim based on the research findings on young native Latin Americans, it is still worth noticing the model presented by them in that Spanish is classified as an alphabetic language like English. According to Ferreiro and Teberosky, children develop the knowledge of an alphabetic writing system through three stages: (1) presyllabic; (2) syllabic; and (3) alphabetic stages. At the presyllabic stage, children are not aware of the relationship

between print and speech. They do not understand that sounds can be represented through letters and words. As for the syllabic stage, spelling performance of children at this time has a special characteristic; that is, the amount of letters children write is in accord with the number of syllables. At this stage, children are also aware of the sound-symbolizing function of letters. Lastly, after children have the capacity for connecting letters with speech, they move on to the alphabetic stage at which they can spell with phonetically appropriate orthographic units.

Ferreiro and her colleague's ideas provide insights into the development of spelling ability in children with alphabetic languages as mother tongue; however, their model is not without limitations. The findings of a study by Cardoso-Martins et al. (2006) conclude that syllabic spelling addressed by Ferreiro and Teberosky happens incidentally only when children depend on letter names to spell words. According to Cardoso-Martins et al., children's syllabic spellings should be categorized as instances of partial alphabetic spellings which they point out Ehri's phase theory does address. They also imply that Ferreiro's stage model of spelling development might be incomplete.

Ehri's phase theory (1986) classifies spelling development in four stages: (1) prealphabetic; (2) partial alphabetic; (3) alphabetic or full alphabetic; and (4) consolidated alphabetic stages. Children gradually demonstrate their understanding of grapheme-phoneme correspondences at the partial alphabetic stage after building up knowledge of letter names and phonology at the first stage, the prealphabetic stage. At the alphabetic stage, children become capable of spelling words with phonetically appropriate letters; for example, they may misspell *book* as *buk*. Up to the consolidated alphabetic stage, children's spelling ability progresses in that they can spell words with multi-letter units such as words ended with a suffix, *-ing*.

In addition to Ehri, the stage model of spelling proposed by Ellis (1994) is also

worth our attention. Based on phases of spelling development recognized by Ellis (1994) and Ehri (2000), Gillon (2004) provides a detailed summary of developmental stages in spelling. In Gillon's summary, children go through four stages to foster spelling ability: (1) precommunicative spelling; (2) semiphonetic spelling; (3) phonetic spelling; and (4) transitional spelling stages. At the precommunicative spelling stage, children's spelling attempts reveal that they do not have knowledge of grapheme-phoneme correspondences. They may only know how to spell their names by reduplicating visual features of letters. At the semiphonetic spelling stage, children start to apply letter-name strategy to spell and write words like *r* for *are* or *u* for *you*. Their spellings appear to be partially phonetic; while their spellings cannot represent complete sound structures in words. Following the semiphonetic spelling stage, children at the phonetic spelling stage are more capable of associating sounds with letters. They can represent major phonological features of words through letters (e.g., *bak* as *back*). Last, at the transitional spelling stage, children not only apply their phonological knowledge, but also their orthographic knowledge to spell. Marking each syllable with a vowel is one of the salient characteristics at this stage.

In light of the above frameworks of developmental spelling stages, it is clear that the knowledge of letters and sounds is vital to early spelling development in English. Most importantly, identifying the stages in spelling development further helps researchers and practitioners to gain an overall idea of how children develop spelling ability at different given point in time (Gillon, 2004). The following is a general description of the process of acquiring spelling skills in monolingual English-speaking children. Children do not often show their ability to spell words even after kindergarten. By grasping the function of the written language, they begin to match letters to sounds at the initial stage of spelling development. Through grapheme-phoneme correspondences, while children are able to represent a

sequence of phonemes with some failure at the beginning, their spelling ability progresses after repeatedly experiencing phonetic spelling practice and conventions of the language.

Spelling performance becomes more complex at later stages with the interaction of the knowledge of phonology, orthography and morphology (Ellis, 1994; Treiman & Bourassa, 2000). Nevertheless, we still cannot deny the paramount importance of the concept of sounds from syllables to phonemes because it prepares children with the understanding of the nature of the alphabetic system at early stages of spelling development (Downing, 1970). Given that written English is highly alphabetic, once children acquire the correspondent letters to specific sounds, they have the ability to spell these sounds in English (Adam, 1990). In other words, the knowledge of phonology is the crucial first step toward building up the awareness of grapheme-phoneme correspondences of written language which closely links to the early spelling development (Ehri, 1992).

Spelling Development in Bilingual Children

The understanding of the spelling developmental stages in monolingual children raises an interest in how ESL learners develop their spelling skills. There has been several literature documented whether the language discrepancies between L1 and L2 yield different progress in ESL spelling development compared with monolingual norms (e.g., Chiappe, Glaeser, & Ferko, 2007; Dildine,1994; Dressler, 2002; Figueredo, 2006; Geva & Zadeh, 2006; Wade-Woolley & Siegel, 1997; Wang & Geva, 2003). A consensus appears in the literature that ESL children generally go through similar stages of spelling development.

Wang and Geva's research (2003) on spelling acquisition in 72 children at the age of 6 in Toronto showed that the developing spelling ability in ESL students was

generally equivalent to that of L1 students. In their 2-year longitudinal study, 35 Cantonese-English bilingual children and 37 English monolingual children received the developmental spelling test four times which measured their emergent English spelling ability. The results indicated that the ESL Cantonese children and their English monolingual counterparts revealed the parallel progress in spelling 16 target words. Generally, both ESL and L1 groups scored similarly and consistently made progress in the spelling assessments. The children in these two language groups all improved considerably. In the fourth session, it was found that both groups were capable of representing every phoneme in each target word.

However, through error analysis, Wang and Geva also noted that the L1 group indeed showed more precise performance on spelling pseudowords than the ESL learners. They observed that phonemes not existing in Cantonese such as *th* probably imposed a challenge for the Cantonese-English bilingual children. This suggests the difficulties ESL children probably encounter when spelling English. Even though the developmental trajectories of spelling in ESL and monolingual children are generally similar, it is likely that ESL children demonstrate their ability in spelling differently from native English speakers due to the dissimilarities between their native language and English (Liow & Lay Choo, 2004).

Holm and Dodd's study (1996) enhances this finding by examining the influence of different language backgrounds on English literacy acquisition. Holm and Dodd's work compared university students from Mainland China, Hong Kong, Vietnam and Australia in terms of English reading as well as spelling skills. All four language groups showed similar results in real word spelling task, and among them, the students from Australia scored significantly better at both real and pseudoword spelling tasks than others. The data also reported that the Hong Kong group performed poorer in spelling pseudowords than the other three language groups. A

possible explanation offered for the Hong Kong ESL learners' lower scores on the pseudoword spelling task was that they did not develop the required phonological awareness neither at syllabic nor phonemic levels in their first language, Cantonese. In other words, because of the distinctions of the phonological as well as orthographic characteristics between Cantonese and English, it takes the Hong Kong ESL learners much more effort to spell sounds they had not heard or pronounced in their L1.

To summarize, with regard to the developmental path of learning to spell, Wang and Geva (2003) noted that there was no significant differences between the ESL and the English-speaking groups. But this finding does not indicate that there is no disparity in learning to spell between ESL learners and English monolinguals in terms of spelling strategies and the rate of spelling development. In addition to Wang and Geva, Holm and Dodd further suggest the difficulties of spelling words for English learners with non-alphabetic language backgrounds. According to Figueredo (2006), the ESL Cantonese-speaking learners were poor at spelling pseudowords because their use of spelling strategies was different from that of monolinguals. He points out that the distance between ESL learners' first language and English is related to the degree of how they and monolingual norms vary in the use of spelling strategies and the rate of spelling development. Although the comparison between ESL learners and native English speakers regarding the developmental rate was not made explicit in Figueredo's paper, such assumption implies that there may be negative transfer that affects ESL learners' use of spelling skills, rate of learning to spell, and particularly, spelling performance.

Generally speaking, for ESL learners, developing spelling ability, there could be certain challenges caused by cross-linguistic differences (Bebout, 1985; Figueredo, 2006; Liow & Poon, 1998; Treiman & Zukowski, 1991). This may result in ESL learners to differ from the native English norms when learning to spell English.

The Role of Phonological Awareness in Spelling Ability

"Spelling is the encoding of the linguistic forms into written forms (Perfetti, 1997)." A general understanding of linguistic mechanisms for spelling gives a useful framework by which to depict the ways children's spelling ability develops. Among the literature, there have been a substantial number of studies tackling the issue regarding the precursor skills of English spelling in children (e.g.,Adam, 1990; Bradley & Bryant, 1983; Caravolas, Hulme, & Snowling, 2001; Jongejan, Verhoeven, & Siegel, 2007; Lundberg, Olofsson, & Wall, 1980; Plaza & Cohen, 2003; Plaza & Cohen, 2004; Plaza & Cohen, 2006; Torneus, 1984). A number of well-known predictors of spelling ability such as phonological awareness, naming speed, syntactic awareness, working memory or reading ability have been widely discussed in literature. The results are consistent with each other, recognizing phonological awareness as the most powerful factor among the predictors influencing spelling skills in children. This can be seen in the following discussion of the literature addressing these areas of concern.

In Plaza and Cohen's related studies (2003; 2004) of predictors of spelling and reading abilities, French-speaking first and second graders were given a battery of tests measuring their L1 reading ability, spelling ability, phonological awareness, morphological awareness, and naming speed. The results revealed that the children who scored low on the phoneme deletion task, generally, performed poorly on spelling measure as well. Apart from that, there were significant interactions between spelling and the three independent variables (i.e. phonological awareness, morphological awareness and naming speed), and phonological awareness remained to be a powerful variable that accounted for most variance in spelling. This is consistent with earlier findings (e.g., Adams, 1990; Caravolas, Hulme & Snowling, 2001; Goswami & Bryant, 1990; Henderson & Beers, 1980; Read, 1986) suggesting

that high phonological awareness facilitates spelling ability.

Caravolas, Hulme, and Snowling (2001) also presented empirical evidence supporting the crucial role of phonological awareness in spelling development in children. Their study differed from Plaza and Cohen's, in that the participants were young English-speaking children and the target language was English. In their study, 153 monolingual British-English children were assessed in terms of verbal IQ, phonological awareness and literacy. The regression analysis showed that the children's phonological awareness involving letter knowledge and phoneme segmentation skill significantly predicted both their conventional and phonological spelling abilities. Such findings, compatible with that of Plaza and Cohen, suggest that children tend to apply what they know about phonology to spell alphabetic languages such as French and English. Specifically, in an alphabetic orthography, phonological awareness might be thought of as the most rudimentary skill for spelling. This leads us to believe that instruction of phonological knowledge is necessary for developing spelling ability in children speaking alphabetic languages.

So, can phonological awareness intervention enhance children's spelling performance? Numerous studies have investigated this question and demonstrated the positive effect of explicit instruction in phonological awareness on spelling ability (e.g., Ball & Blachman, 1991; Brady et al., 1994; Castiglioni-Spalten & Ehri, 2003; Frederickson & Wilson, 1996). In clinical or classroom practice, training in phonological awareness has proved to hold promise for facilitating reading and spelling abilities (Ehri et al., 2001). Frederickson and Wilson (1996) evaluated whether literacy skills, including reading and spelling, in English-speaking children improved after 20-week phonological awareness training. This phonological awareness program was aimed at developing children's ability to make analogies through generating words (e.g., *all: stall, wall, tall*). The 48 participants with

limited literacy were divided into two groups: a control group and an experimental group. Compared to the control group, the 24 children who received phonological awareness training made considerable progress on reading, spelling and phonological awareness measures. The results support the conclusion that phonological awareness intervention appears to be effective in benefiting children's English spelling as well as reading abilities.

Some people may argue that the results would have been different if Frederickson and Wilson had used differing activities to instruct phonological awareness. Another study (Castiglioni-Spalten & Ehri, 2003), however, indicates that no matter how phonological awareness intervention is implemented, it enhances young English-speaking children's literacy skills. In this study, 45 kindergarteners were allocated into three groups: (1) a control group, (2) a "mouth treatment" group, and (3) an "ear treatment" group. The mouth treatment group was taught to articulate sounds with pictures illustrating mouth movements which they mimicked in a mirror. After practicing pronunciation, this group was taught to segment words by pronouncing each phoneme in a word separately. The ear treatment group differed from the mouth treatment group in that no articulatory pictures or mirrors were provided for children to practice with. The results showed that both treatment groups scored higher on a spelling task than the control group. In a reading task, only the mouth treatment group performed significantly better than the others. However, the findings still suggest a benefit to early spellers of phonological awareness intervention regardless of implementation ways.

The above literature adds to a growing body of evidence for the relationship between spelling and phonological awareness in children who speak alphabetic languages; however, this link has not been considered in ESL learners. As noted previously, ESL learners are more likely to exploit different strategies when learning

to spell English words (Figueredo, 2006). In addition, according to Scarborough (1998), children's literacy development is closely associated with their home literacy environment. In other words, ESL children who speak languages other than English at home probably differ from English monolingual children in spelling development. Although we can presume that phonological awareness is still prerequisite for ESL spelling development based on the previous findings (Wang & Geva, 2003), considering the differing way ESL children learn to spell, empirical evidence supporting this assumption is required. Therefore, there has been a gradual increase in attention to constructs of English language learners' (ELLs') spelling ability in literature (e.g., Jongejan, Verhoeven, & Siegel, 2007; Leong, Tan, Cheng, & Hau, 2005; Liow & Lau, 2006).

A longitudinal study by Jongejan, Verhoeven and Siegel (2007) compared ESL school-aged children with various L1 backgrounds (i.e. Chinese, Gujarati, Urdu, and Greek) to English-speaking children. The researchers examined variables including phonological awareness, lexical access, syntactic awareness and working memory that contribute to English spelling and reading abilities. The English monolingual children and ESL learners revealed similar performance on measures of phonological awareness, reading and spelling. As Jongejan et al. note, phonological awareness is the most influential factor that predicts both L1 and ESL children's real-word and pseudoword spelling abilities. The findings imply that not only for monolingual English speaking children but also for ESL learners, phonological awareness remains a key element of English word spelling ability.

While the study by Jongejan et al. has presented that for L2 learners, phonological awareness has a central place in English spelling and reading development, the finding of Leong and his colleagues' paper (2005) is slightly discrepant with the results of the previous studies. The participants in their research,

chosen from three public and church elementary schools in Hong Kong, were 156 Grade-four to-six Chinese children who spoke Cantonese as the first language. In considering the nature of the children's L1 writing system, Leong et al. hypothesized that they may rely more on knowledge of orthography to spell and read English words, rather than on phonological awareness. The results confirmed this assumption, showing that three orthographic and lexical knowledge tasks accounted for most of the variance in spelling as well as reading measures than three phonological awareness tasks. Although one of the phonological awareness tasks assessing onset-rime awareness made significantly contribution to spelling and reading scores, its influence was not as strong as the orthographic measures.

Results in the study of Leong et al. support and extend the findings of the previous literature by substantiating value of orthographic and lexical understanding in spelling and reading abilities in Chinese EFL children. This study, however, is limited by the assessment design for the predictor variables. As acknowledged by the authors themselves, the participants might use both phonology awareness and orthographical and lexical knowledge to finish the tasks which measured orthography and lexicon only. Because evaluation targets of tasks which examined two different independent variables overlapped, it is necessary to treat the results with caution.

Simply stated, in light of this concern, we cannot deny the role of phonological awareness in spelling development; and yet, for children who acquire a logographic language as L1, it must be noted that they probably count on both orthographical and phonological resources to deal with English spelling tasks, that is, the principle of grapheme-phoneme correspondences. Additional work focusing on these aspects would be of great interest and value in understanding influence of the interplay of orthographic and phonological awareness on spelling in Chinese children who learn English as a foreign language.

Compared to research on the predictive power of phonological awareness to spelling in EFL children, there have been more studies of EFL norms compiled positive effects of differing phonological awareness intervention on spelling ability (e.g., Chang, 2002; Chang, 2008; Chen, 2006; Hsu, 2003; Lee, 2008). These studies are in line with the research on monolingual children that phonological awareness intervention is vital to spelling development. Most importantly, the findings from these studies seem to lend some support to the notion that phonological awareness contributes to spelling ability in both native English speakers and ELLs.

Up to this point, there has been cogent evidence proving the predictive role of phonological awareness in relation to spelling performance in both English monolingual and bilingual norms. On these grounds, we may conclude that without phonological awareness, children may not be able to successfully represent sounds with letter strings or even write down their thoughts (Adams, 1990). Most importantly, differences in phonological awareness could be thought of as principal criteria for distinguishing good and bad English spellers. The conclusions support the claim, reported above, that phonological awareness training could contribute to the success of spelling development.

While the existing body of literature is extensive, there have been some points which it has not addressed satisfactorily. First, the conclusions derived from the above research are based largely on investigation of English monolingual and ESL children. With regards to spelling development in EFL children who do not speak English as their L1 and lack opportunities for using English on a daily basis, much less has been done to understand the underlying knowledge EFL children employ for spelling. In the light of the research findings on English monolingual children, to gain a thorough understanding of how EFL children learn to spell, it is necessary to look at the impact of EFL children's phonological awareness on their spelling

performance. Second, the above research was conducted mainly through empirical analyses. Studying the statistical interaction between spelling and phonological awareness may not be enough to understand the degree to which English learners rely on their knowledge of phonology while spelling. Given that the early stages of spelling development in L2 learners are full of trial and error (Bebout, 1985), studying spelling errors is more likely to exhibit to what extent phonological awareness affects spelling performance, and provide additional implications for classroom practice.

Studies on Spelling Errors

Analysis of Spelling Errors

Spelling errors, by definition, are strings of letters formed without following spelling conventions. Several papers (e.g., Deorowicz & Ciura, 2005; Greenberg, Ehri, & Perin, 2002; Ibrahim, 1978; Wyatt, 1973) have identified causes and types of English spelling errors, which goes beyond a statistical analysis of learners' spelling performance. Following are illustrations of different classifications of misspelling data. In Deorowicz and Ciura's (2005) study on a computerized technique for spelling correction, they indicate three reasons that account for spelling errors in typed texts: (1) vocabulary incompetence, (2) uncertainty of spelling or pronunciation, and (3) mistyping. In view of the current research purposes, only the first and the second causes of misspellings will be discussed below.

In terms of the first reason, lack of lexicon in a language is probably one of the major causes of misspelling, especially for children and L2 learners. For example, they may mistakenly replace accurate affixes in words with wrong ones (e.g., *inperfect* for *imperfect*) for they are not certain about usage of negative prefixes in different cases. In addition to vocabulary incompetence, individuals could also misspell words because they represent phonemes of words with incorrect graphemes.

On account of the complexity of English grapheme-phoneme correspondences, when spelling unfamiliar words, individuals are likely to substitute certain letters with wrong ones which sound identical (e.g., *occurrance* for *occurrence*, *grammer* for *grammar*, and *fourty* for *forty*).

The difficulties in lexicon retrieval and grapheme-phoneme correspondences, however, are just an preliminary analysis of misspelling behaviors. Although Deorowicz and Ciura shed some light on causes of misspellings from a general perspective, they do not give a detailed reasons for spelling errors.

Greenberg, Ehri and Perin (2002), differing markedly from Deorowicz and Ciura, observed five types of spelling errors in English monolingual children and adults and provided reasons for each error type. Consistent with Ehri's previous findings (1986), from spelling samples of 144 children and adults, they conclude that misspellings fall into the categories below: (1) phonetic, (2) semiphonetic, (3) nonphonetic, (4) another word correctly spelled, and (5) another word misspelled errors. Erroneously spelled words which represent accurately articulated ones belong to the first two spelling error categories (i.e. phonetic and semiphonetic errors). It must further be noted that most misspellings in the participants who misused grapheme-phoneme correspondences or omitted letters in words (e.g., *wen* for *when*; *bup* for *bump*) fit into these two categories. With regards to nonphonetic errors, they are random spellings that are completely unrelated to phonological or morphological characteristics of conventions (e.g., *chegh* for *squirrel*). Besides this, Greenberg et al. also notes that some participants, especially adults, wrote another word either spelled correctly or incorrectly instead of the correct one. For example, one participant spelled *fortunate* as *force*, and another even substituted *instint* for *inspection*. It seems that to complete the spelling task assigned by the examiners, the participants would perfunctorily give obliquely related answers when spelling

unknown words.

Greenberg and her colleagues, in brief, presented spelling error types by collecting data only on native English speakers. Unfortunately, in their study, the question concerning the causes of ESL learners' misspellings was not made explicit. To understand whether ESL learners make similar spelling errors as their monolingual counterparts, an analysis of spelling errors by Ibrahim (1978) is provided below.

In past work by Ibrahim (1978), Arab-speaking ESL college students' spelling errors are attributed to seven causes: (1) complex grapheme-phoneme correspondence in English, (2) negative influence of the L1, (3) incorrect analogy, (4) inconsistent nature of English word derivation, (5) overgeneralization of spelling rule, (6) confusion about American and British English, and (7) other causes that do not fit into the above six categories.

First, due to the inconsistent and arbitrary nature of English spelling, learners may make spelling errors such as *biginner* for *beginner*, *goverment* for *government*, and *reed* for *read*. More specifically, ESL learners could misspell words with weak vowels, unpronounced letters, or homophones. Second, spelling errors in ESL learners may be relative to negative cross-linguistic transfer. A good illustration of this is when English learners of Arabic make errors like *blaying* or *bicture* because Arabic sound system lacks unvoiced bilabial plosives. As for the third cause of spelling errors, Ibrahim points out that analogy is also responsible for spelling errors in ESL learners. Errors like *tought* for *taught*, for example, take place when learners make a wrong phonetic analogy with words such as *bought* or *fought*. Other types of analogy are orthographic (e.g., *maney* for *many*), and grammatical (e.g., *heared* for *heard*) analogy. Next, learners may spell words inaccurately in that they overgeneralize English word derivational rules. For example, they may write *savety* for *safety* using the analogy of how to change adjectives like *brave* or *slave* into nouns

(*bravery*; *slavery*). In addition to the analogy and derivational errors, some misspellings by ESL learners also show their overgeneralization of spelling rules. For example, if learners do not know certain spelling rules, they may make mistakes like *occured* for *occurred* and *compareing* for *comparing*. With regards to the sixth cause of spelling errors, a good example of this is that ESL learners could spell *inflectional* as *inflextional*, a combination of British *inflexional* and American *inflectional*. Apparently, learners who make this type of errors may experience both American and British spelling conventions and have limited understanding of how to distinguish these two spelling conventions. Last of all, Ibrahim states that there are errors which cannot be placed under any of the above-mentioned categories. In his analysis of ESL spelling errors, the last category involves random errors, slips of pens, difficulty in spelling unfamiliar words, and other errors that can overlap in classification.

Ibrahim's work not only documents causes and types of spelling errors, but also leads to a better understanding of spelling strategies that ELLs may utilize to deal with spelling tasks. The seven possible causes of spelling errors he proposed, however, overlap to some extent. It raises doubts why Ibrahim differentiates phonetic, orthographic and grammatical analogy from the category of derivational analogy. Derivational analogy errors, which in fact are part of misspellings yielded by grammatical analogy, should be classified under the same category with grammatical analytical errors. In addition, as acknowledged by Irabhim himself, some misspelling examples could be placed under more than one category. For example, phonetic analogy errors (e.g., *tought* for *taught*) could also be attributable to the complexity of English spelling conventions. In conclusion, to extract more clear information on causes of spelling errors, reorganizing the classification of ESL spelling error patterns offered by Ibrahim is inevitable.

Taken together, the literature on spelling error causes and types provides us important insights into mechanisms for spelling performance to some degrees despite the fact that no empirical evidence supporting effects of linguistic knowledge on misspelling was documented. By discussing causes and types of spelling errors, it is apparent that English users' fail in spelling is closely related to limited linguistic knowledge. Most importantly, the above analyses of spelling errors all imply that knowledge of grapheme-phoneme correspondences is a major result of misspelling in both English native speakers and ESL learners. As indicated by Treiman et al. (1993), some rules of grapheme-phoneme correspondences in English are difficult to learn (e.g., /w/ for *w*, /æ/ for *a*, and /ɛ/ for *e*). In light of this, English learners, especially for young and L2 students, probably do not have enough understanding of how to match sounds with correspondent letters and therefore spell words inaccurately. However, the work of Deorowicz and Ciura (2005), Greenberg et al. (2002) and Ibrahim (1978) focuses on misspelling in English native speakers and ESL adult learners only, but overlooks that in ESL or EFL children. If these researchers had examined spelling errors of learners with more difficulties in spelling, the issue regarding causes and types of English misspellings would have been tackled thoroughly.

Spelling Errors and Phonological Awareness

In studying ESL spelling development, researchers have noted the powerful influence of phonological awareness on spelling achievement. Findings of these studies have shown that spelling performance is not only significantly associated with phonological awareness ability, but also predicted by it. Even though the preceding literature (Deorowicz and Ciura,2005; Greenberg et al., 2002; Ibrahim, 1978) has suggested that the significance of studying spelling errors, little research has been

done on the link between spelling errors and phonological awareness (Hu, 2003). Given that the studies on identifying causes and types of spelling errors do not present direct connection between English misspelling and its predictive factors, explicit information on this link is therefore required. To answer the question concerning whether phonological awareness significantly accounts for misspelling, numerous studies on the causal relationship between children's linguistic knowledge and spelling errors will be discussed (e.g., Hu, 2003; Kamii, Long, & Manning, 2001; Liow & Lau, 2006; Masterson & Crede,1999; Sutcliffe, Dowker, & Campbell, 1999).

The related studies reported as follows can be classified into two categories. Among them, some studies are exploratory for the focus is to investigate the influence of linguistic knowledge on spelling errors through analyzing spelling error samples (e.g., Liow & Lau, 2006; Sutcliffe, Dowker, & Campbell, 1999). By contrast, some studies attempt to gather empirical evidence supporting the correlation between spelling errors and linguistic knowledge such as phonological awareness, orthographical awareness and so on (e.g., Kamii, Long, & Manning, 2001). A study by Kamii, Long and Manning (2001) that is concerned with an empirical analysis of misspellings will be reviewed below.

Kamii et al. produced empirical research evidence to back up the view that spelling errors are tied with phonological awareness in young children. To evaluate the relationship between these two variables, in their study, 68 kindergarteners in America received a 4-pair-word writing task as well as two oral phoneme segmentation tasks. The spellings in the participants were classified into six levels, and the phoneme segmentation responses were categorized into five levels. The children's spellings advanced to be more and more phonetic and conventional as the level progressed. To be more specific, the children at Level one not having the knowledge of letter-sound relationships drew pictures or wrote random letter strings

to represent a word (e.g., *ostfc* for *hamster*). By contrast, the spelling productions at Level six nearly or even completely followed spelling conventions (e.g., *bubllgum* for *bubblegum*). In terms of the phoneme segmentation level, likewise, the children at the lower level showed inability of decoding words, whereas those at the higher level could segment one of two syllables or all of phonemes in a word. After identifying the levels of the spelling as well as the phoneme decoding abilities in each participant, Kamii et al. further examined statistic association of the two variables (i.e. misspelling and phonemic awareness). Results suggest the presence of an interaction effect between levels of spelling and phoneme segmentation performance in young children. To put it differently, young children at lower levels of spelling ability were placed at lower levels of phoneme segmentation ability, and vice versa.

Overall, the findings of the study by Kammi and Manning are in line with previous research on the relation between spelling and phonological awareness. The only difference is that the previous studies place much more emphasis on "conventional" spelling performance, that is, scores in spelling dictation tasks, rather than erroneous spelling productions. The research of Kamii et al., conversely, aims at identifying and analyzing misspellings. Apparently, the findings of their study lead to several important implications. To begin with, in Kamii et al.'s research, even though most spelling samples were conventionally inaccurate, they were verified to be positively correlated with phoneme segmentation ability. Their research is seen to provide statistical validation for the impact of phonological awareness on spelling errors. Second, by categorizing the young children's spelling ability, Kamii et al. also found that those who at the second level began to represent sounds they heard with letters. This finding leads us to believe that phonological awareness is relevant to literacy learners' beginning writing from an early time. Specifically, young children not well trained in literacy skills do have the ability to utilize their

phonological awareness as a strategy to represent speech with letter strings, whether they spell conventionally or not. In light of this point, documenting different spelling error types and levels could be beneficial for practitioners to identify children's spelling progress and therefore lends help in a practical way (Lutz, 1986; Martins & Silva, 2006; Read, 1986). This highlights the essentiality to study erroneous spellings in beginning literacy learners because this may be a better way to clearly capture how knowledge of letters and sounds work in spelling development.

In short, Kamii et al. provide an in-depth description of spelling errors in young children at different levels and empirical evidence supporting the association between spelling errors and phonological awareness. However, their study only involves English monolinguals rather than those who with different language backgrounds. Is there any possibility that misspelling in ESL learners differ from native English norms due to the discrepancy between their first language and English? In answering this question, it is necessary to discuss the studies of Sutcliffe, Dowker, and Campbell (1999) along with Liow and Lau (2006). These researchers lend support to the previous research on the predictive role of phonology in early spelling performance (e.g., Chan, Hu, & Wan, 2005; Leong, Tan, Cheng, & Hau, 2005; Jongejan, Verhoeven, & Siegel, 2007; Ouellette, & Sénéchal, 2008), and take a further step in the direction of examining factors causing L2 children's spelling errors.

In Sutcliffe et al.'s research (1999), although their major goal is to evaluate the differences between deaf children and ESL children (i.e. Indian-English, Pakistani-English and Bangladeshi-English) at school age with regard to spelling development, their findings are applicable to the array of research on spelling errors. By comparing the participants' spelling samples derived from 60 words between groups, Sutcliffe et al. discovered that a large number of English spelling errors in the ESL group belonged to the type of phonetic errors. This finding may suggest that

ESL children are able to employ their phonological awareness when spelling words.

In addition to this finding, Sutcliffe et al. also found that there were more vowel substitution errors identified in the ESL group, which implies the inference that ESL learners could bring phonological awareness to word spelling tasks (Wang & Geva, 2003). In English writing system, the grapheme-phoneme correspondences in vowels are not consistent (Sun-Alperin & Wang, 2008); therefore, it seems probable that ESL children with immature phonological awareness ability could misspell vowel sounds more often. As a result, the ESL children in Sutcliffe et al.'s study tended to replace correct vowels with wrong ones in words. Unfortunately, we cannot have an explicit knowledge of patterns of spelling errors in ESL children due to the purposes of this study. If the researchers had provided more specific information on L2 learners' misspelling responses, we would have grasped that how phonological awareness relates to spelling difficulties in ESL children.

Similarly, the study by Liow and Lau (2006) also suggests that the role of phonological awareness in spelling errors in bilingual children. Nevertheless, this study is differentiated from Sutcliffe et al.'s by its focus of spelling errors and choice of variables. The population for Liow and Lau's study consists of three different groups of children—English-Mandarin, Mandarin-English, and Malaysia-English bilinguals. Unlike the ESL group in Sutcliffe et al.'s research, spellings Liow and Lau collected are limited to flap spelling errors only, not spelling errors of other kinds of words. Besides phonological awareness, they examined orthographic and morphological knowledge in relation to spelling performance as well.

The intent of Liow and Lau's research is to explore to what extent different metalinguistic knowledge pertains to flap spelling performance. To achieve this goal, 80 kindergarteners in Liow and Lau's research received an extended version of Treiman et al.'s flap spelling task (1994). It is important to notice that there was no

direct assessment of each metalinguistic knowledge— phonological, orthographic, and morphological awareness in this study. Therefore, to examine the relation between phonological awareness and flap spelling, Liow and Lau compared /d/ versus /t/ flapped and unflapped spelling samples. The data show that children are prone to substitute /d/ sounds for /t/ sounds in flap words, which clearly indicates phonological awareness is conducive to beginning spelling. Another major finding is that Liow and Lau ascertain group differences in applying phonological and orthographic awareness to spelling tasks. This supports the view that for ESL learners, the distance between two languages may have an effect on their L2 spelling performance (Sun-Alperin & Wang, 2008). Above all, in view of this conclusion, further investigation on the interplay of phonological awareness and spelling errors of children with different home languages; for example, EFL literacy learners, may hopefully extend this body of literature.

Despite the merit of offering valuable insights, Liow and Lau's research is not without limitations. Similar to the study done by Sutcliffe et al. (1999), given that tests measuring predictor variables, including phonological, orthographic and morphological, are absent in Liow and Lau's research, interpretations of the results are restricted to the exploratory nature of the study. Future work is recommended to administer an empirical approach in order to clarify the influence of different linguistic knowledge on English spelling performance in ESL literacy beginners.

In conclusion, regardless of language backgrounds of participants, most English spelling errors that the above literature reported are seen to relate mainly to phonological awareness. In other words, even though spellings in beginning learners with limited literacy do not follow conventions, they do reflect these learners' attempts to utilize developing phonological awareness to spell unfamiliar words. As Rubin and Eberhardt (1996) noted, spelling errors, that are referred to as "invented

spelling", in fact show children's current knowledge of internal structure in words. To arrive at a full understanding of to what extent phonological awareness is pertinent to differing misspellings in children, the next section is the discussion of studies on invented spelling.

Studies on Invented Spelling

In Richgels's (2001) thorough review of literature on children's emergent writing, he offers comprehensive knowledge of the roles of invented spelling and phonemic awareness in literacy development. The term "invented spelling", originated from Charles Read's study (1971), signifies young children's attempts at writing in a systematic way. Read's initial intention was to illustrate preschoolers' phonological knowledge; however, he accidently found that children's rudimentary writing involves active presentation of grapheme-phoneme principles, although they were not trained in literacy skills. Spellings in these children, needless to say, were not conventionally accurate, but revealed the features of systematicity as well as abstractness. Such interesting finding has opened an era of invented spelling studies in the realm of beginning writing in children.

After Read's work, numerous studies continued to address this issue and documented information regarding the stages of invented spelling, invented-spelling-reading relationship, invented-spelling-phonological-awareness connection, benefits of invented spelling and so on (Clarke, 1988; Gentry, 2000; He & Wang, 2009; Kamii, Long, & Manning, 2001; Kamii & Manning, 1999; Leak, 1996; Lombardino & Bedford, 1997; Lundblade, 1994; Manning, 2004; Martins & Silva, 2006; Miller, 1996; Nicholson, 1996; Ouellette & Senechal, 2008; Rubin & Eberhardt, 1996; Silva & Martins, 2003; Sipe, 2001; Tangel & Blachman, 1992). To understand the relation between phonological awareness and invented spelling, the patterns of

invented spelling will be discussed first. In 1997, Lambardino and colleagues studied the spelling patterns of 100 kindergarten children who were speakers of English. Their spelling performance was assessed by the spelling subset of the standardized Early Reading Screening Instrument (ERSI), in which the children were asked to dictate 12 three-to four-phoneme words orally presented by the researchers.

Ten patterns and 21 response types of invented spellings were found in a sample of 1200 words that collected from the participants. Additionally, Lambardino et al. also observed that the children with higher scores in spelling used the common response types more frequently and used the atypical response types less frequently. The major finding of the study is that as children progress in knowledge of letter-sound and conventions of orthography, they tend to map phonemes to graphemes in writing with better phonetic accuracy.

In short, this study lays a foundation for us to identify possible examples of invented spelling that helps language teachers detect the "red flag" of child's literacy development (Rando, 2009). Besides this, the invented spelling patterns this study generated can be of enormous value for future research into determining the role of phonological awareness in invented spelling. However, the measure of the invented spelling in this study is not without problems. The spelling samples of only 12 words may not be able to fully demonstrate the patterns of invented spelling. The second limitation concerns the implicit interpretation of the children's spelling errors and the occurrence of a particular pattern. If the authors had given a detailed elaboration on the usage of the response types they found in the children's spelling performance, we would have understood the relation between invented spelling and its underlying predictors better.

As opposed to Lambardino and colleagues, some other research lays its emphasis upon the underpinnings of the invented spelling, rather than the patterns of invented

spelling (e.g., Ball & Blachman, 1991; He & Wang, 2009; Kamii & Manning, 1999; McBride-Chang, 1998; Ouellette & Sénéchal, 2008; Tangel & Blachman, 1992; Tangel & Blachman, 1995). These studies complement each other well for each emphasizes a different aspect of the link between invented spelling and phonemic awareness. The data have shown that children tend to unconsciously manipulate phonological knowledge to represent sounds in words in order to express themselves through written language.

The main focus of Kamii and Manning's study (1999) is on the relationship between early invented spelling and letter-sound knowledge of American kindergarteners. In view of this purpose, the researchers investigated spelling development in 57 young children via four-time dictation of words within 5 months. Four pairs of words containing similar morphemes and phonemes (e.g., *ham* & *hamster*) were employed to evaluate beginning levels of spelling growth in relation to phonological awareness. In the children's spellings, they were observed to write more letters to represent words with longer length in sound. Further, Kamii and Manning found that the children wrote the same letters for the same phonemes, despite that the letters were spelled unconventionally or even unphonetically. The findings support the claim addressed previously that letter-sound knowledge is related to spelling errors in kindergarteners at early stages of literacy development. This complements the literature on the statistical correlation between more advanced invented spelling and phonemic awareness (e.g., Ball & Blachman, 1991; McBride-Chang, 1998; Quellette & Sénéchal, 2008; Tangel & Blachman, 1992; Tangel & Blachman,1995).

The study by McBride-Chang (1998) is similar to Kamii and Manning's research in that the attempt is to explore the development of invented spelling in American kindergarteners. These two studies differ in the way the link between invented

spelling and its predictor variables is examined. Instead of adopting an exploratory analysis of invented spellings, McBride-Chang devoted to offer evidence to prove the longitudinal interplay of invented spelling and four variables (i.e. word decoding, conventional spelling, phonological awareness and orthographic ability). Ninety-three young children in her study received measures of cognitive abilities, phonological awareness, alphabet knowledge, orthographic knowledge, reading ability and spelling ability four times over one and a half year. Tangel and Blachman's (1992) five-word dictation test and scoring scale were applied to assess invented spelling. It is noted that the invented spelling measure was administered only in the final three testing sessions and the measure of orthographic knowledge was given only in the last testing session. The correlations showed a strong relationship between invented spelling and phonological awareness. However, once the invented spelling scores at time one and two were controlled, the phonological awareness and alphabet knowledge measures could not predict the variance in invented spelling. The measure of orthographic knowledge, on the other hand, significantly accounted for the children's performance on invented spelling. As proposed by McBride-Chang, the findings indicate that "invented spelling may be multi-faceted" because it is closely related to more than one linguistic knowledge.

While the research of McBride-Chang has yielded the findings that have both theoretical and pedagogical implications, it needs to be treated with caution as the method is not without limitations. Even though the researcher attempted to investigate children's developmental invented spelling and its mechanisms through four-time data collection, she assessed their orthographic knowledge only once. In view of this, the question regarding the long-term influence of orthographic knowledge on invented spelling is unanswered. In addition, we cannot conclude with certainty that orthographic knowledge contributes predominantly to children's

invented spellings compared with phonological awareness as well as alphabet knowledge. To fully understand children's invented spelling in relation to phonological awareness, orthographic awareness and letter-sound knowledge, it is important to review a recent research (Ouellette and Sénéchal, 2008).

Similarly, Ouellette and Sénéchal used three of five words from Tangel and Blachman's (1992) spelling dictation test in their 10-word invented spelling test. They found that letter-sound knowledge, phonemic awareness, orthographic knowledge, and oral language skills (i.e. vocabulary and morphological knowledge) made significant contribution to invented spelling in 5-year-old monolingual children. Among these predictor variables, the phonemic awareness significantly accounted for most of the variance in invented spelling. Specifically, the letter-sound knowledge, which strongly affected the beginning spelling in Kamii and Manning's research, could only explain approximately 5% of the spelling dictation score in this study. In contrast, the phonemic awareness, the highest level of phonological awareness, predicted about 40% of the spellings the children. The results indicate that phonemic awareness is a stronger predictor of invented spelling than knowledge of letters and sounds.

These findings are in line with Ball and Blachman's study (1991), although Ball and Blachman emphasize instruction in phonological awareness and its impact on early spelling as well as reading. Ninety kindergarteners in their study were divided into three groups: (1) a phoneme segmentation training group, (2) a letter-sound and letter-name knowledge training group, and (3) a control group. The statistical results showed that only the first group was significantly better on spelling and reading performance in comparison to the other groups. In addition, the invented spellings in this group showed higher quality for more phonemic segments in words. This is consistent with Tangel and Blachman's findings (1992; 1995) suggesting the

effectiveness of phonemic awareness intervention on invented spelling in English monolingual kindergarteners and first graders. Besides this conclusion, in considering the differing effects of the phoneme segmentation training and alphabet knowledge training, there is another point worth noting. We may reasonably conclude that knowing the name and the sound of each letter is just the first step of learning to spell in English. Instead, the automatic phonological encoding ability, that is, the ability to represent each individual phoneme by its correspondent grapheme, is prerequisite for skillful spellers (Holmes & Quinn, 2009).

Even though the above studies have paved the way for the research of invented spelling, the design of these studies might limit the findings. First, given that the studies by Kamii and Manning (1999) and McBride-Chang (1998) administered four-time interviews to collect data, their flaw is rooted in practice effect resulted from the repeated use of identical test items. There is likelihood that the participants performed better as time went by. Second, these studies tended to collect children's spellings by means of doing dictation of a limited set of word. Specifically, Tangel and Blachman (1992; 1995) only used a five-word spelling dictation task as a main measure of invented spelling. The complete picture of the children's invented spellings with various structures might be overlooked.

Following by the studies on invented spelling in young native English-speaking children, He and Wang (2009) conducted a longitudinal qualitative research to study the invented spelling in four EFL Taiwanese children. Two kindergarteners and two Grade one children received free writing tasks within 14 months. After each individual writing activity, the participants were required to read their essays out loud and then have an interview with one of the authors. Based on Gentry (1978), invented spellings in these children were categorized into two types: (1) letter-name-based spellings (e.g., *pla* for *play*, *weth* for *with*, *slep* for *sleep*); and (2)

letter-sound based spellings (e.g., *baskit* for *basket*, *wes* for *with*, *becls* for *because*).

As pointed out by He and Wang, the EFL children made more vowel spelling errors due to the inconsistency of English vowel spelling conventions. Therefore, the children were observed to use *e* to represent *i*, which sounds like the pronunciation of the name of letter *e* (e.g., *thes* for *this*). In addition, the letter-sound based spelling occurred due to the differences between English and Mandarin Chinese. In other words, the children might not be able to spell words containing sounds they could not discriminate or articulate in the L1. As a result, one child misspelled *brother* as *broder*, and another one wrote *conhre* instead of *country*.

Despite the fact that this study is exploratory, it is capable of supporting the view that phonological awareness is highly pertinent to spelling errors, invented spelling. As opposed to other studies, He and Wang offer an in-depth explication of invented spellings in terms of knowledge of grapheme-phoneme correspondence as well as phonological awareness. Their study appears to be a valuable and worthwhile resource for English teachers to identify children's spelling errors and design useful spelling curricula. Further, their findings also suggest that ELLs, especially for learners speaking nonalphabetic language as their L1, may differ much from their monolingual counterparts in spelling development. However, the results of this study should be treated carefully for its limitation of generalizability. Given that He and Wang only involved four EFL children, the children who were well trained in phonetic skills and oral skills in private institutions since kindergarten, the results cannot be generalized to average EFL beginning learners from public schools.

To sum up, the legitimacy of children's invented spelling that Read and others noted has aroused great attention to the treatment of children's spelling errors. In considering that, important implications can be drawn from the studies on invented spelling. First, encouraging children's invented spelling may not only prompts them

to write more at the early stage of literacy development (Read, 1986; Clarke, 1988), but also increases their practice of grapheme-phoneme representations, phonological awareness, spelling skills and word decoding (Chapman, 1996; Cunningham & Cunningham, 1992; He & Wang, 2009; Silva & Martins, 2003). Additionally, the findings are also applicable to the implementation of early literacy screening (McBride-Chang, 1998). More specifically, if the incorrect spellings in children do not follow certain rules which previous studies have reported, the children may need extra help in phonological awareness instruction instead of spelling drills. Upon this point, no one can deny the theoretical and pedagogical advantages research on invented spelling has brought to the field of early literacy development. On these ground, to provide a window on ELLs' developing spelling ability and factors influencing that, it is necessary to change the focus of attention, away from the conventional spelling performance to the erroneous spelling output in the realm of bilingual children literacy research.

Significance of the Study

While there have been a number of studies investigating spelling performance in relation to phonological awareness in monolingual children, little research has been done on that in L2 learners, EFL learners in particular. With regards to studies on spelling errors, as Richgels (2001) stated, since the time Read (1971) proposed the idea of invented spelling (i.e. the systematicity of spelling errors), the majority of research on invented spelling has merely focused on the young monolingual children, as opposed to L2 beginning learners. It is surprising that over almost 40 years, very little attention is given to spelling errors in ESL or EFL children.

As proposed by Treiman (1993), we can understand how children develop knowledge about grapheme-phoneme correspondences by thoroughly analyzing

children's spelling attempts. Additionally, second language learners of different L1 background might apply differing strategies to spell English words (Figueredo, 2006). Without careful examination of the L2 learners' spelling errors, we can hardly ascertain the construct or stages of their spelling development. Surprisingly, to date, no clear direction has emerged to suggest how the findings drawn from English monolinguals can be translated into the instructional implications for ESL or EFL novice learners. Light should be shed on the relationship between the spelling errors and the phonological awareness in ESL or EFL children, which is still largely under investigated.

Considering that, the present study addresses the issue of to what extent the phonological awareness associate with the spelling errors in the fourth grade EFL Taiwanese children. Hopefully, it will provide English teachers in Taiwan with a better understanding of what students rely upon to learn spelling, as well as suggest pedagogical implications in English education in Taiwan.

Given the theoretical positions taken for the previous research and the status of the field as reviewed previously, the present study is therefore concerned with: (1) phonological awareness group differences in spelling performance; (2) the role of phonological awareness in spelling performance; and (3) types and patterns of spelling errors in Taiwanese EFL children beyond early grade level. It is hoped that results of this study will have considerable impact on the design of spelling instruction as well as the treatment of spelling errors in ELL education.

CHAPTER THREE

METHODOLOGY

Overview

The primary goal of this study is to examine whether EFL children's spelling errors reveal their levels of phonological awareness. Two spelling tasks, three phonological awareness tasks, and an English proficiency test were given to 28 fourth graders. Next, analyses of the children's spelling were performed in order to investigate patterns of spelling errors and to determine whether phonological awareness was an influencing factor.

This chapter presents the research methodology with details of participants, materials, procedures, and data analyses used in this study. Expected results are then presented at the end of this section.

Participants

The present study was administered to an intact class comprising 33 grade-four students from a public elementary school in Hsinchu City, Taiwan. The students were all native speakers of Mandarin Chinese with an average age of 9.8 years. During the process of data collection, five participants were absent at times because of sick leave or participation in school activities. Given that 28 out of 33 students (i.e., 13 boys and 15 girls) completed all four testing sessions, the present study only took these 28 students' performance on measures into account.

With regard to English curriculum design, the participants' school was different from many other national elementary education systems in Hsinchu. The students started studying English from the third grade on, and attended English classes for three times a week, 40 minutes for each class section. Among the three periods of

English per week, one period was taught by a native speaker of English with formal education certificates, the others were taught by a local Mandarin teacher with English education specialization.

Following the school's curriculum guidelines, English course emphasized developing students' basic English skills—reading, listening, writing and speaking for daily usage. From the starting point of the English education in the school, the participants were taught phonics including the knowledge of letter names, letter sounds, and phonemes. In addition, they were required to memorize the spellings of the assigned vocabulary from time to time either for passing class quizzes or school examinations. By Grade 5, the knowledge of the Kenyon and Knott system (KK symbols) would be introduced; that is, the participants would learn how to recognize and say the KK symbols for English words. The participants' textbooks used for English course were *World Kids Level I* (PGC Edutainment, Inc., 2008) and *Welcome to Content Area Reading Level B* (Teacher Created Materials, Inc., 2004).

Even though each participant received the same amount of time and English in school, their language proficiency and spelling development appeared to vary greatly due to different onsets of English exposure outside of the formal education. Specifically, eight of them began to take English lessons in kindergarten, whereas the others (N= 20) first learnt English until elementary school. Of these 20 participants, six only received one-year English education at school. According to the survey eliciting information about the participants' background, their English learning experience ranged from one to up to six years (M= 3.36; SD=1.81). Taken together, at the time of data collection, all of the participants had at least one-year English learning experience in formal education and developed the ability to write English words and identify English letters and sounds.

Materials

The data collection instruments used in this study assessed the EFL grade-four students' spelling ability, phonological awareness, and English proficiency (see Table 3.2 for a summary). The framework of each test is described as follows:

Spelling Ability Tasks

Data on children's spelling ability were collected using spelling samples from a spelling dictation task and writing products from a story rewriting activity. The spelling dictation task was included to archive data on the participants' spelling performance in different structural types of words. Asking the children to spell a set of chosen words is advantageous for two reasons. It is useful to elicit: (1) spellings with various structures, and (2) unknown or difficult spellings that may not be seen in the participants' writing.

In addition, given that the children would make particular kinds of spelling errors repeatedly (Hu, 2003) and the spelling dictation task may not be able to evaluate this phenomenon, the story rewriting task was also administered. As opposed to the spelling dictation task in which the children are asked to spell a limited set of words, rewriting a familiar story encourages them to spell words that they are familiar with using in writing and speaking. That is to say, this provides "a natural setting" for us to examine spelling strategies which children used to apply to daily writing (Shen & Bear, 2000). Moreover, as Adams (1990) points out, children's writing in fact is a mirror of their understanding of the sounds of words. In considering the research foci of the present study, carrying out a writing task to retrieve spelling samples was necessary. To gain an insight into children's overall spelling performance, the spelling dictation task and the story rewriting task were therefore used in this study.

Spelling dictation task. The spelling dictation task contained ten real words and

ten pseudowords varying in structures—CVC, CVCC, CCVC, and CCVCC (see Appendix C). There were 20 test items in total. The participants were asked to write down the words they heard from a recording played at a constant volume. The recording of the test items was prepared by a female native English speaker. She first read aloud the trial number, and then repeated the target word three times at three-second intervals. For all items, her pronunciation was clear and distinct.

The participants were required to respond on an answer sheet consisting of boxes in two columns and ten rows. It was acceptable for them to write only parts of the word if they were unable to spell the whole word. However, they were encouraged to write as many sounds in a word as they could. Stated another way, in this task, they could fully exercise the spelling strategies they had acquired. Before the task, the researcher provided the participants instruction and illustrated these points in Mandarin Chinese to make sure they understand the task requirements. The time required for each child to complete this task was about 30 minutes.

Spelling dictation task scoring. To examine children's spelling strategies, the phonological acceptability evidenced in their spellings was considered. A graded scoring system developed by Treiman and Zukowski (1988) was adopted. Table 3.1 provides a summary of the scoring scheme for the phonological acceptability scale used to evaluate the spellings. Following Treiman and Zukowski's study, the present study assessed partial spellings; in other words, the grapheme representation of each phoneme in words was analyzed respectively. For each segment, a score ranging from 0 to 4 was awarded based on the legality of it as a representation of a specific sound. Children were not penalized if they reversed letters (e.g., *d* for *b*) in words. The total score for one target word, consisting of a score for each individual sound, was converted into a percentage. For example, in the spelling of *tess* for the word *trace*, the first grapheme *t* was awarded 4. The second missing grapheme *r* obtained

a score of 0. The third grapheme *e* was awarded 3 points because /ɛ/ deviates by one distinctive feature from /e/. The final two graphemes *ss* together were awarded 4 points because of their plausibility to represent the target phoneme. Consequently, a score of 11/16, or 68.75% was given to this spelling.

Table 3.1

Scoring Scheme for the Phonological Acceptability Scale

Points	Description	Example
4	Plausible grapheme to represent the target phoneme	(1) Target /k/ represented by (i.e., *c, k, ck, ch*) (2) Target /i/ represented by (i.e., *ee, ea, e_e*)
3	A grapheme which represents a phoneme that deviates by one phonetic feature from the target phoneme	(1) Target /k/ represented by *g* (2) Target *a_e*/e/ represented by (i.e., *e*/ɛ/)
2	(1) Correct grapheme plus an extra adjacent grapheme (2) Correct grapheme in correct order (3) Partially represent phoneme (e.g., only part of the diagraph represented)	(1) Target /t/ represented by *dt* (2) Target /kɪlʧ/ represented by *kilch* (3) Target /ʧ/ (i.e., *ch*) represented by *c* or *h*; Target /ʃ/ (i.e., *sh*) represented by (i.e., *s* or *h*)
1	(1) Implausible grapheme for the target phoneme (2) A grapheme which represents a phoneme that deviates by one phonetic feature from the target phoneme adjacent to another grapheme	(1) Target /p/ represented by (i.e., *k, h, r*) (2) Target /b/represented by (i.e., *pf*)
0	No grapheme represented	

Note. This table was adapted from "The foundations of spelling ability: evidence from a 3-year longitudinal study," by M. Caravolas, C. Hulme, & M. J. Snowling, 2001, *Journal of Memory and Language, 45,* p. 772.

In sum, each spelled word was given a score following the aforementioned criterion. To examine the children's overall performance on the spelling dictation task, the mean score of phonological accuracy in all the spellings per child was computed last. In addition to gauging phonological plausibility of each spelled words, words that were misspelled were further classified into different types and patterns (see Data Analyses section for detailed information).

Story rewriting task. In the story rewriting activity, the children were required to rewrite a story— *Willy and Chucky* read four times by a male native English speaker with English teaching expertise. The story comprises eight pseudowords, including four nouns, two verbs, and two adjectives. These words are orthographically and phonologically legal but lacking meaning (e.g., *fap* refers to a kind of alien, and *driny* is used to describe a unique thing on an alien's head).

During the data collection, the researcher first discussed the story with the participants to help them scaffold the story and construct a concept map for writing. The participants were asked to answer several questions concerning the characters and the story plot. Following the discussion, the researcher had the participants rewrite the story and produce illustrations for it on blank paper. In the meantime, the participants were not allowed to receive any assistance in grammar or spelling. They were encouraged to write as much as possible, regardless of spelling errors, in order to obtain a full picture of their spelling development. In considering that the participants were young beginning learners, the instruction for the story rewriting task was given in their first language. There would be time for them to address any questions regarding the task procedures. The time span for this task, including discussion of the story plot and production of a composition, lasted about 30 minutes.

Scoring of spellings in rewriting task. As opposed to the scoring of the spelling dictation task, in this task, only the words misspelled were depicted and no scores

were awarded to these spellings. Instead, they were analyzed in terms of error types and patterns (see Data Analyses section for detailed information).

Phonological Awareness Tasks

Measures assessing phonological awareness of the participants included: (1) a phoneme identification task, (2) a phoneme blending task, and (3) an onset-rime manipulation task. The primary function of conducting these tasks was to investigate the participants' phonological awareness at the phoneme and onset-rime levels; thus, the researcher could ascertain the relation between spelling errors and phonological awareness. The content for each task is introduced as follows. Complete versions of the phonological awareness tasks are presented in Appendix D.

Phoneme identification task. There were two practice items and 10 test items in this task. Each test item comprised two stimulus words and three response choices. The participants needed to select the letter with the same vowel sound as the two stimulus words from three choices (e.g., *bat, sad*—e, a, i).

Phoneme blending task. Similar to the phoneme identification task, two practice items followed by 10 test items were given to the children. This task required them to identify which of the three choices was the combination of the individual sounds they heard (e.g., *l-o-g*—rog, log, lag).

Onset-rime manipulation task. In this task, the participants heard two practice items and 10 test items containing two stimulus words each. They were asked to select the word with the same onset as the first stimulus word and the same rime as the second stimulus word (e.g., *jeg, pam*—peg, jam, jan).

The three phonological awareness tasks took the participants approximately 30 minutes to complete. All test items in the phonological awareness tasks were pre-recorded by the same native English speaker who read the story—*Willy and*

Chucky to the participants. The participants' native language, Mandarin Chinese was used as the language for task instruction to exclude factors such as L2 proficiency that might intervene with their performance. Following the practice items, each test item was read once with an interval of three to five seconds. One point was awarded for each correctly identified item in the phonological awareness tasks, and the highest raw score for this test was 30 points.

English Proficiency Test

Children's entering language proficiency was assessed with the reading and writing subset of the Cambridge Young Learners English Test (CYLET) at the level of Movers, following the standard procedure described in the assessment manual. The CYLET was specifically designed to test English skills of EFL children at age 6 to 15 based on their cognitive development as well as English learning context. Given that the CYLET is widely used as a measure for young English learners in Asia, and it is extensively developed by a group of experts in English education and assessment, it was chosen as the measure of the children's English proficiency in the present study.

This study only used the reading and writing subset of the CYLET because it assesses literacy skills that are highly related to spelling ability and phonological awareness, the major foci of the present study. Instead of the beginning level, Starter, and the advanced level, Flyer, the second level of the CYLET— Movers was selected in view of its high discrimination values and seemly appropriate difficulty level. In considering the average English learning time and background of the participants, as opposed to the other two levels, Movers distinguishes individual differences and displays literacy development in the fourth grade children in this study.

The reading and writing subset of the CYLET consists of 40 items and is divided into six parts. Each part is composed of 1 to 2 practice and 6 to 7 test items (N=25).

Due to the time constraint and fatigue caused by a long testing time, the first four parts of this subset containing 25 test items were chosen as the major measures, as illustrated below.

The first part comprises eight words with pictures and six sentences describing a particular word. Test takes have to choose one word that fits into each sentence description and write it on the line next to the test items (e.g., You can eat this from a bowl. Sometimes there are vegetables in it. — *soup*). The second part contains one colored picture and six true or false questions. Test takers are required to answer these questions based on what they see in the picture (e.g., There are five white towels in the bathroom. — *yes*). The third part includes six multiple-choice questions in which test takers need to read a sentence from a speaker and chose an item from three as the correct reply from the interlocutor (e.g., Bill, I've got to take you to your friend's birthday party now. — *A.Well; B.OK; C.Then*). With regard to the fourth part, a short story with six words missing is given on the test booklet. Here, test takers have to choose a word presented with a picture among nine choices to fill in each blank. They are then asked to choose the best title for the story among three choices.

In the present study, the instruction for each part of the reading and writing subset of the CYLET was translated into Mandarin Chinese to avoid factors that might affect test performance. Each correct answer was awarded 1 point, and the maximum score on this English proficiency assessment was 25 points. The time needed to complete all the four parts of the reading and writing subset of the CYLET was roughly 30 minutes.

Table 3.2

Summary of Testing Materials

Measures	Time	Tasks or Subtests (no. of items)
Spelling tasks	60 min	Spelling dictation task (20)
		Story rewriting task
Phonological awareness tasks	30 min	Phoneme identification task (10)
		Phoneme blending task (10)
		Onset-rime manipulation task (10)
CYLET	30 min	Reading and writing subset (25)

Data Collection and Procedures

The data collection was carried out in the first semester of the school year over one and a half month. The time frame and procedures of this study are listed in Table 3.3. Prior to the instruments presented previously, the school and the participants' parents were given a consent form (see Appendix A; B) to volunteer to take part in this study. The parents were also asked to fill out a questionnaire which elicited information regarding the children's English learning background.

During the data collection, the participants were tested in group by the researcher. The whole testing procedure per child took approximately 120 minutes, divided into four sessions. The data collection sessions each lasted about 30 minutes and was conducted at roughly one-week intervals.

In the first session, in order to further determine the children's initial language proficiency, the CYLET was administered to measure their English literacy skills. Following the CYLET, to tap the participants' phonological awareness, the phonological awareness tasks were given in the second session. To collect spelling samples from the participants, in the third session, they received the spelling dictation task. In the fifth session, after they listened to the story—*Willy and Chucky* four times, they were presented with the story rewriting task.

Table 3.3

Testing Sessions

Session	Time	Data Collection
1st session	Week 1	Reading and writing subset of CYLET
2nd session	Week 2	Three phonological awareness tasks
3rd session	Week 3	Spelling dictation task
4th session	Week 4	Story rewriting task

Data Analyses

The present study intends to determine the relationship between spelling performance and phonological awareness. Recall that in Chapter One, three questions are raised:

1. Do Taiwanese EFL fourth graders with different phonological awareness show significant different performance in spelling English unfamiliar words?
2. To what extent does Taiwanese EFL fourth graders' phonological awareness relate to and predict their spelling performance?
3. What types and patterns of spelling errors do Taiwanese EFL fourth graders make? How do the children with higher phonological awareness differ from those with lower phonological awareness in spelling error patterns?

To answer the three research questions, both quantitative and qualitative data analyses were performed. The data were specifically examined in three aspects: (1) spelling performance across different phonological awareness groups; (2) the role of phonological awareness in spelling performance; and (3) spelling patterns across different phonological awareness groups.

Spelling Performance across Different Phonological Awareness Groups

To determine whether group effect on spelling performance existed, the participants were first allocated into three phonological awareness groups (i.e., low, middle and high). Descriptive statistics for each group's performance on the spelling dictation and the three phonological awareness tasks (i.e., the phoneme identification task, the phoneme blending task, and the onset-rime manipulation task) were then calculated. Following this, a one-way ANOVA and post-hoc analyses were conducted to ascertain phonological awareness group differences in spelling measures.

The Role of Phonological Awareness in Spelling Performance

First, descriptive statistics for the measures (i.e., the spelling dictation task, the phonological awareness tasks, and the reading and writing subset of the CYLET) were computed. Next, the Pearson product-moment correlation analyses were performed to answer the question concerning the relationship between the variables tested. The intercorrelations among the participants' scores on measures of dictated spelling, phonological awareness and literacy skills were calculated. Finally, a series of hierarchical regression analyses were done to gauge the role of phonological awareness in spelling performance. In the first regression model, scores on phonological awareness tasks were entered into the regression equation alone as the independent variable of spelling performance. To evaluate whether phonological awareness measure continued to be a significant predictor when the reading and writing subset of the CYLET was taken into account, the second regression model evaluated the shared and unique contributions that phonological awareness and literacy skills made to spelling scores.

Spelling Patterns across Different Phonological Awareness Groups

To understand to what extent children's spellings relate to their phonological awareness, their spelling samples were analyzed in terms of: (1) spelling error types and (2) spelling error patterns.

Analysis of spelling error types. To identify types of spelling errors in the participants, misspellings collected from the spelling dictation task were coded into six categories. Adapted from the method of analysis used by Greenberg et al. (2002), the six types were: (1) phonetic error (e.g., *rik* for *rick*), (2) semiphonetic error (e.g., *clch* for *clich*), (3) nonphonetic error (e.g., *koron* for *plump*), (4) correct initial sound (e.g., *m* for *mob*; *rus* for *rick*), (5) another word correctly spelled (e.g., *milk* for *mewp*), and (6) another word misspelled (e.g., *lok* for *blop*). After classifying the spelling errors, the total number and proportion of each error type were calculated to determine the most frequent misspelling types made by the participants.

Analysis of spelling error patterns. This study also employed a coding system adapted from Lombardino et al.'s research (1997) to determine patterns of spelling errors produced by Taiwanese EFL children. The misspelled words collected from the spelling dictation task were identified and classified into six patterns: (1) omission (e.g., *pump* for *plump*), (2) substitution (e.g., *timk* for *tink*), (3) reversal (e.g., *cilch* for *clich*), (4) insertion (e.g., *gaster* for *gast*), (5) combination of the above error patterns (e.g., *che* for *chin*), and (6) random error patterns (e.g., *wiu* for *clich*). The number and proportion of each misspelling pattern were calculated and compared across different phonological awareness groups. It should be noted that spelling errors that were classified as another-word-correctly-spelled or another-word-misspelled types were excluded from the analysis here.

After identifying different phonological awareness groups' preference for spelling patterns, the second step was to examine specific graphemic representations

produced by them respectively. Accordingly, each pattern was further be divided into several categories, as listed in Table 3.4. Under each category, the most salient spelling error responses were described and delineated in terms of grapheme-phoneme principles. How the children across different groups perceived a phoneme and represented it as a particular grapheme were elucidated. To supplement the findings derived from the spelling dictation task, graphemic representations of particular spelling errors collected from the story rewriting task were analyzed similarly.

Table 3.4

Spelling Error Pattern Coding Scheme

Pattern		Category	Response
Omission	1.	Consonant cluster reduction	pump (plump)
	2.	Consonant diagraph reduction	klih (clich); greh (gresh)
	3.	Silent letter reduction	hansome (handsome); nee (knee)
	4.	Omission of vowel	klch (clich); grsh (gresh)
	5.	Omission of consonant	m (mob); lop (blop)
Substitution	1.	Single consonant substitution	gamp (jamp)
	2.	Consonant digraph substitution	rik (rick)
	3.	Consonant cluster substitution	drace (trace); jrack (dreg)
	4.	Substitution of voiceless for voiced counterpart	dreck (dreg) drone (drome)
	5.	Vowel digraph substitution	wep (weep); pit (pite)
	6.	Short vowel substitution	gest (gast); blup (blop)
	7.	Schwa substitution	occurrance (occurrence); grammer (grammar)
	8.	Vowel and consonant substitution	jak (dreg); rak (rick)

Pattern	Category	Response
Reversal	Incorrect order of letters	kilch (clich)
Insertion	Addition of extra letters	gaster (gast)
Combination of the above error patterns	Use of more than one error patterns	che (chin); jak (dreg)
Random	Nonsense string of letters	wiu (clich); hailk (chin)

Coding reliability. To obtain the coding reliability, approximately 17% of spellings (i.e., five out of 28 students' spellings) were randomly selected for a trained second rater to code in terms of spelling error types and patterns. The second rater was a graduate student in Teaching English to Speakers of Other Languages (TESOL) at a university in Taiwan. There was a higher level of agreement between the researcher and the second rater. The inter-rater reliability coefficients for the ratings of spelling error types and patterns both reached 93%.

CHAPTER FOUR

RESULTS

Overview

The main goal of the present study is to understand the relation between spelling performance and phonological awareness in Grade 4 Taiwanese EFL children. The secondary purpose is to investigate types and patterns of spelling errors made by these children with differing levels of phonological awareness.

In this chapter, the results of the present study are presented. First, results concerning whether students with different levels of phonological awareness showed different spelling performance are presented. Second, the role of phonological awareness in spelling performance was examined through the Pearson product-moment correlation analyses and hierarchical regression analyses. Next, patterns of misspelling samples are described in terms of grapheme-phoneme correspondences. Types of spelling errors and particular spelling patterns from different groups of phonological awareness levels are then offered. The last section of this chapter is a summary of the major findings of this study.

Spelling Performance across Different Phonological Awareness Groups

One of the goals of this study is to determine the role of phonological awareness in spelling performance of Taiwanese EFL fourth graders. To this end, the spelling dictation scores of different groups of students with different levels of phonological awareness were compared. Given that 28 out of 33 Grade 4 EFL students completed all data collection sessions, only these students' performance on four measures of performance were taken into account in the final analyses. Table 4.1 reports the means, the standard deviations (SD), and the ranges of the 28 children's raw scores on

the three measures— spelling dictation task, phonological awareness tasks and the reading and writing subset of CYLET. The phonological awareness score is cumulative (30 points total) comprised of scores from a phoneme identification task, a phoneme blending task and an onset-rime manipulation task (10 points each).

Table 4.1
Descriptive Statistics for the Measures

Measures (Maximum scores)	*M*	*SD*	*Range*
Spelling dictation task (100)	62.74	16.86	15.42-84.58
Phonological awareness tasks (30)	16.00	3.95	9.00-23.00
Reading and writing subset of CYLET (25)	15.14	5.49	5.00-24.00

Based on scores from the phonological awareness tasks, the children were divided into three different groups: low (N= 9), middle (N= 13) and high (N= 6) phonological awareness groups. As shown in Table 4.2, the mean score of the low phonological awareness group was 11.22 (*SD*= 1.48, *Range*= 9-13). As for the children of the middle phonological awareness group, their mean score was 16.92 (*SD*= 1.32, *Range*= 15-19). The average score of the high phonological awareness group was 21.16 (*SD*= 1.16, *Range*= 20-23).

The descriptive statistics presented in Table 4.2 show that the children from both middle and high phonological awareness groups scored higher on the spelling dictation task than those from the low phonological awareness group. To further determine whether there were significant differences of spelling scores between the three phonological awareness groups, a one-way ANOVA and post-hoc analyses were performed. The one-way ANOVA reveals that there is a highly significant effect of group, $F(2, 25) = 10.01$, $p < 0.01$. The post-hoc analyses which pinpoints the location of the differences shows that, while there was no significant difference

between the middle and high phonological awareness groups, the middle and high phonological awareness groups respectively performed better than the low phonological awareness group at the level of 0.05. The results concerning group differences in spelling scores are presented in Tables 4.3 and 4.4.

Table 4.2

Descriptive Statistics for Phonological Awareness and Spelling Dictation Scores of Different Groups of Children with Low, Middle, and High Phonological Awareness

	Phonological awareness			Spelling dictation		
Group (No. of children)	*M*	*SD*	*Range*	*M*	*SD*	*Range*
Low (9)	11.22	1.48	9-13	46.69	19.70	15.42-71.27
Middle (13)	16.92	1.32	15-19	70.41	7.44	54.21-83.17
High (6)	21.16	1.16	20-23	70.19	9.92	53.92-84.58

Table 4.3

An ANOVA Analysis for Phonological Awareness Group Effect on Spelling Scores

Source of Variance	*SS*	*df*	*MS*	*F*
Between Groups	3415.00	2	1707.504	10.014**
Within Groups	4262.95	25	170.518	
Total	7677.96	27		

** $p < .01$

Table 4.4

Tukey Post-hoc Analyses for Spelling Dictation Scores from Different Phonological Awareness Groups

Group	Low	Middle	High
Low		*	*
Middle	*		
High	*		

* Pairs where there was a significant difference at the .05 level.

The Role of Phonological Awareness in Spelling Performance

To understand whether EFL primary school children's phonological awareness is associated with and predicts to their spelling of English words, the 28 participants' scores on the spelling dictation task and the phonological awareness tasks were examined through the Pearson product-moment correlation and hierarchical regression analyses.

First, the Pearson product-moment correlation analyses were conducted to examine the intercorrelations among the participants' scores on the three measures. Results of correlational analyses are presented in Table 4.5. The results showed that the correlation between the participants' spelling performance and phonological awareness was significantly related ($r = 0.66$, $p < 0.001$). This relationship is displayed in Figure 4.1. In addition, as observed in Figure 4.2, there was also a significant correlation between the participants' performance on the spelling task and their scores on the reading and writing subset of CYLET ($r = 0.79$, $p < 0.001$). Phonological awareness scores had a statistically significant correlation with the reading and writing subset of CYLET as well (see Figure 4.3).

Table 4.5

Correlation Matrix for Spelling, Phonological Awareness, and Literacy Skills

Variable	Spelling	Phonological awareness	Literacy skills
Spelling	1.00		
Phonological awareness	0.66***	1.00	
Literacy skills	0.79***	0.65***	1.00

***$p < .001$

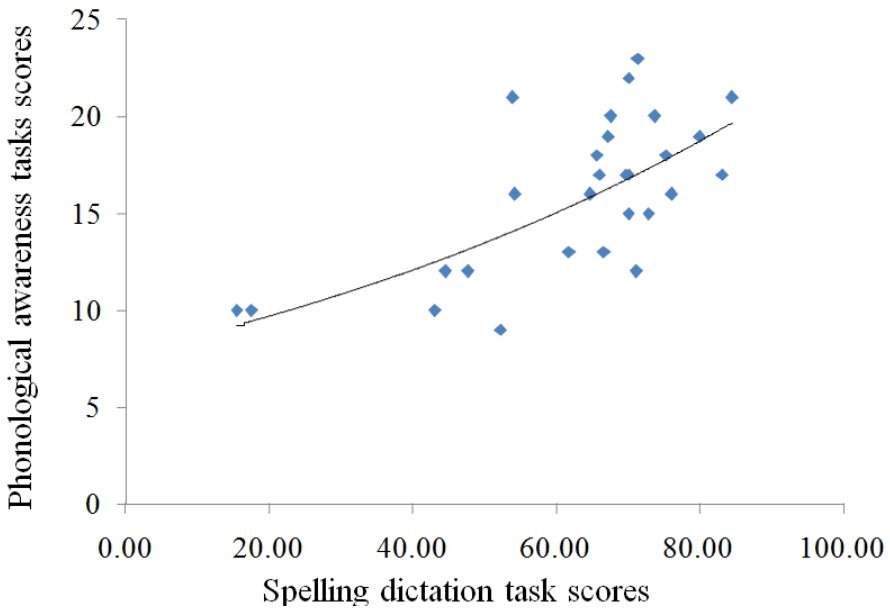

Figure 4.1 *Correlation between spelling dictation and phonological awareness scores*

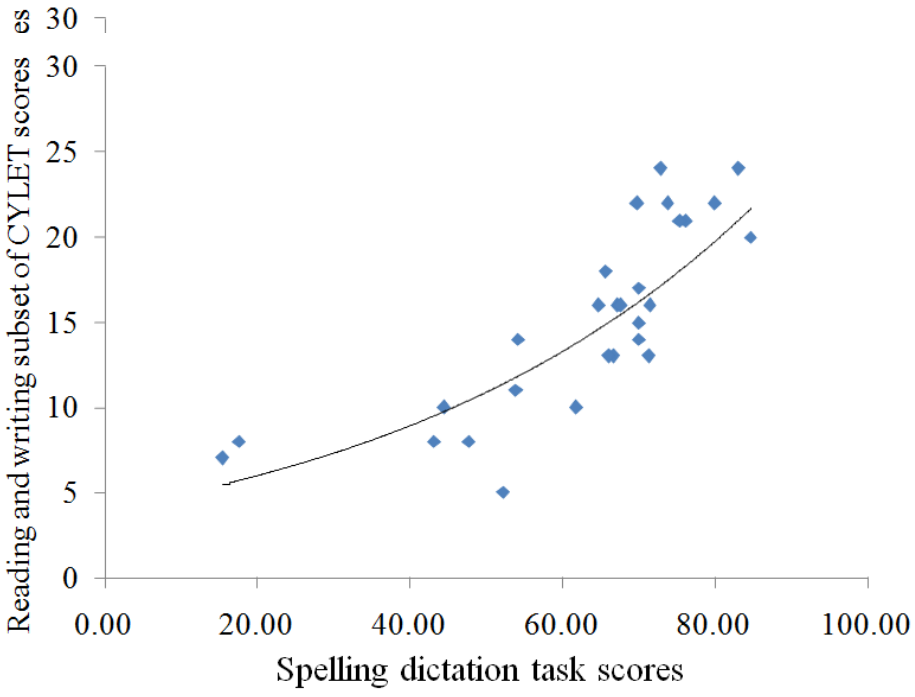

Figure 4.2 *Correlation between spelling dictation task and CYLET Scores*

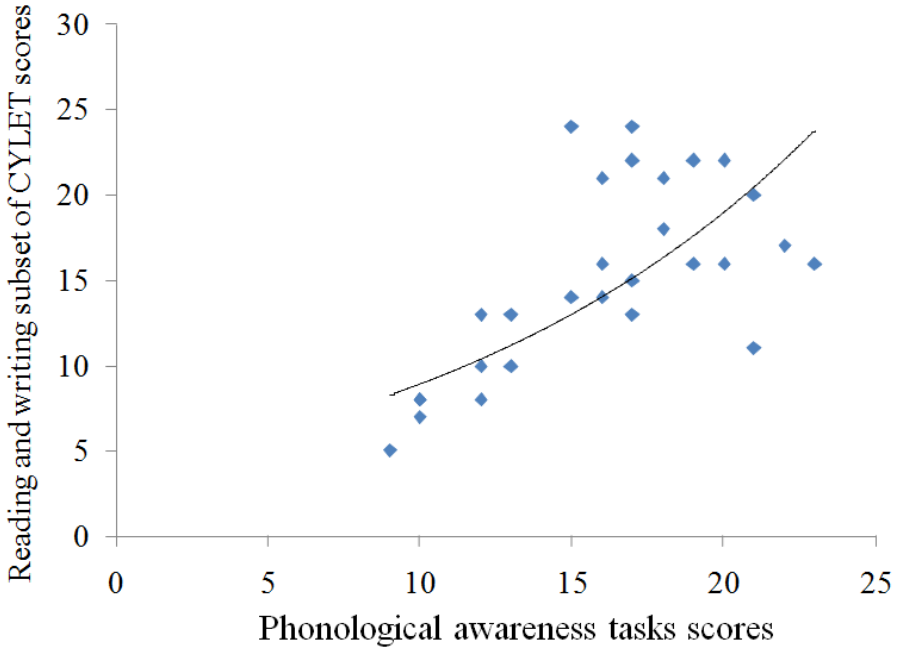

Figure 4.3 *Correlation between phonological awareness tasks and CYLET scores*

Next, in view of the significantly strong correlations among the spelling, the phonological awareness and the reading and writing subset of CYLET scores, this study tested the shared and unique contributions that both phonological awareness and literacy skills (i.e., performance in the reading and writing subset of CYLET) made to spelling performance. To evaluate whether phonological awareness continued to be a significant predictor of spelling performance when literacy skills were taken into account, a series of hierarchical regression analyses were performed. The first regression model only considered the phonological awareness scores as predictor of the spelling, the phonological awareness scores alone accounted for 41% of variance in the spelling scores ($F(1.26) = 19.96$, $p < 0.001$). In the second model, when both phonological awareness and literacy scores, however, were entered, the phonological awareness scores were no longer a significant predictor ($p = 0.12$). Literacy skills explained 63% of statistically significant unique variance ($p < 0.001$) in spelling performance. In other words, when literacy skills were entered into the regression

equation, phonological awareness became nonsignificant. The results of the regression analyses are presented in Table 4.6.

Table 4.6

Hierarchical Regression Analyses with Phonological Awareness and Literacy Skills

Predictors	Δ R^2	B	*β*	*F*	p Value
Model 1					
Phonological awareness	0.41	2.81	0.66	19.96***	0.000
Model 2					
Phonological awareness		1.06	0.25		0.119
Literacy skills	0.63	1.93	0.63	24.23***	0.000

****p* < .001

To sum up, although phonological awareness failed to account for a significant variance in the fourth graders' spelling after their scores on the reading and writing subset of CYLET were considered, it is worthwhile to note that a significant correlation was uncovered between phonological awareness and spelling performance in these EFL children.

Spelling Patterns across Different Phonological Awareness Groups

In addition to statistical analyses, qualitative analysis of misspellings was also conducted to investigate to what extent the 28 grade-four EFL students' spelling errors were associated with their phonological awareness. In view of this purpose, the children's misspelled words were first categorized into different spelling error types. Next, the most salient misspelling patterns of the children were identified and compared across groups of different phonological awareness. Following is the detailed illustration of the results in these two areas of concern.

Overall Percentage and Rank Order for Each Type of Spelling Errors

To gain a general picture of the children's spelling errors, types of misspellings were determined. Greenberg et al.'s method of analysis (2002) was adapted and used as the coding scheme. The children's spelling errors obtained from the spelling dictation task were classified into six types: (1) phonetic error (e.g., *rik* for *rick*), (2) semiphonetic error (e.g., *clch* for *clich*), (3) nonphonetic error (e.g., *koron* for *plump*), (4) correct initial sound (e.g., *m* for *mob; rus* for *rick*), (5) another word correctly spelled (e.g., *milk* for *mewp*), and (6) another word misspelled (e.g., *lok* for *blop*). Table 4.7 provides percentage of occurrence and rank order for each spelling type produced by the participants in the spelling dictation task.

Table 4.7
Proportion of Each Spelling Error Type

Error Type	Total Number	Percentage	Rank of Occurrence
Semiphonetic error	185	39.28%	1
Another word correctly spelled	111	23.57%	2
Phonetic error	53	11.25%	3
Nonphonetic error	53	11.25%	3
Another word misspelled	37	7.86%	5
Correct initial sound	32	6.79%	6

Note. Total number of 471 misspellings represents data after the removal of unanswered items and correct spellings.

In the spelling dictation task, 20 words including real words and pseudowords were given to examine all 28 children's spelling performance. Given that some participants did not spell all the test items, 34 unanswered items were excluded from calculation, and thus the researcher archived 526 spelling samples in total. After excluding another 55 correct responses, the data consisted of 471 spelling errors in all.

As shown in Table 4.7, among these misspellings, semiphonetic errors occurred most frequently. Specifically, approximately 39% of the participants' misspelled words fell into the category of semiphonetic error. Compared to this error type, around 23% of misspellings belonged to the category of another word correctly spelled. As for phonetic errors and nonphonetic errors, the proportions of their occurrence in the participants' misspellings were similar (i.e., about 11%). The rates of the emergence of these two error types were moderately lower than the category of another word correctly spelled. Approximately 7% of the misspelling data was included in the category of another word misspelled. On the other hand, the proportion of the correct-initial-sound category was slightly lower than that of another-word-misspelled type (i.e., about 6%). The rate of this misspelling category was the lowest among those of all other spelling error types.

Overall, in this study, many spelling errors made by the participants were semiphonetic spelling errors; the proportion of these errors (i.e., 39.28%) comprised almost 40% of the misspelled words collected from the spelling dictation task. Other spelling errors were classified as categories of another word correctly spelled, phonetic error, nonphonetic error, another word misspelled and correct initial sound in order of rate of occurrence, respectively.

Comparison of Spelling Error Patterns across Phonological Awareness Groups

In order to look at how the participants exploited their knowledge of grapheme-phoneme correspondences, the most salient spelling patterns gained from the spelling dictation and the story rewriting tasks were depicted. Compared to spelling errors collected from the spelling dictation task (N= 471), the children made fewer spelling errors (N= 75) when rewriting the story—*Willy and Chucky*. The types and patterns of the misspelling data collected from the rewriting task were

limited. Many of them were either repeated or occurred only once in the children's writings. Thus, the children's spontaneous spellings obtained from the story rewriting task were used to supplement the findings derived from the spelling dictation task.

The coding scheme introduced by Lombardino et al. (1997) was adapted (see Table 3.2 for review). Based on the adapted coding scheme, children's spelling errors were further classified into six patterns: (1) omission (e.g., *pump* for *plump*), (2) substitution (e.g., *timk* for *tink*), (3) reversal (e.g., *cilch* for *clich*), (4) insertion (e.g., *gaster* for *gast*), (5) combination of the above error patterns (e.g., *che* for *chin*), and (6) random error patterns (e.g., *wiu* for *clich*). To identify specific graphemic representations in the spelling errors, under each pattern, there were several categories such as omission of consonant diagraph, and omission of vowel etc.

Children's spelling performance (i.e., performance on the spelling dictation task and the writing task) showed differences between different levels of phonological awareness, and so did their spelling patterns. Given the results concerning the group effect on spelling scores (significant group differences in the spelling dictation task emerged except for those between the high and middle phonological awareness groups), in this study, spelling patterns from both middle and high phonological awareness groups are discussed together in comparison with those from the low phonological awareness group. Following is a comparison and contrast of spelling patterns of low, middle and high phonological awareness groups.

As for the low phonological awareness group's misspellings collected from the spelling dictation task (N= 9), the spelling error pattern that occurred most frequently was substitution (i.e., 32.17%), and other misspellings were recognized as combination of the above error patterns (31.30%), random error patterns (20%), omissions (14.78%) and reversal error patterns (1.74%) in order of the rate of

occurrence, respectively. Table 4.8 presents the proportion of each misspelling pattern from the low phonological awareness group in comparison with that from the middle and high phonological awareness groups.

Table 4.8

Comparison of Misspelling Patterns across Different Phonological Awareness Groups

Rank	Low phonological awareness group (N= 9)			Middle and high phonological awareness group (N= 19)		
	Error pattern	Number	Rate	Error pattern	Number	Rate
1	Substitution	37	32.17 %	Substitution	119	56.94 %
2	Combination of the above error patterns	36	31.30 %	Combination of the above error patterns	53	30.99 %
3	Random error pattern	23	20.00 %	Omission	16	7.66 %
4	Omission	17	14.78 %	Random error pattern	13	6.22 %
5	Reversal	2	1.74 %	Insertion	6	2.87 %
	–	–	–	Reversal	2	0.96 %

Note. There were 142 spelling errors collected from the low phonological awareness group, whereas there were 329 spelling errors retrieved from the middle and high phonological awareness groups.

Several characteristics of the low phonological awareness group's spelling patterns are of interest. First of all, despite that no random misspellings were observed in the story rewriting products of the low phonological awareness group, the children from this group produced more random erroneous spelling error patterns in the spelling dictation task. Compared to the middle and high phonological awareness groups, more random error patterns were from the low phonological

awareness group (i.e., 36.11% versus 63.89%). Spelling errors such as *hailk* for *chin*, *ipu* for *mewp*, *dlse* for *gresh*, *clie* for *plump* and so on were seen in the responses by children from this group. As shown in these examples, the errors were just random letter strings which were not related to the sound structure of the target spelling in any aspects.

The second point worth noting is that in the spelling dictation task, except for the 32 unanswered responses from this group of children, several spellings from these children were not complete. Five out of nine children showed difficulties in representing all phonemes with graphemes in words. In other words, there were only one or two letters in their responses; for example, a participant wrote *je* for *dreg*, and another one wrote *d* for *chin*. It must be noted that the children in this group could not even represent initial phonemes with accurate correspondent graphemes while being asked to do the English dictation.

Third, omissions of vowels were found in three out of nine children in this group. A good illustration of this is the dictated spellings like *gls* for *gresh*, *jst* for *trace*, *grsh* for *gresh*, *srnt* for *stoot*, and *fn* for *frun*. Another child's spontaneous spelling, *said* as *shd*, in the story rewriting task also exemplifies this. In addition to omission of vowels, children in this group also made spelling errors that were categorized as consonant diagraph reductions. Take the dictation words *clich* and *gresh* as an example, three children wrote only *h* when spelling *–ch* or *–sh* sounds (e.g., *klih* for *chlich*; *greh* for *gresh*). More than half of the children in this group were able to spell *–ch* or *–sh* sounds in words. However, none of the children from this group were able to correctly spell the sound *ch-* in the word *chin* in the spelling dictation task. Two children wrote *chin* as *h* with some adjacent letters which were incomprehensible both conventionally and phonetically (i.e., *ha* and *hailk*). Two other children, by contrast, substituted *ch-* sound as *tr-* and *th-*, and successfully

represented the *–n* sound in this word (i.e., *trent* for *chin*; *than* for *chin*). When considering the position of the consonant diagraph, *ch* in words (i.e., *chin* versus *clich*), the participants with lower phonological awareness appeared to have more difficulties to spell words that begin with the *ch-* sound than those that end with the *–ch* sound.

With regards to spelling patterns of the children who had better phonological awareness (N= 6 in high phonological awareness group; N=13 in middle phonological awareness group), over half of misspelling patterns collected from the spelling dictation task (i.e., 56.94%) were placed in the category of substitution. Other spelling errors were recognized as combination of the above error patterns (30.99%), omissions (7.66%), random error patterns (6.22%), insertions (2.87%) and reversal error patterns (0.96%) in order of rate of occurrence, respectively (see Table 4.8). It should be noted that most of their spellings obtained from the spelling dictation task (i.e., 327 out of 378 responses) were not conventionally correct; however, their errors were not just nonsense like some of the spelling responses from the low phonological awareness group. Specifically, in most cases, these patterns were comprehensible and systematic. Other than that, the children from both middle and high phonological awareness groups tended to omit the final alveolar (lenis consonant), *d,* in the word, *yed*, in the spelling dictation task. Over one third of children (i.e., seven out of 19) were observed to spell *yed* as *ye, ya* or *yea*. However, they did not show any difficulties in spelling alveolars, *d, t* or *s*, the initial sounds in words like *drag, tink* and *stoot.* It is worth noticing that children from the middle and high phonological awareness groups made much more errors that were classified as the types of another word spelling correctly or another word misspelled than children from the low phonological awareness groups (i.e., 82.55% versus 17.45%). On account of this, not many salient misspelling patterns made particularly by the

children in the middle and high phonological awareness groups were found except for the aforementioned patterns.

While spelling errors in different phonological awareness groups (i.e., low versus middle and high) differed in the aforementioned aspects, for all groups of children, substitution accounted for the largest proportion of their misspelling patterns. Most importantlly, similar misspelling patterns can be found in the children across groups. To begin with, vowel digraph substitutions occurred frequently in the spelling patterns from the children with either lower or higher phonological awareness. The results revealed that the children tended to replace vowel digraphs such as *oo, a_e, ee, ea* and *i_e* with short vowels. Dictated spellings like *tres* for *trace*, *wep* for *weep*, and *pit* for *pite* illustrate this point. Other examples in this category include spellings collected from the story rewriting task, such as *had* for *head*, *hot* for *hate*, and *whop* for *woop*. Another point is that substitutions of consonant clusters were also observed in the responses of children from the three groups. Some children were found to use one single letter to substitute for a consonant cluster in the spelling dictation task, for example, *g-* for *br-*, and *g-* or *j-* for *dr-* (i.e., *grank* for *bring*; *jak* for *dreg*; *jonm* for *drome*), whereas others were shown to write another consonant cluster instead, for example, *gr-* for *dr-*, and *tr-* for *br-* or *dr-* (i.e., *grack* for *dreg; trun* for *drome*).

In conclusion, while substitution was found to be the most frequent error pattern among all groups of children, children with different levels of phonological awareness still showed differences in considering specific misspelling patterns that they made. The spelling patterns of the children in the middle and high phonological awareness groups appeared to be more systematic compared with those of the children in the low phonological awareness group. To those with poorer phonological awareness, spelling words with consonant diagraphs (i.e., *ch* or *sh*) appeared to be challenging in

that many of them dropped one of the grapheme when doing dictation. In addition, they were found to leave out vowels in words. As for the children with higher phonological awareness, spelling patterns such as omissions of final alveolars were observed. Despite the above differences, each group of children seemed to have difficulties in spelling vowel digraphs (i.e., *ee*) and consonant clusters (i.e., *br*-); therefore, they made misspelling patterns like substitutions of vowel digraphs or consonant clusters.

Summary of the Results

In answering the three research questions, the present study therefore aims at: (1) spelling performance across different phonological awareness groups; (2) the role of phonological awareness in spelling performance; and (3) types and patterns of spelling errors for different levels of phonological awareness. The major findings in the present study are summarized below:

1. Significant differences in spelling performance among different groups of phonological awareness (i.e., low, middle and high) were demonstrated. The middle and high phonological awareness groups each scored significantly better on the spelling dictation task than the low phonological awareness group, whereas the middle and high phonological awareness groups showed comparable spelling performance.
2. There was a strong and significant correlation between the two variables (i.e., spelling performance and phonological awareness). It is recognized that phonological awareness alone significantly contributed to the prediction of spelling scores. However, the inclusion of the children's performance on the reading and writing subset of CYLET greatly reduced the contribution of phonological awareness to spelling. Literacy skills seemed

to be a stronger predictor of spelling performance.

3. There are several points worth noting with respect to types and patterns of spelling errors for the Taiwanese EFL fourth graders:

   (1) The children predominantly made semiphonetic spelling errors compared with other types of spelling errors (i.e., phonetic error, nonphonetic error, correct initial sound, another word correctly spelled and another word misspelled). Stated another way, they were more likely to produce spelling errors which were partially phonetically acceptable.

   (2) The children in the low phonological awareness group made more random spelling error patterns than other groups and showed difficulties in spelling consonant diagraphs, the *ch*- sound in particular. One third of the children showed the tendency not to spell vowels in words.

   (3) Compared to the low phonological awareness group, children with a better command of phonological awareness appeared to omit the final alveolar when spelling *yed*. Overall, their spelling patterns were more systematic than those of the children with poor phonological awareness.

   (4) Children across all phonological awareness groups made more spelling errors that were classified as substitutions. Their misspellings were in the categories of vowel digraph substitution and consonant cluster substitution.

CHAPTER FIVE

DISCUSSION

Overview

This chapter presents the discussion on the findings of this study based on the three research foci presented in the Result section. For each focus, the major findings are interpreted and discussed. Several implications drawn from the results are given as well. Following the research discussion in the three areas of concern, a brief summary is offered.

Spelling Performace across Different Phonological Awareness Groups

In this study, the first research question concerns whether Taiwanese EFL fourth graders with different phonological awareness show significantly different performance in spelling unfamiliar English words. A one-way ANOVA analysis demonstrated that there was a significant group effect on spelling dictation scores, whereas post-hoc analyses showed there was no significant difference between the middle and high phonological awareness groups regarding spelling scores. The aforementioned findings suggest two points for consideration. The first point is that there were large differences in spelling development among Taiwanese EFL fourth graders. The connection between spelling performance and phonological awareness in these children is the second point.

To begin with, the difference regarding spelling performance was at two extremes, that is, either at a relatively high level or at a very poor level with few in the middle range. A possible explanation for the large distance in spelling skills is that regardless of formal school English education, each child had differing types of English learning experience and differing amount of English exposure outside of

regular classroom instruction. The results of the survey concerning the participants' English learning background showed that the children's English learning experience ranged from only one to up to six years because they began taking English lessons at different ages. It is no wonder then that they showed divergent performance when doing dictation of English words. This situation may be common in EFL contexts. It seems inevitable that students may vary greatly with regards to English exposure which would affect language abilities including spelling performance and phonological awareness.

As indicated by the present study, in recent years considerable concern has arisen over the bimodal distribution phenomenon in English education in Taiwan (Electronic Journal of English Education, 2007). In a column of the Electronic Journal of English Education (2007), the large discrepancy in English proficiency of Taiwanese EFL learners are attributable to the uneven distribution of education resources, parents' unreasonable expectation on children, limited amount of formal English education, different socio-economic background of individuals, and so forth. These reasons together may explain why the participants in the present study had different exposure to English outside of formal education. As a result, they exhibited markedly divergent English spelling performance and phonological awareness despite that they took the same English course at school.

In Huang's study (2006) on Taiwanese third graders' English literacy development, she also observed this bimodal distribution of EFL children's proficiency including letter-name knowledge, literacy skills, spelling ability and so on. Likewise, as suggested by Huang, the noteworthy discrepancy in Taiwanese children's English ability may be due to the distinct amounts of English exposure among them. She pointed out that a majority of her participants did not have access to English until they entered formal school setting, whereas the remainder had established basic

English skills when receiving regular education at school. These novice English learners might not be able to achieve in English language probably because they found it hard to catch up learning with those were considered advanced learners. Most importantly, Huang reported that many of them were quite passive toward English lessons. In view of the serious bimodal distribution of English proficiency in Taiwanese children, not only do EFL elementary school teachers have difficulty in implementing English instruction, but they also face a problem of saving students who lack motivation and are even at risk for learning. How to mend the large discrepancy in English ability, without doubt, has a central place in EFL education in Taiwan.

With respect to the results concerning group differences, another point worth noting is that children's spelling performance may be highly pertinent to their phonological awareness. Specifically, those with better phonological awareness could employ their spelling strategies well on spelling dictation tasks. This is generally in agreement with the results of Perin's (1983) research on the link between English spelling skills and phonemic segmentation performance in 51 high school students in London. In Perin's study, the participants were allocated into three different groups based on English reading and spelling scores: (1) a good speller and reader group, (2) a poor speller and reader group, and (3) a good speller but poor reader group. With respect to their performance on the first phonemic task, the spoonerism task, the first group scored significantly higher than each of the other groups, but the second and the third groups showed nonsignifcant differences. Similar to these findings, the first group of students also performed significantly better on the second phonemic task, the segment judgment task, whereas the other two groups did not display statistically differing performance on this task. As Perin reported, these findings suggest that those with better spelling skills probably apply

their “spelling knowledge” to phonemic tasks more effectively compared with those with poorer spelling skills.

The findings in Perin’s research appear to parallel those in the present study in that the association between phonological awareness and spelling performance was underlined. However, the direction of Perin’s research differs from the present study. Its focus was on the effect of spelling performance on phonological awareness, whereas the present study was concerned with the phonological awareness group differences in spelling scores. In fact, it should be noted that it is likely that the “spelling knowledge” Perin mentioned refers to how an individual employs knowledge of grapheme-phoneme correspondences to write. Thus, we may reasonably conclude that good spellers have better understanding of speech-sound system of words, that is, phonological awareness. In considering this, it is believed that the implications drawn from Perin’s findings are in line with those in the present study. Children with higher “phonological awareness” may then more effectively exploit their “spelling skills” during English dictation.

In addition to Perin’s findings, the present study is also in accord with Plaza and Cohen’s paper (2004). Plaza and Cohen examined whether French-speaking primary school children’s spelling performance was predicted by their phonological awareness, morphological skills or naming speed. Similar to Perin’s research, in their study, the participants were divided into three different groups: (1) a group of average spellers, (2) a group of weak spellers, and (3) a group of very weak spellers. The ANOVA analyses showed that there was a significant group differences in grapheme-phoneme correspondence mastery, that is, the participants’ performance on the spelling tasks. Furthermore, Plaza and Cohen reported that compared to average spellers, the groups of weak and very weak spellers scored significantly lower on the phonological awareness, morphological skills, and naming speed measures. What these findings

imply is that the children's spelling ability is seen to be relevant to multiple-linguistic knowledge such as phonological awareness and morphological knowledge. This is compatible with the present study despite the fact that the direction of group effect in the present study is different from that in Plaza and Cohen's research. In other words, this study examined phonological awareness group effect on spelling scores, whereas Plaza and Cohen emphasized spelling ability group differences in phonological awareness measures in their research. It is important to note that Plaza and Cohen proposed that children had a poor command of grapheme-phoneme correspondences (i.e., the groups of weak and very weak spellers) could not master spelling strategies well for long term, which corresponds with the stance taken in the present study.

Although the present study differs from studies of Perin (1983) and Plaza et al. (2004) in the language background of the participants and the use of measures, it echoes the findings of their studies by demonstrating the relevance of phonological awareness to spelling performance. Further, the present study enhances the previous studies' findings in two aspects. First, it provides cogent evidence supporting that even for EFL learners, students with better phonological awareness probably have higher scores on the spelling tasks. Second, given that the present study examined the group differences of phonological awareness in spelling performance, not the group differences of spelling performance in phonological awareness, it may be more effective when explaining the influence of phonological awareness on spelling skills. Moreover, the findings suggest that in EFL contexts, the training in phonological awareness may be of primary consideration when developing children's spelling skills. To ascertain whether phonological awareness is the key to spelling success for EFL learners, it is crucial to discuss the results concerning the causal relationship between phonological awareness and spelling performance.

The Role of Phonological Awareness in Spelling Performance

The second research question asks whether Taiwanese EFL fourth graders' phonological awareness relates to and predicts their spelling performance. The correlations show a strong relationship between phonological awareness and spelling dictation scores, and most importantly, the regression analyses demonstrate that phonological awareness alone explained a significant variance in spelling performance. A somewhat surprising finding is that phonological awareness is overridden by scores on the reading and writing subset of the CYLET (i.e., literacy skills) when predicting spelling scores. These findings lay some important theoretical and practical assumptions.

First, not only do the results of the correlation analyses bolster the conclusion drawn from the ANOVA and post-hoc analyses, but they also support the findings of previous studies (e.g., Caravolas, Hulme, & Snowling, 2001; Jongejan, Verhoeven, & Siegel, 2007; Muter & Snowling, 1997; Ouellette & Sénéchal, 2008; Plaza & Cohen, 2006). In these studies, a clear relationship between phonological awareness and spelling ability was observed in both monolingual children and ESL learners. Consistent with the earlier findings, the present study showed that phonological awareness appeared to play a part in learning to spell even for Taiwanese EFL school-aged children. Specifically, the results match with Muter and Snowling's (1997) observations about the correlation between phoneme awareness and spelling performance for English-speaking children. Muter and Snowling's research differs from the present study in that they chose English monolingual children as participants and assessed conventional spellings mainly. Additionally, the present study also complements Jongejan, Verhoeven and Siegel's research (2007) on the precursor skills of spelling in L1 and ESL school-aged children. Compared to the present study, Jongejan et al. focused more on predictor variables of spelling performance

besides phonological awareness, and used very different measures of variables[1]. In spite of the differences, their research along with the present study confirmed that other than English monolinguals, for ELLs, those who obtain higher scores on phonological awareness measures have better performance in spelling English words.

Second, with respect to the regression findings, the present study offers support to numerous studies that point to the positive impact of phonological awareness on children's spelling (e.g., Adam, 1990; Bradley & Bryant, 1983; Caravolas, Hulme, & Snowling, 2001; Jongejan, Verhoeven, & Siegel, 2007; Lundberg, Olofsson, & Wall, 1980; Plaza & Cohen, 2003; Plaza & Cohen, 2004; Plaza & Cohen, 2006; Torneus, 1984). The present study showed that phonological awareness was a significant predictor of EFL children's spelling when it was entered into the regression model alone. What this indicates is that similar to English-speaking and ESL children, EFL learners may also draw upon their knowledge about phonology of spoken language when spelling English words, and most importantly, training in phonological awareness seems to be central to EFL spelling development. This implication generally echoes phonological intervention research on both L1 and L2 acquisition (e.g., Ball & Blachman, 1991; Brady et al., 1994; Castiglioni-Spalten & Ehri, 2003; Chang, 2002; Chang, 2008; Chen, 2006; Frederickson & Wilson, 1996; Hsu, 2003; Lee, 2008). Along with the results of these intervention studies, the present study also suggests that enhancing ELLs' phonological awareness could lead to their achievement in spelling. As proposed by Jongejan et al. (2007), additional training in phonological awareness in still indispensible for ESL children despite the fact that they have similar spelling performance as their monolingual counterparts. In this respect, given the predictive power of phonological awareness revealed in the present

[1] In Jongejan et al.'s study (2007), to tap spelling ability, the participants were asked to spell monosyllabic words that were presented in sentences.

study, language teachers' explicit instruction in sound patterns of words appears to be prerequisite to facilitate EFL children's spelling ability.

However, it must be further noticed that once children's performance in the literacy tasks were considered, phonological awareness was no longer a predictor of spelling. This indicates that Taiwanese EFL children may rely more on reading and writing abilities rather than phonological awareness to spell English words. The finding generally matches with the research by Bhattacharya (2006) that shows middle school children recognized as good readers significantly spelled more syllable segments than children in the poor-reader group. Additionally, the conclusion derived from the regression results of the present study is in moderate agreement with Treiman's claim (1993) that print exposure was probably a major cause of correct spellings from first-graders. The present study, however, is incongruent with the literature which has confirmed that phonological awareness is the most influential underlying component of children's spelling development. This unexpected result may be explained by considering: (1) the overlapping of phonological awareness with literacy skills; and (2) the differences between EFL and ESL contexts.

Firstly, the more likely explanation for phonological being overridden rests in its connection with literacy skills. According to Gillon (2004), phonological awareness shares a reciprocal relationship with literacy ability. Numerous studies (e.g., Adam, 1990; Cataldo & Ellis, 1988; Wang, 2000) have noted that reading is tied closely with phonological awareness. In line with the findings in the present study, in Wang's longitudinal study (2000), the predictive power of phonological awareness in spelling of Chinese ESL preschoolers was affected by reading skills at the last time of data collection. As pointed out by Wang, when predicting children's spelling performance, there may be an overlapping of phonological awareness with reading skills. On these grounds, we may reasonably assume that the predictive power of

phonological awareness must overlap with that of literacy skills in explaining Taiwanese EFL children's spelling performance.

The second reason for the considerable influence of literacy skills' on the contribution of phonological awareness to spelling is the fact that learning contexts for EFL students differ greatly from those for English monolinguals or ESL children, in terms of routes of English learning. On account of the differences, the regression findings obtained from the Taiwanese EFL fourth graders in the present study slightly go against those from the previous research on L1 and L2 learners.

In EFL classes, especially in Taiwan, literacy skills are usually emphasized at a very early learning stage along with oral skills compared with monolingual or ESL norms. As pointed out by Huang (2005), the English ability of Taiwanese children was considerably influenced by educational institutes outside of the formal education system. To cater to most parents' expectations and to train children in test-taking skills, children were exposed to grammar, spelling and reading practice more often than oral practice despite that according to Ministry of Education, R.O.C. (2001), the emphasis of English education in primary grades is on communicative skills. Additionally, in view of learning context, for monolingual and ESL children, reading and writing skills are enhanced at school after the development of oral skills at home or in the community. Although ESL learners may have limited access to verbal English practice before they enter school, they have abundant exposure to listening and speaking in English which is the ambient language. As opposed to monolingual and ESL children, EFL learners generally learn English four skills simultaneously, but literacy skills are typically emphasized more. This may account for why literacy skills could override phonological awareness when predicting the Taiwanese fourth graders' spelling.

In general, the data presented here may lead us to believe that literacy skills and

phonological awareness both play a critical role in EFL children's spelling performance. In view of this, it is suggested for teachers in EFL contexts to consider methods like teaching grapheme-phoneme representative skills or emphasizing literacy activities to benefit students' spelling performance.

Spelling Patterns across Different Phonological Awareness Groups

The last research question concerns the types and patterns of spelling errors made by Taiwanese EFL fourth graders with different phonological awareness levels. In the present study, 471 misspellings archived were classified into six types, and the analysis showed that most of the children's spelling errors were considered semiphonetic. The second most frequent type observed was the another-word-correctly-spelled error. As for spelling patterns, the participants all showed the tendency to make substitution error patterns. They substituted vowel diagraphs or consonant clusters in words. With respect to group differences, the children from the low phonological awareness group appeared to make more random errors, incomplete spellings, vowel omissions, and consonant diagraph reductions. Compared to the low phonological awareness group, the children from the middle and high phonological awareness groups showed better consistency in spelling attempts. The most salient but minor spelling errors from these two groups were omissions of final alveolars. Several insightful implications can be learned through carefully looking at these results.

Semiphonetic Spelling Errors and Another-Word-Correctly-Spelled Misspellings

First, the findings of the children's spelling error types are similar to those in Greenberg, Ehri and Perin's (2002) research on the misspellings of English monolingual children in comparison to adults. To be specific, phonetic and

semiphonetic spelling error types accounted for more than 70% of misspelled words produced by the children. In particular, Greenberg et al. proposed that children's preference for employing graphophonemic skills to spell did not alter even when the dictated words become harder. Their findings, however, slightly differ from the results of the present study in that the participants in their study were not apt to make a large proportion of semiphonetic errors. Instead, their spelling errors mostly fell into the category of phonetic errors, which ranked as the third misspelling type for the children in the present study. It must be noted that in the present study, phonetic errors as well as nonphonetic errors both accounted for approximately 11% of the children's misspellings. The Taiwanese children's tendency to make many more semiphonetic errors than phonetic errors could be explained by considering their first language background. Based on the dual-route theory, we may assume that English users rely on a phonological route when spelling English words. Most importantly, with a logographic language as the L1, the Taiwanese children are not as familiar with grapheme-phoneme conversion process as monolingual counterparts when doing dictation. This could be the reason why the monolinguals in Greenberg et al.'s research appeared to make more phonetic spelling errors as opposed to the Taiwanese children in the present study. Taiwanese children made spelling errors that are partially phonetically plausible rather than misspellings that are mostly phonetically acceptable. This is in tune with Cook's (1997) remark that ESL learners have certain difficulties to use the phonological route to spell, especially problems with mapping graphemes to phonemes.

Another interesting finding is that the Taiwanese EFL children also had an inclination to write other words for the target ones (e.g., *chase* for *trace*), and thus misspelled them. This finding brings out three interesting points. First, similarly, Greenberg, Ehri and Perin (2002) reported that adult literacy learners made this type

of error significantly more than school-aged children. They attributed this to adults' poorer skills in grapheme-phoneme correspondences and their preference for lexical-guessing strategies. Such explanation may account in part for the children's use of other words to do dictation. That is, the Taiwanese children may be apt to make a guess to finish the spelling dictation task. To be specific, the children may not be used to deal with unfamiliar dictated words. Generally, Taiwanese children are usually asked to memorize words and then are tested through spelling tasks. Given that they have limited access to practice sounding-out strategies to spell, they are more likely to write known words that contain similar sounds as the target ones (e.g., *week* for *weep*) to avoid revealing their difficulties to the researcher.

Second, it is noteworthy that a poor command of grapheme-phoneme correspondences should not be used to explain the phenomenon that the Taiwanese children spelled other words as target ones. Most of the another-word-spelled errors were made by the children from the middle and high phonological awareness groups. In view of these children's higher scores on the spelling dictation task, they were supposed to have better skills to spell. This leads to the possibility that the children's another-word-spelled errors reflect a particular spelling strategy that EFL children tended to draw upon when spelling unfamiliar words. Corresponding to a case reported by Gillon and Dodd (1994; 1995) in which one participant was found to spell by using known words (i.e., analogy strategies), the Taiwanese children probably also drew upon familiar words to help in the spelling attempts. When being asked to spell difficult words or even pseudowords, known words that contain similar sound units may first come into the Taiwanese children's mind. They may either successfully spell one word by means of this analogy strategy, or mistakenly misspell it due to "a slip of the mind (Ibrahim, 1978) ." However, if the children were inclined to apply the analogy strategies, they would not produce misspelled words that

were apparently other words. The above interpretation is thus needed to be treated with caution. It is important to take account of another possible explanation for the frequent occurrence of another-word-spelled errors in the Taiwanese children.

In considering that the children with better phonological awareness scored statistically higher on the reading and writing subset of the CYLET, we can assume that these children may be often considered good English learners. On account of these children's high accomplishment in English, they may be apt to avoid making mistakes to embarrass themselves. It is likely that they tended to derive words from their own lexicon instead of taking risk of decoding and encoding words that sounded unfamiliar to them. To them, this might be a safer move to complete the spelling dictation task. What the findings regarding children's spelling error types imply is that EFL learners, Taiwanese children in particular, may lack of experience with invented spelling which has already been recognized as an important factor of literacy development and English teaching (Gentry, 2000). If the children in the present study had well developed grapheme-phoneme representative skills through spelling trial and error, they would have not substituted unfamiliar words with other words in the spelling dictation task. Memorization indeed has an effect on learning to spell, whereas the ability to manipulate sounds and letters can help students master spellings for long term (Gillon, 2004). Like reading low-frequency or unfamiliar words, for spelling difficult words, it is also essential to assess sound patterns of words and segment words into smaller components. Above all, based on the implications presented previously, emphasizing explicit phonics training, teaching analogy strategies, and encouraging invented spelling attempts are believed to be effective in preparing students to deal with unfamiliar words when spelling.

Substitution Spelling Error Patterns

In addition to misspelling types, the results concerning the Taiwanese children's error patterns across different phonological awareness groups should be noted as well. Generally congruent with the study of Lombardino et al. (1997), the present study also observed that substitution was the most frequent occurring error pattern. In Lombardino et al.'s research, for English-speaking preschoolers, the top two misspelling patterns that occurred most frequently were errors, *bak* for *back* and *peekt* for *peeked*. These two error patterns were referred to as consonant diagraph substitution and substitution of voiceless for voiced counterpart, respectively. Different from the children in Lombardino et al.'s study, the Taiwanese children in the present study substituted vowel diagraphs as well as consonant clusters most frequently, which suggests the differences between L1 and L2 learners in spelling performance. As showed by Sutcliffe et al. (1999), L2 children significantly made more misspellings that were classified as vowel substitution error patterns compared with English-speaking deaf children. Sutcliffe et al.'s finding, along with that of the present study indicate that L2 children may have more difficulties in regard to spelling vowels. Given that vowels generally can be spelled in more than one way (e.g., vowel diagraphs), the large proportion of the Taiwanese EFL children's vowel diagraph substitutions may be attributable to the fact that they have little knowledge of ways to spell vowel sounds.

With respect to consonant substitution error patterns, for the Taiwanese children, the inaccurate alternations of consonant cluster, *dr-*, resemble those of the L1 participants in Lombardino et al.'s study (i.e., *jress* or *gress* for *dress*). In the present study, the consonant cluster, *dr-*, was substituted as *j-*, *tr-*, *gr-*. Further, compared to Lombardino et al.'s findings, the Taiwanese EFL children had more problems with spelling consonant clusters rather than voiced/voiceless consonants. Most

importantly, through carefully analyzing their error patterns, it is apparent that they show a wide range of consonant substitutions in their spelling errors. Errors like *jonm* for *drome*, *trun* for *drome*, *grack* for *dreg*, *jak* for *dreg*, or *grank* for *bring* exemplify this. This finding reinforces Cook's claim (1997) that ESL learners make considerably more spelling errors that are in the category of consonant substitution by pointing out that L2 learners may have a poor understanding of mapping sounds of consonant clusters to correspondent letters.

Spelling Error Patterns across Phonological Awareness Groups

In order to gain a better understanding of children's misspelling patterns in relation to their grapheme-phoneme knowledge, it is necessary to contrast specific spelling error patterns across different phonological awareness groups. In the present study, the children from the low phonological awareness group made more random error patterns, whereas those from the middle and high phonological awareness groups made spelling errors that were more comprehensible. These findings clearly support the presented statistical analyses given that the relevance of phonological awareness to children's spellings is demonstrated. Further, the findings are compatible with the literature that notes the role of phonological awareness in spelling errors (e.g., Hu, 2003; Kamii, Long, & Manning, 2001; Liow & Lau, 2006; Masterson & Crede,1999; Sutcliffe, Dowker, & Campbell, 1999). These studies have indicated that both L1 and L2 learners who have better phonological awareness are more effective in applying their understanding of grapheme-phoneme correspondences to spelling English despite that the words they spelled are conventionally inaccurate. Nevertheless, the present study specifically pinpoints the spelling problems that children with poor phonological awareness may have. That is, they may show the tendency to produce more random error patterns, fail to write

complete sounds in words, or drop vowels when spelling. As pointed out by Gillon (2004), poor phonological awareness may account for children's constant spelling difficulties. The reason for the above spelling problems is that those who are recognized as low phonological awareness learners may have rather unclear grapheme-phoneme knowledge and poor phonological representation skills that are necessary for the spelling process. What this implies is the necessity of direct phonological awareness training for English learners who constantly perform poorly in spelling words.

Additionally, children in the low phonological awareness group were observed to omit the consonant digraphs, *sh* and *ch* in the words, *gresh* and *clich*, and fail to spell *ch-* in the word, *chin*. Children's difficulty in spelling consonant diagraphs (i.e., *cin* for *chin*) can be found in Lombardino et al.'s study (1997) as well. The present study, however, differs from Lombardino et al.'s in that the Taiwanese children with poorer phonological awareness mostly dropped the letter *c* and wrote *h* only when spelling *ch* in the words, *chin* and *clich*. The difficulty of representing consonant diagraphs for either L1 or L2 children could be an explanation for these findings. According to Treiman (1993), it is particularly hard to spell grapheme combinations (e.g., *sh*) that are represented by a single phoneme. In view of this point, Wang and Geva (2003) suggested that instruction in how to spell diagraphs is essential for both monolingual and ESL children. It must be further noted that in the present study, the children with better phonological awareness were not apt to misspell words that contained *ch* or *sh* sounds. In this regard, there is likelihood that we can still see the improvement in spelling consonant diagraphs for those with poorer phonological awareness if intensive phonics instruction is given. Additionally, it is believed that explicitly underscoring consonant digraphs when teaching phonics could be beneficial to these children, albeit representing sounds like *ch* or *sh* with correct letters is an

intricate task by nature.

Lastly, as for the children from the middle and high phonological awareness groups, they were found to omit the alveolar, *d* in the word, *yed*. Generally speaking, spelling a single consonant does not cause difficulties for children with better phonological awareness. It is not entirely convincing to use children's unstable phonological awareness performance to account for their difficulty in representing the final grapheme in *yed*. Instead, the more likely explanation may rest in the position of the phoneme. A study of Treiman, Berch and Weatherston (1993) has already confirmed that the context of a consonant could affect children's spelling performance in this consonant. Their omission of could be a result of the position of the phoneme. Specifically, Treiman et al. demonstrated that children could spell initial consonants significantly better than final consonants with respect to words with CVC structure. This finding has to be taken into account when explaining the Taiwanese children's omission of the final consonant in *yed*. Although the lenis consonant *d* is often articulated voiced, it is almost devoiced when occurring in final position of a word (Collins & Mees, 2008). On this ground, we may reasonably assume that for the Taiwanese children, omitting *d* in *yed* is due to the fact that *d* was not articulated as loudly as its surrounding phonemes. In short, the position of consonants affects the way how we articulate them. To enhance children's spelling performance, phonological analysis instruction—in which children learn to use particular phonemes in different positions of words—deserves practitioners' attention (Treiman, Berch, & Weatherston, 1993). Other than explicitly emphasizing grapheme-phoneme correspondences that children may have problem with, great importance is also attached to teaching these correspondences in various contexts. Considering teaching consonant *d*, words like *die* (initial), *cider* (medial) and *side* (final) can be used as different contexts for learners to practice different degrees of voicing.

Summary of the Discussion

In summary, the major findings of the present study raise several points worth discussing. First, in line with previous studies (Perin, 1983; Plaza & Cohen, 2004), this study demonstrated a significant group effect on spelling scores in the Taiwanese EFL children. The findings not only underscore the large differences in Taiwanese EFL learners' spelling ability, but also establish the strong relationship between spelling performance and phonological awareness.

Further, inconsistent with the literature (e.g., Caravolas, Hulme, & Snowling, 2001; Jongejan, Verhoeven, & Siegel, 2007; Plaza & Cohen, 2006), the regression analyses showed that phonological awareness failed to be a significant predictor of spelling when literacy skills were considered. However, the results generally echo Bhattacharya's study (2006) and Treiman's claim (1993) by noting the importance of reading development in spelling achievement. Possible explanations for the unexpected regression findings could be the overlapping of phonological awareness and literacy skills (Wang, 2000), together with the differences between EFL and ESL contexts. The overall results indicate that both phonological awareness and literacy skills play a part in learning to spell for Taiwanese EFL school-aged children.

As a final point, by analyzing spelling error types and patterns, how the Taiwanese EFL fourth graders applied their knowledge about phonology to spelling can be seen. Their large proportion of semiphonetic misspellings shows that L2 learners probably have difficulty in utilizing the phonological route to spell (Cook, 1997). The frequent occurrence of another-word-correctly-spelled misspellings implies that the EFL children may have a tendency to draw on lexical-guessing strategies (Greenberg et al., 2002) or analogy strategies (Gillon & Dodd, 1994; 1995) when being asked to spell difficult words. This also suggests that the EFL children might not well develop their grapheme-phoneme representative skills, and therefore

appeared to spell unknown words as familiar ones. The discussion on misspelling patterns further reveals the L2 children's spelling problems, such as spelling vowel digraphs (Sutcliffe et al., 1999) and consonant clusters (Cook, 1997).

Interestingly, the results concerning misspelling patterns across groups are well in tune with the empirical evidence presented in this study by showing specific differences in spellings between learners with varied phonological awareness. These results also correspond to the studies on the role of phonological awareness in spelling errors (e.g., Hu, 2003; Kamii, Long, & Manning, 2001; Liow & Lau, 2006). The low phonological awareness group's random misspelling patterns and difficulty in spelling consonant diagraphs stress the essentiality of explicit phonological awareness instruction for EFL learners, poor L2 spellers especially. The middle and high phonological awareness groups' omission of the final lenis consonants in words could be a result of devoicing (Collins & Mees, 2008). This lays emphasis on phonological analysis instruction (Treiman et al., 1993) in EFL spelling development.

CHAPTER SIX

CONCLUSIONS

Overview

Albeit the importance of spelling in literacy development and the potential contribution of studying EFL children's spelling patterns, there has far been relatively little research into this area. In light of this, the present study investigated 28 Taiwanese EFL fourth graders' spelling performance in relation to their phonological awareness. Further, specific spelling error patterns made by them were discussed to offer a complete picture of how EFL learners with differing phonological awareness applied grapheme-phoneme principles to spell.

The data collection instruments used in the present study assessed English proficiency, phonological awareness, and spelling performance. The reading and writing subset of the CYLET served as the children's English proficiency baseline. A phoneme identification, a phoneme blending, and a phoneme manipulation tasks were conducted to test the children's phonological awareness. For spelling performance, a spelling dictation task consisted of 20 real words and pseudowords and a story rewriting task were given to the children. Spelling samples collected from the dictation task were analyzed mainly for phonological acceptability. Data analyses emphasized three aspects: (1) spelling performance across different phonological awareness groups; (2) contribution of phonological awareness to spelling scores; and (3) spelling error types and patterns.

The results concerning group differences reveal that scores on the phonological awareness tasks were indicators of performance on the dictation task. A one-way ANOVA and a Post-hoc analyses show that there was a strong group effect on spelling performance. Despite that children from the middle and high phonological

awareness groups did not show statistical differences in spelling scores, they appeared to significantly outperform children from the low phonological awareness group in this aspect. Not only do the findings confirm the connection between phonological awareness and spelling performance, but they suggest a noteworthy discrepancy in spelling ability among EFL school-aged children in Taiwan.

Further, all of the measures were strongly positively correlated. Although phonological awareness accounted for significant unique variance in spelling, it failed to remain significant after children's scores on the CYLET (i.e., literacy skills) were entered into the equation. The relation between phonological awareness and literacy skills and the dissimilarities between EFL and ESL learning contexts may explain this unexpected result. Nevertheless, the regression findings imply that both phonological awareness and literacy skills are essential variables in considering EFL children's spelling ability.

Lastly, the descriptive analyses show that most of children's misspellings fell into the type of semiphonetic errors. A majority of the participants were observed to use another word to spell the target one. Their spelling errors mostly were substitutions such as vowel digraph substitutions and consonant cluster substitutions. The children with poorer phonological awareness produced more random error patterns, made more incomplete responses, and frequently misspelled consonant diagraphs, such as *ch*. Those who had a better command of phonological awareness tended to omit the final consonant in the word, *yed*. Apart from pointing out the possible spelling difficulties that EFL children may encounter, the findings generally lend support to the view, reported above, that phonological awareness plays a critical role in spelling performance. The theoretical and practical implications, the limitations of the present study, and the suggestions for future research are presented below.

Implications of the Present Study

Several theoretical and pedagogical implications can be drawn from the present study. The results contribute to the growing body of literature on spelling development in ELLs in three aspects. First, the present study complements the previous research on monolingual and ESL children by demonstrating that for EFL learners, higher level of phonological awareness is related to better spelling ability as well. Second, this study also provides cogent evidence showing that spelling in English requires not only phonological awareness but also literacy skills for school-aged EFL children. Notwithstanding the regression results contrast with most of earlier studies; such findings may suggest a fruitful line of continued inquiry. Above all, the findings of the present study enhance the empirical evidence uncovered in the previous research by carefully looking at misspellings of EFL children. Through this, we can gain convincing evidence highlighting the importance of phonological awareness in EFL spelling performance. This also sheds light on the extent phonological awareness influences EFL learners' spellings.

Apart from the theoretical implications, the data of the present study also bring out three major pedagogical applications. Firstly, the correlation and regression findings help practitioners obtain a better understanding of what students draw upon during spelling. Based on the overall results, developing students' phonological awareness and introducing literacy activities seem to be beneficial for enhancing EFL children's spelling ability. Language teachers may consider using free writing activities in which children are encouraged to write (spell) what they say (Treiman, 1998). This provides children plenty opportunities of practicing grapheme-phoneme representative skills, which is necessary for effective spelling performance.

In addition, the findings regarding spelling scores across groups have implications for the instruction of spelling skills and phonological awareness in EFL

contexts. Specifically, to cope with the large discrepancy in children's spelling achievement, there are certain approaches. First, different spelling or phonological awareness tasks for students at different levels may be effective in solving this problem (Huang, 2006). Teachers are suggested to attune individual practice to each student's specific learning need; for instance, to poorer spellers, basic phonics exercises should be emphasized, whereas to better spellers, complex grapheme-phoneme correspondences can be taught. Heterogeneous group work (Cohen, 1994) in which students with varied English ability can learn from each other may also be helpful. For example, when cooperatively writing an essay, children will probably have different sources to learn conventional spellings or gain knowledge about various word formation strategies from each other when composing (Sipe, 2001). It must be noted that the findings also suggest that other than upholding learners' conventional spellings, EFL teachers should not overlook the value of invented spelling, for this can help students develop grapheme-phoneme representative skills. Given that beginning language learners' any attempt to match sounds to letters may be a good start in achieving in grapheme-phoneme correspondence (Silva & Martins, 2003), invented spellings (i.e., phonetic spellings) of children, especially for those with poor overall spelling performance, should be encouraged. Other than reinforcing spelling skills, this way may also has an effect on avoiding slow learners becoming demotivated towards future learning and mending the large discrepancy in EFL children's spelling performance.

The last point worth noting is that findings concerning misspelling types and patterns also underscore the importance of explicit phonological awareness training, and further suggest ways of facilitating spelling ability. The discussion on these findings indicates that teachers should consider spellers' common problems with dictation and emphasize grapheme-phoneme correspondence instruction needed for

them. To be specific, when teaching EFL children phonics rules, consonant clusters (e.g., *dr*), consonant diagraphs (e.g., *ch*) and vowel diagraphs (e.g., *ee*) ought to be emphasized. Further, in view of the large proportion of another-word-misspelled spelling errors made by the participants, it seems profitable to include analogy instruction to teach L2 learners "linking the known to the new (Sipe, 2001)." As maintained by Treiman (1998), learning how to use known word structures to spell unfamiliar words benefits children's spelling development. On these grounds, we can reasonably conclude that instructing analogy strategies may help EFL learners beyond early grade levels to develop spelling ability. As for the participants' omission of the final alveolar in the word, *yed*, this implies that practicing grapheme-phoneme correspondences in various contexts is necessary for EFL learners (Treiman, Berch, & Weatherston, 1993). When learning a specific grapheme-phoneme correspondence, teachers should teach it in different word positions. Through drills on different degrees of voicing, children can have a better understanding of grapheme-phoneme principles in English, and, hopefully, they can thus improve their spelling performance.

Limitations of the Study and Suggestions for Future Work

Despite the above-mentioned contributions, the present study has certain limitations that future research should be alerted to. First, given the small sample size in this study, the generalization of the results to other populations may be limited. Problems of generalizability are also due to the fact that an intact sample was used and that the participants' school differed from most public elementary education systems in English instruction. To gain more precise insights into the precursor skills of EFL children's spelling, future research has to be carried out in various settings.

The second shortcoming concerns the limited variables examined in this study. Children's spelling performance is accounted for by many factors other than phonological awareness (Apel, Masterson & Niessen, 2004; Wasowicz, 2009). While numerous studies consistently suggest that phonological awareness is the most influential variable of spelling, to fully investigate EFL children's spelling development, more research is needed on the shared influence of various predictors such as morphological awareness or visual attention on spelling. In considering the unanticipated regression results of the present study, extensive research should be undertaken to continue pursuing this line of investigation into EFL school-aged children in order to determine the role of literacy skills and phonological awareness in spelling performance, respectively.

As a final point, given that the participants had differing English learning experiences outside of the formal education, some of them may be familiar with particular testing words in the dictation task. This may affect in part the results derived from spelling analyses. The limited time for the spelling rewriting task probably restrict the findings concerning misspelling types and patterns as well. For future work, it is recommended to deal with more words in differing structures. Having children spelled different words with the identical clusters or words with the same grapheme that is in differing position may also help to extend discussion of this area of concern. Apart from these suggestions, further research can consider prolonging the time frame for completing a writing task or increasing the numbers of employing writing tasks. Hopefully, this may provide a more thorough results unveiling EFL children's spontaneous spelling errors that the present study might overlook.

REFERENCES

Adams, M. J. (1990). *Beginning to read*. Cambridge, Massachusetts: The MIT Press.

Apel, K., Masterson, J. J., & Niessen, N. L. (2004). Spelling assessment frameworks. In A. Stone, E. R. Silliman, B. Ehren, & K. Apel (Eds.), *Handbook of Language and Literacy: Development and Disorder* (pp. 644-660). New York: Guilford Press.

Asselin, M. (2001). Supporting students' spelling development. *Teacher Librarian, 29*(2), 49-51.

Ball, E., & Blachman, B. (1991). Does phoneme awareness training in kindergarten make a difference to early word recognition and developmental spelling? *Reading Research Quarterly, 26*, 49-66.

Bear, D., & Templeton, S. (1998). Explorations in spelling: Foundations for learning and teaching phonics, spelling, and vocabulary. *The Reading Teacher, 52*(3), 222-242.

Bebout, L. (1985). An error analysis of misspellings made by learners of English as a first and as a second language. *Journal of Psycholinguistic Research, 14*(6), 569-593.

Bhattacharya, A. (2006). Syllable representation in written spellings of sixth and eighth grade children. *Insights on Learning Disabilities, 3*(1), 43-61.

Bourassa, D., & Treiman, R. (2007). *Linguistic factors in spelling development.* Retrieved August 10, 2009, from http://www.literacyencyclopedia.ca

Bradley, L., & Bryant, P. (1983). Categorizing sounds and learning to read: A causal connection. *Nature,* 301, 419-421.

Brady, S., Fowler, A., Stone, B., & Winbury, N. (1994). Training phonological awareness: A study with inner-city kindergarten children. *Annals of Dyslexia,44*, 26-59.

Bryson, B. (1990). *The mother tongue: English and how it got that way.* New York: William Morrow & Company, Inc.

Caravolas, M., Hulme, C., & Snowling, M. J. (2001). The foundations of spelling ability: evidence from a 3-year longitudinal study. *Journal of Memory and Language*, *45*, 751-774.

Cardoso-Martins, C., Corrêa, M. F., Lemos, L. S., & Napoleão, R. F. (2006). Is there a syllabic stage in spelling development? evidence from Portuguese-speaking children. *Journal of Educational Psychology*, *98*(3), 628-641.

Cataldo, S., & Ellis, N. (1988). Interactions in the development of spelling, reading and phonological skills. *Journal of Research in Reading*, *11*, 86-109.

Castiglioni-Spalten, M. L., & Ehri, L. C. (2003). Phonemic awareness instruction: contribution of articulatory segmentation to novice beginners' reading and spelling. *Scientific Studies of Reading, 7*(1), 25-52.

Chapman, M. L. (1996). The development of phonemic awareness in young children: Some insights from a case study of a first-grade writer. *Young Children, 51*(2), 31-37.

Chang, C. P. (2008). *The effects of syllable-awareness based phonics on spelling multi-syllable words for 7th grade junior high school students.* Unpublished master thesis, National Chengchi University, Taipei, Taiwan.

Chang, J. (2002). *Developing fourth graders' word recognition and spelling abilities in English.* Unpublished master thesis, National Taipei Teachers College, Taipei, Taiwan.

Chen, K. I. (2006). *Phonics remedial instruction for English underachievers at elementary school: An action research.* Unpublished master thesis, National Taipei University of Education, Taipei, Taiwan.

Chiappe, P., Glaeser, B., & Ferko, D. (2007). Speech perception, vocabulary, and the

development of reading skills in English among Korean- and English-speaking children. *Journal of Educational Psychology, 99*, 154-166.

Clarke, L. K. (1988). Invented versus traditional spelling in first graders' writings: effects on learning to spell and read. *Research in the Teaching of English, 22*(3), 281-309.

Cohen, E. (1994). *Designing groupwork: Strategies for the heterogeneous classroom.* Retrieved July 7, 2010, from http://www.julieboyd.com.au/ILF/pages/members/cats/bkovervus/t_and_learn_pdfs/design_grpwork.pdf

Collins, B., & Mees, I. M. (2008). *Practical phonetics and phonology: A resource book for students* (2nd ed.). NY: Routledge.

Cook, V. J. (1997). L2 users and English spelling. *Journal of Multilingual and Multicultural Development, 18*(6), 474- 488.

Cunningham, P. M., & Cunningham, J. W. (1992). Making words: Enhancing the invented spelling-decoding connection. *The Reading Teacher, 46*, 106-115.

Deorowicz, S., & Ciura, M. G. (2005). Correcting spelling errors by modeling their causes. *Int. J. Appl. Math. Comput. Sci., 15*(2), 275-285.

Dildine, D. E. (1994). *Spelling acquisition in the elementary ESL classroom.* Retrieved July 10, 2009, from http://www.eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=ED379925

Downing, J. (1970). The development of linguistic concepts in children's thinking. *Research in the Teaching of English, 4*, 5-19.

Dressler, C. (2002). *Inter- and intra-language influences on the English spelling development of 5th grade, Spanish-speaking English-language learners.* Unpublished doctoral thesis, Harvard University, Cambridge.

Duffy, G. G., & Roehler, L. R. (1993). *Improving reading instruction.* New York: McGraw-Hill.

Ehri, L. C. (1986). Sources of difficulty in learning to spell and read. In M. L. K. Wolraich & D. Routh (Eds.), *Advances in developmental and behavioral pediatrics* (pp. 121-195). Greenwich, CT: JAI.

Ehri, L. (1992). Reconceptualizing the development of sight word reading and its relationship to recoding. In Gough & R. Treiman (Eds.), *Reading acquisition* (pp. 107-143). Hillsdale, NJ: Erlbaum.

Ehri, L. (2000). Learning to read and learning to spell: Two sides of a coin. *Topics in Language Disorders, 20*(3), 19-36.

Ehri, L., Nunes, S., Willows, D., Suhuster, B., Yaghoub-Zadeh, & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36*(3), 250-287.

Electronic Journal of English Education. (2007, June 6). 窮爸爸與富爸爸的戰爭：談英語學習雙峰現象 [*Discussion on the bimodal distribution of English achievement.*] Retrieved from http://ejee.ncu.edu.tw/feature.asp?period=4&flag=40

Ellis, N. (1994). Longitudinal studies of spelling development. In G. Brown & N. Ellis (Eds.), *Handbook of spelling* (pp. 155-178). West Sussex, UK: Wiley.

Ferreiro, E., & Teberosky, A. (1986). *Psychogenesis of the written language.* Sao Paulo, Brazil: Artes Médicas.

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*(8), 873-905.

Frederickson, N., & Wilson, J. (1996). Phonological awareness training: A new approach to phonics teaching. *Dyslexia, 2*, 101-120.

Gentry, J. R. (1978). Early spelling strategies. *The Elementary School Journal, 79*,

88-92.

Gentry, J. R. (1982). An analysis of developmental spelling in GNYS at WRK. *The Reading Teacher, 36*, 192-200.

Gentry, J. R. (2000). A retrospective on invented spelling and a look forward. *The Reading Teacher, 54*(3), 318-332.

Geva, E., & Zadeh, Z. (2006). Reading efficiency in native English-speaking and English-as-a-second-language children: The role of oral proficiency and underlying cognitive-linguistic processes. *Scientific Studies of Reading, 10*, 31-57.

Gillon, G. T. (2004). *Phonological awareness: From research to practice.* New York: The Guilford Press.

Gillon, G., & Dodd, B. (1994). A prospective study of the relationship between phonological, semantic and syntactic skills and specific reading disability. *Reading and Writing: An Interdisciplinary Journal, 6*, 321-345.

Gillon, G., & Dodd, B. (1995). The effects of training phonological, semantic and syntactic processing skills in spoken language on reading ability. *Language, Speech and Hearing Services in Schools, 26*, 58-68.

Goswami, U., & Bryant, P. (1990). *Phonological skills and learning to read.* Hove, UK: Erlbaum.

Greenberg, D., Ehri, L. C., & Perin, D. (2002). Do adult literacy students make the same word-reading and spelling errors as children matched for word-reading age? *Scientific Studies of Reading, 6*(3), 221-243.

He, T. H., & Wang, W. L. (2009). Invented spelling of EFL young beginning writers and its relation with phonological awareness and grapheme-phoneme principles. *Journal of Second Language Writing, 18*(1), 44-56.

Henderson, E., & Beers, J. E. (1980). *Developmental and cognitive aspects of*

learning to read: A reflection of word knowledge. Newark, DE: International Reading Association.

Hill, S. (1999, November). *A study of the knowledge of phonics, phonemic awareness, and developmental spelling ability in primary non-readers*. Paper presented at the Annual Meeting of the Mid-South Educational Research Association, Alabama.

Holm, A., & Dodd, B. (1996). The effect of first written language on the acquisition of English literacy. *Cognition*, *59*(2), 119-147.

Holmes, V. M., & Quinn, L. (2009). Unexpectedly poor spelling and phonological-processing skill. *Scientific Studies of Reading*, *13*(4), 295 - 317.

Hu, M. Y. (2003). *An analysis on vowel substitution in spelling errors by junior high school students.* Unpublished master thesis, National Chengchi University, Taipei, Taiwan.

Huang, S. M. (2006). *English literacy proficiency of third grade elementary school students: A study on three ethnic groups in Pingtung County.* Unpublished master thesis, National Pingtung Institute of Commerce, Pingtung, Taiwan.

Huang, S. T. (2005). 兒童學英語、評量很多元、家長認知不夠、學校體制難爲，最後苦了孩子 [*The issue of English evaluation for children in Taiwan*.] Retrieved June 6, 2010, from http://kmw.ctgin.com/member/news_search2/se_content_file8.asp?query=%AD%5E%BBy%BE%C7%B2%DF%B5%FB%B6q&src=N&date=20050316&file=N0178.001&dir=N&area=tw&frompage=se

Ibrahim, M. H. (1978). Patterns in spelling errors. *ELT Journal*, *32*(3), 207-212.

Jongejan, W., Verhoeven, L., & Siegel, L. S. (2007). Predictors of reading and spelling abilities in first- and second-language learners. *Journal of Educational Psychology, 99*(4), 835-851.

Kamii, C., Long, R., & Manning, M. (2001). Kindergartners' development toward

"invented" spelling and a glottographic theory. *Linguistics and Education, 12*(2), 195-210.

Kamii, C., & Manning, M. (1999). Before "invented" spelling: Kindergartners' awareness that writing is related to the sounds of speech. *Journal of Research in Childhood Education, 14*(1), 16-25.

Korkeamaki, R.-L., & Dreher, M. J. (2000). Finnish kindergartners' literacy development in contextualized literacy episodes: A focus on spelling. *Journal of Literacy Research, 32*(3), 349-393.

Leak, C. (1996, April). *First Graders' Strategies for Inventing Spellings*. Paper presented at the Annual Conference of the American Educational Research Association, New York.

Leong, C. K., Tan, L. H., Cheng, P. W., & Hau, K. T. (2005). Learning to read and spell English words by Chinese students. *Scientific Studies in Reading, 9*, 63–84.

Liow, S. J. R., & Lau, L. H. S. (2006). The development of bilingual children's early spelling in English. *Journal of Educational Psychology, 98*(4), 868-878.

Liow, S. J. R., & Lay Choo, L. (2004). Metalinguistic awareness and semi-syllabic scripts: Children's spelling errors in Malay. *Reading & Writing, 17*(1/2), 7-26.

Liow, S. J. R., & Poon, K. K. L. (1998). Phonological awareness in multilingual Chinese children. *Applied Psycholinguistics, 19*(3), 339-362.

Lombardino, L. J., & Bedford, T. (1997). Invented spelling: Developmental patterns in kindergarten children and guidelines for early. *Language, Speech, & Hearing Services in Schools, 28*(4), 333.

Lundberg, I., Olofsson, A., & Wall, S. (1980). Reading and spelling skills in the first year predicted from phonological awareness skills in kindergarten. *Scandanavian Journal of Psychology, 21*, 159-173.

Lundblade, S. M. (1994). *Invented spelling in the writing process: Applications for*

the elementary EFL/ESL classroom. Unpublished master thesis, Biola University, La Mirada, California.

Lutz, E. (1986). *Invented spelling and spelling development.* Retrieved January 2, 2010, from http://www.ldonline.org/article/Invented_Spelling_and_Spelling_ Development

Manning, M. (2004). Invented spelling. *Teaching Pre K-8, 35*(2), 86-87.

Martins, M. A., & Silva, C. (2006). The impact of invented spelling on phonemic awareness. *Learning and Instruction, 16*(1), 41-56.

Masterson, J. J., & Crede, L. A. (1999). Learning to spell: Implications for assessment and intervention. *Language, Speech, & Hearing Services in Schools, 30*(3), 243-254.

McBride-Chang, C. (1998). The development of invented spelling. *Early Education & Development, 9*(2), 147 - 160.

Miller, E. (1996). The case of invented spelling: How theory becomes target practice. The politics of literacy. *Harvard Education Letter, 12*(2), 5-7.

Ministry of Education, R. O. C. (2001). *Grade 1-9 Curriculum Guidelines.* Retrieved December 20, 2009, from http://search.moe.gov.tw/hysearch/cgi/redirect.exe?url=http://english.moe.gov.tw/public/Attachment/66618445071.doc&group=ZA&title=

Nicholson, M.-J. S. (1996). *The effect of invented spelling on running word counts in creative writing.* Retrieved July 10, 2009, from http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED393108&lang=zh-tw&site=ehost-live

Ouellette, G., & Sénéchal, M. (2008). Pathways to literacy: A study of invented spelling and its role in learning to read. *Child Development, 79*(4), 899-913.

Ouellette, G. P., & Sénéchal, M. (2008). A window into early literacy: Exploring the

cognitive and linguistic underpinnings of invented spelling. *Scientific Studies of Reading, 12*(2), 195-219.

Perfetti, C. A. (1997). The psycholinguistics of spelling and reading. In C. A. Perfetti, L. Rieben, and M. Fayol (Eds.), Learning to spell: Research, theory and practice across languages (pp. 21-38). Mahwah, NJ: Erlbaum.

Perfetti, C. A., Beck, I., Ball, L. C., & Hughes, C. (1987). Phonemic knowledge and learning to read are reciprocal: A longitudinal study of first grade children. *Merrill-Palmer Quarterly, 33*, 283-319.

Perin, D. (1983). Phonemic segmentation and spelling. *British Journal of Psychology, 74*, 129-144.

Plaza, M., & Cohen, H. (2003). The interaction between phonological processing, syntactic awareness, and naming speed in the reading and spelling performance of first-grade children, *Brain and Cognition, 53*, 287-292.

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.

Plaza, M., & Cohen, H. (2006). The contribution of phonological awareness and visual attention in early reading and spelling. *Dyslexia, 13*, 67-76.

Post, Y. V., Swank, P. R., Hiscock, M., & Fowler, A. E. (1999). Identification of vowel speech sounds by skilled and less skilled readers and the relation with vowel spelling. *Annals of Dyslexia, 49*, 161-191.

Rando, R. (2010). *Using invented spelling to provide evidence of early writing development in primary grades.* Retrieved January 3, 2010, from http://home.sbu.edu/educ505_67/invented_spelling.htm

Read, C. (1971). Pre-school children's knowledge of English phonology. *Harvard Education Review, 41*, 1-34.

Read, C. (1986). *Children's creative spelling.* London: Routledge & Kegan Paul.

Richards, J. C. (1971). A non-contrastive approach to error analysis. *ELT Journal, 25*(3), 204-219.

Richards, J. C. (1974). *Error analysis: Perspectives on second language acquisition.* London: Longman.

Richgels, D. (2001). Invented spelling, phonemic awareness, and reading and writing instruction. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 142-155). NY: The Guilford Press.

Rubin, H., & Eberhardt, N. C. (1996). Facilitating invented spelling through language analysis instruction: An integrated model. *Reading and Writing, 8*(1), 27-43.

Scarborough, H. (1998). Early identification of children at risk for reading disabilities: Phonological awareness and some other promising predictors. In B. K. Shapiro, P. J. Accardo, & A. J. Capute (Eds.), *Specific reading disabilities: A view of the spectrum* (pp. 75-119). Timonium, MD: York Press.

Shen, H. H., & Bear, D. R. (2000). Development of orthographic skills in Chinese children. *Reading and Writing, 13*(3), 197-236.

Silva, C., & Martins, M. A. (2003). Relations between children's invented spelling and the development of phonological awareness. *Educational Psychology, 23*(1), 3.

Sipe, L. R. (2001). Invention, convention, and intervention: Invented spelling and the teacher's role. *Reading Teacher, 55*(3), 264.

Stuart, M. (1999). Getting ready for reading: Early phoneme awareness and phonics teaching improves reading and spelling in inner-city second language learners. *British Journal of Educational Psychology, 69*(4), 587-605.

Sun-Alperin, M. K., & Wang, M. (2008). Spanish-speaking children's spelling errors with English vowel sounds that are represented by different graphemes in English and Spanish words. *Contemporary Educational Psychology, 33*(4),

932-948.

Sutcliffe, A., Dowker, A., & Campbell, R. (1999). Deaf children's spelling: Does it show sensitivity to phonology? *J. Deaf Stud. Deaf Educ., 4*(2), 111-123.

Tangel, D. M., & Blachman, B. A. (1992). Effect of phoneme awareness instruction on kindergarten children's invented spelling. *Journal of Reading Behavior, 24*(2), 233-261.

Tangel, D. M., & Blachman, B. A. (1995). Effect of phoneme awareness instruction on the invented spelling of first-grade children: A one-year follow-up. *Journal of Reading Behavior, 27*(2), 153-185.

Torneus, M. (1984). Phonological awareness and reading: A chicken and egg problem? *Journal of Educational Psychology, 76*, 1346-1358.

Treiman, R. (1993). *Beginning to spell.* New York: Oxford University Press.

Treiman, R. (1998). Why spelling?: The benefits of incorporating spelling into beginning reading instruction. In J. Metsala & L. Ehri (Eds.), *Word recognition in beginning literacy* (pp. 289-313). Mahwah, NJ: Erlbaum.

Treiman, R., & Bourassa, D. C. (2000). The development of spelling skill. *Topics in Language Disorders, 20*(3), 1-18.

Treiman, R., & Zukowski, A. (1991). Levels of phonological awareness. In S. A. Brady & D. P. Shankweiler (Eds.), *Phonological processing in literacy: A tribute to Isabelle Y. Liberman* (pp. 67-83). Hillsdale, NJ: Erlbaum.

Treiman, R., Berch, D., & Weatherston, S. (1993). Children's use of phoneme-grapheme correspondences in spelling: Roles of position and stress. *Journal of Educational Psychology, 85*(3), 466-477.

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.

Wang, M. (2000). *The development of spelling and its relationship to decoding \ phonological processing in Chinese ESL children.* Unpublished doctorial dissertation, University of Toronto, Toronto, Canada.

Wang, M., & Geva, E. (2003). Spelling acquisition of novel English phonemes in Chinese children. *Reading and Writing*, 16(4), 325-348.

Wasowicz, J. (2009). *What do spelling errors tell us about language knowledge?* Retrieved June 3, 2009, from http://www.speechpathology. com/articles/article detail.asp?article id=316

Wyatt, V. (1973). An analysis of errors in composition writing. *ELT Journal, 27*(2), 177-178.

APPENDICES

Appendix A

Consent Form for the School Administration: Chinese

學校研究同意書

您好！我們是邱子容與陳湘菱，就讀於交通大學英語教學研究所。我們的碩士論文研究計畫是要了解台灣國小學生從聽故事中習得英語單字的狀況及拼字能力。在獲得貴校同意後，我們預計在學校進行研究約兩個月。

此一研究包含三個主要階段，首先，我們會請學生完成一份英文能力的測驗，藉此了解參與研究學生目前的英語程度。第二階段，我們會讀一本自編的英文故事書給學生聽，總共四次；在第一次、第二次及最後一次說完故事後，將會給學生一個簡單的字彙活動。第三階段，學生會完成音韻覺識、單字拼寫活動，最後，還會請學生依據故事內容，完成一篇短文。整個研究採樣過程將進行七到八次（每次間隔一星期），每次時間大約三十至四十分鐘，盡量以不影響孩子的正常學習爲原則。

爲確保參與研究學校及貴校的權益及隱私，所有研究紀錄及研究報告將使用識別號碼或匿名來替代真實姓名與校名。只有我們、指導教授及研究助理能夠調閱本研究資料，包括測驗結果或研究筆記等；所有的研究資料，如測驗結果或活動成果，將僅侷限於學術或教育使用，絕不會任意對外公開。

參與本研究須徵得學校及家長的同意。貴校及學生能隨時退出本研究，不須負任何形式的責任。研究結束後，我們將贈與貴校我們的論文研究報告，每位參與研究的學生也會獲得一份小禮物，以感謝校方及參與學生對本研究計畫的支持與協助。

Appendix A (Continued)

Consent Form for the School Administration: Chinese

我們及我們的指導教授相信此研究能對了解學生英語能力有極大的助益，研究結果亦能提供國小英語教學相關訊息。身爲英語教學所研究生，我們希望我們的專業能對貴校有所協助。若有需要，請保留此同意書複本一份。如果貴校對本研究有任何疑問，歡迎與我們聯絡，邱子容：0980-270-695，roxyjam0611@yahoo.com.tw；陳湘菱：0939-518-913，winnerling@hotmail.com；您也可以與我們的指導教授－交通大學英教所林律君老師聯絡：03-5712121 #52716，reginelin@mail.nctu.edu.tw。

敬祝
事事順心！

邱子容與陳湘菱敬上

邱子容 陳湘菱　交通大學英語教學研究所碩士生

林律君　交通大學英語教學研究所助理教授

****

我已閱讀並充分了解上述訊息，我身爲學校代表，同意邱子容、陳湘菱在 _____ (學校名稱)進行研究。我亦持有此同意書複本。

校方代表簽名：　　日期：

Appendix B

Parental Consent Form: Chinese

家長研究通知書

我們是就讀於交通大學英語教學研究所碩士班的學生邱子容和陳湘菱，目前從事台灣兒童英語發展的研究，想邀請您的孩子參與研究。本研究將於今年的十月到十一月間進行，每週花費孩子約三十到四十分鐘**非正課**的時間，目的在了解台灣學齡兒童自聽英文故事中習得單字的狀況及拼字能力的發展。參加本研究，您的孩子可以每週多一些時間聽聽英語故事、從事英語學習的活動。此外，我們還會贈與每位參與的孩子一份小禮物。爲確保孩子的權益及隱私，所有研究資料、紀錄及報告將使用辨別號碼或匿名來替代真實姓名。所有的研究資料，如測驗結果或活動成果，將僅侷限於學術或教育使用，絕不會任意對外公開。

若您同意孩子參與本研究，請協助填寫下列同意書及孩子的基本資料，相信您孩子的參與，將幫助我們更加了解台灣國小英語教育與學生學習之需要！

敬祝 闔家平安！

交通大學英語教學研究所碩士生 邱子容、陳湘菱敬上

2009/10/02

Appendix B (Continued)

Parental Consent Form: Chinese

家長研究通知書回函

☐了解並同意參加此研究（請填寫研究參與者基本資料調查表）

家長簽名：_____

☐ 不同意參加此研究

研究參與者基本資料調查表

姓名：_____ 座號：_____ 年齡：_____ 性別：☐ 男 ☐ 女

1. 孩子學習英語約多久？約_____年 _____月

2. 孩子在小學及幼稚園階段，有在校外學習英文嗎？

☐ 是（請填答 2-1） ☐ 否

2-1. 如果有的話，請問何時開始學習？

☐ 幼稚園小班 ☐ 幼稚園中班 ☐ 幼稚園大班 ☐ 小一 ☐ 小二

☐ 小三

3. 孩子曾學過自然發音法（phonics）嗎？ ☐ 是 ☐ 否

4. 是否曾居住外國超過半年以上：

☐ 是，_____（國名及時間） ☐ 否

5. 您是否擔心過孩子語言或其它方面的發展？

☐ 是，_____（哪方面）☐ 否

＊請在簽名後，讓孩子將此回函帶到學校給老師，謝謝您！

Appendix C

Words for Spelling Dictation Task

Class: _____ Number: _____ Name: _____

1	[mɑb]	11	[jɛd]
2	[gæst]	12	[dʒæmp]
3	[rɪk]	13	[tɪŋk]
4	[tʃɪn]	14	[blɑp]
5	[drɛg]	15	[frʌn]
6	[plʌmp]	16	[klɪtʃ]
7	[brɪŋ]	17	[grɛʃ]
8	[drom]	18	[mjup]
9	[wip]	19	[stut]
10	[tres]	20	[paɪt]

Appendix D

Phonological Awareness Tasks

Task 1. Phoneme Identification

Practice Items

	Stimulus	**Response Choices**		
1.	bat, sad	e	a	i
2.	sit, pig	e	a	i

	Stimulus	**Response Choices**		
1.	tad, zap	a	e	i
2.	lisp, wit	a	e	i
3.	keg, speck	a	e	u
4.	rot, prop	a	o	i
5.	brunt, hub	u	e	i
6.	jeer, breech	oa	ee	ie
7.	slain, bail	oe	ea	ai
8.	moat, load	oa	ea	ie
9.	mite, stile	o_e	a_e	i_e
10.	tame, bade	a_e	i_e	o_e

Appendix D (Continued)

Phonological Awareness Tasks

Task 2. Phoneme Blending

Practice Items

	Stimulus	**Response Choices**		
1.	l-o-g	rog	log	lag
2.	n-a-p	nap	neg	nab

	Stimulus	**Response Choices**		
1.	f-a-d	fad	vad	fed
2.	m-e-ss	mess	mez	mass
3.	j-i-b	jib	jeb	gib
4.	bl-a-nd	bland	land	lod
5.	gr-i-st	grist	gist	grest
6.	dr-ai-l	drail	jail	jrail
7.	kn-e-lt	knelt	knel	melt
8.	tr-ou-t	trout	drout	jrout
9.	sl-u-mp	slump	slup	slum
10.	squ-i-nt	squint	skint	scuit

Appendix D (Continued)

Phonological Awareness Tasks

Task 3. Onset-rime Manipulation

Practice Items

	Stimulus	**Response Choices**		
1.	jeg, pam	peg	jam	jan
2.	clab, bod	clod	clot	bab

	Stimulus	**Response Choices**		
1.	kag; lis	kis	lag	gis
2.	wep, jox	wox	jep	wok
3.	dod, fuch	duch	fod	doch
4.	nat, tok	nok	tat	nog
5.	pab, gafe	pafe	gab	pave
6.	crip, runk	crunk	rip	clunk
7.	glopt, hoor	gloor	hopt	glor
8.	swame, fleed	sweed	flame	sweet
9.	fril, smare	frare	smil	flare
10.	splee, skaw	splaw	skee	sblaw