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The Effects of Teaching Analogy-based Reading and Spelling Strategies to Children in Years Three and Four

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Abstract

The dominant approach to teaching reading and spelling in New Zealand schools is grounded in whole-language theory. This approach to literacy instruction disadvantages children with weak alphabet knowledge and phonological skills. Deficits in these crucial skills are the most commonly implicated causes of persistent reading difficulties. Left unremediated, problems with initial mastery of the essential skills underpinning reading and spelling are likely to result in long term difficulties. In fact, research indicates that interventions for children who are still struggling to attain fundamental reading skills in year five are more time-consuming, more expensive, and less likely to be successful than those implemented at an earlier stage.

The current study was a non-randomised, pretest-intervention-posttest design with one control group. The aim of the study was to implement and evaluate the effects of an analogy strategy-based intervention programme, based on the Benchmark Word Detectives Programme, which taught phonological skills and analogy strategies for reading and spelling. The intervention involved a group of year three and four children ($n = 15$) with reading and spelling difficulties. Children were assessed in a range of literacy related measures before and after the intervention programme. Lessons were 30-45 minutes in duration, four times a week, for eight weeks (a total of 32 lessons). The efficacy of the programme in accelerating children's progress in reading and spelling related skills, relative to a non-intervention control group, was evaluated.

The key findings from the present study were that an eight-week small-group intervention focusing on analogy strategies significantly improved children's letter-sound knowledge, phonemic awareness, decoding, and spelling skills compared to that of a control group. These findings suggest that a modified version of the Benchmark Word Detectives Programme can be effective in improving the skills of New Zealand children who struggle with reading and spelling.

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Chapter 1: Introduction

In order to learn to read and spell in an alphabetic system such as English, children need to understand how the system works (Blachman, 1997; Ehri, 1992; Juel & Minden-Cupp, 2000). Children must acquire phonemic awareness (an understanding that printed words represent sounds that can be segmented into smaller subunits), and a conscious recognition of the way that letters and sounds are connected (Blachman, 1997; Catts & Kamhi, 2005; Cunningham, 1990; Hatcher, Hulme, & Ellis, 1994; Ryder, Tunmer, & Greaney, 2007). Most children (approximately 75%) will acquire these crucial understandings independently through experience with books regardless of the type of instruction they receive (Tunmer & Chapman, 2002). These children are likely to come from backgrounds where they have the benefit of high levels of Literate Cultural Capital. Literate Cultural Capital (LCC) refers to the extent to which young children are 'immersed in language' which could include being read to at home, having access to many books and writing materials, modelling and encouragement from others, and rich verbal communication experiences (Ryder et al., 2007; Tunmer, Chapman, & Prochnow, 2006). Children who lack the advantage of high levels of LCC often struggle to acquire phonemic awareness and secure knowledge of letter-sound correspondences. This is mainly due to the predominant whole language approach to reading instruction that has been in use in primary school classrooms throughout New Zealand for the past four decades (Tunmer, & Greaney, 2007; Tunmer et al., 2006). Whole language theory is based on the assumption that learning to read is as natural as learning to speak (Smith & Elley, 1994, 1997; Tunmer & Nicholson, 2011). The focus of instruction is therefore on constructing meaning, with minimal attention given to word level skills. Consequently, New Zealand reading scores have fallen consistently since 1970 in comparison to other developed nations. In addition, up to 20% of 6-year-olds fail to make adequate reading progress in their first year at school (Tunmer & Nicholson, 2011).

Once children begin to fall behind in reading and spelling, it can become difficult for them to catch up with their peers, and in fact, they tend to fall further and further behind over time. This phenomenon, known as *Matthew effects* in reading, involves a rich-get-richer and poor-

get-poorer trend caused by differential experience and practice in reading (Stanovich; 1986). The difference in the volume of reading undertaken, and the consequent effects on vocabulary between good and poor readers is large and tends to increase with age (Conrad, 2008). Furthermore, without the ability to decode unknown words, struggling readers' opportunities to learn from text are diminished, thus they become entrenched at reading levels well below their capacity for comprehension (Stanovich, 1986). Prevention of negative Matthew effects is the most efficient solution, and this may be achieved by ensuring that all children receive high-quality early instruction in phonological awareness and alphabetic coding early in their school lives (Tunmer, Chapman, & Prochnow, 2003). Children who are struggling with reading and spelling in their third or fourth year at school are in danger of having on-going literacy difficulties throughout their adult lives (Torgesen, Al Otaiba, & Grek, 2005; Wren, 2000).

Rationale

Over time, more and more words become part of a child's sight vocabulary, which consists of words that are securely represented in memory so that their pronunciation and meaning can be instantly recalled during reading (Ehri, 1992). A large sight word vocabulary is the basis on which good readers and spellers depend. Words can only become sight words through repeated phonological recoding (Ehri, 2005a; Share, 2004). The process of phonological recoding involves mapping sounds onto letters, or groups of letters (Share, 2004). According to Share, Jorm, McLean, and Matthews (1984), phonological recoding skills enable children to decode unknown words by themselves, providing a method of self-teaching, and also serving to consolidate visual-phonological pathways in memory for the new words. Once these pathways are established, children become able to retrieve the pronunciations of words automatically without recoding (Ehri, 1992). Children reading at this level are said to have achieved automaticity, or the ability to retrieve pronunciations and meanings of words immediately upon seeing them.

Impairments in phonological awareness are the most commonly implicated causes of persistent reading difficulties (Conrad & Levy, 2011; Hoover & Tunmer, 1993; Tunmer & Chapman, 2002). In addition, early phonological skills are highly predictive of later reading

ability (Conrad & Levy, 2011). Wren (2000) notes that if children have reading and spelling difficulties in year four, they are likely to continue to struggle as they grow older. However, with appropriate instructional conditions it is possible to significantly improve the development of children's phonological decoding skills (Torgesen & Davis, 1996). Recent research on reading and spelling development has led to an elaboration of instructional programmes that focus on supporting children's progress through successive developmental levels of reading and spelling acquisition (White, 2005). An example of such an instructional approach is *analogy instruction*. The basis of analogy instruction is that children develop a system of recognition of shared patterns within words (Goswami, 1998b). For example, knowledge of the word *name* may be used to decode the word *came*. In addition the spelling pattern *-ame* can be applied to a number of other words (e.g. *flame*, *blame*, *same*, *tame*). Analogy-based word learning is theoretically well supported (White, 2005).

The Present Study

The aim of the present study was to implement and evaluate an analogy strategy-based intervention programme that taught phonological skills and analogy strategies for reading and spelling. The intervention involved a group of year three and four children with reading and spelling difficulties. Lessons were 30-45 minutes in duration, four times a week, for eight weeks (See Appendix A for an example of a weekly plan). The efficacy of the programme in accelerating children's progress in reading and spelling related skills, relative to a non-intervention control group, was then evaluated.

The hypotheses of the present study were that explicit training in analogy strategies based would lead to improved letter-sound knowledge and phonemic awareness, gains in decoding and spelling words, and that any new reading and spelling skills learnt would be generalised to novel words. The present study contributes to the theoretical base of analogy strategy research by investigating whether a brief intervention programme has positive effects on the achievement of children in years three and four who are struggling with reading and spelling.

Overview

This thesis is comprised of five chapters. The second chapter contains a review of literature in which cognitive developmental theories of reading and spelling are discussed, as are the main causes of literacy difficulties. The importance of phonological skills and instructional methods are addressed in addition to a description of the roles of rhymes, rimes, and analogies in reading and spelling. Relevant research is discussed and the way children learn to read in New Zealand is addressed. Chapter two concludes with a summary of the present study and its aims and hypotheses. Chapter three described the research design and the methodology used in the study. Chapter four presents the results and chapter five consists of a discussion of the findings in relation to the literature and a consideration of the theoretical and practical implications of the study.

Chapter 2. Literature Review

Introduction

There is a large body of research focusing on how children acquire literacy skills. Cognitive developmental phase theories of reading and spelling provide a model based on progressive development through a number of distinct but overlapping phases of development (Ehri, 2005a). Children who struggle with reading and spelling are likely to have deficits in phonological awareness (Juel & Minden-Cupp, 2000; Nicholson, 2004; Tunmer & Nicholson, 2011). Phonological awareness skills include the understanding of and ability to detect and generate rhyming words, count syllables and segment and blend phonemes. Phonemic awareness is a specific aspect of the broader term of phonological awareness relating to the understanding that words can be divided into subunits smaller than syllables, and the ability to manipulate sounds, that are represented in print, to form words (Blachman, 1997; Cunningham, 1990; Hatcher et al., 1994; Ryder et al., 2007). Letter knowledge and phonemic awareness are closely connected to reading ability (Catts & Kamhi, 2005; Ehri, 1992; Share et al., 1984; Torgesen, Wagner, and Rashotte, 1997). Children with literacy difficulties often have great difficulty attaining phonemic awareness resulting in significant problems acquiring the alphabetic principle and phonological skills (Gough & Tunmer, 1986; Juel & Minden-Cupp, 2000; Lovett, Barron, & Benson, 2003; Shaywitz, 2003; Vellutino, Fletcher, Snowling, & Scanlon, 2004).

Research on effective interventions for struggling readers in their third and fourth years at school indicate that analogy strategy instruction may be effective in improving phonological awareness and literacy skills. Struggling readers must not only be explicitly taught letter-sound relationships and patterns, but also when and how to apply this knowledge when decoding words in connected text (Tunmer & Nicholson, 2011). Modelling and guided practice are key approaches when teaching these crucial skills. Analogy strategy instruction provides a reliable and efficient method of increasing the number of sight words in memory (Ehri, 1992). Once a quality representation of a key word has been formed in memory, it may be used to decode a number of other words that contain the same or similar spelling patterns (Ehri, 1992; Gaskins, 2004).

This chapter begins with a discussion of theories of reading and spelling acquisition. Cognitive developmental theories are based upon phase models, which describe development of skills from the pre-literate phase through to competency. The two major categories of causation (intrinsic and extrinsic causes) implicated in literacy difficulties are then briefly examined. The next section of this chapter describes the fundamental skills, knowledge and instruction that are important for the development of reading and spelling abilities (e.g. phonological awareness, explicit word level instruction, and rhyme and analogy skills). A discussion of relevant research is undertaken, followed by a description of how literacy is taught in New Zealand schools. The Benchmark Word Detectives Programme is outlined, and the current study and its aims and hypotheses are summarised.

Theories of reading and spelling

Developmental theories of reading and spelling follow a progression from pre-literate, through semi-phonemic and phonemic to the full alphabetic (reading) or correct (spelling) phases. Specific characteristics of reading and spelling difficulties, and the type of instructional activities that are most helpful, varies depending on developmental phase (Juel & Minden-Cupp, 2000)

Reading

Young children generally begin learning to read words by making associations between prominent visual features of the word and its meaning (Bowman & Treiman, 2008). In their 2008 study, Bowman and Treiman found that children who could read up to one word from a list of straightforward words (e.g. look, stop, in) were better at recognising words with distinctive visual features in a logographic manner, phonetically unrelated to pronunciation. Children who could read several simple words were better at learning words with phonetic cues. Bowman and Treiman (2008) concluded that young pre-readers who are familiar with letters are able to make use of a limited amount of phonological knowledge, particularly when words have a letter name clue at the beginning (e.g. AP for ape). Preferential attention to the beginnings of words demonstrates that pre-readers understand that English is written left-to-right (Bowman & Treiman, 2008). There is considerable evidence for phase

models of reading acquisition (Farrington-Flint, Coyne, Stiller, & Heath, 2008). Children have been found to use different strategies at succeeding stages of literacy development, with variable efficiency, depending on the problem to be solved (Farrington-Flint et al., 2008). Relying only on phonological sounding out on a letter-by-letter basis is not always a successful way to read words, and children move past this stage and begin using retrieval strategies as their sight word vocabulary increases in size (Farrington-Flint et al., 2008). According to Gough & Tunmer's (1986) Simple View of Reading model, the reader must be able to decode words and possess a sufficient level of language (or listening) comprehension in order to gain meaning from what is being read. Thus, the act of reading is comprised of two elements; decoding and listening comprehension. Values of each variable can range from 0 (nullity) to 1(perfection), and reading (R) is equivalent to the product of decoding (D) and comprehension (C), demonstrated by the equation $R = D \times C$. Children with reading difficulties have differing profiles of strengths and weaknesses in the two variables (Catts, Hogan, & Adlof, 2005). In the early stages of reading acquisition, decoding skill accounts for a larger proportion of the variance in reading comprehension than listening comprehension does. This balance gradually shifts as children become more proficient readers until listening comprehension accounts for the vast majority of the variance in reading comprehension ability (Hoover & Tunmer, 1993; Vellutino et al., 2004). Similarly, Catts et al. (2005) note that decoding problems are more prominent in the earlier stages of reading acquisition, and listening comprehension difficulties are implicated more often in older children with reading difficulties. These results demonstrate the basic dissociation between decoding and listening comprehension and a developmental course of reading acquisition.

According to Ehri (1995, 1998), there are at least four ways to read words, contextual guessing, letter-sound decoding, analogy, and sight. Contextual guessing consists of making use of context or meaning based cues in the text or pictures to predict the word. Letter-sound decoding involves phonologically sounding out letters and blending the sounds to form the word. Reading words by analogy consists of recalling information about sight words and applying it to unknown words (e.g. using knowledge of the word night to read the word flight). Sight word reading involves retrieving lexical information about the words from memory. Fluent readers are primarily sight word readers. Unfamiliar words that have not been stored in memory, and therefore are not sight words, are read by decoding,

analogy, or contextual guessing. Ehri (1992; 1995; 2005a) proposed a cognitive developmental model of reading acquisition containing three distinct, but overlapping, phases.

Logographic phase (visual cue reading or pre-alphabetic)

In this phase children read words by attending to visual features of the word or its surroundings that are unrelated to pronunciation but are arbitrarily related to meaning. For example, recognising the word 'Coke' on the familiar red and white label and the golden arches of McDonalds, or remembering that the word yellow has two tall sticks in the middle of it (Ehri, 1992). Ehri (2005a) notes that children at this stage link print to meaning but not letters to sounds. In addition, Ehri (2005a) found that children in the pre-alphabetic stage failed to notice changes in the letters of environmental print such as the McDonalds logo; this is because the children were not using the letters themselves to identify the word. When a pair of words shares a similar structure and/or shape, logographic readers tend to confuse them for one another, as the visual cues they are using are the same for both words. Children in the logographic phase may also substitute synonyms because their visual cues are related to meanings and not pronunciations (Ehri, 1992). Analyses of the different types of reading and spelling mistakes made by visual cue and cipher reader have indicated a basic discontinuity in the way word recognition skills develop from the initial stage to the next (Tunmer & Nicholson, 2011).

Phonetic cue phase (partial alphabetic)

Readers at the phonetic cue phase have enough letter knowledge to facilitate a fundamental level of phonemic awareness. This enables them to attend to some of the sounds in words based on spellings thereby forming partial connections in memory (Ehri, 1992; 1995; 1998; 2005a). Children at this phase attend predominantly to boundary letters and therefore tend to confuse words with common initial and/or final consonants, although they are able to accurately read some words out of context (Ehri, 2005a). During this phase of reading, systematic connections are formed between spelling and pronunciation rather

than meaning. Letters are more reliably connected with a specific word rather than a meaning that could be communicated by a number of other words (Ehri, 1992).

Full alphabetic phase

Cipher readers have acquired decoding skills and grapho-phonemic knowledge enabling them to form connections in memory between all the letters in words and their pronunciations and to decode unknown words (Ehri, 1995; 2005a). The development of phonemic skills facilitates rapid growth of an increasingly reliable and accurate sight-word vocabulary (Ehri, 2005a). During the full alphabetic phase reading continues to develop and the predominant connections in memory for sight words become morphographic (letter sequences are rapidly recognised as a single unit) (Conrad, 2008). At this point readers attain automaticity, where the pronunciation and meaning of printed words are instantly accessed with minimal effort on decoding (Ehri, 2005a).

A similar cognitive-developmental model of word reading has been proposed by Spear-Swerling and Sternberg (1996) with the addition of another phase between the phonetic cue and mature alphabetic phases described by Ehri (2005a). This additional phase is controlled word recognition, where words are recognised accurately but slowly and laboriously (Spear-Swerling & Sternberg, 1996). This type of careful and deliberate phoneme by phoneme decoding negatively affects comprehension, as the mental effort expended in identifying the word leaves little over for comprehending the meaning of the text (Perfetti, 1985).

According to Ehri (2005a), the duration of reading developmental phases is influenced by the type of instruction children are exposed to. Phonics based methods have been found to reduce the amount of time children spend becoming fully-alphabetic readers. Children taught using whole-language or meaning oriented methods are more likely to use context, visual, and partial letter cues when attempting unknown words. This is in contrast to children instructed in code-emphasis methods, who are more likely to produce non-words in response to unfamiliar words (Ehri, 2005a). Children must move through logographic reading to phonetic cue to the cipher or full alphabetic phase if reading acquisition is to

progress normally; a process which does not necessarily develop naturally (Tunmer & Nicholson, 2011). Ehri, Satlow, and Gaskins (2009) assert that the development of reading skill develops optimally when instruction begins with individual letter-sound correspondences, which are consolidated through subsequent instruction in larger chunks or strings of letters. Goswami (1998a) describes reading acquisition as a process where phonological and orthographic knowledge increasingly interact over time. Gough, Ehri, and Treiman (1992) explain that rhyming words share a common sound, and words that rhyme and have a common spelling pattern, form an orthographic category. Knowledge of the alphabetic principle (the explicit understanding of the correspondence between letters and their sounds or phonological forms) and phonological recoding skills (the ability to decode letters and letter clusters into spoken form) are the bases for acquiring word specific knowledge to decode unknown words, and for the construction of detailed orthographic representations that are needed for word recognition to become automatic (Share, 2004; Tunmer & Nicholson, 2011). Achieving automaticity of word recognition, or the ability to sight read, is crucial because cognitive resources that were previously being devoted to laboriously decoding words can be redeployed into comprehension of the text (Tunmer & Nicholson, 2011).

Spelling

Research indicates that spelling abilities emerge progressively and are linked to children's development in much the same way as reading abilities (Brown, Sinatra, & Wagstaff, 1996). In fact, reading words and spelling them are dependent on the same fundamental information about orthography and phonology (knowledge of spelling patterns and links between written spoken forms of words) (Brown et al, 1996; Ehri, 1992, 1998, 2000). Children's early spelling attempts are closely linked to their progress in learning to read (Ouellette & Sénéchal, 2008a). According to Adams (1990) reading and spelling are "directly and causally linked" (p. 392). Similarly, Cunningham and Cunningham (1992) noted that decoding and spelling are "mirror-like processes" (p. 106). Furthermore, Cunningham and Cunningham also note that evidence indicates a close connection between measures of spelling ability and children's reading accuracy. They report that the ability to spell a word by year three is a near perfect predictor of ability to read the word.

Spelling development is thought to follow a phase model that is somewhat analogous to phase models of reading acquisition (Ouellette & Sénéchal, 2008a). Phases of spelling development can be revealed by children’s misspellings (Henderson & Templeton, 1986; Brown et al., 1996). Research has explicated a general progression children’s spelling development, summarised in Figure 1 (Brown et al., 1996; Ehri, 2000; Henderson & Templeton, 1986).

Stage	Definition	Example
1 Preliterate, or pre-phonemic.	Where the student uses letters but they are strung together in a random way. The letters have no clear relationship to sounds.	SDLNVSLKRXIG (I am going to the shop)
2 Semi-phonemic.	Where the student can represent some of the sounds in words. The letters bear some relationships to sounds but they are incomplete.	I got a bra (I got a brother)
3 Phonemic or letter-name.	Generated spelling where the student spells words strictly according to their sounds. There are letters to represent most phonemes.	I lik scool (I like school)
4 Transitional	Where the generated spellings also show signs of conventional spellings. Reliable letter patterns are present that correspond to sounds. May contain errors at syllable boundaries (syllable juncture) or in representation of Latin and Greek roots (derivational constancy).	Spells CAKE as CAEK
5 Correct	Where the student spells correctly	Spells CAKE correctly as CAKE

Figure 1. The phase theory of spelling development. Adapted from “Learning to read and learning to spell: Two sides of a coin,” by L. C. Ehri, 2000, *Topics in Language Disorders*, 20, 19-36.

Spelling development is a creative, interactive developmental process involving both phonological and orthographic components, both of which are present from the early stages of learning to spell (Lennox & Seigel, 1998; Treiman, 1998). In addition, a number of skills are employed in spelling including; grammatical, semantic, phonological, analogical, and orthographic skills (Lennox & Seigel, 1998; Snowling, 2000). To spell a word, children must

form an orthographic (written or printed) representation of the word from the phonological (spoken) form (Nation, 1997). Children do not learn to spell by memorising sequences of letters. Rather, they create or invent spellings for words using their current knowledge of language and print; based on the developmental stage they have attained (Treiman, 1998). In phases 2 and 3 children begin to generate their own invented spellings for unknown words. Phonological, or invented, spelling may be attempted by children regardless of their reading ability (Ouellette & Sénéchal, 2008a). Invented spelling progresses through increasingly sophisticated developmental phases that reflect children's increasing knowledge of letter-sound correspondences (Ouellette & Sénéchal, 2008a). Invented spelling activities and practice lead to improvement in the skills and knowledge (e.g. phonological and orthographic awareness, and insight into the alphabetic principle) that are required in order to learn to read, although it may not transfer automatically to improved word reading for young children (Sénéchal, Ouellette, Pagan, & Lever, 2012).

Causes of literacy difficulties

There are two major categories of causes implicated in literacy difficulties. Extrinsic, or experiential, causes are those that are located in a child's environment and may include lack of instruction, poor quality instruction, and/or a home environment lacking in LCC (Catts & Kamhi, 2005; Tunmer & Nicholson, 2011; Vellutino et al., 2004). The other main category of causation implicated in literacy difficulties are intrinsic or internal causes. These may include genetic causes, neurological causes, or language based deficits such as problems with vocabulary, phonological awareness or retrieval.

Vellutino et al. (2004) found that around two thirds of a group of children with reading difficulties were easily remediated with high quality phonics based intervention programmes, implicating experiential or extrinsic causes for their reading problems. The remaining one-third of the children did not respond to these intervention programmes and so were thought to have organic or intrinsic causes for their reading difficulties (Vellutino et al., 2004; Vellutino, Scanlon, & Sipay, 1997). Vellutino et al (2004) therefore assert that the majority of reading difficulties are caused by extrinsic factors such as experiential or instructional deficits. Conversely, impairments in phonological awareness are the most

commonly implicated causes of persistent reading difficulties (Hoover & Tunmer, 1993; Tunmer & Chapman, 2007).

The importance of phonemic awareness

Phonemic awareness is the ability to understand that words can be divided into subunits smaller than syllables, including beginning, middle, and end sounds; and the ability to reflect upon and manipulate these speech segments when represented by letters, to form words (Blachman, 1997; Catts & Kamhi, 2005; Cunningham, 1990; Hatcher et al., 1994; Ryder, et al., 2007). In other words, a reader must be able to segment words into their constituent sounds and make connections between those sounds and letters (or groups of letters) (Blachman, 1997). Along with letter knowledge, no other variable is as reliably related to reading ability (Catts & Kamhi, 2005; Ehri, 1992; Share et al., 1984; Torgesen et al., 1997). Phonemic awareness is a specific aspect of the broader term, *phonological awareness*, which refers to understanding of, and ability to manipulate, the various levels of sound units such as words, syllables, onset-rime units and phonemes (Catts & Kamhi, 2005). Onset-rime is an intermediate sub-syllabic level between phonemes and syllables (Share & Blum, 2005). A syllable can be subdivided into the onset and rime. Onsets are optional in words, whereas rimes are mandatory (Goswami, 1998a). For example, the words *eat* and *ice* are rimes without onsets. The onset is the initial consonant(s) preceding the vowel, and the rime is the vowel and any consonants that follow it (e.g. *r-ain*, *sh-op*) (Adams, 1990; White, 2005). However, onset-rime awareness and phonemic awareness are not completely distinct – some words have single phoneme onsets (e.g. *c-at*, *s-eat*) and some have single phoneme rimes (e.g. *z-oo*, *tr-ee*) (Goswami, 1998a). Phonological awareness, and in particular, phonemic awareness, play a critical role in reading ability (Torgesen et al., 1997). Possession of phonemic awareness is described by Byrne, Fielding-Barnsley, Ashley, & Larsen (1997) as a necessary but not sufficient prerequisite to reading.

Furthermore, Catts and Kamhi (2005) explain that children with good phonemic awareness are often able to acquire the alphabetic principle more quickly and easily. To grasp the alphabetic principle is to attain a clear understanding of the relationship between letters and phonological segments or sounds (Tunmer & Nicholson, 2011). If children fail to attain

the alphabetic principle, it is likely they will remain functionally illiterate in the long-term (Blachman, 1997; Ehri, 1992; Spear-Swerling & Sternberg, 1996). Problems with this initial mastery can lead to on-going reading difficulties (Torgesen et al., 2005). If children are still struggling to attain fundamental reading skills when they are in year five, not only is intervention more time-consuming and costly, it is much less likely to be successful (Wren, 2000).

There are three key ways in which phonemic awareness is crucial to the development of reading ability. Firstly, it allows children to become aware of the alphabetic principle. Second, it is crucial for children to recognise sound-spelling correspondences in order to develop sight word recognition. Third, it allows children to categorise words based on beginning, middle, or end sounds and therefore to more accurately guess unknown words in context based on one or more of these features (Catts & Kamhi, 2005; Torgesen et al., 2005). Phonemically decoding each word is a slow and effortful way of reading, however, the development of this skill, through increasing phonemic awareness, supports the growth of a sight vocabulary, which is crucial for fluent, efficient, reading (Catts & Kamhi, 2005; Torgesen et al., 2005). Poor phonemic awareness skills and failure to grasp the alphabetic principle lead to reading problems that are likely to be exacerbated by negative Matthew effects. Children who demonstrate awareness of the alphabetic principle and make use of letter-sound relationships in their reading attempts ultimately become better readers regardless of the specific instructional approach they are exposed to in the classroom (Tunmer & Nicholson, 2011).

Phonemic awareness is considered to be more crucial in early spelling development than in that of early reading, indicating that children may make analogies based on phoneme-grapheme correspondences in spelling before they use them in reading (Nation & Hulme, 1998). In other words, spelling by analogy is more closely related to phonemic-level phonological awareness than rime-level phonological awareness (Nation & Hulme, 1998). It has been found that young children's use of analogy in reading is related to their awareness of rhyme and their analogy use in spelling is related to phonemic awareness (Nation & Hulme, 1998). Consequently, when spelling words, children may be able to make analogies

between words that share rime units, and in addition, words that share as little as a single letter sound correspondence.

Byrne et al. (1997) explain that the vast majority of children will not achieve phonemic awareness from their initial encounters with written language. Children with reading difficulties often have great difficulty differentiating the individual speech sounds in words, and with segmenting and blending these sounds. This results in significant problems acquiring the alphabetic principle and phonological skills (Gough & Tunmer, 1986; Juel & Minden-Cupp, 2000; Lovett et al., 2003; Shaywitz, 2003; Vellutino et al., 2004). This is because the 40 phonemes in the English language are abstract concepts that are particularly difficult to perceive in speech, and must therefore be constructed from it (Juel & Minden-Cupp, 2000; Nicholson, 2004; Tunmer & Nicholson, 2011).

Conventional phonics instruction helps children make links between printed and spoken words, and in turn promotes phonemic awareness (conscious recognition of the small units of sound or phonemes that comprise words) (Juel & Minden-Cupp, 2000). However, according to Gough (1996) traditional phonics programmes do not emphasise the development of phonemic awareness enough. Invented spelling activities promote phonemic awareness and letter-sound knowledge in a similar manner to phonics programmes (Juel & Minden-Cupp, 2000). It seems that the actual activities undertaken are less important than the opportunity provided by generated spelling activities to induce awareness of the separate speech units in spoken words. This awareness allows children to induce further spelling-sound correspondences on their own (Juel & Minden-Cupp, 2000).

The Role of Explicit Word-Level Instruction

Struggling readers must not only be explicitly taught letter-sound relationships and patterns, but also when and how to apply this knowledge when decoding words in connected text (Tunmer & Nicholson, 2011). Modelling and guided practice are key approaches when teaching these crucial skills. The development of a “set for diversity” (Gaskins, Gaskins, Anderson, & Schommer, 1995; Tunmer & Nicholson, 2011; p 419) gives children the ability to read irregular (e.g. said, people) or polyphonic spellings (e.g. read, live) by enabling them

to correctly match a word they are reading to one that occurs in their listening vocabulary and fits the context of the sentence. Sometimes phonemically decoding a word does not immediately lead to its correct pronunciation (e.g. 'stomach' pronounced as 'stow-match', or 'glove' pronounced as 'clove'). Children need to learn to use phonological representations as a starting point in word identification and then, if necessary, make changes to the pronunciation until a word is reached that is part of their listening vocabulary and makes sense contextually (Tunmer & Chapman, 2012).

There are too many letter-sound relationships for all of them to be taught directly (Ehri, 2005a; Gough & Hillinger, 1980; Greaney, 2011; Juel & Minden-Cupp; Tunmer & Nicholson, 2011). Children learning to read are rapidly inundated with unfamiliar, and increasingly complex, printed words, referred to by Juel and Minden-Cupp (2000) as an "orthographic avalanche". Of these words, very few are directly taught at school.

The fact that there are too many correspondences for each to be taught individually is the reason children must be taught effective strategies that enable them to identify unfamiliar words independently (Greaney, 2011; Tunmer & Nicholson, 2011). Share's self-teaching hypothesis (1999; 2004) states that every time a word is decoded successfully is an opportunity for the word to become part of a child's sight word vocabulary. The detailed, word specific, orthographic knowledge that is required to decode the word is the basis for acquiring efficient sight word recognition (Juel & Minden-Cupp 2000; Share, 2004). Share (1999) notes that relatively few correct trials are required to gain a full orthographic representation of a word in memory. This is how phonological recoding facilitates self-teaching by providing a way for children to develop their sight word knowledge independently.

Visual/grapho-phonics cues are the most strategically valuable and reliable cues for identifying words (Greaney, 2011). Self-teaching can only be achieved if children possess the prerequisite knowledge of the alphabetic principle, sufficient phonological skills and strategies for decoding words (Ehri, 1992; Juel & Minden-Cupp, 2000; Share, 2004). Explicit phonics instruction is particularly beneficial in helping children discover the alphabetic principle (Snow & Juel, 2005; Tunmer & Nicholson, 2011). Once children have grasped the alphabetic principle, they are able to begin inducing orthographic representations of words

on their own and therefore begin to take advantage of positive Matthew effects on their reading achievement (Share, 2004; Thompson, Fletcher-Flinn, & Cottrell, 1999). In this way, word recognition starts as a highly environment dependent process and becomes more learner dependent over time.

While phonemically decoding each word is not ultimately the most efficient way to read, it is an important first step that must be mastered before a large vocabulary of sight words is retained, and enables reading to become fluent (Share, 2004; Torgesen et al., 2005). Direct instruction can only practically teach a portion of the letter-sound correspondences and phonics rules that are needed to decode words effectively (Juel & Minden-Cupp, 2000). In order to retain sight words as complete orthographic representations, knowledge of letter-sound correspondences and spelling patterns must first be utilised in decoding the words (Ehri, 2005b; Share, 1999, 2004; Tunmer & Nicholson, 2011). This process allows the reader to form sublexical, visuophonological links between printed and spoken words in lexical memory, which is the basis for acquiring automatic or sight word knowledge (Ehri, 1993, 1998; Tunmer & Chapman, 2012).

Onset-rime units, Rhymes, and Analogies

In the English language rimes are naturally simpler, more psychologically accessible, linguistic units than phonemes or syllables. Consequently, awareness of onset-rime units develops earlier than awareness of phonemes or syllables (Ehri & Robbins, 1992; Goswami, 1998b; Treiman, Mullennix, Richmond-Welty, & Bijeljac-Babic 1995). Nonetheless, acquiring awareness of onsets and rimes is a useful first step towards phonemic awareness of other units of sound (Iversen & Tunmer, 1993). Onset-rime awareness and phonemic awareness are specific aspects of the broader category of knowledge known as phonological awareness. Children with reading difficulties and associated underlying poor phonological skills do not tend to spontaneously use rime analogies even when they have securely learnt the spelling patterns of analogous words to the ones they are attempting to decode (Goswami, 1998a). However, these children can begin using analogies provided they have access to programmes that include both phonological instruction and analogy training.

In languages where relationships between spelling and sound are highly predictable and transparent such as Spanish and German, any word can be decoded once the relevant grapheme-phoneme correspondences have been learnt (Goswami, 1998a). English is less predictable and transparent. However, rime-based coding enables children to make analogies between known words and new words and moderates the level of ambiguity that is typical of written English (Goswami, 1998a; Goswami & Bryant, 1992; Treiman et al., 1995). Wylie and Durrell (1970) list 37 rimes (e.g. at, ack, ap, ash, eat, op, ing) that appear in over 500 common primary school level words).

Rhyme awareness precedes phoneme awareness, and is therefore closely linked to reading development (Bryant, MacLean, Bradley, & Crossland, 1990). In addition, there is a perfect correspondence between rhyme and rime (Adams, 1990; Goswami & Mead, 1992; Goswami, 1998b; Treiman et al., 1995). Onset-rime segmentation (e.g. l-ake, br-ake, s-eat, m-eat) is naturally intuitive to most children and adults as there is less orthographic redundancy between onset and rime than elsewhere in written English (Adams, 1990; Goswami, 1998b; Treiman et al., 1995). This makes onset-rime parsing more natural, and in fact, children may implicitly learn about orthographic rime units from print exposure alone (Treiman et al., 1995). According to Goswami and Bryant (1992), the ability to discriminate onsets and rimes in words is an important factor in explaining the connection between rhyme and reading. Rhyme detection is a strong predictor of later analogy use in children (Ehri & Robbins, 1992). As awareness of rhyme develops early in childhood, and onset-rime units are relatively accessible, they are deduced developmentally earlier than other subunits of language (Goswami & Mead, 1992).

Knowledge of onsets and rimes also directs children's attention to common spelling sequences, which may translate to improved reading and spelling development (Goswami & Bryant, 1992; Goswami & Mead, 1992; Roberts & McDougall, 2003). Knowledge of rimes facilitates the spelling of unknown words in that analogous words can be recalled, and spelling patterns (or chunks of words that are known) can be used to generate a spelling (Brown et al., 1996). Ehri and Robbins (1992) note that in order for children to read unknown words by noticing and pronouncing known chunks, or spelling patterns, they must also have attained phonological awareness. When a rime is learnt (e.g. /at/), children can

use this knowledge to read an unknown word containing the /at/ rime (Ehri & Robbins, 1992). The pronunciation of vowels is more predictable when they are analysed at the level of rime unit, e.g. the vowel in rime units /at/, /ad/, /ay/, and /ate/ is much more predictable than /a/ on its own (Ehri & Robbins, 1992; Adams, 1990; Treiman et al., 1995).

Evidence on the use of orthographic analogies supports their functional importance in the early stages of learning to read, particularly in English (Goswami, 1998a). The use of orthographic analogy allows a prediction about pronunciation to be made based on common elements of spelling (Goswami, 1998a). Analogies that are also rime units have been found to be more useful than those that cross over the onset-rime boundary. For example, it is easier for a beginning reader to apply their knowledge of the word 'beak' to read 'peak' than it is to use 'bean' to read 'beak' (Goswami, 1998b). Familiarity with both rhyming words and orthographic categories is important in the use of analogy strategies for the decoding of regular and irregular words. Furthermore, children's rhyming ability is indicative of their awareness of the boundaries between onset and rime in words (Muter, 1998). Common spelling patterns and rhymes/rimes map naturally onto phonological categories that children already possess (Gough et al., 1992).

Research by Ehri and Robbins (1992), Goswami (1991; 1998b), and Roberts and McDougall (2003) indicate that children at very early stages of learning to read can use analogies to some extent, although their use tends to be task-dependent. However, Ehri (1998) concludes that children must possess phonological recoding skills in order to fully and efficiently utilise an analogy method, as it is necessary to retain a full representation of the rime unit and its pronunciation in memory in order to apply the known information to the unknown word. Children without sufficient knowledge of rimes are likely to use less reliable and efficient strategies (e.g. sentence context, picture cues) to read unfamiliar words (Brown et al., 1996). Once rimes are consolidated in memory, a process eased by the greater psychological accessibility of the onset-rime unit over other phonological forms to young readers, their use becomes automatic (Brown et al., 1996). As children learn to read they develop more sophisticated representations in memory allowing them to make analogies with smaller orthographic units (Roberts & McDougall, 2003).

Orthographic Analogies in Reading and Spelling

Analogy instruction involves systematically teaching children how and when to use orthographic rimes (e.g. *-at*, *-ice*, *eat-*, *ope*) strategically in reading and spelling unfamiliar words (Brown et al., 1996). As decoding and spelling processes are fundamentally linked, analogy-based instruction for reading may be generalised to spelling instruction (Conrad, 2008; Brown et al., 1996). Additionally, children develop awareness of the phonological and orthographic features of rimes at approximately the same time; therefore it follows that they should be able to apply analogy strategies to both decoding and spelling unfamiliar words (Brown et al., 1996). However, as spelling is a more complex task than reading, requiring better quality orthographic representation, transfer between the two skills is not always even (Conrad, 2008). Learning to spell a word results in a high-quality representation that supports the reading of the word, but the representation obtained from reading the word may not translate into being able to spell it quite so easily (Conrad, 2008). However, spelling practice that includes phonemic and alphabetic skills (e.g. mapping phonemes onto graphemes), rather than word specific spelling list practice, does have a positive transfer effect on reading those words (Conrad, 2008).

According to Ehri (1992), the most effective way to memorise words as sight words is to match the letters in the word to their spoken counterparts that are already present in memory. The connecting of spelling and spoken forms of words occurs when children fully analyse words, and in doing so, recognise the letters as symbols that represent sounds (Gaskins, 1998a; 2004). Once a rime, or keyword that contains the rime, has been fully analysed and learnt, an orthographic representation of the word is formed that can support the reading or spelling of unfamiliar words through analogy to the learnt word (Conrad, 2008). Using an analogy approach is more efficient than other strategies as it involves learning letter strings that are consistent in pronunciation and spelling over a number of words, for example, Wylie and Durrell's (1970) 37 dependable rimes.

While significantly less research has been conducted regarding the potential role of rime analogy-based instruction in spelling development than in reading development, studies that have been undertaken have shown that analogy strategies can help young spellers to

spell unfamiliar words (Brown et al., 1996; Treiman, 1998). Much of the extant research has been conducted with young children (preschool up to year two) because evidence indicates that intervention with younger children is more likely to successfully prevent future literacy problems which, if not addressed early, will become increasingly difficult to remediate (Treiman, 1998). However, studies with older children with reading and spelling difficulties have yielded positive results (Treiman, 1998). Proficient readers and writers use knowledge of spelling patterns to make analogies from familiar to unfamiliar words (Adams, 1990). Other strategies that are often employed to spell unfamiliar words include, for example, relying on memorised visual forms (difficult, unwieldy and can't be used for spelling unknown words); using the dictionary (tends to be time-consuming); sounding words out (an issue as letters vary in pronunciation according to their position in a word); and asking for help from others (not always possible and does not encourage independence) (Brown et al., 1996).

Comparisons between good and poor spellers have revealed that both utilise orthographic knowledge (knowledge of how letter sounds vary according to their position within words) to the same extent (Lennox & Seigel, 1998). However, poor spellers tend to rely on visual cues (using memorised letter sequences to spell words) whereas good spellers use phonological skills (mapping letter to sounds) (Lennox & Seigel, 1998). In fact, children with reading and/or spelling difficulties are likely to be more attuned to the visual characteristics of printed words than average or good readers and spellers (Lennox & Seigel, 1998). The ability to combine these two skills forms the basis for reading and spelling by analogy, and their simultaneous use requires meta-cognitive skills (Greaney, Tunmer & Chapman, 1997; Lennox & Seigel, 1998). Metacognition is essentially knowledge of cognition, and of useful cognitive strategies and how and when to use them (Pressley & Harris, 2008-2009). A major advantage of analogy instruction is that it can be delivered explicitly in isolation, or holistically, as part of the literacy curriculum (Brown et al., 1996). According to Goswami (1998b) there are three key features of rime analogy instruction. The first is instruction in phonological skills relating to rhymes, the second, instruction in the orthography of rimes, and the third, clear explicit training in the connections between the first and second features.

Intervention Programmes

Analogy strategy based interventions have been a focus of recent research. Analogy instruction teaches children how and when to make use of rime units to read and spell unfamiliar words (Brown et al., 1996). Intervention research relating analogy strategy instruction is reviewed in the following section. A number of important facts of analogy instruction are examined in the following research. First, as analogy based intervention research identifies the close links between reading and spelling as a crucial factor in programmes, studies by Conrad (2008), Conrad and Levy (2011), Ouellette & Sénéchal (2008b), and Sénéchal et al. (2012) investigating the links between reading and spelling are described. Second, two highly relevant New Zealand studies by Ryder et al. (2007) and Greaney et al. (1997) that examined the effects of implementation of phonics-based programmes into whole-language classrooms are discussed. Third, studies by Goswami (1998a), and Peterson and Haines (1992) that investigated the benefits of combining phonological and orthographic instruction are described. And finally, studies by White (2005), Allen (1998), Brown et al. (1996), Lovett, Lacerenza, Borden, Frijters, and Steinbach (2000), and Ehri et al. (2009) are reviewed. These studies are all based upon the Benchmark Word Identification (BWI) Programme (Gaskins, Downer, Anderson, Cunningham, Gaskins, & Schommer, 1988; Gaskins et al., 1995). The Benchmark school is a specialist centre for children with reading difficulties, and the source of extensive research and development on analogy strategy-based instruction (Gaskins, 2004; Gaskins et al., 1995).

Conrad (2008), Conrad and Levy (2011), Ouellette & Sénéchal's (2008b), and Sénéchal et al. (2012) investigated the effects of spelling practice of reading ability with typically developing children and those with reading and spelling difficulties. Reading and spelling are tasks that require the same knowledge sources (Adams, 1990; Brown et al, 1996). Consequently, it is intuitive that practicing one should benefit the other, although not necessarily to the same extent.

Conrad (2008) investigated whether reading and spelling practice are transferrable (i.e. whether reading practice generalises to spelling and spelling practice generalises to reading). The study involved 41 typically achieving year three children divided into a

reading practice group (n = 20) and a spelling practice group (n = 21). Participants practiced reading or spelling a list of 40 words, four times a day over four days. Spelling practice was found to facilitate reading words more than reading facilitated spelling (Conrad, 2008). This finding is not surprising given that spelling is a more difficult task than reading, primarily because it requires fully complete mental representations of words. The results indicated that, as spelling practice facilitates the development of higher quality mental representations than reading practice does, it is more likely to transfer to reading than vice versa. The children in this study were found to be able to segment common spellings and use them to read and spell new words (Conrad, 2008). These findings support the concept that reading and spelling programmes should be coordinated, and that spelling instruction may be especially important for developing reading skills of young children (Conrad, 2008; Ehri & Robbins, 1992).

Subsequently, Conrad and Levy (2011) studied the effects of teaching children with reading difficulties to recognise common spelling patterns within words. Words with shared orthographic patterns were presented with the shared portion highlighted for emphasis and the children were taught to attend to the similarities between them (Conrad & Levy, 2011). The intervention programme resulted in improvements in accuracy and speed of reading (Conrad & Levy, 2011). This study provided evidence to support the teaching of orthographic analogies within words in order to increase the efficiency with which children with reading difficulties develop their knowledge of spelling patterns and regularities, and decoding (Conrad & Levy, 2011).

Together, the results of Conrad (2008) and Conrad and Levy's (2011) studies demonstrated that typically developing children are better at generalising analogy skills than those with reading difficulties, indicating that children without sufficient decoding skills are unable to use analogies effectively enough to generalise the strategy to unknown words (Ehri, 1998, Ehri & Robbins, 1992; Conrad & Levy, 2011). In addition, struggling readers usually need more practice at reading words before orthographic representations become secure; and they are also likely to require explicit instruction on attending to and utilising shared orthography between words (Conrad & Levy, 2011).

The results of Ouellette & Sénéchal's (2008b) and Sénéchal et al.'s (2012) studies provided direct evidence that training and practice in invented spelling can lead to improvements in reading. Ouellette & Sénéchal's (2008b) investigated the effects of invented spelling instruction in typically developing five-year-olds, and Sénéchal et al. (2012) investigated effects of similar training on five-year-olds who were at risk of reading failure. Explicit training in invented spelling that included repeated practice and developmentally appropriate, targeted, feedback on how the each spelling attempt could be improved was delivered over a period of four weeks in Ouellette & Sénéchal's (2008b) study and eight weeks in Sénéchal et al.'s (2012) study. Both of these programmes resulted in greater improvements in word reading for intervention group children over controls. Two control groups were employed in each study, one was taught phonemic awareness skills, and the other an unrelated activity (e.g. drawing pictures). The outcomes of these studies indicate that practising invented spellings for unknown or new words is important as it helps children recognise the way spoken words map onto phonemes, and encourages the development of high quality lexical representations of words in memory (Sénéchal et al., 2012). Lexical representations (combinations of phonology, orthography, and meaning) are critical for the development of sight word reading (Ouellette & Sénéchal, 2008b).

The results of two New Zealand based studies conducted by Ryder et al. (2007), and Greaney et al. (1997) are particularly relevant as they highlight the effectiveness of phonic-based strategy instruction for children from classrooms where the predominant theory of reading instruction is based on whole-language theory. Ryder et al., (2007) examined the effects of explicit instruction in phonemic awareness and phonemically based decoding skills of six and seven-year-olds with reading difficulties, and Greaney et al. (1997) investigated the effects of teaching six and seven-year-old struggling readers to make use of metacognitive analogy strategy training in reading.

The aim of Ryder et al.'s (2007) study was to deliver explicit instruction in letter-sound correspondences and spelling patterns. The intervention group (n=12) participated in 56 small-group lessons of 25 minutes duration, undertaken over a period of 24 weeks by a trained teacher aide (Ryder et al., 2007). A matched control group (n = 12) continued to receive their normal classroom programme for the duration of the intervention. The

teaching sessions included oral phonemic awareness activities (e.g. rhyme identification and production, and phoneme isolation, segmentation, blending, and substitution), word writing, “chaining” exercises (e.g. making a single change to create a new word each time i.e. pat, pot, not, nat, nap, map), and matching phoneme picture cards with letter. Participants’ received immediate feedback and opportunity to practice applying their newly learnt skills to contextual reading. At posttest, the intervention group attained significantly higher scores than the control group in measures of phonemic awareness, decoding, isolated word reading, and comprehension (Ryder et al., 2007). This study demonstrates that small group instruction in phonemic awareness, and phonemically based decoding skills is effective in improving the reading skills of children with reading difficulties in New Zealand classrooms.

The participants in Greaney et al.’s (1997) study comprised of a group of younger typically developing readers (mean age = 6.69 years) and a reading age matched group of older, struggling readers (m = 8.52 years). The children with reading difficulties were divided into two groups, an analogy strategy group and an item-specific training group. The analogy strategy group were systematically instructed in the use of rime analogy strategy. The item-specific group received structured teaching of spelling and reading without reference to orthographic rimes. In addition the item-specific group’s reading errors were addressed initially with meaning-based prompts. Teaching sessions of 30 minutes duration were delivered four times a week for 11 weeks. Greaney et al. (1997) found that children who received explicit instruction in the use of rime units (i.e. the analogy group) made greater gains than those taught item-specific strategies. Furthermore, these gains were maintained at follow-up one year later. This study indicates that explicit instruction in the strategic use of rime spelling units helps struggling readers improve their knowledge of grapheme-phoneme correspondences, overcome the tendency to guess words based on initial or final consonants, and develop better word reading skills.

The results also revealed that the older, struggling readers had difficulty using a rime-based analogy strategy to read unknown words even when they were able to segment onset-rime units. This finding indicates that although they possess sufficient phonological skills to make

use of analogy strategies, they are instead relying on less effective strategies, such as sentence context or partial letter-sound cues (Greaney et al., 1997).

The following studies by Goswami (1998a), and Peterson and Haines (1992) combined instruction in orthographic analogies with phonological training. Goswami (1998a) found that seven, eight, and nine-year-old children read nonsense words with both phonological and orthographic real word rime neighbours (e.g. *dake* and *bomic*) significantly faster and more accurately than nonsense words with phonological but no orthographic rime neighbours (e.g. *daik*, *bommick*). Orthographic and phonological analogies are not the same thing. Children are able to make more analogies when the analogies being studied share common orthography (e.g. bread-head), rather than just phonology (e.g. bread-said) (Goswami, 1998a). Children may read nonsense words such as *dake* using an analogy strategy to compare it to a known real word such as *make*. Nonsense words such as *daik* and *bommick*, however, may only be read by phonemically decoding letter-sound correspondences. Goswami (1998a) concluded that this finding indicates a strong effect of orthographic familiarity of word segments in reading.

Peterson and Haines' (1992) study involved teaching five and six year-old children phonological and orthographic analogy strategies using 10 different taught rimes. The children were divided into three groups (low, medium, and high achieving) based on their ability to verbally segment words into onset-rime units. Children were instructed on a one-to-one basis, in seven lessons of 15 minutes duration over a period of a month. Lessons involved practice reading multiple examples of rhyming words divided into onset and rime (e.g. *b-all* and *f-all*). Children were asked to read the resulting words when the onset letter was changed or removed (e.g. *b-all* became *t-all* or *-all*). The control group for this study received their regular classroom teaching throughout the intervention. The results showed that children who were low segmenters at pretest made the highest gains in segmenting, and medium and high segmenters made the greatest gains in reading words by analogy and letter-sound knowledge. This study provided support for the relationship between phonemic awareness and strategy use, and for the role of onset-rime units in reading development.

The remaining studies in this section are all based upon the Benchmark Word Identification (BWI) Programme (Gaskins et al., 1988; Gaskins et al., 1995). The participants in White's (2005) study were 15 teachers and 280 year-three children, both typically developing and with reading difficulties, from four different primary schools. The teachers were trained in the implementation of an analogy-based phonics programme consisting of 150 lessons, each of 20 minutes duration. Features that the programme had in common with the Benchmark Word Detectives Programme included the teaching of a weekly set of key words, use of a word wall to display taught key words, and a number of activities designed to ensure key words were securely encoded in memory (e.g. production of lists of rhyming words and explicit analogy strategy modelling and instruction). A multisensory approach to word learning was adopted, for example, children would chant spellings in unison and write displayed key words repeatedly. Results indicated that the number of lessons delivered by teachers (mean number of lesson completed was 99.8, SD 38.6; range 20 – 150) was significantly related to the reading and comprehension achievement gains of the children. A key implication from the results of this study is that an analogy strategy based intervention can be successfully implemented by classroom teachers as an integrated part of literacy instruction.

Additionally, White (2005) asserts that systematic and strategic instruction are critical features of analogy-based intervention programmes (White, 2005). Systematic instruction involves teaching lessons that follow a logical sequence or progression, and ensuring that children are provided ample opportunity to apply spelling and decoding skills to novel words that contain taught spelling patterns (Ehri et al, 2009; White, 2005). Strategic instruction involves the explicit modelling of analogy strategies, so that children attain a level of cognitive clarity, providing them with skills they can apply independently when confronted with unknown words (White, 2005). Inclusion of metacognitive strategy instruction is particularly important in light of findings indicating that gains in component skills (e.g. phonological processing skills) do not always automatically generalise into improved reading and spelling of novel words (Lovett et al., 2000).

Allen (1998) combined key features of the BWI Programme with some whole language-based methods to develop an Integrated Strategies Approach (ISA) to analogy-based

instruction. The ISA was subsequently implemented in classrooms and as an after school tutoring programme. This approach integrated the essential skills that children must acquire to read with an interest and purpose for reading to encourage and maintain their enthusiasm. Allen describes the critical difference between the BWI and ISA as relating the way word-level instruction is carried out. In the BWI Programme, word study is isolated from context, with words studied in a structured systematic order; whereas in the ISA the words selected for word-level analysis are chosen from those occurring in literature from the curriculum. Essential components of the ISA included: understanding rhyme; learning key words; learning spelling patterns (orthographic rimes); spelling and decoding new words by analogy; and learning to cross-check using alternative strategies (Allen, 1998).

Some key Benchmark school instructional techniques and tools implemented in Allen's ISA included: teacher modelling and student application of integrated strategy use; using a word wall to support spelling and reading activities; opportunities to practice strategy use in quality, developmentally appropriate children's literature; writing and other response activities that are naturally developed from the literature (Allen, 1998). The ISA was successful in remediating the reading difficulties of the majority of the participants. For example, 100% of primary school children participating in the ISA through an after school tutoring programme were reading well below grade level when they entered the programme. After six months of participation 70% of the children were reading at age-appropriate levels (Allen, 1998). Similarly, results for year-four children participating in the ISA within their regular classroom show that the percentage of children reading at grade-level or higher increased from 74% to 93% within one year. In addition, gains were found to be maintained at one-year follow-up.

Alternatively, Brown et al. (1996) examined the effects of analogy instruction on spelling development. Their intervention took place over a school year, and was implemented as an integrated part of the literacy programme by the classroom teacher who was also one of the researchers. The participants were a year three class (n = 28) of mixed ability. Lessons consisted of a variety of activities and instructional methods. For example, explicit explanation of the benefits of analogy strategies, teacher modelling, guided practice, and application of analogy strategies to decoding and spelling new words (Brown et al., 1996).

Specific activities included introduction and analysis of weekly keywords that each included a taught orthographic rime, placing of keywords on a prominently visible word wall, searching for other words containing target rimes, and writing stories using keywords and analogous words (Brown et al., 1996).

Brown et al. (1996) used a BWI framework to design an intervention programmed aimed at examining the influence of orthographic analogy instruction on children's spelling behaviour. Brown et al. (1996) conducted their study with year three children because they generally have phonemic awareness skills, but tend to lack automaticity in decoding and spelling. As Ehri and Robbins (1992) stated, phonemic awareness is an important prerequisite for effective use of rime analogies. Therefore, in general, the participants in this study were posited to be at the right developmental stage to take full advantage of instruction in the use of orthographic rimes. The intervention was implemented by the class teacher, who was one of the researchers. Short skills-based lessons, based on the BWI Programme, were structured daily for the whole class. The lessons were focused on teaching analogy strategies (and their benefits), modelling, guided practice, and application to new word was taught. The teacher also took advantage of opportunities throughout the day to present spontaneous analogy-based mini-lessons that were adapted respective to children's ability levels. The teaching in Brown et al.'s (1996) study had a metacognitive emphasis, evidenced by strategy-based instructional use of modelling by the teacher and, for example, group discussion of children's spelling attempts (successful and unsuccessful). Results showed that children of all abilities increased the rate at which they independently used rimes from instruction to generate spellings. The lower achievers used rimes from instruction 13% of the time at the beginning of the year, 63% in the middle and 87% at the end of the year, which was more than the average achievers by the end of the year (average achievers; beginning = 33%, middle = 73%, end = 80%) and very close to the higher achieving students scores (high achievers; beginning = 53%, middle = 57%, end = 97%).

In Lovett et al.'s (2000) study two programmes were taught to struggling readers aged between six and 13 years. The first was an analogy-based word identification programme (word identification strategy training or WIST) and the second was the same but with an additional grapho-phonemic analysis component (phonological analysis and blending/direct

instruction or PHAB/DI). Participants received either 70 hours of instruction in the WIST or PHAB/DI conditions, or 35 hours of instruction in each condition. Those who received both types of instruction were divided into two groups, one of which began with WIST instruction followed by PHAB/DI, and the other started with PHAB/DI followed by WIST. Lovett et al. (2000) taught four decoding strategies in their WIST Programme. 1) Word identification by analogy, 2) searching for a chunk of the word that is known, 3) attempting variable vowel pronunciations (or using a set for diversity, e.g. clown, blown), and 4) peeling off prefixes and suffixes in multisyllabic words. One of the main differences between the WIST and PHAB/DI Programmes is the size of subsyllabic unit that is emphasised. WIST emphasised onset-rime units whereas PHAB/DI also focused on individual phonemes.

The WIST and PHAB/DI methods both resulted in large reliable treatment effects that generalised to other aspects of reading acquisition such as phonologically based non-word reading, word identification, and passage reading skill measures (Lovell et al., 2000). Explicit instruction in subsyllabic segmentation appears to be crucial in order for children with learning difficulties to transfer knowledge of a new word to another similarly spelled word (Lovett et al., 2000). The key findings of Lovett et al.'s (2000) study indicate that learning outcomes improved when phonological and strategy-based approaches were combined. The Benchmark Word Detectives Programme was revised to include extensive instruction in grapho-phonemic analysis as a result of this study.

Ehri et al. (2009) investigated the effects of two types of structured, systematic and explicit phonics programmes with a group (n = 102, ages 6.01 – 8.07, mean 7.04 years) of year two, three, and four children, over a period of four years. This study was undertaken within the Benchmark school. The children had been referred from their previous schools due to lack of progress in reading and other literacy related skills despite having spent between one and three years at school. The first instructional programme in this study was the keyword analogy method (KEY), the second was the enriched keyword analogy method (KEY-PLUS). The KEY Programme involved the introduction of five new keywords every week, which formed the basis of the subsequent activities for that week. Specific activities included generating rhyming words that matched the rimes of the keywords, story composition using

keywords, echo and choral reading of stories, decoding unknown words, focusing on spelling patterns by sorting rhyming words into lists, and spelling instruction focusing on shared rime units. Children were encouraged to practice and share their reasoning process in problem solving and to maintain a flexible approach to decoding unfamiliar words (Ehri et al., 2009). The KEY-PLUS Programme was fundamentally very similar to the KEY Programme in its structure, content, activities and instruction. The crucial difference was the addition of three major components. The first was teaching children to fully analyse key words by attending specifically to all grapheme-phoneme correspondences within them. This activity was done using a structured format so children could fully understand how the words conformed to the spelling system, and consequently would be able to retain full orthographic representations of the words in memory. The second component was the use of spelling activities to reinforce phonemic awareness skills (particularly segmentation). For example, the KEY group children learned spelling by chanting letter names and identifying shared spelling patterns with keyword, while the KEY-PLUS group used Elkonin boxes (i.e. a series of boxes drawn horizontally) in which the letter(s) representing one phoneme were written in each box. The final additional component was making discoveries about spelling regularities in words. Children were encouraged to share their discoveries and keep a record of them in a 'language log'. It is worth noting that as the children were attending the Benchmark school, the rest of their day at school aside from the time spent in the intervention programme, was largely focussed on applying strategy skills to constructing meaning from text.

The main finding from Ehri et al.'s (2009) study was that children in the KEY-PLUS group achieved higher mean scores in word reading, pseudoword reading, and spelling assessments than the KEY group, particularly during the first two years of the programme. In addition the mean scores of the KEY-PLUS children in standardised reading and spelling assessments improved from below-average to above-average levels after one year of instruction and remained above average for the duration of the study. The KEY group children reached average achievement levels in these assessments only in years three and four of the programme. The implications of this are that the KEY-PLUS intervention methods provide superior remediation of reading and spelling difficulties more quickly than KEY (Ehri et al., 2009). This is an important factor as a large research base supports the

concept that the earlier children's literacy difficulties are addressed, the greater the chance of intervention being successful.

Summary of Intervention Research

Research evidence indicates that analogy strategy-based interventions for children with reading and spelling difficulties are effective in helping those children accelerate their progress in phonological skills, decoding, spelling, and comprehension. There are a number of fundamental aspects that successful intervention programmes have in common. These features are; systematic and explicit instruction in phonological and orthographic skills and strategy use, in addition to modelling and guided practice in context, followed by clear and immediate corrective feedback. Studies have demonstrated that combining instruction in phonemic awareness with instruction in orthography is more effective than teaching either element in isolation (Goswami, 1998b; Lovett et al., 2000; Peterson & Haines, 1992).

Interventions where close attention is paid to grapheme-phoneme correspondences and linking spelling instruction to reading instruction improved the speed with which children attain age-appropriate skills (Ehri et al, 2009).

Analogy-based intervention programmes do not need to be overly time consuming. Fifteen to 30 minutes daily is adequate (Greaney et al, 1997; Peterson & Haines, 1992; White, 2005). Studies of varying duration and intensity have yielded positive results, although it is sometimes unclear how well gains are maintained over time. Analogy interventions have been successfully implemented with small groups and whole classes (Allen, 1998; Brown et al., 2000). Instruction that includes a range of activities, involving oral and printed language, with ample opportunity to apply skills to reading and spelling in context is an effective way to maintain motivation and enthusiasm (Allen, 1998).

Benchmark Programme

Benchmark school was founded in Media, Pennsylvania, in 1970 by Gaskins and colleagues (1988). The school is a specialist centre for children with reading difficulties where they are taught an intensive, research based curriculum, focussing on strategy instruction (Gaskins,

2004). Gaskins, Ehri, Cress, O'Hara, & Donnelly (1997) assert that the Word Detectives Programme differs from other more traditional phonics programmes in that it aims to teach children the skills they need to develop a large sight word vocabulary, in order to help them use these fully represented sight words to decode new words by analogy. Spelling and phonics 'rules' are not explicitly taught in the BWI Programme as they are in traditional programmes that tend to teach children phonics rules which they are then encouraged to apply to reading new words.

Benchmark school teachers and researchers noticed that many struggling readers were trying to learn new words by memorising each one as a unique form, or reading by the visual cue method (Gaskins, Ehri, Cress, O'Hara, & Donnelly, 1996-1997). Research indicates that good readers are able to quickly and accurately match all the sounds in a spoken word to the letters in its printed equivalent. These observations led to the development of the programme based around decoding by analogy in which children are systematically taught to segment words into their constituent sounds and match these to the letters they see (Gaskins, 2004).

Development of the Word Detectives Programme (an analogy-strategy based decoding programme) began in the early 1980's when Benchmark school staff collaborated on their research into decoding by analogy (Gaskins et al., 1995). Research and development was and is on-going and by the mid 1990's Benchmark school had integrated the principles of Ehri's (e.g. 1998) stage theory of word learning into its theoretical perspective (Gaskins, 2004; Gaskins et al., 1996-1997).

The Benchmark Word Detectives series consists of multidimensional evidence-based, instructional programmes targeting word identification, spelling, and fluency of children from school entry to year six (Gaskins, 1998b; Gaskins et al., 1995). It is a strategy -based programme that is designed to allow children to make their own discoveries about the way our language works and to be flexible when selecting a strategy from several options based on the current situation. In this respect the Word Detectives Programme can be thought of as a metacognitive approach (Gaskins, 1998a; Gaskins et al., 1995).

Originally, the Word Detectives Programme was based on learning to read by analogy to a set of taught key words (e.g. a word-families approach). Additional elements were incorporated based on Ehri's (1992) stage theory work in the mid 1990's, particularly teaching children to fully analyse the grapheme-phoneme constituents of words. In this way, key words became sight words with secure connections between spelling and pronunciation in memory (a strong orthographic representation) (Gaskins et al., 1996-1997). The key strategy in the programme involves decoding and spelling by analogy. Key words are used as a starting point to analogise with and decode unknown words (e.g. the keyword 'day' can be used to decode 'play', 'say', 'may' and 'clay' and keywords 'ride' and 'fill' may be used to decode the word 'hillside'). The key words are carefully selected by their familiarity and representation of common spelling patterns. Specific activities (e.g. compare/contrast, changing the vowel, rhyming word sort) are devised to guide children in making their own decisions and discoveries while providing plenty of opportunities to use their new strategy skills in real reading situations.

The Word Detectives Programme at Benchmark school follows five day cycles in which the children learn 5 keywords per week. Children work on literacy activities around three hours every day. Key components of instruction include word recognition instruction (decoding and spelling), writing (composition and response to reading), vocabulary, and explicit, scaffolded instruction in comprehension strategies (Pressley, Gaskins, Solic, & Collins, 2006). The Word Detectives Programme comprises the word recognition instruction portion of the day, which is about 30 minutes in duration; however children are prompted to use the strategies throughout the school day. Word Detectives sessions consist of a series of short, high interest, interactive activities with an emphasis on full analysis of keywords and matching of phonemes and graphemes (Pressley, et al., 2006).

Learning to read in New Zealand

The dominant approach to reading instruction over the last 40 years in New Zealand has been one of whole language. This constructivist approach is based on the theory that learning to read follows the same basic processes as learning to speak; in other words, language acquisition is supposed to be a natural process (Smith & Elley, 1994, 1997; Tunmer

& Nicholson, 2011). Thus, whole language teaching approaches are modelled on spoken language acquisition, where the focus is on the construction of meaning, and instruction in word level skills and strategies is minimal (Greaney, 2011; Smith & Elley, 1997). However, under this approach, 15-20% of New Zealand 6-year-olds require intensive one-to-one tutoring in reading in addition to regular classroom teaching (Tunmer & Nicholson, 2011).

The dominance of whole-language or meaning-based reading instruction in New Zealand classrooms has seen New Zealand's ranking in the International Association for the Evaluation of Reading Achievement (IEA) literacy survey fall from first in 1970, to 6th in 1990, 13th in 2003, and 26th in 2006. Furthermore, Tunmer et al. (2006) found that composite measures of LCC (including phonological awareness, grammatical awareness, letter knowledge, and receptive vocabulary) at age 5.1 accounted for almost 50% of the variance in reading comprehension at year 7. The prevalence of a meaning-based, constructivist approach to teaching literacy in New Zealand benefits children with high levels of LCC at school entry, but disadvantages those with limited LCC (Tunmer & Nicholson, 2011). In addition, Matthew effects in reading seem to be particularly apparent in New Zealand schools, where the spread of test scores in the IEA studies has shown markedly high levels of variance with a large tail of underachievement (Tunmer et al., 2003). According to Tunmer et al. (2003) the best way to prevent negative Matthew effects in children at risk of reading failure is to ensure they receive high-quality early instruction in phonological awareness and alphabetic coding.

In addition, it has been demonstrated that 9% of a school population with reading difficulties in their first year of formal education were able to, after one term of remediation, improve to the extent that only 1.5% remained poor readers. Vellutino et al.'s (2004) research highlights an issue that is highly relevant for New Zealand schools. There are many children who arrive at school with low levels of LCC, which makes them vulnerable to reading and spelling difficulties. The type of reading instruction they receive in their early education plays a critical role in such children's future literacy success.

Advocates of the whole language method have argued that explicit teaching of letter sound relationships and word level skills is not only unnecessary but could potentially be detrimental to reading development by distracting children from comprehending text (Clay,

2005b; Greaney, 2011; Tunmer & Nicholson, 2011; Smith & Elley, 1994). For example Clay (1998) asserted that *“beginning readers need to use their knowledge of how the word works; the possible meanings of the text; the sentence structure; the importance of order of ideas, or words, or of letters; the size of words or letters; special features of sound, shape, and layout; and special knowledge from past literary experiences before they resort to left to right sounding out of chunks or letter clusters or, in the last resort, single letters”*(p.9). More recently, Clay (2005a) has also asserted that children’s attention should be prompted to attend to sentence structure initially, followed by meaning cues when reading aloud. In addition Clay (2005b) has also stated that calling attention to letters may be detrimental to children’s reading because it can distract them from accessing the meaning of text. However, these arguments are refuted by overwhelming empirical evidence from studies demonstrating that children exposed to specific phonics instruction go on to become better decoders and comprehenders than those taught in whole language based classrooms (e.g. Greaney & Arrow, 2010; Greaney, 2011; Pressley, 2006; Tunmer & Nicholson, 2011).

One of the bases of the whole language approach is that words in text are highly predictable and may be guessed based on a range of cues, to the extent that only minimal attention to word level information is required to confirm the prediction (Greaney, 2011; Tunmer & Greaney, 2010; Tunmer & Nicholson, 2011). However, average predictability of content words (e.g. swing, slide, park, playing) has been found to be less than 10% and for function words (e.g. the, for, in, some, of, they) around 40% (Tunmer & Nicholson, 2011). The repercussion of this finding is that the meaning of a passage of text is primarily conveyed by the words that occur least often (Juel & Minden-Cup, 2000). Also contrary to the theories underpinning whole language, is the theory that as readers become more proficient, they rely less and less on context (Pressley, 2006; Tunmer & Nicholson, 2011). According to Pressley (2006) teaching children to use prediction based on meaning and context is synonymous with teaching them to read the way poor readers do. Phonological recoding ability is vital in order to make use of sentence context to identify unknown words (Tunmer & Nicholson, 2011).

Conversely, phonics-based, or code oriented, theorists posit that learning to read is not a natural process, evidenced by the fact that while spoken language is universally used by all

humans and is biologically based, written language is culturally transmitted and far from universal (Catts & Kamhi, 2005; Perfetti, 1985; Tunmer & Nicholson, 2011). When learning the spoken form of language, children must memorise phonological forms that arbitrarily represent objects or concepts without the support of systematic links between pronunciation and meaning (Bowman & Treiman, 2008). In contrast, written language in alphabetic writing systems is systematically linked to its spoken form. Simply being exposed to a language is not necessarily sufficient to enable all children to learn to read (Tunmer & Nicholson, 2011). Code-oriented instruction provides explicit isolated and context-based teaching of grapheme-phoneme correspondences and phonemic awareness, which are the basic prerequisites for successful decoding and the development of a sight word vocabulary (Pressley, 2006; Tunmer & Nicholson, 2011).

A Balanced Approach?

The theoretical assumptions underpinning the whole language and phonics approaches both have strengths and shortcomings. Byrne (2005) refers to the process of learning to read as being placed on a continuum from wholly learner dependant to wholly environment dependant. The phonics approach is placed towards the environment dependent end of the spectrum while whole language approaches are at the learner dependant end (Tunmer & Nicholson, 2011).

Rather than a one-size-fits-all, teacher centred, rigid programme of teaching that is common to traditional phonics programmes, a needs and assessment based programme should be considered. This takes into account children of varying levels of reading related skills and experience and consequently, their varying requirements in the explicitness and intensity of instruction (Tunmer & Nicholson, 2011). The developmental process of learning to read involves a number of phases, which vary individually in duration and may break down at any given point (Ehri, 1992; Spear-Swerling & Sternberg, 1996; Tunmer & Nicholson, 2011). The phase an individual child has reached determines the best instruction methods to overcome difficulties. Critical cognitive skills and learning strategies in order for progression in the phases of learning to read are: phonemic awareness, letter knowledge, understanding of

the alphabetic principle, use of alphabetic coding skills and exposure to print (Tunmer & Nicholson, 2011).

Allen (1998) used a combination of whole language and phonics approaches in the development of her Integrated Strategies Approach (ISA). For example, systematic, explicit instruction in onset-rime based spelling patterns and analogy strategies was integrated with reading and discussion of literature, and writing responses based on reading. This approach enabled children to develop critical skills for reading along with an interest in and purpose for reading (Allen, 1998). White (2005) described the analogy strategy instruction in his intervention programme as a balanced approach, which he defined by the inclusion of ample opportunities for reading connected text, discussion of literature, and writing activities. These features were in addition to explicit teaching of phonological skills and decoding strategies in structured lessons. Another important feature of White's (2005) balanced instruction was that to the intervention was implemented by the regular class teachers. Because of this, the teachers were able to prompt the use of taught analogy strategies for decoding during reading, and the use of the word wall during spelling.

Tunmer and Nicholson (2011) assert that the best feature of phonics and whole language instruction should be combined as neither approach can provide the optimal balance of learner-dependant and environment-dependant teaching for all children. In fact, intervention studies have found that including a combination of isolated word-level instruction and guided practice in its application to text reading is more significant than the theoretical basis or method of teaching that is employed in the programmes (Allen, 1998; Farrington-Flint et al., 2008; Tunmer & Nicholson, 2011).

The current study

Discovering the most useful and efficient remediation activities for children with reading and spelling difficulties is of key importance in literacy research. Evidence supports the use of analogy-based instructional programmes and their utility in helping young children improve their reading and spelling strategies and skills.

The current study involves the implementation of a brief, modified version of the Benchmark Word Detectives Programme with a small group of year three and four children in a small rural New Zealand primary school. Much of the research base for analogy approaches to reading has been conducted with children in their first year or two of school; therefore there is not as large a research base for this age group as there is for younger children (school new entrant or five-six year-old range). It is known that reading and spelling interventions are often more effective when implemented earlier, this is the reason that more research occurs with younger children. However, there is evidence that although children may be able to make orthographic rime analogies at the very early stages of reading development, it is likely that doing so is task dependent and the frequency of occurrence may be overestimated due to the research method of providing an explicit clue word (Farrington-Flint & Wood, 2007). Slightly older children (e.g. years three and four, or seven to nine year-olds) are more likely to be able to make efficient strategic use of rime analogies as they possess higher levels of phonemic awareness (Farrington-Flint & Wood, 2007). In addition, many studies have been carried out with younger children who are typically developing readers. Older children with reading and spelling difficulties are likely to be at an earlier developmental stage in terms of their literacy skills and so the same instructional techniques are likely to be relevant to both groups.

There is a strong research base to support the efficacy of the Benchmark Word Detectives Programmes in the USA (Pressley et al., 2006), but it is very time-consuming and costly to run. However, a modified version such as that posited here, could be more feasible for classroom implementation. The primary goal of the current study is to investigate if the Word Detectives element of the Benchmark Programme can effectively be modified for use with New Zealand children as part of their regular school day. The Benchmark school runs a very intensive programme involving hours of literacy study daily (Gaskins, 2004; Pressley et al., 2006). Time and budget constraints make it important to discover if a shorter, less intensive programme based on the principles of the Benchmark system can be beneficial for children with reading and spelling difficulties in New Zealand.

Research Aims

The aim of the current study was to implement a modified version of the Benchmark Word Detectives Programme (Gaskins, 1998b). This had two parts: the first was to explicitly teach the use of analogy strategies to a group of year three and four children with reading and spelling difficulties and the second was to evaluate the efficacy of the programme in accelerating children's progress in reading and spelling related skills.

Hypotheses

The hypotheses of this study were three-fold. Firstly, it was expected that explicit training in analogy strategies based on a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties would lead to improved letter-sound knowledge and phonemic awareness. Secondly, it was expected that explicit training in analogy strategies based on a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties would lead to gains in decoding and spelling words. Third, it was expected that the explicit strategy-based instruction provided in the modified version of the Benchmark Word Detectives Programme would facilitate generalisation of skills to decoding and spelling novel words.

Chapter 3: Methodology

Research Design

In the present study, a non-randomised, pretest-intervention-posttest design was used to compare a group of year three and four children with reading and spelling difficulties with an age and ability matched control group. The study was non-randomised as children from a single mixed-age classroom comprised the intervention group and age and ability matched students from two other classrooms formed the control group. The intervention group participated in an instructional programme that was based on a modified version of the Benchmark Word Detectives Programme (Gaskins 1998b; Gaskins, 2004). The group that received the intervention, of 32 teaching sessions over a period of eight weeks, consisted of eight children (six girls and two boys) from a single mixed age year three and four classroom. The control group consisted of seven children (six girls and one boy) from two separate mixed age classrooms. Control group children from year three were selected from a mixed year two/three class and control group children from year four were selected from a mixed year four/five classroom. The control group were closely matched in age and reading and spelling related skills. During the intervention phase of the study the control group received no intervention in addition to their regular classroom activities.

The participating school used a team planning model based on a school-wide literacy planning document and regularly shared teaching of literacy between classes through the use of “cross-grouping” where children are grouped by ability across classes for particular lessons. These factors contributed to consistency between the intervention and control groups in terms of their regular classroom teaching programme. The intervention class teacher was kept informed about the content of the teaching sessions, however the sessions remained separate from the children’s regular class work to minimise disruption to the teacher’s planning and to the rest of the class.

This study employed a modified version of the Benchmark Word Detectives Programme, with two main aims. The first aim was to explicitly teach the use of analogy strategies to a group of year three and four children with reading and spelling difficulties and the second

aim was to evaluate the effectiveness of the programme in terms of improved decoding and spelling, and generalisation of these skills to new words.

Setting and Participants

Setting

The study was undertaken in a decile six semi-rural, full primary school (years one-eight; 168 pupils) in the lower North Island. A school's decile rating from one to ten indicates the extent to which it draws its students from low socio-economic communities. A rating of one indicates that the school community is predominantly of a low socio-economic status. Informed consent to undertake the present study was obtained from the participating school principal, and consent to participate was obtained from the teachers, the children, and their parents or guardians (See Appendix B).

Semi-structured interviews, surveys and observations revealed that the regular literacy programme taught in year three and four classrooms was grounded in constructivist whole-language theory. However the teachers also incorporated structured phonics activities into their literacy sessions. Children in all of the participating classes were assigned daily (Mon-Thurs) reading and spelling homework consisting of a levelled book to read at home and a list of up to ten spelling words to be practised over the course of the week. Spelling words were learnt at home and then tested in school once a week. Once children achieved a score of more than 80% in their termly spelling assessment they were able to move up to the next spelling level.

Participants

The participants were 15 year three and four children, 12 girls and three boys, aged from seven years and four months to nine years. The average age of the children was eight years and three months (SD = 5.68 months) in the intervention group and eight years and one month (SD = 7.09 months) in the control group (See Table 1). The participants were selected based on the reading assessment data held by their teachers and the results of word reading and pseudo-word reading assessments administered to the whole class. All of the participants were native English speakers with no additional disabilities such as visual or

auditory difficulties Five of the participants from each group had received other literacy based interventions in the past or were concurrently attending other literacy based support programmes, for example computer-based phonics programmes, unspecified support from a resource teacher of literacy (RTLit), or private tutoring held outside of school.

Table 1
Mean age and year of school as a function of group

	Year 3	Year 4	Total	Mean Age at Pretesting (Years and Months)	SD (months)
Intervention Group	4	4	8	8.03	5.68
Control Group	4	3	7	8.01	7.09

Materials and Procedure

The study was conducted over a 12 week period during terms two and three of the school year; six weeks before a two-week school holiday and six weeks following the break.

Pre and Post Testing

Pre and Post testing was undertaken on a one-to-one basis, in a quiet area separate from the regular classroom. Testing was carried out in the same order for all children, beginning with the Peabody Picture Vocabulary Test (PPVT). This test was conducted first as it was visually appealing and non-threatening and therefore served as an ice-breaker for the researcher, helping gain the children’s trust and confidence. At times the order of testing varied due to preferences of the participants, time restrictions, or absences. In addition it was sometimes necessary that the children were assessed over two sessions due to fatigue or time constraints inherent in the school day.

Peabody Picture Vocabulary Test (PPVT III form B)

In this assessment of receptive vocabulary (Dunn & Dunn, 1997), children were asked to identify one picture out of a choice of four in response to single word stimuli (e.g. 'vine', 'horrified', 'fragile') presented orally by the researcher. The pages were presented in the form of an A4 sized flipbook with four numbered colour pictures printed on each page. Participants were able to indicate their choice by pointing at the selected picture, or by orally stating the number (from 1-4) that corresponded to the selected picture. A practice page was presented before beginning testing in order to ensure that the children understood what was expected. The initial item is selected based on the child's age. There are 12 pages in each set and 19 sets in total. Testing was discontinued after eight or more incorrect responses were given within a single set. The PPVT III reports reliability coefficients between 0.86 and 0.98 (Dunn & Dunn, 1997).

Letter name and sound knowledge

This brief alphabet assessment (Nicholson, 2005) was designed to check whether the children knew each letter name and associated sound. The 26 letters of the alphabet were presented on a sheet of paper in random order, once in upper case and once in lower case. Children were asked to identify each letter name and to say the sound that it represents. This was done for both sets of letter (upper and lower case) yielding a total maximum score of 26 for each of the four measures (i.e. 26 lower case letter names, 26 lower case letter sounds, 26 upper case letter names and 26 upper case letter sounds).

Analogy use in word reading

The Test of Analogies (Greaney, 1992) assessment provided a measure of the extent to which the children were able to use analogy strategies to identify isolated words (See Appendix C). Two A4 sheets containing the same 100 words, arranged in rows of five with black lines between each row, were presented one after the other. On one sheet the words were arranged randomly so that no two consecutive words could be read using analogies. On the other sheet the words were arranged in lines of five, in which all words on the line shared an analogical unit either at the end (e.g. *tr-uck*, *s-uck*, *m-uck*, *l-uck*, *st-uck*) or embedded within the word (e.g. *teacher*, *seat*, *meat*, *mean*, *neat*). Children were asked to

read the words aloud one after the other along each line. The lines were hidden from view and uncovered as each line was read by the child. Comparing children's scores on the two versions provided an estimate of their ability to use analogies when reading words isolated from context. The 100 words in the lists were selected by Greaney (1992) from the New Zealand Basic Word List as they all had high 'imagery rating' scores (at least five out of seven), and were therefore likely to be familiar to the participants. One point was given for every word read correctly. The maximum score was 100 for each sheet.

Phonemic Awareness

The Gough-Kastler-Roper (GKR) Phonemic Awareness Assessment (Gough, Kastler, & Roper, 1984) is a language assessment that measures children's understanding of, and ability to manipulate, individual phonemes in words. This measure consisted of six sections (one for phoneme segmentation, one for blending, two for deletion and two for substitution), each containing seven items; therefore the maximum score was 42. All items in the test were administered verbally, and the participants' were not able to see the researcher's copy of the data collection sheet. An example item was administered before each section to ensure the child understood what was expected of them. The GKR has reliability coefficients of greater than 0.70 (Nicolson, 2004). The activities undertaken to assess the elements of phonemic awareness are summarised (a-d) below:

a. Phoneme segmentation

Participants were assessed on their ability to enunciate the sounds that comprise a simple word (e.g. for the word teeth, the three correct phonemes were, t/i:/θ) (See Appendix D details about phonetic symbols).

b. Phoneme blending

Participants were asked to blend together verbally presented phonemes to form a word (e.g. for the presented phonemes n /aɪ/ s the correct response would be "nice").

c. Phoneme deletion

Two assessments were made in this section, one for deletion of the initial phoneme in the presented words and one for deletion of the final phoneme in the presented words. For example, children were asked "can you say 'top' without the 't'?", and "can you say 'same' without the 'm'?"

d. Phoneme substitution

In the final two assessments of this measure, children were asked to swap first the initial phoneme in the target words for a specified alternative, and then to manipulate the final phoneme in the target words for specified alternatives (e.g. “can you say ‘ball’ not with a ‘b’ at the beginning but with a ‘k’; and “can you say ‘park’ with a ‘t’ at the end instead of a ‘k’?”).

Word Reading

The Burt Word Reading Test (Gilmore, Croft, & Reid, 1981) is an individually administered test, which provides a measure of word recognition. It has been revised and standardised for use in New Zealand. The student test card consists of 110 words printed in decreasing font size and ordered according to difficulty. Participants were presented with the student card, and asked to read the word aloud line by line from left to right. Testing was discontinued when ten consecutive words were read incorrectly. Children were then prompted to check the card for any additional words they could read. Scores were given as one point for every word read correctly with standard pronunciation. The maximum score was 110. The Burt Word Reading Test had a test-retest reliability coefficient of 0.97. Results provide an estimate of reading age in comparison to chronological age (e.g., a score of 54 gives a reading age of 8.07, or eight years and seven months).

Decoding

The Bryant Test of Basic Decoding Skills (Bryant, 1975) is an individually administered assessment consisting of a sheet of 50 non-words of increasing difficulty. The initial 20 pseudowords are consonant-vowel-consonant (CVC) words (e.g., buf, dit, nuv). The next 20 items are more complex single syllable pseudowords (e.g., yode, shi, groaf, cleef). The final ten items contain more than one syllable (e.g., relhime, gaction, uncabeness). Due to the absence of any other cues, (e.g. morphological or contextual), the only method by which these words can be read is through the use of phonic information, and as such, the results of this test provide an estimate of decoding ability. It was explained to the participants that all of the pseudowords (referred to as ‘alien words’) comply with the usual, commonly known letter-sound correspondences in English words. Children were then asked to use their

knowledge of letter-sound relationships and spelling patterns to decode the words, and to read them aloud. Children were scored one point for each correctly decoded word; the maximum score was 50. Juel (1988) reported reliability coefficients of between 0.90 and 0.96 for this assessment measure.

Reading in Context

The Neale Analysis of Reading Ability—3rd Edition, forms 1 and 2 (NARA) (Neale, 1999) measures reading accuracy (decoding) and reading comprehension of connected text and is standardised on Australian children from six years of age. Children were asked to read aloud a series of passages of increasing difficulty as the researcher recorded the child's reading of each word. After each passage, children answered a set of comprehension questions which provided a reading comprehension score. Each reading miscue, or error, is coded by error type and marked on the researcher's copy of the answer booklet. Each passage was scored out of a maximum of 16 marks, and a mark was deducted for each miscue. If more than 16 miscues occurred in a passage, that passage was not counted and testing was discontinued on completion of the passage. The comprehension questions (4-8 questions per passage), were asked immediately after the passage was read and one point was awarded for each correct response. Test-retest reliability coefficients are reported as 0.95 for reading accuracy and 0.93 for reading comprehension. Internal consistency reliability coefficients range between 0.85 for year four comprehension to 0.96 for accuracy. Parallel form reliability ranges from 0.84 to 0.97 for seven, eight, and nine-year-olds.

Standardised spelling

The South Australian Spelling Test (SAST) (Westwood, 2005) is a standardised test of spelling ability. Children were administered the assessment in small groups. Each word was aurally presented in isolation, then in a sentence followed then repeated in isolation again. The words were presented in order of increasing difficulty, starting with phonetically regular words and some sight words and progressing through to rule based spelling and more difficult words. Children were asked to write each word next to the correct number on their answer sheet. This measure consisted of 70 words in total; however testing was discontinued after ten consecutive spelling errors. The participant's responses were scored as either correct or incorrect, and their raw scores (total of items correct) were evaluated

against the range of scores typical for students of that particular age level. The raw scores were then converted into an approximate spelling age for each child. The reliability of the SAST is 0.96 at most year levels.

Invented spelling

The invented spelling test (Nicholson, 2005) contained 18 relatively simple words (e.g. lump, side, jail). This measure was administered with small groups of children. They were aurally provided with the word, then a sentence using the word, and then the word was repeated in isolation. Participants responded by writing the target word next to the corresponding number on their answer sheet. Scoring was undertaken in two ways for this measure. The first was simply to assign a mark for each correctly spelled word (for a maximum score of 18). In the second scoring process (phoneme scoring), between zero and four points were given for each word depending on how well the spelling portrayed the phonemes in the word (the maximum score was 72). Children's errors in the invented spelling assessment were used to determine the approximate level of their spelling development. A problem solving chart was provided to enable analysis of miscues and suggested activities for remediation (Nicholson, 2005).

Teacher Surveys

A brief survey (See Appendix E) about the methods and activities the control group teachers used to instruct children in reading and spelling in the classroom was distributed and completed by the two control group class teachers. Questions included, for example, "How do you instruct children to approach spelling when they are writing independently?" and "What prompts do you use when children are reading aloud and come to an unknown word? Which prompts do you find the most beneficial?"

Intervention Procedures

The children in the intervention group of the current study (n=8) were taught by the researcher for 32 sessions of between 30 and 60 minutes duration over eight weeks for a total instruction time of 28 hours. The programme incorporated key features of the Benchmark Word Detectives Programme and followed a structured, predictable sequence of

lessons. Activities were designed to be engaging, interesting, and multisensory in order to maintain children’s enthusiasm and motivation. The intervention group were taught a set of key words in the initial session each week. The key words were selected by the researcher based on the inclusion of a dependable rime unit from Wylie and Durrell’s (1970) list of 37 dependable rimes (See Figure 2). These rime units are dependable as their pronunciation is consistent across words, and in addition, over 500 basic English words can be made with them. Initial consonants or consonant clusters were selected to provide instruction and practice with a range of blends, digraphs, and consonant strings (e.g. str-ing, bl-ack, br-ight, sn-ore). The key words were added to a word wall after their introduction, to be used as a resource throughout the programme. The word wall was a large blue corrugated cardboard tri-fold board, to which large boldface printed copies of all the key words were attached as they were introduced each week. The board was easily portable so it could be moved if the location of the teaching session was changed.

-ack	-ash	-ick	-it
-all	-at	-ide	-ock
-ain	-ate	-ight	-oke
-ake	-aw	-ill	-op
-ale	-ay	-in	-ore
-ame	-eat	-ine	-or
-an	-ell	-ing	-uck
-ank	-est	-ink	-ug
-ap	-ice	-ip	-ump
			-unk

Figure 2. The 37 Dependable rimes (Wylie & Durrell, 1970).

The content of each session was flexible and catered for children’s needs. Some of the specific activities evolved or changed completely over the weeks. However, they all followed a pattern.

Daily Introduction

At the beginning of each session goals were outlined in order to clarify tasks and strategies for analysing and decoding words. Achievements, difficulties, and discoveries about

language from the previous session were briefly discussed. The goal of discussion was to increase students' metacognitive awareness of the ways in which they can take control of their learning and to celebrate enthusiasm and success. Providing the children with an understanding of the rationale for the methods they were learning improved their motivation to use the strategies (Gaskins et al., 1998b; Gaskins, 2004).

Key words for the week are introduced

In the first week of the programme three key words were introduced and used as the basis for the instructional programme. By week three, the children were familiar with intervention procedures and the researcher was able to increase the number of key words introduced to five.

Specific instruction

Strategy instruction was provided to equip the children with a useful, effective set of tools that may be used to decode an unknown word. Learning that vowels can be pronounced a number of different ways, often depending on the surrounding letters, encouraged children to try different vowel pronunciations, starting with the most common one and then attempting others until the correct pronunciation is arrived upon (e.g. 'oo' as in 'moon', 'book', 'blood' or 'pool'). Another strategy that was taught was to search for parts of words that are known or can be easily decoded by analogy to a known word. When decoding an unknown word, particularly a longer, challenging word, searching for spelling patterns or chunks within it that are known, or that occur in an analogous word, is a useful method to begin decoding the word. Identifying affixes and reducing a longer word to its root form is another strategy that serves to make decoding more straightforward and manageable. Analogy strategies can be applied in conjunction with any other strategies to further facilitate decoding.

Word Analysis

After the introduction of the key words for the week, the words were then fully analysed, which meant a study of the letters, their corresponding phonemes and their spelling pattern or rime. A template (See Figure 3) was used to guide the analysing process, which was also

modelled by the researcher (Gaskins et al., 1998b). In weeks one to three of the intervention programme, analysis was modelled by the researcher, and then completed by the children as a written task using their own copy of the analysing words template. Children then read their analyses aloud. After week three, the group were confident enough in the process to fully analyse words verbally; this was done individually (using self-talk), in pairs, or as a group.

Analysing Words	
1.	The word is _____
2.	Stretch the word. I hear _____ sounds.
3.	I see _____ letters because _____
4.	The spelling pattern is _____
5.	This is what I know about the vowel _____ _____
6.	Another word on the Word Wall like _____ is _____. They are alike because _____

Figure 3. The Talk to Yourself Word Analysis Chart (Gaskins et al., 1998).

Weekly poem

Guided practice in word analysis was ultimately aimed at increasing the number of fully analysed words in the children's lexical memories, so that their ability to apply this knowledge to the decoding of unknown words was dramatically increased (Gaskins et al., 1998b; Gaskins, 2004). The weekly poems were fully or partially written by the researcher to ensure they contained a number of key words or analogous words, and were appealing to the children (See Appendix F for examples). Poems were introduced on the first day of the week after the introduction of the new key words. Children were given their own copy of the poem and pointed to each word as it was read by the researcher. After the poem was read to the children, they participated in echo reading, a rereading strategy designed to help children develop fluency. The researcher read each line of the poem first and the children echoed back the same line, while following along in the text. In this way, the researcher modelled what fluent, expressive reading looked and felt like. On subsequent days the children took turns at reading lines from the poem while the others' followed along with

their fingers. As further practice children were provided a copy of the weekly poem on which they could search for, read, and circle or underline all the words that share spelling patterns with the new keywords or any previous keywords learnt. A copy of the weekly poem was given to each child to take home and practice reading to parents and whanau.

Generating and reading rhyming words

The children generated written lists of words that rhymed with a keyword (e.g. for the keyword *night*, the children generated the list; *light, might, fight, fright, tight, bright, sight, right, dight, white, kite, bite*). Children took turns to contribute to a group list of rhymes that were arranged by the researcher into rhymes that shared the key spelling pattern, rhymes with a different spelling pattern, and rhymes that were non-words. Rhymes that shared a rime with the keyword were read (to themselves, a partner, or the researcher) in the format “If I know (e.g. night), then I know (e.g. light)”.

Spelling with Elkonin boxes

A prepared template, based on Elkonin boxes (Elkonin, 1973), was used so that children were able to develop the ability to segment words into their constituent phonemes. The children were provided with a template sheet (See Figure 4) containing an array of boxes. They were instructed in how to stretch out the sounds in the target word and assign one sound per box, and to put an ‘X’ in any remaining boxes to indicate that the word only contains the sounds specified. The amount of modelling required for this activity was initially high as children became confused by the difference in the number of letters and the number of sounds contained within some words, e.g. chain, ship, blame.

sh	i	p	x	x
l	igh	t	x	x
t	r	ai	n	x

Figure 4. Spelling with Elkonin boxes (Elkonin, 1973).

Spelling test

Each Thursday during the intervention, a spelling test was administered containing rime analogues of previous and current keywords. The tests were shorter in the first half of the intervention as fewer keywords had been learnt. In the second half of the intervention (weeks 4 – 8) more words had been analysed and learnt and the tests consisted of 25 words.

Rhyming word sort

This activity was used in the first four weeks of the intervention programme to provide further practice and reinforcement at identifying and writing words containing key patterns. Children were provided a template sheet with the correct number of spaces, and another sheet containing key word analogues in random jumbled order. Children identified the rime and entered it in the bubble above each list and then assigned all the words on the sheet to a list depending on the rime. To add challenge to this activity, longer words into which the key spelling patterns were embedded (e.g. unsinkable, broken, sticker) were used in the random order word sheet.

Looking through words

This activity was undertaken as an introduction to the concept of reading difficult or *challenge* words. A challenging word was introduced bit-by-bit beginning with a single letter; then on every subsequent line small changes were made/added until the complete word appeared (See Figure 5). Children were able to read each stage easily and therefore were able to read a word that they may not have even attempted had it been presented in its entirety initially.

Compare/contrast - challenge words

This guided practice activity involved the decoding of tricky challenge words that were selected by the researcher to ensure they contained one or more of the spelling patterns being studied that week and in some cases, a relevant affix. This activity provided an immediate opportunity to put strategy instruction into practice. A sheet with a list of sentences containing an underlined challenge word was provided to each child. Children initially looked for any key spelling patterns, smaller words, or affixes that they were able to

recognise, and either circled them or wrote them below the word. These portions were pronounced using an analogy strategy to the relevant keyword before moving on to addressing the remaining part(s) of the word. This activity concentrated the children's attention on discriminating spelling patterns and applying an analogy strategy to use what they already knew to decode unknown words that they would previously have been reluctant to attempt (See Appendix G).

not
noc
noc go
noc o
noc o kate
noc o skate
noc o late
choc o late
chocolate

Figure 5. Looking through words.

Changing the vowel sound to create pseudowords

In this activity children selected one or two key words from the word wall and replaced the vowel(s) with another to create a pseudoword (e.g. blink - blunk, name - neme) which was then either taught to or tested on a partner. This activity provided decoding practice and an opportunity for peer instruction and modelling.

Partner reading

The children read the weekly poem aloud to a partner who would listen and offer strategy suggestions and clues for the reader when they made reading mistakes. The purpose of this was to improve the children's self-confidence and image of themselves as capable learners (Gaskins, 1998b; Gaskins, 2005).

What's In My Head?

Up to five clues were verbally provided by the researcher on the identity of a mystery word that shared a spelling pattern with a word from the word wall (See Figure 6). Children wrote

a guess for every clue, modifying their answers as new clues were provided. This activity further reinforced phonemic segmentation and analysis of words, by encouraging children to think about what they knew about language and sound-letter matches.

My word has _____ sounds. It has _____ letters. The vowel makes the same sound as you hear in _____. The word begins with the same letter as the word _____. The word ends with the same letter as the word _____. The spelling pattern in the word is _____.

Figure 6. Examples of clues provided for What's In My Head activity

Writing tasks

The last teaching session of the week contained a writing task. Examples of writing activities included writing a new verse for the weekly poem, (See Appendix F) creating imaginative sentences using keywords, or writing a response to the poetry.

A summary of the way in which the activities were distributed over the weeks of the intervention programme as the children's skills developed is shown in Table 2. The final week was used to consolidate the material learnt to date and to practice applying skills and strategies. The remaining rimes left in the 37 dependable rimes that had not been covered were introduced. These rimes were initially omitted due to time constraints and had been selected for omission based on their simplicity or similarity to another learnt rime. During week seven, instruction was specifically planned around the differences in pronunciation of the vowel sound 'o' in a number of different words, in addition to the set key words for the week, some of which did not have dependable rimes.

The children were given a booklet of activities that were based on the ones that had been taught during the intervention sessions (e.g. rhyming word sort, generating rhyming words, and keyword word search) to take home and complete over the two-week school holidays

that fell in the middle of the intervention programme (See Appendix H for examples). This was designed to reinforce their learning and minimise any regression effects due to the break away from school and the programme.

Table 2

Instructional activities as a function of intervention week

Phase of intervention	Day 1	Day 2	Day 3	Day 4
Every Week	Introduction Strategy instruction	Introduction Strategy instruction	Introduction Strategy instruction	Introduction Strategy instruction
	Key words introduced	Generating and reading rhyming words	Spelling test Partner reading	Writing tasks
	Word analysis Weekly poem introduced			
Weeks 1-4		Rhyming word sort	What's in my head?	
		Spelling with Elkonin boxes		
Weeks 4-8		Looking through words	Changing the vowel	Compare/contrast of challenge words

Summary

This chapter explained the research methodology of the present study. The study aimed to provide an eight week intervention programme based on a modified version of the Benchmark Word Detectives Programme (Gaskins, 1998b). The intervention programme was designed to explicitly teach the use of analogy strategies to a group of year three and four children with reading and spelling difficulties. The study involved a non-randomised, pretest-intervention-posttest design with one control group. The intervention lessons were delivered in a quiet area away from the main classroom. There were 32 lessons of 30-45 minutes duration. The children in the intervention and control groups were assessed in a

number of literacy related measures prior to commencement of the intervention and after its conclusion. The results are presented in chapter four.

Chapter 4: Results

The purpose of this study was to investigate the effects of a modified version of the Benchmark Word Detectives Programme on the spelling and decoding skills of a group of year three and four children with reading and spelling difficulties. It was expected that the programme would result in children from the intervention group making accelerated progress in comparison with those in the control group. A non-randomised, one-control group, pretest-intervention-posttest design was used to examine the effects of the intervention over time. The significance level for all analyses was set to $p < .05$ due to the small sample size.

This chapter presents the results of the analysis carried out to address the three hypotheses. The first hypothesis was that explicit training in analogy strategies based on a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties would lead to improvements in letter-sound knowledge and phonemic awareness. The second hypothesis was that the explicit strategy-based instruction provided in the modified version of the Benchmark Word Detectives Programme would lead to improvements word decoding and spelling. The third hypothesis was that the explicit strategy-based instruction provided in the modified version of the Benchmark Word Detectives Programme would lead to generalisation of new skills to the decoding and spelling novel words.

A one-way analysis of variance (ANOVA) was conducted to compare the mean scores for each of the assessments for the control and intervention groups at the pretest phase. The result of this analysis demonstrated that there was no significant difference between the groups on any pretest measure with the exception of the invented spelling assessment, $F(1, 13) = 4.80, p = .047$. When the same assessment was scored according to the number of phonemes represented, no significant difference in the progress of the control and intervention groups was apparent, $F(1, 13) = 1.10, p = .11$. Overall, the two groups (control and intervention) were closely matched in their vocabulary, reading, and spelling abilities at the pre-intervention phase.

Receptive Vocabulary

The mean standard scores for the *Peabody Picture Vocabulary Test (PPVT III form B)* (Dunn & Dunn, 1997) were 101.13 (SD = 8.18, range = 93-114) for the intervention group, and 96.14 (SD= 12.56, range = 80-112) for the control group. This assessment was undertaken at pretesting to make sure that both groups had a similar level of receptive vocabulary. The results of a one-way ANOVA show that the groups mean scores for the PPVT did not differ significantly $F(1,13) = .851, p = .373$.

Letter Name and Sound Knowledge

Letter name knowledge was assessed at the same time as letter sound knowledge, but the results were not analysed as children in both the control and intervention groups attained ceiling scores. At posttest, both groups scored highly, however, the intervention group attained higher average scores for both lower case (mean = 25.63) and upper case (mean = 25.75) than the control group (See Table 3).

Table 3

Means and standard deviations for measures of letter sound knowledge reading as a function of group and time of testing

	Pretest				Posttest			
	Intervention n=8		Control n=7		Intervention		Control	
	M	SD	M	SD	M	SD	M	SD
Letter Sounds								
Lower case (26)	22.25	2.05	23.29	1.50	25.63	0.74	24.57	1.27
Upper case (26)	22.63	2.72	23.86	1.95	25.75	0.46	24.29	1.50

A repeated measures ANOVA was used to establish the effect of the intervention on the children's letter-sound knowledge. The independent variable was group type (intervention group and control group). The dependent variable was letter-sound knowledge (upper and lower case). There was a main effect of time within-groups for letter sound knowledge, $F(1,$

13) =19.33, $p = .001$, indicating that both groups improved in their knowledge of letter sounds over time. There was no main effect of group-type $F(1,13) = .01$, $p = .919$, but there was a significant interaction $F(1,13) = 6.56$, $p = .024$. The interaction showed that the intervention group made significantly greater improvement over time. The interaction was significant overall when upper and lower case letters were analysed together, but when separate analyses were conducted the interaction was significant for lower case letters only.

Analogy Use in Word Reading

The Test of Analogies (Greaney, 1992) was used to assess the participants' ability to make use of orthographic analogies in word reading. The intervention group had higher scores at pre and posttest, and made greater gains than the control group during the intervention phase (See Table 4). More words were read correctly by children in both groups when the words were categorised according to common spelling patterns (comprising one line of five words each on the stimulus sheet). However, there were two children (one from the control group and one from the intervention group) who read more words correctly in the random order condition. One of the children stated that she found this condition easier and that the categorised words were more confusing. The difference between the numbers of words read correctly in the random order and the categorised conditions remained proportionately similar from pretesting to posttest for both groups.

Data on number of words read correctly as a function of position of the target spelling pattern were analysed. Half of the words ($n=50$) contained spelling patterns in the rhyme/rime position, (e.g. *-ight* in *light* and *right*), and the other half contained embedded spelling patterns (e.g. *-ur* in *nurse* and *burn*). Both groups read more words correctly when the spelling pattern was in the rime/rhyme position. For example, the intervention group's average scores in this condition were 43.00 for rimes in random order and 44.88 for categorised rimes, compared to 38.88 and 40.13 respectively for embedded rimes. The lowest scores for both groups were attained for reading words with embedded spelling patterns presented in random order (See Table 4).

Table 4

Mean number of words read correctly in the Test of Analogies as a function of group, word order, and position of spelling pattern.

	Control Group		Intervention Group	
	Mean	SD	Mean	SD
Pretest				
Random Order Total (100)	60.86	19.39	71.75	13.21
Embedded position (50)	27.00	11.31	33.25	10.53
Rime position (50)	33.86	9.12	38.50	5.83
Categorised Total (100)	65.43	19.44	76.50	13.22
Embedded position (50)	31.29	11.63	36.37	6.93
Rime position (50)	34.14	9.19	40.13	6.79
Posttest				
Random Order Total (100)	61.00	21.70	81.25	10.85
Embedded position (50)	28.86	12.40	38.88	6.51
Rime position (50)	31.71	9.41	43.00	3.93
Categorised Total (100)	66.71	18.63	85.00	11.59
Embedded position (50)	29.71	10.52	40.13	8.27
Rime position (50)	37.00	9.54	44.88	3.60

Phonemic Awareness

Phonemic awareness scores at pretest were 35.25 and 32.29 for the intervention and control groups respectively (See Table 5). By posttest the mean score in the GKR was 38.88 for the intervention group and 36 for the control group. A repeated measures ANOVA was carried out on the component subtests and the total score of the GKR. There was a main effect of time within-groups for the segmentation $F(1, 13) = 34.82, p < .001$, initial deletion, $F(1, 13) = 10.10, p = .007$, final deletion, $F(1, 13) = 19.33, p = .013$, and final substitution $F(1, 13) = 8.28, p = .033$ subtests of the GKR. There was a main effect of time within-groups for the total score, $F(1, 13) = 62.28, p < .001$, and although there was no main effect for group type $F(1,13) = 0.54, p = .474$, there was a significant interaction $F(1,13) = 4.94, p = .045$, demonstrating that the intervention group made significantly greater improvement in phonemic awareness over time than the control group.

Table 5

Means and standard deviations for measures of phonemic awareness as a function of group and time of testing

	Pretest				Posttest			
	Intervention n=8		Control n=7		Intervention		Control	
	M	SD	M	SD	M	SD	M	SD
GKR (Maximum Score)								
Segmentation (7)	4.63	1.06	5.29	1.26	7.00	0.00	6.29	0.76
Blending (7)	5.63	1.41	5.86	1.07	6.38	1.06	6.14	1.46
Deletion initial (7)	6.38	0.74	5.86	1.57	6.89	0.35	6.71	0.76
Deletion final (7)	4.25	1.49	5.29	1.38	6.13	1.13	6.14	1.21
Substitution initial (7)	6.00	0.76	5.71	1.13	6.50	0.76	6.00	1.29
Substitution Final (7)	4.88	1.13	4.29	1.98	6.00	0.76	4.71	2.14
Total Score (42)	35.25	1.98	32.29	5.59	38.88	2.90	36.00	4.62

Isolated Word Reading and Decoding

The control group scored higher than the intervention group in decoding at pretest. The mean for the control group was 15.43, compared to 12.63 for the intervention group (See Table 6). However the results of a one-way ANOVA indicate that this difference was not significant ($F(1,13) = .994, p = .337$). At posttest the intervention group mean was 29.38 compared to 21.86 for the control group (See Table 6). The Burt Word Reading test (Gilmore et al., 1981) was used to assess the children's ability to read real words isolated from context. At pretest, the control group ($m = 37$) and intervention group ($m = 38$) means were similar (See Table 6). Posttest means were 45.38 for the intervention group and 37.86 for the control group, indicating that the intervention group made greater gains than the control group in context-free word reading.

In order to investigate the effectiveness of the intervention for word reading, a repeated measures ANOVA was carried out for each of the two isolated word reading assessments. For the decoding test, in which pseudowords were used, there was an overall main effect of time $F(1, 13) = 77.32, p < .001$ indicating that both groups improved significantly in decoding over the period of the intervention. There was no main effect of group type, $F(1, 13) = .62, p = .44$, however, there was a significant interaction $F(1,13) = 15.33, p = .002$

demonstrating that the intervention group made significantly greater gains in decoding than the control group (See Figure 7).

Table 6

Means and standard deviations for measures of isolated word reading as a function of group and time of testing

	Pretest				Posttest			
	Intervention n=8		Control n=7		Intervention		Control	
	M	SD	M	SD	M	SD	M	SD
Bryant Test of Basic Decoding Skills								
Total words (50)	12.63	5.40	15.43	5.47	29.38	7.33	21.86	6.74
Burt Word Reading Test								
Total words (110)	38.00	11.15	37.00	9.83	45.38	11.39	37.86	8.23

A repeated measures ANOVA was conducted on the results of the Burt Word Reading Test to establish the effects of the intervention on the children’s context-free word reading.

There was a main overall effect of time $F(1, 13) = 6.76, p = .022$, but no significant effect of group type $F(1, 13) = .70, p = .418$. The interaction between time and group was close to reaching significance ($F(1,13) = 4.24, p = .06$).

Spelling

The intervention group’s pretest scores on the invented spelling measure were higher than those of the control group. A one-way ANOVA revealed that the difference was significant $F(1, 13) = 4.80, p = .047$. However, the increase between the pre and posttest means (3.62 for the intervention group, and 0.43 for the control group) indicate that the intervention group improved more than the control group during the intervention (See Table 7). A repeated measures ANOVA was conducted to assess the effectiveness of the intervention for invented spelling. The independent variable was group type and the dependant variable was spelling score. There was a significant effect of time $F(1, 13) = 28.90, p < .001$, a significant effect of group type $F(1, 13) = 6.21, p = .027$, and a significant interaction $F(1, 13) = 17.97, p = .001$ (See Figure 8).

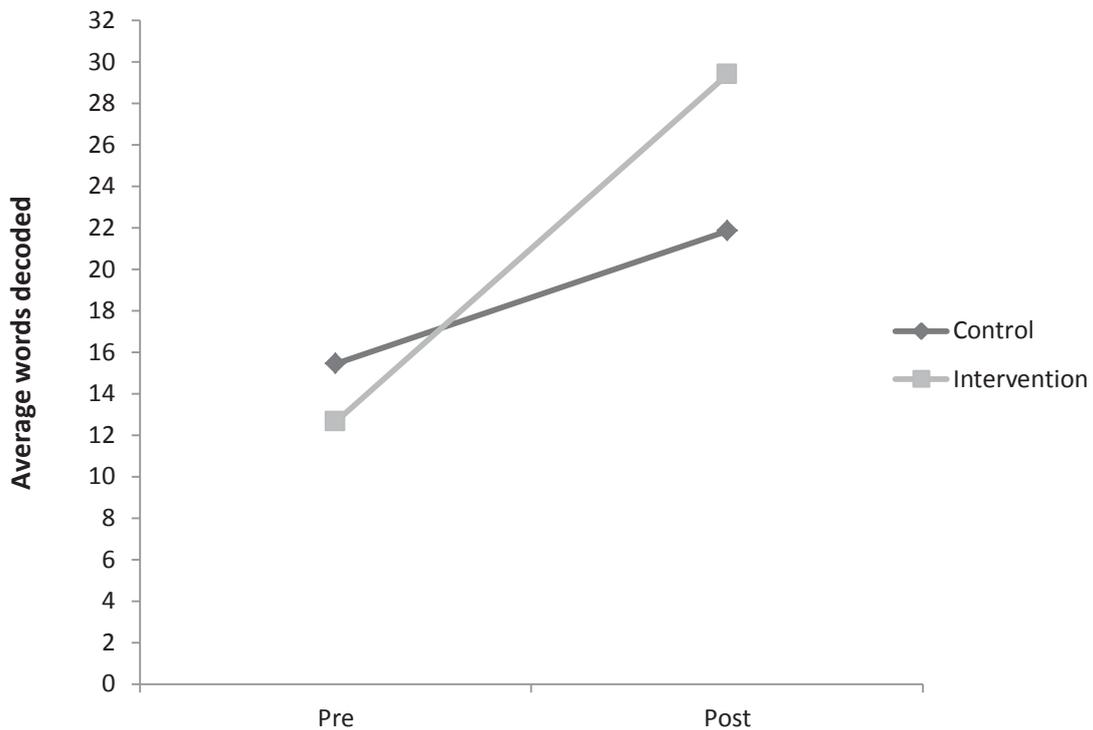


Figure 7. Mean total number of non-words decoded correctly in the Bryant Test of Basic Decoding Skills (Bryant, 1975) by the control and intervention groups as a function of time of testing

Table 7

Means and standard deviations for measures of spelling as a function of group and time of testing

	Pretest				Posttest				
	Intervention n=8		Control n=7		Intervention		Control		
	M	SD	M	SD	M	SD	M	SD	
Invented spelling									
Total words (18)	10.63	2.45	7.71	4.11	14.25	2.92	8.14	4.63	
Phonemic scoring (72)	59.13	5.74	51.00	8.52	65.88	4.51	52.86	11.70	
South Australian Spelling Test									
Total words (70)	25.75	4.71	22.29	6.58	28.75	5.39	22.14	8.25	

A repeated measures ANOVA was conducted to determine the outcomes of the intervention on spelling with a standardised spelling test, the South Australian Spelling Test (SAST;

Westwood, 2005). The intervention group had higher mean scores than the control group at both the pretest ($m = 25.75$) and the posttest ($m = 28.75$) phases (See Table 7).

Nonetheless, there were no significant effects of time $F(1, 13) = 2.40, p = .145$, group type $F(1, 13) = 2.61, p = .131$, or interaction $F(1, 13) = 2.91, p = .112$ for this measure.

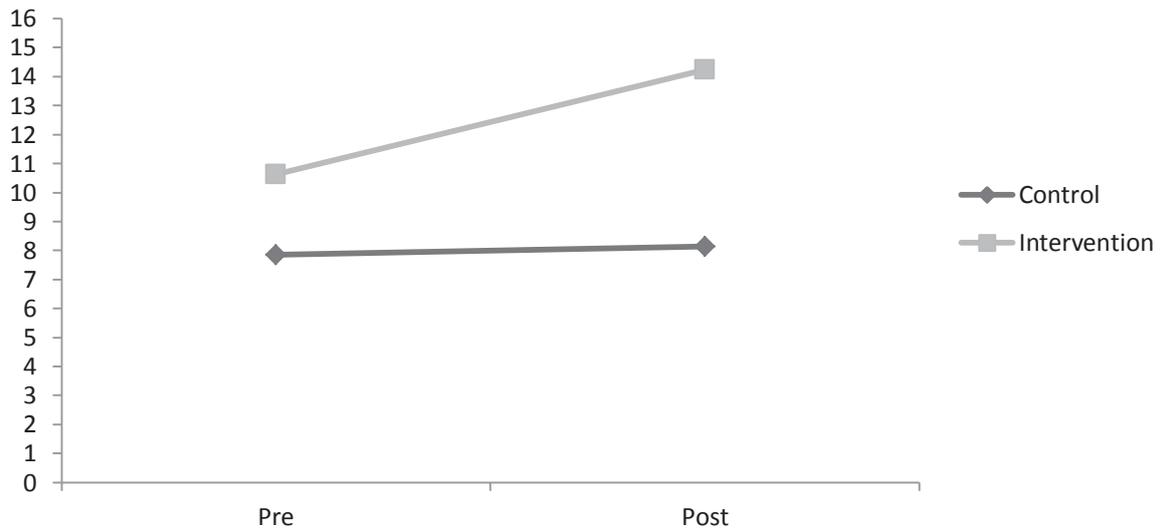


Figure 8. Mean number of words spelled correctly in the Invented Spelling Test (Nicholson, 2005) for the control and intervention groups as a function of time of testing

A further repeated measures ANOVA was carried out in order to compare the control and intervention group's progress over the course of the intervention phase when the assessment was scored phonemically. Phonemic scoring was based on how well the spelling captured the phonemes in each word. There was a significant main effect of time $F(1, 13) = 10.75, p = .006$, and group type $F(1, 13) = 7.11, p = .019$, however the interaction $F(1, 13) = 3.48, p = .085$ did not reach significance when the assessment was scored phonemically.

An analysis of the types of spelling errors the children made was undertaken. The percentage of semi-phonemic errors made by children in the intervention group halved during the intervention phase (See Table 8). In addition, the number of correctly spelled words increased from a mean of 59% at pretest to a mean of 79.2% at posttest for the intervention group. Conversely the control group mean for phonemic errors increased from 14.3 at pretest to 20.6 at posttest. The percentage of correctly spelled words increased

from 42.9 at pretest to 45.2 at posttest for the control group. In addition the children in the intervention group spelled words with increasing conventionality, even if they were still incorrect. For example, at pretest a child spelled the word fill as filp. At posttest her attempt, fil, while still incorrect was more conventionally spelled and more phonetically accurate. Similarly, another child spelled the word yell as yeuy at pretest, and yal at posttest.

Table 8

Analysis of percentage of each error type and of correctly spelled words for the intervention and control groups as a function of time of testing

	Pretest		Posttest	
	Intervention n=8	Control n=7	Intervention	Control
Spelling Analysis %				
Semi-phonemic	22.9	39.7	11.1	27.8
Phonemic	7.9	14.3	6.25	20.6
Transitional	11.1	3.2	3.5	6.3
Correct	59	42.9	79.2	45.2

Use of analogy strategies

Spelling tests comprising of 25 words containing the key rime patterns, i.e. words that were analogous to key words, from the current and past weeks were administered weekly. The tests contained no key words and the word wall was not visible during the tests. Therefore, the tests were a measure of how well the children were able to use an analogy strategy to spell novel words. In weeks one to four of the intervention programme the tests were completed collaboratively. In the final four weeks of the intervention they were completed individually. The number of words spelled correctly by each participant in spelling tests administered during week's five to eight is shown in Figure 9.

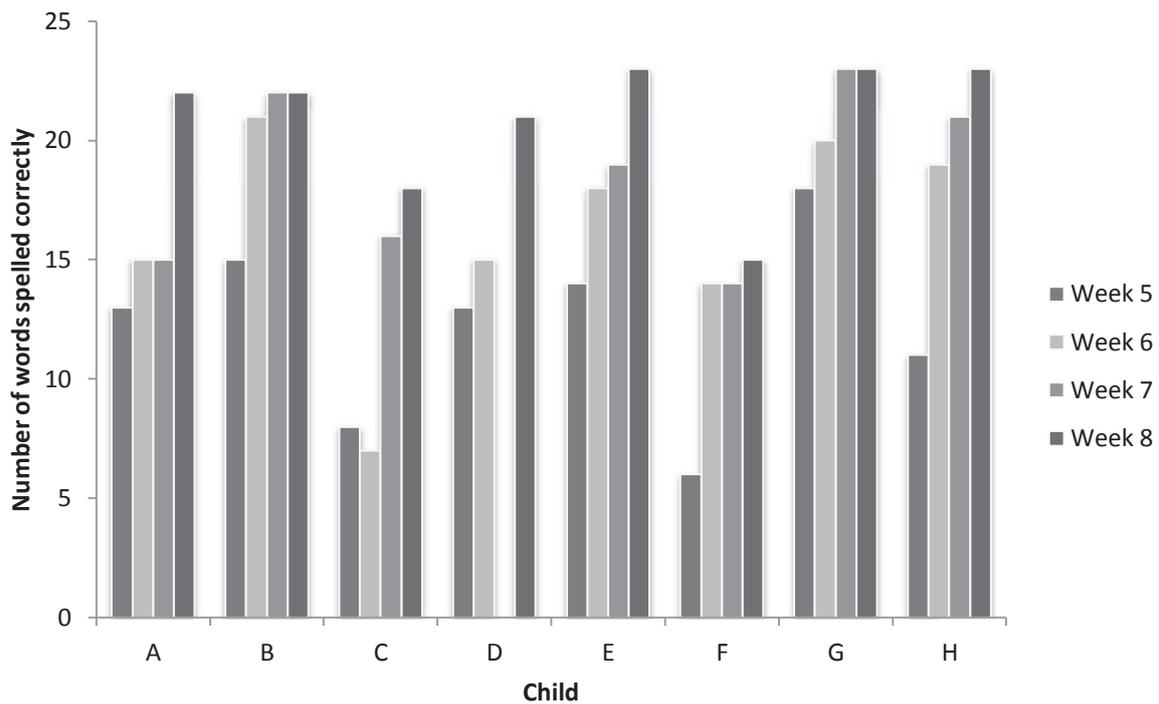


Figure 9. Number of correctly spelled words for each child in the intervention group as a function of week of intervention programme
 Note: Child D was absent in week 7

Reading in Context

The results of the Neale Analysis of Reading Ability (NARA) (Neale, 1999) produced separate scores for accuracy, comprehension, and rate of reading in context. The intervention group scored higher on all three sections of the Neale at both pre and posttest (See Table 9), but the difference between their scores and the control group's scores was not significant. There was a significant effect of time on accuracy $F(1, 13) = 88.55, p < .001$ and comprehension $F(1, 13) = 11.16, p = .005$ scores, but there were no significant differences in the amount of progress made by the control and intervention groups in this measure. There was no significant difference between groups for the rate score although the high standard deviations make interpretation of these scores unreliable.

Table 9

Means and standard deviations for accuracy, comprehension, and rate from the Neale Analysis of Reading Ability (NARA) as a function of group and time of testing

	Pretest				Posttest			
	Intervention n=8		Control n=7		Intervention		Control	
	M	SD	M	SD	M	SD	M	SD
NARA								
Accuracy	26.63	5.48	22.86	8.95	31.25	9.45	24.71	8.36
Comprehension	11.00	1.60	10.29	1.80	14.38	4.31	11.14	3.80
Rate	49.38	19.62	45.57	25.13	45.50	13.80	37.43	15.58

Teacher Surveys

The results of the teacher surveys (See Appendix E) indicated that the control group teachers approach to teaching spelling and reading were similar. For example, the way spelling homework and classroom practice was organised, and the types of strategies used to encourage spelling unknown words during independent writing. However, there were some differences, particularly in regard to the types of prompts employed when children became 'stuck' when reading aloud. The year three control group teacher will be referred to as 'Teacher A', and the year four control group teacher will be referred to as 'Teacher B'.

Teacher A and Teacher B provided a weekly list of levelled spelling words for children to practice and learn. Specific activities for learning spelling in both control group classrooms included phonics based activities, spelling rules, writing spelling words in sentences, writing definitions for the words, putting spelling lists in alphabetical order, investigating vowels, and repeated practice writing the words. Teachers A and B had similar approaches for independent spelling during writing. Children were encouraged to sound out the word and write their best attempt during drafting, then come back to the word and check it during re-working. The use of dictionaries to find the correct spelling during the re-working phase was encouraged in both control classrooms. In addition, Teacher A encouraged children to think of another word like the target word to try and help them spell it. The teachers used a combination of strategies targeted to individual children's needs to address spelling difficulties. Teacher B noted that the selection of fun spelling activities such as drawing the

word, or writing it in bubble writing, increased the enthusiasm and motivation of children who struggled with spelling.

The prompts used by the control group teachers when children were reading aloud and come to an unknown word differed in nature and priority of cues. Teacher A placed an emphasis on word level cues. For example, children were encouraged to look through the word for familiar chunks, think of language rules (e.g. magic e makes the vowel say its name), sound out the word, and think of another word that looks like that. Teacher A also used context prompts (e.g. what is the story about? What word would make sense?) when appropriate. Teacher B's primary prompts when children were reading aloud included reading on, looking at the picture, checking for sense, self-correcting, and thinking about word families (words with similar spelling patterns, including orthographic analogies). Interestingly, both teachers made use of analogy strategy prompts when encouraging children to read unknown words. Both of the control group teachers used a mixture of isolated word level instruction and reading in context in their reading instruction. They identified a range of strategies that they have found useful for helping children who are having reading difficulties. Teacher B emphasised discussion about the text prior to reading, including making predictions, looking at pictures, and making connections to prior knowledge. Teacher A emphasised individualised instruction and word-level strategies as priorities.

Summary

In summary, the results demonstrated that the intervention group and the control group were reading and spelling at similar levels at the pretest phase of the intervention. The groups also possessed comparable levels of receptive vocabulary and phonemic awareness at pre-intervention. Further, the results showed that the intervention group made greater gains over the course of the intervention programme than the control group in a number of measures. Specifically, the intervention group significantly outperformed the control group in progress in letter-sound knowledge, phonemic awareness, decoding, and invented spelling. There were no significant differences between the groups' rate of progress in

measures of letter-name knowledge, some subtests of phonemic awareness, isolated word reading, and standardised spelling.

Overall, the results indicated that an eight-week (32 session) analogy strategy-based intervention, grounded on a modified version of the Benchmark Word Detectives Programme, can accelerate the development of reading and spelling related skills to a greater degree than the regular classroom literacy programme for a group of year three and four children with reading and spelling difficulties.

Chapter 5: Discussion

The aim of the current study was to implement a modified version of the Benchmark Word Detectives Programme (Gaskins, 1998b). This involved explicitly teaching the use of analogy strategies for reading and spelling to a group of year three and four children with reading and spelling difficulties. The efficacy of the programme in accelerating children's progress in reading, spelling and phonological skills, relative to the progress made by a non-intervention control group was evaluated.

The hypotheses of this study were three-fold. Firstly, it was expected that explicit training in analogy strategies based on a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties would lead to improved letter-sound knowledge and phonemic awareness. Secondly, it was expected that explicit training in analogy strategies based on a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties would lead to gains in decoding and spelling words. Third, it was expected that the explicit strategy-based instruction provided in the modified version of the Benchmark Word Detectives Programme would facilitate generalisation of skills to decoding and spelling non-instructed words. The results of the study support the hypotheses. This chapter presents a discussion of the results in relation to previous similar studies. Limitations of the present study and implications for the teaching of reading and spelling in New Zealand schools will also be discussed.

Letter-Sound Knowledge and Phonemic Awareness

The first hypothesis was that improvements in letter-sound knowledge and phonemic awareness would result from participation in a modified version of the Benchmark Word Detectives Programme for year three and four children with reading and spelling difficulties. Including an element of explicit instruction in phonological skills was seen as vital by developers of the Benchmark Programme in light of research highlighting the connection between the level of such skills and ability to use orthographic analogy strategies. Phonological awareness, and in particular, phonemic awareness, play a critical role in reading ability (Torgesen et al., 1997). Possession of phonemic awareness is described by

Byrne et al. (1997) as a necessary but not sufficient prerequisite to reading. Children with poor phonological skills do not tend to spontaneously use rime analogies even when they have securely learnt the spelling patterns of analogous words to the ones they are attempting to decode (Goswami, 1998b). However, these children can begin using analogies provided they have access to programmes that include both phonological instruction and analogy training.

The children in the intervention and control groups scored at ceiling on a test of letter names. This was expected due to the fact that all the participants were in their third or fourth year of schooling. The intervention group made more progress than the control group in their knowledge of lower-case letter sounds to the extent that they reached ceiling scores in this measure at posttest. This finding may be related to the inclusion of explicit instruction in grapheme-phoneme correspondences in the intervention programme. Research indicates that the more functional alphabet knowledge children possess, the more likely it is that they will become fluent readers (Adams, 1990; Gaskins, 2004).

There are no New Zealand based norms for the Gough-Kastler-Roper (GKR) phonemic awareness assessment (Gough et al., 1986). However, according to Nicholson (2005) a typically achieving seven-year-old would score 35 out of 42. Pretest scores on the GKR indicated that on average, the participants in both groups possessed similar levels of phonemic awareness to a typically achieving seven-year-old prior to the intervention. While this was somewhat lower than would be expected given that the average chronological age of the children was slightly over eight years, it was sufficient to enable them to take advantage of instruction in analogy strategies. Evidence of this is provided by Brown et al.'s (1996) study, which investigated the effects of analogy instruction of the spelling behaviour of year three children. This age-group was selected by Brown et al. as they generally have good letter name and sound knowledge, but not automaticity in decoding. In this way, the children in the present study met Ehri and Robbins (1992) criteria for analogy instruction. In summary, the intervention group made significantly greater gains in phonemic awareness than the control group during the intervention. This indicates that children in the present study were at a developmentally appropriate stage to take full advantage of analogy strategy instruction.

According to Greaney et al. (1997) it is possible that struggling readers do possess the knowledge and skills they need to make use of rime-unit analogies in reading, but that they tend to rely instead on ineffective strategies such as partial letter-sound cues or sentence context. This finding is consistent with the results of the present study, which indicated that the children did have phonemic awareness, but lacked the ability to spontaneously use rime analogies. Children with reading difficulties tend to focus on the boundary letters in words at the expense of medial information (Greaney et al., 1997). This strategy is characteristic of Ehri's (1998) phonetic cue readers, who use initial and final consonants as the primary cue when identifying words (Ehri, 1998; Greaney et al., 1997). Explicit instruction in rime analogies encourages readers to focus on all the sounds in a word. In addition, spelling-sound correspondences for vowels are highly consistent in rime units, which increases the predictability of pronunciation (Greaney et al., 1997).

Decoding and Spelling Words

The second hypothesis related to expected gains for the intervention group, relative to the control group, in measures of decoding and spelling. The results supporting this hypothesis showed that the intervention group demonstrated greater gains than the control group in measures of decoding and invented spelling.

In the decoding measure, children read aloud a list of pseudowords that were referred to by the researcher during testing as 'alien words'. Pseudo words follow the same letter-sound correspondences and syntactic rules as other words, however in the absence of other cues, they can only be read through the use of phonic information. In other words, pseudowords cannot be identified orthographically or visually, so they must be "sounded out", through application of letter-sound correspondences. The control group scored higher than the intervention group at pretest in this measure. However at posttest, the intervention group significantly outperformed the control group. The analogy strategies taught to the intervention group children provided them with strategy knowledge that they were able to apply to novel words. Children in the logographic or phonetic cue phases of reading development have difficulty with decoding generally characterised by problems reading

psuedowords (Ehri, 1998). This is because they have low-level phonological skills and may not have grasped the alphabetic principle. Consequently, they are unable to make full connections between letters and sounds, and are therefore find it difficult to use phonological information to identify words (Ehri, 1992; 1998). Ehri and Saltmarsh (1995) found that children with reading difficulties who are held up in the phonetic cue phase find remembering letters in the middle of words especially challenging, and so they tend to rely on initial or final consonant sounds as their main cue for identifying words. This behaviour has been found to be more prominent in children taught to read using whole-word methods (Ehri, 1992). The significant progress made in decoding development by the intervention group indicates that the programme enhanced their phonological skills and advanced their reading towards a subsequent developmental phase.

The difference between the control and intervention group's scores in the Burt Word Reading test (Gilmore et al., 1981) did not reach significance. This may have been due, in part, to the brevity of the intervention programme. The intervention group did make better progress than the control group in this measure of context free word reading over the course of the intervention. If the intervention was of a longer duration, it is likely that these results would have reached significance.

The intervention group obtained higher scores in accuracy and comprehension measures of contextual reading at pre and posttest. However, there were no significant differences in the amount of progress made by either group during the intervention. The intervention group maintained higher scores between pre and posttest. In addition, both groups decreased in their rate of reading, effectively reducing the fluency with which they read between pre and posttest. Reduced fluency in children's reading has been associated with improvements in comprehension (Connelly, Johnston, & Thompson, 2001) although the relationship between fluency and comprehension was not tested in the present study.

A possible explanation for the lack of generalisation of intervention strategies to the decoding of unknown words in context could relate to the phase of reading development that the children were operating within. The children were capable of sight-word reading, but may have been using less efficient strategies such as partial letter-sound, or context

cues instead (Greaney et al., 1997). These strategies are typical of readers in the phonetic cue or partial alphabetic phase of reading development (Ehri, 1998). This indicates that the children did not have a thorough enough knowledge of the words in the assessment measure (or other words that share spelling or rime patterns with those in the assessment) for them to have become sight words. A large sight word vocabulary, comprised of words that are fully represented in memory, is characteristic of readers in the full alphabetic phase (Ehri, 1998; Gaskins et al, 1996-1997). Once again, the intervention programme in the present study may not have been of sufficient duration to facilitate the acquisition of such representations for the range of words encountered in the contextual reading assessment.

Results of weekly spelling tests undertaken during the intervention programme demonstrated that the children were able to use analogy strategies to decode novel words that contained rimes in common with taught keywords. The reason they were able to achieve this is likely to be because they had fully analysed the keywords to the extent that they were stored in memory as sight words. The intervention group also made significant progress in decoding. This result can be explained in terms of the phonological awareness focus of the modified Benchmark Programme. Children learned to fully analyse words, and as a result, were able to pay attention to all of the grapheme-phoneme correspondences in words, rather than, for example, concentrating overly on boundary letters (characteristic of phonetic cue phase reading). They were effectively armed with a set of efficient strategies with which to approach the decoding of unknown words.

Although the intervention group outperformed the control group in the invented spelling measure at pretest, the results demonstrated that they still made significantly greater progress in invented spelling than the control group during the intervention, and that their scores were significantly higher at posttest. While the words in the invented spelling measure may be spelled phonemically, a number of them (e.g. cake, tight) required transitional spelling knowledge. The transitional stage of spelling development is described by Ehri (2000) as being placed in between phonemic and correct spelling. Children in the phonemic stage, spell words in close correspondence to their sounds (e.g. 'her shoo is tite' for 'her shoe is tight'). In the transitional stage, children are aware that some sounds may be spelled in more than one way, or may be irregularly spelled. They begin to spell a

number of words conventionally and their errors often demonstrate knowledge of conventional spellings (e.g. spelling cake as caek) (Nicholson, 2005). The intervention group scores indicate that they had, on average, advanced in terms of the way they spelled words according to the phase model of spelling acquisition. Furthermore, invented spelling tasks have been found to improve phonological awareness, orthographic awareness, and insight into the alphabetic principle (Ouellette & Sénéchal, 2008b). Further evidence of progress in spelling development was provided in the finding that the intervention group's spelling became more conventional between pre and posttest. Even words that were spelled incorrectly at posttest showed evidence of increasing conventionality (e.g. *yell* spelled as *yeuy* at pretest and *yal* at posttest). Increased conventionality in spelling indicates progression in developmental spelling phase that reflects children's increasing knowledge of phonology, orthography and the alphabetic principle (Sénéchal et al., 2012). The results from the present study are encouraging in terms of the potential of analogy instruction to improve fundamental literacy skills.

The intervention group had higher mean scores in the South Australian Spelling Test (SAST) than the control group at both pretest and posttest. Although their scores indicate that intervention group made more progress in spelling than the control group, the difference did not reach significance. The SAST is a standardised measure of spelling achievement, and it contains a large number of exception words (such as *who*, *answer*, and *sure*). In addition, the SAST was designed to be used with children from age six to 16, indicating that only a small number of the words were at an appropriate spelling level for the children in the present study. It is likely that the discrepancy between the results of the two spelling measures in the present study can be attributed to these factors, which amount to a lack of specificity. In other words, the SAST did not seem to be sufficiently discriminative to measure the types of changes in spelling that the intervention was based upon. The more detailed analysis provided by the invented spelling measure (a more sensitive test) was able to detect these changes more accurately.

Generalisation of Decoding and Spelling Strategies

The Test of Analogies (Greaney, 1992) was used to assess the participants' ability to make use of orthographic analogies in word reading. The intervention group had higher scores at pre and posttest, and in addition, made greater gains than the control group during the intervention phase. As was expected, children in the intervention and control groups read more words correctly when the words were categorised according to a shared spelling pattern. However, the position within the words of the target spelling pattern differentially affected the children's word reading scores. Half of the words contained spelling patterns in the rhyme/rime position, (e.g. *-ight* in *light* and *right*), and the other half contained embedded spelling patterns (e.g. *-ur* in *nurse* and *burn*). On average, children in both groups scored the highest for words categorised according to a shared spelling pattern that was in the rhyme/rime position within the word. These were rhyming words, which by definition also shared an orthographic rime. The lowest scores were obtained for words presented in random order that contained embedded spelling patterns. Two children (one from each group) read fewer words correctly when they were categorised. This was unexpected, and may be explained by phonological and/or alphabet knowledge deficits that made it difficult for them to distinguish between similar words. The difference between the numbers of words read correctly in the random order and the categorised conditions remained proportionately similar from pretest to posttest for both groups. However, the intervention group made more progress in analogy word reading than the control group, indicating intervention gains.

Children were tested on words containing the key rime patterns, (i.e. words that were analogous to key words), during the intervention. The tests contained no key words and the word wall was not visible during the tests. Therefore, the tests were a measure of how well the children were able to use an analogy strategy to spell novel words. The number of words spelled correctly increased between weeks five and eight of the intervention for every child. This finding indicates that the children were using analogy strategies to spell the novel words during testing and that their ability to do so increased week by week. An analogy spelling strategy is likely to be more reliable and efficient than those advanced by other instructional approaches, such as relying on memorised spellings (difficult,

especially when writing a word not seen in print before), using the dictionary (time consuming and inconvenient), sounding words out (problematic because the pronunciation of an individual letter varies according to the surrounding letters), and asking for assistance (not always possible, does not promote independence) (Brown et al., 1996).

Direct evidence for a transfer effect from spelling and reading practice was not found in the present study. However, it was implied in the results, which demonstrated that the intervention group made significant gains in spelling and decoding. Conrad (2008) noted that both reading and spelling practice generalised to the other skill. However spelling practice was more successful at facilitating reading than vice versa. The reason for this is that unlike reading, spelling practice requires the production of letter patterns which necessitates thorough attention be paid to all letters (Conrad, 2008). Furthermore, the motor act of writing words is thought to help retain them in memory. Spelling practice readily generalises to word reading, of both the practiced words and other words that share orthographic features (Conrad, 2008). The common processes between decoding and spelling were made explicit in the present study and as a result it is likely that instruction and practice in one skill impacted on the other. The results in the present study were consistent with research findings that demonstrate the importance of combining spelling and reading instruction and practice in literacy programmes.

Literacy Instruction at School

The study was undertaken in a decile six semi-rural, full primary school in the lower North Island. The regular literacy programme at the participated school was typical of New Zealand primary schools in that it was grounded in constructivist, whole-language theory. However, the teachers also incorporated structured phonics activities into literacy sessions. The literacy planning document utilised within the participating school promotes reading cues based on whole language theory as promoted by the Ministry of Education (2003). For example, the literacy policy states that children should be encouraged to reread or read on to gain meaning, predict words using meaning, picture, sentence structure, and lastly, visual information cues. The type of teaching prompts used by teachers directly affects the ability of children to acquire metacognitive strategy based techniques for word identification that

they can subsequently apply to other novel words independently (Greaney, 2011). Individual teachers differed in their approaches to the teaching of word identification and spelling strategies, however the bias was towards whole-language theory.

Participant Feedback

The intervention class teacher was positive throughout the programme, and reported that she was pleased with the noticeable progress made by the group, particularly in spelling. The children related their enjoyment of the sessions to the researcher and were always ready and waiting for sessions to begin. During the programme a child, after successfully decoding a challenging word, declared “Miss C should do this stuff with us.” Furthermore, the activities in the modified programme were designed to be interesting and engaging, and this was evidenced during the present study. The children were eager to attend sessions and participated eagerly in the activities. For example, they reacted particularly positively to the “changing the vowel” activity as it provided a decoding challenge and an opportunity to teach their peers and show off their knowledge. Additionally, the children reported increasing self-confidence in reading and spelling during the intervention.

Limitations and Implications

Limitations

A primary limitation of the current study is the small sample size. Fifteen children were involved in the study. The intervention group consisted of eight children and the control group of seven. The small sample size makes it harder to generalise results to a larger population, potentially affecting the validity and generalisability of the study. The size of the sample was based on the number of children in the year three/four class at the participating school who were having difficulties in reading and spelling and for whom permission was gained. Another consideration in selecting the group size was the number that would be manageable for the researcher in the intervention teaching sessions to enable sufficiently intensive instruction and specific, personalised feedback.

Additional limitations were the potential differences in the way the participating teachers approached the teaching of reading and spelling. The control group was comprised of four children from one class and three from another. This was necessary due to the distribution the year three and four children within the school. The year three control group children came from a mixed year two/three class, and the year fours from a year four/five class. This may have been one reason the control group teachers approached reading instruction in different ways. According to the Ministry of Education, (2003) and the literacy policy of the participating school, for children between ages five and eight and a half years, instructional emphasis was on decoding words, and from eight and half onwards the emphasis changed to reading to learn and critical thinking. The intervention group children were all from the same classroom. The differences in instruction and classroom environment between and within the two groups could have affected the validity of comparisons. However, given the similar results during pretesting there was confidence that there were no significant practical differences between the control and intervention group children across classes.

The intervention was separate from regular class work and therefore the strategies taught were not reinforced by the teacher, modelled or practised during the rest of the school day. This separation was necessary from a practical point of view for the purposes of the present study, to minimise disruption to the rest of the class and reduce distractions for the intervention group children. This was achieved by having the session take place in a quiet room away from the main classroom. However, the isolation of the intervention from the regular class may have reduced its power in comparison to programmes that are undertaken by class teachers, as additional opportunities to practice applying the skills and strategies learned in the intervention sessions to regular classwork were not available. On the other hand, the advantages of teaching analogy strategies to a small group rather than a whole class tempered this limitation somewhat.

A further limitation of the present study is its brevity. Although intervention gains were made, research indicates that intervention ideally should be longer in duration if gains are to be maintained (e.g. Ehri et al., 2009; White, 2005). Additionally, it is possible that generalisation of skills into reading in context would have begun to occur if the intervention had been in place over a longer period of time. However, even given the brief duration, the

results of this study are promising. In this short period of eight weeks children were able to make significant advances in reading and spelling compared to those in the control group.

Furthermore, analogy instruction itself has an inherent limitation. The strategies taught in the present study were useful primarily for regularly spelled words, for which a number of other words that share a spelling pattern (or orthographic rime) exist. However the analogy instruction in the present study included a 'set for diversity' strategy, to encourage correct pronunciation of exception words (e.g. *laugh* and *island*). This specific strategy promoted awareness that some words are irregularly spelled and encouraged strategic problem solving when such words were encountered. Furthermore, this limitation is minimised in light of the fact that analogy instruction is a developmentally appropriate intervention that is useful in teaching children fundamental word identification skills and sufficient phonemic and strategy instruction that they may begin to become 'self-teachers' (Share, 2004). It is also worth noting that research indicates that if children fail to attain fundamental reading skills (e.g. phonological awareness and decoding abilities) by the time they reach year five, there is an increased risk they will struggle with reading and spelling in the long term (Blachman, 1997; Ehri, 1992; Spear-Swerling & Sternberg, 1996; Torgesen et al., 2005). Furthermore, interventions for older children with literacy difficulties are increasingly time consuming and costly, and are less likely to be successful (Wren, 2000).

Implications for Further Research

Further research should include a similar programme implemented over a longer duration to assess generalisation effects. It would be expected that generalisation to naturalistic writing samples would occur and this could be assessed through measurement of the increase in use of instructed rimes versus non-instructed rimes over time. Generalisation of decoding skills would be expected to occur in contextual reading and this would be likely to positively affect accuracy, comprehension, and ultimately fluency. The present study was too brief in duration for these outcomes to be practical. Future research similar to that undertaken by Brown et al. (1996) and Allen (1998) with whole classes by the regular class teacher, but in a New Zealand context would be beneficial. This type of intervention would provide opportunity for better generalisation, increased guided practice, and the advantage

of instruction being embedded into topics throughout the curriculum. It would also allow teachers to take advantage of spontaneous reinforcement of strategies and mini-lessons throughout the day. Brown et al's (1996) study was implemented by the class teacher with the whole class. Children of all abilities were found to have benefitted from the intervention, although the lower achievers made greater gains (Brown et al., 1996). This finding, together with the current findings, have significant implications for New Zealand based research, particularly in light of the tail of underachievement caused by the large number of children who start school with low levels of LCC. These children subsequently struggle to gain alphabet knowledge and attain phonological awareness in classrooms where literacy instruction is grounded in whole language theory.

Implications for Practice

The present study provides support for the benefits of a modified version of the Benchmark Word Detectives analogy strategy Programme. The modified version of the programme is not overly time consuming or costly to implement. The programme could quite easily be integrated into a regular classroom curriculum, and in fact research indicates that such programmes are more successful when implemented in classrooms (Allen, 1998; White, 2005). This is because the teacher is able to take advantage of teachable moments as they arise, and of opportunities to encourage the use of analogy strategies and word walls in reading and spelling (White, 2005). Gaskins et al. (1995) found a significant positive relationship between children's decoding development and the amount of time their teachers spent reinforcing the use of analogy strategies, in addition to regular specific lessons.

Conclusion

The predominant approach to reading instruction that has been in use in primary school classrooms throughout New Zealand for the past 40 years is grounded in constructivist, or whole-language theory and is based on the assumption that learning to read is as natural as learning speak (Smith & Elley, 1994, 1997; Tunmer & Nicholson, 2011). However, currently up to 20% of six-year-olds fail to make adequate reading progress in their first year at school

(Tunmer & Nicholson, 2011). One of the major reasons so many children fail to progress in literacy is that they have poor phonemic awareness skills and are unlikely to have grasped the alphabetic principle. The chances of them doing so are reduced by exposure to whole-language instruction. As time goes by these children's problems are likely to be exacerbated by negative Matthew effects causing them to fall further behind. In fact, children who have reading and spelling difficulties in their fourth year of school have an increased risk of continuing to struggle with reading and spelling throughout their lives (Torgesen et al., 2005; Wren, 2000).

Analogy strategy based instruction such as that provided by the Benchmark Word Detectives Programme and other similar programmes that are based on the Benchmark version show potential for use in New Zealand classrooms. Analogy instruction promotes the development of a large base of sight words that can support the reading or spelling of unfamiliar words through analogy to the learnt words (Conrad, 2008). Another advantage of analogy instruction is that it can be delivered individually, to groups, or holistically, as part of the whole-class literacy curriculum (Brown et al., 1996). A further advantage is the metacognitive emphasis of analogy strategy instruction, which enables children to make their own discoveries about the way our language works, and to be flexible when selecting strategies based on the current situation (Gaskins, 1998a; Gaskins et al., 1995).

The key findings from the present study were that an eight-week (32 lesson) small-group intervention focusing on orthographic rime-based analogy strategies significantly improved children's letter-sound knowledge, phonemic awareness, decoding and spelling skills compared to that of a control group. These findings suggest that a modified version of the Benchmark Word Detectives Programme can be effective in improving the skills of New Zealand children in years three and four who struggle with reading and spelling.

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Appendices

Appendix A

Example Weekly Plan

Week Five

Week Five

Keywords

- crash
- shock
- tale
- thank
- blink

Day One Activities

- Introduce key words
- Fully analyse key words – talk with self/partner
- Spelling with elkonin boxes
- Make a list of rhyming words for keywords
- Reading weekly poem – echo-read

Day Two Activities

- Generate lists of rhyming words for our new keywords. Read rhyming words using “If I know then I know”
- Echo read poem
- Rhyming word sort
- Compare contrast strategy – model and work on compare/contrast worksheet

Day Three Activities

- Echo read poem – around the table
- Find keywords and spelling patterns in poem
- Self-assessing and sharing with a partner
- Introduce tomorrow's writing activity – think and plan.

Day Four Activities

- Spelling test
- Discoveries about language. Model and share. Discuss discoveries.
- Writing. What would you do if it weren't for mum?
- Finish rhyming word sort

Appendix B

Ethics approval letter.

School letter.

Principal, Teacher, and Parent Information sheets.



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

1 October 2012

Angela Evans
35 Hongi Street
Ohakea
MANAWATU 4816

Dear Angela

Re: HEC: Southern B Application – 12/45
The effect of teaching analogy-based reading strategies to children in Years 3 and 4

Thank you for your letter dated 28 September 2012.

On behalf of the Massey University Human Ethics Committee: Southern B I am pleased to advise you that the ethics of your application are now approved. Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Dr Nathan Matthews, Chair
Massey University Human Ethics Committee: Southern B

cc Mr Keith Greaney
School of Educational Studies
PN900

Dr Alison Arrow
School of Educational Studies
PN900

Prof Howard Lee, HoS
School of Educational Studies
PN900

07 September 2012

Dear Sir/Madam

I am writing to request permission to conduct a research study in your school. I am a graduate student of educational psychology at Massey University, studying towards a Master of Educational Psychology degree. Next year I will be doing a research project on the effect of teaching children some analogy-based strategies to help them with reading and spelling. The study is called: The effect of teaching analogy-based reading strategies to children in years 3 and 4.

My research plan is to examine the effect of intensively teaching a group of year 3 and 4 children, who are having difficulty learning to read fluently, analogy-based strategies to help them with word recognition, reading in context, and spelling. If permission is granted, I would need to come into school on a daily basis for around eight weeks to work with a small group of year 3 and/or 4 children who are having some difficulties with reading and spelling. The sessions would be conducted during class time, with specific details arranged to be negotiated with the teachers. Informed consent would be obtained from the teachers and parents or guardians of participants prior to the study starting. Further details about how the study would work are provided in the enclosed draft information sheets. Confidentiality of any identifying information is assured at all times, including that of the children, families, teachers, and school.

Your approval for me to conduct this research would be greatly appreciated. If you have any questions about this study please feel free to contact myself or my supervisors using the contact details below.

Student researcher: Angela Evans, phone 0211279487, email ang.evans.2001@gmail.com
Supervisors: Keith Greaney (contact details); Alison Arrow (contact details)

Yours Sincerely

Angela Evans

Enclosures

The Effect of Teaching Analogy-based Reading Strategies to Children in Years 3 and 4.

SCHOOL INFORMATION SHEET

Researcher's Introduction

My name is Angela Evans and I am studying towards my Master of Educational Psychology degree with Massey University. My thesis research plan is to examine the effect of intensively teaching a group of year 3 and 4 children with literacy learning difficulties, analogy-based strategies to help them with word recognition, reading in context, and spelling.

Project Description and Invitation

Children participating in this research project will be individually assessed using a variety of short tests of reading related skills at the beginning of the project and again at the conclusion of the intervention. The intervention itself will consist of daily sessions with the researcher and a small group of children. These sessions will be carefully structured to teach the participating children how to use analogy strategies (for example, using knowledge of 'cave' to decode 'save') in their reading and spelling. Research indicates that children who are having difficulties with reading and spelling may benefit from specific instruction in analogy strategies. Session times will be negotiated with the class teacher to minimise disruption to the children's regular school day. A control group of children who are reading at a similar level to the intervention group will receive the assessments only. I would be grateful if (your school/teachers and staff/children from your class) would agree to participate in/assist with this study.

Participant Identification and Recruitment

This research project is targeted for children in years three and four, who have been identified as having fallen behind the level that is expected for their chronological age in reading and spelling. Potential participants can be nominated by the classroom teacher who would then forward information sheets and consent forms to the children and their parents or caregivers. Up to 10 participants may be included in each group (intervention and control). This is the maximum that would be manageable for the teaching sessions. It is not anticipated that there will be any risk or discomfort for the participants, however if any issues that cannot be resolved arise, children may be withdrawn from the study.

Project Procedures

Children will be taught by the researcher for up to 30 minutes per school day for the duration of the research project (approximately 8 weeks). Including assessments the total time involved for the participating children will be approximately 15 hours. The time and specific location of teaching sessions will be arranged by negotiation with the class teacher.

Data Management

All identifying information, including that of participating children, teachers, and the school, will be kept strictly confidential. All data will be collected using a numerical coding system so children cannot be identified. Data will be stored securely until such time as it is destroyed. The final report will not identify any individual or school.

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- withdraw from the study;
- ask any questions about the study at any time during participation;
- be given access to a summary of the project findings when it is concluded.

Project Contacts

If you have any questions about this study please feel free to contact myself or my supervisors. Contact details are provided below.

Student researcher: Angela Evans, phone 0211279487, email ang.evans.2001@gmail.com
Supervisors: Keith Greaney, phone 06 356 9099 extn 84461, email k.t.greaney@massey.ac.nz;
Alison Arrow, extn 84460, email a.w.arrow@massey.ac.nz.

Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 12/45. If you have any concerns about the conduct of this research, please contact Dr Nathan Matthews, Acting Chair, Massey University Human Ethics Committee: Southern B, telephone 06 350 5799 x 8729, email humanethicsouthb@massey.ac.nz

The Effect of Teaching Analogy-based Reading Strategies to Children in Years 3 and 4.

TEACHER INFORMATION SHEET (INTERVENTION/CONTROL)

Researcher's Introduction

My name is Angela Evans and I am studying towards my Master of Educational Psychology degree with Massey University. My thesis research plan is to examine the effect of intensively teaching a group of year 3 and 4 children, who are having difficulty learning to read fluently, analogy-based strategies to help them with word recognition, reading in context, and spelling.

Project Description and Invitation

Research indicates that children who have some difficulties with reading and spelling may benefit from specific instruction in analogy strategies. This study will investigate the effects of a modified version of the Benchmark Word Detectives Programme, designed to assist children with literacy learning difficulties. I am inviting you to participate in this study.

Children participating in both the intervention and control groups in this research project will be removed from the classroom for an assessment session using a variety of short tests of reading related skills at the beginning and end of the project. The intervention itself would involve me coming into school and working with the intervention group 4/5 times a week for sessions of 20 to 30 minutes duration, for about eight weeks. These sessions will be carefully structured to teach the participating children how to use analogy strategies (for example, using knowledge of 'cave' to decode 'save') in their reading and spelling.

Participating Teacher's involvement

The teacher's involvement in the actual assessment and teaching sessions themselves will be minimal. However, I will need teachers to identify which children are likely to be suitable participants for the study and assist me by passing on information and consent documents to their parents. In addition, participating teachers will be willing to let me work with a group of up to 10 children from their class either within the classroom or in a withdrawal room for the duration of the study. Children will be taught by the researcher for up to 30 minutes per school day for the duration of the research project (approximately 8 weeks). Including assessments the total time involved for the participating children will be approximately 15 hours.

The control group of children will be selected on the same basis as the intervention group (i.e. they will be reading at a similar level) but they will receive the pre and post intervention assessments only. At the conclusion of the study I would be happy to present the findings and a summary of the techniques used as a professional development session for teaching staff. I can also provide a modified version of the intervention to children in the control group. I would be grateful if you would agree to participate in this study (in intervention/control group).

Participant Identification and Recruitment

This research project is targeted for children in years three and four, who have been identified as having difficulties with reading and spelling to the extent that they have fallen significantly behind the level that is expected for their chronological age. Up to 10 participants may be included in each group (intervention and control).

Data Management

All identifying information, including that of participating children, teachers, and the school, will be kept strictly confidential. All data will be collected using a numerical coding system so children cannot be identified. Data will be stored securely until such time as it is destroyed. The final report will not identify any individual or school.

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- withdraw from the study;
- ask any questions about the study at any time during participation;

- be given access to a summary of the project findings when it is concluded.

Project Contacts

If you have any questions about this study please feel free to contact myself or my supervisors. Contact details are provided below.

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The Effect of Teaching Analogy-based Reading Strategies to Children in Years 3 and 4.

PARENT INFORMATION SHEET (INTERVENTION GROUP)

Researcher's Introduction

My name is Angela Evans and I am studying towards my Master of Educational Psychology degree with Massey University. Before beginning my studies in Educational Psychology I worked as a primary school teacher in the UK. I am also a mother to three young children. My thesis research plan is to assess the effect of teaching year 3 and/or 4 children some analogy-based strategies that may help them develop their reading and spelling skills.

Project Description and Invitation

Children participating in this research project will be individually assessed in a range of reading related skills at the beginning and end of the project. The programme itself will consist of daily sessions working with myself and a small group of other children for about 8 weeks. These sessions will be carefully structured to teach the children how to use letter-sound relationships and analogy strategies (for example, using knowledge of 'cave' to read 'save') in their reading and spelling. Research indicates that children who have literacy learning difficulties are likely benefit from instruction in analogy strategies. Sessions will include a number of interesting, interactive, and engaging activities that should be enjoyable and stimulating for the children. *The session times will be within the school day and are to be negotiated with the class teacher to minimise disruption to your child's regular school programme.*

I would be grateful for your permission for your child to participate in this study.

Project Procedures

Children will be taught by the researcher for up to 30 minutes per school day for the duration of the research project (approximately 8 weeks). Including assessments the total time involved for the participating children will be approximately 15 hours. The time and specific location of teaching sessions will be arranged by negotiation with the class teacher.

Data Management

All identifying information, including that of participating children, teachers, and the school, will be kept strictly confidential. All data will be collected using a numerical coding system so children cannot be identified. Data will be stored securely until such time as it is destroyed. The final report will not identify any individual or school.

Participant's Rights

You are under no obligation to accept this invitation. If you decide give permission for your child to participate, you have the right to:

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The Effect of Teaching Analogy-based Reading Strategies to Children in Years 3 and 4.

PARENT INFORMATION SHEET (CONTROL GROUP)

Researcher's Introduction

My name is Angela Evans and I am studying towards my Master of Educational Psychology degree with Massey University. Before beginning my studies in Educational Psychology I worked as a primary school teacher in the UK. I am also a mother to three young children. My thesis research plan is to assess the effect of teaching year 3 and/or 4 children some analogy-based strategies that may help them develop their reading and spelling skills.

Project Description and Invitation

Children participating in this research project will be individually assessed in a range of reading related skills at the beginning and end of the project. The children will be divided into two groups; an intervention group and a control group. The intervention group will participate in teaching sessions. The control group will initially only receive the assessments at the beginning and end of the intervention. These assessments will be done during class time and will take about one to one-and-a-half hours in total. Using a control group is the best method of measuring the effectiveness of the programme as it allows me to compare the progress of the children in the intervention group with that of the children in the control group. At the conclusion of the study I will pass the findings and methods over to teachers so control group children and others can have a chance to try the techniques. I would be grateful for your permission for your child to participate in the control group of this study.

Data Management

All identifying information, including that of participating children, teachers, and the school, will be kept strictly confidential. All data will be collected using a numerical coding system so children cannot be identified. Data will be stored securely until such time as it is destroyed. The final report will not identify any individual or school.

Participant's Rights

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- withdraw your child from the study at any time;
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Appendix C

Test of Analogies

ball	tall	wall	hall	fall
farm	hard	card	start	part
boat	coat	goat	oat	float
lunch	thunder	funny	bunch	hunt
cow	now	how	brow	bow
horse	more	forget	store	morning
sheep	peep	sleep	steep	deep
mouse	around	about	house	shout
train	again	main	rain	pain
road	toast	coast	soap	moan
truck	luck	stuck	suck	muck
teacher	seat	meat	mean	neat
night	light	fright	might	right
jump	dump	mumble	lump	grumble
book	took	look	shook	hook
kitten	little	litter	sitting	glitter
leg	peg	beg	keg	dreg
moon	room	noon	shoot	boot
green	seen	been	keen	teen
nurse	burn	hurt	church	Turn

ball	more	stuck	sitting	farm
meat	keg	boat	around	might
lunch	again	mumble	keen	cow
look	church	horse	luck	sheep
beg	part	mouse	light	noon
train	dump	been	hunt	road
hurt	bow	truck	little	hall
teacher	peg	start	deep	night
oat	shout	jump	seen	bunch
book	burn	brow	moan	kitten
store	muck	leg	card	steep
moon	goat	house	right	green
main	grumble	nurse	how	soap
tall	forget	suck	glitter	hard
mean	dreg	coat	about	fight
thunder	rain	lump	teen	now
shook	turn	litter	fall	peep
toast	shoot	seat	coast	took
morning	room	pain	wall	neat
funny	hook	sleep	boot	float

Appendix D

Glossary of Phonetic Symbols

VOWELS	monophthongs				diphthongs			Phonemic Chart voiced unvoiced
	i:	ɪ	ʊ	u:	ɪə	eɪ		
	sheep	ship	good	shoot	here	wait		
	e	ə	ɜ:	ɔ:	ʊə	ɔɪ	əʊ	
bed	teacher	bird	door	tourist	boy	show		
æ	ʌ	ɑ:	ɒ	eə	aɪ	aʊ		
cat	up	far	on	hair	my	cow		
CONSONANTS	p	b	t	d	tʃ	dʒ	k	g
	pea	boat	tea	dog	cheese	June	car	go
	f	v	θ	ð	s	z	ʃ	ʒ
fly	video	think	this	see	zoo	shall	television	
m	n	ŋ	h	l	r	w	j	
man	now	sing	hat	love	red	wet	yes	

The 44 phonemes of Received Pronunciation based on the popular Adrian Underhill layout

adapted by [EnglishClub.com](http://www.englishclub.com)

The International Phonemic Alphabet (IPA). Retrieved from:
<http://www.englishclub.com/images/pronunciation/Phonemic-Chart.jpg>

Appendix E

Teacher Survey

Brief Teacher Survey

Spelling

1. What specific activities do you use to teach spelling (including homework)?
2. How do you instruct children to approach spelling when they are writing independently?
3. What do you find to be the most useful activities for assisting children who struggle with spelling?

Reading

1. What prompts do you use when children are reading aloud and come to an unknown word? Which prompts do you find the most beneficial?
2. Do you teach children to read words through isolated word study, as part of reading in context, or a mixture of these methods?
3. What do you find to be the most useful activities for assisting children who struggle with reading?

Appendix F

Examples of Weekly Poems

Week four poem:

Wordspinning

Spin slowpoke into owl spoke

Snap pans into naps

Mix backstroke into stack broke

Turn parts into traps

Switch post into stop

Whisk china into chain

Carve hops into shop

Stir marine into remain

Twist tame into mate

Make mean into name

Juggle taste into state

In the wordspinning game

Week Four Keywords; shop, chain, broke, name, ate

Note. Adapted from “Wordspinning,” by J. Foster, 2000. In P. Cookson, *The Works: Every Kind of Poem You Will Ever Need for the Literacy Hour*. London: Macmillan.

Week five poem:

Things I'd Do If It Weren't For Mum

Live on lollies, chips and ginger ale.
Trade the cat in for a Clydesdale.
Go to bed at eleven o'clock.
Fit my door with a great big padlock.
Leave my clothes all scattered about.
Play loud music, scream and shout.
Overflow the bath. Spill and splash.
Throw tantrums. Bash and crash.
Paint my bedroom red and pink.
Leave the dishes in the sink.
Find out what it's like to be me.
Let this list grow long...Get free!

PS Take my savings from the bank.
Buy an enormous shark tank.

Week Five Keywords; crash, shock, tale, thank, blink

Note. Adapted from "Things I'd do if weren't for Mum," by T. Mitton, 2000. In P. Cookson, *The Works: Every Kind of Poem You Will Ever Need for the Literacy Hour*. London: Macmillan.

Appendix G

Compare/contrast example worksheet

Compare-contrast

The new t-shirt mum bought me was nonshrinkable.

In the tree outside my window a nightingale was singing.

My maths was so hard yesterday, I was really overthinking it.

It was unthinkable that I wouldn't get to go to the party.

Mum went to the haberdashery department to buy some buttons.

To take the lid off the jar you need to turn it counterclockwise.

Dad works at the Stockbrokerage in the city.

An Ankylosaurus was a kind of armoured dinosaur.

Our next door neighbour was a grumpy, cantankerous old man.

Microscopic plants that live in the sea are sometimes called phytoplanktonic.

Appendix H

Example activities from take-home holiday booklet.

Take the beginning from a red word and match it with the spelling pattern from a blue word. Make as many words as you can. Then swap and use the beginnings of the blue words and the spelling patterns of the red ones. Some of these will be real words and some of them won't. Underline the nonsense words. You don't have to write in colour, I have just done that to show you how I made these words.

<p>stop</p> <p>choke</p> <p>train</p> <p>slate</p> <p>night</p> <p>hill</p> <p>same</p>	<p>e.g. stuck, might, <u>chack</u>, <u>prate</u></p>	<p>duck</p> <p>tell</p> <p>back</p> <p>price</p> <p>cake</p> <p>meat</p> <p>rate</p>
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See how many rhyming words you can find for each of our keywords. Underline any that rhyme but don't share the same spelling pattern.

shop	broke	chain	state	night	will	same