The Effects on the Spelling of Year Two, Six-Year-Old Children when SRA Spelling Mastery is added to the Whole-Language Process Writing Approach to Written Language.

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ABSTRACT

This thesis defines spelling, describes the models of spelling development, and the research into the teaching of spelling. In New Zealand, the teaching of spelling is embedded in the whole-language classroom programme. Evidence suggests that the level of achievement in spelling in children’s writing is of current concern (Flockton & Crooks, 1999).

The purpose of this study was to examine the effect of the addition of daily ten-to-fifteen minute SRA Spelling Mastery lessons had on the spelling of six-year-old children, in their daily process writing. In addition, the extent of generalisation of both the phonological skills and the specific spellings of high frequency irregular words taught to the children’s writing were analysed.

A single-case, combined multiple-baseline and reversal design was used to compare differences in spelling performance during baseline conditions and treatment (SRA Spelling Mastery) conditions. During baseline, the children continued participating in the whole-language classroom programme. In the treatment phase, the children participated in a daily SRA Spelling Mastery lesson as an addition to the baseline procedures.

Seven, six-year-old Year Two children, from a regular classroom, four boys and three girls who met the criteria for teaching at SRA Spelling Mastery Level A (based on the SRA Spelling Mastery Level A Placement Test) and who had no identified difficulties or special needs nor were receiving programmes additional to the classroom programme, participated in the study. Gentry’s (1981, 1982) stages were used to determine the children’s spelling development.
The results showed that the children’s phonetic spelling accuracy increased during SRA Spelling Mastery, indicating a treatment effect; however, minimal change occurred in the level of orthographic spelling accuracy. When the number of different words written without a prompt, and orthographic and phonetic spelling accuracy were compared, a possible treatment effect occurred. The high frequency irregular words taught generalised to the children’s writing. There was a possible gender effect during the SRA Spelling Mastery conditions favouring girls. The children rated SRA Spelling Mastery as more preferred than process writing.
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CHAPTER 1

INTRODUCTION

Written communication is a critical skill children need to acquire in order to succeed in a literate world. For New Zealanders to have the best chance to achieve their goals children and adults need to be able to draw on strong foundation skills (Ministry of Education, 2003). The Ministry of Education recognises the importance of literacy and has developed policy and guidelines for schools. Schools are charged with the responsibility for delivering the curriculum. Eight essential skills have been specified in The New Zealand Curriculum Framework, and communication skills is one of the eight essential skills. Writing is one aspect of communication skills (Ministry of Education, 1994).

The New Zealand English Curriculum statement is the official document of the Ministry of Education, and it defines the standards for the delivery of the English curriculum in New Zealand schools. O’Rouke (1994, as cited in Ministry of Education, 1994) states, “It focuses on developing the highest levels of literacy and understanding of language for a variety of purposes, to enable students to participate fully in society and the world of work” (p.5).

The ability to spell is a component of literacy. Spelling is neither the least nor the most important component of writing, yet it is a crucial component (Graham & Miller, 1979). Croft (1983) states that the reason for spelling words correctly is in order for an individual to communicate effectively in writing. The ability to spell is often recognised as a measure of being a competent writer (Smith & Elley, 1997).

This literature review is divided into three sections, which cover respectively, spelling theory, teaching practice, and the current spelling performance of New Zealand children. In the first section, spelling is defined, and models of spelling development and the
research into the models are described. In the second section, the methods of teaching spelling in New Zealand schools and the models of spelling schools apply are described, and the research into their efficacy in teaching spelling is discussed. In the third section, the current spelling performance of New Zealand children is reviewed.

Spelling Models

What is Spelling?

Hanna, Hodges and Hanna (1971) define spelling as encoding language, while Graham and Miller (1979) break spelling up into a range of skills describing it as, “the ability to recognise, recall, reproduce, or obtain orally in the written form the correct sequence of letters in words” (p. 2). Nicholson (2000) defines spelling as applying the alphabetic principle - “spelling involves writing alphabetic characters that correspond to the sequence of phonemes in spoken words” (Nicholson, 2000, p. 224) - and the sequence of alphabetic characters should match society’s agreed sequence as recorded in the dictionary.

Nicholson (2000) qualifies this additional requirement to his definition, noting that there are exceptions to the correct spelling of words using an exact grapheme representation for each phoneme; matching each phoneme to a grapheme may be phonetically correct, yet the word is spelled incorrectly, e.g., was spelled as wos. In addition to the alphabetic principle, not all phonemes are represented by a single grapheme. Spelling includes both cipher and lexical knowledge. Cipher knowledge refers to applying phoneme-grapheme correspondences, whereas lexical knowledge refers to knowing the different spellings of certain phonemes and which spelling to use for a particular word. Henderson and Templeton (1986) expand on Nicholson’s definition, noting that spelling of English is an alphabetic
writing system that incorporates three principles, namely spelling by sound, spelling by pattern, and spelling by meaning.

Models of Spelling

The models of how children learn to spell and educators’ understanding of the English writing system have influenced the methods teachers use to teach spelling (Treiman & Bourassa, 2000). Prior to the 1960’s most of the research on spelling competency was based on psychologists’ research into memorisation of letter sequences and serial learning (Treiman, 1993). English orthography was viewed as inconsistent and illogical (Graham, 1985; Graham & Miller, 1979). Teaching of spelling was based on memorisation of letter sequences and rote learning (Treiman, 1993). An alternative model viewed English orthography as consistent and logical, a system that consisted of patterns but not a complete system (Graham & Miller, 1979). Teaching of spelling was based on phonemic patterns and spelling rules or spelling generalisations. In the literature, both models have been referred to as the traditional model, however, in this thesis memorisation of letter sequences will be referred to as the list traditional model and memorisation of phonemic patterns and spelling rules will be referred to as the phonemic traditional model.

In the 1960s research focused on how children acquire spoken language (Treiman, 1993). Development of oral language was viewed as creative, children inductively learning and applying the rules of oral language (Chomsky, 1972). Read (1971) applied the creative acquisition of oral language to written language. Read proposed that young children learned to write tacitly, using their knowledge of phonology to invent their own spellings for English orthography. From Read’s research, the developmental model of spelling was proposed. This model proposes that children learn to spell creatively by applying different strategies during different stages of spelling development (Treiman & Bourassa, 2000). The child attempts to represent the sounds of the letters in words (Treiman, 1993) and applies his / her
knowledge of orthography (Bissex, 1980). The different stages of spelling development reflect the child’s changing phonological knowledge. Another area of research has involved study into phonemic awareness skills and their effect on learning to read and write (Treiman, 1993).

In contrast to the developmental model where children are said to use different cognitive strategies over time, the dual-route model of spelling involves both phonological and visual aspects (Frith, 1980). The dual-route model proposes that two cognitive processes, the phonological and lexical processes are involved when spelling (Barry, 1994). Barry states that the two processes are separate. An alternative cognitive model recently proposed is the connectionist model, and proponents of the connectionist model accept that dual processes are involved in spelling but the phonological and lexical processes are linked (Treiman, 1993).

*Traditional models.* Teachers applying the list traditional model present children with a list of words at the beginning of the week to memorise, and test the children on the words at the end of the week (Smith & Elley, 1997). Practice activities related to the words in the list that include putting the words into sentences or completing structured worksheets are given to children to complete (Graham & Miller, 1979). The phonemic traditional model involves teaching phoneme-grapheme correspondences, spelling patterns, and spelling generalisations for a range of words that then can be applied to new words (Graham & Miller, 1979). For both traditional models, spelling is taught through formal instruction as a separate subject (Brown, 1990; Graham, 1985) outside the context of reading or writing (Nicholson, 2000; see Appendix A for a fuller description of the models).

*Research and the traditional models.* Hanna et al.’s study (1971) applied encoding rules using phoneme-grapheme correspondences to over 17000 words to determine the regularity of spellings based on phoneme-grapheme correspondences. The findings showed
that most phoneme-grapheme correspondences for consonants and short vowels had single spellings and that many vowels had predictable spellings in particular positions in words. When a computer applied the algorithm, the computer spelled almost half of the 17000 words correctly. Hanna et al. (1971) explained that although the level of accuracy was low for efficient writing, it was substantial considering only phonological knowledge was applied to the new words. If morphology, knowledge of spelling compound words, and knowledge of words introduced from other languages that have maintained their original spelling had been included in the algorithm, the percentage of spelling accuracy would have been higher. Other spelling errors occurred because of some unpredictable spellings that would have occurred regardless of applying phonological or morphological knowledge. Homonyms that required knowledge of the word in context were another group of words spelled incorrectly. The findings of Hanna et al.'s study provide support for teaching using the phonemic traditional model.

Other research into teaching spelling applying the traditional models has focused on children diagnosed with a disability, e.g., learning disabilities, cognitive, emotional, or other disabilities, or health problems (Graham & Miller, 1979). This research on spelling has centered on procedures for testing spelling words and instructional practices for teaching spelling words.

Two procedures used by teachers for testing and studying the list of words that have been investigated are the test-study-test and study-test procedures. The test-study-test procedure involves pre-testing the children on the list of words prior to the children studying them. The children then learn the words they spelled incorrectly. The study-test procedure involves children being given a list of words to learn (Graham & Miller, 1979). Graham (1985) states that the test-study-test procedure is more effective than the study-test because the pre-test of the test-study-test procedure determines the words the child needs to learn and
the procedure focuses on the words the child cannot spell rather than those the child can already spell. Procedures for teaching words in lists and words based on phonemic patterns and spelling generalisations have been investigated.

From the research in teaching spelling to children with learning disabilities Gettinger (1984) proposed that three critical instructional principles are required for improvement in spelling performance, namely sufficient and distributed practice with corrective feedback, generalisation to words not taught, and reduced unit size, i.e., a reduced number of spelling words in the list to learn. In a study of 39 eight-year-old children with learning disabilities, Gettinger, Bryant, and Fayne (1982) applied these critical instructional principles. Children in the experimental group were taught spelling patterns in the context of regular words and irregular words. The procedures for teaching the regular and irregular words included teaching one word at a time, teaching a small number of words each day, immediate error correction, practice of individual words until the words were spelled correctly for three consecutive trials, distributed and cumulative review of the words taught, and writing the words in sentences. Teachers of the comparison group of children taught the same words using their usual teaching method. Gettinger et al. (1982) found that using these instructional principles, children in the experimental group improved in their spelling significantly in comparison to the children in the control group, both in higher spelling accuracy and in generalisation of the spelling patterns taught to novel words.

Foxx and Jones (1978) researched the use of positive practice and positive reinforcement in the learning of spelling lists, to determine which instructional practice had better spelling outcomes with 29 children described as ‘poor spellers.’ Positive practice required the children to write each word they misspelled in the spelling list correctly, write its correct phonetic spelling, its part of speech, its dictionary definition, and its correct usage in five sentences. Accurate spelling was reinforced with parental and teacher approval,
prizes, positive teacher comments, and display of high spelling marks. Foxx and Jones (1978) stated that the positive practice procedure was probably aversive and negatively reinforcing, however, the results showed that positive-practice and positive reinforcement were more effective than positive reinforcement alone.

Based on Foxx and Jones’s (1978) study, Ollendick, Thomas, Matson, Esveldt-Dawson, Shapiro, and Edward (1980) used positive-practice alone and positive-practice with positive reinforcement, extending Foxx and Jones’s study to compare traditional instruction with and without positive reinforcement. The results replicated Foxx and Jones’s (1978) results. Positive practice for incorrectly spelled words and positive reinforcement of correctly spelled words produced optimum gain in spelling performance.

N. N. Singh, J. Singh, and Winton’s (1984) study compared the efficacy of positive practice alone and with positive reinforcement in reducing uncorrected reading errors and self-correction of errors. The results also replicated Foxx and Jones’s (1978) results; the addition of positive reinforcement was superior to positive practice alone.

*Phonemic-based commercial spelling programmes.* Often phoneme-grapheme correspondences and spelling rules are taught using commercial programmes (Graham & Miller, 1979). Cronnell and Humes (1980) analysed seven spelling programmes used in American schools to determine their content and efficacy to teach spelling but did not identify the specific programmes they used. Cronnell and Humes (1980) found that each spelling programme contained similar content; however, the sequence of teaching the spelling principles was diverse. All programmes included a standard list of high frequency words and a list of uncommon words, with the list of uncommon words differing considerably across the spelling programmes. Their (1980) review of the programmes identified that each programme had the following deficiencies: there was insufficient practice; often review and reteaching of simple spellings that children were able to perform
occurred during more advanced levels of the programmes; and the specific words taught did not relate to the spelling skill being taught. Most programmes did not require the child to perform realistic written tasks, but instead many exercises concentrated on copying. Cronnell and Humes’ (1980) evaluation was that the programmes focused more on teaching words rather than the spellings and spelling principles that children could apply to different words.

Templeton’s (1991) evaluation of commercial spelling instruction programmes supports Cronnell and Humes’ (1980) review stating that commercial spelling instruction programmes do not give sufficient practice in phonics, structural analysis, or application to unknown words, and new information was introduced before old information was consolidated. Templeton’s conclusion was that as an outcome of the programme design children had a superficial understanding and recalled spelling using rote memorisation. Graham and Miller (1979) proposed that spelling outcomes from commercial spelling programmes were not positive because often the words taught were out of context.

To overcome these apparent inadequacies, Templeton (1991) recommended that spelling programmes include a variety of exercises using words that the children can read, words that reflect the spelling generalisations being taught, children manipulating words rather than looking up words and putting them into sentences, review of words taught, and exercises that challenged learners. Programmes also should include vocabulary development using categorising, analogies, cloze activities, definitions, and figurative language.

**Developmental Spelling Model**

The developmental model contrasts the two traditional models with regard to how children develop their spelling competency. The developmental view of learning to spell is not serial learning and rote memorisation of letters but creative, children inductively recognising the phoneme to grapheme correspondence. Children apply different cognitive
strategies during different stages of learning to spell (Gentry, 1984; Treiman, 2000). Treiman (1993) explains that the outcome of Read’s (1971) research was a shift from viewing spelling in visual terms to linguistic terms.

Stage theory models of spelling development. From Read’s (1971) study subsequent stage theory models of how spelling develops have been proposed. Gentry (1981, 1982), Henderson and Templeton (1986) and Ehri (1987) propose three different stage theory models. Each model uses different names for the different stages; however, the descriptions are similar (Olson, 2000). The stages reflect the child’s emerging understanding “that things can be represented on paper by symbols that are not pictures” (Griffith & Leavell, 1996, p.85). Children apply their phonological knowledge by representing speech as text, that is, creating or using invented spelling to achieve this. According to the stage theories, at different stages children use different strategies to spell. Children begin using letter name knowledge and then their phonological knowledge to spell words. Using letter name spelling the phoneme is represented by the name of the grapheme, e.g., the grapheme e is written to represent the phoneme /i/ (Treiman & Bourassa, 2000), or the first sound in the word elephant is spelled with the letter l (Gentry, 1982). Using phonological knowledge the child represents each phoneme spoken with a grapheme, a single letter, or a group of letters (Treiman, 1994). During later stages, the child uses orthographic patterns and morphological relationships in words to spell, additional to phonological knowledge (Treiman & Bourassa, 2000). When the child applies morphological knowledge to spelling, the child considers the meaning of the word that is spelled and spells the word accordingly, e.g., the words meat and meet, are homonyms, words that sound the same but have a different meaning. Morphological knowledge includes the knowledge that words are made up of morphemes, that is, units of meaning that are called morphographs when written. Each phoneme is a unit of sound that can alter meaning, e.g., /bl/, /p/ change the meaning of the
words *bat* and *pat*, whereas each morpheme in a word is a unit of meaning that has a different meaning, e.g., */kaetz/* is made up of two morphemes, written as *cat* and the plural marker *s.*

*Treiman’s research into spelling development.* Treiman’s (1993) findings showed that the stage theory models gave an overall picture of children’s spelling development, however, Treiman stated that the models did not show the complexity of the phonological, orthographic, and morphological representations demonstrated in children’s spelling. Instead of hierarchical stages of spelling that demonstrated different cognitive strategies to spell, Treiman’s findings showed that children used multiple strategies and a range of knowledge types when spelling. Treiman suggested that children might predominately use one process or strategy during a particular stage but not to the exclusion of others. Lennox and Siegel (1994) suggest that the spellings of children show phonological and lexical knowledge, and analogy develops continuously and in tandem. Lennox and Siegel’s (1994) explanation supports Treiman’s (1993) findings in that children’s spelling may not develop using a single process or strategy at a time (see Appendix A for a fuller description of Treiman’s research into spelling development).

Treiman’s (1993) analysis of phonological representations showed children matched speech to writing that would be analysed as phonetically incorrect because the phoneme-grapheme correspondences were represented in unconventional ways yet were plausible, accurately representing aspects of the phonemes in the word. Attending to phonetic differences is demonstrated when a child represents spellings of words beginning with *tr* spelled as *chr* and *dr* spelled as *gr* or *j.* Spelling voiceless stop consonants in the initial position of words when the phoneme follows the phoneme /sl/, with the voiced phoneme pair, e.g. the letters *sp* spelled as *sb* also demonstrate attention to phonetic differences (see
Appendix B for a fuller description of this phonetic analysis). Treiman and Bourassa (2000) analysed the spellings as plausible even though the spellings were unconventional.

When children first represent speech in print at the phoneme level, Treiman and Bourassa (2000) suggest that children may not be able to attend to all phonemes in a word. As a result, the child may only be able to complete a partial phoneme grapheme analysis of a word. When attending to phonemes in a word, children represent a level of phoneme-grapheme correspondence that is between syllables and phonemes. Treiman (1993) showed that children failed to analyse speech into all the phonemes. The children did not separate the initial and final consonant clusters, the children omitted the second consonant in the initial cluster and the first consonant in the final cluster. When a child is unable to complete a full phonemic break down of a word, the child is likely to spell the word incorrectly. This has been linked to the child’s development of phonemic awareness skills (Treiman, 1993).

**Phonemic Awareness**

The stage theory models (Ehri, 1987; Gentry, 1981, 1982; Henderson & Templeton, 1986) and Read (1971) and Treiman’s (1993) findings showed that children demonstrate different levels of phonological knowledge in their invented spellings. The developmental stages described in Ehri (1987), Gentry (1982), and Henderson and Templeton’s (1986) models showed the degree of the child’s refinement in perceiving phonological segments in words and representing these phonemes in the written form as graphemes at different developmental stages.

Phonological awareness or phonemic awareness skills define specifically the phonological skills a child has. Torgeson (1999) defined phonological awareness as a general level of awareness, e.g., of the syllabic structure of words, whereas phonemic awareness is explicit knowledge at the phoneme level. Phonemic awareness is the awareness that a syllable can be broken up into separate phonemes and individual phonemes
can be combined to form words. As a child’s phonemic awareness develops, the child is more able to manipulate phonemes. Phonemic awareness assists children’s understanding of the alphabetic principle that letters in print represent speech at the phoneme level (Jager Adams, Foorman, Lundberg, & Beeler, 1998; Torgeson, 1999).

Phonemic awareness skills have been broken up into a number of different skills, phoneme segmentation, phoneme blending, and phoneme comparison. Phoneme segmentation includes manipulation of phonemes through deletion, addition, substitution, and counting phonemes, whereas phoneme comparison that includes discrimination of phonemes at the beginning, middle, and end of words (Torgeson, 1999). Spelling errors reflect difficulties in specific phonemic awareness skills, e.g., difficulties in phoneme segmentation are reflected in similar error patterns in spelling (Treiman, 1994).

*Research and phonemic awareness into spelling.* The National Reading Panel in the United States of America conducted a review of 52 studies on phonemic awareness that met their research methodology criteria. The criteria were that (1) the study was published in English in a refereed journal, (2) it focused on reading development across the full range of school year levels, and (3) the experimental or quasi-experimental design had either a control group or a multiple baseline. From the 52 studies, there were 96 comparisons of treatment and control groups. Results of the phonemic awareness skills meta-analysis showed that teaching phonemic awareness skills was the critical factor for improvement in the children’s phonemic awareness skills in reading and spelling. The conclusion was that phonemic awareness skills exert “strong and significant effects on reading and spelling” (The National Reading Panel, 2001, p.7), and the effects continued after the phonemic awareness skills teaching was discontinued.

Frost (2001) focused on the relationship between phonemic awareness, reading, and spelling development and invented spelling. Forty-four children at the beginning of Grade
one, aged from six years ten months to seven years six months were divided into two groups, a high-level group and a low-level group based on their phonemic awareness. The results showed a strong relationship between phonemic awareness and spelling development. The group of children with a high level of phonemic awareness on entry to Grade One developed spelling competence faster than the group of children with a low level of phonemic awareness. Frost, (2001) concluded that invented spelling was also related to a high level of phonemic awareness. Frost described the spelling of children with a low level of phonemic awareness as non-phonemic, “like scribbling, letter writing, or global writing” (p.498). Frost’s explanation was that the children did not use invented spelling because they did not have phoneme-grapheme correspondence. Gentry (1999) also suggested that invented spelling is highly related to phonemic awareness, and through analysis of a child’s invented spelling the level of phonemic awareness could be identified.

**Dual –Route Model**

Brown and Ellis (1994) suggest the dual-route model is conceptually similar to the developmental model. The dual-route model proposes that there are two cognitive processes or ‘routes,’ namely a phonological and a lexical route that may be accessed to spell words (Barry, 1994, Brown & Ellis, 1994; see Appendix A for a fuller description of the model).

*Research and the dual-route model into spelling.* Barry (1994) claims that evidence in support of the dual-route model has come from studies in the area of the written language disorders, phonological dysgraphia, and lexical dysgraphia. A person with phonological dysgraphia can retrieve words stored, but the person is unable to construct spellings using phonological knowledge only. In contrast, a person with lexical dysgraphia is unable to retrieve words stored in memory yet can apply phonological rules and phoneme-grapheme correspondence to spell (Brown, 1990). Barry (1994) cited the findings of Shallice (1981),
and Beauvois and Derouesne (1981) working with patients who demonstrated the ability to spell using either the phonological route or the lexical route, but not both.

*Connectionist Model*

The connectionist model recognises that spelling involves both phonological and lexical knowledge, however, the model suggests that there is only one cognitive route to spell, but the orthographic and phonological units are linked by neural connections (see Appendix A for a fuller description of the model).

*Research into the connectionist model and spelling.* The connectionist model of spelling is one of the models that has been proposed using computational techniques (Brown & Ellis, 1994). Brown and Loosemore (1994) suggest that by implementing spelling models computationally the model could be demonstrated formally, examined, described in behavioural terms, and predictions could be derived from the model.

Findings from Brown, Loosemore, and Watson’s study (1993, as cited in Brown & Loosemore, 1994) showed that the spellings of words by both the computer and groups of children improved over time, and that words with phoneme-grapheme correspondence consisting of one spelling for the same rime segment were the easiest to learn to spell, words that had no rime equivalent (i.e., irregularly spelled words) were more difficult to spell, while words with phoneme-grapheme correspondence with more than one spelling for the same rime were the most difficult to spell. From these findings, Brown and Loosemore (1994) concluded that it was possible to spell both regular and irregular words using one mechanism.

These results showed that the words easiest to learn to spell were based on phonological information, whereas the most difficult words to spell required lexical information only. One implication of these results is that, in order to learn different word types, different teaching methods are required. This has implications for teaching irregular
words. In addition, if children need to rely on lexical knowledge to recall spellings when phonological knowledge would have provided the child with the necessary information to spell a word, they are disadvantaged because to apply lexical knowledge, recall of letter sequences is required.

Treiman’s (1993) interpretation of the spelling skills demonstrated by the Grade One children in her study supports the connectionist model, in that children accessed different cognitive connections as they wrote. Treiman identified that the children’s spellings showed that the children knew more than one spelling could represent many phonemes and that spellings of a particular phoneme were more common than other spellings. Treiman hypothesised that the strength of these phoneme-grapheme connections depended on two factors, the phoneme-grapheme correspondences the child was exposed to and the frequency of the exposure. The more frequently a phoneme was associated with a grapheme, the stronger the connection between the phoneme spoken and the spelling became. This highlights the effect memory has on spelling performance.

*Spelling and Memory*

All the models reviewed noted the role visual memory has on spelling. The list traditional model focuses specifically on visual memory to recall correct spellings. The phonemic traditional model teaches the phonological, morphological, and orthographic knowledge through spelling patterns, spelling rules, and memory. Each stage theory model (Ehri, 1987; Gentry, 1982; Henderson & Templeton, 1986) includes the role of visual memory in different stages of spelling development. Ehri (1987) proposed further that children store in memory the spelling of words because of exposure to the word presented visually, and then children recall the letter sequences when spelling the word. The dual route model includes accessing the lexical process that provides the child or adult with the ability to spell words that are stored and retrieved from the visual memory (Barry, 1994).
Treiman (1993) suggested that in addition to analysing the phoneme-grapheme relationship and representing the phoneme as a grapheme in the correct sequence, memory of the sequence of phonological units was required. The connectionist model proposes that continued exposure strengthens connections (Treiman, 1993). This raises the question, if exposure to correct spelling strengthens connections, are the neural connections weakened by incorrect exposure of the phoneme written?

*Research into memory and spelling.* Brown (1990) proposed that the impact of incorrect spelling has on spelling performance depends on the view of how spellings are stored in memory. A word's orthography may be held in memory either as a single representation or as multiple representations. From the single representation perspective, an incorrect spelling has the effect of making the dimensions of the correct version more salient, and the incorrect spelling forces the child to attend to the dimensions of the correct spelling. In contrast, based on the multiple representation idea, the correct spelling is usually the stronger representation than the incorrect spelling. Exposure to incorrect spellings weakens the saliency of the correct spelling and leads to difficulty in discriminating between correct and incorrect versions (Brown, 1990).

Brown (1988) studied the effects of exposure to incorrect spellings on the spelling accuracy of university students. In two studies university students were pre-tested on a spelling test of words that were relatively difficult yet familiar to the students. The students were then instructed to generate incorrect spellings for some of the words, and in the second study they viewed incorrect spellings of some of the words while aware that the spellings were incorrect. In both studies, the students were then post-tested on the same spelling lists. The students were more likely to switch a correct spelling to an incorrect spelling following exposure to an incorrect spelling or following an incorrect spelling generated by them. The
findings of these studies were consistent with the argument that exposure to incorrect spellings, and writing incorrect spellings reduced the saliency of the correct spelling.

In a third study university students were shown incorrect spellings of words at zero, one, or three exposures. The students were asked to rate how close the incorrect spelling was to the correct spelling. The negative impact of exposures increased with the increase in the number of exposures to the incorrect spelling, with the word being rated as looking more correct with each successive exposure.

The results of all the studies indicated that the university students' ability to later produce or identify correct versions of the same words were disrupted following exposure to incorrect spellings. Based on the connectionist model, the conclusion is that neural connections are strengthened with continued exposure (Treiman, 1993). Taking this connectionist view that neural connections are strengthened through exposure to the correct spelling, the results of Brown's (1988) studies indicated that exposure to incorrect spelling weakened the neural connections for the correct spelling and this was magnified when the exposure to incorrect spellings increased. Brown (1990) suggested that these findings may have implications for continuing to encourage children to use invented spellings in process writing.

Summary of the Spelling Models Reviewed

The models reviewed have many aspects in common and that contrast. The developmental model is based on the child developing spelling tacitly through different stages that apply increasing levels of phonological knowledge that is then expressed in their invented spellings, morphological knowledge, and orthographic knowledge. The dual-route model incorporates two cognitive processes that are described in the stage theories models; however, these processes are recognized as processes that enable a child or adult to spell different types of words, that is, regular and irregular words. The connectionist model
proposes these processes are linked, and the links are strengthened through increased frequency of exposure. The list and the phonemic traditional models use different strategies to explicitly teach the spelling skills that the developmental model proposes children learn tacitly. A separate important linguistic skill that influences children’s spelling is phonemic awareness skills.

Teaching Spelling in Schools

In New Zealand, primary schools teachers employ a range of methods to teach spelling. The whole language approach to teaching and learning is standard teaching practice in New Zealand. Writing is taught using process writing, and the teaching of spelling occurs within process writing (Ministry of Education, 1992). This teaching approach reflects the developmental model of spelling (Nicholson, 2000). In addition, teachers provide children with weekly personal spelling lists to learn. Often Spell Write (Croft & Mapa, 1998) essential lists and the Spell Write (Croft, 1983) procedure of learning words are used to teach spelling. Learning words in lists reflect the list traditional model of spelling (defined in the first section under the heading traditional models), however, instead of all children receiving the same list of words to learn, the word lists are personalised including the words the children use in their writing. Some schools also teach phonological skills explicitly using phonemic awareness skills programmes as part of the reading or spelling programme.

A variety of different phonemic-based spelling programmes, either created by teachers or commercially produced are also used to teach spelling in some schools. The programmes reflect the phonemic traditional model of spelling (defined in the first section under the heading traditional models). New Zealand does not have a database on teacher’s practice of teaching phonics explicitly outside the context of reading or writing; however,
based on anecdotal and descriptive research reports, McNaughton (1999) concluded that it is likely that explicit and planned teaching of phoneme-grapheme correspondences occurs. One phonemic-based programme, the Direct Instruction approach to teaching spelling is reviewed below. The Direct Instruction spelling programmes reflect the phonemic traditional model. The content and design of the programmes reflect also the developmental sequence of spelling skills proposed by the stage theories model and reflect the dual-route and connectionist model of spelling.

*Whole-Language Approach to Spelling*

Treiman (1993) states that the developmental view of spelling has become integral with the whole language approach to teaching, and stage theories models fit well into the whole language approach to reading and writing. The whole language perspective views learning as a top-down process in which the child deductively recognises and applies the rules (Yellin, 1986). This view argues that when a child spells using invented spelling, the child is transcribing speech and reinventing spelling not reproducing learnt word patterns (Bissex, 1980). Based on this view, spelling development begins the first time a child makes a mark on a paper (Griffith & Leavell, 1996; Treiman & Bourassa, 2000).

In a whole language classroom, the teaching of reading and writing takes place through exposure in a literacy-rich environment, within an integrated programme (Ministry of Education, 1997) that is meaning-based (Smith & Elley, 1997). Language and text are explored in context (Hood, 2000). Writing and reading are interrelated, and each process supports the development of the other process (Ministry of Education, 1992). Spelling is viewed as an integral part of the writing process (Croft, 1983). For spelling to develop, children need both exposure to written language through reading and practice through writing (Wilde, 1990). Croft (1983) states that “spelling is an aspect of written language, so
the teaching and learning of spelling must take place as far as possible within the context of
writing” (p.8).

*Newsboard and Spelling*

Before the children write, the teacher presents the newsboard to involve the children in exploring language (Hood, 1997, 2000). Hood (2000) described the newsboard as the junior spelling programme. The children learn about story structure, develop vocabulary, and are taught spelling patterns and other surface features through teacher modelling and providing examples. The newsboard gives the teacher an opportunity to teach skills the teacher has noticed are difficult for the children or used incorrectly based on the children’s errors in their writing, and the teacher’s knowledge of the next skill to teach.

*Process Writing and Spelling*

Process writing is the approach used in whole language classrooms to teach writing. The key elements in process writing that involve spelling instruction include invented spelling, correct spelling, spelling consciousness, conference, and publishing.

*Invented spelling.* When children write, they apply their phonological knowledge using invented spelling to write words. Other terms have been used in place of invented spelling to describe the spelling including temporary spelling, sound spelling, constructed spelling, phonic spelling, developmental spelling (Gentry, 1999), and spelling approximation (Ministry of Education, 1992).

During process writing Graves (1994) emphasises that invented spellings are encouraged and spelling correctness is not emphasised as the children write. Instead, the children are encouraged to write words making approximations based on the sounds they hear in the word (Brown, 1990). Children are taught to say the phonemes in the word slowly so the child hears the phonemes in the word and is able to write the grapheme that corresponds to the phoneme (Graves, 1994). Encouraging children to use invented spellings
allows children to focus on writing and the meaning (Wilde, 1990). When children are able to attempt spelling using invented spelling, they are able to use words from their oral language in their writing (Graves, 1994), and when children focus on content rather than spelling words correctly, they are not limited to writing words that they know how to spell (Graves, 1983; Wilde, 1990; Ministry of Education, 1992).

Invented spellings are not viewed as mistakes, but as errors and a source of information for instruction (Bissex, 1980). Spelling attempts can be viewed as stages of accuracy and not as correct or incorrect (Gentry, 1999). Gentry (1981) states, “Teachers must celebrate mistakes rather than expect correct spelling before development is allowed to occur” (p.381). By analysing children’s invented spelling, the teacher is able to identify the child’s existing word knowledge and use this to design appropriate spelling activities (Gentry, 1999; Griffith & Leavell, 1996; Invernizzi, Abouzeid, & Gill, 1994). In New Zealand, Gentry’s stage model (Gentry, 1982) is used to determine and describe children’s spelling development (Ministry of Education, 1992).

Correct spelling and spelling consciousness. The focus of writing competence is on expression and content of the written work rather than an emphasis on the mechanics of spelling and punctuation. This is so the child’s interest and motivation is sustained (Ministry of Education, 1992). However, in process writing neither writing correct spelling nor developing spelling consciousness are excluded. During proofreading and editing, children are encouraged to correct spelling. Croft (1987) asserts that teaching children to recognise their spelling errors during proofreading is an important aspect of a spelling programme. Gentry (1981) proposes that when children write for a purpose, meaning is given to what they are writing, and as an outcome the children develop a spelling consciousness (Gentry, 1981). Griffith and Leavell (1996) propose that children also develop a spelling consciousness through proofreading. Hood (2000) agrees with Griffith and Leavell (1996)
and further states that children will only start developing a spelling consciousness when they have a purpose for writing, a real reader to read their writing, and publication is part of process writing. When writing for others, the child considers the audience and produces a product that is edited with words spelled correctly (Ministry of Education, 1992).

Conference. The conference provides an opportunity for the teacher to talk with children individually or in groups, to give feedback on content, proofreading, editing skills, and to discuss publishing the story. During a roving conference, the teacher moves around the children, talks briefly with different children as they write, and provides guidance on their writing and spelling. In a group conference, the children share their drafts and receive feedback from each other. The conference is also a time to introduce particular phoneme-grapheme correspondences, focus on sounding out words, and discriminating the phonemes within the words (Ministry of Education, 1992).

The spelling skills taught are identified by the teacher and in response to the child’s writing. Smith and Elley (1997) suggest that the teaching of a skill occurs at the point the child is ready to learn the new skill. The spelling skills are taught in mini lessons (Graves, 1994; Wilde, 1990) or as ‘teachable moments’ (Ministry of Education, 1992).

Publishing. A published story is a piece of written work that has been edited and is ready to be viewed by an audience. Prior to publishing, the teacher conferences with the child, concentrating on editing, in particular on surface features. Graves (1983) set a number of guidelines for publishing; that the teacher may change the child’s invented spellings to correct orthographic spelling, whereas syntax errors are not changed as they reflect the child’s language. Publishing provides the child with a record of what the child has written, contributes to the sense of audience, and gives a reason for writing (Ministry of Education, 1992).
Research into process writing and spelling. Groff (1986) states that the teaching of spelling via process writing is not based on findings of experimental studies comparing the effectiveness of teaching spelling using formal teaching versus children being encouraged to write and use invented spellings. Instead, the research on developmental spelling consists mainly of descriptions and anecdotal evidence in support of the efficacy of the various models (Brown, 1990; Smith & Elley, 1997). Smith and Elley add that many proponents of process writing including Graves, Calkins, and Hood’s, work in collaboration with classroom teachers and record change anecdotally and in terms of qualitative not quantitative data. Smith and Elley caution that most of our understanding of the positive effects of process writing is based on teachers’ intuitions, and therefore when reviewing process writing, observation should not be confused with outcomes. In addition, Smith and Elley state that Calkins and Graves report only successful outcomes, which introduce the issue of the efficacy of the documented reports. Brown (1990) considers that the developmental model needs more empirical testing to determine its validity as a model to teach spelling, going as far as to suggest, “until this model goes beyond the descriptive toward being proscriptive or comparative, it will remain of limited usefulness” (p.370).

In contrast to reports based on descriptions and anecdotal evidence, Clarke (1988) conducted a comparative study over five months that compared the written progress of children in writing, in four Grade One classrooms. In two classrooms, the children were encouraged to use invented spelling during process writing, while the children in the other two Grade One classrooms were encouraged to write using conventional spelling. The results of the study showed that children participating in each teaching approach wrote more words at the end of the five months than at the beginning. The children encouraged to write using invented spelling wrote significantly more words than the children who were
encouraged to spell the words correctly. At the end of the study, the syntactic complexity of the children was similar for children participating in each teaching approach.

Children in the classrooms encouraged to use invented spelling spelled more words incorrectly than the children did encouraged to spell words correctly. During the study, the mean number of words per child spelled at the phonetic stage and the transitional stage generally increased each month. An unexpected outcome occurred in terms of spelling accuracy for the children encouraged to use invented spelling. The children's mean spelling accuracy increased during the first two months but then decreased over the last three months of the study to levels below the first month. In contrast, the spelling accuracy of the children encouraged to spell words correctly remained consistently high across the study.

Clarke (1988) scored word complexity using the Johnson High Frequency Word List and found that the mean percentage of words written at each complexity level was similar for both groups; this finding suggested that neither group of children felt restricted to use only the words they could spell.

Post-tests were conducted to measure spelling accuracy using the Wide Range Achievement Test Spelling Subtest, and a spelling word list of high frequency irregularly spelled words and low frequency regularly spelled words. The children who were encouraged to use invented spelling had higher mean scores of the measure than the children encouraged to write words correctly. Clarke (1988) suggested that the children encouraged to use invented spelling developed skills in phonic analysis through matching the letter with the phoneme as they wrote.

While the children were participating in the study, all children received phonics instruction as part of their language arts programme. The phonics programme taught included teaching letter sounds in isolation, initial letter sounds, identifying sounds in their reading, sound sequencing, and a variety of oral drills and worksheets. As a result, the
phonics programme may have affected the spelling development of the children and biased
the results of the children encouraged to use invented spelling. This could have occurred
because knowledge of phoneme-grapheme correspondence, discrimination of phonemes in
words, and phoneme sequencing are important in learning to spell. Phonemic awareness
skills are also pre-requisites for learning to spell words (Treiman, 1993; see above).

Castle, Riach, and Nicholson (1994) examined whether the addition of phonemic
awareness skills training had a greater effect on the spelling development of five-year-old
children in their first few months of school than teaching spelling in the whole language
programme through process writing. The 30 children in the study were divided into two
groups. The children in the phonemic awareness group received phonemic awareness skills
teaching twice weekly, for ten weeks. The phonemic awareness lessons consisted of the
phonemic awareness skills, phoneme segmentation, phoneme substitution, phoneme
deletion, and rhyme. The children in the process writing group wrote their own stories and
were encouraged to use invented spellings.

Five pre-test and five post-test measures were administered to both groups of
children to assess phonemic awareness skills and spelling. Phonemic awareness was
assessed using Roper’s measure of phonemic awareness and spelling was assessed using a
standardised assessment, the Wide Range Achievement Test of Spelling and an experimental
spelling test that contained an equal number of three word types, regular, irregular, and non-
words, e.g., *vub*. To measure how the children spelled words in writing, the children
received a dictation test and a word-writing test. In the word-writing test, the children wrote
a list of words in ten minutes.

The post-tests results showed both groups improved in phonemic awareness skills,
however, the children in the phonemic awareness group showed greater improvement in
phonemic awareness skills, significant improvement in the Wide Range Achievement Test
of Spelling, and the experimental spelling test, in comparison to the process writing group. Although the post-test scores for dictation and word writing were higher for the children in the phonemic awareness group, the difference between the two groups was not statistically significant. Castle et al. (1994) suggested that the non-significant results for the dictation test might have been due to a ceiling effect and the non-significant results for the word-writing task to its open-ended nature. Castle et al. (1994) suggested that the addition of a phonemic awareness skills programme at school entry to supplement the whole-language process writing programme will assist children in learning to spell.

*Developmental Spelling and Formal Spelling Instruction*

As reviewed above, researchers who have studied spelling from a developmental perspective agree that children move through stages towards learning orthographic spelling through tacit learning (Gentry, 1982; Henderson & Templeton, 1986; Templeton, 1991, Treiman, 1993; Wilde, 1990). Both Gentry (1999) and Templeton (1991) suggest that children learn to spell as a result of writing and reading, and through direct spelling instruction. Gentry (1999) argues that teachers should encourage children to use invented spellings and teach correct spelling, however, there are differences as to when the researchers recommend teachers should directly teach spelling.

Gentry (1982) recommends that direct spelling instruction should occur only when the child is at the transitional stage. Olson (2000) suggests that prior to the transitional stage, spelling instruction should occur as a ‘teachable moment,’ as part of the writing conference. Gentry (1981) advises against the introduction of formal spelling instruction before children have reached the transitional stage suggesting that the introduction of formal instruction leads to frustration and little spelling success. Gentry (1981) further recommends that formal spelling instruction should be deferred for older children who have not reached the transitional stage. At the transitional stage when the child is spelling words close to
orthographic spelling, 15 minutes of daily spelling and word study should be provided (Gentry, 1999). Gentry (1981) recommends that once formal instruction is introduced, opportunities for the child to write extensively should be continued. Griffith and Leavell (1996), applying Henderson and Templeton (1986) stages, recommend that children should not receive formal spelling instruction until children are at the within-word stage. The within word stage equates to Gentry’s transitional stage (1981, 1982).

Templeton (1991) recommends that formal direct spelling instruction appropriate to the child’s developmental stage should occur at all stages of spelling development, as this will assist children to move through the stages. Templeton argues that although children move through developmental stages, the process of learning to write for most children is not like learning to speak as suggested by Wilde (1990), since for most children, more than reading and writing opportunities are required. Templeton stresses that children cannot discover all they need to learn, and without being explicitly taught spelling children are deprived of the information about words that is valuable to them. It is the teacher’s responsibility to assist children to learn patterns and acquire conscious strategies for analysis and generalisation.

Templeton (1991) recommends explicit spelling instruction that includes systematic and sequenced word study showing explicitly the spelling patterns and demonstrating the regularity of words and patterns. Words need to be familiar to the child, namely the words selected should be those the children have already been exposed to in reading and should be grouped according to patterns or principles. Rules should not be taught, but sufficient examples should be provided so the child abstracts or constructs the spelling patterns. Templeton (1991) does not view structured instruction, and reading and writing that is purposeful to be pedagogically incompatible. Instead, Templeton views the inclusion of
both as a necessary integrated approach if children are to achieve their potential in word knowledge and reading and writing.

Treiman (1993) proposed that from her study children learn the alphabetic principle and orthographic conventions through exposure to print. In addition, her findings showed that without direct instruction children applied the orthographic conventions from their earliest exposure to text. The easier skills could be learnt tacitly, but the more difficult phonological skills and orthographic conventions required formal instruction. Treiman (1993) suggested, “Children learn more quickly and easily if given instruction that meets their needs” (p.150). To provide the appropriate spelling instruction, the teacher must be aware of the children’s phonological and orthographic knowledge. In addition to spelling instruction, Treiman (1993) states that the teaching of phonemic awareness is essential for young children and should be part of the spelling curriculum. A level of phonemic awareness is required for children to begin to “invent their own spellings” (Treiman, 1993, p.292). Although children are often able to break syllables up into the onset and rime, breaking words up into phonemes is more difficult and requires formal phonemic awareness instruction.

*Personal spelling lists.* Although advocates of process writing consider spelling should be integrated in writing, teachers include weekly spelling lists. Graves (1994), who proposes that children should be encouraged to practise invented spelling suggests the inclusion of weekly spelling tests that consist of high frequency words, personal words that the children select that they continue to misspell, and words that the children use frequently.

Hood (2000) proposes that in order to write, children require a written sight vocabulary. When a child can spell a number of high frequency words, the meaning of the writing is maintained, and the child can focus on spelling the interest words. The teacher is more able to read what is written and can guide the child in his/her approximations. Hood
recommends that children should be given lists of words to learn based on words the child uses in his/her writing that approximates the correct spelling.

Spell Write-Revised (Croft & Mapa, 1998) is a spelling programme that is used extensively in New Zealand schools. Spell Write-Revised reflects the key principle that spelling is first a skill of writing and is best mastered within the context of writing. When spelling is incorporated as part of writing and spelling patterns are taught as part of the process of writing, there are indications that spelling generalisations are enhanced (Croft, 1983), however, Croft (1987) recognises that writing alone is insufficient for most children to develop spelling competency. Word study and spelling should be included as a component of the classroom language programme. Croft (1987) recommends that a spelling programme should include personal spelling lists, mastery of the essential word lists, (i.e., high frequency words used in children’s writing), and word study. It should concentrate on word meaning, use, and the structure of words (see Appendix C for a fuller description of Spell-Write).

Direct Instruction (DI)

The Direct Instruction model developed by Engelmann and his colleagues is based on empirical research on curriculum design and effective teaching practice (Stein, Carnine & Dixon, 1998). Stein et al. describe the Direct Instruction model as, “a comprehensive system of instruction that integrates effective teaching practices with sophisticated curriculum design, classroom organization and management, and careful monitoring of student progress, as well as extensive staff development” (p.227). The curriculum design principles that underlie all Direct Instruction programmes are to identify the big idea, organise content, teach explicitly, use generalisable strategies, scaffold instruction, integrate skills and concepts, and provide adequate review (Carnine, 1994; Stein et al., 1998; see Appendix C for a description of the Direct Instruction programme design).
Direct Instruction with capital D and I should not be confused with other direct instruction approaches. Approaches where the teacher promotes learning through actively supporting the student are referred to as direct instruction. Direct instruction in the lowercase can include supporting the student through scaffolding, giving explicit instructions, and explanations on how to do a task (Howell, Fox, & Morehead, 1993). The term direct instruction is used collectively for methods that use highly structured, teacher-controlled environmental contingencies of differential reinforcement of student’s academic performance, and systematic presentation of instructional material. In spelling, the features of direct instruction include a test-study-test format that incorporates immediate corrective feedback, error-correction procedures, positive reinforcement for correct spelling, modelling and imitation of correct spelling, and systematic repeated practice to learn a set of words (Gettinger, 1993).

Direct Instruction Spelling Programmes

SRA Spelling Mastery and SRA Corrective Spelling Through Morphographs (SRACSTM) are spelling programmes that apply Direct Instruction principles (see Appendix C for a description of SRA spelling programmes).

Research on Direct Instruction spelling programmes. Robinson and Hesse (1981) used the SRACSTM programme to investigate whether the SRACSTM programme met the stated objectives of the programme, in that it taught morphological rules that could be generalised, enabling children to apply morphological analysis of words to spell new words. Over eight months of instruction, an experimental group of 143 Grade Seven children received SRACSTM while the control group of 29 Grade Seven children were taught spelling indirectly, as the opportunity arose, weekly lists of words, and completed activities using the list words.
All children in the study were assessed prior to commencement of the study on four measures, namely tests of Rule Application, Morphological Analysis, Spelling Ability, and the Spelling Subset of the Stanford Achievement Test. The Rule Application, Morphological Analysis, and Spelling Ability tests were created from morphographs and rules taught in the SRACSTM programme. Half of the items in each test selected from the programme were directly taught and the remaining half of the items had not been taught, but the items were based on the morphographs included in the programme. Robinson and Hesse (1981) selected the Stanford Achievement Test, Spelling Subtest as the fourth measure because the assessment was a norm-referenced assessment and general spelling ability and knowledge was assessed. In addition, the skills assessed in Stanford Achievement Test, Spelling Subtest were the same skills taught in the SRACSTM programme. Based on the pre-test results, the children were grouped in low, average, and high achievement levels.

The results of the group of children taught SRACSTM showed that the programme taught the skills the programme purported to teach. Low, average, and high achieving children in the experimental group all showed significant gains in comparison to the control group in tests of Rule Application, Morphological Analysis, and Spelling Ability. In particular, the low and average achieving children made greater improvements in spelling than the high achieving children for the Test of Spelling Ability. The high achieving children in the pre-test showed they had already mastered two-thirds of the content in the programme prior to starting the programme, posing a risk of a ceiling effect for this group. Robinson and Hesse (1981) concluded that the children's scores on the Spelling Ability test indicated that some generalisation had occurred children spelled correctly words not taught. To spell the words not taught, Robinson and Hesse (1981) asserted that the children needed to apply morphological knowledge and spelling rules to spell the words.
In contrast, the results on the Stanford Achievement Test Spelling Subtest were not statistically significant, perhaps because of limitations of the spelling skills taught by the programme to generalise. Robinson and Hesse (1981) hypothesised that the lack of generalisation to spelling skills may have been a result of the instruction not including application of the spelling rules and words to other curriculum areas. In support of this view, Robinson and Hesse (1981) stated that the format of the test of Spelling Ability was familiar to the children while the Stanford Achievement Test Spelling Subset was a proofreading activity. To ensure generalisation of the newly acquired skills, Robinson and Hesse (1981) suggested extending the instruction of learning to spell using morphographs to include the students’ daily written expression.

Hesse, Robinson, James, and Rankin’s (1983) follow-up study investigated the retention of the spelling learned by 109 Grade Seven children who received instruction in morphographs and investigated generalisation of this learning to a non-programme specific situation.

The children were assessed three times on two measures, the Morphograph Spelling Test and the Spelling Subtest of the Stanford Achievement Test. The Morphograph Spelling Test was created from the SRACSTM programme. Half of the words in the test were taught in the programme, and the remaining words were constructed of morphographs taught, but the words were not used specifically in the programme.

The children were assessed prior to beginning the SRACSTM programme, at the end of the instruction phase, and a year later. The instruction phase of the study continued through the Grade Seven school year until 140 lessons were completed. During the following year, the children did not receive formal spelling instruction but were taught spelling informally and as the opportunity arose. The children were expected to learn the spellings of new vocabulary taught and to use correct spelling in their writing.
The results showed the children’s spelling improved using both measures, the Morphograph Spelling Test and the Stanford Achievement Test, Spelling Subtest when pre-test and post-test results were compared. However, there was a higher gain in the post-test mean scores for the Morphograph Spelling Test. The Morphograph Spelling Test post-test results, at the end of the programme, and the follow-up test a year later showed there was no significant difference between both post-test results in spite of the subjects not having received any formal spelling instruction following the instructional phase. Hesse et al. (1983) suggested that the results showed that teaching morphographs had an effect in both generalisation and retention of learning.

Hesse et al. (1983) concluded that a limitation in the study design was that the study did not include a control group, so no comparisons or conclusions could be made regarding the effectiveness of the programme compared to another.

Lum and Morton (1984) compared the effects the SRA Spelling Mastery and the Nelson programmes had on the spelling and reading of Grade Two seven-year-old children. Two classes of children participated in the study, twenty to thirty minutes daily, over the school year. A class of 16 children were taught spelling using SRA Spelling Mastery Level A and part of Level B. The teacher taught the sequential lessons following the teacher’s presentation guide to teach the lessons. The other class of 20 children were taught spelling using the Nelson programme. The Nelson programme focused on phonemic patterns and spelling rules and consisted of five parts in which (1) the words were introduced, (2) the children wrote the words, (3) the words were written in sentences, (4) the children completed exercises, and (5) on Friday, the children were tested on the words in a dictation test.

The Wide Range Achievement Test, the Test of Written Spelling, and the Slosson Oral Reading Test were administered at the beginning and at the end of the study. Results for all measures showed that children in the class taught spelling using SRA Spelling
Mastery showed greater grade equivalent gains than the children in the class taught spelling using the Nelson programme. In addition, Lum and Morton (1984) stated that there was a gender effect for all measures. Girls taught spelling using SRA Spelling Mastery made greater gains than boys taught spelling using SRA Spelling Mastery. When the two programmes were compared, the boys taught spelling using SRA Spelling Mastery made greater gains in the spelling assessments and the Slosson Oral Reading Test than the girls did taught spelling using the Nelson programme.

McCormick and Fitzgerald (1997) evaluated the effectiveness of the application of the SRA Spelling Mastery programme used school-wide. Twenty-two female Year Six children taught spelling using Level F of the SRA Spelling Mastery programme were selected. The South Australian Spelling Test (Westwood, 1999), Proof Reading Tests of Spelling and a questionnaire were administered to the children. A questionnaire on student achievement and satisfaction and teacher satisfaction was administered to the teachers.

The South Australian Spelling Test results indicated that SRA Spelling Mastery was highly effective, with children performing well above their chronological age. In addition, a child with an IQ of 78 scored well within the normal range of spelling as indicated by standardised tests. Other children who were classified by IQ as gifted, achieved at adult levels in spelling. Generally, children had a positive attitude towards spelling, and the teachers held highly positive views about the programme.

Although the results indicated that the SRA Spelling Mastery programme had contributed to the spelling proficiency of the students, there were several limitations to the study. McCormick and Fitzgerald (1997) acknowledged that the study was descriptive, since no pre test data was available to measure student gains on the SRA Spelling Mastery programme, and the study did not control for cultural, socio-economic, or chance effects.
Burnette et al. (1999) compared the efficacy of teaching spelling using the SRA Spelling Mastery programme to a whole word approach. The study took place in an elementary school, across Grade levels over a school year. Four hundred and forty-six children across Grade One to Grade Six (USA year levels) participated. Children in 13 of the 17 classes were taught spelling using SRA Spelling Mastery. The children in the other four classes were taught spelling using a whole word approach. Five levels of SRA Spelling Mastery (A –E) were taught during the study (e.g., the Grade One children were taught using level A, where as the Grade Six children were taught levels C – E) depending on the child’s spelling ability. The spelling teaching sessions took place daily for 15 to 20 minutes. The teachers using the SRA Spelling Mastery programmes followed the teacher’s presentation guide to teach the lessons. The teachers using the whole word approach created their own list of words to teach based on the state’s essential academic learning requirements and on the content taught in class.

Two measures, the Test of Written Spelling – 3 consisting of two subtests, predictable words, and unpredictable words, and Correct Letter Sequencing were administered. The predictable words were defined as words that could be spelled using phonemic patterns and the unpredictable words were defined as words that could not be spelled using phonemic patterns (i.e., irregular words). The Correct Letter Sequencing assessed how closely the word was spelled correctly. The children were assessed on these measures at the beginning and at the end of the study.

The post-test scores for all measures showed that the scores of the children taught spelling using the SRA Spelling Mastery programme and the whole word approach across Grades One Grade Six were higher than before the study began. When comparing the results of the children in grades where both approaches were used, there was only a small difference in degree of change between the approaches used. The largest mean change
occurred for all measures in Grade One where SRA Spelling Mastery Level A was taught. Unfortunately, there were no comparative results as the whole word approach was not taught at Grade One.

Burnette et al. (1999) identified several limitations in the study. All children in Grade One and some of the classes in Grade Two and Grade Three were taught reading using SRA Reading Mastery, which includes a spelling component, while other classes had been taught reading using SRA Reading Mastery in previous years. The spelling component in the SRA Reading Mastery may have had an effect on the children’s spelling. Another limitation was that the children’s level of spelling at the beginning of the study was shown to be not equivalent for the classes of children taught using SRA Spelling Mastery or the whole word approach.

**SRA Spelling Programmes Summary of Findings**

The findings of the studies of SRACSTM and SRA Spelling Mastery showed positive effects on the children’s spelling. The change in the children’s spelling scores showed the SRACSTM and the SRA Spelling Mastery programmes were successful in teaching spelling and generalisation to new words. The results of Hesse et al.’s study showed retention of skills taught over time. The studies that compared the SRA spelling programmes to other spelling programmes, namely Robinson and Hesse, (1981), Lum and Morton (1984), and Burnette et al. (1999), showed that the SRA spelling programmes had a greater effect on improving the children’s spelling than each of the comparative spelling programmes.

Robinson and Hesse’s (1981) findings showed the teaching of morphographs resulted in the children making greater improvement in spelling than the group of children taught words in spelling lists, activities based on the words, and incidentally or as the opportunity arose. Although the children’s spelling scores showed SRACSM was more successful, the
results need to be viewed with caution. The structure of the tests favoured the SRACSM programme and might have biased the result. The structure of the tests targeted the set of morphographs that were taught in the SRACSTM programme and the words tested in the Stanford Achievement Test Spelling Subset contained only words that consisted of the morphographs taught during the SRACSTM. In contrast, Burnette et al. (1999) and Lum and Morton’s (1984) studies did not control the tests to reflect what was taught in either the SRA Spelling Mastery programme or the comparative programmes.

In addition, to a method effect, Lum and Morton’s findings showed a gender effect, in that girls taught SRA Spelling Mastery scored better than boys did taught SRA Spelling Mastery. These findings introduce the issue of gender difference in learning. Both girls and boys benefited more learning spelling during SRA Spelling Mastery lessons than learning spelling during the Nelson programme lessons but these findings suggest girls benefited the most.

When SRA Spelling Mastery and the Nelson programme are compared, both spelling programmes taught phonemic patterns and provided similar activities for children to learn the spellings of words. The results indicate that the design, sequence of skills taught, and content of SRA Spelling Mastery were superior to the Nelson Programme. Integrated in the SRA Spelling Mastery programme the phonemic awareness skill of phoneme segmentation was taught which was not included in the Nelson programme.

New Zealand Children’s Spelling Performance

The Ministry of Education’s overall goal is to develop the highest possible level of literacy (Ministry of Education, 1994). To achieve this goal the Minister of Education made this statement in October 1998, “By 2005, every child turning nine will be able to read,
write, and do maths for success” (Ministry of Education, 1999, p.1). The Literacy Taskforce has been set up to advise the Minister on achieving this objective. To achieve this level of children’s literacy and numeracy by the age of nine, the Literacy Taskforce believes this can be best achieved through focussing on teaching during the first four years of school (Ministry of Education, 1999).

Currently, it appears that many children are not becoming successful in spelling. Hood (2000) has observed Year Four and Year Five children who are unable to spell words, “such as: they (thay), there (ther), had (hat), and a range of other quite simple, basic words. These children are in trouble and there are thousands of others throughout the country” (p.73). Hood states that 12 and 13 year old children are still using invented spelling, and their spelling is not improving. Hood uses the analogy of the development of walking from rolling, crawling to walking, to describe children who are still using invented spelling when they should be using correct spelling, “In spelling terms we still have ‘crawlers’ at the age of twelve or thirteen. They are not getting any better.” Hood did not identify whether this level of spelling success was more prevalent for boys or girls.

Current evidence shows that boys are underachieving (Ministry of Education, 1999). The Literacy Taskforce states, “The challenge is to ensure that our teaching practices are equally effective for all children” (Ministry of Education, 1999, p. 6).

The current standards of literacy are a source of concern. The latest National Educational Monitoring Project (NEMP) Writing Assessment R 1998 results (Flockton & Crooks, 1999) for Year Four and Year Eight showed poor spelling performance for both class levels. Flockton and Crook’s (1999) evaluation was that there was, “considerable scope for improvement” (p.51). In addition, Flockton and Crooks reported that most
children saw the teacher as their main reader and as a consequence children’s writing showed the lack of a spelling conscience, that is, spelling words correctly when writing.

To address the spelling conscience issue, Hood (2000) suggests that children need to take responsibility for their writing, there needs to be a real reader, an unknown reader of the writing, and writing needs to be published. To address poor spelling performance Hood (2000) suggests that teachers need to be more proactive in ensuring children in junior classes have a core vocabulary of high frequency words, and teacher expectation should be that children of the age of nine and ten would not be using invented spelling. To achieve this Hood recommends that children are taught a strategy of learning how to spell words, e.g., Spell Write, (Croft 1983; Croft & Mapa, 1998) and have an efficient method of checking spelling. To extend their vocabulary Hood (2000) suggests using Spell Write Revised (Croft & Mapa, 1998) to provide children with new words they can use in their writing.

Graham and Miller (1979) attributed under-achievement of children in spelling to be possibly due in part to, inadequate classroom instruction, poorly designed commercial materials, and the absence of spelling programmes based on research findings. The Literacy Taskforce states that, “the quality of the curriculum - its content, design, and the way in which it is taught and monitored - is also a significant influence on children’s achievement” (Ministry of Education, 1999, p. 2). To address literacy of which spelling is an integral part, the Literacy Taskforce state that it is essential, that teachers are skilled and are able to select and use the most appropriate strategy to meet the child’s needs rather than following a particular approach (Ministry of Education, 1999).
Aim of the Study

The review of the literature presented above shows that a range of methods is used to teach spelling. The research into the stages of children’s spelling presented above shows that spelling is developmental, the dual-route model shows that two processes are involved to enable a child to spell using phonological and lexical knowledge, and the connectionist model suggests that the processes are linked. It is recognised that phonemic awareness skills are important as underpinning skills necessary for reading and spelling. Process writing is the vehicle used by New Zealand teachers for children to write and to develop their spelling. The teaching of spelling giving children weekly personal spelling lists to learn occurs and is encouraged (Croft & Mapa, 1998; Hood, 2000). Direct teaching of spelling occurs, often based on the words the children are learning and spelling patterns or rules are taught when the teacher determines these are appropriate. Although there is no database on teaching practice, McNaughton (1999) states that most teaching of spelling occurs incidentally, however, direct teaching does occur.

The Literacy Taskforce states that there is lack of information about the strategies that provide the best outcomes for children who have been identified as in the underachieving groups (e.g., boys) and recommends more research be undertaken to identify those strategies that are successful to provide guidance to teachers (Ministry of Education, 1999).

Current research shows that children, and in particular boys, are achieving poorly in literacy that includes spelling. This situation is of concern particularly when the Ministry of Education (1994) focus is to develop the highest levels of literacy to enable children to participate fully in society following their secondary education. Taking the Ministry of Education’s goal of high literacy levels and the present situation, the purpose of this study
was to investigate the effects of introducing in addition to the regular whole-language classroom programme a comprehensive, systematic spelling programme that targeted specific skills necessary to spell. SRA Spelling Mastery was selected because it is a comprehensive teacher-directed spelling programme that incorporates research-based teaching strategies.

The SRA Spelling Mastery Level A programme teaches foundation phonological skills that children exhibit in their invented spellings (Gentry, 1981, 1982; Henderson & Templeton, 1986; Read, 1971, Treiman, 1993). Starting at Level A ensured the children would be taught the phoneme-grapheme correspondences in sequence. Starting at a higher level may have resulted in the children not having all the background knowledge or phonological skills necessary at a later level. This may have masked the efficacy of the SRA Spelling Mastery programme.

Year Two six-year-old children were selected to participate in the study because at this age children spell at the level of phonological and lexical knowledge that meets SRA Spelling Mastery Level A criteria. This class year level is also within the year level range the Literacy Taskforce recommended as crucial for achieving the Ministry of Education’s literacy goal (Ministry of Education, 1999).

Previous studies have compared the effects of SRA Spelling Mastery with other programmes that are similar in design that teach spelling skills explicitly. The findings of each study showed SRA Spelling Mastery increased spelling skill in comparison to other structured spelling programmes (Burnette et al., 1999; Lum and Morton, 1984); however, between methods the difference was not consistently statistically significant. None of the reviewed studies compared SRA Spelling Mastery with a programme that teaches spelling skills using a whole-language approach nor based on the teaching practice in New Zealand schools.
To determine what effects direct spelling teaching has on children’s spelling in their writing, it was important to incorporate SRA Spelling Mastery with process writing. A limitation Robinson & Hesse (1981) identified in their study was the lack of transfer of the morphographs taught to non-programme specific situations. Robinson & Hesse taught the morphographs in isolation from other written language-based activities. The measurement selected for this study to determine transfer of spelling skills taught was the analysis of the children’s daily writing.

Research Questions

The research questions posed in this study are: What effects does the addition of SRA Spelling Mastery Level A to the children’s daily written language programme have on the spelling of six-year-old in their written expression? In particular, what change occurs with regard to spelling performance and generalisation to writing when the children’s writing vocabulary is not controlled? Should a systematic sequential programme be included as part of the written language programme when children begin school, once children have a particular level of spelling knowledge, or when children fail to gain sufficient spelling competency? Is there a different effect on boys and girls’ spelling performance in their writing when the children are taught SRA Spelling Mastery?
CHAPTER 2

METHOD

Participants

*Ethical considerations.* Before the study began, ethical clearance was obtained in accordance with the Christchurch College of Education consent regulations. Once ethical clearance was granted, the researcher contacted the principal of a local state primary school to obtain approval to conduct the study in his school. Permission to conduct the research was given by the principal and the classroom teacher of the Year Two children.

A letter explaining the purpose of the research and a parental / caregiver consent form to be signed by parents or caregivers was given to all the children in the Year Two class. Eight children, four girls and four boys who returned the signed forms and who met the criteria below were selected to participate in the study.

To preserve the participants' anonymity, the names of the children have been changed.

*Criteria for selection of participants.* All 26 children in a Year Two class, at a decile seven state primary school were given the SRA Spelling Mastery Level A Placement Test. The criterion for teaching children at Level A of SRA Spelling Mastery was that the children spell five or fewer words correctly. Eighteen children met the criteria.

Once the children who met this level of spelling competency were identified, any child who was receiving specialist educational support from other agencies or attended other programmes additional to the classroom programme was excluded. Any child the classroom teacher identified as having speech and language difficulties, learning disabilities, hearing loss, or was an English Speaker of Other Languages (E.S.O.L.) was also excluded. The
purpose of excluding children who were identified as having a special need was to eliminate other variables that may have an effect on the change in spelling of the children in the study.

Of the 15 children eligible to participate in the study, eight children were selected by the classroom teacher on the basis that the children would have positive social interactions.

*Children.* Eight children from New Zealand European background (four girls and four boys) were selected and divided into two groups for instructional purposes. Two girls and two boys were assigned to each group for gender balance. The classroom teacher selected which children would be in each group based on positive relationships between the selected children.

Jenny, from Group Two who was assigned to start SRA Spelling Mastery during the second condition did not continue in the study. Jenny’s spelling ability improved when she started the SRA Spelling Mastery lessons to a level above the criterion of Level A SRA Spelling Mastery. It was considered ethically inappropriate to have Jenny continue when her spelling performance level was above the work being taught or when another variable may have influenced her spelling improvement.

Seven children continued throughout the remainder of the study. The seven children’s reading ages ranged from 5-5.25 years to 6.5-7 years at the beginning of the study (Table 1).

Table 1

<table>
<thead>
<tr>
<th>Child’s Name</th>
<th>Reading level (Colour)</th>
<th>Reading Level (Age in years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>Green</td>
<td>5.75 - 6</td>
</tr>
<tr>
<td>Keith</td>
<td>Blue</td>
<td>5.5 - 5.75</td>
</tr>
<tr>
<td>Karen</td>
<td>Turquoise</td>
<td>6.5 - 7</td>
</tr>
<tr>
<td>Cathy</td>
<td>Yellow</td>
<td>5.25 - 5.5</td>
</tr>
<tr>
<td>Clinton</td>
<td>Yellow</td>
<td>5.25 - 5.5</td>
</tr>
<tr>
<td>Anthony</td>
<td>Red</td>
<td>5.0 - 5.25</td>
</tr>
<tr>
<td>Anna</td>
<td>Green</td>
<td>5.75 - 6</td>
</tr>
</tbody>
</table>
Apparatus and Materials

*SRA Spelling Mastery Level A Placement Test.* The classroom teacher used the SRA Spelling Mastery Level A Placement Test in the SRA Level A Teacher’s Book. Each child wrote the spelling words on a single sheet of paper.

*SRA Spelling Mastery.* The researcher used the SRA classroom Teacher’s Book, and each child was given a SRA Spelling Mastery Student’s Book Level A to write in.

*Writing section.* A timer was set to ring after twenty minutes of writing had elapsed. The children wrote their stories in an exercise book. Each day the children brought their dictionary, *My Words: An Aid to Writing and Spelling in Junior Classes* (Croft, 1989) and their spelling notebook. The exercise books in which the children wrote their stories were kept by the researcher. The researcher provided the children with pencils to write.

Measures and Assessment Procedures

*SRA Spelling Mastery Level A Placement Test.* The classroom teacher administered the Placement Test to all children in the Year Two class. The SRA Spelling Mastery Level A Placement Test consisted of ten words. The classroom teacher said each spelling word on its own and then in a sentence. The researcher marked and scored the test, correct out of ten. The criterion for beginning SRA Spelling Mastery Level A was spelling five or fewer words correctly. The errors were not analysed. These words are listed in Table 2.

Table 2

<table>
<thead>
<tr>
<th>SRA Spelling Mastery Level A Placement Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>many</td>
</tr>
<tr>
<td>sharp</td>
</tr>
</tbody>
</table>
Writing behaviours. The researcher collected the daily twenty-minute writing samples and analysed the samples using a variety of measures. The daily writing behaviour scores were recorded on the daily data recording sheet (see Appendix D).

1. Orthographic spelling accuracy (SA)
Orthographic spelling accuracy was defined as correct orthographic spelling. Orthographic spelling accuracy was determined from the proportion of different words written without a prompt spelled correctly, divided by the total number of different words written without a prompt. The percentage correct was calculated by multiplying the proportion correct by 100.

Criterion for correct spelling of a word was 50% or more of the multiple uses of the same word spelled correctly. If fewer than 50% of the multiple uses of the same word were spelled incorrectly, the word was not counted as a correct spelling.

2. Phonetic spelling accuracy (PS)
Phonetic spelling was defined as spelling the letter as it sounded using a letter or combination of letters that was phonetically possible or legal (Treiman, 1993). Phonetic spelling was calculated from the words spelled incorrectly. Phonetic spelling was recorded at phoneme-grapheme level. Each regular phoneme-grapheme correspondence within a word that was spelled phonetically correctly was counted.

Phonetic spelling accuracy was calculated from the proportion of correct phonetically spelled letters divided by the total number of phonetically spelled letters. The percentage correct was calculated by multiplying the proportion correct by 100.

Scoring phonetic spelling
A. Letters in words that did not correspond to a phonetic spelling but were correct orthographically were not counted. For example, in the word brother the letter o is spelled orthographically correctly yet not phonetically correctly. The letter o is pronounced as /ʌ/ as a short vowel, e.g., as in the word hut and is usually written as the letter u.
B. Different letters or letter combinations within words were scored correct if the letters corresponded to a phonetically regular way of spelling a phoneme, e.g., the word ‘great’ is recognised as an irregularly spelled word, yet letters within the word have a regular phoneme-grapheme correspondence pattern.

a. The letters g, r, and t follow the regular phoneme-grapheme correspondence pattern.

b. The long vowel pronounced /ei/ spelled ea does not follow the regular phoneme-grapheme correspondence pattern.

c. Spelling the phoneme /ei/ using either of the following letters or letter sequences is phonetically correct or legal (Treiman, 1993) and was scored correct:

i. grate (silent final e)

ii. grait (double vowel letters)

iii. grayt (vowel and semi vowel; y)

d. The spelling of the phoneme /ei/ was incorrect if either of the following letters were written:

i. gret

ii. grat

The letters e and a are pronounced as phonemes /e/ and /æ/.

e. If the child spelled the phoneme /ei/ using ea, this was excluded because it was the correct conventional or orthographic spelling.

C. The final phoneme /l/ in words is usually omitted. The final phoneme was not counted, e.g., girl. The total number of phonemes in girl is two.

D. Voiceless phonemes, e.g., /p/, /t/, /k/ in initial phoneme clusters when following the phoneme /s/ become unaspirated and sound like the voiced phoneme. The phoneme /p/
sounds like the phoneme /b/, the phoneme /t/ sounds like the phoneme /d/, and the phoneme /k/ sounds like the phoneme /g/. Spelling the voiceless phoneme with the voiced phoneme spelling was scored phonetically correct, e.g. /spʊ t/ spelled sbot.

E. Phoneme changes occur for the phonemes /t/ and /d/ when the phonemes precede the phoneme /t/. The phoneme /t/ is pronounced /f/ and the phoneme /d/ is pronounced /dʒ/.

Spelling the letters tr, e.g., in the word train as chr was scored phonetically correct. Spelling the letters dr, e.g., in the word drink as gr or jr was scored phonetically correct.

F. The letters th pronounced as /θ/ or /ð/ are usually pronounced by children as the phonemes /f/ or /v/. Spelling the letters th with the letters f or v was scored phonetically correct.

G. Phoneme-grapheme correspondences were analysed phonetically correct using the criteria in Table 3.
<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Letter spelling</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short vowels</td>
<td>/ɒ /</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>/ɪ /</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>/æ/</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>/e/</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>/ʌ /</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>/ʊ /</td>
<td>Oo</td>
</tr>
<tr>
<td></td>
<td>/ə /</td>
<td>Er</td>
</tr>
<tr>
<td>Long vowels</td>
<td>/i:/</td>
<td>ee, ea, e and y (end of a word)</td>
</tr>
<tr>
<td></td>
<td>/æi/</td>
<td>Ar</td>
</tr>
<tr>
<td></td>
<td>/au/</td>
<td>oo, ew</td>
</tr>
<tr>
<td></td>
<td>/ɔ /</td>
<td>or, aw, au</td>
</tr>
<tr>
<td></td>
<td>/ɜ /</td>
<td>er, ir, ur</td>
</tr>
<tr>
<td>Diphthongs</td>
<td>/ɒɪ /</td>
<td>oa, o and ow (end of a word)</td>
</tr>
<tr>
<td></td>
<td>/ai/</td>
<td>i + final letter e, ie, y</td>
</tr>
<tr>
<td></td>
<td>/eɪ/</td>
<td>a + final letter e, ai, ay (end of a word)</td>
</tr>
<tr>
<td></td>
<td>/eə /</td>
<td>eer, ere</td>
</tr>
<tr>
<td></td>
<td>/au /</td>
<td>Ow</td>
</tr>
<tr>
<td></td>
<td>/ɔi /</td>
<td>Oy</td>
</tr>
<tr>
<td>Consonants</td>
<td>/p/</td>
<td>P</td>
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<td></td>
<td>/b/</td>
<td>B</td>
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<td></td>
<td>/d/</td>
<td>D</td>
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<tr>
<td></td>
<td>/kl</td>
<td>c, k</td>
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<tr>
<td></td>
<td>/g/</td>
<td>G</td>
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<td>/f/</td>
<td>F</td>
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<td>/v/</td>
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<tr>
<td>Phoneme</td>
<td>letter spelling</td>
<td>Example</td>
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<td>---------</td>
</tr>
<tr>
<td>/ʃ/</td>
<td>she</td>
<td>Shop</td>
</tr>
<tr>
<td>/θ/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>/tʃ/</td>
<td>j, g</td>
<td>jam, gym</td>
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<tr>
<td>/m/</td>
<td>m</td>
<td>Man</td>
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<td>/n/</td>
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<td>No</td>
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<td>ing</td>
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<td>h</td>
<td>Hat</td>
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<td>l</td>
<td>Lit</td>
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<td>/r/</td>
<td>r</td>
<td>Run</td>
</tr>
<tr>
<td>/w/</td>
<td>w</td>
<td>Wind</td>
</tr>
<tr>
<td>/j/</td>
<td>y</td>
<td>Yellow</td>
</tr>
<tr>
<td>/s/</td>
<td>s</td>
<td>Saw</td>
</tr>
<tr>
<td>/z/</td>
<td>z</td>
<td>Zoo</td>
</tr>
<tr>
<td>/θ/</td>
<td>f</td>
<td>thin, with</td>
</tr>
<tr>
<td>/ʃ/</td>
<td>v</td>
<td>this, brother</td>
</tr>
</tbody>
</table>

3. Total Word Score (TS)

The total number of words written by each child was counted to obtain the total word score.

4. Total Different Words Without a Prompt (TDWNP)

The total number of different words without a verbal or visual prompt written by each child was counted to obtain the total different words without a prompt score. A verbal prompt was defined as spelling part of the word or the complete word out loud to the child. A visual prompt was defined as the word written available to the child to see. Words written on the white board during the storyboard were not counted in the sample of words written by each child.

5. Word Complexity

Word complexity was defined as the number of syllables in a word. The levels of word complexity identified were one syllable, two syllable, and more than two syllable words. The
daily total number of one syllable, two syllable, and more than two syllable words written by each child during each condition was counted. The proportion of each of one syllable, two syllable, and more than two syllable words was divided by the total number of words written, multiplied by 100 to obtain the percentage for each level of word complexity.

*Generalisation of SRA Spelling Mastery to writing.* Generalisation of words taught during the SRA Spelling Mastery lessons was defined as writing the words correctly in the children’s stories. Words taught during the SRA Spelling Mastery lessons that were used in the children’s writing were recorded on the daily data recording sheet (see Appendix D). The percentage of words spelled correctly was calculated by dividing the proportion of words spelled correctly by the total number of words written and multiplied by 100.

*Children’s preference for SRA Spelling Mastery and process writing.* Each Friday following the written language lesson, the children who were assigned to SRA Spelling Mastery rated their overall enjoyment of the SRA Spelling Mastery lesson and writing a story. The researcher showed each child separately, a piece of paper with four line drawn faces that represented the rating scale from one to four: “No, I don’t like it,” “Okay,” “I like it,” “I like it a lot.” The children made their selection, pointing to a picture of a face, and the researcher recorded their responses (see Appendix E).

*Stage of spelling development.* The Placement Test spelling errors were selected as pre-test measures of the children’s stage of spelling development. The spelling errors were analysed according to Gentry’s (1981, 1982) stages. The Level A Placement Test spelling words could not be used as a post-test measure of the children’s stage of spelling development as several words in the spelling placement test were taught during the SRA Spelling Mastery lessons. The last ten spelling errors the children wrote in their writing were selected as the post-test measure. Each spelling error was analysed and assigned one of Gentry’s stages (1981, 1982). To determine the percentage of words spelled at the different
stages, the proportion of words spelled at each stage was divided by the total number of words spelled, multiplied by 100.

*Quality of spelling in writing.* Pre-test and post-test measures of the quality of spelling in writing were taken for each child in the study. Pre-test measures were taken during the first week of baseline, and the post-test measures were taken the week following the completion of the study. The classroom teacher rated each child’s performance according to a quality of spelling in writing checklist with a rating scale from one to four: one as not yet, two as sometimes, three as usually, and four as established. The skills for quality of spelling in writing included alphabet knowledge, understanding of spelling vocabulary, use of invented spelling, proofreading, spelling conscience, and attitude towards spelling (see Appendix F).

*Procedural reliability.* To determine if the researcher had followed the specific procedures for implementing the SRA Spelling Mastery lessons, newsboard, writing a story, and conference, two Master of Teaching and Learning degree students were trained in recording the specific procedures. The written language lessons during the first week were videoed and viewed by the researcher and the two procedural reliability recorders. Training was carried out until interrater agreement between the researcher and two recorders was 100%.

One in five written language lessons was videoed and viewed independently by the two recorders. A checklist was given to each recorder to assess criteria (see Appendix G). To score SRA Spelling Mastery, each recorder had a copy of the lesson from the Classroom Teacher’s Book and the Student’s Workbook Level A. Each recorder placed a tick for each criteria met. Procedural reliability was determined by dividing the number of criteria met by the total number of criteria. The percentage was calculated by multiplying the proportion of ticks by 100.
Reliability of writing behaviours. To determine if the researcher was analysing the writing samples accurately, a recoder was trained in recording the writing behaviours measures. Training was carried out until interrater agreement between the researcher and the recoder was 100%. A trained recoder independently scored one writing sample per week, scoring the writing behaviours for each child. Writing behaviour reliability was determined by subtracting the total number of disagreements from the total number of agreements for total word score, total different words without a prompt, orthographic spelling accuracy, phonetic spelling accuracy, and word complexity. The percentage was calculated by multiplying the agreement by 100.

Setting

The study took place during the first part of the morning in a decile 7, suburban contributing state primary school (Year one to Year Six). The first two weeks of baseline took place in the children’s classroom. The group instruction lessons took place in a spare classroom within a block of classrooms opposite to the students’ classroom.

Procedures

Experimental design. A single-case, combined multiple-baseline and reversal design was used to compare the effect teaching using SRA Spelling Mastery Level A procedures had on the spelling in the children’s writing. The seven children were divided into two groups, one of four children (Group One) and one of three children (Group Two). Each group of children received two four-week phases of intervention with SRA Spelling Mastery Level A procedures during the study additional to the classroom programme (i.e., baseline condition). Baseline condition consisted of the children receiving newsboard, process writing, learning weekly spelling lists, teaching of spelling during reading and incidentally at other times during the school day. To establish a multiple baseline treatment design, Group One began four weeks of SRA Spelling Mastery lessons while the Group Two children
continued under the baseline condition. The reversal design aspect was implemented by having the children begin the study with baseline followed by the intervention condition. A reversal occurred when the children resumed baseline conditions. The treatment pattern for Group One was ABABA, with two weeks of baseline followed by four weeks of SRA Spelling Mastery, and following the reversal, the two conditions repeated for a following four weeks each, concluding with the final baseline condition. The treatment pattern for Group Two was ABAB, with six weeks of baseline, followed by four weeks of SRA Spelling Mastery, and then the reversal to baseline, and the two conditions repeated for the following four weeks each, concluding with SRA Spelling Mastery. The treatment pattern is shown in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Timeline of Experimental Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks</td>
</tr>
<tr>
<td>1  2  3  4  5  6  7  8  9  10  11 12 13 14 15 16 17 18</td>
</tr>
<tr>
<td>Group 1</td>
</tr>
<tr>
<td>Group 2</td>
</tr>
<tr>
<td>B1  ...</td>
</tr>
<tr>
<td>Note. B = Baseline condition.</td>
</tr>
<tr>
<td>SM = SRA Spelling Mastery condition</td>
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</table>

General classroom procedures. The study took place daily from Monday to Friday during part of term one, term two, and part of term three of the four-term primary school year.

Pre-treatment baseline. The initial two-weeks of baseline was collected from the children's daily story writing samples. The researcher was present in the classroom, while the classroom teacher continued to teach the written language lessons with the whole class but made the following modifications. The classroom teacher ensured the children had opportunity to write for twenty minutes. The children were told that they did not need to use their dictionaries during the writing phase of the story writing but to use them to check spelling of the words they were not sure of during proofreading. When the researcher
noticed a child using a dictionary, the researcher reminded the child to use the dictionary during proofreading.

During the first two weeks of baseline, the researcher observed each of the classroom teacher's written language lessons. The researcher provided assistance to the classroom teacher through assisting children to locate spelling words in their dictionary during proofreading and listening to the children read their stories. This time also provided opportunity for the researcher to establish rapport with the children as the children became familiar with the researcher and identified her as another teacher. The children demonstrated this by asking the researcher to help them during their writing. At times the researcher remained in the classroom during mathematics and assisted the classroom teacher with groups of children.

The written language lesson was divided into two parts, (1) the newsboard (Hood, 1997, 2000) and (2) writing a story. During the newsboard the children sat on the mat in front of a portable whiteboard facing the classroom teacher. The newsboard occurred after news telling and before the children wrote their story. The classroom teacher used the newsboard to demonstrate a new writing skill or practise a writing skill already taught. During the baseline, the researcher observed the classroom teacher model ideas to develop a story using a mind map strategy, the structure of a story having a beginning, middle and end, sequencing events in a story, topic ideas, punctuation, and shared writing (the children and classroom teacher writing the story together).

Each day the form of writing was different. The sequence was Monday and Friday, diary; Tuesday and Thursday, topic; and Wednesday, free choice. The daily newsboard was based around the form of writing the children would write about at their desks.
The children broke up into groups of four children or into pairs to tell the other children what they were going to write before the children went to their desks to write. The classroom teacher asked a few children to tell her what they were going to write about.

The children wrote at their desks in their story writing books. The children were able to use an eraser to rub out any errors or to make any changes. As the children wrote, the teacher conducted a ‘roving’ conference (Ministry of Education, 1992), asking different children what their first word was, to read their first sentence, and to read their story. When a child tried to spell a word, the child was praised for being brave and told to pat himself / herself on the back.

After 20 minutes, the classroom teacher instructed the children to proofread their writing. The children were given the opportunity to continue writing if they had not finished but were instructed to make a circle by the last word they wrote. This mark was used to identify the words written during the twenty-minute writing opportunity.

The teacher timetabled a particular period of time for the written language lesson. This time included newsboard, time for the children to plan, write, and proofread their stories, and time for the teacher to conduct conferences with the children. From this, the researcher allocated twenty minutes of the time to the children writing their story. Twenty minutes allocated to writing replicates the length of time Clarke (1988) designated for Grade One children writing in her study.

To proofread their stories, the classroom teacher instructed the children to check for capital letters and full stops and to underline any words the children needed to check for correct spelling. The children checked the words they underlined using their dictionary and wrote the correct spelling above the word.

When the children had finished proofreading, they drew a picture under the story and then read their story to another child who had finished also. If the written language lesson
time had not elapsed, the children were able to find a book to read or an activity to do alone, or with other children. During the proofreading and after the children had finished their story, the classroom teacher assisted the children and chose several children for a conference.

*General treatment instructional procedures.* The researcher conducted the ten to fifteen minute SRA Spelling Mastery lessons and the written language lesson. While the group of children attended the SRA Spelling Mastery lesson in the spare classroom, the other group of children remained in the classroom with the classroom teacher for news telling and / or fitness exercises.

The researcher based the newsboard and writing sections of the written language lesson on the classroom teacher’s lesson format and the philosophy of teaching writing as described in Ministry of Education (1992) and Hood (1997, 2000). Following the classroom teacher’s lesson format provided continuity for the children.

The classroom teacher determined the form of writing for each day. The weekly format was usually followed (see above). Occasionally this format was changed, and when the classroom teacher changed the format, the researcher altered the form of writing to match that of the other children in the class.

The classroom teacher gave the children a weekly spelling list to learn. Each child’s spelling list was made up of one to five high frequency words from the Spell-Write lists 1 or 2 (Croft, 1983). Two examples from Essential list 1 were *was* and *the*, and two examples from Essential list 2 were *there* and *me*. The remainder of the children’s spelling list consisted of a personal list, viz, three to five words selected from the children’s writing. Each day one word the child spelled incorrectly yet closely approximated the correct spelling was selected by the researcher and written in the child’s spelling notebook. This word was
also written in the child’s story writing exercise book. After proofreading, the children copied the word correctly in their story writing exercise book.

The classroom teacher selected words from the children’s spelling notebook to be included in each child’s spelling list to learn during the week. The classroom teacher incorporated teaching the children’s individual spelling list into the classroom programme. Each Tuesday the children wrote out their spelling lists and took them home to be tested by their parents. On Wednesday a buddy tested the words orally. On Thursday the classroom teacher gave the children either whole class or individual word study activities based on the word lists to complete. On either Friday or Monday the classroom teacher tested the children’s spelling words in a written spelling test. The children learned the spelling words using Croft’s (1983) procedure; copy, study, learn and test (see Appendix C for a fuller description).

Each day before the children went back to the classroom, two children from either Group One or Group Two were chosen by the researcher to read their story to the classroom teacher. This ensured the classroom teacher had opportunity to monitor each child’s writing at least weekly. Periodically the classroom teacher would ask to take all the children’s books in, to mark and make comments. This provided the classroom teacher with an additional opportunity to be aware of the children’s progress in their story writing. Every four weeks the classroom teacher requested the children write a sample story in their sample book for ongoing monitoring of progress. The specific procedures for story writing were followed during writing the sample stories.

To ensure the children had examples of their stories to keep, each Friday the children selected a story from their daily writing to be published (Graves, 1983; Ministry of Education, 1992). Each published story was word-processed on the computer with spelling and grammatical errors removed, printed, and then pasted into the child’s own published
stories exercise book. Before each story was typed, the researcher discussed with the child any changes the child would like to make to the story. The integrity of the child’s meaning and the child’s perspective was maintained (Ministry of Education, 1992).

At the end of the writing lesson, when the children had completed their writing and had read to another child, the children were able to illustrate their stories. The books were kept on the bookshelf for the children to read during the last five minutes of each lesson. At the end of the study the children were given their published stories to keep.

*Specific treatment instructional procedures.* Before the written language lesson began, the classroom teacher told the researcher what form of writing the children would write that day, and if there was a topic, what the topic would be.

*Newsboard.* During the first ten minutes of the written language lesson, both groups of children sat on the mat in a semicircle facing the researcher and a whiteboard. Over the duration of the study the newsboard section of the lesson included language based topics the classroom teacher was teaching (e.g., the rocky shore and dinosaurs), and vocabulary and concepts related to the classroom topics. Additional skills demonstrated included using interesting words (which included adjectives and synonyms), modelling writing a story, and punctuation. In addition, a skill the researcher had identified during writing the previous day as a difficulty for one or more children was also demonstrated. The researcher used the whiteboard to write the sentences and to write key topic words the children could refer to during the writing phase.

Before going to the desk to write, the children were given time to think about what they were going to write, the audience they were writing for, and to share this with a buddy (another child). This part of the writing process incorporated the planning stage.

*Writing section instructional procedures.* The words written on the whiteboard during the newsboard were available to the children to view and copy. The children were
given twenty minutes to write their story. The children were given the instruction, "Write whatever you want to" and to make spelling approximations. "When I do not know how to write a word, I say the word slowly and write down all the sounds I hear." The children were instructed to write on every second line. This provided the children with a space to correct the spelling of the words they had checked using the dictionary during proofreading. When making corrections, the child put a line through the word and wrote the word again (Ministry of Education, 1992).

After twenty minutes the timer rang. The children were able to continue writing after the twenty minutes if they had not finished their story. To identify the words written during the twenty minutes, the children were instructed to draw a circle beside the last word written. The researcher checked to ensure this was occurring.

When the children had finished writing their story, the researcher instructed the children to proofread their story. The instruction given was, "Proofread what you have written. Underline the words you tried, and are not sure of." The children were also instructed to check for capital letters and full stops, that they had used adjectives, and a variety of vocabulary. The children used their dictionaries to check some of the words they had underlined. If the word was spelled incorrectly, the children wrote the word correctly on the line above the word. When the children had finished proofreading, they drew a picture and then read their story to another child.

The conference component of the written language lesson occurred during the last five minutes with a maximum of two children. This ensured each child was seen individually at least once a week. By conferencing at the end of the twenty-minute writing stage, the researcher did not interrupt the children as they wrote or limit their twenty-minute writing opportunity. The children read their story to the researcher. The researcher praised the children for spelling attempts irrespective of the accuracy, the structure, and the
vocabulary used in their story. The conference was used as a 'teachable moment' (Ministry of Education, 1992), an opportunity to introduce or teach one skill based on the child’s writing sample. The skills taught included those introduced during newsboard and spelling patterns using examples from the child’s writing samples. While the conference took place, the other children were able to continue to write, proofread, draw their picture, read to each other, or read a published story.

If a child struggled with what to write and finished before the twenty minutes lapsed, the researcher used this situation to conference with the child during the twenty-minute writing time. During these conferences, the researcher encouraged the child to continue writing, personalising what the child was writing, and asked questions to extend what the child was writing, or to refocus the child to write from a different perspective or situation (Ministry of Education, 1992).

**SRA Spelling Mastery instructional procedures.** The children sat at a desk using their student book. The researcher presented each lesson as scripted in the SRA Spelling Mastery Classroom Teacher’s Book. Each SRA Spelling Mastery Level A lesson was broken up into a variety of spelling based tasks, averaging five to seven activities. SRA Spelling Mastery A consisted of sixty teacher directed lessons, each lesson designed to take ten to fifteen minutes to complete.

The lessons focused on three spelling skills, namely phoneme-grapheme correspondence, spelling regularly spelled words, and high frequency irregularly-spelled words. The regular words consisted of words composed predominately of the graphemes for phonemes already taught in the programme, e.g., *hot, man, if*. The irregular words contained graphemes that did not correspond directly to the phoneme, e.g., *many, what, friends*.

Irregularly spelled words were introduced in sentences, e.g., the words, *what* and *are*, were introduced in the sentence, *What are we to do?* The sequence began first with the
spelling of the words modelled in the sentence. The children spelled out aloud the letters for each word in unison and then copied the sentence. In unison, the children read the sentence again and then spelled out aloud each word without looking at the words. Individual children were asked to spell the words out aloud. The complete model of the word was gradually faded over five lessons. The children filled in gaps of missing letters of the words until the children wrote the sentence independently without seeing the words.

Each phoneme-grapheme correspondence, regular word, and irregular words taught in sentences were introduced in a lesson and taught during the next six lessons. Mastery was assumed after six subsequent lessons. Phoneme-grapheme correspondences and words taught to mastery were reviewed in the following lessons to ensure long-term retention and generalisation to writing (Dixon et al., 1990).

Each scripted lesson stated what the teacher /in this case, the researcher/ would say and do, and what and how the children would respond. Group (unison) responding and individual responses were used in the oral activities. To ensure all children responded in unison, the researcher used a signal the downward movement of the pen held by the researcher to show the children when to respond. Group responding gave the children many opportunities to practise the skill. Individual responding was introduced when all the children were responding correctly. All children were given opportunity to respond individually, however, those children who made more errors during the group responding were given additional individual practice. The criterion for acceptable performance was defined as correctly responding by all children. When criterion was achieved, the researcher began the next exercise.

When an incorrect response occurred, an error correction procedure was used. The correction was presented to all children, not directed to the child who made the error. The error correction consisted of four steps, namely model, lead, test, and delayed test. The
researcher modelled the correct response to the children. The model step was followed with the children performing the response on their own. If the children repeated the error, the researcher included the lead step, which was the researcher saying the correct response with the children. The lead step was followed again by the test step. The delayed test was the test repeated later during the lesson. A correct response to a delayed test demonstrated the children had learnt and retained the skill.

Each lesson was presented quickly to maintain interest and maximise on task behaviour yet at a rate at which all children could follow successfully. Additional group and individual practice were included until all children performed successfully, before the researcher started the next exercise in the teacher's script book. Positive reinforcement for on task behaviour, correct responding, and attempts were given in the form of verbal praise stamps, and stickers.

Each lesson was sequential, building on skills taught in previous lessons. The oral exercises included a range of the following:

1. Alphabet: the children say the letter name
2. Pronunciation:
   a. the children segment a word into each phoneme, (cvc), e.g., *mat* pronounced /m/ /æ/ /t/
   b. the children segment a word into each phoneme, (ccvc), e.g., *spot* pronounced /s/ /p/ /ɔ/ /t/
   c. the children segment a word into each phoneme, (cccvc), e.g., *split* pronounced /s/ /p/ /l/ /ɪ/ /t/  
3. Spelling sounds: the children name the letter for the phoneme spoken by the researcher
4. Spelling words: the researcher says the letters of the word, the children name the word and or point to the picture of the word

5. Patterns:
   a. the children spell words that have the same short vowel, e.g., /æl/
   b. the children spell words that end with double consonant, e.g., /mill/
   c. the children spell words that end with all, e.g., /fall/
   d. the children spell words that end with phoneme /zl/ but spelled s, e.g., has
   e. the children spell words that have the phoneme /al/ spelled with the letters ar.

Written exercises:

1. Scanning:
   a. the children identify a letter in a sequence of letters, e.g., circle the letter p in the sequence m h t p t t a p a t h p o a p b t h m p h t p o b p h p
   b. the children identify a word in a sequence of letters, e.g., circle the word has in the sequence, haashisashashashashahas

2. Copying: the children copy a word beside a picture of the word

3. Writing sounds: the children write the letter for the phoneme spoken by the researcher

4. Fill in: the word is written with a letter or letters missing
   a. the researcher says the sounds in the word, and the children fill in the missing letter or letters in the word
   b. the researcher says the word, and the children fill in the missing letter or letters in the word

5. Matching: the children match the word on the left column and write the word in the blank
6. Sentences:
   a. the children copy the sentence and spell each word out aloud without looking
   b. the children write the sentence filling in the missing letters
   c. the children write the sentence independently

7. Sentence dictation:
   a. the researcher reads a sentence, the children complete the words with missing letters and copy the sentence

8. Sentence variation: the children write sentences made up of words they have been taught in previous lessons

9. Crossword puzzle: the researcher says the word, and the children write the word in the boxes.
CHAPTER 3

RESULTS

The results of the study consist of measures taken from the SRA Spelling Mastery placement test results, the children's writing behaviours, and their generalisation of words taught during SRA Spelling Mastery. In addition, the children's preferences for SRA Spelling Mastery and the process writing tasks, changes in their stage of spelling development, and the quality of spelling in their writing were assessed. The Placement Test, generalisation of words taught during SRA Spelling Mastery, children's preference for SRA Spelling Mastery and process writing, stage of spelling development, and quality of spelling in writing were analysed descriptively. The analysis of the writing behaviours was through a visual analysis of time series data displayed in standard graphs supplemented by reference to data tables.

**SRA Spelling Mastery Level A Placement Test**

To participate in the study, the children selected had to meet the criteria of spelling five or fewer words out of 10 correctly in the SRA Spelling Mastery Level A Placement Test. The results for the Placement Test are listed in Table 5. The number of words the children spelled correctly ranged from one to three.
Table 5

*Number of Words Spelled Correctly out of Ten Words in the Level A Placement Test*

<table>
<thead>
<tr>
<th>Child’s Name</th>
<th>Words spelled correctly</th>
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<tbody>
<tr>
<td>Robert</td>
<td>2</td>
</tr>
<tr>
<td>Keith</td>
<td>1</td>
</tr>
<tr>
<td>Karen</td>
<td>3</td>
</tr>
<tr>
<td>Cathy</td>
<td>2</td>
</tr>
<tr>
<td>Clinton</td>
<td>1</td>
</tr>
<tr>
<td>Anthony</td>
<td>1</td>
</tr>
<tr>
<td>Anna</td>
<td>2</td>
</tr>
</tbody>
</table>

*Writing Behaviours*

Writing measures that analysed phonological and lexical aspects of spelling were selected because spelling a word correctly reflects both phonological and lexical aspects of spelling. Correct spelling at word level was not sufficiently fine-grained enough to show change in applying phonological knowledge to spelling, e.g., phoneme-grapheme correspondence or phonemic patterns. Analysis of spelling errors at the grapheme level was used to measure phonetic spelling accuracy, which showed only the phonological aspect of spelling. The lexical aspect of spelling words at grapheme level was eliminated in order to not mask the phonological correspondence to the grapheme. Any graphemes that were spelled correctly yet did not correspond to the phoneme-grapheme relationship were excluded.

Five writing behaviours, namely orthographic spelling accuracy, phonetic spelling accuracy, the total number of words written, the number of different words written without a prompt, and word complexity were identified and analysed. Eighty-four written language lessons occurred during the eighteen-week study. The total number of daily writing samples for each child ranged from 80 to 83.

The daily scores and the mean for the first week and the final week for each condition for each child’s writing behaviours were calculated.
Orthographic spelling accuracy (SA). The daily orthographic spelling accuracy scores are shown in Figure 1. Taking into account the age of the children, a low level of orthographic spelling accuracy was considered to be within the band from 0% to 50%, a moderate level was considered to be within the band from 51% to 70%, while a high level was considered to be within the band from 71% to 100% accuracy. All children began the study writing words with a moderate level of orthographic spelling accuracy over the duration of the first baseline.

For Robert, three daily scores were at a high level, but the trend showed a moderate level of orthographic spelling accuracy. Robert’s daily orthographic spelling accuracy scores during the first baseline (baseline 1) showed a large amount of variability. A rise in accuracy was observed towards the end of baseline 1. The daily orthographic spelling accuracy scores for the other children showed considerable variation mostly within the moderate band but not to the same extent as that of Robert in baseline 1. Cathy and Anthony exhibited a rising baseline while for most of the other children baseline levels were relatively flat during this phase.

During the first SRA Spelling Mastery condition (SRA Spelling Mastery 1), Robert’s daily orthographic spelling accuracy showed variability to a reduced degree relative to baseline 1, and variability in Robert’s highest and lowest orthographic spelling accuracy scores was similar to most of the other children. The level of orthographic spelling accuracy for the other children remained at a level similar to that observed in baseline 1. Keith’s daily orthographic spelling accuracy did increase in variability relative to the variability shown in baseline 1.

Reduced orthographic spelling accuracy was observed during the SRA Spelling Mastery phase for Robert, and this pattern was repeated by Anna.
Figure 1. Daily orthographic spelling accuracy scores for each condition, for each child (SA)
For Cathy, orthographic spelling accuracy increased towards the end of SRA Spelling Mastery 1 while no consistent change was observed for the other children.

When the baseline condition was reinstated (baseline 2), variability in Robert’s daily orthographic spelling accuracy increased, and his level of orthographic spelling accuracy rose. Increased variability in orthographic spelling accuracy was observed in half of the children while it decreased for Clinton and remained at a similar level for Karen and Anna. Karen’s level of orthographic spelling accuracy also showed a rising level while Cathy, Clinton, and Anthony showed a falling level towards the end of baseline 2, and Anna and Keith’s daily scores showed a pattern similar to baseline 1.

In contrast to the increase in variability of orthographic spelling accuracy scores during baseline 2, during the second treatment phase of SRA Spelling Mastery the variability of Robert’s daily orthographic spelling scores reduced, and reduced variability was observed for most of the other children while for Anna variability in daily orthographic spelling accuracy remained at a similar range to baseline 2. During the second phase (Spelling Mastery 2), orthographic spelling accuracy increased for most of the children while Keith’s level was relatively flat.

During the third reversal (baseline 3), of the children who experienced the third baseline condition, variability in daily scores increased for Robert and Karen and decreased for Keith and Cathy. Robert’s level decreased initially but then increased to a level, similar to that of baseline 1. Keith, Karen, and Cathy’s scores showed no change in the level of orthographic spelling accuracy compared to SRA Spelling Mastery 2.

The range of variability in the daily orthographic spelling accuracy scores was less during the SRA Spelling Mastery conditions than during the baseline conditions. The range of variability in the daily orthographic spelling accuracy scores made it difficult to detect change during baseline and SRA Spelling Mastery conditions. The mean orthographic
spelling accuracy for the first week and the final week of each condition were analysed and are shown in Figure 2.

The change in mean orthographic spelling accuracy between Robert’s mean score for the first and final week of SRA Spelling Mastery 1 showed there was no treatment effect, but instead a decrease in the level of orthographic spelling accuracy. During SRA Spelling Mastery 2 a small increase in orthographic spelling accuracy was observed indicating possibly a weak treatment effect. During baseline 3 Robert’s level of orthographic spelling accuracy decreased in the first week and then increased by the end of the study. For Keith and Cathy a weak treatment effect occurred during SRA Spelling Mastery 1 while for Karen a weak treatment effect occurred during SRA Spelling Mastery 2. For the other children, no treatment effects were observed during either SRA Spelling Mastery condition.

When the level of daily orthographic spelling accuracy scores were compared across conditions, minimal change occurred for most children. For Robert, there was a small change and for Karen, a moderate change occurred. At the end of the study, most children were still spelling at a moderate level of orthographic spelling accuracy while Robert and Karen were spelling at a high level.
Figure 2. Mean first and final week of orthographic spelling accuracy for each condition, for each child. (SA)
**Phonetic spelling accuracy (PS).** The daily phonetic spelling accuracy scores are shown in Figure 3. The phonetic spelling accuracy was calculated at the grapheme level from the words spelled incorrectly. Both phonetically regular and irregular words spelled incorrectly were analysed for phonetic spelling accuracy.

The three levels of phonetic spelling accuracy (i.e., low, up to 50% moderate, between 51% and 70%, and high above 70%) were used to describe the level of phonetic spelling accuracy. Most children began the study with a moderate level of phonetic spelling accuracy while Karen displayed a high level. Over the extended baseline, four of Anthony’s daily phonetic spelling accuracy scores were in the moderate level, but most scores were within the low-level band.

Robert’s daily phonetic spelling accuracy scores during the first baseline (baseline 1) showed a moderate amount of variability. A rising baseline was observed towards the end of baseline 1. For most of the children with a moderate level of phonetic spelling accuracy, their daily phonetic spelling accuracy scores showed greater levels of variability than did Robert. Cathy and Clinton exhibited a rising baseline within the moderate level, while Keith’s rising baseline exhibited daily scores within the high level of phonetic spelling accuracy towards the end of the phase. Anna’s baseline levels were relatively flat and variability was less than that displayed by the other children. Karen who showed a high level of phonetic spelling accuracy exhibited a falling and then a rising baseline within the high phonetic spelling accuracy level. Anthony showed the greatest variability with four days within the moderate level of phonetic spelling accuracy, but most scores were within the low level. Across the phase within the low level, most scores were at the lower end of the band.
Figure 3. Daily phonetic spelling accuracy scores for each condition, for each child (PS).
During the first SRA Spelling Mastery condition (SRA Spelling Mastery 1), Robert’s daily phonetic spelling accuracy scores showed variability to a reduced degree relative to baseline 1. His level of phonetic spelling accuracy fell at the beginning of the phase, followed by a rise into the high-level band of phonetic spelling accuracy. This falling and rising pattern was repeated by Keith and Karen. Cathy exhibited a rising level while Clinton and Anna’s daily variability was relatively flat. Anthony’s pattern during the first weeks of SRA Spelling Mastery 1 was not dissimilar to baseline 1. Daily scores showed large variability within the low-level band of phonetic spelling accuracy with daily scores at the lower end of the band. The pattern changed during the second two weeks, variability decreased, and a rise in scores was observed with scores reaching the upper band of the low level and within the lower band of the moderate level.

When the baseline condition was reinstated (baseline 2), variability of Robert’s phonetic spelling accuracy increased and his baseline scores rose. Phonetic spelling accuracy remained at a similar level to SRA Spelling Mastery 1 for Keith, Karen, and Clinton. For Cathy, Anthony, and Anna, variability increased towards the end of the phase with a falling baseline.

In contrast to a trend of increased variability for Robert, Cathy, Anthony, and Anna during baseline 2, variability was less during SRA Spelling Mastery 2. Keith and Karen’s variability and level of phonetic spelling accuracy remained similar to baseline 2 while both Clinton’s variability and accuracy levels increased. The phonetic spelling accuracy rose also for the other children. For Anthony, the increase in phonetic spelling accuracy scores put his scores for the duration of the phase at the upper range of the low-level band and within the moderate level band of phonetic spelling accuracy.

During the third reversal (baseline 3), the children who experienced the third baseline condition, variability in daily scores increased, and the level of phonetic spelling
accuracy decreased for Robert, Keith and Cathy towards the end of the phase. Karen’s phonetic spelling remained at a level that was similar to SRA Spelling Mastery 2.

When the baseline and SRA Spelling Mastery conditions were compared, there was less variability in daily phonetic spelling accuracy during the SRA Spelling Mastery conditions.

The change in mean phonetic spelling accuracy between the mean score for the first and final week of each condition is shown in Figure 4. The change in mean phonetic spelling accuracy between the mean score for the first and final week of baseline 1 showed an increase for Robert, Keith, and Clinton while remained relatively even for the other children. When SRA Spelling Mastery was introduced (SRA Spelling Mastery 1), no treatment effect was observed during the condition for Robert, Keith, Karen, or Clinton, but a treatment effect was observed for Cathy, Anthony, and Anna. When the second phase of SRA Spelling Mastery was reintroduced, a treatment effect was observed for all the children with the exception of Karen.

The children who had the third baseline (baseline 3), their phonetic spelling accuracy increased and decreased from the first and final week. Robert and Cathy’s phonetic spelling accuracy increased during the first week but dropped during the final week of baseline while Keith and Karen’s scores dropped once baseline conditions resumed. Keith’s scores continued at this level during the final week of baseline, and Karen’s phonetic spelling accuracy increased.
Figure 4. Mean first and final week of phonetic spelling accuracy for each condition, for each child (PS).
When mean phonetic spelling accuracy was compared from beginning to the end of the study (Figure 4), phonetic spelling accuracy increased for all children, with the greatest change occurring for Anthony. At the end of the study Robert and Karen displayed a high level of phonetic spelling accuracy while the other children including Anthony, exhibited a moderate level of phonetic spelling accuracy.

To determine the level of change in phonetic spelling accuracy from one condition to another, percentage change between the mean final week phonetic spelling accuracy scores for each condition, for each child was analysed using the formula \( \text{second condition} - \text{first condition} \times 100 \) and is shown in Table 6.

Table 6

<table>
<thead>
<tr>
<th>Child's name</th>
<th>% change</th>
<th>% change</th>
<th>% change</th>
<th>% change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B1 and SM1</td>
<td>SM1 and B2</td>
<td>B2 and SM2</td>
<td>SM2 and B3</td>
<td>B1 and SM2</td>
</tr>
<tr>
<td>Robert</td>
<td>2.78% *</td>
<td>1.46%</td>
<td>6.2%</td>
<td>-0.7%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Keith</td>
<td>-7.5% *</td>
<td>1.63%</td>
<td>6.1%</td>
<td>-7.94%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Karen</td>
<td>3.84% *</td>
<td>0.63%</td>
<td>3.67% *</td>
<td>2.34%</td>
<td>7.93%</td>
</tr>
<tr>
<td>Cathy</td>
<td>14.15%</td>
<td>-6.64%</td>
<td>15.01%</td>
<td>1.72%</td>
<td>22.19%</td>
</tr>
<tr>
<td>Clinton</td>
<td>1.51% *</td>
<td>-9.31%</td>
<td>13.85%</td>
<td></td>
<td>13.85%</td>
</tr>
<tr>
<td>Anthony</td>
<td>23.72%</td>
<td>-11.81%</td>
<td>30.44%</td>
<td></td>
<td>40.68%</td>
</tr>
<tr>
<td>Anna</td>
<td>14.25%</td>
<td>-16.76%</td>
<td>24.98%</td>
<td></td>
<td>23.09%</td>
</tr>
</tbody>
</table>

*Note. SM 1 = SRA Spelling Mastery 1. SM 2 = SRA Spelling Mastery 2.


* = No positive treatment effect (i.e., % change below 4% analysed as below threshold to indicate change).

Positive percentage change indicated phonetic spelling accuracy increased, whereas negative percentage change indicated phonetic spelling accuracy decreased relative to the previous condition. Negative percentage change and percentage change below the threshold
of change to be detected occurred between SRA Spelling Mastery and baseline conditions, whereas positive change occurred for most children between baseline and both SRA Spelling Mastery conditions indicating a positive treatment effect. A negative percentage change occurred for Keith, and Robert and Clinton’s percentage change did not reach the threshold of a positive treatment effect during SRA Spelling Mastery 1 relative to baseline 1. During both phases of SRA Spelling Mastery the percentage change in Karen’s phonetic spelling accuracy did not reach the threshold of a treatment effect. Karen showed the smallest percentage change of all the children. Karen had the highest level of phonetic spelling accuracy of all the children at the beginning of the study, exhibiting a high level of phonetic spelling accuracy (see Figure 3 and Figure 4). For Karen, not reaching the threshold of change indicated a ceiling effect.

A stronger treatment effect was observed for the children with lower phonetic spelling accuracy that was reflected in larger percentage changes (Table 6). Anthony showed the greatest change in phonetic spelling accuracy during each SRA Spelling Mastery condition and from the beginning to the end of the study compared to the other children. Anthony began the study exhibiting a low and variable level of phonetic spelling accuracy during story writing (see Figure 3 and Figure 4) and the lowest stage of spelling development of all the children in the SRA Spelling Mastery Placement Test (see Table 10).

Total Word Score (TS). The daily total number of words written are shown in Figure 5. Robert’s daily number of total words written during the first baseline (baseline 1) showed a large amount of variability from 10 to 50 words written.
Figure 5. The daily total number of words written for each condition, for each child (TS).
Most children showed a similar variability while Anthony's variability was less, and Clinton and Anna's variability was considerably greater, writing from 10 to 110 words and 30 to 95 words respectively.

During the first phase of SRA Spelling Mastery (SRA Spelling Mastery 1), variability for Robert and Anthony was less relative to baseline 1. Clinton and Anna, who showed the greatest variability during baseline 1, decreased their variability while variability increased for the other children.

When the baseline condition was reinstated (baseline 2), Robert's variability increased, but the daily number of total words written was similar to SRA Spelling Mastery. A rising baseline was observed for most of the children while Karen displayed a falling baseline, and Anna displayed a rise at the beginning of the baseline condition and then a falling baseline.

When SRA Spelling Mastery was reintroduced (SRA Spelling Mastery 2), Robert showed similar variability to baseline 2. Most children exhibited less variability while Karen exhibited an increase in variability. During the first weeks of the SRA Spelling Mastery condition, total number of words written first increased, and then decreased during the final weeks of SRA Spelling Mastery 2. Robert, Keith, Cathy, and Clinton displayed an upward trend in total words written across the condition while for Anthony and Anna, their pattern was similar to baseline 2, the children continued to write more words.

During the third reversal (baseline 3) variability increased and the children wrote more words relative to SRA Spelling Mastery 2.

The change in mean total number of words written between baseline and SRA Spelling Mastery conditions is shown in Figure 6.
Figure 6. Mean first and final week of total number of words written for each condition, for each child (TS).
A stable baseline (baseline 1) was exhibited by most of the children while Cathy and Keith showed variability in mean number of words written between the first and the final week. When the SRA Spelling Mastery condition was introduced, a negative treatment effect was observed for Robert, Keith, and Cathy, in that the children wrote fewer words. No treatment effect occurred for Anthony and Anna; these children wrote a similar number of total words. A treatment effect was observed for Karen, who wrote more words.

When SRA Spelling Mastery was reintroduced a treatment effect was observed for Keith, Cathy, Clinton, and Anna while the other children’s scores were similar to baseline 2.

When the third baseline was reinstated (baseline 3), for three of the four children who had the additional baseline condition, their total number of words written continued at a similar number to SRA Spelling Mastery 2 while increasing for Keith and Cathy to some extent.

When performance at the beginning of the study was compared to performance at the end of the study, the children wrote more words at the end of the study than at the beginning.

During the first phase of SRA Spelling Mastery most children wrote fewer or a similar number of words relative to baseline 1. During the second phase of SRA Spelling Mastery all children wrote more words or a similar number relative to the preceding baseline condition (baseline 2).

There was a ceiling effect evident on the number of words the children were able to write in a 20-minute period. The highest number of total words written across the study was above 70 words, achieved by Karen during SRA Spelling Mastery 1, Anna during SRA Spelling Mastery 2, and Cathy during baseline 3. The highest number of words written by the other children ranged from Anthony (37 words) to Clinton (64 words). For comparison,
the mean number of total words written per child during Clarke’s (1988) study ranged from 13 to 41 words (Grade One children at the end of the five month study).

*Total number of different words without a prompt (TDWNP).* The daily total number of different words written without a prompt are shown in Figure 7. Variability of the daily total number of words written without a prompt across conditions for each child was similar to the variability of the daily number of total words written by each child, during each condition.

The change in mean total number of different words written without a prompt between baseline and SRA Spelling Mastery conditions is shown in Figure 8. The change in the total number of different words written without a prompt across conditions was similar to the total number of words written across conditions, for most children. Both positive and negative treatment effects were evident. A negative treatment effect was observed during SRA Spelling Mastery 1 for Robert, Keith, and Cathy. A treatment effect was evident for Karen and Anna, and a weak treatment effect was evident for Clinton. A treatment effect continued during SRA Spelling Mastery 2 for Cathy, Clinton, and Keith, however, the treatment effect observed for Keith was weak.

Most children wrote fewer words or a similar number of different words without a prompt during SRA Spelling Mastery 1 relative to baseline 1, and all children wrote more or a similar number of different words without a prompt during SRA Spelling Mastery 2 relative to baseline 2.
Figure 7. The daily total number of different words written without a prompt for each condition, for each child (TDWNP).
Figure 8. Mean first and final week of total number of different words written without a prompt. For each condition, for each child (TDWP).
The total number of different words written without a prompt was compared with the total number of words written. When children wrote more words, the children also wrote more different words during SRA Spelling Mastery conditions, and when the children wrote fewer words, the children wrote fewer different words without a prompt. Two exceptions were observed, in that when Cathy wrote more total number of words during SRA Spelling Mastery 2 relative to baseline 2, she wrote fewer different words without a prompt relative to baseline 2. The inverse was observed for Anna during SRA Spelling Mastery 1, since her total number of words was similar relative to baseline 1, but the number of different words without a prompt increased relative to baseline 1.

*Orthographic spelling accuracy, phonetic spelling accuracy and total number of different words written without a prompt.* Orthographic spelling accuracy, phonetic spelling accuracy, and the total number of different words written without a prompt are shown in Figure 9. When orthographic spelling accuracy, phonetic spelling accuracy, and the total number of different words written without a prompt across conditions were compared, either a participation or a treatment effect was observed for most of the children. For most children during the second phase of SRA Spelling Mastery, when the children wrote more different words, the children maintained or increased their orthographic and phonetic spelling accuracy. In contrast, when most children wrote more different words during baseline 2, orthographic and phonetic spelling accuracy decreased or remained at a similar level.
Figure 9. Mean first and final week of orthographic spelling accuracy, phonetic spelling accuracy (percentage), and total number of different words written without a prompt for each condition, for each child.
Cathy wrote more different words during baseline 2 and orthographic spelling accuracy decreased while phonetic spelling accuracy was maintained. However, during SRA Spelling Mastery 2 when Cathy wrote more different words, both her orthographic and phonetic spelling accuracy increased. During the third baseline phase Cathy wrote more words at the beginning of the phase, and orthographic spelling accuracy was maintained while phonetic spelling accuracy increased. At the end of the baseline phase Cathy wrote fewer different words and both orthographic and phonetic spelling accuracy decreased to a similar level relative to SRA Spelling Mastery 2. A similar pattern was repeated by Anthony during baseline 2. Anthony wrote more different words and both orthographic and phonetic spelling accuracy decreased, whereas during SRA Spelling Mastery 2, when Anthony wrote more different words, both orthographic and phonetic spelling accuracy increased (Anthony did not experience baseline 3).

Anna wrote more different words during SRA Spelling Mastery 1 and phonetic spelling accuracy increased while orthographic spelling accuracy decreased (to baseline 1 levels when Anna wrote fewer different words), but both orthographic and phonetic spelling accuracy increased when Anna wrote more different words during SRA Spelling Mastery 2. For Clinton, when he wrote more different words, orthographic and phonetic spelling accuracy increased during SRA Spelling Mastery 1, and this was continued during baseline 2 and SRA Spelling Mastery 2. Karen increased the number of different words written during SRA Spelling Mastery 1 from a mean of 27 words to a mean of 43 words, yet her phonetic spelling accuracy was maintained and her orthographic spelling accuracy decreased only by 8%.

For Keith, when he wrote more different words during baseline 2, orthographic spelling accuracy decreased and phonetic spelling accuracy remained at a level similar to that in SRA Spelling Mastery 1. However, when Keith wrote more words during SRA
Spelling Mastery 2 relative to baseline 2, his level of orthographic and phonetic spelling accuracy dropped to baseline 2 levels.

Robert showed a different pattern, in that during baseline 2 he wrote more different words, and his orthographic and phonetic spelling accuracy increased.

Word complexity. The number of syllables in a word was used as a measure of word complexity. The percentages of the three levels of word complexity, that is, one syllable, two syllable, and more than two syllable words written by each child during each condition are listed in Table 7. Most words written by each child were one syllable words. There was little variation between the percentages for the different levels of word complexity across conditions, for each child. The children wrote words of similar complexity irrespective of whether they were receiving SRA Spelling Mastery lessons or assigned to baseline conditions.
<table>
<thead>
<tr>
<th>Child's Name</th>
<th>Level of word complexity</th>
<th>B1</th>
<th>S M 1</th>
<th>B2</th>
<th>SM 2</th>
<th>B 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>1 syllable words</td>
<td>83.33%</td>
<td>79.34%</td>
<td>79.40%</td>
<td>81.8%</td>
<td>81.44%</td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>16.00%</td>
<td>17.96%</td>
<td>17.78%</td>
<td>15.91%</td>
<td>16.34%</td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>0.67%</td>
<td>2.71%</td>
<td>2.86%</td>
<td>2.30%</td>
<td>2.17%</td>
</tr>
<tr>
<td>Keith</td>
<td>1 syllable words</td>
<td>84.66%</td>
<td>81.31%</td>
<td>82.58%</td>
<td>82.80%</td>
<td>85.28%</td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>14.72%</td>
<td>17.30%</td>
<td>13.87%</td>
<td>15.48%</td>
<td>12.94%</td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>0.61%</td>
<td>1.38%</td>
<td>3.55%</td>
<td>1.72%</td>
<td>1.77%</td>
</tr>
<tr>
<td>Karen</td>
<td>1 syllable words</td>
<td>78.41%</td>
<td>78.76%</td>
<td>80.67%</td>
<td>78.38%</td>
<td>78.15%</td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>11.02%</td>
<td>18.28%</td>
<td>16.29%</td>
<td>19.15%</td>
<td>16.95%</td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>4.08%</td>
<td>2.96%</td>
<td>3.04%</td>
<td>2.41%</td>
<td>4.90%</td>
</tr>
<tr>
<td>Cathy</td>
<td>1 syllable words</td>
<td>80.5%</td>
<td>82.56%</td>
<td>83.38%</td>
<td>79.93%</td>
<td>83.73%</td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>16.95%</td>
<td>16.62%</td>
<td>15.04%</td>
<td>16.67%</td>
<td>14.22%</td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>2.54%</td>
<td>0.81%</td>
<td>1.58%</td>
<td>3.40%</td>
<td>2.05%</td>
</tr>
<tr>
<td>Clinton</td>
<td>1 syllable words</td>
<td>82.55%</td>
<td>78.55%</td>
<td>78.59%</td>
<td>80.70%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>15.11%</td>
<td>17.43%</td>
<td>17.34%</td>
<td>15.38%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>2.34%</td>
<td>4.02%</td>
<td>4.07%</td>
<td>3.92%</td>
<td></td>
</tr>
<tr>
<td>Anthony</td>
<td>1 syllable words</td>
<td>84.20%</td>
<td>87.62%</td>
<td>83.95%</td>
<td>83.66%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>13.99%</td>
<td>11.43%</td>
<td>14.2%</td>
<td>13.24%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>1.81%</td>
<td>0.95%</td>
<td>1.85%</td>
<td>3.10%</td>
<td></td>
</tr>
<tr>
<td>Anna</td>
<td>1 syllable words</td>
<td>80.70%</td>
<td>77.28%</td>
<td>82.98%</td>
<td>79.39%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 syllable words</td>
<td>15.91%</td>
<td>19.02%</td>
<td>15.81%</td>
<td>16.47%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than two syllable words</td>
<td>3.39%</td>
<td>3.69%</td>
<td>1.20%</td>
<td>3.76%</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SM 1 = First SRA Spelling Mastery condition.  
SM 2 = Second SRA Spelling Mastery condition.  
B1 = First baseline condition.  
B2 = Second baseline condition.  
B 3 = Third baseline condition.
Generalisation of Spelling Mastery to Writing

The generalisation of the words used and taught during the SRA Spelling Mastery lessons and written correctly in the children’s writing are listed in Table 8. Few of the words that were taught during the SRA Spelling Mastery lessons were used by the children in their writing during the first SRA Spelling Mastery condition. However, during the following baseline condition and the second SRA Spelling Mastery condition, the children used more of the words taught during the SRA Spelling Mastery lessons. The children who had the baseline condition for the last condition continued to write words taught during the Spelling Mastery lessons. The results showed that words taught during the SRA Spelling Mastery lessons were spelled correctly by all children in their daily writing, ranging from 80% to 100% across conditions.

Table 8
Generalisation of SRA Spelling Mastery Words to Children’s Writing

<table>
<thead>
<tr>
<th>Child’s Name</th>
<th>SM 1</th>
<th>B 2</th>
<th>SM 2</th>
<th>B 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td>1</td>
<td>0</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Keith</td>
<td>4</td>
<td>3</td>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>Karen</td>
<td>5</td>
<td>32</td>
<td>52</td>
<td>51</td>
</tr>
<tr>
<td>Cathy</td>
<td>0</td>
<td>3</td>
<td>34</td>
<td>41</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinton</td>
<td>0</td>
<td>4</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Anthony</td>
<td>4</td>
<td>13</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Anna</td>
<td>0</td>
<td>14</td>
<td>41</td>
<td></td>
</tr>
</tbody>
</table>

Note. Words written = number of words taught in Spelling Mastery and written.
% words correct = percentage of words spelled correctly in writing.
SM 1 = First SRA Spelling Mastery condition.
SM 2 = Second SRA Spelling Mastery condition.
B 1 = First baseline condition.
B 2 = Second baseline condition.
B 3 = Third baseline condition.
Children's Preference for SRA Spelling Mastery and Process Writing

The range and modal ratings of preference for the SRA Spelling Mastery lessons and process writing during the SRA Spelling Mastery conditions for each child are listed in Table 9. The children rated SRA Spelling Mastery and process writing separately. The condition mode and range for SRA Spelling Mastery and process writing ratings by the children varied. When the modal rating for SRA Spelling Mastery and process writing for each child was compared, SRA Spelling Mastery was rated higher than process writing by three of the seven children during the first SRA Spelling Mastery condition. During the second SRA Spelling Mastery condition, the SRA Spelling Mastery modal preference rating for most children either increased or remained at the highest rating. Most children rated SRA Spelling Mastery as more preferred than process writing. The modal SRA Spelling Mastery rating for most of the children ranged from “I like it” to “I like it a lot.” In contrast, the modal preference rating for process writing during the second SRA Spelling Mastery condition was varied; ratings increased, decreased or remained the same. The process writing modal preference rating for most children ranged from “No I don’t like it” to “Okay.”

In contrast, Robert and Keith had low ratings for SRA Spelling Mastery lessons and process writing during both SRA Spelling Mastery conditions, with evaluations ranging from “No I don’t like it” to “Okay.”
Table 9

Children's Preference for SRA Spelling Mastery and Process Writing

<table>
<thead>
<tr>
<th>Child's Name</th>
<th>SM1 Mode</th>
<th>SM1 Range</th>
<th>PW Mode</th>
<th>PW Range</th>
<th>SM2 Mode</th>
<th>SM2 Range</th>
<th>PW Mode</th>
<th>PW Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>1</td>
<td>1-2</td>
<td>1</td>
<td>1-3</td>
<td>1</td>
<td>1-2, 4</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Keith</td>
<td>2</td>
<td>2-4</td>
<td>2</td>
<td>2-3</td>
<td>1</td>
<td>1-3</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Karen</td>
<td>2</td>
<td>2-3</td>
<td>2</td>
<td>2-3</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1-2</td>
</tr>
<tr>
<td>Cathy</td>
<td>4</td>
<td>1, 4</td>
<td>4</td>
<td>3-4</td>
<td>4</td>
<td>1, 4</td>
<td>1</td>
<td>1, 4</td>
</tr>
<tr>
<td>Clinton</td>
<td>2</td>
<td>1-3</td>
<td>1</td>
<td>1, 4</td>
<td>3</td>
<td>3-4</td>
<td>2</td>
<td>2-3</td>
</tr>
<tr>
<td>Anthony</td>
<td>2</td>
<td>2-4</td>
<td>1</td>
<td>1, 3-4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1-2</td>
</tr>
<tr>
<td>Anna</td>
<td>4</td>
<td>3-4</td>
<td>2 &amp; 3</td>
<td>2-3</td>
<td>3 &amp; 4</td>
<td>3-4</td>
<td>2 &amp; 3</td>
<td>2-3</td>
</tr>
</tbody>
</table>

Note. 1 = "No, I don’t like it." 2 = "Okay." 3 = "I like it." 4 = "I like it a lot."

SM = Spelling Mastery. PW = Process Writing.
SM1 = First SRA Spelling Mastery condition.
SM2 = Second SRA Spelling Mastery condition.

Stage of Spelling Development

The stage of spelling development for each child at pre and post intervention is shown in Table 10. Stage of spelling development was calculated from the children’s spelling errors and analysed according to Gentry’s (1981, 1982) scheme. The pre-test measure selected was each child’s spelling errors in the SRA Spelling Mastery Level A Placement Test. The post-test measure selected was the last 10 spelling errors each child made in their daily writing samples.

During the pre-test each child spelled words representative of more than one stage of development. The stage of spelling development for five out of the seven children was predominantly at the phonetic stage. Of the remaining two children, Anthony’s level of spelling development was at the earlier pre-communicative and semi-phonetic stages. In contrast, Karen’s spelling development was predominately at the most advanced transitional stage before the study had started. Karen’s spelling development showed a ceiling effect when the pre-test and post-test results were compared, and no change in her spelling development occurred.
At the end of the study, excluding Karen, all children were spelling words at a higher stage of spelling development than at the beginning. Five of the six children were at the phonetic and transitional stages rather than at the phonetic stages. All children who spelled some words at the semi-phonetic stage during the pre-test were spelling words at the phonetic and transitional stages in the post-test. Anthony, in contrast, was still spelling some words at the semi-phonetic stage, however, during the post-test Anthony’s stage of spelling for most words was at the phonetic stage.

Table 10

<table>
<thead>
<tr>
<th>Child’s Name</th>
<th>Pre-test Spelling errors in the SRA Spelling Mastery Level A Placement Test</th>
<th>Post-test Last 10 words spelled incorrectly in writing samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>100% phonetic</td>
<td>40% phonetic 60% transitional</td>
</tr>
<tr>
<td>Keith</td>
<td>11% semi-phonetic 56% phonetic 33% transitional</td>
<td>70% phonetic 30% transitional</td>
</tr>
<tr>
<td>Karen</td>
<td>29% phonetic 71% transitional</td>
<td>30% phonetic 70% transitional</td>
</tr>
<tr>
<td>Cathy</td>
<td>28.5% semi-phonetic 43% phonetic 28.5% transitional</td>
<td>60% phonetic 40% transitional</td>
</tr>
<tr>
<td>Clinton</td>
<td>78% phonetic 22% transitional</td>
<td>60% phonetic 40% transitional</td>
</tr>
<tr>
<td>Anthony</td>
<td>22% pre communicative 78% semi-phonetic</td>
<td>10% semi-phonetic 90% phonetic</td>
</tr>
<tr>
<td>Anna</td>
<td>25% semi-phonetic 62.5% phonetic 12.5% transitional</td>
<td>50% phonetic 50% transitional</td>
</tr>
</tbody>
</table>
Quality of Spelling in Writing

The pre-test and post-test results of spelling quality are listed in Table 11. The classroom teacher rated the children at the beginning and at the end of the study according to the skills for spelling quality. Following the study, the teacher rated all children as having remained the same or improved by one or two rankings with regard to spelling quality. There was also a ceiling effect on the performance level of the skills. Once a skill was ranked as established, the child could not show any further improvement in that skill because the child had demonstrated the upper limits of the skill. The ceiling effect was most evident for Karen, in that during the pre-test the classroom teacher ranked Karen’s spelling knowledge for ten of the skills as “established.”

During the pre-test, all children were rated as “established” for the engaged in writing skill. During the pre-test, the classroom teacher rated six of the seven children as demonstrating some knowledge of all the identified spelling skills. An exception was the asking questions about spelling skill, since Robert was rated as “not yet” demonstrating this skill.

Anthony, in contrast, showed a different level of spelling knowledge. During the pre-test, the classroom teacher rated Anthony as not demonstrating the following range of spelling skills: alphabet knowledge, vocabulary of spelling, understanding spelling is phonetically regular, consults for standard spelling, and uses a dictionary or references successfully. Following the study, the classroom teacher rated Anthony as “sometimes” to “usually” demonstrating spelling knowledge for all skills.
<table>
<thead>
<tr>
<th>Skill</th>
<th>Robert pre PT</th>
<th>Robert post Ch</th>
<th>Keith pre P</th>
<th>Keith post Ch</th>
<th>Karen pre PT</th>
<th>Karen post Ch</th>
<th>Cathy pre PT</th>
<th>Cathy post Ch</th>
<th>Clinton pre PT</th>
<th>Clinton post Ch</th>
<th>Anthony pre PT</th>
<th>Anthony post Ch</th>
<th>Anna pre PT</th>
<th>Anna post Ch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engages in writing</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td></td>
</tr>
<tr>
<td>Sees spelling as a function of writing</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 +1</td>
<td>3 +1</td>
<td>4 +1</td>
<td></td>
<td></td>
<td>4 +1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knows alphabet (letters)</td>
<td>4 +1</td>
<td>4 +1</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>4 *</td>
<td>3 +2</td>
<td>4 *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confident in alphabet ordering</td>
<td>3 0</td>
<td>3 0</td>
<td>4 *</td>
<td>4 +1</td>
<td>3 0</td>
<td>2 +1</td>
<td>3 0</td>
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<tr>
<td>Understands vocabulary of spelling:</td>
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<tr>
<td>Letter</td>
<td>4 *</td>
<td>4 +1</td>
<td>4 *</td>
<td>4 +1</td>
<td>4 *</td>
<td>3 +1</td>
<td>4 *</td>
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</tr>
<tr>
<td>Word / syllable</td>
<td>4 *</td>
<td>3 0</td>
<td>4 *</td>
<td>3 0</td>
<td>4 *</td>
<td>2 0</td>
<td>4 +1</td>
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<tr>
<td>Vowel / consonant</td>
<td>3 +1</td>
<td>3 +1</td>
<td>4 +1</td>
<td>3 +1</td>
<td>4 +1</td>
<td>2 +1</td>
<td>4 +2</td>
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<tr>
<td>Base word/ compound words</td>
<td>3 0</td>
<td>3 +1</td>
<td>4 *</td>
<td>3 +1</td>
<td>3 0</td>
<td>2 +1</td>
<td>3 0</td>
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<tr>
<td>Inflections (ed, ing)</td>
<td>3 0</td>
<td>3 +1</td>
<td>4 *</td>
<td>3 +1</td>
<td>3 0</td>
<td>2 0</td>
<td>3 0</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Singular / plural</td>
<td>3 0</td>
<td>3 0</td>
<td>3 0</td>
<td>3 0</td>
<td>3 0</td>
<td>2 +1</td>
<td>3 0</td>
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<tr>
<td>Understands that spelling is phonetically</td>
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<tr>
<td>regular (regular and exceptions)</td>
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<tr>
<td>Uses invented spelling (approximations)</td>
<td>3 0</td>
<td>3 +1</td>
<td>4 *</td>
<td>4 +1</td>
<td>3 0</td>
<td>2 0</td>
<td>3 0</td>
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<tr>
<td>Proof reads / edits effectively</td>
<td>3 +1</td>
<td>3 +1</td>
<td>4 +1</td>
<td>3 0</td>
<td>2 0</td>
<td>2 0</td>
<td>3 0</td>
<td></td>
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<tr>
<td>Consults for standard spelling</td>
<td>3 +1</td>
<td>3 +1</td>
<td>4 +1</td>
<td>3 0</td>
<td>3 +1</td>
<td>3 +2</td>
<td>4 0</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Robert</td>
<td>Keith</td>
<td>Karen</td>
<td>Cathy</td>
<td>Clinton</td>
<td>Anthony</td>
<td>Anna</td>
<td></td>
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<tr>
<td></td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
<td>pre PT</td>
<td>post Ch</td>
</tr>
<tr>
<td>Uses dictionary / references</td>
<td>3</td>
<td>+1</td>
<td>3</td>
<td>+1</td>
<td>4</td>
<td>+1</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>+1</td>
<td>2</td>
<td>+1</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Asks questions about spelling successfully</td>
<td>2</td>
<td>+1</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>+2</td>
<td>3</td>
<td>+1</td>
<td>3</td>
<td>+2</td>
<td>2</td>
<td>+1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Successfully learns new words</td>
<td>3</td>
<td>+1</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>+1</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Possesses positive attitude towards spelling</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>+1</td>
<td>4</td>
<td>*</td>
<td>4</td>
<td>+1</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>+1</td>
<td>4</td>
<td>*</td>
</tr>
</tbody>
</table>

*Note.* 1 = not yet. 2 = sometimes. 3 = usually. 4 = established.

PT = Post-test, CH = Change.

* = ceiling.

Skills based on J. Harrison’s (1996) criteria.

**Reliability**

Reliability was calculated as described in the method section.

*Procedural reliability.* The two procedural reliability recorders each returned a measure of 100% reliability for all written language lessons viewed on the video tape.

*Writing behaviours reliability.* The writing behaviours reliability for Total Word Score (TS), Total Different Words Without a Prompt (TDWNP), Orthographic Spelling Accuracy (SA) and Phonetic spelling accuracy (PS) ranged from 95% - 100%.
CHAPTER 4
DISCUSSION

The purpose of this study was to examine the effect a daily ten-to-fifteen minute structured spelling programme, as an addition to a whole-language based writing programme (process writing), had on the spelling of six-year-old children. The classroom programme consisted of spelling taught using the technique newsboard (Hood, 1997), process writing (Ministry of Education, 1992), reading, personal spelling lists (Croft, 1983; Hood, 2000), and incidental teaching at other times during the school day.

The writing behaviours showed that SRA Spelling Mastery had a positive effect on the spelling development of the children in the study with regard to phonological knowledge. Phonetic spelling accuracy increased for most children during the SRA Spelling Mastery conditions. In addition, during the SRA Spelling Mastery conditions when the children wrote more words and more different words without a prompt, for most children, orthographic and phonetic spelling accuracy increased. When the first condition and the final condition were compared, all children were spelling at a higher stage of spelling development (with the exception of Karen who was already spelling at the highest developmental level), (Gentry, 1982). This was also shown in the increase in the level of phonetic spelling accuracy for all children at the end of the study. However, the greatest increase in phonetic spelling accuracy occurred for Anthony who started the study with the lowest level of phonological knowledge shown in the stage of spelling development (Gentry, 1981; 1982) and in the level of phonetic spelling accuracy in his writing. Overall, the change in spelling accuracy for all children was small.
Experimental Design of Study

The ideal baseline pattern is low and stable. The ideal data set that demonstrates a clear treatment effect is described as the following pattern. Change relative to the baseline occurs when the treatment is introduced. An effect can be attributed to the treatment when change occurs that is different to the previous baseline, and when baseline is resumed, the data reverts to the previous baseline level. The replication of the treatment shows similar change that occurred during the first treatment phase, and the behaviour is repeated by the other participants. When the change occurs during the treatment phase for all the participants in a multiple-baseline design study, then confidence is high that the variable that caused the change is the treatment. When all or most participants repeat the same behaviour in baseline and treatment phases, the treatment effect is described as strong, whereas if a few participants repeat the baseline and treatment phases, the treatment effect is weak (Cooper, Heron & Heward, 1987). A rising baseline can also mask change that occurs during the treatment phases. A participation effect, in contrast, is change due to participation in the study and / or change that occurs over time.

Spelling is a complex cognitive skill that involves three components when spelling regular words, (1) phonological knowledge, i.e., the analysis of each phoneme-grapheme correspondence, (2) the representation of each phoneme as a grapheme or graphemes in the correct sequence and (3) the memory of the sequence of the phonological units (Treiman, 1993). For spelling irregular words, visual memory (i.e., retention, retrieval, and recall), of the grapheme sequences is required. Once a child learns a cognitive skill and applies that knowledge, the knowledge cannot be unlearned (Alberto & Troutman, 1995). Knowledge and learning is cumulative. What may occur is that the child does not focus or attend to the information, and therefore the child does not apply the knowledge. Alternatively, if a skill taught is still at the accuracy stage of learning, and the child has not mastered the skill, when
the teaching is discontinued, the child may not retain the skill. In spelling, when a skill is taught during treatment phase that is then discontinued during baseline, the level of baseline may not revert to the previous level of baseline due to a carry-over effect (Cooper et al., 1987).

The results of the writing behaviours discussed below did not show clearly or conclusively change during the treatment phases relative to the baseline phases across the seven children in the study. When the change could not be attributed to the treatment with confidence, but change did occur, then participation was considered the most probable reason for change.

*Improvement in Orthographic and Phonetic Spelling Accuracy*

From the beginning to the end of the study the change in the children’s orthographic spelling accuracy was minimal. All children began the study with a moderate level and ended the study spelling orthographically at a similar level. Only Karen and Robert were spelling at a high level at the end. During the second SRA Spelling Mastery phase, a weak effect was evident for some children that could have been attributed to either SRA Spelling Mastery or as an outcome of just participating in the programme. A rising baseline and variability also made it difficult to attribute change to SRA Spelling Mastery and not to another variable. One principle of the developmental model described in the different stage theory models (Ehri, 1987; Gentry, 1982; Henderson & Templeton, 1986) is that children apply different cognitive strategies and develop spelling competency through writing. The minimal change in the children’s orthographic spelling possibly may suggest that the children improved, because they were practising spelling in their writing or were exposed to correct spellings during their classroom programme rather than the spelling skills taught during SRA Spelling Mastery. At word level, there was minimal change in orthographic spelling accuracy. A finer-grained analysis may have identified closer approximations to the
correct spelling if letter sequences had been analysed. For phonetic spelling accuracy a finer-grained analysis was applied (i.e., phoneme- grapheme sequences) that indicated that SRA Spelling Mastery had a positive effect on phonetic spelling accuracy.

A rising baseline was also evident in phonetic spelling accuracy; however, through analysis at the grapheme level, the degree of improvement during SRA Spelling Mastery showed that change could be attributed to the addition of SRA Spelling Mastery to the children’s programme.

*Reduced Variability in Spelling Accuracy and Phonetic Spelling Accuracy Levels*

Reduced variability in conjunction with a trend of increasing daily orthographic and phonetic spelling accuracy levels were observed particularly during the second phase of SRA Spelling Mastery. The results suggest either of two things.

Firstly, that the children were more aware of spelling the words correctly, and therefore the children were developing a spelling conscience. Writing for a purpose is one reason given by Hood (2000) that promotes a spelling conscience. It is of interest that reduced variability occurred during SRA Spelling Mastery conditions in comparison to baseline conditions. During both baseline and treatment conditions, the children participated in process writing, but the reduced variability suggests that the various SRA Spelling Mastery tasks and the instructional design may have had an effect on children’s spelling conscience.

As part of the instructional design, positive practice was incorporated in the teaching lessons in the error correction procedure, delayed retesting, and cumulative review procedures (Gersten, Carnine, & Woodward, 1987; Kameenui & Simmons, 1990). Positive reinforcement as verbal praise and stamps were presented for attempts and correct responding, while positive reinforcement in the form of verbal praise and stamps was also presented for on-task behaviour as the children wrote and during conferencing with the
children for attempts and correct spelling. Positive practice with positive reinforcement during SRA Spelling Mastery may have been a contributing reason for reduced variability.

Foxx and Jones (1978), and Ollendick et al.’s (1980) findings showed positive practice with positive reinforcement was more effective than positive practice alone on improving spelling performance, and N. N. Singh, J. Singh, and Winton’s (1984) findings showed in reduced uncorrected reading errors and self-correction of errors that positive practice combined with positive reinforcement was more effective than positive practice alone. These findings show that the inclusion of positive practice and positive reinforcement as a strategy for teaching spelling has positive effects on spelling and reading performance.

If the reduction in variability reflects children’s demonstration of a spelling conscience, then the increase in variability when the baseline condition was resumed suggests a lack of spelling conscience. Flockton and Crooks (1999) identified the lack of spelling conscience as one of the factors contributing to the Year Four and Year Eight children’s poor spelling performance. Developing a spelling conscience is important in children spelling words correctly. Further investigation needs to be considered, into which strategies promote a spelling conscience while the children write, rather than the children demonstrating a spelling conscience, when proofreading (Griffith & Leavell, 1996).

Secondly, reduced variability may indicate that the children were developing skill in orthographic spelling based on lexical knowledge, and the children were attempting to apply visual memory to spell words correctly, but the change was not significant enough to show a treatment effect.

_Effect of Phonemic Awareness and Phonic Skills on Spelling Accuracy and Phonetic Spelling Accuracy Levels_

The phonological skills taught during the SRA Spelling Mastery lessons included phonic skills, representing the phoneme with the grapheme, and applying spelling patterns to
phonemes, e.g., spelling the final phoneme with a double consonant in the word *mill*. A variety of activities were presented to teach, practise, and generalise the skill to writing words. The phonemic awareness skill taught was phoneme segmentation. The phonological skills, namely phonic skills, segmenting the word into the individual phonemes and representing the phonemes with the correct graphemes are required to spell. When either skill is lacking the child will be unable to spell the word correctly. When the child is unable to segment the word into the individual phonemes, the child does not have the opportunity to represent the phoneme with any grapheme. In contrast, when the child is able to segment the word into the individual phonemes, the child can recognise that the phoneme needs to be represented and therefore can assign a grapheme to the phoneme, thereby enabling the child to be more successful in spelling the word correctly.

Treiman’s (1993) study identified difficulties in phoneme segmentation when children were unable to complete a full phonemic breakdown of words. Treiman’s findings showed that children’s inability to separate the initial and final consonant clusters in words resulted in children omitting one of the consonants and spelling the word incorrectly. Teaching children to segment words into the individual phonemes gives children a strategy to break words up, to discern the phonemes that make up the word, and heightens the children’s awareness of phonemes within words.

SRA Spelling Mastery taught the children to segment words into the individual phonemes and then taught the children the spelling of the words. The greater change in phonetic spelling accuracy in comparison to orthographic spelling accuracy may be attributed to the teaching of the phonemic awareness skill of phoneme segmentation rather than teaching phoneme-grapheme correspondences. The SRA Spelling Mastery programme taught the children to segment words that consisted of consonant-vowel sequences up to the complex CCCVC sequences, e.g., *strip*. Treiman (1993) identified these consonant blends in
the initial position as difficult for children to perceive and to represent in their spelling. The skill of phonemic segmentation enabled the children to discriminate each phoneme and assign the graphemes for the initial consonant blends, e.g., *str* in the word *strip* but also gave the children the skill to attend to phonemes in other positions of the word, e.g., phonemes within the syllables in the words.

The lack of much change in the level of orthographic spelling accuracy shown in the results may be attributed to the number of phoneme-grapheme correspondences and spelling patterns taught during the study; since over the duration of the study only a limited number were taught. The level of orthographic spelling accuracy may reflect generalisation of the specific phoneme-grapheme correspondences and spelling patterns taught. This suggests that if the children had been taught a greater number of phoneme-grapheme correspondences and spelling patterns spelling accuracy during SRA Spelling Mastery, spelling accuracy could have been higher.

During baseline conditions, the children may have improved in their phonemic segmentation skills and spellings of phoneme-grapheme correspondences through newsboard, process writing, learning spelling lists, and exposure to text, however, the change in the children’s phonetic spelling accuracy indicated these methods were possibly not as effective in comparison to SRA Spelling Mastery. The specific teaching of phoneme segmentation skills may have been the crucial factor in the observed improvement in the children’s phonetic spelling accuracy.

Castle et al.’s (1994) findings showed that specific teaching of phonemic awareness skills resulted in greater phonemic awareness skill, orthographic spelling accuracy in words in isolation and in written text, in comparison to the performance of the children taught using process writing. The findings of the present study do not reflect the change in orthographic spelling accuracy as occurred in Castle et al.’s study. SRA Spelling Mastery focused on
teaching phoneme segmentation only. Ehri (1987) only identified the phonemic awareness skill of phoneme segmentation in the second stage of spelling development. The findings indicate that the ability to segment words into individual phonemes had an effect in phonetic spelling accuracy. The question remains, would the inclusion of teaching other phoneme awareness skills (e.g., manipulating words through phoneme deletion or substitution) have had a greater effect in phonetic spelling accuracy, and increased orthographic spelling accuracy like that observed in Castle et al’s study (1994)?

Assessing the children during each condition in phoneme segmentation skills, other phonemic awareness skills, e.g., phoneme deletion phoneme and phoneme substitution, would have given data on the level and change in phoneme segmentation skills, and the effect phoneme segmentation had on the untaught phonemic awareness skills of phoneme deletion or phoneme substitution across the study. Assessing application of specific phoneme-grapheme correspondences and spelling patterns would have given data on the spellings of phoneme-grapheme correspondences and spelling patterns across the study.

*Generalisation of Spelling Skills*

Generalisation of the phonological skills taught during the SRA Spelling Mastery lessons to the children’s writing was shown in the children’s increased mean phonetic spelling accuracy during the SRA Spelling Mastery conditions, particularly during the second treatment phase. Generalisation of the specific words used and the irregular high frequency words taught during SRA Spelling Mastery lessons to the children’s writing occurred. This was reflected in the percentage of words spelled correctly in the children’s writing during both SRA Spelling Mastery and baseline conditions. Teaching the SRA Spelling Mastery lessons prior to the children writing provided practice for both the words and the phonological skills taught. The findings indicate that having children write following the SRA Spelling Mastery lesson aided generalisation from the SRA Spelling
Mastery lesson to the children’s writing. Lack of generalisation of spelling skills taught during SRA Corrective Spelling Through Morphographs to non-programme specific situations was identified by Robinson and Hesse (1981) to be due to instruction not including the children’s daily writing.

The findings showed that for generalisation to the children’s writing to occur, the spelling skills taught and specific words taught must be used in the children’s writing. These findings support Croft (1983) and Templeton’s (1991) view that spelling is an aspect of writing and should take place within the context of writing.

During both SRA Spelling Mastery and baseline conditions, for a few children, their mean phonetic spelling accuracy increased, but their mean orthographic spelling accuracy decreased or remained at a similar level. The possible explanations for this occurrence are that the children were able to generate a correct phonetic representation but did not know which grapheme or grapheme sequence to write, or that the children focused on spelling words based on phonological information only and did not take the lexical information into account (Gentry, 1982). The data was not analysed to determine whether applying phonological knowledge incorrectly contributed to this.

As children encode phonological skills, children can over-generalise these skills. Over-generalising can occur when a child is learning the phonological skills implicitly or explicitly. Bissex (1980), Gentry (1982), Read (1971), and Wilde (1990) describe over-generalising as part of the developmental process. As children write, they deductively learn, and apply phonological knowledge and orthography making closer approximations to the correct spelling.

It is important to consider over-generalisation as it has implications for how specific phoneme-grapheme correspondences, spelling patterns, and spelling generalisations are taught. If children continue to spell words that are phonetically possible yet incorrect, the
programme procedures and what is taught needs to be evaluated as to how successful the programme is in teaching spelling. When the number of children and the number of conditions are considered, the occurrence of increased phonetic spelling accuracy corresponding to decreased orthographic spelling accuracy or orthographic spelling accuracy remaining at a similar level was infrequent. This finding suggests that the children were applying both phonological and lexical knowledge as they spelled. Based on this suggestion, the SRA Spelling Mastery programme appears to be successful in teaching both phonological skills and knowledge of when to apply them.

Generalisation of spelling skills and the specific words taught during SRA Spelling Mastery occurred, but in addition, the children’s spelling showed that other spelling skills not taught during the SRA Spelling Mastery lessons were used in the children’s writing. These skills cannot be attributed to SRA Spelling Mastery but to the other components of the children’s spelling programme. In ten to fifteen minutes a day out of a full five-hour literacy-rich classroom programme, not all the spelling patterns or words the children want to write can be taught at one time. Based on the stage theory models (Gentry, 1982; Henderson & Templeton, 1986; Ehri, 1987) children learn tacitly. These findings indicate that both, implicit learning and explicit teaching result in generalisation to the children’s writing.

*Duration for Change to Occur in Phonetic Spelling Accuracy*

An increase in phonetic spelling accuracy occurred for some children during the first phase of SRA Spelling Mastery, showing a modest treatment effect, but this did not occur for other children. However, during the second phase, all children with the exception of Karen increased in their phonetic spelling accuracy, showing a treatment effect. For Karen, her phonetic spelling accuracy was high, affected by a ceiling for phonetic spelling accuracy. This finding indicates that the duration of each SRA Spelling Mastery condition was
probably too short to show change during the first phase for some children. Although there was a four-week break of lessons between the first and the second phase of SRA Spelling Mastery, the lessons taught were cumulative and reviewed previous learning in a systematic manner that may have enhanced retention. This may have contributed to the increase in phonetic spelling accuracy for all children (with the exception of Karen, see above) during the second phase, and hence the short condition duration may not have masked the effect SRA Spelling Mastery had on phonetic spelling accuracy.

Following SRA Spelling Mastery 1 when conditions returned to baseline (baseline 2), phonetic spelling accuracy reduced as shown in the percentage change (see Table 6) for all children regardless of whether a treatment effect occurred during SRA Spelling Mastery 1.

These results indicate two things. Firstly, within a short period of introducing a spelling programme that specifically targets phonological skills, phonetic spelling accuracy improves for at least some children, and second, in order to maintain or to continue the gains made from the SRA Spelling Mastery lessons, most children require more than a short period of structured spelling instruction. These findings suggest, for continued development of phonetic spelling accuracy, a structured spelling programme needs to be ongoing.

**Effect of Words Written and Word Complexity on Spelling Accuracy and Phonetic Spelling Accuracy**

The children generally wrote fewer words and fewer different words without a prompt during the first SRA Spelling Mastery condition. However, during the second SRA Spelling Mastery condition, most children wrote more words, and most children wrote more different words without a prompt. Change in orthographic and phonetic spelling accuracy between baseline and treatment conditions were compared when the children wrote more different words than during the previous condition. For most children, who wrote more
different words during baseline 2, their level of orthographic and phonetic spelling accuracy was maintained or decreased, whereas during SRA Spelling Mastery 2, for most children, their level of orthographic and phonetic spelling accuracy was maintained or increased. The variability of daily scores and the rising baselines makes interpretation of the data difficult to determine whether the sustained and increased level of orthographic and phonetic spelling accuracy can be attributed to a treatment effect and not to participating in the programme.

Considering this, the differing results during the first and second phase of SRA Spelling Mastery are of interest because the children were writing under the same conditions. When the children wrote fewer words, it appears that the children may have focused on their spelling to the exclusion of writing content. This finding confirms the process writing principle that the child’s focus initially should be on content when writing and on spelling correctly during proofreading, enabling children to write freely without the constraints of thinking about spelling the words correctly. A claimed benefit of concentrating on content is that children do not limit themselves to writing words they know how to spell correctly (Graves, 1983; Ministry of Education, 1992; Wilde, 1990) and that children use a wider vocabulary drawing on their oral language (Graves, 1994). The increase in the number of words written and the number of different words without a prompt during the second SRA Spelling Mastery condition appears to refute the process writing view. The increase in words written suggests that the children were able to write freely and were not inhibited by concentrating on spelling as the children wrote. Writing more different words without a prompt implies that the children wrote using a variety of vocabulary.

The level of complexity of words was another measure of vocabulary range and level of spelling difficulty. The hypothesis is that words of less complexity are easier to spell, while words that are more complex are more difficult to spell. If children restricted
themselves to writing words they could spell, then the level of word complexity would reflect this. The findings did not show a reduction in word complexity. Instead, the level of word complexity written by all the children was similar during all conditions irrespective of SRA Spelling Mastery or baseline conditions. The findings imply that across conditions the children did not alter or limit their choice of vocabulary or restrict their vocabulary to easier words to spell. This was highlighted when the topic the children were studying was dinosaurs. Children, irrespective of whether they were receiving SRA Spelling Mastery lessons or the baseline condition wrote stories naming and describing a range of dinosaurs. Having children concentrating on content rather than spelling is an integral part in process writing because it believed that the children’s interest and motivation can be better sustained that way (Ministry of Education, 1992). In this situation, the topic provided the children with the interest and motivation to write. Focusing on spelling did not appear to reduce the children’s interest or motivation.

The findings of this study are consistent with Clarke’s (1988) findings. The children in Clarke’s study (1988) wrote words of the same level of difficulty irrespective of whether the children were encouraged to write using invented spelling or encouraged to write with correct spelling using dictionaries and words provided by the teacher.

The number of different words without a prompt written appears to have had an effect on the level of spelling accuracy. There was no restriction on the words the children were able to use. The children were free to choose the words they wrote. The words the children wrote correctly or incorrectly were not recorded to identify the changing corpus of words written, or analysed to determine which words the children wrote incorrectly, or when the words were spelled correctly. Based on the increased number of different words written by the children without a prompt, it is assumed that the corpus of words the children wrote changed and increased across the study. This changing and diverse written vocabulary may
explain the continued relatively static level of spelling accuracy across the study for most children.

The findings have implications for children’s writing with regard to how much children write and how accurately the children write. Initially the children wrote fewer words; however, this effect was brief. A reduced number of words written should not be a reason for not teaching specific phonological skills or specific words explicitly. The treatment effect of phonetic spelling accuracy is of greater benefit than any negative impact of a reduction in the number of words written. For a brief period, it may be more important to trade off writing more words in favour of writing words accurately, in order in the end to achieve both, i.e., an increase in the number of words written, while sustaining an increase in both orthographic and phonetic spelling accuracy. In addition, the level of word complexity was not compromised while the children wrote fewer words.

The teacher taught the spelling of specific words by giving the children weekly personal spelling lists to learn. The researcher did not have access to the children’s personal spelling lists or the weekly test results to identify any effect the learning of spelling words using Croft’s (1983) procedure had on the spelling accuracy of words in the children’s writing. Identifying these words could have provided data on the effectiveness of teaching personal word lists and the generalisation of these words to the children’s writing. Generalisation of spelling list words to the children’s writing would have provided useful comparative data to the generalisation of words taught during SRA Spelling Mastery.

*Who Benefits from SRA Spelling Mastery Level A?*

During this short study, change in phonetic spelling accuracy during Spelling Mastery showed a treatment effect. The child who had the least phonological knowledge benefited more than did the children with a moderate level of phonological knowledge. Anthony began the study with the lowest level of phonological knowledge of all the
children, spelling at the pre-communicative and semi-phonetic stages (Gentry, 1981, 1982). While Anthony received the extended six-week first baseline condition, his daily phonetic spelling accuracy although variable, remained low. It was only when he received the SRA Spelling Mastery lessons that his mean phonetic spelling accuracy increased. The percentage change results show that the addition of SRA Spelling Mastery resulted in major improvement in Anthony's phonological knowledge from the beginning to the end of the study. At the end of the study, Anthony's mean phonetic spelling accuracy was at the moderate level that was similar to most of the other children.

**Issues related to teaching spelling programmes.** The change in Anthony's phonetic spelling accuracy during SRA Spelling Mastery conditions raises several issues for the teaching of spelling. The spelling programme needs to teach the skills the child lacks, and the skills the child requires in order to spell words correctly. Spelling requires both phonological and lexical knowledge (Nicholson, 2000). Both elements should therefore be included in a spelling programme. The decision when to introduce a structured spelling programme, and how to integrate the programme into the classroom programme needs to be considered.

The spelling programme during baseline conditions consisted of the researcher teaching spelling during the written language lesson, during newsboard, and as a 'teachable moment' when the researcher had a conference with the children (Ministry of Education, 1992). In process writing, the daily writing by children is perceived as a component of spelling instruction. Children practise and develop their cognitive strategies to spell as they write (Graves, 1983; Wilde, 1990). The other component of the spelling programme occurred in the classroom with the classroom teacher, with the children learning and tested on their personal weekly spelling lists, during reading, and incidental teaching as other opportunities arose during the school day.
The baseline conditions provided a range of methods for teaching spelling; however, the programme was not systematic in teaching the skills in a developmental sequence. The skill selected in a ‘teachable moment’ during process writing may be the next skill the child requires, but the skill may not be taught or practised again until the error occurs again in the children’s writing. Some children require more than one exposure to the example and multiple opportunities to practise in order to retain and generalise the specific skill. For Anthony this appeared to be the case. If Anthony had been able to learn and retain skills through incidental teaching and weekly spelling lists, his phonetic spelling accuracy would have reflected this.

In Tremain’s (1993) view, children learn more quickly when instruction is given and difficult phonological skills need to be taught. This statement introduces two issues; the time it takes to learn a skill, and the skills that are difficult to learn. The time it takes for a child to learn a skill and apply it to their writing becomes an ethical issue when the child over time fails to learn a skill deductively, which in contrast could have been taught explicitly, enabling the child to apply it in his/her writing. This ethical issue has implications for efficacy of teaching and learning, when to intervene with a targeted programme, and which skills need teaching.

Treiman (1993) states that difficult phonological knowledge needs to be taught, but determining what is easy and what is difficult phonological knowledge for a child to learn may be different for different children. Anthony’s lack of progress and the large variability with most of his scores at the bottom end of the low level, during the extended baseline condition suggests all phonological knowledge was difficult for Anthony to learn without direct instruction in phonological skills. Anthony’s results showed that he had not learnt the skills deductively through speaking, reading, and writing but required a systematic programme that taught the specific skills.
Based on Gentry's (1982) recommendations, no child should be given formal spelling instruction before the child is at the transitional stage of spelling development. Gentry's reason is that formal instruction leads to frustration and little spelling success. These present findings suggest otherwise. All children exhibited spelling success in their writing. Only one child began the study spelling words predominantly at Gentry's (1982) transitional stage. All children, who were spelling words below the transitional stage of spelling development prior to the study commencing, improved to a more advanced stage of spelling development by the end of the study.

Without the addition of the structured spelling programme, Anthony's phonological knowledge may have continued at low levels for an extended period. This lack of phonological knowledge would have continued to have detrimental effects on Anthony's spelling, reading, and access to written communication.

For Anthony, pre-test reading measures showed he was reading at the 5-5.25 year level, at least one year below his chronological age. In comparison to the other children in the study, Anthony's level of spelling was also lower. A spelling test, e.g., South Australian Spelling Test (Westwood, 1999) that scores spelling age was not administered to determine spelling age prior to the start of the study. This information would have given another measure of discrepancy between chronological age and spelling age, although the age score would not have given specific information on specific areas of difficulty.

*Gender Effect*

The change in phonetic spelling accuracy during Spelling Mastery showed a potential gender effect in favour of girls that requires further investigation. Although Anthony began the study with the lowest phonological knowledge and made the greatest percentage change in phonetic spelling accuracy during SRA Spelling Mastery, the other boys in the study appeared to benefit less from the SRA Spelling Mastery lessons than did the girls. Apart
from Karen, the children who did not show a clear treatment effect during the first phase were the three boys who were spelling at a moderate level during baseline 1, whereas all girls spelling at the moderate level of phonetic spelling accuracy showed a positive treatment effect. A gender effect, favouring girls was demonstrated in Lum and Morton’s (1984) study when SRA Spelling Mastery and the Nelson programme were compared.

This finding suggests that the boys may have required a longer period of SRA Spelling Mastery for change to be generalised to their writing. Excluding Anthony, phonetic spelling accuracy increased during SRA Spelling Mastery for the other boys. The cumulative effect of the first phase may have contributed to the change in the second phase. Although the percentage change for the boys was above the threshold level for change, the level of change was still lower in comparison to the girls who were spelling at a moderate level during baseline 1.

The percentage change in phonetic spelling accuracy suggests that, apart from Anthony, the structure and design of the SRA Spelling Mastery programme benefited girls more. The Literacy Taskforce recognises the significant influence that content, design, and teaching strategies have on children’s achievement (Minister of Education, 1999). The Literacy Taskforce also claims that in literacy boys are not achieving as well in comparison to girls. For all children to succeed, teaching practice must be equally effective for all children. When providing programmes, the issue of gender needs to be considered, in order to provide the most effective programme that ensures optimum gains for both genders.

Taking into consideration the small number of children in the study as a limitation, the gender effect identified during SRA Spelling Mastery needs to be explored more. The delivery of instruction was different to the teaching approach the children usually experienced. This may also explain the reduced number of words written and the number of different words written without a prompt during the first SRA Spelling Mastery condition, in
comparison to the increased number of words written and the number of different words written without a prompt during the second SRA Spelling Mastery condition. A possible explanation could have been a settling in time to the programme. Extending the length of each condition may have strengthened or weakened the gender effect. Extending the length of the conditions and the study, and having a larger group of children in the study would provide further information into gender effect.

*Exposure to Incorrect Spellings*

The effect of exposure to incorrect spellings during process writing on spelling accuracy needs to be considered. Brown (1988) identified this issue when university students practised writing incorrect spellings and therefore were exposed to incorrect spellings, the findings showed the students' spelling accuracy was affected adversely.

During the SRA Spelling Mastery lessons the children were exposed to correct spellings, and the children practised correct spelling. When an error occurred, the error was immediately corrected. During story writing, children wrote words both correctly and incorrectly and were exposed to the incorrect spellings. When children are encouraged to use invented spelling and are not shown the correct spelling, or not shown the correct spelling until proofreading or during a conference, this may have an impact on correct spelling. The representation of the correct spelling may be weakened, as occurred in Brown's (1988) study.

In contrast to Brown's study, where the participants were university students who were able to spell and had had extensive exposure to text, the participants in this study were six-year-old children learning to read, write, and spell. The practice of and exposure to correct spelling, and the visual discrimination and visual memory activities included as part of the SRA Spelling Mastery lessons may have strengthened the children's visual memory of the correct spelling. The evidence supporting this possible explanation was the
generalisation of the high frequency irregular words taught, written correctly in the children’s writing.

*Children’s Preference for SRA Spelling Mastery and Process Writing*

Gentry’s (1981) other reason for not teaching spelling explicitly before a child is spelling at the transitional stage is the claim that the children will become frustrated. The findings of this study suggest the children did not become frustrated, but instead the children preferred SRA Spelling Mastery lessons to process writing, and most children perceived the lessons positively. This was shown in how Anthony rated SRA Spelling Mastery and process writing. Based on Gentry’s view, Anthony who began the study with the earliest spelling development stages, pre-communicative and semi-phonetic, rated SRA Spelling Mastery more highly than process writing. The assumption for the positive preference for SRA Spelling Mastery lessons in comparison to process writing was that the children were successful during the SRA Spelling Mastery lessons, the lessons were structured, and the introduction of new learning occurred when the children had learnt the previous skill. A possible reason for the increase in preference for process writing, by some children during the second SRA Spelling Mastery condition may have been a consequence of the researcher’s assumption that children felt positive about spelling during SRA Spelling Mastery and that transferred to the children when writing during process writing.

*Study Limitations*

Two major limitations to the study were identified, namely the duration of the conditions and the study, and the method of selecting the children to participate in the study.

The duration of the study was short in comparison to other studies researching SRA Corrective Spelling Through Morphographs and SRA Spelling Mastery programmes (Burnette et al., 1999; Hesse et al., 1983; Lun & Morton, 1984; Robinson & Hesse, 1981). SRA Spelling Mastery is a spelling programme that is designed to be taught over a full
school year (Dixon, Engelmann & Bauer, 1990). The skills are taught sequentially with strategies that incorporate positive practice (Gersten, Carnine, & Woodward, 1987; Kameenui & Simmons, 1990). Change in phonetic spelling accuracy occurred during SRA Spelling Mastery, but there was no significant change in orthographic spelling accuracy during either baseline or SRA Spelling Mastery conditions. The short condition duration may have masked the level of change in spelling accuracy that might have occurred as an outcome of SRA Spelling Mastery had the conditions and the study duration been longer. Only a limited number of phoneme-grapheme correspondences and spelling patterns were taught during the short study. More phoneme-grapheme correspondences and spelling patterns would have been taught if the length of the study had been extended, and this may have shown positive change in spelling.

The degree of change in the spelling of six-year-old children that is considered reasonable needs to be explored. Not controlling the words the children wrote, nor identifying the original corpus of words during first baseline condition, nor identifying the words added to the corpus that were spelled correctly and incorrectly made it impossible to identify specific change in orthographic and phonetic spelling in each condition, for specific words. For phonetic spelling, it was an analysis at the grapheme level that showed whether the children were able to segment the phonemes and represent these with an appropriate grapheme or grapheme sequence. For orthographic spelling accuracy, the analysis was at a more gross level, noting if the spelling of the whole word was correct or not. Gentry (1982) described correct spelling as based on the children spelling correctly the corpus of words that is appropriate for a particular age level (see Appendix A). The spellings of the words written by the children were not analysed for words that were below the six-year-old level, at the six-year-old level or above. Without this analysis, no comparison could be made according to age level words. Instead, word complexity based on syllable length was used. This
provided a gross level of information on how complex the word was to spell based on morphology, e.g., tense markers.

The procedure for determining which children were suitable to participate in the study was based on the number of words spelled correctly in the SRA Spelling Mastery Level A Placement Test. The children selected met the selection criteria, however, the level of phonological knowledge for the children was variable, ranging from low to high, reflected in analysis of the spelling errors using Gentry’s (1982) criteria and the level of phonetic spelling accuracy analysed during the first baseline condition.

The SRA Spelling Mastery Level A Placement Test did not test phonological skills specifically but used the number of spelling errors the children made in a list of words that included regular words and irregular high frequency words to determine spelling knowledge. Counting the number of words spelled correctly instead of analysing the spelling errors may have not been sufficiently fine-grained to identify children who already had the foundation phonological skills taught at the beginning of Level A. Selecting children based on the number of spelling errors and not the type of error may have resulted in children being included who already had phonological skills the SRA Spelling Mastery programme taught and hence masked the true effect of the programme. Most of the children had a moderate level of phonetic spelling accuracy during baseline 1, and based on the Placement Test results, the children were spelling at the phonetic stage (Gentry, 1981; 1982). For Karen whose spelling development was predominately at the transitional stage (Gentry, 1981; 1982), this was more evident. Karen met the criteria spelling five or fewer words correctly, however, of the seven words Karen spelled incorrectly, most of the words were spelled closely approximating the correct spelling. The SRA Spelling Mastery Level A lessons may have taught Karen new phonological skills and irregular high frequency words in addition to
providing practice and review of the phonological skills Karen already had, but it may not have targeted the specific spelling skills Karen required.

Anthony was the only child who began the study with a low level of phonological knowledge, and he benefited the most in phonological development. Having only one child begin the programme with a low level of phonological knowledge makes it impossible to determine if the high degree of change in Anthony’s phonetic spelling accuracy would have been repeated, for other children with a low level of phonological knowledge. The percentage change in phonetic spelling accuracy of the children who began the study with a moderate level and at the phonetic spelling stage showed the change was relatively consistent across gender.

This study has shown that for children to achieve the optimum improvement in spelling, the spelling programme needs to target the specific skills the children require. For Anthony, placement at the beginning of Level A of SRA Spelling Mastery was the most appropriate. These findings suggest that when using the SRA Spelling Mastery programme, in addition to testing the children on the Placement Test, analysis of the errors needs to occur as well. Testing regular words in the Level A Placement Test provided a survey level assessment of phonological skills. Specific testing of phonemic awareness skills of sound segmentation, manipulation of phonemes through phoneme deletion and phoneme substitution, and testing phoneme-grapheme correspondences would have provided a more accurate assessment of the phonological skills of the children. This information would have provided important information on the appropriateness of teaching at the beginning of level A of the SRA Spelling Mastery programme prior to selection to participate in the study.

Conclusion

The introduction of SRA Spelling Mastery Level A had positive effects on the phonetic spelling accuracy for the children, in particular for Anthony, but no significant
effect on orthographic spelling accuracy was observed. During the second phase of SRA Spelling Mastery, the children continued to write more words and more different words without a prompt as the children continued to improve in their orthographic and phonetic spelling accuracy, but it was not conclusive that the change could be attributed to SRA Spelling Mastery and not attributed generally to participation in the teaching programme. Skills taught during the SRA Spelling Mastery lessons generalised to the children’s writing in their phonetic spelling accuracy, and the specific high frequency words taught generalised to their writing. The children continued to express themselves freely as they wrote and were not inhibited by focusing on spelling to the exclusion of writing content. In addition, the children rated SRA Spelling Mastery lessons positively, and there was a possible gender effect in favour of girls. These results over a short period demonstrate some level of efficacy of SRA Spelling Mastery when it teaches phonological and lexical skills the children require.

The findings of this present study provide limited additional support to the studies that have evaluated SRA spelling programmes and have found that teaching spelling using Direct Instruction programmes is effective in improving the spelling skills of children (Burnette et al., 1999; Hesse et al., 1983; Lun & Morton, 1984; Robinson & Hesse, 1981).

Hood (2000) has identified spelling performance in children to be a concern, describing children eleven and twelve years of age taught in whole-language classrooms who are still spelling using invented spelling. Findings from NEMP (Flockton & Crooks, 1999) showed that many children are not becoming successful spellers. Hood (2000) suggests that teachers teach spelling skills in a programme that is integrated during newsboard, reading, or current events, as there is insufficient time within the school day to assign a separate 20 minutes of instructional time for spelling.
The results of this short study are inconclusive in showing the benefits of SRA Spelling Mastery as a developmental programme to supplement the whole-language classroom programme. As a remedial programme, the benefits of SRA Spelling Mastery have not been considered in this study. SRA Spelling Mastery produced positive effects in teaching phonological skills reflected in phonetic spelling accuracy but not in orthographic spelling accuracy. The large percentage change in Anthony's phonetic spelling accuracy in change demonstrated the success of SRA Spelling Mastery. The benefits lay not just in the sequenced phoneme-grapheme correspondences, or the spelling patterns, and phonemic awareness skill of phoneme segmentation taught but in the design of the programme that provided practise, scaffolded learning, review of skills taught, and application to writing.

In teaching high frequency words that generalised to the children's writing, SRA Spelling Mastery was effective. With regard to phonological skills and lexical skills, in teaching specific high frequency irregular words, the targeted spelling programme (in this case SRA Spelling Mastery and process writing) may be the combination needed to change the low level of spelling performance identified by Flockton and Crooks (1999) and Hood (2000). Children need to be able to express their thoughts on paper and not feel inhibited by having to concentrate on their spelling to the exclusion of sequencing and developing their ideas. Process writing provides the mechanism to achieve this. SRA Spelling Mastery as shown in these results is a programme that teaches phonological skills, spelling patterns, and spelling of specific high frequency words children can then apply to their writing. The combination of both teaching approaches offers benefits not provided by either approach alone.

Taking into consideration the major limitations of the study, both in duration and analysis of the corpus of words at age or class year level, the results suggest that it would be appropriate to include a structured spelling programme that teaches foundation phonological
skills, lexical skills, and phonemic awareness skills in conjunction with process writing from entry to school.

Future Direction

The New Zealand Ministry of Education has a commitment to providing a world-class education system. The New Zealand Ministry of Education’s objective is to achieve highest levels of literacy and for children to leave school able to participate fully in society and in work (Ministry of Education, 1994).

For New Zealand to achieve this objective, the most efficient method of teaching spelling needs to be researched and implemented. From the literature and from personal observation, teachers use one or more of the following to teach spelling, namely process writing, personal word lists, teaching phonemic patterns, and commercial spelling programmes. McNaughton’s (1998) research into the teaching of spelling in New Zealand found spelling instruction occurs within and outside the context of writing and reading. McNaughton described best practice in New Zealand as a balanced and integrated programme; however, McNaughton did not define the components of a balanced programme.

The Literacy Taskforce reports that decisions on the teaching strategies, approaches, and materials schools use should not be determined at Ministry of Education level but at the school level, with the qualifying statement, “However, the taskforce was concerned that, given the evident under-achievement of some children, “more of the same” will not be good enough” (Minister of Education, 1999, p.6). Although the Literacy Taskforce considers it is the school’s responsibility to decide on the strategies to teach literacy, the Literacy Taskforce recommends research to determine the most effective strategies (Minister of Education, 1999). It is important that schools and teachers are aware of the most effective programmes
so they can then make informed decisions about how spelling should be taught in their schools to provide the best outcome for children. Investigating how teachers teach spelling, the programmes used by teachers, and identifying the most effective spelling programme design and teaching methods that meet the needs of all children including the underachieving groups (Minister of Education, 1999) would provide this information for the New Zealand setting.

There needs to be further research to determine the effects of continued direct spelling instruction, particularly using Direct Instruction over a longer period with a larger group of children who have similar levels of phonological and lexical knowledge. In addition, the corpus of words used should be assigned an age and or class year level and be incorporated in the analysis of the orthographic and phonetic spelling accuracy. A comparative study including a control group of children taught spelling within the classroom whole-language programme and children taught spelling based on personal lists would provide evidence to determine the level and type of change in writing behaviours that occurs between incidental and direct spelling instruction. Some teachers include phonological awareness skills programmes as part of their classroom programme. Castle et al.'s (1994) study showed teaching phonemic awareness skills resulted in more improvement in phonemic awareness skills and spelling performance than was observed in the children taught during process writing. In Castle et al.’s study, the children in the phonemic awareness group were taught phonemic awareness skills, but the children did not participate in process writing to write stories. A comparative study of children taught phonological skills integrated in the SRA Spelling Mastery programme and a specific phonological awareness skills programme followed by children writing during process writing would provide evidence of the efficacy of both programmes and generalisation to children’s writing. The findings may extend the current knowledge of the effect teaching phonological
skills has in the development of children’s spelling, and which phonemic awareness skills are more critical. In SRA Spelling Mastery Level A, only phoneme segmentation was taught and practised. Both reading and spelling require phonological knowledge. Extending the research into the effects the SRA Spelling Mastery programme has on reading development would provide additional information of the efficacy and application of the skills taught to reading.
REFERENCES


Hood, H. (1999). Dancing with the pen ...or ... Line dancing with the curriculum. *The New Zealand Principal, 14,* 5-6.


APPENDIX A

MODELS OF SPELLING DEVELOPMENT

Traditional Model

The traditional model that is referred to in the literature is reviewed as two traditional models, the list traditional model and the phonemic traditional model. Brown (1990) describes the traditional model as a two-stage model, the child progresses from being unable to spell a word to being able to spell the word correctly. Children are not considered to move through different stages towards spelling competency, instead, when children spell the word correctly, children demonstrate competence. In contrast, when a child spells a word incorrectly, the child is at the pre-competence stage of spelling. Spelling errors represent different aspects of a single stage of spelling proficiency either pre-competency or competency. Brown’s (1990) definition encompasses both the list and phonemic traditional models.

Graham and Miller (1979) describe spelling not as a single skill but as a procedural task that includes recognition, discrimination, and recall to record the letters of words in the correct sequence. The act of spelling a word correctly is through rote visual memorisation. Treiman (1994) states that the child’s linguistic knowledge is not considered. When a child makes an error, the error is not analysed with regard to the child’s developing knowledge of orthography but in terms of visual memorisation. The error is classified as an addition, omission, substitution, or reversal, relative to the correct spelling of the word, e.g. tar spelled as tr is analysed as an omission of the letter a.

List traditional model. The list traditional model of spelling includes orthographic knowledge, but the knowledge is word specific. A whole word approach to learning words is used (Graham & Miller, 1979). Children learn the sequence of letters for each individual
word reproducing the serial as a whole (Treiman, 1994). A study-test model is used to teach lists of words (Graham & Miller, 1979). Children are presented with a list of words at the beginning of the week to memorise, and the list is then tested at the end of the week. The list usually consists of 10 to 20 words (Smith & Elley, 1997; Wilde, 1990). Practice activities may include putting the words into sentences or completing structured worksheets (Graham & Miller, 1979). All children receive the same list of words irrespective of the children’s ability to spell the words, the children’s reading ability (Treiman, 1993), or relevance of the words to the children’s writing (Nicholson, 2000). Many teachers used Schonell’s essential spelling list. Schonell’s list consisted of words used most often in children’s reading and writing, grouped according to the level of difficulty not according to frequency of use (Nicholson, 2000).

Smith and Elley (1997) report that the list traditional model of providing children with a set list of words at the beginning of the week to learn and tested at the end of the week continues to be used by teachers in New Zealand. An identified disadvantage of this teaching approach has been the lack of generalisation of words taught and words learnt out of the context of writing, into young children’s writing (Croft, 1987; Smith & Elley, 1997). Brown (1990) suggests that for the ease of administration, efficacy of teacher time, and parental expectation of spelling homework has perpetuated the use of the traditional list model in schools.

*Phonemic traditional model.* The phonemic traditional model teaches words using a phonemic approach. The phonemic approach involves teaching phoneme-grapheme correspondences, spelling patterns, and spelling generalisations for a range of words that then can be applied to new words (Graham & Miller, 1979). Wren (2001) describes phonics as an instructional approach that emphasises and teaches letter-sound relationships and spelling generalisations (rules) explicitly. Opponents of teaching spelling patterns and
spelling generalisations explicitly regard spelling as exhibiting some level of regularity, but there is a lack of consistency, in that most phonemes are spelled in different ways, graphemes have different spellings, and there are exceptions to spelling patterns and rules (Graham & Miller, 1979).

*Developmental Spelling Model*

*Read's research on spelling development.* Read (1971) observed a small number of preschool children beginning to write without formal instruction in spelling or reading. Read found the preschool children had an unconscious knowledge of phonology and were able to tacitly organise phonemic segments of words and invent spellings to correspond to the phoneme spoken. The major finding, Read reported was that the children produced similar invented spellings to represent words spoken that teachers described as implausible. Read suggested from this finding that invented spellings expressed the children’s implicit knowledge of phonology.

*Gentry's stages of spelling development.* Based on the description of one child’s developing written language skills (Bissex, 1980), Gentry (1981, 1982) identified five stages in the development of spelling competence. Each stage is conceptually different but represents the child’s developing understanding of English orthography (Gentry, 1982). The student moves through the developmental stages sequentially.

1. Pre-communicative stage, the child uses letters to represent words. However, numbers may be used also. By using letters, the child demonstrates an emerging knowledge of the alphabet. The child does not apply phoneme-grapheme correspondence. Words written appear to be a random sequence of letters.

2. Semi-phonetic stage, the child makes a partial approximation of phoneme-grapheme correspondences, e.g., *dump* spelled *dp*. Also evident at the semi-phonetic stage,
the child represents the syllable or word with a letter reflecting the letter name, e.g., the letter r represents the word, _are_, or the letter u represents the word _you_.

(3). Phonetic stage, the child uses phonological representations, i.e., phoneme-grapheme correspondences for the complete word. Graphemes are assigned solely using phonological knowledge, e.g., cat spelled as _cat_ or _kat_.

(4). Transitional stage, the child moves from relying solely on phonological representations to relying more on visual representations. The child applies different alternative graphemes, a single letter or letter combinations, to represent phonemes. Orthographic conventions are adhered to, e.g., vowels are used in every syllable, vowel digraphs (ee, ea), and silent letters are used, e.g., _type_ spelled as _tipe_. Another feature which is sometimes evident, all letters of the word may be written but not written in the correct sequence, e.g., _house_ spelled as _huose_. Bissex (1980) described this occurrence as ‘interference’. Bissex explained that this feature reflects the child using a visual strategy to spell the word. The child applies visual memory, but the memory is not integrated sufficiently for the child to recognise an incorrect spelling.

(5). Correct stage, the child’s spelling knowledge is firmly established. The child continues through experiences in writing to make finer discriminations, and the child’s pattern or type of spelling errors change qualitatively because of continued experience with print (Gentry, 1984).

Gentry (1982) qualifies the correct stage by stating, “Correct spelling, though easily identified, may exist at different levels” (p.197). Gentry states that correct spelling is usually viewed with regard to current instruction, that the child has spelled the words correctly, rather than reflecting the spelling development level of the child. Gentry expands this statement by explaining that instructionally, children of a particular Year level who are able
to spell words designated appropriate for that Year level would be described as a “correct speller.”

Children are able to spell some words correctly from the earliest stage, the pre-communicative stage, e.g., their names, and during all subsequent stages until the correct stage. Gentry (1982) suggests a child at the semi-phonetic stage of writing may write 0-50% of his / her words correctly. It is through the child’s errors that the child’s level of spelling development can be determined. Gentry refers to the correct stage as a developmental stage that reflects the child’s spelling words showing knowledge of English orthography and spelling generalisations.

Henderson and Templeton stages of spelling development. Henderson and Templeton (1986) also identified five developmental stages, stating that the development of spelling arise through exposure and continued involvement in reading and writing. Henderson and Templeton (1986) describe that the stages reflect the spelling system of English orthography consisting of the three hierarchical principles, (1) alphabetic (phoneme-grapheme correspondence), (2) within-word patterns, and (3) meaning (morphological knowledge).

(1). Stage I, the child writes letters, but the letters do not correspond to the phonemes in the word. The child understands the purpose of writing, how to write letters, and the names of letters but does not have the phonological knowledge to represent the phoneme as a grapheme (Henderson & Templeton, 1986).

(2). Stage II, the letter name stage, the child begins to associate the phoneme to the grapheme. Early in Stage II the name of the letter is primarily used to represent the phoneme and consonant grapheme. Vowel phonemes are represented although not spelled conventionally, e.g., *pet* is spelled as *pit*. Later in Stage II the short vowels are spelled
correctly, e.g., pet spelled as pet, however, the long vowels are not spelled correctly, being represented by a single letter only, e.g., train spelled as tran (Templeton, 1991).

(3). Stage III, the with-in-word stage, the consonants, and vowel phonemes are represented in letter sequences, two vowels to represent a phoneme, or silent letter, or patterns, e.g. boat. Invented spellings of boat reflect this, e.g., bote (Henderson & Templeton, 1986; Templeton, 1991).

(4). Stage IV, the syllable-junction stage, syllables are combined in words. Children learn that at the juncture where syllables are joined, there may be one letter, double letters, or deletion of letters, e.g., in the word make, the e is dropped before adding the suffix to write making, whereas for the word brag, the consonant is doubled when the suffix is added (Templeton, 1991). Children also demonstrate an awareness of the effect stress and accent have within single syllables.

(5). Stage V, the derivational-constancy stage, children recognise patterns of derivation and the spelling / meaning relationships in words, e.g., prefixes, suffixes, and word roots (Templeton, 1991). Children incorporate their morphemic knowledge within words when spelling (Henderson & Templeton, 1986).

Ehri’s stages of spelling development. (1). Stage zero, when the child as a pre-reader has learnt the letter names, the child is able to produce semi-phonetic invented spellings. The child uses letter name spellings and usually represents one or two phonemes with graphemes, e.g., giraffe spelled asjf.

(2). Stage one, the child’s spellings are more phonetically correct, and the graphemes chosen are more conventional, e.g., giraffe spelled as geraf. This level of spelling reflects the child’s understanding of phoneme-grapheme correspondence, phoneme segmentation, and decoding in reading.
(3). During the final stage, Stage two, the child has a better understanding of spelling patterns within words and becomes not as strictly tied to the phoneme-grapheme correspondence principle. The child uses both phonemic and morphemic patterns to spell. This is shown in the regular past tense spelling of ed regardless of the pronunciation of the past tense marker, e.g., stepped pronounced as /t/, jogged pronounced as /d/ or sprinted pronounced as /s/d/.

Ehri (1987) proposed that children store specific words in memory through direct spelling instruction and through reading. The child uses visual representations to recall the spellings. Through repeated exposure to text, readers build a lexicon of written words in memory. In turn, the spellings of these words are also stored, and the child retrieves the spellings when the child writes a word (Ehri, 1998).

_Treiman's research into spelling development._ Treiman’s (1994) analysis of the stage theories postulates that children’s spelling development progresses from applying phonological knowledge to representing words written, and at later stages children apply knowledge of orthographic patterns and morphology when spelling.

Treiman (1993) found that the writings of Grade One children showed that children applied knowledge that stage theories suggested was unavailable to the children as a beginning writer, e.g., Gentry (1982) would have classified the children’s spelling at the semi-phonetic stage, yet the children used orthographic conventions and combined phonology and letter names spelling. This is in contrast to Gentry’s description that it is not until the transitional stage that children regard orthographic constraints. Instead of a hierarchy of strategies, Treiman findings showed that children used multiple strategies and a range of knowledge types when spelling. Treiman suggested that children may predominately use one process or strategy during a particular stage but not to the exclusion of others.
Treiman (1993) showed that children used letter-name spellings. Treiman found letter-name spellings were more common for some letters, e.g., u and r, than for other letters. Treiman suggested the reason for this was the phonological properties of the letter-names, stating that some letter names are easier than others are to analyse into phonemes. The ability to match speech using letter-name spellings showed early phonological representations.

Treiman’s (1993) analysis of phonological representations showed children matched speech to writing that would be analysed as phonetically incorrect, because the phoneme-grapheme correspondences were represented in unconventional ways yet were plausible, accurately representing aspects of the phonemes in the word. Treiman explained applying these graphemes to the phonemes demonstrated the child’s fine sensitivity to phonemes spoken. The children were able to discriminate the phoneme from the other phonemes in a word and represent the phoneme with a grapheme. Henderson and Templeton (1986) concur with Treiman’s explanation stating that young children often note features no longer attended to by adults. Treiman rationale for the early spellings produced by children was that when writing the young child’s focus is at the phonemic level of encoding language. Demonstrating phonological knowledge in children’s invented spelling also demonstrates the child is able to attend to phonetic differences and to disregard what is similar. When developing phonological knowledge, Read (1971) highlights, “A child must learn to attend to certain phonetic differences and to abstract from others in a specific and systematic way” (p. 2).

Treiman and Bourassa (2000) proposed that when young children made sound-based errors, this demonstrated again that spelling largely is a process of symbolising the linguistic structure of words spoken and is not a process of memorisation of letter sequences. In addition, the child discriminated the phonetic difference and wrote it accordingly. This
illustrates Read's (1971) statement that in learning language the child needs to discern when to attend to a phonetic difference and when to ignore it.

**Dual Route Model**

Brown and Ellis (1994) suggest the dual-route model is conceptually similar to the developmental model. The dual-route model proposes that there are two cognitive processes or 'routes,' namely a phonological and a lexical route that may be accessed to spell words (Brown & Ellis, 1994; Barry, 1994). Barry (1994) suggests furthermore that each process may develop at different times.

When children or adults spell, they may use one, either the phonological, or the lexical process. Barry (1994) argues that the processes are separate yet do not need to operate independently.

When using the phonological route, the child spells using the phonological form of the word (Treiman, 1993). Barry (1994) calls the phonological route the assembled route. Spelling is constructed or assembled by analysing the phonemes in the word, by phonological segmentation and by applying knowledge of the alphabetic principle (phoneme to grapheme correspondence) to spell. The child assigns a single or combination of graphemes to represent the phoneme (Treiman, 1993). Integration of orthographic elements is used when more than one representation of a spelling is possible, e.g., the vowel /ei/ can be spelled with the letters a, and final e in the word *hate* or spelled with the letters ai in the word *train*. Applying this knowledge, the child is able to spell unknown regular words, i.e., words that consist of letters that correspond to the phonemes. Treiman describes errors applying the phonological process as a legal or a phonetic error.

Treiman states that the phonological route, as an explanation for one of the processes to spell is compatible with children having phonemic awareness skills. In order to access the phonological route, phonemic awareness skills are required.
The lexical route or word-specific route retrieves the spelling of words stored in memory (Barry, 1994). The lexical route is similar to the traditional model in that the word is spelled through rote memorisation of letter sequences (Treiman, 1993). When spelling a word, the word is accessed and retrieved from the memory store. Barry (1994) calls this the orthographic output lexicon. In addition to the lexicon store, there is a semantic store that can be accessed to retrieve known words. Ehri (1998) proposed that readers build a lexicon of written words in memory through repeated exposure to text, and the spellings of the words attach to syntactic, semantic, and phonological stores.

**Connectionist Model**

Brown and Ellis (1994) consider that the dual-route model and stage theories model have limitations. Brown and Ellis state that the dual-route model does not provide an explanation on how the transition to different spelling stages occurs, whereas the stage theories do not provide an explanation for the causal changes in the developmental stages. Brown and Ellis (1994) consider the connectionist model to propose a radically different view as to how spelling development occurs. The connectionist model recognises spelling involves both phonological and lexical spelling, however, it suggests that there is only one cognitive route to spell, but the orthographic and phonological units are linked by neural connections.

Brown and Loosemore (1994) call the connectionist model a neural network model of spelling. In English, many phonemes can be represented in written form by more than one spelling (Treiman, 1993). Because of this, the neural connections or links cannot be one to one. The links are from a phoneme to a grapheme, but the links must be one to many depending on the different variations of spellings for each phoneme (Brown & Loosemore, 1994).
APPENDIX B

PHONETIC REPRESENTATIONS

Spellings of the letters tr and dr.

Representing the affrication of the letters t and d in the initial position of words when preceding the letter r, e.g., in the words trap and drink demonstrates sensitivity to phonological segments, and the child focused on spelling at the phonemic level. Read (1971), Henderson and Templeton (1986), and Treiman (1993) document children spelling chr and gr in the initial consonant cluster instead of tr and dr respectively. Spelling trap as chrap and drink as grink were phonetically acceptable. The degree of frication change, when the phoneme /d/ and /t/ was articulated before the phoneme /r/ was similar to that of /ʃ/ and /ðʒ/ (Treiman, 1993). Henderson and Templeton’s (1986) analysis of the ch spelling was that the digraph ch was more correct phonetically than spelling t. Treiman found that substituting the letter t with the letters ch occurred more often when preceding the letter r than in other positions. The substitution did not occur, when the phoneme /t/ was in the initial position of the word and preceded a vowel, as in the word tap.

Spellings of letters sp, st, sc, sk.

Phonetic changes occurred when the /s/ phoneme preceded a stop consonant in the initial position of words. Treiman’s analysis (1993) found stop consonants following /s/ showed a tendency to be written in unconventional yet plausible ways. Stop phonemes, e.g., /pl, bl, tl, kl, gl, occur when the flow of air is obstructed first, and then the air is released resulting in a small burst of sound. Each voiced and voiceless stop pair obstructs the air at different places of articulation (Treiman, 1993). Voiced and voiceless stops are distinguished from each other, e.g., /k/ and /g/ in the words cot and got. The /k/ is voiceless,
and /g/ is voiced. In contrast, when the phonemes /k/ and /g/ follow the phoneme /s/, the velar stops (/k/ and /g/) are not distinguished. In written English, the phoneme /k/ is represented the same way following the letter s even though the phonetic properties are more similar to the voiced velar stop /g/ (Klatt; Lotz, Abramson, Gerstman, Ingemann, & Nemser; Reeds & Wang as cited in Treiman & Bourassa, 2000). The /s/ in /sk/ becomes unaspirated, and the phoneme /k/ that follows sounds similar to the voiced phoneme /g/ (Treiman, 1993). Treiman (1993) found children at times symbolised voiced stops following /s/, e.g., sky spelled as sgie.
APPENDIX C

SPELLING PROGRAMMES

*Spell Write-Revised*

Spell Write-Revised (Croft & Mapa, 1998) contains essential word lists of high
frequency words most often used in primary children’s writing. Croft (1983) recommends
that a child’s personal spelling list should be made up of five to fifteen words selected from
words misspelled in the child’s writing plus words from the essential word section of Spell-
Write Revised (Croft & Mapa, 1998). Words from the group words section (Croft & Mapa,
1998), and words from topics taught in other curriculum areas (e.g., science, social studies,
and language) can be selected to use for word study (Croft, 1983).

To learn spelling words, Croft (1983) developed a procedure that is used extensively
by New Zealand teachers, - copy, study, learn, and test. The sequence incorporates the
auditory, visual, and kinaesthetic modalities to learn the spelling of the words. The child
says the word, looks at the word, says the letters in the word, copies the word, and writes the
word without looking. At each stage of the procedure when the child writes the word
incorrectly, the child repeats the sequence. When the child completes the sequence
correctly, the child learns the next word.

*Direct Instruction Programme Design*

Direct Instruction design uses explicit step-by-step teaching to ensure the teacher’s
presentation is faultless, and the instructions given are both clear and unambiguous. Skills
are classified according to different knowledge forms. Teaching of each knowledge form
has a particular procedure and sequence. Each skill is taught sequentially with a range of
examples both positive and negative. There is adequate systematic practice and immediate
error correction for mastery of acquisition, fluency, and application. A cumulative review of
newly learned concepts ensures maintenance of the skills learned. Skills taught are teacher-directed, so the student learns the component skills necessary for more advanced composite skills. Teacher direction is gradually faded, replaced by independent student work (Gersten, Carnine, & Woodward, 1987; Kameenui & Simmons, 1990).

**Direct Instruction Spelling Programmes: SRA Corrective Spelling Through Morphographs (SRACSTM) and SRA Spelling Mastery.** SRA Spelling Mastery teaches sequentially the three categories of spelling knowledge phonemic, orthographic, and morphographic knowledge. These parallel the order of the developmental stages and categories of spelling knowledge proposed by Gentry (1982) and Henderson and Templeton (1986). Teaching children phoneme-grapheme correspondences to spell regular words allows children access phonological knowledge, whereas teaching high frequency irregular words as a whole word allows children to access visual memory and lexical knowledge. Teaching children to spell both regular and irregular words reflect the dual-route model of spelling (Barry 1994; Treiman, 1993). Teaching the phonemic awareness skill of phoneme segmentation during SRA Spelling Mastery Level A applies the phonological route of the dual-route model enabling a child to spell regular words (Barry 1994; Treiman, 1993).

SRACSTM applies the third spelling category, morphographic knowledge (Henderson & Templeton, 1986). Children are taught to spell a few morphographs, and then the children learn to combine the morphographs to spell new words and multisyllabic words. The spelling of morphographs is maintained visually for words with related meanings (e.g., nation, national, and nationality are derived from the same morphograph). Bissex (1980) asserts that morphographic knowledge provides children with a strategy to apply the meaning at the morpheme level to unknown words.

Simonsen and Gunter (2001) explain that teaching children to spell using different approaches incorporates the strengths of each spelling category (e.g., phonemic,
orthographic, and morphographic knowledge) while minimising each weakness. Dixon (1991) suggests that only phonemic generalisations (spelling patterns) that are highly reliable and that can be generalised to words not taught, and words that are useful for the child are taught. Hanna et al.’s (1971) findings showed the high regularity of particular spelling generalisations that were appropriate to teach children and therefore could be applied to new words. For some words, the morphological or a phonological approach is not sufficient to allow a person to generalise correct spelling performance to all the words, so that for these words, Dixon (1991) states that the whole word approach needs to be taught.
APPENDIX D
Daily Data Recording Sheet

<table>
<thead>
<tr>
<th>Child’s Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>TS</td>
</tr>
<tr>
<td>TDW</td>
</tr>
<tr>
<td>TDWNP</td>
</tr>
<tr>
<td>SA</td>
</tr>
<tr>
<td>PS</td>
</tr>
<tr>
<td>1 Syl</td>
</tr>
<tr>
<td>2 Syl</td>
</tr>
<tr>
<td>&gt; 2 Syl</td>
</tr>
<tr>
<td>SM word</td>
</tr>
<tr>
<td>Form</td>
</tr>
</tbody>
</table>

Note. TS = Total number of words written.
TDW = Total number of different written.
TDWNP = Total number of different words written without a prompt.
SA = Orthographic spelling accuracy.
PS = Phonetic spelling accuracy.
1 Syl = one syllable word.
2 Syl = 2 syllable word.
> 2 Syl = More than two syllable word.
SM word = SRA Spelling Mastery word taught written in story writing.
Form = genre of writing.
APPENDIX E

PREFERENCE RATING SCALE

No, I don’t like it  Okay  I like it  I like it a lot
## APPENDIX F

### QUALITY IN SPELLING IN WRITING

<table>
<thead>
<tr>
<th>Child's Name</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>Not yet</td>
</tr>
<tr>
<td>Engaged in writing</td>
<td></td>
</tr>
<tr>
<td>Sees spelling as a function of writing</td>
<td></td>
</tr>
<tr>
<td>Knows alphabet (letters)</td>
<td></td>
</tr>
<tr>
<td>Confident in alphabet ordering</td>
<td></td>
</tr>
<tr>
<td>Understands vocabulary of spelling</td>
<td></td>
</tr>
<tr>
<td>- letter</td>
<td></td>
</tr>
<tr>
<td>- word / syllable</td>
<td></td>
</tr>
<tr>
<td>- vowel / consonant</td>
<td></td>
</tr>
<tr>
<td>- base word / compound word</td>
<td></td>
</tr>
<tr>
<td>Inflections (ed, ing)</td>
<td></td>
</tr>
<tr>
<td>Singular / plural</td>
<td></td>
</tr>
<tr>
<td>Understands that spelling is phonetically regular</td>
<td></td>
</tr>
<tr>
<td>(regular and exceptions)</td>
<td></td>
</tr>
<tr>
<td>Uses invented spelling</td>
<td></td>
</tr>
<tr>
<td>(approximations)</td>
<td></td>
</tr>
<tr>
<td>Proof reads / edits effectively</td>
<td></td>
</tr>
<tr>
<td>Consults for standard spelling</td>
<td></td>
</tr>
<tr>
<td>Uses dictionary / references successfully</td>
<td></td>
</tr>
<tr>
<td>Asks questions about spelling</td>
<td></td>
</tr>
<tr>
<td>Successfully learns new words</td>
<td></td>
</tr>
<tr>
<td>Possesses positive attitude towards spelling</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Skills based on J. Harrison’s (1996) criteria.
### APPENDIX G

**CRITERIA FOR PROCEDURAL RELIABILITY**

Name

(Observer for Procedural Reliability)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Week</th>
<th>Week</th>
<th>Week</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRA Spelling Mastery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. lesson sequence was followed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. error correction procedure was followed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newsboard:</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. researcher was responsive to the children's interests, e.g., researcher gave positive feedback</td>
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<tr>
<td>2. message of writing was named, e.g., topic</td>
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</tr>
<tr>
<td>3. purpose / audience for the writing was given</td>
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<tr>
<td>4. form of writing was named, e.g., diary</td>
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<tr>
<td>5. time was given for the children to think about the story they would write</td>
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</tr>
<tr>
<td>6. the children shared with a buddy what they will write</td>
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<td></td>
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</tr>
<tr>
<td>7. newsboard could include one of the following: researcher modelling writing a story, writing words or a skill or new vocabulary, e.g., adjectives, synonyms.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Writing stage:**

<table>
<thead>
<tr>
<th></th>
<th>Week</th>
<th>Week</th>
<th>Week</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. twenty minutes opportunity to write</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. the children were told to put a line through a word when the child wanted to change the word (no rubber) and to say the word slowly and write down all the sounds the child heard, when unsure of the spelling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Week</td>
<td>Week</td>
<td>Week</td>
<td>Week</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>3. children assigned to SRA Spelling Mastery were instructed to use some of the words taught.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proofreading:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. children were instructed to put a line under the words they were not sure of and to check for punctuation, e.g., capital letters, full stops</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. children were instructed to check they had used interesting words and the story made sense</td>
<td></td>
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<td>3. children were instructed to check spelling using their dictionary, writing book or words around the room.</td>
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<td>After writing:</td>
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<tr>
<td>1. the researcher listened to at least four children read their story</td>
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<td>2. the children read to a buddy</td>
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<tr>
<td>3. on each child’s story the researcher marked some words, ticking correct phoneme-grapheme correspondences</td>
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<td>4. one word was selected as a spelling word and written for the child to copy, and the word was put into the child’s individual spelling notebook (each child at least four days per week)</td>
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<td>5. praise was given for, e.g., attempts at spelling, correcting words, semantic complexity, syntactical features, or for on-task behaviour.</td>
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<td>Five-minute conference:</td>
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<td>1. conference a maximum of two children</td>
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<td>2. the conference based on the child’s story could include, the researcher asking questions about the story providing positive feedback, teaching a skill, or reviewing a skill taught during the SRA Spelling Mastery lesson.</td>
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