Primary school teachers' knowledge of phonemic awareness and its importance as a factor in learning to read

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Abstract

The purpose of this research was to gain an understanding of the knowledge that teachers in New Zealand primary school classrooms have in regard to phonemic awareness, their understanding of its importance as a factor in learning to read, and the methods they use to assess and teach it. International assessments continue to highlight an unacceptably large gap in reading achievement between good and poor readers in New Zealand primary schools (Mullis, Martin, Foy, & Drucker, 2012; Tunmer, Chapman, Greaney, Prochnow, & Arrow, 2013a). Up to 20% of children in New Zealand primary school classrooms are struggling to learn to read (Education and Science Committee, 2001, 2008; Education Review Office, 2005). Research shows that explicit instruction in phonemic awareness will help children struggling with reading to learn to read (Ehri et al., 2001; Hatcher, Hulme, & Snowling, 2004; Nicholson, 2003; Pressley, 2006; Ryder, Tunmer, & Greaney, 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). Teachers' knowledge of phonemic awareness becomes important in the context of providing this explicit instruction.

An online survey was used to assess 68 in-service teachers' knowledge of phonemic awareness. Four semi-structured interviews were also conducted which allowed the survey findings to be investigated further in four local contexts to add depth to the researcher's understanding. Results revealed that participants struggled to define phonemic awareness, and did not understand the differences between phonemic awareness, phonological awareness, and phonics. Participants found some tasks more difficult than others, in particular phoneme counting and phoneme identity. There were also discrepancies between the participants' perceived knowledge and their actual knowledge. Participants tended to overestimate their actual knowledge, perceiving themselves as more knowledgeable with regard to phonemic awareness than they actually were. Phonemic awareness did not appear to be regularly assessed nor explicitly taught in most of the participants' classrooms. The findings suggest that the teachers who participated in this study did not typically have the knowledge of phonemic awareness needed to be able to provide the explicit instruction in phonemic

awareness children struggling to learn to read need in order to become successful readers.

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Glossary

The following are key words used during the course of this research and how they have been defined for the purposes of this research study.

Grapheme – "A written or printed letter or letters that represents a phoneme" (Henry, 2010, p. 311).

Orthography – "The writing system of a language" (Center, 2005, p. 267).

Phoneme – "The smallest units in spoken language that change the meaning of words, e.g., /h/ and /b/ in 'hat' and 'bat'" (Center, 2005, p. 267).

Phonemic awareness – "…a conscious awareness of the smallest unit of sound in a [spoken] word and an ability to manipulate the sounds (e.g., delete the /h/ from *hat* and replace with the phoneme /p/ to get *pat*)" (Nicholson & Dymock, 2015, Glossary).

Phonetics – "The study of linguistic speech sounds and how they are produced and perceived" (Moats, 2010, p. 278).

Phonics - "…refers to teaching sound-letter correspondences for reading and spelling" (Gillon, 2004, p. 11).

Phonological awareness – "…awareness of the phonological structure of a word at the syllable, onset-rime, and phoneme level" (Gillon, 2004, p. 9).

Phonology – "The rule system within a language by which phonemes are sequenced and uttered to make words; also, the study of this rule system" (Moats, 2010, p. 278).

Chapter One: Introduction

The purpose of this research was to gain an understanding of the knowledge that teachers in New Zealand primary school classrooms have in regard to phonemic awareness, their understanding of its importance as a factor in learning to read, and the methods they use to assess and teach it. Both quantitative and qualitative data was collected via an online survey and four semi-structured interviews.

1.1 Context of the research study

Reading is an essential skill that students need in order to be able to function not only in an education system but also to participate fully in society (Moats, 2010). The Ministry of Education (2007) in its national curriculum states, "Literacy in English gives students access to the understanding, knowledge, and skills they need to participate fully in the social, cultural, political, and economic life of New Zealand and the wider world" (p. 18). Hence learning to read is important for all children. There are many factors that can impact on a child learning to read, including the foundation knowledge of language and literacy experiences a child begins school with and whether the reading instruction they receive at school meets their learning needs (Greaney & Arrow, 2012; Pressley, 2006; Tunmer et al., 2013a; Tunmer, Chapman, & Prochnow, 2006). International assessments show a persistent gap in literacy achievement between good and poor readers in New Zealand primary schools, suggesting that while current literacy practices are meeting the needs of the majority of children, they are not meeting the needs of up to 20% of children who are struggling to learn to read (Education and Science Committee, 2001, 2008; Education Review Office, 2005; Greaney & Arrow, 2012; Mullis et al., 2012; Tunmer et al., 2008, 2013a).

While there is a general consensus amongst researchers that the main purpose of reading is to make meaning from text (Clarke, Snowling, Truelove, & Hulme, 2010; Gaskins, 2011; Goswami, 2005; Gough & Hillinger, 1980; Pressley, 2006), there are many different models of reading that explain how children learn to read.

For example, some researchers believe that children will learn to read naturally by being immersed in a literacy rich environment full of "real" experiences (Goodman & Goodman, 1979; Tracey & Morrow, 2006). Other researchers hold the view that reading is not a natural act but rather children need to be taught a series of specific skills before they can comprehend text (Gough & Hillinger, 1980; Tracey & Morrow, 2006). Different approaches to teaching reading have arisen from the different models of reading. For example, a top-down approach to teaching reading focuses on meaning-based instruction and assumes decoding skills are learnt implicitly, while a bottom-up approach believes decoding skills need to be explicitly taught before meaning making can occur (Goodman & Goodman, 1979; Gough & Hillinger, 1980; Pressley, 2006; Tracey & Morrow, 2006). In New Zealand primary schools the Ministry of Education has adopted a top-down whole language approach to teaching reading. Some researchers, however, believe that New Zealand's whole language approach is not meeting the needs of poor readers because it does not respond to differences in children's literate cultural capital (Greaney & Arrow, 2012; Tunmer & Prochnow, 2009; Tunmer et al., 2008, 2013a; Tunmer, Chapman, & Prochnow, 2004; Tunmer et al., 2006). Research studies have shown that explicit instruction in phonemic awareness is an effective intervention for these struggling readers (Ehri et al., 2001; Hatcher et al., 2004; Nicholson, 2003; Pressley, 2006; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). Pressley (2006) claims "learning to read is easier and more certain if the child has achieved a high level of phonemic awareness than if the child has not" (p. 118). Teachers' knowledge of phonemic awareness and their understanding of its role in learning to read, along with knowledge of the methods that can be used to assess and teach it therefore becomes important in the context of being able to provide explicit instruction in phonemic awareness to struggling readers (Cunningham, Perry, Stanovich, & Stanovich, 2004).

Although many studies investigating teachers' linguistic knowledge have been conducted overseas, very few have been conducted in the New Zealand context. Studies conducted have also tended to investigate teachers' broader knowledge of language structure; very few have focused specifically on phonemic awareness. Under New Zealand's current approach to teaching reading, phonemic awareness

is taught implicitly (Ministry of Education, 2003, 2009, 2010) and as such is probably not part of the content of current teacher education programmes (Carroll, 2006). It follows that teachers therefore may not necessarily have the knowledge to explicitly teach phonemic awareness, nor understand its role in learning to read, or know what methods can be used to assess and teach phonemic awareness, should the need arise. This research study sets out to investigate what knowledge of phonemic awareness and understanding of its importance as a factor in learning to read primary teachers have and what methods they use to assess and teach it.

1.2 Overview of the thesis

This chapter has provided the context for this research study. Chapter Two explores this context further by providing a review of the literature concerning phonemic awareness and its importance as a factor in learning to read, New Zealand's literacy practices and achievement, research studies that investigate the effectiveness of phonemic awareness instruction, as well as research studies relating to teachers' knowledge of language structure. The literature review concludes with the research questions being stated.

Chapter Three details the methodology used in the course of this research. The participants' demographic statistics are discussed. The two measures used to collect both quantitative and qualitative data are described — an online survey and four semi-structured interviews. The procedure used to conduct the research is outlined, as well as the process followed to analyse the data.

Chapter Four presents the results of the online survey and the semi-structured interviews. The questions in the online survey that could be analysed quantitatively using descriptive statistics formed the assessment of teacher knowledge of phonemic awareness. The remaining qualitative questions in the online survey were analysed thematically to give supporting information. The qualitative data generated from the semi-structured interviews was also analysed thematically.

Chapter Five discusses the results of the online survey and the semi-structured interviews in relation to the research questions, and links are made to the literature review in Chapter Two. The implications of these results are discussed, limitations of the study are identified, and suggestions for future research are made before final conclusions are drawn.

Chapter Two: Literature Review

2.1 Introduction

Learning to read is a complex, cumulative process, and what constitutes a good reader in terms of knowledge and skills has kept researchers busy for many years. There has been much debate about what reading is, the knowledge and skills important for becoming a skilled reader, and how reading should be taught. This literature review reviews these issues and explores them in a New Zealand context in relation to our performance in international reading assessments and current teaching policies and practice.

2.2 The Simple View of Reading

There is agreement amongst researchers that the goal of reading is not to decode but to understand or construct meaning from text. In order to be able to construct meaning, however, the reader must first decode (Clarke et al., 2010; Gaskins, 2011; Goswami, 2005; Gough & Hillinger, 1980; Pressley, 2006). There has been much debate as to how children learn to read and what knowledge and skills are important in the reading process. Gough and Tunmer's (1986) Simple View of Reading (SVR) predicts that reading is the product of decoding and comprehension: Reading Comprehension (R) = Decoding (D) x Listening Comprehension (C). According to the SVR, "reading ability should be predictable from a measure of decoding ability…and a measure of *listening* comprehension" (Gough & Tunmer, 1986, p. 7). The SVR model is based on the premise that both decoding and listening comprehension are necessary skills for reading comprehension, with neither being sufficient on its own (Aouad & Savage, 2009; Gough & Tunmer, 1986; Kendeou, Savage, & van den Broek, 2009).

Some researchers contend that because "reading is one of the most complex cognitive skills that humans can learn" (Goswami, 2008, p. 73), the SVR is only part of a more complex, elaborate phenomena, and it seems unlikely that it can

provide a framework for teaching sufficiently rich enough to capture this complexity (Georgiou, Das, & Hayward, 2009; Goswami, 2008; Kirby & Savage, 2008). While numerous research studies have shown that decoding and listening comprehension account for a large proportion of the variance in reading comprehension (Catts, Adlof, Hogan, & Weismer, 2005; Eason & Cutting, 2009; Georgiou et al., 2009; Johnston & Kirby, 2006; Joshi & Aaron, 2000; Savage, 2006), numerous studies have also looked at what other cognitive-processing skills may account for variance unexplained by decoding or listening comprehension; e.g., fluency, naming speed, phonological awareness, working memory, performance IQ, oral vocabulary, visual word recognition, text accuracy (Adlof, Catts, & Little, 2006; Georgiou et al., 2009; Johnston & Kirby, 2006; Kershaw & Schatschneider, 2012; Ouellette & Beers, 2010; Ouellette, 2006; Savage, 2006; Vellutino, Tunmer, Jaccard, & Chen, 2007). However, there appears to be differences in the opinions of what the components of decoding and listening comprehension should each include and how they should be defined. For example, are fluency and/or accuracy separate components that contribute to reading comprehension or are they included in decoding? It follows that this, combined with how they are measured, will impact on how a research study will account for reading comprehension variance (García & Cain, 2014; Kirby & Savage, 2008; Tunmer & Greaney, 2010).

Vocabulary is a critical component in both listening and reading comprehension and is now thought of by some researchers as the link between decoding and language comprehension, giving a new version of the SVR (Dymock & Nicholson, 2012; Tunmer & Chapman, 2012). In order for students to understand what they are hearing or reading, it makes sense that they first need to understand what the words mean (Cain, Oakhill, & Lemmon, 2005; Dymock & Nicholson, 2012; Pressley, 2006). Ouellette (2006) found that breadth of vocabulary related to decoding, while depth of vocabulary related to reading comprehension. Supporters of the SVR model do not "discount other potential contributors to the reading process, but rather propose that decoding and comprehension are core competencies that drive reading comprehension experiences" (Kendeou et al., 2009, pp. 353–354).

While skill in both decoding and comprehension usually go hand in hand, this is not always the case and students can have difficulties with decoding, comprehension, or both (Aouad & Savage, 2009; Catts, Hogan, & Fey, 2003; Dymock, 1993; Gough & Tunmer, 1986). This is depicted in Figure 1.

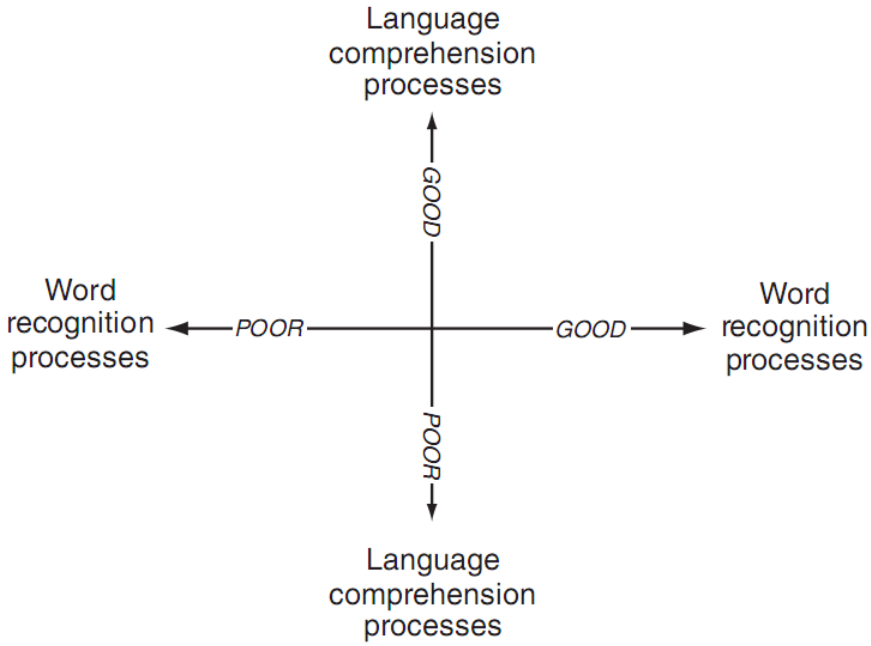


Figure 1. The Simple View of Reading[1]

The SVR model is supported by research studies that have identified children who are good decoders but poor comprehenders (Applegate, Applegate, & Modla, 2009; Cain et al., 2005; Catts, Adlof, & Weismer, 2006; Catts et al., 2003; Clarke et al., 2010), children who are poor decoders but good comprehenders (Adlof et al., 2006; Catts et al., 2006; Spooner, Baddeley, & Gathercole, 2004), as well as children who are poor decoders and poor comprehenders (also known as mixed reading disability) (Leach, Scarborough, & Rescorla, 2003; Tunmer & Chapman, 2007; Westerveld, Gillon, & Moran, 2008). These research findings imply that the foundations for decoding processes and listening comprehension processes are different, and both need to be developed in children learning to read in order to

[1] The Simple View of Reading. From Literacy as a complex activity: Deconstructing the simple view of reading, by M. Stuart, R. Stainthorp, & M. Snowling, 2008, *Literacy*, *42*(2), p. 62. Copyright 2008 by Blackwell Publishing. Reprinted with permission.

prevent reading difficulties (Kendeou et al., 2009; Stuart, Stainthorp, & Snowling, 2008). Children will differ in terms of strengths and weaknesses with respect to decoding and listening comprehension and will therefore "require different strategies to support their reading development" (Kendeou et al., 2009, p. 366). Pressley (2006) believes this can be achieved through balanced literacy instruction. Children should be taught both decoding skills and comprehension skills when learning to read. Balanced literacy instruction combines the strengths of both decoding and comprehension, thus creating "instruction that is more than the sum of its parts" (Pressley, 2006, p. 1).

2.3 Decoding

Henry (2010) defines decoding as "the skills and knowledge by which a reader translates printed words into speech…the ability to pronounce words subvocally in silent reading or vocally in oral reading" (p. 3). In order to decode written language, the reader has to first understand the alphabetic principle — that letters represent sounds or phonemes. A phoneme is the smallest unit of sound that can change the meaning of a word, thus distinguishing one word from another (Center, 2005; Henry, 2010; Moats, 2010). Goswami (2008) contends that children learning to read in English have "the most difficult learning problem" (p. 70) due to the complexity of English phonology (sound system) and orthography (written language). English language does not follow a 1:1 letter-sound mapping and has a complicated syllable structure, hence teaching reading needs to recognise this complexity (Goswami, 2008).

According to Ehri (2005) students learn to read words in four basic ways:

- Decoding – children use sounding out and blending, also known as synthetic phonics. Children make letter-sound matches to identify words.
- Analogizing – also known as the rhyming approach. Children decode a word by making an analogy with a known word.
- Predicting – children use the context of surrounding words plus one or a few of the letters in the unknown word to predict the unknown word.

- Sight – children read words from memory. These are words they have read before and the reader recognises.

Goswami (2005, 2006) believes that due to the inconsistent nature of English orthography as discussed above, children learning to read need to develop decoding strategies in parallel at different grain sizes — large grain-size (syllable and onset-rime), small grain-size (grapheme-phoneme), and whole-word analogy (recognition of the whole word).

As children learn to read, they go through four phases of reading development (summarised in Figure 2) (Ehri & McCormick, 1998; Ehri, 2005; Gaskins, 2011; Moats, 2010):

- Pre-alphabetic or Logographic – children remember a word based on a distinctive and purely visual cue; e.g., *dog* by the tail in *g*. Children understand that written language represents speech but do not understand the alphabetic principle — that the letters in words are represented by sounds.
- Partial alphabetic – children begin to use letter-sound information but do not use all the letters in a word. The alphabetic principle is understood and the names and sounds of the alphabet letters are known. Children begin to read and spell by sounding out parts of words.
- Full alphabetic – children use and remember all the letter-sound matches in a word. Their phonemic awareness is more developed and grapheme-phoneme correspondences are stronger. A grapheme is defined as a letter or combination of letters that represents a single phoneme (Henry, 2010; Moats, 2010). Children start to have more automatic recognition of words.
- Orthographic or Consolidated alphabetic – children have consolidated their letter-sound knowledge and remember matches between multi-letter units and syllable units. Children can transfer known grapheme-phoneme correspondences and patterns to unknown words and make connections to syllables and other meaningful parts of words. More sight words are increasingly retained in memory.

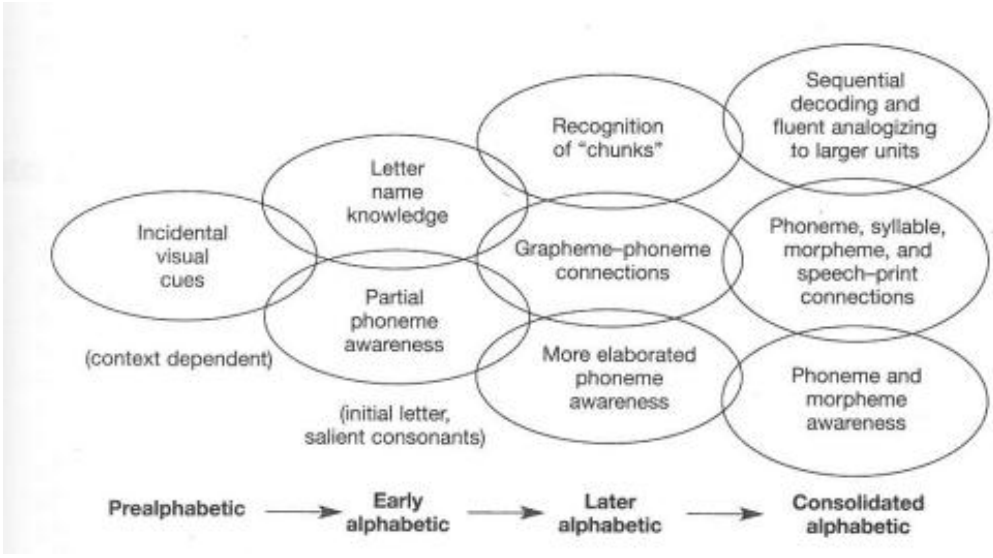


Figure 2. Phases of reading development[2]

Supporting these four phases of reading development is the decoding-spelling continuum of what children need to learn during each year of school. Decoding and spelling go hand in hand as they share a common orthography and are usually taught in sequence together, each reinforcing the other (Henry, 2010). Figure 3 shows the decoding-spelling continuum (the American grades K–8 relate to New Zealand school years 1–9).

[2] Schematic representation of reading and spelling development. From *Speech to Print: Language Essentials for Teachers* (2nd ed., p. 11), by L. C. Moats, 2010, Baltimore, MD: Paul H. Brooks Publishing Co. Copyright 2010 by Paul H. Brookes Publishing Co., Inc. Reprinted with permission.

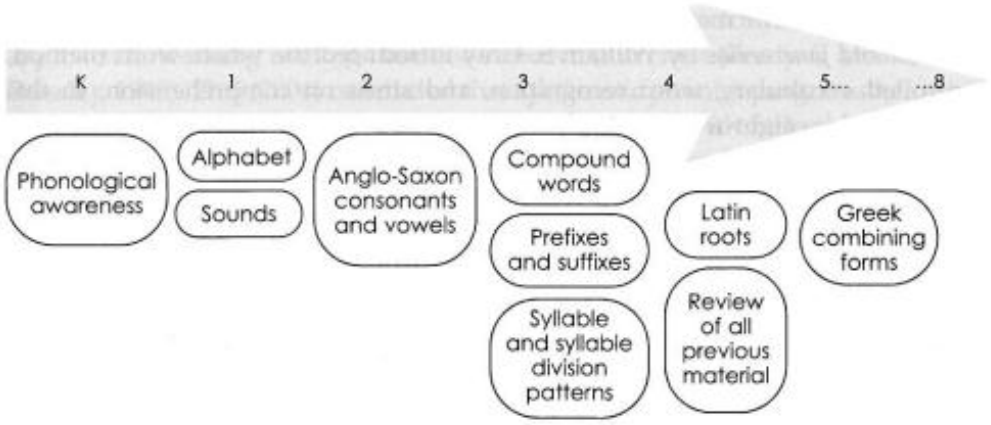


Figure 3. The decoding-spelling continuum[3]

2.3.1 Phonological awareness

As seen in Figure 3, phonological awareness forms the foundation on which children learn to read and spell. Phonological awareness is related to spoken language not written language, and involves understanding that spoken words are composed of segments of sound. It is the ability to manipulate the sounds in spoken words and break them down into their smaller parts — syllables, onset-rime, and phonemes. (Gillon, 2004; Moats, 2010; Nicholson, 2005). If we look at the word *cat* in terms of each of these parts, it has one syllable /cat/. The onset of the word *cat* consists of the first consonant *c*, and the rime *at* is the short vowel *a*, and the following consonant *t*. The word *cat* has three individual sounds or phonemes /c/ /a/ /t/. These different levels of phonological knowledge are highlighted in a further example in Figure 4.

[3] The decoding-spelling continuum. From *Unlocking Literacy* (2nd ed., p. 9), by M. K. Henry, 2010, Baltimore, MD: Paul H. Brooks Publishing Co. Copyright 2010 by Paul H. Publishing Co., Inc. Reprinted with permission.

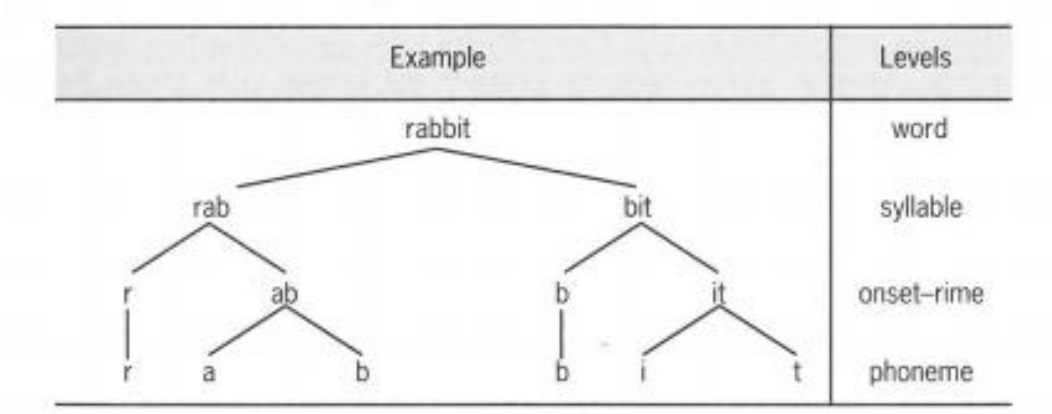


Figure 4. Levels of phonological knowledge[4]

Ouellette and Haley (2013) differentiate phonological awareness into larger (words and syllables) and smaller (individual speech sound) segment awareness, and implicit (word and syllable sound patterns) and explicit (manipulation at the phoneme level) awareness. Research studies show that children can gain phonological awareness at the larger implicit segment awareness through minimal teaching; however, the smaller explicit segment awareness can be more difficult for children to grasp and usually requires more explicit teaching (Gillon, 2004; Mraz, Padak, & Rasinski, 2008). This smaller explicit segment awareness is known as phonemic awareness.

2.3.2 Phonemic awareness

Phonemic awareness is one of the most important skills children need to have in order to learn to read (Ehri et al., 2001; Hulme et al., 2002; National Reading Panel, 2000b; Nicholson, 2005; Ouellette & Haley, 2013; Pressley, 2006). Phonemic awareness is one part of phonological awareness and is defined as "a conscious awareness of the smallest unit of sound in a [spoken] word and an ability to manipulate the sounds (e.g., delete the /h/ from *hat* and replace with the phoneme /p/ to get *pat*)" (Nicholson & Dymock, 2015, Glossary). Phonemic

[4] Levels of phonological knowledge. From *At the cutting edge: The importance of phonemic awareness in learning to read and spell* (2nd ed., p. 27), by T. Nicholson, 2005, Wellington, New Zealand: NZCER Press. Copyright 2005 by Tom Nicholson. Reprinted with permission.

awareness is related to spoken not written language. It can be broken down further into synthetic (blending) and analytic (segmenting) skills. Usually children develop synthetic skills before analytic skills (Nicholson, 2005; Ouellette & Haley, 2013).

2.3.3 The importance of phonemic awareness in learning to read

Phonemic awareness becomes critically important when children decode unknown words using the sounding-out and blending strategy (Pressley, 2006). Once children understand that words are made up of sounds, they need to be able to manipulate those words at an individual phoneme level when matching them to letters/graphemes in written words when reading (Ehri & Nunes, 2002; Nicholson, 2005; Perez, 2008; Pressley, 2006). Research studies have shown that phonemic awareness is one of the best predictors of reading success in children in the first two years of schooling (Ehri & Nunes, 2002; Hulme et al., 2002; Mraz et al., 2008; National Reading Panel, 2000b; Nicholson, 2005; Pressley, 2006) and support the claim that "learning to decode depends on phonemic awareness" (Pressley, 2006, p. 151).

2.3.4 Findings from studies

In 1997, in response to a congressional request, a National Reading Panel (NRP) was convened in the United States of America (USA) to "assess the status of research-based knowledge, including the effectiveness of various approaches to teaching children to read" (National Reading Panel, 2000a, Congressional Charge, para. 1). The role of phonemic awareness instruction in learning to read and spell was the subject of a meta-analysis conducted by a sub-group of the NRP. There have been many research studies conducted over the last few decades by many different researchers to investigate the role of phonemic awareness in facilitating reading acquisition. The benefit of a meta-analysis of these individual studies is that it looks at the weight of evidence of a large number of studies, allowing only those studies that meet set criteria to be included and thus reducing the effects of individual study design problems (Ehri, 2006; Nicholson, 2005). Fifty-two studies that had been published in peer-reviewed journals between 1976 and 2000

were included in this meta-analysis. Only studies that allowed the outcomes of intervention and control groups to be compared were included. The intervention groups all received instruction in phonemic awareness, while the control groups received instruction other than phonemic awareness or no special instruction (Ehri et al., 2001). Findings from the meta-analysis concluded that instruction in phonemic awareness "was found to make a statistically significant contribution to reading acquisition" (Ehri et al., 2001, p. 251). It was found that phonemic awareness instruction made contributions to various groups of readers (i.e., normally developing, at risk of reading failure, reading disabled, different grade levels, different socioeconomic backgrounds) to varying degrees. However, although phonemic awareness may contribute less in normally developing readers as reading skill increases, children at risk of reading failure, regardless of age, will benefit from phonemic awareness instruction (Ehri et al., 2001).

The NRP findings were supported by the findings of Torgesen et al. (2001) in their study of the effect of explicit phonemic awareness instruction on 60 children, aged 8–10, with severe reading disabilities conducted in the USA. Two intervention programmes that provided explicit and systematic instruction in word-level reading (phonemic awareness, phonemic decoding, and sight word recognition), but differed in methods of teaching were studied to determine their effects on reading skills. Both intervention programmes focused on stimulating phonemic awareness, one through writing and spelling activities, the other via articulatory cues and word-reading skills. Children were randomly assigned to a programme and all received one-to-one instruction in two 50-minute sessions per day for eight weeks. Pre-, post-, one-, and two-year follow-up tests were conducted. Significant gains were made on all measures assessed and these improvements remained stable over the two-year follow-up period for both intervention programmes. Both intervention programmes showed around four times the progress made through previous special education received in the course of the children's "normal" schooling. Large improvements in reading ability were produced from both intervention programmes, with no significant difference between the effectiveness of the two programmes (Torgesen et al., 2001).

A longitudinal study of 410 new entrant children in the United Kingdom (UK) examined the effects of explicit phonological awareness training on reading was conducted by Hatcher, Hulme and Snowling (2004). The children were divided into four groups — rhyme instruction, phoneme instruction, rhyme and phoneme instruction, and a control group that received their normal reading instruction. Children received three 10-minute sessions per week in groups of 10–15 children for 14.5 school months (5.4 months in the first year of school and 9.1 months in the second). In contrast to the findings of Ehri et al. (2001), no significant improvement in reading was seen for normally developing children. Explicit phonological awareness training did improve their phonological skills but this did not translate to their reading. Progress in reading was assessed using real word and pseudoword measures. However, children identified as at risk of reading failure that received explicit phoneme skills training showed gains in learning to read. The normal reading instruction of the control group was not intensive enough or specifically targeted to sufficiently meet the individual needs of these children. Without training in phonemic awareness, at risk children, in the first three years of schooling, tended to fall behind their peers in terms of reading skills (Hatcher et al., 2004).

Strattman and Hodson (2005) conducted an investigation of the relationships among phonological processing variables (phonemic awareness, working memory, rapid automatised naming (RAN), and multisyllable word production) and their contribution to decoding and/or spelling. Results from assessment of 75 second grade children were analysed. A strong correlation between decoding and spelling was found, supporting the hypothesis that they are based on the same cognitive and linguistic underpinnings. Although different variables contributed small but significant variances to both decoding and spelling, phoneme manipulation contributed the greatest amount to both. Other findings were significant contributions from working memory and receptive vocabulary to decoding, and multisyllable word production and RAN to spelling. Implications are that both decoding and spelling can be facilitated through explicit instruction in phoneme manipulation, and assessment of a child's ability to manipulate phonemes could be used as a predictor of their decoding and spelling success.

Recent studies have been conducted in New Zealand that focus on explicit instruction in phonemic awareness and phonologically-based decoding strategies, particularly for at risk readers. Studies that were selected met the following criteria:

- Involved primary school children.
- Focused on code-based strategies and skills with implications for phonemic awareness instruction.
- Conducted in English.
- Published since 2000.

Tunmer and Chapman (2002) found that although being taught in a whole language classroom that emphasised text-based strategies, the majority of 152 new entrant children sampled reported using word-based strategies rather than text-based strategies when learning to read. Children were assessed at the end of Year 1 and toward the middle of Year 3 for phonological processing (pseudoword decoding and phoneme segmenting), context facilitation (reading 80 words in isolation then in context), reading performance on word reading ability and comprehension measures, as well as book level, reading self-efficacy, and academic self-concept. The word-based group performed better in reading achievement and reading-related skills, as well as having greater reading self-efficacy and academic self-concept. Although the study did not permit causal links to be made between word-based strategies, reading achievement, and reading perception measures, the results supported a code-emphasis approach as being more effective than a whole language approach to beginning reading instruction.

Tunmer, Chapman, and Prochnow (2003) further examined the effects of a code-emphasis approach in their retrospective study, investigating whether supplementary materials and strategies used to help children develop phonological awareness and alphabetic coding skills in a modified intervention programme produce greater gains in reading achievement compared to a standard whole language comparison group. Data for the comparison group (n = 63 children) came from Tunmer and Chapman's (2002) study. The modified programme

comprised of 80 children matching the same criteria as the comparison group. They were tested at similar testing points, with a selection of the same tests, especially those assessing phonological processing skills, as the comparison group study. The use of supplementary materials and strategies to develop phonological awareness and alphabetic coding skills resulted in significant gains in reading achievement with an average difference of reading age of 14 months between the two groups by the end of Year 2. Tunmer et al. (2003) also examined the results to determine whether the use of these materials and strategies reduced the gap in reading achievement between Māori and Pakeha children. Findings showed the gap in reading achievement was reduced by the end of Year 2; however, the sample size, especially of Māori students, was small (initially 17 but dropped to 12), so further research would be needed to confirm this. Overall findings suggest that adding instruction in phonological awareness and alphabetic coding to the whole language approach could reduce the number of children struggling to read and reduce the gap between good and poor readers.

It has been argued that socioeconomic background can be linked to reading acquisition because of its influence on the literacy-related experiences and language competencies (literate cultural capital) children begin school with. Nicholson's (2003) longitudinal study compared the effects of phonemic awareness instruction on a group of 88 low-socioeconomic background children with 23 high-socioeconomic background children. Phonemic awareness, verbal ability, letter knowledge, spelling, pseudoword and real word reading, and reading comprehension were assessed at Year 1, 2, and 5. Results showed significant differences between the two groups, which widen over time, supporting the claim that differences in literate cultural capital impacts on reading ability. The "rich get richer" and the "poor get poorer" (Stanovich, 1986). Although a wide range of results was found for both groups at school entry, the high socioeconomic group scored higher on average than the low socioeconomic group in all measures. These significant differences between the two groups were found to continue at the end of Year 2 and 5. However, the steady dropout rate of the low-socioeconomic group for each year measured and the high dropout rate of both groups by Year 5 (low-socioeconomic $n = 33$, high-socioeconomic $n = 13$) need to be noted when interpreting these results. Alphabet knowledge was found to be

the strongest predictor of reading development at the end of Year 1; however, phonemic awareness was found to be a stronger predictor at the end of Year 2. Findings implied under a whole language approach, children who get behind in reading will stay behind unless they have phonologically-based instruction.

Explicit instruction in phonemic awareness and phonologically-based decoding strategies was found to be an effective intervention strategy for struggling readers by Ryder, Tunmer, and Greaney (2008). Twenty-four 6- and 7-year-old struggling readers were randomly assigned to either a control or intervention group. For 24 weeks the 12 intervention group children (in groups of three) received four 20–30 minute sessions per week on phonemic awareness and phonologically-based decoding strategies. The control group received their normal whole language teaching with no explicit phonological instruction. Phonemic awareness, phonological decoding ability, word recognition (context free and in connected text), and reading comprehension were assessed pre- and post-intervention for both groups. On post-test measures of phonemic awareness, pseudoword decoding, context-free word recognition, and reading comprehension, the intervention group significantly outperformed the control group. Positive intervention effects were maintained in two-year follow up data and had generalised to word recognition in connected text. The small sample size is a limitation that would necessitate further research with larger numbers to have more confidence in the findings. Concurring with Nicholson (2003), Ryder et al. (2008) believe educational practice needs to respond to differences in literate cultural capital at school entry so all children have the same opportunity for reading success. Instruction needs to be differentiated to cater to differing skill needs of beginning readers, with particular focus on developing phonemically-based word level skills and strategies, particularly for struggling readers.

The first formal assessment of literacy for all children in New Zealand primary schools is the Observation Survey (Clay, 2013). This assessment is performed when a child turns 6 years old. Usually they have had one year of schooling, dependent on when they started school. The assessment tool includes book reading level, letter identification, concepts about print, word reading, writing vocabulary, and a hearing and recoding sounds in words measure (Clay, 2013).

Greaney and Arrow (2012) used this assessment as a method for investigating the effects on literacy development of providing phonologically-based instruction to predominantly Māori and Pasifika students in their first year of school. A control group of 26 children who had been at school for up to 20 months was assessed using the Observation Survey (Clay, 2005) plus Burt word reading, phonological-based assessments, phoneme segmentation, and pseudoword reading measures. An intervention group comprised of 15 new entrant students received whole class and small group lessons that focused on phonological-based skills on a daily basis, four days a week, over a 10-week period. They were assessed pre-test and post-intervention, using the same additional measures as the control group as well as letter-sound knowledge and letter writing ability measures. A post-test assessment was also performed which included and aligned with the regular Observation Survey. Results for all measures increased between the pre-test and post-intervention assessments for the intervention group and continued to increase at the post-test assessment. The intervention group outperformed the control group in all Observation Survey and additional assessment measures. Results highlighted the positive impact of phonologically-based intervention instruction. Explicit phonological-based instruction impacted positively on the development of phonemic awareness. Like previous studies findings are limited by small sample size. Greaney and Arrow (2012) believe the lack of phonemic awareness measures in the Observation Survey means teachers can be unaware of students' weaknesses in this area and hence their risk of reading difficulties. Children's first major literacy assessment does not happen until after 12 months at school, preventing early detection of reading difficulties and representing "a 'wait-to-fail' approach" (Greaney & Arrow, 2012, p. 27). This does not, however, recognise difficulties may be detected from formative assessments made by a teacher during the first year.

The significance of the findings from these New Zealand studies becomes even more apparent when we consider teaching approaches to reading instruction and literacy achievement in the New Zealand context (discussed in sections 2.4 and 2.5). The results of these New Zealand studies are summarised in Table 1.

Table 1. Summary of New Zealand research studies relating to phonemic awareness

Author/Year	Participants	Focus of Study	Findings
Tunmer & Chapman (2002)	• *N* = 152 • mean age 5-years, 1-month	• Two groups - text-based (TB) and word-based (WB). • Strategy relationship to reading achievement, reading related skills, and academic self-concept.	• Majority of children reported using word-based strategies (TB – 34.3%; WB – 52.1%; no response – 13.6%). • WB group performed better in reading achievement and reading-related skills, as well as having greater reading self-efficacy and academic self-concept. • Results support a code-emphasis approach as being more effective than a whole language approach to beginning reading instruction.
Nicholson (2003)	Low-socioeconomic: • *n* = 88 • mean age 5.27-years High socioeconomic • *n* = 23 • mean age 5.26-years	• Socioeconomic background effects on reading.	• Significant differences between the two groups, which widen over time. • High-socioeconomic group scored higher than the low-socioeconomic group in all measures. These differences continued at the end of Year 2 and 5. • Alphabet knowledge – strongest predictor of reading development at the end of Year 1. • Phonemic awareness – stronger predictor at the end of Year 2.

Tunmer, Chapman, & Prochnow (2003)	Comparison group • *n* = 63 • mean age 5-years 1 month Modified programme • *n* = 80 • mean age 5-years 1 month	• Phonological awareness. • Alphabetic coding skills.	• Significant gains in reading achievement between the two groups by end of Year 2. • Reduced reading achievement gap between Māori and Pakeha children by end of Year 2. • Adding instruction in phonological awareness and alphabetic coding to the whole language approach could reduce the number of children struggling to read and reduce the gap between good and poor readers.
Ryder, Tunmer, & Greaney (2008)	• *N* = 24 • age: 6- and 7-years	• Phonemic awareness • Phonologically-based decoding strategies.	• Post-test measures of phonemic awareness, pseudoword decoding, context-free word recognition, and reading comprehension – intervention group significantly outperformed control group. • Positive intervention effects were maintained in two-year follow up data.
Greaney & Arrow (2012)	Control group: • *n* = 26 • age range 6-6.8-years Intervention group • *n* = 15 • new entrant	• Phonological-based skills.	• Intervention group showed significant gains in all measures pre-test to post-intervention. • Intervention group outperformed control group in all assessment measures. • Explicit phonological-based instruction impacted positively on the development of phonemic awareness.

2.4 Models of the reading process

Many theories/models of the reading process have emerged over the last century (Tracey & Morrow, 2006; Tunmer & Nicholson, 2011). Two contrasting viewpoints for understanding the reading process have led to what has been termed the "great debate" or "reading wars" (Connor, Morrison, & Katch, 2004; Tunmer & Nicholson, 2011). The bottom-up model of the reading process proposes that children learn "to read only with considerable difficulty" (Gough & Hillinger, 1980, p. 180) whereas the top-down model is based on the premise that literacy acquisition is an "extension of natural language learning for all children" (Goodman & Goodman, 1979, p. 138). Interactive models emerged as an intermediary between the top-down and bottom-up processing approaches (Tracey & Morrow, 2006).

2.4.1 Bottom-up model of the reading process

The bottom-up model is based on the theory that the reading process is made up of discrete stages where the reader processes information in sequence using a progression from lower-order to higher-order skills (Manzo & Manzo, 1993; Stanovich, 1980; Tracey & Morrow, 2006). It is presumed that the lower-order decoding skills are necessary before the higher-order meaning making can occur. Meaning cannot be made unless the reader can first decode the words. The primary strategy in this approach is sounding-out words, with context cues only being used when sounding-out does not reveal the exact word to the reader. Proponents of the bottom-up model of the reading process believe that reading is not a natural act but a difficult, slow process that needs to be explicitly taught. (Gough & Hillinger, 1980; Nicholson, 2000; Smith & Elley, 1997; Tracey & Morrow, 2006). In this approach "good readers don't guess" (Nicholson & Hill, 1985, p. 196), but translate text into sound and ultimately into meaning (Gough & Hillinger, 1980; Manzo & Manzo, 1993; Tracey & Morrow, 2006). Implications of this model are that decoding skills are explicitly taught and built up systematically from the simple to the complex, until the decoding process has

become automatised, and the reader reasonably fluent, allowing meaning making to become easier.

2.4.2 Top-down model of the reading process

The top-down model of reading views learning to read as a natural act (Goodman & Goodman, 1979) and has a heavy reliance on the reader rather than the printed text being read. The primary goal is for the reader to construct meaning, emphasising higher-order meaning making skills. It is assumed that decoding skills can be learnt incidentally through the process of reading without direct instruction. The reader uses the context of what they are reading and what they know to predict and hypothesise about what the words might be in the upcoming text (Pressley, 2006; Smith & Elley, 1997; Tracey & Morrow, 2006). Pressley (2006) contends that in this approach "learning to read is more about learning to guess words well, based on the meaning cues in the text and the prior knowledge brought to the text, with letter- and word-level cues definitely less important in word recognition" (p. 20). Proponents of this model believe that explicit teaching of decoding skills can fragment the reading process, distract the child from making meaning, and turn reading into a difficult task (Smith & Elley, 1997).

2.4.3 Interactive model of the reading process

Interactive models cater for individual differences and recognise that children can use and amalgamate information simultaneously from multiple sources of knowledge (Stanovich, 1984; Tracey & Morrow, 2006). Stanovich (1980) combined the interactive model with a compensatory mechanism which states "that a deficit in any particular process will result in a greater reliance on other knowledge sources, regardless of their level in the processing hierarchy" (p. 32). Reading is regarded as normally being a bottom-up process; however, when bottom-up processes fail, the reader compensates by using top-down processes, allowing lower-level and higher-level processes to simultaneously interact. The interactive-compensatory mechanism accounts for the reader with poor decoding

skills to use higher-level knowledge sources (Manzo & Manzo, 1993; Stanovich, 1980; Tracey & Morrow, 2006).

2.5 Literacy achievement in New Zealand

Although New Zealand has generally performed well in international assessments, it has shown a higher variation in test scores than other countries (Tunmer et al., 2008, 2013a). An unacceptably large gap in reading achievement between good and poor readers in New Zealand schools was first highlighted by the international study of literacy achievement conducted by the International Association for the Evaluation of Educational Achievement (IEA) in 1991. Data from subsequent international assessments obtained from the Progress in International Reading Literacy Study (PIRLS) conducted by the IEA show that this large gap has not narrowed over time. PIRLS is an international comparison of children's reading experiences and achievement in 45 countries/regions. It is a five-year cycle of assessments (first administered in 2001) that assesses reading literacy of children in grades equivalent to Year 5 in New Zealand. Three cycles have now been conducted and analysed (Mullis et al., 2012; Tunmer et al., 2008, 2013a, 2003). New Zealand's results are summarised in Table 2.

Table 2. New Zealand PIRLS reading achievement scores[5]

PIRLS Assessment Cycle	Mean scale score	Standard Deviation	5th Percentile score	95th Percentile score	New Zealand Ranking
2001	529	93	360	668	13th
2006	532	87	374	664	24th
2011	531	88	373	666	23rd

It should be noted that although New Zealand's ranking dropped from 13th in 2001 to 24th in 2006 and remained stable at 23rd in 2011, there has been no significant difference in its mean scores, standard deviations, and percentile scores over time. However, further analysis of the mean results for each year has shown large proportions of students performing at high and low levels even though we have a centralised education system and a national curriculum, with the majority of poor readers associated with low income backgrounds and an over-representation of Māori and Pasifika students (Tunmer et al., 2008, 2013a).

2.5.1 Reasons behind New Zealand's literacy achievement results

New Zealand has one of the longest tails of underachievement based on its variation in scores between good and poor readers (Greaney & Arrow, 2012; Tunmer et al., 2008, 2013a). Evidence suggests that while current literacy practices may meet the needs of most students, they do not meet the needs of up to 20% of students (Education and Science Committee, 2001, 2008; Education Review Office, 2005). Some researchers argue that this is because New Zealand's national constructivist whole language approach to reading instruction does not

[5] Means, standard deviations and percentiles of the reading achievement scores for New Zealand as a function of PIRLS test cycle. Adapted from Why the New Zealand Literacy Strategy has failed and what can be done about it: Evidence from the Progress in International Reading Literacy Study (PIRLS) 2011 and Reading Recovery monitoring reports, by W. E. Tunmer, W, J. W. Chapman, K. T. Greaney, J. E. Prochnow, & A. W. Arrow, 2013, *Australian Journal of Learning Difficulties, 18*(2), p. 144. Copyright 2013 by Taylor & Francis. Adapted with permission.

respond to differences in literate cultural capital. A Matthew effect (rich-get-richer and poor-get-poorer) (Stanovich, 1986) is created in reading achievement due to the less literate cultural capital of low income background, Māori, and Pasifika children (Greaney & Arrow, 2012; Tunmer & Prochnow, 2009; Tunmer et al., 2008, 2013a, 2004, 2006). Literate cultural capital refers to the early literacy-related experiences and language competencies that children bring with them when they enter school (Greaney & Arrow, 2012), and includes variables such as phonological sensitivity, grammatical sensitivity, receptive vocabulary, and letter knowledge (Tunmer et al., 2006). According to Greaney and Arrow (2012), "children enter school with very large differences in…(literate cultural capital) and these differences have a strong influence on learning to read and write at school" (p. 9). Children with higher levels of literate cultural capital will not be disadvantaged from New Zealand's whole language approach, but those with limited amounts may be disadvantaged (Tunmer et al., 2004, 2006). This is supported by studies that demonstrate children entering first grade (equivalent to New Zealand Year 2) with higher levels of literacy skills will benefit from more meaning-based instruction whereas children with less literacy skills will benefit from more code-based instruction (Connor et al., 2004; Juel & Minden-Cupp, 2000).

New Zealand has had Reading Recovery (RR), an intervention programme in place to assist young poor readers for over 30 years; however, concerns have been raised about its effectiveness, as it seems to have had little impact on narrowing the literacy achievement gap during this time (Tunmer et al., 2013a). RR is a national early literacy preventative programme aimed at bringing readers who are struggling after one year of school up to the average of their peers through one-to-one instruction over 12–20 weeks. RR should reduce the number of students needing remedial assistance in later years (Clay, 1987a, 1987b). However, while RR does benefit many struggling readers, it does not appear to work for those children who are most at risk of developing ongoing reading difficulties (Reynolds & Wheldall, 2007; Tunmer et al., 2013a). According to Moats (2000) and Tunmer (2003), RR is based on whole language premises and will not be able to assist struggling readers with poor phonological processing skills, a key component of decoding. Readers with poor phonological processing skills require

more explicit instruction in phonemic awareness and phonologically-based decoding skills than what RR lessons usually provide (Nicholson, 2006; Reynolds & Wheldall, 2007; Tunmer et al., 2013a, 2003). There is also concern over whether RR is targeted at the right students. Although RR targets students in the lowest 20% of individual schools, this 20% may not align with the 20% of poor readers identified across New Zealand in international assessments. Students in a lower achieving school could miss out on assistance because they fall outside the 20% for their school, whereas students in a higher-achieving school may enter the programme with higher RR assessment measure scores because they fall within the 20% for their particular school. Low income background, Māori, and Pasifika children are usually associated more with lower-achieving schools, so there is more potential for some struggling readers to not have access to the instruction they need (Tunmer et al., 2013a).

2.6 National Literacy Strategy

In response to growing concerns with regard to literacy achievement in New Zealand, the government set up a Literary Taskforce in 1998 to advise the government on how to achieve its goal that "by 2005, every child turning nine will be able to read, write, and do maths for success" (Literacy Taskforce, 1999, p. 4). The Literacy Taskforce was comprised of 23 people who were mostly all involved professionally in education. Their purpose was to come up with recommendations intended to raise literacy achievement in all students, but in particular focusing on "closing the gap between the lowest and the highest achievers" (Literacy Taskforce, 1999, p. 7). A Literacy Experts Group, made up of leading literacy researchers, was also convened to provide advice to the Literacy Taskforce "from a range of theoretical and academic perspectives on literacy learning" (Literacy Experts Group, 1999, p. 1). Rather than making radical changes in response to these growing concerns over literacy achievement, the recommendations made by the Literacy Taskforce instead supported maintaining current practices (a constructivist whole language approach) with some suggested improvements. They did not adopt all of the recommendations

made by the Literacy Experts Group (Smith, 2000; Soler & Openshaw, 2006; Tunmer et al., 2013a). Of particular note was the following recommendation:

> We do not support the view that beginning reading instruction should focus on teaching children to rely on sentence cues as the primary strategy for identifying unfamiliar words in text. Rather, greater attention needs to be focussed on the development of word-level skills and strategies in beginning reading instruction, including the development of phonological awareness. (Literacy Experts Group, 1999, p. 6)

This view of the Literacy Experts Group was further supported by recommendations made to the New Zealand Government by the Education and Science Committee (2001) in their inquiry into the teaching of reading in New Zealand, also undertaken in response to trying to close the reading gap. In particular they recommended "that the Ministry of Education provide advice and support to schools to incorporate successful phonics programmes into the classroom" (p. 17), "that all primary teacher-training providers incorporate the teaching of phonetic skills and word-level decoding into their programmes" (p. 27), and "that there be a greater emphasis on the benefits of phonics instruction in Literacy Leadership materials" (p. 32).

In formulating its National Literacy Strategy, the Ministry of Education adopted the recommendations of the Literacy Taskforce and largely rejected those of the Literacy Experts Group and the Education and Science Committee (Smith, 2000; Soler & Openshaw, 2006; Tunmer et al., 2013a). In response to the Literacy Taskforce recommendations *Effective Literacy Practice in Years 1 to 4* (Ministry of Education, 2003) and *Effective Literacy Practice in Years 5 to 8* (Ministry of Education, 2006) were developed as the primary teacher resources for teaching literacy. Since then the Ministry of Education have also implemented national *Reading and Writing Standards for years 1–8* (Ministry of Education, 2009) and *The Literacy Learning Progressions: Meeting the Reading and Writing Demands of the Curriculum* (Ministry of Education, 2010) in an effort to reduce the reading achievement gap. However, as subsequent results have shown:

> Despite some overall improvements, the gap between our high performing and low performing students remains one of the widest in the Organisation of Economic Cooperation and Development (OECD). These low performing students are likely to be Māori or Pasifika and/or from low socio-economic communities. Disparities in education appear early and persist throughout learning. (Ministry of Education, 2011, p. 8)

2.6.1 Literacy practice in New Zealand

New Zealand has a national education system, which means, in theory, all children have access to the same education. All public primary schools teach the same national curriculum (Ministry of Education, 2007), and all children are expected to meet the same national standards for reading and writing (Ministry of Education, 2009) at various stages of development in their schooling.

Literacy practice in New Zealand primary schools is based on a top-down constructivist whole language approach (Pressley, 2006; Tunmer et al., 2013a) that emphasises higher-order meaning making skills. Literacy acquisition has three aspects which develop together: "learning the code, making meaning, and thinking critically" (Ministry of Education, 2003, p. 24). Children learn to read by being immersed in real literature and engagement in literacy activities (e.g., language experience, guided reading, shared reading, independent reading, reading to talking with). While this approach acknowledges that children need to learn the code, it is only deemed meaningful in the context of achieving the goal of "reading and writing with meaning and purpose" (Ministry of Education, 2003, p. 24). The sounding-out strategy for decoding is not recognised as an appropriate strategy for children learning to read. "Children whose control of the strategies is limited may process text in inappropriate ways — for example, by relying on their memory, by trying to sound out every single word..." (Ministry of Education, 2003, p. 39).

The Ministry of Education (2009, 2010) classifies reading skills as constrained or unconstrained: "…some reading skills…are constrained to small sets of

knowledge that are mastered in relatively brief periods of development. In contrast, other skills…are unconstrained by the knowledge to be acquired or the duration of learning" (Paris, 2005, p. 185). Vocabulary and comprehension are defined as unconstrained skills by the Ministry of Education, whereas decoding and phonological awareness are classified as constrained skills that will develop in a similar way for most students (Ministry of Education, 2009, 2010; Tunmer, Chapman, Greaney, Prochnow, & Arrow, 2013b). Decoding strategies and phonological awareness are not explicitly taught as the focus of instruction, but are taught within the context of other instructional strategies (Ministry of Education, 2003, 2009, 2010). Students are taught to decode unknown words by simultaneously using all sources of information (semantic, syntactic, visual, graphophonic, and prior knowledge and experience) to predict, cross-check, confirm, and self-correct as they read (Ministry of Education, 2003; Ryder et al., 2008).

Patel (2010) rejects the Ministry of Education's (2003) claim that its effective literacy practice is based on scientific evidence and believes that New Zealand's one-size fits all approach is not meeting the needs of all children. Through undertaking a review of the research, she concludes that effective literacy practice needs to include instruction in phonemic awareness, alphabetic principle, word recognition (automaticity and fluency), vocabulary, and reading comprehension, and that explicit instruction is a core element for at risk readers. Patel (2010) contends that while the *Effective Literacy Practice in Years 1 to 4* (Ministry of Education, 2003) recognises the importance of phonemic awareness, letter-sound relationships, fluency and vocabulary, it does not provide teachers with the instructional information needed to teach them. Nor does it align itself with the skills students need to achieve each year as identified in *The Literacy Learning Progressions: Meeting the Reading and Writing Demands of the Curriculum* (Ministry of Education, 2010). Patel (2010) further suggests that teachers may not be equipped to teach children struggling to learn to read under the whole language framework as they have not been provided with the necessary knowledge and tools.

2.6.2 Summary

The Ministry of Education (2010) states in *The Literacy Learning Progressions* that by the end of Year 6 at primary school a child is meant to be able to draw on knowledge and skills to decode "texts fluently and accurately, using a range of reliable strategies" (p. 16). While some readers respond positively to the Ministry of Education's (2003) top-down approach of whole language or multiple cues, some argue that this approach does not provide sufficient "phonologically-based word-level skills and strategies" (Tunmer et al., 2008, p. 116) that some readers need in order to become skilled readers. This is supported by the persisting reading achievement gap seen in international assessment results, suggesting that the uniform top-down whole language approach to reading instruction discussed above may not be effective and equitable for all New Zealand children, in particular our poor readers.

2.7 Teacher knowledge

Under the SVR model of reading, decoding and listening comprehension are both necessary skills in order to be able to read. While the whole language approach used to teach reading in New Zealand is meeting the needs of the majority of readers, poor readers continue to struggle. Some researchers believe that is because these poor readers need to be explicitly taught decoding skills (Henry, 2010; Moats, 2010; Nicholson, 2006; Pressley, 2006; Ryder et al., 2008; Shankweiler & Fowler, 2004; Torgesen, 2004; Tunmer et al., 2013a, 2003; Tunmer, Prochnow, Greaney, & Chapman, 2007). The whole language approach views comprehension not only as the end goal of reading, but also as the pathway to reading (Ministry of Education, 2003), and, as such, comprehension strategies are both implicitly and explicitly taught (Ministry of Education, 2003). In comparison decoding is regarded as a lower-level skill that children will acquire without direct instruction. Evidence shows, however, that in order to learn to read, poor readers also need intense, systematic instruction in decoding (Pressley, 2006). This is important because decoding and comprehension both take place in the limited capacity short-term memory, thus competing with each other.

Therefore if a reader is having trouble decoding the words then there is limited memory space to comprehend those words. In theory more space is made available for comprehension if a reader can decode accurately and fluently (Pressley, 2006; Ryder et al., 2008; Tunmer & Chapman, 2002).

Teachers' knowledge of language becomes important in the context of providing this systematic and effective instruction in decoding. Teachers cannot teach knowledge they do not have (Binks-Cantrell, Washburn, Joshi, & Hougen, 2012; Nolen, McCutchen, & Berninger, 1990). If teachers do not have the requisite language knowledge and understanding themselves they cannot accurately assess their students or differentiate their instruction to meet individual students' learning needs, leaving the potential to confuse struggling readers further. This may result in assessments being misinterpreted, inaccurate examples or models being used in instruction, or decoding strategies and/or phonological skills required by the student not being taught. The teacher will not be able to adequately assist students, respond to their questions, or give appropriate feedback to students' errors because they do not themselves possess the knowledge required to do so (Brady et al., 2009; Carroll, 2006; Cunningham et al., 2004; Moats, 1994, 2009; Piasta, Connor, Fishman, & Morrison, 2009; Spear-Swerling, Brucker, & Alfano, 2005).

Research studies have shown that phonemic awareness is an essential skill to be able to decode and readers with poor decoding will benefit from explicit instruction in phonemic awareness when learning to read (Ehri et al., 2001; Hatcher et al., 2004; Nicholson, 2003; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). If the gap in literacy achievement between good and poor readers is to be reduced, it follows that teachers need to be able to assess and teach phonemic awareness as well as the other components of decoding. A teacher's ability to assess and teach phonemic awareness will depend on their actual knowledge of phonemic awareness (Cunningham et al., 2004). According to Spear-Swerling and Zibulsky (2014), there is a correlation between teachers' knowledge of phonemic awareness and the amount of time teachers spend on phonemic awareness instruction. Teachers with higher levels of knowledge of phonemic awareness are more likely to allocate more time to phonemic awareness

instruction. Research studies suggest, however, that teachers do not have the necessary linguistic knowledge, especially phonological knowledge that is required to assess and teach children to read. This is discussed further in section 2.7.2.

2.7.1 Perceived versus actual knowledge

While teachers' actual knowledge is important in providing effective instruction, their perceived knowledge is also important. Inaccurate perceptions of teaching knowledge and skills could impede recognition of the need for further training. If teachers perceived knowledge aligns with their actual knowledge then "they presumably will be more receptive to seeking out and / or receiving information they do not possess" (Cunningham et al., 2004, p. 144).

2.7.2 Findings from studies

The initial search for "studies of teachers' knowledge of phonemic awareness" in the University of Waikato library database revealed almost 4000 articles. This was gradually honed down to 11 studies included in this literature review after applying the following criteria:

- Conducted since the NRP report 2000.
- Included "phonemic awareness".
- Participants include in-service teachers.
- Participants are primary teachers (excluded intermediate, secondary or tertiary).
- Participants are native English speakers.
- Special learning disorders were excluded; e.g., deaf children, autism, Williams Syndrome.
- Conducted in USA, UK, Australia or New Zealand.
- Conducted in English.
- Excluded teaching English as a second language.
- Do not involve student intervention studies.
- Method comparisons were excluded.

The researcher found only two studies conducted in New Zealand, however, because this research investigates in-service teachers' knowledge of phonemic awareness, the Nicholson (2007) study was excluded on the basis that the participants were first-year teacher trainees.

Moats (2009) assessed 139 primary teachers' knowledge of language structure. Results reinforced and extended findings of previous studies (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Cunningham et al., 2004; McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002; Moats, 1994), showing that teachers had misconceptions and gaps in the foundation knowledge they need to assess and teach children to read and spell. Phoneme counting results in particular were poor and the greatest gap was morphology knowledge (structure and form of words).

Carroll (2006) found there was "a wide variance of teachers' understandings and use of the concept of 'a sound' and how they then used this knowledge to segment words into sounds" (p. 44). In order to investigate the phonological awareness knowledge of New Zealand primary schools' educators, Carroll (2006) surveyed 212 pre-service, in-service, and specialist teachers; and teacher aides. Only 12% of teachers achieved over the 95% pass criteria. The widest variance was in phoneme segmentation; syllable counting was the most accurate. Teachers who used a phonics or phonological awareness programme in their teaching did not perform differently on the phonological awareness assessment compared to those teachers who did not. Variance in teachers' knowledge of phonological awareness becomes important when we consider the implications for consistency in teaching between teachers and schools. If teachers have different understandings of what a sound is, it means instruction will be different in different classrooms, with the potential for some children being taught incorrectly.

Cheesman, McGuire, Shankweiler, and Coyne (2009) specifically investigated teachers' knowledge of phonemic awareness and its instruction. Two hundred and twenty-three first year teachers from 102 schools in the USA were surveyed. The survey included nine questions that assessed participants' knowledge of phonemic awareness and its instruction (e.g., definition of a phoneme, definition

of phonemic awareness), and six questions that assessed participants' phonemic awareness skills (i.e., application of knowledge). Results were low for both phonemic awareness knowledge and skills. Teachers could not identify and count phonemes, and only 18% were able to answer at least 80% of the items correctly. Phonemic awareness and phonics were consistently confused. The findings confirmed that the spelling of words influenced teachers as they used letters (orthography) rather than sounds (phonology) in phonemic awareness tasks.

Extending Moats' (1994) study Bos et al. (2001) investigated 252 pre-service and 286 in-service teachers' knowledge and perceptions about early reading instruction. Positive attitudes towards both implicit (meaning-based) and explicit (code-based) instruction by both groups in the perception survey demonstrated support for a balanced approach to instruction; however, knowledge assessment results suggested teachers do not have the necessary knowledge of language structure, in particular phonological awareness, to teach children to read. This is based on the inability of 53% pre-service and 60% in-service teachers to answer nearly half of the knowledge questions. While more teaching experience or specialist teaching aligned with greater knowledge, scores for all groups were less than two-thirds correct. Both groups confused phonological awareness and phonics. Some differences were evident when comparing knowledge and perceptions; however, both groups felt more prepared to teach reading when perceived and actual knowledge aligned.

Consistent with the Bos et al. (2001) study, Fielding-Barnsley and Purdie (2005) also found primary teachers showed positive attitudes to both meaning-based and code-based instruction, supporting a balanced approach to teaching reading. They examined the knowledge of and attitudes to language structure (metalinguistics) in the process of learning to read of 93 final year pre-service teachers, 209 in-service teachers, and 38 specialist teachers in Australian primary schools. While teachers acknowledged the importance of metalinguistic knowledge, actual knowledge was not particularly strong (specialist 73%; in-service 62%, pre-service 54%). Consistent with Cheesman et al. (2009) results were correct in the more simple (e.g., syllable counting) than complex (e.g., phoneme counting) aspects of language. Teachers showed a reliance on

orthography rather than phonology, a finding congruous with Carroll (2006), Cheesman et al. (2009), Cunningham et al. (2004), and Moats and Foorman (2003). Attitudes to and knowledge of metalinguistics were not affected by teacher experience; however, they were influenced by specialist training.

Cunningham, Perry, Stanovich, and Stanovich (2004) not only explored perceived versus actual knowledge but also whether teachers calibrated that knowledge. Knowledge of children's literature, phonemic awareness, and phonics were assessed, as well as their perception of knowledge in each area of 722 Kindergarten–Year 3 teachers from 48 elementary schools in the USA. Teachers displayed limited knowledge in all three areas. Phonemic awareness results in particular were very poor: 20% all incorrect; 30% half correct; less than 1% all correct. However, the assessment task only included counting phonemes in 11 words. Consistent with Carroll (2006), Cheesman et al. (2009), Fielding-Barnsley and Purdie (2005), and Moats and Foorman (2003), findings suggested teachers used orthography rather than phonology when counting phonemes. Cunningham et al. found that "teachers knew relatively little about phonemic awareness…or phonics" (p. 161), meaning the potential exists for misleading information to be given when teaching children. Teachers had some degree of calibration between their perceived and actual knowledge of children's literature, but poor calibration of phonemic awareness and phonics. This is concerning because inaccurate perceptions of teaching knowledge and skills may impede a teachers' recognition of the need for further training.

Brady et al. (2009) investigated whether intensive professional development (PD) impacts on teachers' phonological and phonics knowledge. Fifty-seven first grade teachers were assessed pre- and post-PD. Pre-PD teachers' knowledge of phonological awareness and phonics was weak. Intensive PD was then given in the form of a two-day summer institute, monthly workshops, and weekly in-class support from highly knowledgeable mentors for one school year. Post-PD assessment showed substantial gains in both teachers' phonological awareness and phonics knowledge. Teacher self-efficacy ratings did not significantly correspond with initial knowledge performance suggesting that perceived and actual knowledge did not correspond. The level of initial knowledge, years of

teaching experience, and attitudes towards PD, motivation, and self-efficacy accounted for significant portions of knowledge gain variances.

McCutchen, Abbott, et al. (2002) also investigated whether teacher knowledge of language structure could be deepened through PD, but extended this to see whether this increased knowledge impacted on teaching practice, and ultimately gains in students' reading and writing skills. Forty-four kindergarten and first grade teachers, and 492 kindergarten and 287 first grade students participated in the study. PD comprised of an intensive two-week summer institute focusing on developing teachers' knowledge of "phonology, phonological awareness, and its role in balanced reading instruction" (McCutchen, Abbott, et al., 2002, p. 73), and continued through the school year with three follow-up sessions and class visits. The study compared an experimental group (n = 24), which received PD and a control group (n = 20), which received no PD. Although teachers had high general knowledge, their linguistic knowledge was poor on the pre-test (46.1% and 44.4% respectively). Phonological knowledge increased for the experimental group after instruction (53.6%) when post-tested one year later. The control group attended a summer institute one year later and was pre-tested again. No significant difference was found between the two pre-tests. The control group then received instruction at the institute. Phonological knowledge also increased for the control group after instruction (57.9%). After PD teachers spent more time on explicit instruction tailored to the emerging skills of their students (kindergarten on phonological awareness; first grade on comprehension strategies). Findings showed that students' reading and writing skills could be improved by changes in teacher knowledge and classroom practice. Kindergarten students' phonological awareness and letter-sound knowledge was positively related to the amount of explicit phonological instruction.

McCutchen, Harry, et al. (2002) investigated the relationships between teachers' knowledge of literature and phonology, beliefs toward reading instruction, classroom practice, and students' reading outcomes. Twenty-four kindergarten; 27 first grade, second grade, or a combination; and eight specialist teachers participated. Observing teachers' classroom practices sought to strengthen assessment results. Similar to McCutchen, Abbott et al.

(2002), teachers had poor phonology and orthography knowledge despite having a high general academic knowledge. No significant relationships were found between teachers' knowledge, classroom practice, and their beliefs toward reading instruction. Teachers' phonological awareness knowledge correlated with their use of explicit phonological instruction, suggesting teachers with higher knowledge allocated more time to explicit phonological instruction. Teachers' phonological knowledge and the amount of explicit phonological instruction led to greater gains in reading achievement (measured by word reading) in kindergarten students' but not in first and second grade students.

A three-phase longitudinal study of reading instruction in low-performing urban schools allowed Moats and Foorman (2003) to survey and observe teachers' linguistic knowledge, teaching competence, and student reading achievement over a four-year period for 50 Kindergarten–Grade 2, 42 Grade 2–3, and 103 Grade 3–4 teachers. The knowledge surveys were tweaked at each phase based on the previous phase's findings. Gaps were found in teachers' content knowledge of language, particularly in phonemic awareness. Consistent with Carroll (2006), Cheesman et al. (2009), Cunningham et al. (2004), and Fielding-Barnsley and Purdie (2005), Moats and Foorman (2003) found teachers used orthographic patterns rather than phonology on phonemic awareness tasks. However, similar to Brady et al. (2009) and McCutchen, Abbott et al. (2002), regular PD increased teachers' linguistic knowledge and led to increased results in student reading achievement. The findings suggested that teachers acquire knowledge through explicit instruction and ample practice; hence they need to be systematically taught the content they teach.

Piasta, Connor, Fishman, and Morrison (2009) also investigated the relationship between teachers' code-based language knowledge, teaching practices, and students' reading achievement. The study involved 42 first grade teachers and 437 first grade students. Similar to other studies, teachers averaged only 52% on the teacher knowledge assessment. Teacher knowledge did not relate to education, experience, or use of explicit instruction. Contrary to McCutchen, Abbott et al. (2002) and McCutchen, Harry et al.(2002), teacher knowledge alone did not directly affect students' reading gains; however, the

interaction between teacher knowledge and the amount of explicit decoding instruction given did. The more time spent on explicit decoding instruction by teachers with higher knowledge, the higher the reading gains in their students. The more time spent on explicit decoding instruction by teachers with lower knowledge, the weaker their student reading gains. Furthermore this study found reading gains in first year students whereas McCutchen, Harry, et al. (2002) found gains only in Kindergarten students not Grade 1 and 2 students.

Results of the studies are summarised in Table 3.

Table 3. Summary of studies relating to teacher knowledge

Author/Year	Country	Participants	Focus of knowledge	Findings
Bos, Mather, Dickson, Podhajski, and Chard (2001)	USA	• *N* = 538	• Early reading instruction.	• Positive attitudes toward both implicit and explicit instruction. • Teachers do not have the necessary knowledge of language to teach children to read. • Teaching experience or specialist training aligned with greater knowledge. • Scores for all groups were <2/3 correct. • Some differences were evident when comparing knowledge and perceptions.
McCutchen, Abbott, Green, Beretvas, Cox, Potter, Quiroga, and Gray (2002)	USA	• *N* = 44 teachers • *N* = 779 students	• Relationship between teacher knowledge, PD, teaching practice, and students' reading and writing skills.	• High general knowledge. • Poor linguistic knowledge pre-test. • Post-PD phonological knowledge increase. • Post-PD more time spent on explicit instruction. • Student learning improved by changes in teacher knowledge and classroom practice. • Phonological awareness and letter-sound knowledge positively related to amount of explicit instruction (Kindergarten).

McCutchen, Harry, Cunningham, Cox, Sidman, and Covill (2002)	USA	• *N* = 59	• Relationships between teachers' knowledge of literature and phonology, beliefs toward reading instruction, practice, and students' reading outcomes.	• High general knowledge. • Poor phonology and orthography knowledge. • No significant relationships between teachers' knowledge, practice, and beliefs. • Teachers' phonological awareness correlated with use of explicit phonological instruction. • Teachers' phonological knowledge and the amount of explicit phonological instruction led to greater gains in kindergarten students' reading achievement only.
Moats and Foorman (2003)	USA	• *n* = 50 K-2 • *n* = 41 Grade 2–3 • *n* = 103 Grade 3–4	• Language structure.	• Gaps in teachers' content knowledge of language, particularly phonemic awareness. • Orthographic patterns used rather than sound. • PD increased teacher knowledge and led to student reading gains.
Carroll (2006)	New Zealand	• *N* = 212	• Phonological awareness.	• Wide variance between knowledge of sounds and the application of that knowledge. • Widest variance – phoneme segmentation. • Using phonics in teaching does not improve teachers' personal phonological awareness.

Cunningham, Perry, Stanovich, and Stanovich (2004)	USA	• *N* = 722	• Actual versus perceived knowledge.	• Very poor phonemic awareness results. • Teachers used orthography instead of phonology. • Poor knowledge of phonemic awareness and phonics. • Poor calibration between perceived and actual knowledge of phonemic awareness and phonics.
Fielding-Barsley and Purdie (2005)	Australia	• *N* = 340	• Language structure (metalinguistics).	• Positive attitudes to both meaning-based and code-based reading instruction. • Actual knowledge poor. • Results were correct in the more rudimentary than complex aspects of language. • Reliance on orthography rather than phonology. • Attitudes and knowledge not affected by teacher experience, but were influenced by specialist training.
Brady, Gillis, Smith, Lavalette, Liss-Bronstein, Lowe, North, Russo, and Wilder (2009)	USA	• *N* = 57	• Impact of PD on phonological and phonics knowledge.	• Substantial gains in teachers' phonological awareness and phonics knowledge. • Gains correlate with initial knowledge levels, years of experience, and attitudes. • Perceived versus actual knowledge did not correspond.

Cheesman, McGuire, Shankweiler, and Coyne (2009)	USA	• *N* = 223	• Phonemic awareness and its instruction.	• Low results for both phonemic awareness knowledge and skills. • Phonemic awareness and phonics consistently confused. • Orthography rather than phonology used. • Teachers need explicit instruction and practice.
Moats (2009)	USA	• *N* = 139	• Language structure.	• Teachers had misconceptions and gaps in foundation knowledge needed to assess and provide instruction. • Poor phoneme counting results. • Greatest gap – morphology knowledge.
Piasta, Connor, Fishman, and Morrison (2009)	USA	• *N* = 42 teachers • *N* = 437 students	• Relationship between teachers' language knowledge, practice, and students' reading achievement.	• Poor results on knowledge assessment. • Knowledge did not relate to education, experience, or use of explicit instruction. • Teacher knowledge alone did not directly affect students' reading gains. • Interaction between teacher knowledge and the amount of explicit decoding instruction given did.

2.7.3 Summary of findings from studies

Overall the findings suggest that teachers do not have the knowledge of phonemic awareness required to provide the effective phonemic awareness instruction children with poor decoding need in order to learn to read. In all of the studies, teachers' knowledge of language structure was poor, especially their phonological knowledge, particularly at the phoneme level. Teachers consistently struggled with phoneme identity, phoneme counting, and phoneme segmentation tasks, tending to rely on orthography rather than phonology, confusing phonological awareness and phonics. There was poor calibration between perceived and actual knowledge, meaning that teachers may not be aware that they lack the requisite content knowledge necessary to assess and teach their students. Knowledge was also not necessarily related to either education or experience. There was a general consensus that teacher education programmes do not provide teachers sufficient content knowledge needed to teach struggling children to read. However, teacher knowledge could be improved through explicit instruction and opportunities to practice (Brady et al., 2009; McCutchen, Abbott, et al., 2002; Moats & Foorman, 2003).

Critics of these studies might argue that teacher knowledge of language is not necessary to teach the majority of students to read; however, this argument loses credibility in the case of beginning and struggling readers where evidence supports that teacher knowledge and explicit phonological instruction relates to improvement in students' reading skills (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002; Moats & Foorman, 2003; Moats, 2009).

2.8 Summary

New Zealand has continued to have an unacceptably large gap in reading achievement between good and poor readers as evidenced by international assessment results. While the current national whole language approach to teaching reading is meeting the needs of the majority of students, it is not responsive to the needs of poor readers who make up to 20% of students. These

poor readers are associated with low-income background, Māori, and Pasifika students who come to school with less literate cultural capital. Literacy practices in New Zealand primary classrooms focus on comprehension and are based on the premise that children will learn decoding skills implicitly in the context of reading (Education and Science Committee, 2001, 2008; Education Review Office, 2005; Greaney & Arrow, 2012; Ministry of Education, 2003; Tunmer & Prochnow, 2009; Tunmer et al., 2008, 2013a, 2006). However, research shows that without explicit instruction in phonemic awareness, these children will continue to struggle to learn to read (Ehri et al., 2001; Hatcher et al., 2004; Nicholson, 2003; Pressley, 2006, 2006; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). In order to meet the needs of these poor readers, teachers therefore need to be able to explicitly teach phonemic awareness. Hence teachers' knowledge of phonemic awareness becomes important in the context of its application to effective instruction. Teachers cannot meet the individual needs of their students if they do not have the requisite knowledge and understanding themselves in order to teach what the student needs to learn (Cunningham et al., 2004; McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002; Piasta et al., 2009).

Very few research studies have been carried out that investigate teachers' linguistic knowledge in the New Zealand context; only two studies in the last decade (Carroll, 2006; Nicholson, 2007) have been found by the researcher. This research study differs from these two previous studies in four ways. Firstly, it investigates the knowledge of in-service teachers only, whereas Nicholson's (2007) study surveyed pre-service teachers only, and Carroll (2006) surveyed a combination of pre-service and in-service teachers and teacher aides. Secondly, a review of the research both in New Zealand and overseas relating to teacher knowledge revealed that most studies assessed teacher knowledge in the broader context of language structure and phonology. A common finding from these studies, however, was poor performance in questions that assessed phonological awareness, in particular those relating to phonemic awareness (Carroll, 2006; Cheesman et al., 2009; Cunningham et al., 2004; Moats & Foorman, 2003; Moats, 1994, 2009). Hence this resarch focuses on teachers' knowledge of phonemic awareness, whereas Nicholson (2007) investigated the broader knowledge of

language structure and whether it could be improved through explicit teaching, and Carroll (2006) investigated knowledge of phonological awareness. Thirdly, this research also includes a comparison of teachers' perceived knowledge versus their actual knowledge. Neither Carroll (2006) nor Nicholson (2007) make this comparison in their studies, both studies only investigated teachers' actual knowledge. Finally, there are differences in the methodology used to collect the data. This research uses an online survey and four follow-up semi-structured interviews. Nicholson (2007) used a pre-test, teaching, post-test scenario, and Carroll (2006) used a face-to-face survey and discussion format.

Findings of the New Zealand and overseas studies included in this literature review show that teachers do not appear to have the requisite linguistic knowledge needed to teach children to read effectively, especially struggling readers. In particular, results for phonological knowledge at the phoneme level were consistently poor. This is of concern when we consider that phonemic awareness has been identified as an essential skill in learning to read and needs to be explicitly taught, especially for struggling readers (Ouellette & Haley, 2013; Pressley, 2006). Research shows that decoding skills can be facilitated through explicit instruction in phoneme manipulation (Strattman & Hodson, 2005), and children with below average reading-related skills will make greater improvements when they receive more teacher-managed, code-focused instruction (Connor et al., 2004; Tunmer et al., 2013a). If poor readers are to become skilled readers then they will need explicit instruction in phonemic awareness from knowledgeable teachers. This means teachers need to have the content knowledge of phonemic awareness themselves in order to be able to accurately assess their students and then provide the necessary instruction to meet their needs. It is therefore important to understand whether teachers' knowledge has changed since the aforementioned studies were undertaken, and what knowledge of phonemic awareness primary teachers teaching in New Zealand classrooms currently have.

2.8.1 Objectives of this research study

The aim of this research is to gain an understanding of the knowledge that teachers in New Zealand primary school classrooms currently have in regard to

phonemic awareness, their understanding of its importance in learning to read, and the methods they use to assess and teach it. The research questions are:

- What knowledge of phonemic awareness do primary school teachers have?
- What is primary school teachers' understanding of the role of phonemic awareness in learning to read?
- What methods do teachers use to assess and teach phonemic awareness?

Chapter Three: Methodology

3.1 Introduction

Research is the systematic and purposeful construction of knowledge. It may solve a problem, illuminate a situation, contradict, confirm, or build on existing knowledge (Menter, Elliot, Hulme, Lewin, & Lowden, 2011; Mutch, 2013). It is the research question that is the most fundamental and this needs to dictate and determine what modes of inquiry or methodologies are appropriate to obtain useful information (Ercikan & Roth, 2006; Johnson & Onwuegbuzie, 2004; Mutch, 2013).

Research activities have traditionally been classified into qualitative and quantitative based on the types of data and analyses used (Ercikan & Roth, 2006; Mutch, 2013). Qualitative research is an exploratory or inductive approach that enhances understanding of the phenomena being researched by collecting descriptive or word based accounts of the participants' experiences with the phenomena (Bryman, 2012; Johnson & Christensen, 2008; Mutch, 2013). Methodology includes ethnography and case study, and uses instruments such as semi-structured interviews or participant observations. The focus is on words rather than quantification, with the key ideas, patterns, and/or themes emerging out of the data itself (Bryman, 2012; Johnson & Christensen, 2008; Mutch, 2013). Qualitative research is seen as more subjective, with a higher degree of researcher involvement and purposeful sampling (Denscombe, 2007).

In contrast, quantitative research is more of a confirmatory or deductive approach in which numerical data is gathered from a random sample to allow generalisations to be made to a broader population (Bryman, 2012; Johnson & Christensen, 2008; Mutch, 2013). The focus is on quantification rather than words, with numerical data analysed statistically in order to prove or disprove an idea or hypothesis. Methodology usually takes the form of surveys, interventions, or experiments. Quantitative research is seen as more objective in nature with the

researcher more detached from the research process (Bryman, 2012; Denscombe, 2007; Johnson & Christensen, 2008; Menter et al., 2011; Mutch, 2013).

Ercikan and Roth (2006) contend, however, that all phenomena have both qualitative and quantitative characteristics. "…the material world (ontology) and knowledge about it (epistemology) have both qualitative and quantitative characteristics" (p. 14). Ercikan and Roth (2006) believe a mixed method approach that uses multiple methods and modes of inquiry should be used so that the elements of both quantitative and qualitative can be represented. A mixed method approach will provide the strengths of both quantitative and qualitative research, overcoming the weaknesses and biases of a single approach, and thus allowing a more complete picture of the phenomena being researched to be provided (Denscombe, 2008; Johnson & Onwuegbuzie, 2004). Denscombe (2008) further suggests that mixed method research increases the accuracy of the data by using the principles of triangulation. One method can be used to compare or check the findings of a different method.

This research study uses a mixed method approach, incorporating both qualitative and quantitative data collected to gain a more complete picture of what is being researched. Initially an online survey was emailed to teachers in primary schools in the Waikato, Auckland, and surrounding areas in order to investigate what knowledge of phonemic awareness and its importance in learning to read teachers have, whether it is explicitly taught as part of their reading instruction programmes, and if it is taught, what methods are being used to assess and teach it. Using a survey that collects a mixture of qualitative and quantitative data means a larger number of teachers could be studied (quantitative strength) while at the same time providing an understanding and description of individual teachers' knowledge and experiences of the phenomena (qualitative strength) (Denscombe, 2007; Johnson & Onwuegbuzie, 2004). Four semi-structured interviews were then undertaken in order to add depth and clarify the findings further by investigating the knowledge and use of phonemic awareness in local contexts (Johnson & Onwuegbuzie, 2004).

The research paradigm "refers to the researcher's assumptions of reality (ontology), knowledge (epistemology) and ways of gathering knowledge of reality (methodology)" (Markula & Silk, 2011, p. 53). Research paradigms have been the centre of great debate in literature. Traditionally quantitative methods have been aligned with a positivist paradigm, which presumes knowledge has one reality, is objective, and generalisable (Johnson & Onwuegbuzie, 2004; Markula & Silk, 2011; Neuman, 2011). Whereas qualitative methods have been aligned with a constructivist or interpretivist paradigm, which presumes knowledge, has multiple realities, is subjective, and particular to local contexts or settings (Johnson & Onwuegbuzie, 2004; Markula & Silk, 2011; Neuman, 2011). An online survey can fall within a positivist or interpretivist paradigm depending on whether it collects quantitative or qualitative data, and the semi-structured interview is usually associated with being a qualitative method and falling within an interpretivist paradigm (Johnson & Christensen, 2008; Markula & Silk, 2011; Neuman, 2011). However, Krauss (2005) contends that the methodology must match the phenomenon being studied rather than a particular paradigm. What is important is that the methodologies used allow the researcher to answer the research question(s). This pragmatist view allows the mixing of research components and focuses on what will work in practice, in this case drawing on both interpretive and positivist paradigms to enhance the quality of the research (Cohen, Manion, & Morrison, 2011; Johnson & Christensen, 2008; Johnson & Onwuegbuzie, 2004; Krauss, 2005; Onwuegbuzie, 2002). Using an online survey to collect both quantitative and qualitative data, and then clarifying and enhancing the findings through semi-structured interviews, aligns this research more with an interpretive paradigm in that it seeks to make meaning from individual teachers' understandings and experiences to give a picture of teachers' knowledge of phonemic awareness and its application in primary school classrooms.

3.2 Participants

3.2.1 Online survey participants

An invitation was sent via email to the principals and/or school administrators of 416 schools in the Waikato and surrounding areas, followed by 234 schools in the Auckland and surrounding areas, inviting them to distribute the online survey to teachers at their schools. Consequently the distribution of the survey was out of the control of the researcher and at the discretion of the school administrator or principal; hence the exact number of teachers who were invited to participate in the survey is unknown. For this reason a "true" response rate to the survey could not be calculated. One hundred and twenty-three participants responded to the survey. If the number of responses is considered as a proportion of the number of schools invited to participate then there is a response rate of 19%. Of these 123 responses, 68 were considered to be complete responses for data analysis purposes, and 55 were deemed incomplete and not included in the analysis of the data. The criteria applied to determine an incomplete response were:

- Demographic questions answered only.
- Less than 25% of the teacher knowledge questions answered.

Of the 68 participants, 62 were female (91%) and six were male (9%). Thirty-six (53%) participants were aged between 50 and 59, with the majority being aged over 40 years *(n* = 56; 82%) and 12 were aged younger than 40 years (18%). In terms of ethnicity, three-quarters classified themselves as New Zealand European (*n* = 51; 75%); five as European (7%); and eight as Māori (*n* = 2; 3%), Māori/New Zealand European (*n* = 5; 7%), Māori/European (*n* = 1; 2%), or New Zealander (*n* = 1; 2%). The remainder (*n* = 3, 4%) was made up of other nationalities: one American, one South African European, and one Indian. Experience was high with 43 (78%) of the participants having more than 10 years' teaching experience, 30 (44%) of these had been teaching for more than 20 years. Fifteen (22%) had taught for 10 years or less. Twenty-five (37%) participants had a Bachelor qualification and 17 (25%) participants had a Bachelor with Diploma or Higher Diploma of Teaching qualification. Four (6%) had a Graduate Diploma of Teaching and 12 (17%) had completed a Master or postgraduate qualification.

Ten (15%) had a Diploma, Advanced Diploma, or Higher Diploma of Teaching. A summary of the demographic statistics for the participants is given in Table 4.

Table 4. Demographic statistics of survey participants

Characteristic	Number (N = 68)	Percentage (%)
Gender:		
Male	6	9
Female	62	91
Age Range:		
18–29	4	6
30–39	8	12
40–49	13	19
50–59	36	53
60–69	7	10
70+	0	0
Ethnicity:		
Māori	2	3
Pasifika	0	0
New Zealand European	51	75
European	5	7
Māori/New Zealand European	5	7
Māori/European	1	2
New Zealander	1	2
Other	3	4
Years teaching:		
0 to 5	4	6
6 to 10	11	16
11 to 15	17	25
16 to 20	6	9
20+	30	44
Qualifications:		
Master or Postgraduate	12	17
Bachelor	25	37
Graduate Diploma of Teaching	4	6
Diploma of Teaching	8	12
Advanced or Higher Diploma of Teaching	2	3
Bachelor & Diploma of Teaching	15	22
Bachelor & Higher Diploma of Teaching	2	3

Thirty-three (48%) participants were teaching children in their first three years of school, 16 (24%) in Year 3/4 to 6, four (6%) in Year 5/6/7 to 8, six (9%) were

teaching five or more year levels in the same class, four (6%) were specialist teachers, four (6%) were associate or deputy principals (6%), and one (1%) was on study leave. The year levels participants are currently teaching are analysed in more detail in Table 5.

Table 5. Year levels participants are currently teaching

Current year level(s) teaching:	Number (N = 68)	Percentage (%)
New Entrant/Year 1	15	22
Year 2	6	9
Year 3	2	3
Year 4	3	4
Year 5	0	0
Year 6	1	2
Multilevel (New Entrant – Year 4)	16	23
Multilevel (Years 4–8)	9	13
> 4 Year levels (Years 1–8)	7	10
Specialist	4	6
Associate/Deputy Principal	4	6
Study Leave	1	2

The decile rating of a school is linked to the socioeconomic background of its community. The lower the decile rating, the higher the proportion of low-socioeconomic students (Ministry of Education, 2013). Decile ratings range from one being the lowest to 10 being the highest. Decile ratings are not a measure of the quality of a school but rather a means by which the Ministry of Education allocates funding. This is based on the premise that lower decile schools need more funding to provide the additional resources needed to support their students' learning needs (Ministry of Education, 2014). Decile ratings become relevant in the context of poor readers because poor readers in New Zealand have been associated with low-income or low-socioeconomic backgrounds (Tunmer et al., 2008, 2013a). The participant teachers covered the range of decile rankings in the schools they taught in (see Figure 5).

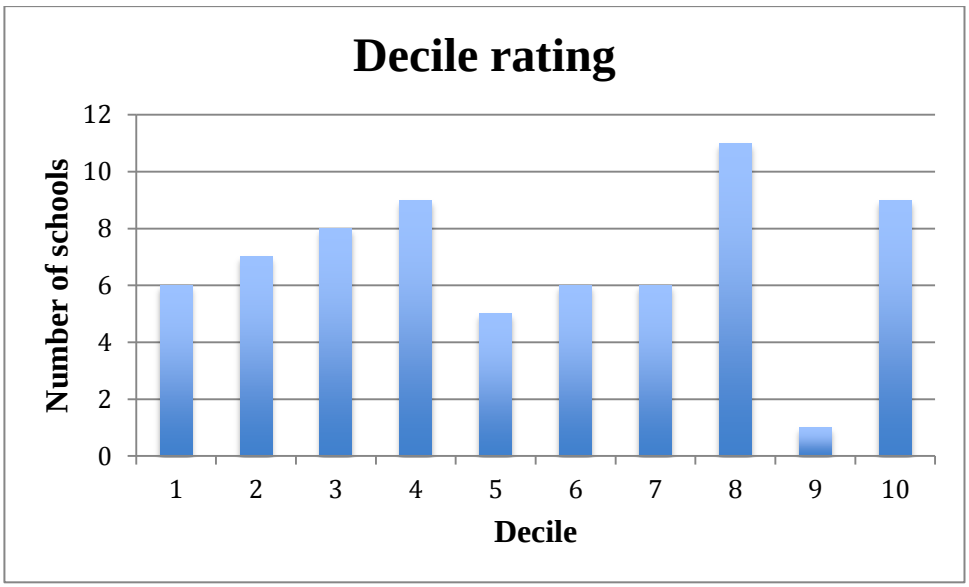


Figure 5. Decile ratings of participants' schools

3.2.2 Interview participants

Access to interview participants was through the survey. At the end of the survey, participants were asked if they were willing to participate in a semi-structured interview to add depth to the research findings. Seventeen participants indicated their willingness to be interviewed on the survey responses; however, only seven participants contacted the researcher via email. It was not possible for the researcher to contact the other 10 participants because the survey responses were anonymous and could not be traced back to individual participants. Four interviewees were selected from the seven participants to participate in a follow-up interview by applying the criterion of the four participants located closest to Hamilton in distance. One of these four participants did not respond to the email invitation so the next closest participant to Hamilton was invited to participate.

All four interviewees were female. One was aged between 30 to 39 years and three were aged between 50 to 59 years. All were experienced teachers, two had more than 10 years' teaching experience and two had more than 20 years' teaching experience. Three were New Zealand European and one was from South Africa. Two interviewees taught a New Entrant class, one a Year 2/3 class, and the other taught a Year 3/4 class. All taught in lower decile schools, meaning a higher proportion of low-socioeconomic background children. One interviewee is

currently studying at Masters level, one completed a Bachelor of Teaching, one completed an Advanced Diploma of Teaching, and one completed a Bachelor degree and a Diploma of Teaching in her native country. The interviewees' demographic statistics are summarised in Table 6.

Table 6. Demographic statistics of interviewees

Participant	Gender	Age range	Ethnicity	Years teaching	Qualifications	Current teaching level	School decile rating
1	Female	30–39	New Zealand European	14	Currently completing Masters	New Entrant	3
2	Female	50–59	New Zealand European	13	Bachelor of Teaching	Year 2/3	2
3	Female	50–59	South African	21+	Bachelor + Diploma of Teaching	Year 3/4	1
4	Female	50–59	New Zealand European	21+	Advanced Diploma of Teaching	New Entrant	4

3.3 Measures

Two measures were used while conducting this research. Firstly, an online survey consisting of both quantitative and qualitative questions was used to investigate teachers' knowledge of phonemic awareness, its importance in learning to read, whether it is explicitly taught as part of their reading instruction programmes, and if it is taught, what methods are being used to assess and teach it. Secondly, four semi-structured interviews using qualitative questions were conducted in order to add depth to the researcher's understanding of what is happening with respect to phonemic awareness in those four classrooms.

3.3.1 Online survey

The online survey was constructed using LimeSurvey and consisted of two sections (see Appendix A). The first section collected demographic data of the participants: gender, age group, ethnicity, years teaching, school decile ranking, year level currently teaching, year levels previously taught, and qualifications (adapted from Bos et al., 2001). The second section surveyed teachers' knowledge of phonemic awareness and how they applied this knowledge when teaching. The questions were developed and adapted from instruments used in similar studies where teacher knowledge was assessed (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994, 2009; Nicholson, 2007; Strout, 2008). This second section contained 17 questions split into five parts. Participants answered each part before moving on to the following part and it was not possible for participants to return to a previous part. This was done to reduce the effect of question content influencing participants' answers. The first part centred around reader characteristics and reading instruction programmes to find out what participants believed are the key characteristics/skills children need to have in order to be good readers, and what the key components/features of participants' reading programmes are. These two qualitative questions were designed by the researcher to see if participants believed, without prompting, that phonemic awareness is a key characteristic of a good reader and to find out how many

participants actually included it as part of their reading programme, before assessing their actual and perceived knowledge of phonemic awareness.

The second part focused specifically on phonemic awareness. Participants were first asked to define phonemic awareness in their own words (Spear-Swerling et al., 2005; Strout, 2008). This question was then extended by the researcher to ask them to explain if and why it was either included as part of their reading programme or not. If it was included then the methods they used to assess and teach it were to be briefly described. The definition given in the first instance was important as the participants' understanding of phonemic awareness would impact on the interpretation and analysis of subsequent responses. Participants were asked to choose from four choices to describe their current knowledge or skill level with regard to teaching and providing students with structured practice in phonemic awareness (Cunningham et al., 2004). This would allow a comparison of their percieved versus actual knowledge, as discussed in section 2.7.1, to be made. Studies have shown discrepancies between what teachers know (actual knowledge) and what they think they know (percieved knowledge) (Bos et al., 2001; Brady et al., 2009; Cunningham et al., 2004; Spear-Swerling et al., 2005). Information on where they have gained their knowledge of phonemic awareness was also collected.

The third part comprised of four multiple-choice questions. The first question related to phonological awareness and involved counting the number of syllables in six words (Moats, 1994, 2009). The next three questions related to the application of phonemic awareness knowledge: defining a phoneme, counting the number of phonemes in eight words, and identifying the third phoneme in eight different words (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994, 2009; Strout, 2008). Nicholson (2007) suggests that phoneme counting is an indicator of a teacher's linguistic awareness. This is based on the finding in his study of 33 trainee teachers, that the question that most correlated to trainee teachers' improved linguistic awareness from pre-test to post-test after explicit instruction, was the one that asked trainee teachers to count phonemes.

The fourth part also contained four multiple-choice questions that assessed participants knowledge of language in relation to short vowels, long vowels, consonant blends, and digraphs (Bos et al., 2001). Previous research studies found that teachers had difficulty separating orthography from phonology (Carroll, 2006; Cheesman et al., 2009; Cunningham et al., 2004; Fielding-Barnsley & Purdie, 2005; Moats & Foorman, 2003) and would count or identify phonemes based on spelling rather than sounds. These four multiple-choice questions were included to support the researcher's understanding of phoneme counting and identification results.

The fifth and final knowledge part used a qualitative question to explore participants' knowledge of the difference between phonological awareness, phonemic awareness, and phonics (adapted from Nicholson, 2007). This question was included because other studies found that teachers could not define them, did not understand their differences, and/or confused them (Bos et al., 2001; Cheesman et al., 2009; Cunningham et al., 2004; Spear-Swerling et al., 2005).

Once the survey was designed, it was then piloted in order to increase its validity. According to Mutch (2013) "*validity* means that your study actually measures what it sets out to measure" (p. 109). How the survey is constructed is a critical component of validity. The questions themselves, the order of the questions, question type (qualitative/quantitative), the scales used, and the layout or format can all contribute to a survey's success (Menter et al., 2011). Question comprehensibility will affect the quality and validity of the findings (Lenzner, 2012). While a strength of a survey is that respondents all answer the same questions, the responses will be dependent on the respondents understanding the question in exactly the same way and as intended by the researcher (Desimone & Floch, 2004; Neuman, 2011). This was important in this survey given that participants could not go back to questions in previous parts of the survey. Piloting or pre-testing the survey with a small subset of teachers similar to the intended online survey respondents would help minimise this to help ensure the intended information could be captured (Bryman, 2012; Desimone & Floch, 2004; Fowler, 1998; Gillham, 2007; Johnson & Christensen, 2008; Menter et al., 2011). A pilot questionnaire was sent out to a sample of nine teachers not expected to be

in the survey pool; e.g., teachers not currently teaching in the classroom or teaching in schools the survey would not be sent to. Four responses were received. Respondents were asked to comment on the format of the survey, clarity of instructions, question comprehensibility and content, and question order. As a result minor adjustments (e.g., changing a question from qualitative to multiple-choice, moving one question earlier, including more options in a multiple-choice scale) were then made based on the responses and respondents' feedback.

3.3.2 Interview questions

The four interviews were semi-structured, meaning that while a framework of standardised questions was constructed by the researcher (see Appendix B), some of the interview questions were dependent on the responses given by the interviewees at the time, resulting in variations between participants. As responses to the survey were anonymous, the researcher had no knowledge prior to the interview of the interviewees' knowledge of phonemic awareness. Thus the questions were developed from the survey which was adapted from other research studies (Moats (1994), Nicholson (2007), Spear-Swerling et al. (2005), and Strout (2008)).

3.4 Procedure

After ethical approval was received from the University of Waikato Faculty of Education Research Ethics Committee (see Appendix C), an invitation to participate in the survey was sent via email to 416 primary schools in the Waikato and surrounding areas, followed by 234 primary schools in the Auckland and surrounding areas. The email outlined the purposes of the research, what would be involved for the participants, and a request for the survey to be distributed to teachers within the school (see Appendices D and E). Who the survey was distributed to at a school was out of the control of the researcher and was at the discretion of the school administrator/principal. The survey could be accessed on the web link provided in the email. Teachers then decided if they

wished to participate and gave their informed consent by completing and submitting the survey online. Informed consent is an important ethical consideration for any research and is based on the participants' right to freedom and self-determination. Information regarding the purpose, conduct, and dissemination of the research is given to participants so they can make an informed decision as to whether they will participate in the research study or not (Bryman, 2012; Cohen et al., 2011; Mutch, 2013). Contact details of the researcher were provided to allow the participants to ask any questions or clarify information. The survey was open for three weeks. A reminder email was sent out 10 days before the survey was due to close.

At the end of the survey, the participants were asked if they were willing to participate in the study further by being interviewed. It was in this way that the possible participants for the four semi-structured interviews were accessed. Seven teachers emailed the researcher indicating their willingness to be interviewed. Four participants were selected to participate in a follow-up interview as discussed in section 3.2.2. Interviewees were contacted via an email explaining the purpose of the interview (see Appendix F). The information sheet was again attached to the email for interviewees' information (see Appendix E). Interviewees were asked to complete an Informed Consent form (see Appendix G). The researcher and the interviewee agreed to a mutually agreeable time for the interview to occur via email or telephone. The interviews took place at a mutually agreed upon venue and were recorded using the *Quick Voice* application on an iPad. Each interview took 30–40 minutes. Interviews were then transcribed and these transcripts were sent back to the interviewees via email for approval. A face-to-face interview is also a social encounter with verbal, visual, and nonverbal communication occurring. The transcription and interviewee approval steps in interviewing are important to try to minimise "data loss, distortion and the reduction of complexity" of the data (Cohen et al., 2011, p. 426). Two of the interviewees changed one word each in their respective transcripts. Once all four interviewees gave approval of their transcripts, the data was analysed (see section 3.5.2).

3.5 Analysis

Quantitative and qualitative data require different analysis strategies; however, both require raw data to be coded before analysis. Coding can be defined as "systematically reorganizing raw data into a format that is easy to analyze" (Neuman, 2011, p. 383).

The survey contained both quantitative and qualitative questions. Most of the quantitative questions used closed questions in which the participants' selected their response(s) from multiple-choice. This allowed the answers to be pre-coded as correct or incorrect (Bryman, 2012; Cohen et al., 2011; Denscombe, 2007). Two of the qualitative questions asked for definitions which were marked quantitatively (discussed further in section 3.5.1). Other open questions used in the survey and the semi-structured interviews generated qualitative answers, which required post-coding. These responses were in the participants' own words and had to be coded into categories using a thematic approach by looking for patterns and themes that arose from within the data itself. These patterns and themes were analysed and summarised to describe the main findings (ideas, concepts, views, experiences) of the research as it related to the research questions (Bryman, 2012; Cohen et al., 2011; Menter et al., 2011; Mutch, 2013). Where appropriate, qualitative data was turned into quantitative data by analysing the frequency within a category (Cohen, Manion, & Morrison, 2007; Denscombe, 2007).

Once the survey data had been coded and entered on a database, it was checked for accuracy before being analysed. Coding and data entry errors can affect the validity of the findings (Menter et al., 2011; Neuman, 2011), so a manual check of all data input was carried out to minimise the effects of this.

After analysis of the data, internal validity was also checked. Internal validity demonstrates that the explanation or interpretation of the data given can be sustained by the data (Cohen et al., 2011). An effective method to maximise internal validity is inter-rater reliability: "whether another observer with the same

theoretical framework and observing the same phenomena would have interpreted them in the same way" (Cohen et al., 2011, p. 202). The researcher's marking of the teacher knowledge assessment and the coding and interpretation of the online survey and semi-structured interviews' qualitative questions were checked by and moderated with either a teaching fellow or a senior lecturer from the Arts and Language Education Department of the University of Waikato. The definition of phonemic awareness question had a 93% agreement rate in marking the participants' answers. The difference between phonological awareness, phonemic awareness, and phonics question had an 88% agreement rate in marking the participants' answers. The researcher and a teaching fellow moderated differences before scores were entered into the Microsoft Excel workbook. Analysis of the interview data was checked by a teaching fellow who also has seven years recent primary teaching experience. The agreement rate was not measured quantitatively; however, no significant changes were made, only a few suggestions that did not affect the interpretation of the results.

3.5.1 Online survey

Once the online survey closed, the survey data was analysed using LimeSurvey and Microsoft Excel. The survey was split into two sections: the participant demographic information and the teacher knowledge section.

3.5.1.1 Demographic information

The demographic information was used to develop the participant statistics discussed previously in section 3.2.1. The data was entered into a data table in a Microsoft Excel workbook where each category was analysed by calculating the number and percentage of each possibility.

3.5.1.2 Teacher knowledge

The teacher knowledge section was analysed in two parts. The first part analysed quantitatively the questions that had a right or wrong answer to provide a measure of teachers' knowledge of phonemic awareness. The second part

analysed thematically the qualitative questions that provided supporting information in relation to the knowledge assessment.

3.5.1.2.1 Teacher knowledge assessment

The teacher knowledge assessment comprised of the 10 questions in the survey that have answers that allow quantitative analysis. These questions were marked manually using model answers (see Appendix H), and then entered into a data table in a Microsoft Excel workbook. As discussed in section 3.3.1, the teacher knowledge assessment measure used in this research was developed and adapted by the researcher from various knowledge assessment tools used in similar studies (Bos et al., 2001; Cunningham et al., 2004; Moats, 1994, 2009; Spear-Swerling et al., 2005; Strout, 2008). Where a question was taken directly from an assessment used in another study so was the model answer if it was available. Four of the six syllable counting words, three of the phoneme counting words, and their answers were taken directly from the *Teacher Knowledge Survey* used by Moats (2009). One of the phoneme counting words, six of the phoneme identity words, and their answers were taken directly from the *Informal Survey of Linguistic Knowledge* used by Moats (1994). Two of the phoneme counting words; the phoneme definition, short vowel, consonant blend and digraph questions; and their answers were taken directly from *The Teacher Knowledge Assessment: Structure of Language* used by Bos et al. (2001). The researcher developed the long vowel question, two of the syllable counting words, two of the phoneme counting words, and their answers. Model answers for the two qualitative questions were developed from definitions given in literature (Gillon, 2004; Nicholson & Dymock, 2015). A senior lecturer and a teaching fellow checked the model answers.

The researcher and a teaching fellow moderated answers to the two questions that required qualitative responses, i.e., the definition of phonemic awareness, and the difference between phonological awareness, phonemic awareness, and phonics. These questions could have a fully correct (1 point), partially correct (.5 point), or incorrect (0 point) answer. The other eight questions were multiple-

choice and worth one point for each part of the question. This included the six syllable counting, eight phoneme counting, eight phoneme identifying, and four language feature questions. For all but one of these questions there was only one correct answer. The question regarding long vowel sounds, however, caused considerable discussion when it came to formulating the model answer. The question asked which word contained a long vowel sound. The intended answer *lame* contains the long *a* vowel. *Hoot* and *ploy*, however, contain the vowel digraphs /oo/ and /oy/ respectively which also give a long vowel sound, hence could also be argued to be correct. This question was designed by the researcher and on reflection should have been designed with multiple-choice options that allowed only one possible answer. Unfortunately this was not picked up until analysing the data. It was decided that participants would score one point if they got all three words and .5 point if they got one or two of the words. The knowledge assessment had a total of 29 points.

Once the data had been entered into the Microsoft Excel workbook in numerical form, the data was analysed using descriptive statistics. Descriptive statistics describe or summarise the data. Measures of analysis used included frequency, percentage, mean, standard deviation, and range. Results are presented visually using pie charts, tables, and bar graphs (Cohen et al., 2011; Johnson & Christensen, 2008). When using descriptive statistics, generalisations cannot be made to a larger population (Johnson & Christensen, 2008; Mutch, 2013).

Each of the 10 questions was analysed by calculating the frequency and percentage of the different responses possible. Each individual question was further analysed in the same way at the individual word level where appropriate. An overall mark out of 29 was also calculated for each participant. The mean, minimum, maximum, median, mode, and standard deviation for all 68 participants were then calculated from these total scores. Participants were asked in the survey to describe from four options their current knowledge or skill level in terms of teaching and providing students with structured practice in phonemic awareness. These responses were also entered into the workbook allowing participants' perceived and actual knowledge to be compared by applying the following criteria:

• Expert	75–100%	A- or better
• Proficient	60–74.5%	B- to B+
• Minimal skills	40–59.5%	D to C
• No experience	<40%	E

The criteria were developed by the researcher and a senior lecturer, and are aligned with the University of Waikato's grade percentages.

3.5.1.2.2 Qualitative questions

The first two knowledge questions regarding the key characteristics/skills children need to have in order to be good readers, and the key components/features of participants' reading instruction programmes were analysed in two ways. Firstly, by looking for the key words "phonemic awareness", the researcher could investigate how many participants included phonemic awareness in their responses without being prompted. Secondly, the responses were also analysed using the thematic analysis to identify common themes and patterns.

The thematic analysis for each question was conducted manually. A summary of the responses for each question was printed out using LimeSurvey. Each question was analysed separately. Each response within a question was coded individually by identifying key words or phrases; e.g., oral language, identify letters and sounds, and were tallied using a table. Key words or phrases that related to the same characteristic/skill or component/feature were grouped together. For example, some participants used the umbrella term "comprehension", but some mentioned individual comprehension strategies such as "self-monitoring", "prior knowledge related to the story" or "prediction skills". If a participant mentioned more than one comprehension strategy, it was only tallied once under the umbrella word comprehension. Oral language and vocabulary were grouped together as another example. The frequency and percentage of each characteristic/skill and component/feature were then calculated. Results for the 10 most frequently occurring themes only are reported for each question.

The methods used to assess and teach phonemic awareness were also analysed thematically. Only those participants with fully correct responses for the definition of phonemic awareness were included in the analysis. This is based on the premise that if a participant does not know what phonemic awareness is, then how can they know if they are assessing and teaching it. Individual responses for the assessment methods, teaching methods, and source of phonemic awareness knowledge questions were cut and pasted from LimeSurvey into a table. Each question was then analysed separately. Key words were identified and highlighted using different coloured highlighter pens. These key words were then grouped and tallied. The frequency of each theme was then calculated.

3.5.2 Semi-structured interviews

After each semi-structured interview was completed, the interview was transcribed and the transcript emailed back to the interviewee for approval. Once the data was approved it was then analysed. The data was analysed manually using a thematic approach for qualitative data adapted from Raibee (2004). The following procedure was used:

1. The interview transcripts were printed on different coloured paper for each interviewee.
2. Four main themes were identified from the research questions: knowledge of phonemic awareness, role of phonemic awareness, assessment methods and teaching methods.
3. Each main theme was written as a heading on a large piece of paper.
4. Key words and phrases relating to these themes were highlighted using different coloured highlighter pens on the interview transcripts.
5. Text relating to each theme was then cut out and grouped on the large piece of paper for that theme.

The data for each theme was then interpreted to generate the results. When interpreting the data, consideration was given to the interviewees' actual words, their meaning and the context it was given in, as well as the frequency, intensity, consistency, and specificity of the comments made, in order to discover the larger concepts or trends (Rabiee, 2004). Sub-themes were identified within some

themes. Knowledge of phonemic awareness was classified as actual knowledge and source of the knowledge; and teaching methods was classified as decoding instruction, explicit teaching of phonemic awareness, time spent on phonemic awareness instruction, and whether teaching approaches were school-wide or teacher specific. Supporting information also emerged from the data regarding the learner profiles of the students the participants teach, the key characteristics/skills participants believe a good reader needs to have, and the key components/features of their reading programmes. The internal validity of the researcher's coding, identification of the themes, and interpretation of the data was crosschecked by a teaching fellow.

3.6 Summary

An online survey investigating teachers' knowledge of phonemic awareness and its importance in learning to read was sent out to 416 primary schools in the Waikato and surrounding areas, followed by 234 primary schools in the Auckland and surrounding areas, inviting teachers to participate. Of the 123 responses received, 68 were deemed to be complete for analysis purposes. Four semi-structured interviews were then conducted to investigate the survey findings further in four local contexts in order to add depth to the researcher's understanding. The results are presented in Chapter Four.

Chapter Four: Results

4.1 Introduction

This research investigated primary teachers' knowledge of phonemic awareness and its importance in learning to read, whether it was explicitly taught as part of their reading instruction programmes, and if it was taught, what methods were used to assess and teach it. Two methods were used to collect the data: an online survey and four semi-structured interviews. The data has been analysed using the methodologies described in Chapter Three. Results from the survey and the interviews will be presented separately.

4.2 Online survey

The survey was made up of both qualitative and quantitative questions. These questions were split into two sections. The first section contained questions that collected participants' demographic information, which were presented and discussed in Chapter Three (see section 3.2.1). The second section contained questions that investigated teacher knowledge and was analysed in two parts. Questions that were either correct or incorrect were analysed quantitatively to make up the teacher knowledge assessment of phonemic awareness. The remaining qualitative questions that did not necessarily have a right or wrong answer were analysed separately to give supporting information. The results of the latter two parts are presented in the following sections.

4.2.1 Teacher knowledge assessment

The teacher knowledge assessment of phonemic awareness was comprised of ten questions. Three questions had multiple parts. The results were analysed initially by question then added together to give an overall score. Model answers for each question can be found in Appendix H.

4.2.1.1 Definition of phonemic awareness

Participants were asked to define phonemic awareness in their own words. For the purposes of this research study, phonemic awareness is defined as "…a conscious awareness of the smallest unit of sound in a [spoken] word and an ability to manipulate the sounds" (Nicholson & Dymock, 2015, Glossary). This definition of phonemic awareness formed the basis for the model answer (see Appendix H) and development of the marking criteria. Responses were marked as fully correct (1 point), partially correct (.5 point), or incorrect (0 point). The marking criteria for each category are given in Table 7.

Table 7. Marking criteria for the definition of phonemic awareness question

Points	Criteria
1 point	Must include : • awareness of sounds in a word at the phoneme level, i.e., used words like individual, smallest, distinctive; • the ability to manipulate phonemes, i.e., used words like identify, understand, work with, blend, break up/down, isolate; and • reference to spoken words only, i.e., did not link phonemes to letters or written words.
.5 point	Sounds must be related to spoken words only (i.e., did not link sounds to letters or written words) and • identified an awareness of sounds at the phoneme level only (but not the ability to manipulate phonemes); or • identified the ability to manipulate sounds in words but did not specify at what level; or • identified an awareness of sounds in words but did not specify at what level.
0 point	Linked sounds to letters, letter-sound correspondences, or written words or text. Defined phonological awareness, phonics, phonology, or phonetics instead of phonemic awareness.

Examples of responses by participants in each category are given in Table 8.

Table 8. Examples of participants' responses by marking category

Marking key	Example of Response
Fully correct[a]	"The ability to hear, isolate, manipulate phonemes in words" (Participant 14). "being able to break a word down to it's [*sic*] smallest sound and then blend it back together" (Participant 51). "Phonemic awareness is the ability to notice, think about, and work with the individual sounds in words" (Participant 118).
Partially correct[b]	"an awareness of the smaller sounds that fit together to make words" (Participant 32). "Understanding the different sounds that make up words" (Participant 78). "hearing, identifying and using sounds in words" (Participant 148)
Incorrect[c]	"knowledge and understanding of the letter sounds and how they work in words" (Participant 15). "the stuy [*sic*] of sounds" (Participant 29). "children are able to relate the sounds ty [*sic*] hear to objects, pictures and words" (Participant 33).

[a] Fully correct because Participants 14, 51, and 118 identified awareness of phonemes (used phonemes, smallest sound, and individual sounds respectively); they all included the ability to manipulate phonemes (used words manipulate, blend, and work with respectively), and they did not link phonemes to letters/written words. [b] Partially correct because Participants 32, 78, and 148 all related sounds to spoken words (no reference was made to letters/written words), and Participant 32 used smaller instead of smallest so did not specify the phoneme level (smaller could refer to syllables, onset-rimes, or phonemes); and Participants 78 and 148 referred to sounds but did not specify sounds at what level. [c] Incorrect because Participant 15 linked sounds to letters; Participant 29 defined phonetics; and Participant 33 did not specify sounds at the phoneme level, and sounds were linked to items they could see, i.e., objects, pictures and words, implying the words were written words not spoken words.

Eight (12%) of the 68 participants were able to define phonemic awareness fully, 15 (22%) participants were able to define it partially, and 45 (66%) participants were unable to define phonemic awareness. Thirty-five (52%) participants confused phonemic awareness with phonics. The results are presented in Figure 6.

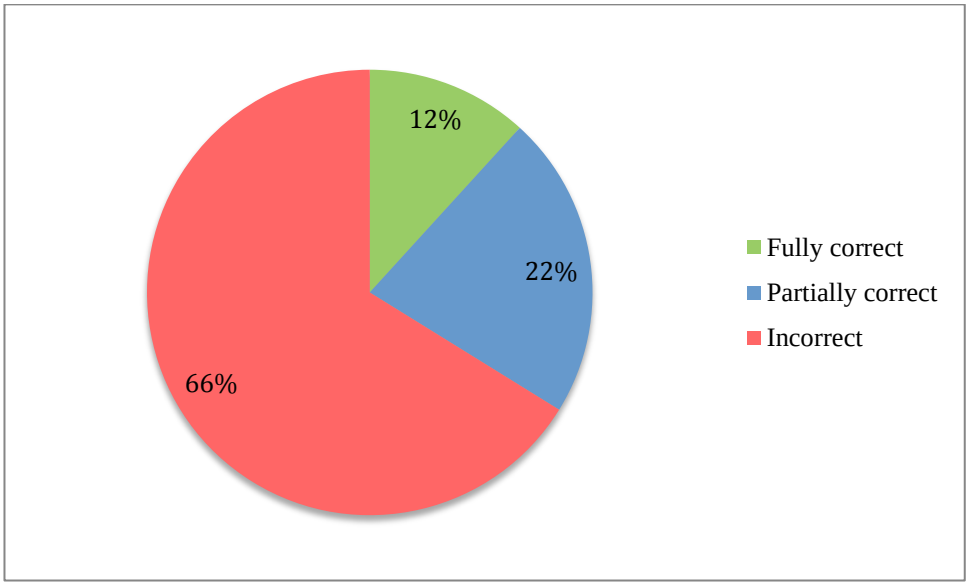


Figure 6. Participants' ability to define phonemic awareness

4.2.1.2 Syllable counting

The syllable counting question asked participants to count the number of syllables in six different words. Of the 68 participants, 23 (34%) could count the syllables in all six words correctly, 26 (38%) counted the syllables in five words correctly, 10 (15%) counted the syllables in four words correctly, six (9%) counted the syllables in three words correctly, two (3%) counted the syllables in two words correctly, and one (1%) counted only one word correctly (see Figure 7).

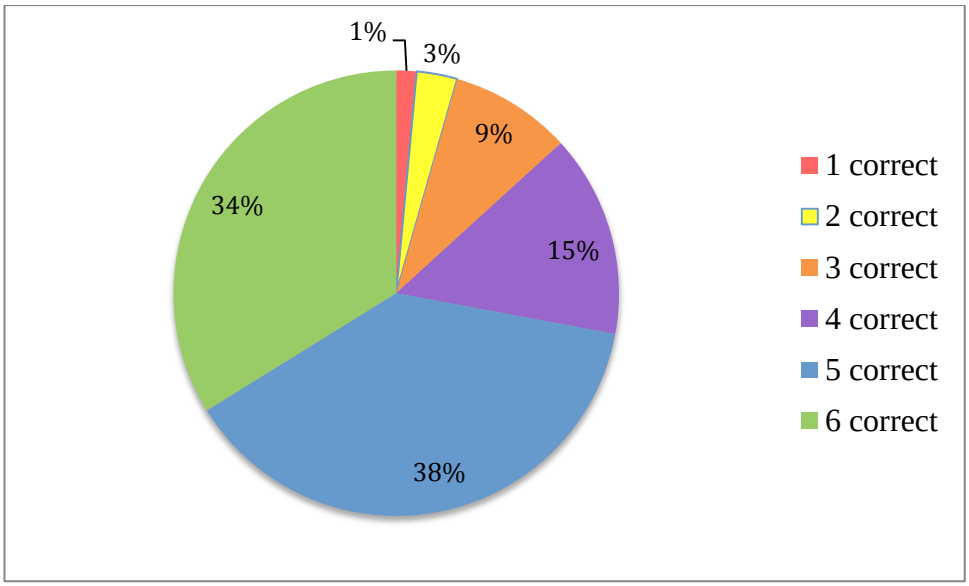


Figure 7. Participants' ability to count the number of syllables in words (maximum 6 words correct)

Participants found *incredible* and *finger* were the easiest words to count the syllables, with greater than 94% of participants able to count them correctly. *Shirt* and *enabling* proved the most difficult with 63% and 72% of participants counting them correctly respectively. *Vocabulary* and *shirt* both had approximately 80% of participants count their syllables correctly. These results are summarised in Figure 8.

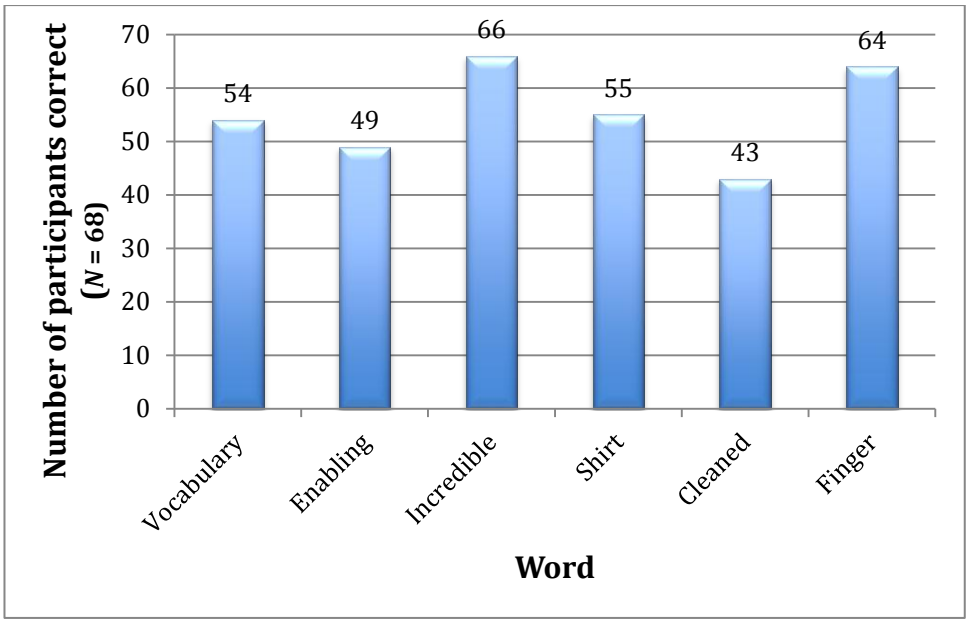


Figure 8. Number of participants who could count the number of syllables correctly in a word

4.2.1.3 Definition of a phoneme from a multiple-choice list

Fifty-eight (85%) participants were able to correctly identify the definition of a phoneme as a single speech sound from a multiple-choice list, i.e., a single letter, a single speech sound, a single unit of meaning, a grapheme, or not sure. Five (8%) participants confused a phoneme and phonics by identifying a phoneme as either a grapheme, a speech sound + a grapheme, or a speech sound + a single letter. Two (3%) participants believed a phoneme to be a single unit of meaning and three (4%) participants were not sure.

4.2.1.4 Phoneme counting

Phoneme counting was the task that participants found the most difficult. Participants were asked to count the number of phonemes in eight different words. One (1%) participant was able to correctly count the phonemes in all eight words. Twenty-seven (39%) participants counted between five and seven words correctly. Forty-one (61%) participants counted four or less words correctly, five (7%) were not able to count any words correctly at all. See Figure 9 for a breakdown of these results.

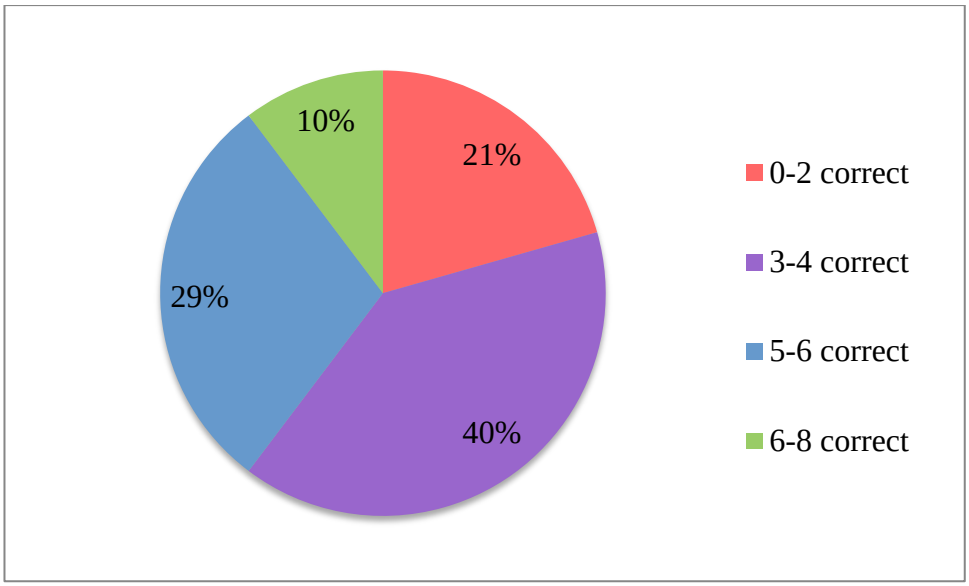


Figure 9. Participants' ability to count the number of phonemes in a word (maximum 8 words correct)

Box was the most difficult word for participants to count the phonemes. Three (4%) participants counted the four phonemes correctly. Fifty (74%) participants believed *box* had three phonemes.

Over 80% of the participants could count the three phonemes in *cat* (*n* = 56; 82%) and the two phonemes in *sea* (*n* = 57; 84%). Fifty (74%) participants could correctly count the two phonemes in *know*. All but five *(n* = 13; 19%) of the other participants believed *know* had three phonemes.

Less than 50% could count the four phonemes correctly in *thank (n* = 30; 44%) and *grass* (*n* = 29; 43%) and the five phonemes in *straight* (*n* = 28; 41%). Twenty-nine (43%) and 26 (38%) participants believed *thank* and *grass* had three phonemes. Responses to the number of phonemes in *straight* varied with three (*n* = 20; 29%) and four (*n* = 11; 16%) being the most common. The five phonemes in *racing* were correctly counted by 13 (19%) participants. The most common answer for *racing* was four phonemes (*n* = 37; 55%). The results for phoneme counting by word are summarised in Figure 10.

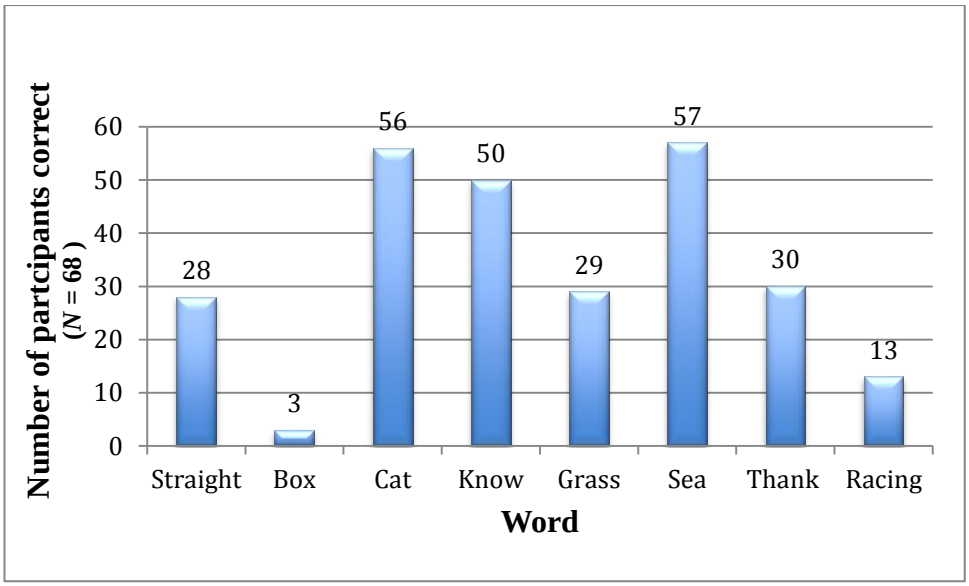


Figure 10. Number of participants who could count the number of phonemes correctly in a word

4.2.1.5 Identifying the third phoneme

Participants were given eight different words in which to identify the third phoneme. They had to write their response in the space provided. No participant was able to identify the third phoneme in all eight words correctly. Four (6%) participants correctly identified the third phoneme in seven words. Twenty-five (37%) participants identified the third phoneme correctly in either five or six words. Nearly 60% of the participants (*n* = 39; 57%) identified the third phoneme in four or less words. The most common score was four words (*n* = 24; 35%). Five (7%) participants were unable to identify the third phoneme in any word. Results are presented in Figure 11.

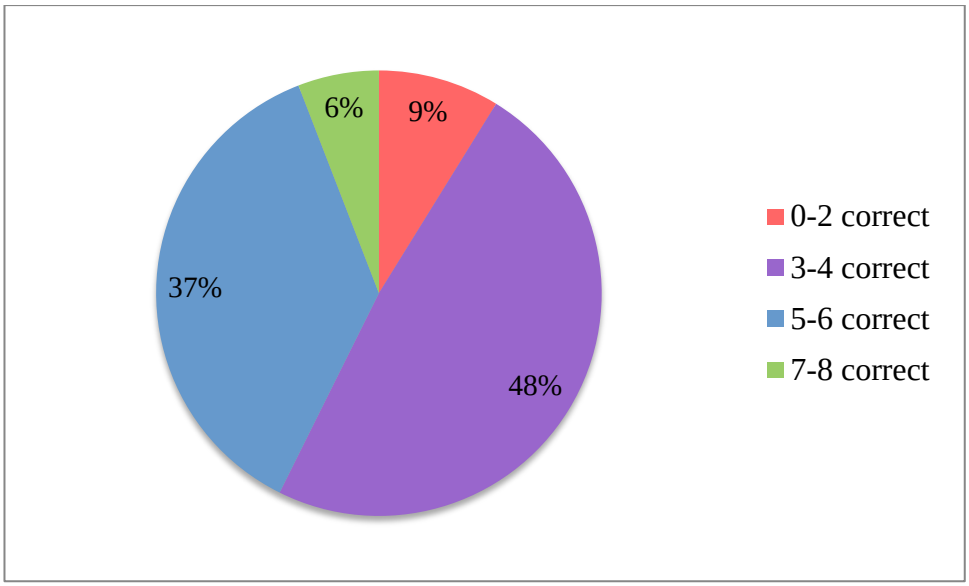


Figure 11. Participants' ability to identify the third phoneme in a word (maximum 8 words correct)

Participants had the most difficulty identifying the third phoneme in *explain*. One (2%) participant correctly identified /s/. The most common answer was /p/ (*n* = 25; 37%).

Twenty-four (35%) participants correctly identified the vowel digraph /ay/ as the third phoneme in *prayer*. Nineteen (28%) believed the third phoneme was /er/.

Educate, *witch* and *stood* all had similar results for the number of participants correctly identifying the third phoneme. Thirty-eight (56%) participants correctly identified /u/ as the third phoneme in *educate*. Fifteen (22%) participants believed /c/ was the third phoneme. Forty (59%) participants correctly identified /tch/ as the third phoneme in *witch*. Twenty-two (32%) participants believed /t/ was the third phoneme. Thirty-seven (54%) participants correctly identified the vowel digraph /oo/ as the third phoneme in *stood*; however, 22 (32%) participants believed /d/ was the third phoneme.

Forty-six (68%) participants correctly identified /k/ as the third phoneme in *chalk*. The next most common answers were /l/ and /lk/ (both *n* = 8, 12%).

The word that participants were the most successful in identifying the third phoneme was *tough* (*n* = 56; 82%). Results are summarised in Figure 12.

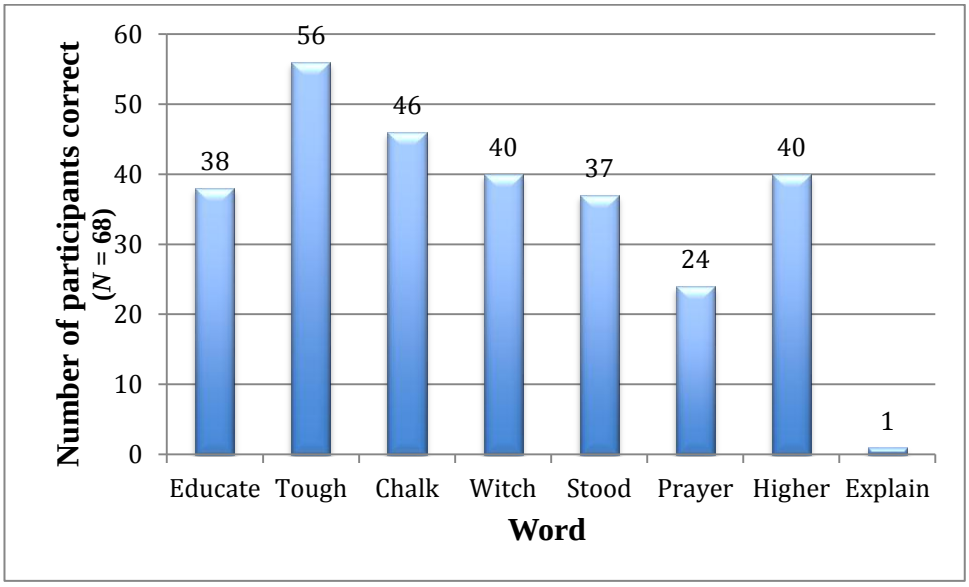


Figure 12. Number of participants who could identify the third phoneme correctly in a word

4.2.1.6 Language knowledge

Two questions investigated participants' knowledge of short vowel and long vowel sounds. Two questions asked participants to identify the definition of a consonant blend and a consonant digraph. These four questions were included to help support the researcher's understanding of phoneme counting and identification results. The short vowel, consonant blend, and consonant digraph questions all had only one correct answer. The long vowel question had three correct answers out of a list of five words. Participants had to identify all three words that contained a long vowel sound to answer the question correctly and score one point, (e.g., *lame, hoot*, and *ploy*). If participants identified one or two words containing a long vowel sound they scored .5 point. For all four questions if a participant gave an incorrect answer as well as a correct answer, it was marked as incorrect.

Twenty-nine (43%) participants could correctly identify the word containing a short vowel sound. Twelve (18%) could identify all three words containing a

long vowel sound and 59 (88%) could identify at least one of the three words containing a long vowel sound.

Thirty-seven (55%) participants correctly identified a consonant blend as a combination of two or three consonants pronounced so that each letter keeps its own identity/sound. Ten (15%) participants believed this was a consonant digraph. Fourteen (20%) participants either gave no answer or were not sure. Forty-one (60%) participants correctly identified that two combined letters that represent one single speech sound is a consonant digraph. Nine (13%) participants believed this was a consonant blend. Thirteen (19%) either gave no answer or were not sure. Results are summarised in Table 9.

Table 9. Results of language structure questions

Question	Number of participants correct (N = 68)	% of participants correct
Short vowel	29	43
Long vowel[a]		
• 3 words correct	12	18
• 2 words correct	10	15
• 1 word correct	37	55
Consonant blend	37	55
Consonant digraph	41	60

[a] Long vowel question had more than one possible answer. Points were broken down into the number of words participants identified (3 words = 1 point; 1 or 2 words = .5 point).

4.2.1.7 Difference between phonological awareness, phonemic awareness, and phonics

The last question in the teacher knowledge assessment asked participants to explain the difference between phonological awareness, phonemic awareness, and phonics. For the purposes of this research study, phonological awareness is defined as "…awareness of the phonological structure of a word at the syllable, onset-rime, and phoneme level" (Gillon, 2004, p. 9); phonemic awareness is defined as "…a conscious awareness of the smallest unit of sound in a [spoken] word and an ability to manipulate the sounds" (Nicholson & Dymock, 2015,

Glossary); and phonics "…refers to teaching sound-letter correspondences for reading and spelling" (Gillon, 2004, p. 11). These three definitions formed the basis for the model answer (see Appendix H) and development of the marking criteria. Responses were marked as fully correct (1 point), partially correct (.5 point), or incorrect (0 point). The marking criteria for each category are given in Table 10.

Table 10. Marking criteria for difference between phonological awareness, phonemic awareness, and phonics question

Points	Criteria
1 point	Clearly defined all three terms or demonstrated an understanding of the differences. Fully correct means: Phonological awareness must include • an understanding of the three levels – syllable, onset-rime, and phoneme. • no reference to letters/written words; Phonemic awareness must include • awareness of sounds at the phoneme level, i.e., uses words such as individual, smallest, distinctive, isolate, manipulate. • no reference to letters/written words; Phonics must include reference to both teaching approach and letter-sound correspondences.
.5 point	Defined two terms fully correct and one incorrect or partially correct; or defined one term fully correct and two partially correct; or defined two terms partially correct. Partially correct means: • Demonstrated an understanding that phonological awareness and phonemic awareness are to do with sounds in spoken words, i.e., no reference to letters/written words. • Phonics – referred to teaching approach or letter-sound correspondences.
0 point	Only one term defined correctly or less than two terms defined partially correct.

Examples of responses by participants in each category are given in Table 11.

Table 11. Examples of participant responses by marking category

Marking key	Example of Response
Fully correct[a]	"Pnonics [*sic*] is learning about letter/sound relationships. Phonemic awareness is the ability to articulate, hear and isolate sounds and use them to help in reading and writing and the order of the sounds is important. Pnonological [*sic*] awareness is a bit more advanced like being able to generate new words using sound analogy for example by changing the onset" (Participant 19).
Partially correct[b]	"Understanding the connection between written and spoken sounds. Understanding that words can be broken into individual sounds (and being able to hear and distinguish the sounds) Phonics is the practice of linking spoken and written sounds to read and write" (Participant 24). "Phonological awareness – Development of rhyme and syllables Phonemic awareness – awareness of spoken sounds in words Phonics – understanding the relationship between letters and sounds" (Participant 56). "phonemic awareness – identify individual sounds in words. Phonological awareness – understanding rhyme, patterns of sounds awareness of sounds. phonics- Teaching phonological awareness and phonemic awareness" (Participant 58)
Incorrect[c]	"phonics is the sounds produced. phonemic awareness is knowing that different letters produce different sounds. phonological awareness is knowing how it all works together" (Participant 27). "phonological awareness, knowing what the sounds are, phonemic awareness, knowing what the sounds do, phonics, studying sounds" (Participant 40). "phonics is sound and symbol/letters Phonemic hearing words and then chunks of sound. Phonological is using the sound chunks in reading and writing" (Participant 80).

a Fully correct because Participant 19 defined phonics and phonemic awareness fully correct. Phonological awareness was deemed close enough to be classified as fully correct on the basis that although not all three levels were specified, giving an example implied knowledge of other levels, hence demonstrating an understanding of the differences between the three terms.

b Partially correct because Participant 24 defined phonological awareness incorrectly, phonemic awareness fully correct, and phonics partially correct (no reference to teaching approach); Participant 56 only partially defined all three terms (phonological and phonemic awareness - no phoneme level specified; phonics no reference to teaching approach); Participant 58 defined phonemic awareness correctly, phonological awareness partially correct (i.e., no reference to syllables and phonemes), and phonics incorrectly (phonics is not a teaching approach for phonological and phonemic awareness). **c** Incorrect because Participant 27 could not define any of the terms correctly; Participant 40 could not define any of the terms correctly; Participant 80 defined only phonics partially correct (no reference to teaching approach).

One (1%) participant could explain the difference between phonemic awareness, phonological awareness, and phonics. Twenty-three (34%) participants were able to answer the question partially correct and forty-four (65%) participants could not explain the differences. These results are summarised in Figure 13.

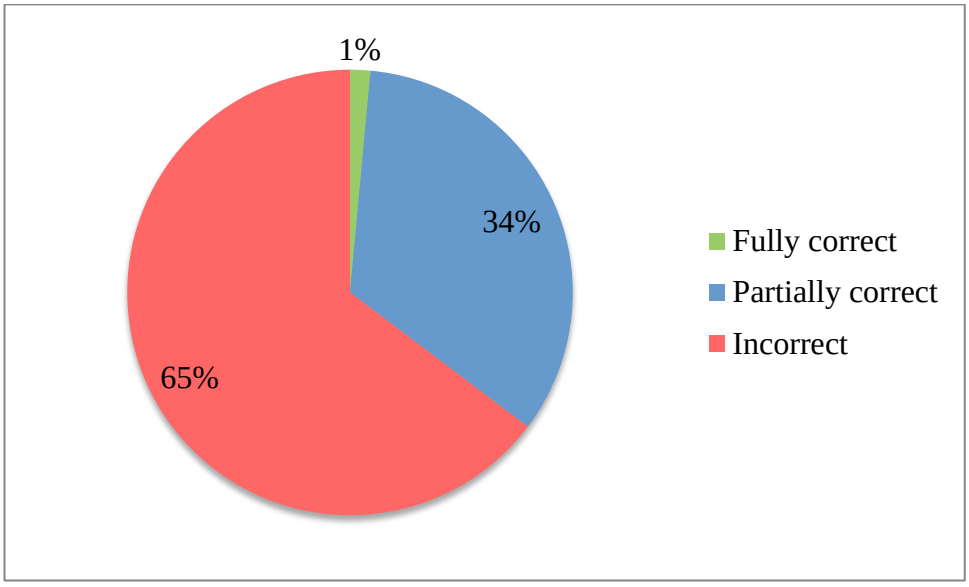


Figure 13. Participants' ability to explain the difference between phonological awareness, phonemic awareness, and phonics

4.2.1.8 Overall teacher knowledge assessment scores

The scores for each question were then added together to give an overall score for teacher knowledge. The maximum score possible for the teacher knowledge of phonemic awareness assessment was 29. None of the 68 participants answered the assessment 100% correctly; 62 (91%) were less than 75% correct, 33 (49%) were less than 60% correct, and 11 (16%) were less than 40% correct. The highest mark obtained was 25.5 (88%), achieved by one participant, and the lowest was 5 (17%), by two participants. The mean score was 16.4 (57%) with a standard deviation of 4.7. The median was 15.3 (53%) and mode was 17.5 (60%). Table 12 presents a summary of the actual teacher knowledge assessment results using the test score ranges outlined in section 3.5.1.2.1.

Table 12. Actual teacher knowledge assessment results by test score range

% Correct	Test score range (maximum 29)	Number of participants (N = 68)	% of participants
75-100	22 - 29	6	9
60-74.5	17.5 – 21.5	29	43
40-59.5	11.5 - 17	22	32
<40	0 - 11	11	16

4.2.2 Perceived knowledge assessment

In order to be able to compare teachers' perceived knowledge with their actual knowledge of phonemic awareness, participants were asked in a multiple-choice question in the online survey to describe their current knowledge or skill level in teaching and providing students with structured practice in phonemic awareness. Participants chose from four categories: expert, proficient, minimal skills, and no experience. Where participants (n = 2) selected two answers to this question, they were placed in the lower category; e.g., one participant answered expert and proficient so was classified as proficient, the other selected proficient and minimal skills so was classified as minimal skills. Eight (12%) participants perceived themselves as having expert knowledge. The majority of participants (n = 46; 68%) believed themselves to be proficient, 12 (18%) perceived themselves as having minimal skills, and one (1%) participant believed they had no experience. Teachers' perceived knowledge of phonemic awareness by proficiency level is presented in Table 13.

Table 13. Perceived teacher knowledge

Perceived knowledge proficiency	Number of participants (N = 68)	% of participants
Expert	8	12
Proficient	46	68
Minimal skills	12	18
No experience	1	1
No answer	1	1

4.2.2.1 Perceived versus actual knowledge

Participants' perceived knowledge was then compared with their actual knowledge by aligning the four perceived knowledge categories with test score ranges using the criteria outlined in section 3.5.1.2.1. Expert equates to 75–100% correct on the teacher knowledge assessment, proficient relates to 60–74.5% correct, minimal skills relates to 40–59.5% correct, and no experience relates to less than 40% correct. When the perceived knowledge data is compared with actual knowledge data by proficiency category (see Table 14), using the criteria, there are large discrepancies in the proficient (perceived 68% versus actual 43%), minimal skills (perceived 18% versus actual 32%), and no experience (perceived 1% versus actual 16%) categories. The expert category is the closest in alignment (perceived 12% versus actual 9%).

Table 14. Perceived versus actual knowledge comparison

Knowledge proficiency	% Correct	Perceived % of Participants	Actual % of Participants
Expert	75-100	12	9
Proficient	60-74.5	68	43
Minimal skills	40-59.5	18	32
No experience	<40	1	16

Further analysis was then conducted comparing each individual participant's perceived knowledge versus actual knowledge. Only 28 (41%) of the 68 participants showed alignment between their perceived and actual knowledge; e.g., a participant perceived their knowledge as proficient and their actual test score fell within the proficient range. Thirty-nine (57%) participants perceived and actual knowledge did not align; e.g., a participant perceived their knowledge as proficient but their actual test score fell within the minimal skills range. One (2%) participant did not answer the perceived knowledge question so a comparison could not be made.

The alignment data of individual participants was then further investigated by proficiency category, see Table 15, revealing that no category showed full

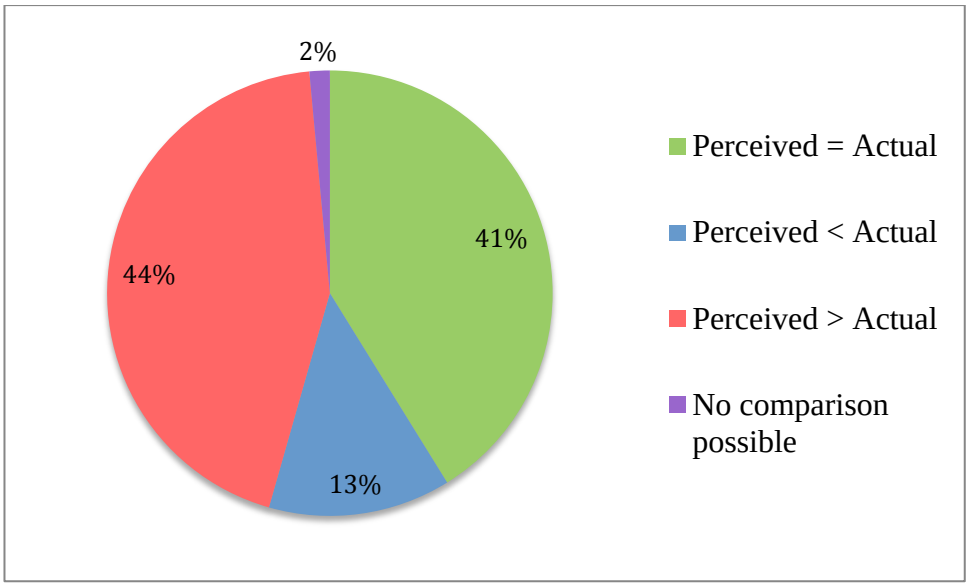
alignment between perceived and actual knowledge. The category that showed the most alignment was the proficient level with 21 out of 29 participants aligning. In the expert category only two out of six participants showed alignment, in the minimal skills category only five out of 22 showed alignment, and all 11 in the no experience category did not align.

Table 15. Perceived knowledge by proficiency level

Knowledge proficiency	Align[a]	Not align[b]	No answer	Total
Expert	2	4	0	6
Proficient	21	8	0	29
Minimal skills	5	16	1	22
No experience	0	11	0	11
Total	28	39	1	68

[a] Align - actual and perceived knowledge fell within the same proficiency category. [b] Not align - actual and perceived knowledge fell within different categories.

Whether participants perceived themselves more or less knowledgeable than they actually were was also investigated. Of the 39 participants whose knowledge did not align, 30 (44%) participants perceived their knowledge as greater than it actually was; e.g., a participant perceived their knowledge as proficient but their actual knowledge score fell within the minimal skills range. Nine (13%) participants perceived their knowledge as less than it actually was; e.g., a participant perceived their knowledge as minimal skills but their actual knowledge fell within the proficient range. The results are summarised in Figure 14.



Note. No comparison possible – the perceived knowledge question was not answered by Participant 112, hence no comparison could be made to her actual knowledge.

Figure 14. Participants' perceived knowledge versus actual knowledge alignment comparison

4.2.3 Qualitative survey responses

The remaining qualitative questions were analysed thematically to provide information regarding the methods currently being used to assess and teach phonemic awareness in the participants' classrooms.

4.2.3.1 Key characteristics/skills of good readers

Participants were asked to write in their own words, without any prompting, what the key characteristics/skills they believe children need to have in order to become good readers. Fourteen (21%) participants indicated that phonemic awareness was a skill children need to have in order to be good readers. During the thematic analysis of the responses to this question, 20 different characteristics/skills were identified from the data. Results for the 10 most frequently occurring characteristics/skills, determined by the number of participants who listed each, are reported. The characteristic/skill that the most participants believed children needed to have to be good readers was comprehension (n = 35; 52%). Twenty-eight (41%) participants believed that both oral language, which includes vocabulary, and letter-sound knowledge were

also important. Concepts about print (CAPS) were seen as a key skill by 20 (29%) participants. Developing sight words and exposure to reading were next with 17 (25%) participants each. Phonemic awareness and decoding strategies for unknown words were both regarded as key skills by 14 (21%) participants. Motivation/confidence/enthusiasm was a key characteristic for 12 (18%) participants and phonological awareness was seen as a key skill for children to have by 11 participants (16%). The results are summarised in Table 16.

Table 16. Key characteristics/skills children need to have to be good readers

Key characteristic/skill	Number of participants (N = 68)	% of participants
Comprehension	35	52
Oral language (includes vocabulary)	28	41
Letter-sound knowledge	28	41
CAPS	20	29
Sight words	17	25
Exposure to reading	17	25
Phonemic awareness	14	21
Decoding (word strategies)	14	21
Motivation/confidence/enthusiasm	12	18
Phonological Awareness	11	16

4.2.3.2 Key components/features of participants' reading programmes

Participants were also asked to write in their own words what the key components/features of their reading programmes were. Seven (10%) participants indicated that phonemic awareness was a key component/feature of their reading programme. During the thematic analysis of the participants' responses, 20 different components/features emerged from the data. The 10 most frequently occurring components/features, determined by the number of participants who cited each, are reported. Comprehension instruction was a key component by the most number of participants *(n* = 36; 53%). Phonics (*n* = 31; 46%) and guided reading (*n* = 26; 38%) were also important components. Shared reading was a key component/feature for 19 (28%) participants. Teaching children strategies for

decoding unknown words was differentiated from phonics by the participants and was a key component/feature for 18 (27%) participants. Developing oral language and vocabulary was an important component of 15 (22%) participants' reading programmes. Fourteen (21%) participants listed carrying out reading related activities as a key component and building sight words was important for 13 (19%) participants. The last two most frequently occurring components/features were Reading To Talking With (RTTW) (n = 12; 18%) and reading mileage/practice (n = 11; 16%). These results are summarised in Table 17.

Table 17. Key components/features of participants' reading programmes

Key component/feature	Number of participants (N = 68)	% of participants
Comprehension instruction	36	53
Phonics	31	46
Guided reading	26	38
Shared reading	19	28
Decoding (word strategies)	18	27
Building oral language (includes vocabulary)	15	22
Reading related activities	14	21
Building sight words	13	19
RTTW	12	18
Reading mileage/Practice	11	16

Four of the 14 participants who said that phonemic awareness was a key skill for children to be good readers also said it was a key component/feature of their reading programme. Two of these participants were specialist teachers, one taught Year 2 children, and one taught Year 4 children. Only two of these four participants defined phonemic awareness correctly in the teacher knowledge assessment; one confused phonemic awareness and phonics, and one was only partially correct as there was not a clear enough distinction made between phonemic awareness and phonological awareness; e.g., "knowing and understanding how sounds work together to make words" (Participant 27).

4.2.3.3 Phonemic awareness instruction

Participants were asked if phonemic awareness instruction was part of their reading programme. Sixty-four (94%) participants indicated that phonemic awareness instruction was part of their reading programme. One (1.5%) participant indicated that it was not; however, she commented she was not teaching reading. Two (3%) participants were not sure if phonemic awareness instruction was part of their reading programme and one (1.5%) participant did not answer the question.

Methods used to assess and teach phonemic awareness were also investigated, as well as the source of participants' knowledge of phonemic awareness. Only the responses from the eight participants who were able to define phonemic awareness fully correct in the teacher knowledge assessment were analysed based on the premise that if a participant did not fully know what phonemic awareness was, then how could they understand its importance, assess, and teach it correctly? Although one participant could define phonemic awareness she was not sure if she included it as part of her instruction programme, hence did not give responses for the importance or methods of assessment and teaching questions.

4.2.3.3.1 Importance of phonemic awareness and its role in learning to read

All seven of the participants' responses analysed indicated they included phonemic awareness in their reading instruction because they believed that knowledge of the sounds in words is essential in order for children to phonologically recode letters into sounds when reading. Examples of explanations include, "They have to now [*sic*] and be able to make the individual sounds" (Participant 18); "Students are often unable to distinguish the sounds they are making in their own speech…This makes both reading and writing problematic as they are unable to recognise spoken and written words" (Participant 24); "chn [*sic*] need this is [*sic*] a tool to help them read and write" (Participant 45).

4.2.3.3.2 Assessment methods

Participants were asked to indicate which method they used to assess phonemic awareness. Of the seven participants whose responses were analysed, four indicated they used formative assessment in the form of observation to assess children's phonemic awareness. One participant used an oral language assessment and two participants indicated they used a phonemic awareness test. One said they used the *Gough-Kastler-Roper Phonemic Awareness Test* (Roper, 1984) and the other made reference to assessments published by Tom Nicholson.

4.2.3.3.3 Teaching methods

Participants were also asked to indicate the method they used to teach phonemic awareness. Of the seven participants whose responses were analysed, five confused phonemic awareness instruction with phonics instruction, indicating they used a phonics programme as their method of teaching phonemic awareness. One participant used Jolly Phonics, three used a Yolanda Soryl phonics programme, and one participant indicated through examples the use of phonics activities; e.g., "They also use a yellow/blue card with the alphabet on during writing time and I support them singing the song and finding the sound on the card" (Participant 18). Two of the participants demonstrated they used phonemic awareness activities.

4.2.3.3.4 Source of participants' phonemic awareness knowledge

Participants' indicated that the main sources of their knowledge of phonemic awareness were from professional development (PD) and/or their own research. The examples of PD given, however, highlighted participants' confusion between phonemic awareness and phonics. Three participants had had PD in the Yolanda Soryl phonics programme, and one in Gaye Byers' writing. One participant said she gained her knowledge from postgraduate study. Two participants indicated that their knowledge of phonemic awareness was gained from their teacher

education programme; for one participant this training was Teaching English in Schools to Speakers of Other Languages (TESSOL).

4.3 Semi-structured interviews

Four semi-structured interviews were conducted with interviewees from four different primary schools; three schools were in the Waikato region and one in the Auckland region. The four interviewees were female and all were experienced teachers with a minimum of 13 years' teaching experience. They all taught in lower decile schools, ranging from decile 1 to decile 4. Interviewees 1 and 4 taught new entrant classes, Interviewee 2 a Year 2/3 class, and Interviewee 3 a Year 3/4 class. Further information regarding the interviewees was discussed in section 3.2.2. The results of the interview data were analysed thematically as discussed in section 3.5.2.

4.3.1 Key characteristics/skills children need to be good readers

When asked what they thought were the key characteristics/skills children need to become good readers, none of the four interviewees specifically mentioned phonemic awareness; however, Interviewee 1 did say "building on their phonological awareness and knowledge of rhyme" is important. Interviewee 4 also emphasised rhyming and the segmentation of words and syllables. Interviewees 1, 2, and 4 believed strong oral language and vocabulary were important. All of the interviewees emphasised the importance of letter-sound knowledge: "they need skills like sounds, sounds of…letters even before they name letters …. They need to know sounds, blends, digraphs…" (Interviewee 4). Interviewees 3 and 4 believed building sight words as well as "knowledge about meaning" were also key characteristics/skills.

4.3.2 Key components/features of participants' reading programmes

None of the four interviewees specifically mentioned phonemic awareness as a key component/feature of their reading programmes. All had guided reading

groups sorted by children's reading ability. Interviewees 1, 2, and 4 used a phonics programme as part of their reading instruction; Interviewee 3 used phonics if children needed it on an individual or small group basis: "if there are individual children that need it then I'll do one-to-one teaching with them" (Interviewee 3). Interviewees 1, 2, and 4 mentioned shared reading in their reading programmes and also word work activities. Comprehension strategies were specifically mentioned as part of the reading programmes of Interviewees 3 and 4: "we go into the more deeper features of reading….comprehension strategies" (Interviewee 3).

4.3.3 Learner profiles

The four interviewees all indicated they had children with reading difficulties in their classrooms. Interviewee 1 said she had a "really really low [new entrant] class" where assessments showed that the struggling children could not differentiate the sounds in words and had poor oral language skills.

> But we're finding that kids are coming in with really poor oral language skills and I think that's…that's part of the reason why they can't hear the sounds in words cos they can't actually say them. (Interviewee 1)

Interviewee 2 also indicated she had struggling readers who could not differentiate the sounds in words. She said the children in the class who had had phonics instruction the year before performed better than those that hadn't. "…what sounds can you hear and…it was blank...like huh?...it's a trend. And it's been a trend for far too long" (Interviewee 2).

Interviewee 3 said she had 70–80% ESOL (English for Speakers of Other Languages) students in her class and said she found that her struggling readers struggled to read print. They had basic high frequency words but would struggle when they came to a word not in their vocabulary. "In my case I do have 70–80% of my children are ESOL children…So ah language is a barrier" (Interviewee 3).

Interviewee 4 indicated she had a large proportion of children starting school in her new entrant class with low literate cultural capital:

> Learners here come in at very very low levels of experiences, of prior knowledge, they need a lot of language experience. They come in not knowing what a nursery rhyme is. Many of them come in and the first time they hold a book they hold it upside down….they don't know what a letter is. (Interviewee 4)

4.3.4 Interviewees' knowledge of phonemic awareness

When the interview data relating to knowledge of phonemic awareness was interpreted, two subthemes emerged from the data: interviewees' actual knowledge and the source of their knowledge. Interviewees' knowledge of phonemic awareness and how it differed from phonological awareness and phonics varied, as did the sources of that knowledge. Each is discussed below.

4.3.4.1 Interviewees' actual knowledge

Interviewee 1 demonstrated a good understanding of both phonemic awareness and phonological awareness, but was not able to clearly define phonics.

> …phonemic is well I know that phoneme means sound and smallest unit of sound so I think phonemic awareness is the knowledge of sounds and like you know phonemic awareness activities would be things like um say cat ok now change the /k/ to /b/ bat…And…phonological awareness is more like the umbrella term of you know like the knowledge of rhymes and putting all those other like different things under that umbrella….phonics is more like your knowledge of um…how they blend together I guess….And whether you're doing explicit teaching or implicit teaching as well so there's like different ways that you can teach them. (Interviewee 1)

She knew that phonemic awareness related to spoken not written words and was able to identify what phonemic awareness skills were important: blending, segmenting, deletion of initial and final phonemes, and substitution of initial and final phonemes.

Interviewee 2 associated phonemic awareness with phonics, this was evident from the link between sounds with letters in her explanation. "Um being aware that…sounds are…you know can segment just the single letter in small words um but being aware too that you know that groups of letters…will always make that sound" (Interviewee 2). She did not realise that phonemic awareness was related to spoken words not letters. When asked what phonemic awareness skills were important she again referred to written not spoken sounds: "recognise the different spelling patterns, the different combinations…hear and record accurately" (Interviewee 2). She did recognise that blending and segmenting skills were important; however, the example given was in the context of written not spoken words:

> …so words we can read…we'll say the first word sound um /l/ /e/ /k/ so the sound of each little letter and…then if we're doing like *at,* and just saying not saying /a/ /t/, once we've got those sounds we'll blend them together and just take off the…first consonant and then say that as a…little chunk. (Interviewee 2)

She did not understand the difference between phonemic awareness, phonological awareness, and phonics. "Um phonics is…hearing sounds. I always think of like phone, hearing sounds…phonemic is [is] the chunks…and the word families…and that sort of thing…the awareness is being able to segment and blend them" (Interviewee 2).

Interviewee 3 also associated phonemic awareness with phonics. "…it's the sounds…that the letters have a sound that goes with it" (Interviewee 3). She did not realise that phonemic awareness was related to spoken words not letters. This was also evident when asked what phonemic awareness skills were important "…they have to know the letters…the name of the letter and the sound it makes"

(Interviewee 3). She could not clearly define phonological awareness and was unsure about phonics: "phonological um awareness is ah like clusters of sounds…You know you try to put them together to make a word, sequence of sounds…phonics just ah both maybe, just teaching" (Interviewee 3).

Like the previous two interviewees, Interviewee 4 also associated phonemic awareness with phonics: "being aware of sounds related to print" (Interviewee 4). She did not realise that phonemic awareness was related to spoken words not letters. This was also evident when asked what phonemic awareness skills were important: "they've gotta know the sounds, they've gotta link the sounds to the letters as well" (Interviewee 4). She could not differentiate phonemic awareness, phonological awareness, and phonics: "phonemes is probably the sounds…the phonological is more the…yeah...um...phonics, well phonics…well...yeah...I don't know" (Interviewee 4).

4.3.4.2 Source of knowledge

Interviewees' knowledge of phonemic awareness came from different sources. Interviewee 1 gained her knowledge through undertaking postgraduate studies at university, in particular from a paper on reading difficulties. She has also completed PD at her current school but could not remember the name of the programme.

Interviewee 2 gained her knowledge from her own research saying she is "just naturally inquisitive…I'm very nosy". This research includes Joy Allcock's book *Spelling Under Scrutiny*, watching Yolanda Soryl on YouTube, and purchasing and using *Jolly Phonics*.

Interviewee 3 gained her knowledge from phonics training, which was part of the teacher education programme in her native country. She also attends phonics PD when she can to keep herself up to date.

Interviewee 4 believed her knowledge developed from 'being in the game for years and a passion for literacy". She is Reading Recovery trained and has

attended various PD over the years from educational consultants with specialist knowledge in reading and writing, including Gail Loane, Jill Eggleton, Louise Dempsey, and Sheena Cameron.

4.3.5 Knowledge of the role of phonemic awareness in learning to read

Interviewee 1 understood the importance of phonemic awareness and its role in learning to read:

> Because spoken language transfers to written language so they need…the alphabet knowledge and sound knowledge before they're even able to read and write…so that they can decode….unless you explicitly teach them, they're just going to form habits…I think it's important to teach them from the start so there's no kind of hidden agenda. (Interviewee 1)

Although the other interviewees could not fully define phonemic awareness, they all strongly believed that explicit phonological-based decoding instruction is important for children, in particular struggling children, to become good readers:

> …I just don't like kids missing out…we need to do something about the awareness [teachers' awareness of the importance of phonics instruction]…it needs to be part of education…I'm not at policy level but I can make changes in my classroom and my practice. (Interviewee 2)

> …I came from a country where we saw the importance of phonics…[we] I know that it is important to help struggling readers…because if you look at the National Standards document or the Literacy Progressions there is an aspect there that…places emphasis on phonemic sounding so I look at that and I say but do we actually do this? (Interviewee 3)

"…if they haven't got the sounds they don't yeah...gotta have the sounds and then it yeah develops from there but initially you gotta have those sounds, you're sunk if you don't" (Interviewee 4).

All the interviewees believed that the struggling readers in their classrooms made significant improvements in their reading with explicit phonological-based decoding instruction.

4.3.6 Methods used to assess and teach phonemic awareness

4.3.6.1 Assessment methods

None of the interviewees assessed phonemic awareness as a regular part of their assessment regime. Interviewee 1 did use the *Gough-Kastler-Roper (GKR) Phonemic Awareness Test* (Roper, 1984) to assess phonemic awareness if she was concerned about a particular child. "If I'm really concerned about a child's phonemic awareness I'll use that test" (Interviewee 1). Interviewees 2, 3, and 4 assessed phonics rather than phonemic awareness; e.g., "if they're recording…a higher frequency of sounds accurately or nearly there…through their reading and there's always that improvement in their spelling so it sort of triangulates round" (Interviewee 2); "we used to do phonics tests. We used them on the sounds" (Interviewee 3); "…with letter ID, but a lot of them now are just saying the letters" (Interviewee 4).

4.3.6.2 Teaching methods

When analysing the data on teaching methods used to teach phonemic awareness, four subthemes emerged from the data: decoding instruction, explicit teaching of phonemic awareness, time spent phonemic awareness instruction, and the extent of instruction.

4.3.6.2.1 Decoding instruction

The four interviewees believed they used a balanced approach to teaching reading that included teaching both decoding and comprehension strategies as well as building vocabulary to support these strategies. For decoding instruction, all four interviewees used a phonics programme. Interviewee 1 used the *Teaching*

Handwriting, Reading And Spelling Skills (THRASS) programme. Interviewee 2 used a mixture of *Jolly Phonics*, the Yolanda Soryl approach, and *Reading Eggs*. Interviewee 3 used a structured phonics programme she had developed from her teacher education training and PD. Interviewee 4 used a combination of her own experience, *Jolly Phonics*, YouTube clips, *Reading Eggs*, and the Yolanda Soryl approach.

4.3.6.2.2 Explicit teaching of phonemic awareness

Interviewees 1, 2, and 3 believed they explicitly taught phonemic awareness. Interviewee 1 demonstrated that she did explicitly teach phonemic awareness separately from her phonics programme; e.g., "Sometimes I might use the counters like and do the little phoneme boxes…changing and manipulating sounds and odd one out that's all done verbally" (Interviewee 1). However, Interviewees 2 and 3 confused phonics instruction with phonemic awareness instruction; examples of teaching given during the interviews linked sounds to letters rather than the sounds in spoken words. Interviewees 2, 3, and 4 all taught and manipulated sounds in the context of letters rather than spoken words.

4.3.6.2.3 Time spent on phonemic awareness instruction

Interviewee 1 said she integrated her phonemic awareness instruction into different areas of her reading and writing programme so "I'm not spending like a twenty minute chunk on it". She estimated she spent ten minutes at the start of a reading lesson and then during the lesson as the need arose.

Interviewees 2, 3, and 4 taught phonics not phonemic awareness. Interviewee 2 spent approximately ten minutes per day in small group instruction for those children that needed phonics instruction. Interviewee 3 also taught in small groups and indicated she spent half of her 20-minute lesson if the need arose for a group. Interviewee 4 indicated she spent "absolute heaps" of time on phonics instruction.

4.3.6.2.4 Extent of phonemic awareness instruction

Phonemic awareness instruction was part of the reading programme of Interviewee 1 only but was not part of the school-wide reading programme.

Inclusion of phonological-based decoding instruction was done only if the individual teacher believed it necessary in all of the interviewees' schools. For Interviewee 1 the *THRASS* programme was a school-wide programme and all teachers had had PD; however, it was not a "must do" but a "can do" so it was up to individual teachers as to whether they used it. Phonics was a regular part of their reading programmes for Interviewees 2, 3 and 4 but it was not a school-wide programme. "…there's nothing like a formal phonic programme in the school…I don't know…what the other teachers use" (Interviewee 3).

4.4 Summary

The results of the online survey and the four semi-structured interviews were presented in this chapter. Analysis of the teacher knowledge assessment in the online survey showed a wide range in teacher knowledge of phonemic awareness and its importance in learning to read. Results revealed that while 85% of participants could identify the definition of a phoneme from a multiple-choice list, 88% of participants struggled to define phonemic awareness, and 99% of participants did not understand the differences between phonemic awareness, phonological awareness, and phonics. Some tasks were more difficult than others, in particular phoneme counting and phoneme identity. There were discrepancies between participants' perceived and actual knowledge. Phonemic awareness did not appear to be regularly assessed nor explicitly taught in most of the participants' classrooms.

The four semi-structured interviews investigated further participants' knowledge of phonemic awareness and its importance in learning to read in four different local contexts. Only one interviewee demonstrated knowledge of phonemic awareness, the other three confused phonemic awareness and phonics.

All struggled to differentiate phonemic awareness, phonological awareness, and phonics fully. Only one interviewee assessed and explicitly taught phonemic awareness if the need arose; however, all of the interviewees strongly believed explicit phonological-based instruction was important for children to learn to read, and believed it made significant improvements in the reading ability of children struggling to read in their classrooms. All used a structured phonics programme in their reading programme to varying degrees in relation to the year levels being taught and individual students' learning needs.

A discussion of the results, their possible implications, and how they compare to the literature previously discussed will be presented in Chapter Five.

Chapter Five: Discussion and Conclusion

5.1 Introduction

The aim of this research was to gain an understanding of the knowledge that teachers in New Zealand primary school classrooms have with regard to phonemic awareness, their understanding of its importance as a factor in learning to read, and the methods they use to assess and teach it. This chapter discusses the findings presented in Chapter Four in relation to the research questions and the literature review. Implications of the findings, limitations of the study, and suggestions for future research are also considered, then final conclusions are drawn.

The research questions addressed are:

- What knowledge of phonemic awareness do primary school teachers have?
- What is primary school teachers' understanding of the role of phonemic awareness in learning to read?
- What methods do teachers use to assess and teach phonemic awareness?

Results are consistent with those of previous research studies and show that the teachers who participated in this study typically do not have the knowledge of phonemic awareness, nor an understanding of the importance or the role of phonemic awareness in learning to read.

5.2 Knowledge of phonemic awareness

According to the Simple View of Reading (SVR) (Gough & Tunmer, 1986), children need to develop both decoding and comprehension strategies in order to become good readers. Children can struggle to learn to read due to poor decoding, poor comprehension, or a combination of both (Aouad & Savage, 2009; Catts et al., 2003; Dymock, 1993; Gough & Tunmer, 1986). Teachers therefore

need to be able to teach both decoding and comprehension in order to meet the learning needs of their struggling readers.

Research studies have shown that teachers' knowledge of language structure becomes important in the context of decoding instruction and students' reading achievement (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002; Moats & Foorman, 2003; Piasta et al., 2009). McCutcheon, Abbott et al. (2002) and McCutcheon, Harry et al. (2002) both found that the greater a teacher's phonological awareness knowledge, the greater their use of explicit phonological instruction which led to greater gains in students' reading achievement. Phonological awareness is the ability to manipulate the sounds in spoken words at three levels: syllable, onset-rime, and phoneme (Gillon, 2004; Moats, 2010; Nicholson, 2005). At the smallest phoneme level this ability is referred to as phonemic awareness. Phonemic awareness is an important skill children need to be able to decode, and research shows that children with poor decoding skills will benefit from explicit phonemic awareness instruction (Ehri et al., 2001; Hatcher et al., 2004; Pressley, 2006; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). Teachers' knowledge of phonemic awareness is therefore important in relation to teachers ability to provide the explicit phonemic awareness instruction their struggling readers need.

Although phonemic awareness is recognised by the Ministry of Education as "fundamental to early success in reading and writing" (Ministry of Education, 2003, p. 32), in the whole language approach, phonemic awareness is not usually explicitly taught as the focus of instruction but is taught within the context of other instructional strategies (Ministry of Education, 2003, 2009, 2010). The Ministry of Education (2003), however, does state that explicit, direct instruction in what students need in order to be able to read and write should be part of every teacher's effective literacy practice. However, if teachers can only teach what knowledge they have, not what they do not have (Binks-Cantrell et al., 2012; Nolen et al., 1990), it would suggest that if teachers do not have knowledge of phonemic awareness, they cannot explicitly teach phonemic awareness should their students need such instruction.

Studies that have investigated teachers' knowledge of language revealed that teachers did not typically have the requisite linguistic knowledge, in particular phonological knowledge, to teach children to read effectively, particularly struggling readers (Carroll, 2006; Cheesman et al., 2009; Cunningham et al., 2004; Moats & Foorman, 2003; Moats, 1994, 2009). Consistent with Carroll (2006), Cheesman et al. (2009), Cunningham et al. (2004), and Moats and Foorman (2003) who found that teachers' knowledge of phonemic awareness was particuarly poor, findings in this present research study also suggest that teachers do not typically have the knowledge of phonemic awareness required to provide the explicit phonemic awareness instruction children with poor decoding need in order to learn to read. In terms of knowledge proficiency, only 9% of the online survey participants fell into the expert category and were able to answer 75% or more of the teachers' knowledge of phonemic awareness questions correctly. Forty-three percent were found to have proficient skills, 48% of the teachers surveyed were found to have only minimal skills or no experience. These findings support the findings of Carroll (2006) where 12% of teachers achieved the pass criteria, and Cheesman et al. (2009) where only18% of the first year teachers were able to answer 80% of the items correctly.

Consistent with findings from Brady et al. (2009) and Cunningham et al. (2004), teachers' perceived knowledge and actual knowledge did not correspond, with only 41% of participants in this study showing alignment. Further analysis showed that teachers in this study had a tendency to overestimate rather than underestimate their knowledge, a finding consistent with Cunningham et al. (2004). Overestimation of knowledge is concerning because teachers may not be aware of the knowledge they do not possess, and thus not recognise the need to learn or seek out the information they need to in order to teach children to learn to read effectively (Cunningham et al., 2004).

Teachers' lack of knowledge of phonemic awareness was highlighted by 88% of teachers in the online survey not being able to define phonemic awareness. Only 12% (n = 8) of survey participants and one of the four interviewees were able to define phonemic awareness. Fifty-two percent of the survey participants and three of the interviewees thought phonemic awareness was understanding the

relationship between sounds and letters, not understanding that phonemic awareness relates to spoken words not written, thus confusing phonemic awareness with phonics. These findings are consistent with Cheesman et al. (2009), who found that the teachers in their study were not able to identify the definition of phonemic awareness from a multiple-choice list, with most equating phonemic awareness with phonics.

Participants also displayed confusion when asked to explain the difference between phonemic awareness, phonological awareness, and phonics. Only one survey participant demonstrated an understanding of the differences between all three terms. One interviewee could differentiate phonemic awareness and phonological awareness, but could not clearly define phonics. Although 12% (n = 8) of survey participants were able to define phonemic awareness, none of these participants were able to fully explain the difference between phonemic awareness, phonological awareness, and phonics. Ninety-nine percent of survey participants could not explain the differences between the three terms. Three of the four interviewees consistently confused phonemic awareness and phonics. The results suggest that teachers do not understand how phonemic awareness differs from phonics instruction, findings consistent with Cheesman et al. (2009).

Teachers' inability to define phonemic awareness and their confusion between phonemic awareness and phonics is interesting when you consider that 85% of teachers could identify a phoneme as being 'a single speech sound'. This is consistent with Bos et al. (2001) who asked the identical question and found 88% of in-service teachers could do the same. A possible explanation for this could be the difference in the type of question. When defining a phoneme, participants were able to choose from a multiple-choice list; however, when defining phonemic awareness and explaining the differences between phonemic awareness, phonological awareness, and phonics, participants were asked to write answers in their own words. The choice of predetermined answers in the multiple-choice question may have provided prompts or clues that the participants could use as a process of elimination when making their selection.

Teachers performed better on the phonological awareness task than the phonemic awareness tasks, with participants scoring higher when counting the number of syllables than other phoneme level tasks. Ouellete and Haley (2013) suggest this is because the larger syllable segment is an implicit part of phonological awareness whereas working at the smallest part, the phoneme level, involves explicit awareness. The scores were not as high as Carroll's (2006) findings, where teachers achieved a mean of 9.9 when counting the number of syllables in 10 words. A breakdown of the individual words used in Carroll's (2006) assessment measure was not available to allow further analysis of this difference. Information regarding the level of complexity of the words used or the range of the number of syllables for example, could help explain the difference in results if the information were available. The results, however, were consistent with Moats (2009) for the words *incredible*, *shirt*, and *cleaned*. Results for *enabling* differed with 72% in this study correctly counting three syllables compared to 95% in the Moats (2009) study. The word *cleaned* was the most difficult with 27% of teachers believing it had two syllables rather than one, a result comparable with Moats and Foorman's (2003) finding of 20%.

Phoneme counting was the most difficult task for teachers. Only 1.5% (n = 1) of participants were able to accurately count the phonemes in all eight words. This result is worse than Carroll's (2006) study where 7.5% of all participants were able to accurately count the phonemes in 10 words, but consistent with Cunningham et al. (2004) where less than 1% of participants counted the phonemes accurately in 11 words. Differences in the number of specialist teachers participating in the studies might provide a possible explanation. Specialist teachers made up 13% of participants in Carroll's (2006) study compared to 6% in the present study. Cunningham et al. (2004) investigated the knowledge of Kindergarten–Grade 3 teachers, unfortunately no information is given as to whether any of these had specialist training. Specialist teacher knowledge becomes important when the findings from the Bos et al. (2001) and Fielding-Barsnley and Purdie (2005) studies are considered. Both studies found specialist training aligned with greater knowledge, hence the higher proportion of specialist teachers in Carroll's (2006) study may account for the difference in results.

Sixty-one percent of participants in the present study could only count the phonemes accurately in half of the words or less (i.e., four or less of the eight words). Results for individual words were consistent with both Bos et al. (2001) and Moats (2009). The word that participants found the most difficult was *box* with only 4% of survey participants accurately counting four phonemes. This result is worse than the 15% in the Bos et al. (2001) and 24% in the Fielding-Barnsley and Purdie (2005) studies. The most common answer was three phonemes (74%). This suggests most participants did not know that *x* is made up of two phonemes /k/ and /s/, and were using orthography (letters) rather than phonology (sounds). This was further supported by participants not being able to correctly identify /s/ as the third phoneme in *explain*, with the most common answer being /p/. Given that three participants counted the phonemes correctly in *box* it is surprising that only one correctly identified the third phoneme for *explain*. However, with *box* they had to choose the number of phonemes from a multiple-choice list whereas for *explain* participants were required to give their own answer, suggesting that although the two previously got *box* correct, they may not truly understand the reasons why. The use of orthography rather than phonology was also apparent with 32% of participants identifying /t/ rather than /tch/ as the third phoneme in *witch*. These results are consistent with findings from Carroll (2006), Cheesman et al, (2009), Cunningham et al. (2004), Fielding-Barnsley and Purdie (2005), and Moats and Foorman (2003) who also all found that teachers had difficulty separating orthography from phonology.

Consonant blends and digraphs caused confusion for participants, evident from the similar proportions of participants incorrectly counting three phonemes and correctly counting four phonemes in both *grass* and *thank*. Carroll (2006), Cunningham et al. (2004), and Moats and Foorman (2003) also found that teachers found it difficult to identify consonant blends and digraphs, and words containing consonant blends were often allocated less phonemes.

Confusion between blends and digraphs also manifested when identifying the third phoneme in a word, particularly when the word began with a consonant blend. For example, in *prayer*, 35% of participants correctly identified the vowel digraph /ay/ as the third phoneme, but 28% identified /er/ suggesting these

participants thought *pr* was a digraph (single sound) rather than a blend (two sounds). This also occurred for *stood* where 54% correctly identified /oo/, but 32% identified /d/ when asked to identify the third phoneme. Similar results were found by Moats (1994) where 40% of teachers correctly identified /ay/ as the third phoneme in *prayer*, and 45% of teachers correctly identified /oo/ as the third phoneme in *stood*. Although 85% of the participants knew what a phoneme was, 57% could not identify the third phoneme correctly in more than four out of the eight words.

The confusion between consonant blends and digraphs is further supported by the results from the consonant blend and digraph multiple-choice questions. Only 54% of participants in this study knew that the statement "a combination of two or three consonants pronounced so that each letter keeps its own identity/sound is called a" consonant blend, and 60% knew the statement "two letters that represent one single speech sound are called a" digraph. These results compare to 61% and 48% respectively in the Bos et al. (2001) study for the same questions.

Perhaps the most surprising result was in teachers' ability to identify words containing a short vowel sound. Less than half (43%) of participants could correctly identify the word containing a short vowel. This result differs significantly from the 93% in the Bos et al. (2001) study and the 95% in the Fielding-Barnsley and Purdie (2005) study. A possible explanation for the difference may be due to marking inconsistencies between the studies. Participants in the present study were marked incorrect if they selected more than one answer to the multiple-choice question and one of those answers was incorrect (e.g., *slip + cold*). Whether this was the same in the Bos et al. (2001) and Fielding-Barnsley and Purdie (2005) studies is not known. A closer examination of the present study showed that a further 46% of participants did in fact select *slip*, but also selected one, two or, in two cases, three more words (e.g., *slip + start + cold + point*), so were marked as incorrect. Had participants been marked as correct if they had *slip* in their answer and the other answers were ignored, then a total of 89% correctly identified the short vowel sound, making the results more comparable with the other two studies.

5.3 Understanding of the role of phonemic awareness in learning to read

Phonemic awareness is one of the best predictors of future reading success in children in the first two years of schooling (Ehri & Nunes, 2002; Hulme et al., 2002; Mraz et al., 2008; National Reading Panel, 2000b; Nicholson, 2005; Pressley, 2006) and is a critical skill for children to be able to learn to read (Ehri et al., 2001; Hulme et al., 2002; National Reading Panel, 2000b; Nicholson, 2005; Ouellette & Haley, 2013; Pressley, 2006). Phonemic awareness is the ability to hear and manipulate the individual sounds in words and becomes important when linking phonemes to letters when decoding text (Ehri & Nunes, 2002; Nicholson, 2005; Perez, 2008; Pressley, 2006). Research shows that children with poor decoding skills can make significant gains in reading when they receive explicit instruction in phonemic awareness (Greaney & Arrow, 2012; Hatcher et al., 2004; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). Understanding the importance of phonemic awareness and its role in learning to read is therefore essential for teachers in order for them to be able to meet all students' learning needs.

However, 88% of the online survey participants and three of the four interviewees in this study could not define phonemic awareness, implying they did not have an understanding of phonemic awareness and its role in learning to read. When participants were asked initially, only 21% of the online survey participants and none of the interviewees mentioned phonemic awareness as a key characteristic/skill that children need to become good readers. Only 10% of the online survey participants and none of the interviewees mentioned phonemic awareness as a key component/feature of the participants' reading programmes. Only when asked specifically about whether phonemic awareness was part of their instruction programme did 94% of survey participants indicate that it was, and three of the four interviewees indicate they believed they explicitly taught phonemic awareness. However, these results need to be considered in conjunction with the participants' actual knowledge of phonemic awareness rather than their perceived knowledge. Only 12% of the survey participants and one of

the interviewees were able to define phonemic awareness and explain why phonemic awareness was an important part of their reading programme. If teachers do not know what phonemic awareness is then it follows that they would not therefore know if phonemic awareness was part of their instruction programme or why phonemic awareness is important in learning to read. Interviewee 1 supported this when being interviewed by acknowledging that only through doing a postgraduate paper on reading difficulties did she realise the importance of phonemic awareness and the role phonemic awareness plays in children learning to read:

> "Yeah. I think um…like I know how important it is now but if you'd int—did the same interview on me three years ago, I would have struggled to answer those questions and be able to justify what I was doing in my classroom." (Interviewee 1)

5.4 Methods currently used to assess and teach phonemic awareness

Unfortunately participants' poor knowledge of phonemic awareness limits discussion on the methods used to assess and teach it. Only the responses for the eight online survey participants, who could fully define phonemic awareness, and the four interviewees where context and clarification of responses existed, were analysed.

5.4.1 Assessment methods

The only phonemic awareness assessment specifically identified in this research was the *GKR Phonemic Awareness Test* (Roper, 1984), used by one survey participant and one interviewee if she was concerned about a particular child. Whether these responses relate to the same teacher is unknown due to the anonymity of the survey responses. Two of the nine survey participants indicated they did use a phonemic awareness test, but the other did not specifically identify which test. The remainder of the other survey participants and interviewees all

assessed in the context of phonics instruction, which cannot be classified as assessment of phonemic awareness.

5.4.2 Teaching methods

Even though eight of the online survey participants could correctly define phonemic awareness, only two clearly demonstrated that they explicitly taught phonemic awareness activities; e.g., "…the children are asked to blend, isolate, substitute, delete, match and segment sounds…They also fill in elkonin boxes based on words taken from their dictation sentences" (Participant 21);

> Word segmentation i.e. what are the sounds in 'frog'. Word blending i.e. what is this word (sound out word to the children) – w e n t Deletion of initial phoneme i.e. say crab without the cr. Phoneme substitution i.e. say ball instead of using a b start the new word with h. (Participant 56)

Five of the survey participants who answered the teaching methods question demonstrated confusion between phonemic awareness and phonics, indicating they used a phonics programme to teach phonemic awareness. This was also true in the case of three of the four interviewees. As Nicholson (2005) points out "Teaching phonemic awareness is not the same as teaching phonics. Phonics teaches how to link letters to phonemes, but phonemic awareness teaching concentrates on sound…and does not use the alphabet" (p. 37). Only one interviewee clearly demonstrated that she explicitly taught phonemic awareness separately from her phonics programme and could give examples of the sorts of activities she used, e.g.,

> "…what sounds does cat have in it? /k/ /a/ /t/ and you know sometimes we might clap the word or whatever and then…we would say ok like change the cat to hat and you know like I get them to say it then make it with magnetic letters and then write it". (Interviewee 1)

Due to the anonymity of the survey responses it is unclear whether one of the survey participants who taught phonemic awareness and Interviewee 1 are the same teacher.

5.5 Implications

Research shows that explicit instruction in phonemic awareness and phonologically-based decoding strategies is an effective intervention strategy for struggling readers (Ehri et al., 2001; Greaney & Arrow, 2012; Hatcher et al., 2004; Ryder et al., 2008; Torgesen et al., 2001). In order to meet the learning needs of these struggling readers, teachers need to have knowledge and understanding of phonemic awareness. A large proportion of the teachers who participated in this study demonstrated limited knowledge and understanding of phonemic awareness. One of the main implications therefore is that these teachers may not have the phonemic awareness knowledge and skills required to explicitly teach those children who are struggling to learn to read (Bos et al., 2001). Furthermore because of participants' tendency to overestimate their knowledge, they are not necessarily aware that they do not possess this knowledge and will not recognise the need for further training (Cunningham et al., 2004). Fifty-two percent of the online survey participants and three of the four interviewees confused phonemic awareness with phonics. Five of the eight survey participants who could define phonemic awareness confused phonemic awareness instruction with phonics instruction, citing phonics programmes as their method of teaching phonemic awareness. A major implication of this, especially combined with teachers' tendency to overestimate their actual knowledge, is the potential for those teachers to believe that they are actually teaching phonemic awareness when in fact they are not. This is reflected in 94% of the survey participants and three of the four interviewees believing that phonemic awareness is a part of their reading programme.

Poor teacher knowledge of phonemic awareness has implications for classroom practice. Without the necessary phonemic awareness knowledge, when teaching phonemic awareness, teachers will not be able to select appropriate

activities, use accurate examples, give appropriate feedback to students, assess students' learning needs accurately, nor differentiate instruction to meet their students' learning needs (Brady et al., 2009; Carroll, 2006; Cunningham et al., 2004; Moats, 1994, 2009; Piasta et al., 2009; Spear-Swerling et al., 2005).

The level of teachers' phonological knowledge has been linked to teachers use of, and the amount of time they spend on explicitly teaching phonologically-based decoding strategies as well as gains in students' reading achievement (McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002; Piasta et al., 2009). Spear-Swerling and Zibulsky (2014) specifically found that teachers' knowledge of phonemic awareness and phonics was associated with the amount of time teachers allocated to phonemic awareness and phonics instruction. The results of the present study imply that teachers who participated in this study may not allocate the time to explicit phonemic awareness instruction their struggling readers need due to their own poor knowledge of phonemic awareness.

A further implication is that in order to be able to provide the effective phonemic awareness instruction their struggling readers need, the teachers who participated in this study would need to increase their knowledge of phonemic awareness, and their understanding of its role in learning to read. Research studies have shown that teachers' phonological knowledge can be increased through professional development (PD) that includes explicit phonemic awareness instruction (Brady et al., 2009; McCutchen, Abbott, et al., 2002; Moats & Foorman, 2003). There are also implications for teacher education programmes in New Zealand. The question arises as to whether current programmes give pre-service teachers the knowledge of phonemic awareness, and the understanding of its role in learning to read, that they need to meet the learning needs of all children in their classrooms, particularly those children struggling to learn to read. Carroll (2006) suggests they do not and that there is a need for the inclusion of explicit phonological awareness, especially phonemic awareness instruction, in teacher education programmes in New Zealand.

Another implication of the findings is in relation to New Zealand's tail of literacy underachievement. The consistency of the findings of this research with

other studies which investigated teachers' linguistic knowledge, conducted in New Zealand and overseas, is concerning in terms of the literacy achievement gap between good and poor readers in New Zealand primary schools identified in international assessments (Mullis et al., 2012; Tunmer et al., 2008, 2013a). There is a danger that this gap might not reduce, but continue to widen, or at least maintain the status quo, unless the Ministry of Education reviews its current policies on literacy practice in New Zealand primary schools (Patel, 2010; Tunmer et al., 2013a). New Zealand's mean scores have remained stable; the literacy achievement gap between good and poor readers has not reduced, and the same top-down constructivist whole language approach to teaching literacy, which emphasises meaning-based instruction, has continued to be maintained. The Literacy Experts Group (1999) and the Education and Science Committee (2001) both advocated the inclusion of phonological instruction in their reports to the Ministry of Education. Consistent with findings from overseas studies, research studies conducted in New Zealand demonstrated that explicit instruction in phonemic awareness helps struggling readers learn to read and helps to negate the effects of differences in the literate cultural capital children bring when they start school (Greaney & Arrow, 2012; Nicholson, 2003; Ryder et al., 2008). For all children to have an equal opportunity for success in reading, educational practices must respond to the differences in the literate cultural capital that children begin school with (Nicholson, 2003; Ryder et al., 2008; Tunmer et al., 2013a). However, under New Zealand's current approach to teaching literacy it is dependent on the phonemic awareness knowledge of the teacher, and their understanding of its role in learning to read, as to whether those struggling readers have access to explicit phonemic awareness instruction. The researcher does not intend to suggest that explicit phonemic awareness or phonological-based decoding instruction on its own will reduce the gap, but rather that the inclusion of explicit phonemic awareness instruction and decoding instruction into the current whole language approach would result in a more balanced approach to teaching literacy, allowing teachers to have the knowledge necessary in all areas to meet the differing learning needs of all children, particularly struggling readers (Patel, 2010; Pressley, 2006; Tunmer et al., 2013a, 2003). To be successful at teaching reading, teachers need to have access to all the knowledge and essential tools they need to be able to differentiate their instruction (Patel, 2010).

5.6 Limitations of the research

There are a number of limitations that need to be considered when interpreting the results of this research. The response rate to the online survey was low (19%). The survey was sent out to a total of 650 schools in the Waikato, Auckland and surrounding areas via email, only 123 responses were received. Whether this is an accurate measure of the response rate is unknown as the distribution of the survey within a school was at the discretion of the principal or school administrator as to whether it was forwarded to teachers or not. Of those 123 responses only 68 were complete responses, resulting in a low sample size. In addition only four semi-structured interviews were conducted. The low sample sizes of the online survey and the semi-structured interviews, as well as the use of descriptive statistics to analyse the data, means that the results cannot be generalised to a broader population and can only be considered in relation to the teachers who participated in this study. There is also no way to know if the online survey responses contained participant bias from the point of view that perhaps only those participants with an interest in phonological-based decoding were more interested to complete the survey, as was the case with the semi-structured interviews. A replication of the study with a larger sample size for both the online survey and the semi-structured interviews would give greater levels of confidence and generalisabilty in the results.

Another limitation is that the study focused on teachers' knowledge of phonemic awareness, representing only a small portion of the knowledge and understanding that teachers need to teach reading effectively. Research has also not yet determined the level of knowledge and understanding of phonemic awareness, or of the other components of reading teachers need to effect positive outcomes in their students' reading achievement (Bos et al., 2001; Moats & Foorman, 2003).

Whilst every endeavor was made by the researcher to remain neutral while conducting the semi-structured interviews, it cannot be certain that all bias was eliminated. To increase the reliability of the findings, however, the interviews

were recorded, transcribed and sent to the interviewees for approval. Very minimal changes were made with two of the interviewees correcting one word only in their respective transcripts.

Finally, the possibility of researcher bias in the analysis and interpretation of the data also needs to be considered. The effects of bias, however, were minimised by increasing the internal validity of the findings through inter-rater checking and moderation of the teacher knowledge assessment marking, the coding and interpretation of the online survey qualitative responses, and the researcher's coding, identification of themes, and interpretation of the interview data.

5.7 Future research

While many studies investigating teachers' linguistic knowledge have been conducted overseas, very few studies have been conducted in New Zealand. The researcher found only one conducted since 2000 involving in-service teachers (Carroll, 2006). A replication of this present research study with larger sample sizes could allow generalisabilty to a broader population. More in-depth analysis could be carried out to see whether teachers' knowledge of phonemic awareness and understanding of its role in learning to read has any correlation to factors such as teaching experience, specialist training, and/or teaching qualifications. The content of different teacher training programmes and how the content relates to teachers' actual knowledge could also be investigated, in particular whether teacher education programmes contain instruction on how to assess and teach phonemic awareness. With a larger sample size inferential statistics could be used to analyse the relationship between the participants' knowledge of phonemic awareness and how they then apply that knowledge to phonemic awareness tasks; for example, is there a correlation between the participants' ability to define phonemic awareness and their ability to count the number of phonemes in words, or their teacher knowledge assessment total score? Research could be done investigating teachers' attitudes and perceptions towards code-based instruction

and whether this might be a factor in their use of explicit phonemic awareness instruction.

Future research could also be extended to investigate the relationship between teachers' knowledge of phonemic awareness and students' reading achievement. If teachers' phonemic awareness knowledge is increased through PD, for example, does this then translate into reading gains in their students?

Further research could also extend other intervention studies conducted in New Zealand (Nicholson, 2003; Ryder et al., 2008) to investigate the effects of including explicit phonemic awareness instruction in a whole language classroom on students reading achievement, particularly for struggling readers.

5.8 Summary

This study showed a wide variance in teachers' knowledge and understanding of phonemic awareness, and overall results on the teacher knowledge assessment of phonemic awareness were poor. Although a large proportion of participants could identify the definition of a phoneme from a multiple-choice list, they found phoneme counting and phoneme identification tasks particularly difficult, and seemed unclear of the difference between a consonant blend and a digraph. Findings suggest a significant number of these teachers may work on the spelling of words (orthography) rather than the hearing of sounds (phonology). Very few participants were able to define phonemic awareness and distinguish it from phonological awareness and phonics, with many confusing phonemic awareness with phonics. Poor knowledge of phonemic awareness implies that the majority of participants did not have an understanding of the role of phonemic awareness in learning to read. There were significant discrepancies between participants' perceived knowledge and their actual knowledge, with fifty-seven percent of teachers showing no alignment between what they thought they knew and what they actually knew. Further analysis showed that there was a tendency to overestimate their actual knowledge, meaning these teachers were unaware of the

gaps they may have in their actual knowledge and may not seek out new information if necessary.

Limited information was found on the methods teachers used to assess and teach phonemic awareness as not many of the participants' actually assessed or taught it. The confusion with phonics was again apparent as most assessed and taught phonics rather than phonemic awareness. Only two online survey participants and one interviewee were able to demonstrate that they actually assessed and taught phonemic awareness.

Overall, the findings suggest that the teachers who participated in this study typically did not have the requisite knowledge to provide explicit phonemic awareness instruction, and hence may not have the skills necessary to teach struggling readers to learn to read.

The present study supports the findings of previous research conducted both overseas and in New Zealand, and suggests further research possibilities that could be carried out to build on this knowledge.

5.9 Conclusion

International assessments continue to show a wide variation between good and poor readers in New Zealand primary schools (Mullis et al., 2012; Tunmer et al., 2013a). Evidence suggests that the current whole language approach to reading instruction is not responding to the differences in low literate cultural capital that poor readers begin school with (Greaney & Arrow, 2012; Tunmer & Prochnow, 2009; Tunmer et al., 2008, 2013a, 2003) and is not meeting up to 20% of children's learning needs (Education and Science Committee, 2001, 2008; Education Review Office, 2005). Research shows that these children will continue to struggle to learn to read unless they receive explicit instruction in phonemic awareness (Ehri et al., 2001; Hatcher et al., 2004; Nicholson, 2003; Pressley, 2006; Ryder et al., 2008; Strattman & Hodson, 2005; Torgesen et al., 2001). Literacy practices in New Zealand do not currently support explicit

instruction in phonemic awareness. Phonemic awareness is believed to be a constrained skill that children will learn implicitly (Ministry of Education, 2003, 2009, 2010; Tunmer et al., 2013b). According to the Ministry of Education (2003) "Young children are believed to typically develop phonemic awareness through many experiences with oral language, especially with poems, jingles, rhymes, songs and word games" (p. 32). There needs to be a greater emphasis placed on differentiating instruction to allow all children, irrespective of ethnicity or socioeconomic background, equitable opportunities for success in reading (Tunmer et al., 2013a, 2007). Teachers therefore need to be equipped with all the essential knowledge and skills they need to be able to teach reading effectively (Patel, 2010), including phonemic awareness.

The present study set out to gain an understanding of the knowledge that teachers in New Zealand primary school classrooms have in regard to phonemic awareness, their understanding of its importance in learning to read, and the methods they use to assess and teach it. Data was collected via an online survey, followed by four semi-structured interviews, which allowed the survey findings to be investigated further in four local contexts to add depth to the researcher's understanding. Findings revealed that the participants typically had poor knowledge of phonemic awareness and limited understanding of the role of phonemic awareness in learning to read. Although the findings can only be related to the teachers who participated in this study, the findings are consistent with previous research studies, suggesting that teachers in New Zealand primary schools may not have the knowledge required to provide explicit phonemic awareness instruction. The teachers in this study tended to believe they were more knowledgeable than they actually were, suggesting they are unaware they do not have the knowledge necessary to meet their students' differing learning needs. If they do not have the knowledge, they will not be able to teach effectively (Cunningham et al., 2004; Moats, 1994; Spear-Swerling et al., 2005). According to Cheesman et al. (2009):

> For children who struggle with reading acquisition, effective PA [phonemic awareness] instruction requires a teacher who thoroughly understands its implications for reading achievement, has competent skills,

> and has a complete understanding of the content, scope, and sequence of instruction that is more explicit, comprehensive, intensive, and supportive than is necessary for normally progressing students. (p. 272)

Findings of this study suggest that teachers' knowledge of phonemic awareness, and their understanding of its role in learning to read, as well as methods to assess and teach it, need to be increased in order to meet the differing skill needs of the children they are teaching to read, particularly struggling readers.

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Appendix A

Online Survey

Primary school teachers' knowledge of phonemic awareness and its importance as a factor in learning to read.

My name is Linda Clark and I am conducting this survey as part of research for my Master's thesis at the University of Waikato. The purpose of this study is to investigate primary school teachers' knowledge of phonemic awareness and its role in learning to read.

Thank you for taking the time to complete this survey. The survey should take you approximately 15 minutes to complete. Please answer all questions even if you are not sure. Unsure is a valid response.

Please note that clicking on the submit button at the end of this survey means that you give your informed consent to participate in the survey.

There are 26 questions in this survey

Section 1: General Questions

1 []Are you male or female? *

Please choose **only one** of the following:

- ○ Female
- ○ Male

2 []What is your age group? *

Please choose **all** that apply:

- ☐ 18-29
- ☐ 30-39
- ☐ 40-49
- ☐ 50-59
- ☐ 60-69
- ☐ 70+

3 []What is your ethnicity? *

Please choose **all** that apply:

- ☐ Māori
- ☐ Pasifika
- ☐ New Zealand European
- ☐ European
- ☐ Asian
- ☐ Other: _____

4 []How many years have you been teaching? *

Please choose **all** that apply:

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 20+

5 []What is the most recent decile ranking of your school? *

Please write your answer here:

6 []What year level(s) are you currently teaching? *

Please choose **all** that apply:

- ☐ New Entrant/Year1
- ☐ Year 2
- ☐ Year 3
- ☐ Year 4
- ☐ Year 5
- ☐ Year 6
- ☐ Specialist teacher
- ☐ Other:

7 []What year levels have you previously taught? *

Please choose **all** that apply:

- ☐ New Entrant/Year 1
- ☐ Year 2
- ☐ Year 3
- ☐ Year 4
- ☐ Year 5
- ☐ Year 6
- ☐ Year 7
- ☐ Year 8
- ☐ Other: _____

8 []What are your qualifications? *

Please choose **all** that apply:

- ☐ Master or Postgraduate degree
- ☐ Bachelor degree
- ☐ Graduate Diploma of Teaching
- ☐ Diploma of Teaching
- ☐ Higher Diploma of Teaching
- ☐ Advanced Diploma of Teaching
- ☐ Other: _____

Section 2: Teacher Knowledge

9 []What are the key characteristics/skills children need to have in order to be good readers?

Please write your answer here:

10 []What are the key components/features of your reading instruction programme?

Please write your answer here:

Section 3 Teacher Knowledge

11 []What is phonemic awareness?

Please write your answer here:

12 []Is phonemic awareness instruction part of your reading programme?

Please choose all that apply and provide a comment:

- ☐ Yes (please explain why)
- ☐ No (please explain why)
- ☐ I'm not sure

13 []If you answered yes to the question 12, please briefly describe how you assess students phonemic awareness.

Please write your answer here:

14 []If you answered yes to question 12, please briefly describe what instructional methods <u>you</u> use to develop students' phonemic awareness?

Please write your answer here:

15 []How would you describe your current knowledge or skill level with teaching and providing students with structured practice in phonemic awareness?

Please choose **all** that apply:

- ☐ No experience
- ☐ Minimal skills
- ☐ Proficient
- ☐ Expert

16 []Where have you gained your knowledge of phonemic awareness?

Please choose all that apply and provide a comment:

☐ Teacher Education Programme (University or Teachers' College)	
☐ Professional Development (please specify)	
☐ Your own research	
☐ Other (please specify)	

Section 4: Teacher Knowledge

17 []How many syllables are in each word? *

Please choose the appropriate response for each item:

	1	2	3	4	5	Not sure
vocabulary	○	○	○	○	○	○
enabling	○	○	○	○	○	○
incredible	○	○	○	○	○	○
shirt	○	○	○	○	○	○
cleaned	○	○	○	○	○	○
finger	○	○	○	○	○	○

18 []What is a phoneme? *

Please choose **all** that apply:

- ☐ A single letter
- ☐ A single speech sound
- ☐ A single unit of meaning
- ☐ A grapheme
- ☐ Not sure

19 []How many phonemes are in each word? *

Please choose the appropriate response for each item:

	1	2	3	4	5	6	7	Not sure
straight	○	○	○	○	○	○	○	○
box	○	○	○	○	○	○	○	○
cat	○	○	○	○	○	○	○	○
know	○	○	○	○	○	○	○	○
grass	○	○	○	○	○	○	○	○
sea	○	○	○	○	○	○	○	○
thank	○	○	○	○	○	○	○	○
racing	○	○	○	○	○	○	○	○

20 []What is the third phoneme in each of the following words?

	Third phoneme
educate	
tough	
chalk	
witch	
stood	
prayer	
higher	
explain	

Section 5: Teacher Knowledge

21 []What word contains a short vowel sound? *

Please choose **all** that apply:

- ☐ treat
- ☐ start
- ☐ slip
- ☐ cold
- ☐ point
- ☐ Not sure

22 []What word contains a long vowel sound? *

Please choose **all** that apply:

- ☐ some
- ☐ cup
- ☐ hoot
- ☐ lame
- ☐ ploy
- ☐ Not sure

23 []A combination of two or three consonants pronounced so that each letter keeps its own identity/sound is called a ...? *

Please choose **all** that apply:

- ☐ Silent consonant
- ☐ Consonant digraph
- ☐ Diphthong
- ☐ Consonant blend
- ☐ Not sure

24 []Two combined letters that represent one single speech sound are called a ...? *

Please choose **all** that apply:

- ☐ Schwa
- ☐ Consonant blend
- ☐ Phonetic
- ☐ Digraph
- ☐ Diphthong
- ☐ Not sure

Section 6: Teacher Knowledge

25 []Briefly explain the difference between phonological awareness, phonemic awareness, and phonics.

Please write your answer here:

Section 7: Follow-up Interview

26 []Would you be willing to participate in a follow-up 30-45 minute interview?

Please choose **only one** of the following:

- ○ Yes
- ○ No

If yes then please email me. My email address is: thekiwiclarks@gmail.com

Thank you very much for completing this survey. I really appreciate the time and effort you have made.

Submit your survey.
Thank you for completing this survey.

Appendix B

Post Survey Interview Questions

1. Revisit the first two questions from the questionnaire to clarify information:

- What are the key characteristics/skills children need to have in order to be able to read successfully?
- Why do you think these are the key characteristics/skills?
- Can you tell me more about the key components/features of your reading instruction programme?

2. Can you tell me about the learners you teach?

3. Do any of them have difficulty with reading? If so what type of reading difficulties do they have? What do you do to support them?

4. What is phonemic awareness?

5. How does phonemic awareness differ from:

- phonological awareness?
- phonics?

6. Is phonemic awareness instruction part of your reading programme?

- How does it fit into your reading programme?
- Is it explicitly taught?

7. Why is phonemic awareness important?

8. What phonemic awareness skills are most important?

9. How do you assess phonemic awareness?

10. What instructional methods do you use to assess and develop phonemic awareness?

- Time devoted to phonemic awareness?

- Teaching resources used? Source?

11. Where has your knowledge of phonemic awareness been learned?
    - Was it part of your teacher education programme?
    - Have you engaged in any professional development on phonemic awareness?

Appendix C

Ethical Approval

Dean's'Office'
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THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

MEMORANDUM

To: **Linda Clark**

cc: Dr Sue Dymock

From: **Associate Professor Garry Falloon**
Chairperson, Research Ethics Committee

Date: 5 June 2014

Subject: Supervised Postgraduate Research – Application for Ethical Approval (EDU38/14)

Thank you for submitting the amendments to your application for ethical approval for the research project:

Primary school teachers' knowledge of phonemic awareness and its importance as a factor in learning to read

I am pleased to advise that your application has received ethical approval.

Please note that researchers are asked to consult with the Faculty's Research Ethics Committee in the first instance if any changes to the approved research design are proposed.

The Committee wishes you all the best with your research.

Garry Falloon

Associate Professor Garry Falloon
Chairperson
Research Ethics Committee

Appendix D

Invitation to principals, school administrators and teachers to participate in an electronic survey

Hello

My name is Linda Clark and I would like to invite you to complete an online survey.

As part of my Master's thesis at the University of Waikato I am conducting research into primary school teachers' knowledge of phonemic awareness and its role in learning to read. You will find more information in the attached information sheet.

It would be greatly appreciated if you would circulate this survey to all teachers throughout your school. Responses from a wide variety of teachers with diverse experience will enhance the research findings.

Participation in the survey is voluntary. The survey will take approximately 15 minutes to complete. Participants are encouraged to complete the survey in one sitting. Participants will have three weeks to complete the survey. A reminder will be sent out one week before it closes.

Responses will be entirely anonymous, and participants will not be identified in any publication or report on this research. Data will be kept confidential and cannot be traced back to the participants. I will not be able to see who has participated in the study.

Completing the survey implies that participants are giving their consent to participate in the survey.

If you encounter any problems or if you require any clarification regarding the survey you are welcome to phone or email me. My contact details are below and I am happy to answer any questions you may have.

Below you will find instructions on how to access the survey.

After the survey has been completed, I wish to conduct more in-depth interviews with a randomly selected sample of survey participants. The survey asks any teachers willing to be interviewed to contact me at the contact details below.

Thank you very much for your cooperation.

Kind regards

Linda Clark
Email: thekiwiclarks@gmail.com
Phone: 021 023 72474

To access the survey please click the following link, or copy into your Internet browser:
https://education.waikato.ac.nz/survey/index.php/survey/index/sid/791794/newtest/Y/lang/en

Appendix E

Information sheet for principals, school administrators and participating teachers

International assessments have continued to highlight a large gap between good and poor readers in New Zealand primary schools. Learning to read is a complex process and there are many factors to be considered when teaching children to read. The purpose of this study is to investigate primary school teachers' knowledge of phonemic awareness and its role in learning to read.

Very few studies of this nature have been conducted in a New Zealand context. It is hoped the findings of this research will add to the growing knowledge in this area.

The Faculty of Education Ethics Committee at the University of Waikato has approved this study. The findings of the study may be disseminated in oral presentations, seminars, conferences, or journal articles. You will not be identified in any publication and data will be kept confidential and cannot be traced back to you.

The research will involve a two-step approach. Firstly a survey will be sent out to all primary schools in the Waikato/Auckland and surrounding areas inviting primary teachers to participate. The survey findings will then be explored in more depth by conducting individual interviews of a randomly selected sample of survey participants. Please contact me at the contact details below if you are willing to participate in an interview.

For the survey phase, clicking on the submit button means that you give your informed consent to participate in the survey. After your survey has been submitted you will not be able to withdraw your responses. For the interview phase, further information will be provided including the completion of an Informed Consent Form. Participants are free to withdraw from this phase up until they approve the transcripts of their interviews.

If you wish to be emailed the model answers for the knowledge survey and a summary of the findings of this research once it has been completed, please advise me by email.

Please contact me should you have any questions regarding this research, my contact details can be found below. You are also welcome to contact my supervisor, Dr. Sue Dymock, should you wish to discuss any aspect of this research with her. You will find her contact details below.

Researcher:
Linda Clark
Email: thekiwiclarks@gmail.com
Phone: 021 023 72474

Supervisor:
Dr. Sue Dymock
Email: sdymock@waikato.ac.nz
Phone: 07 838 4500 ext. 7717

Appendix F

Email invitation to teachers to participate in an interview

Dear [Name]

Thank you for contacting me to indicate your interest in participating further in my research with an interview.

As you will be aware from the survey, as part of my Master's thesis at the University of Waikato I am conducting research into primary school teachers' knowledge of phonemic awareness and its role in learning to read. I have attached the information sheet sent with the survey again for your information.

Following on from the findings of the survey, I would like to conduct individual interviews with four primary teachers. While the survey gave me a broad understanding of primary teachers' knowledge and practice of phonemic awareness, the purpose of the interviews is to add depth to this understanding.

Participation in the interview is voluntary and you may withdraw at any stage until approving the interview transcript. It is anticipated that the interview will take about 30–45 minutes. The interview will be recorded using an electronic device (e.g., iPad) and a transcript of the interview will be provided for your approval before the information is analysed.

You will not be identified in any publication or report on this research, and any information will be kept confidential to my supervisor, Dr. Sue Dymock, and myself.

You are welcome to contact me at any stage should you have any questions regarding this research, my contact details can be found below. You are also welcome to contact my supervisor, Dr. Sue Dymock, should you wish to discuss any aspect of this research with her. You will also find her contact details below.

Could you please indicate your willingness to participate in an interview by completing and returning the attached Consent Form? Could you also please indicate some times that suit you to carry out the interview either on the consent form or via email or phone.

Thank you very much for your cooperation. I look forward to hearing from you soon.

Kind regards

Linda Clark
Email: thekiwclarks@gmail.com
Phone: 021 023 72474

Appendix G

Interview consent form for participating teachers

This consent form explains how your rights will be protected while you participate in this research. If you are happy to participate please sign and return the completed form as soon as possible.

☐ I understand the purpose of Linda Clark's research and that by signing this form I am happy to take part in an interview.

☐ I know that at any time I can withdraw from the study, up to approving the transcript of my interview.

☐ I have had an opportunity to ask questions and have them answered.

☐ I understand that if I have any concerns regarding this research that I prefer not to discuss with the researcher, I can contact:

Supervisor:
Dr. Sue Dymock,
Email: sdymock@waikato.ac.nz
Phone: 07 838 4500 ext. 7717

☐ I am happy for Linda Clark to use the information from this interview for the purpose of a Master's thesis she is completing and any subsequent publications.

☐ I understand that I will not be personally identified and any information will be kept confidential to Linda Clark and her supervisor, Dr. Sue Dymock.

☐ I understand that the interview will be recorded using an electronic device (e.g., iPad) and I will be able to approve a transcript of the interview if I wish.

☐ I am aware I will be able to access the completed thesis at the University of Waikato Research Commons: http://researchcommons.waikato.ac.nz

Signed:

Date:

Please indicate days and times that you are available for an interview:

Appendix H

Teacher Knowledge Assessment with Model Answers

(Answers are italicised in bold)

1. What is phonemic awareness?

Phonemic awareness – "…a conscious awareness of the smallest unit of sound in a [spoken] word and an abili**ty **to manipulate the sounds (e.g., delete the /h/ from* **hat** *and replace with the phoneme /p/ to get* **pat)"* (Nicholson & Dymock, 2015, Glossary)**.**

2. How many syllables are in each word?

vocabulary	1	2	3	4	***5***
enabling	1	2	***3***	4	5
incredible	1	2	3	***4***	5
shirt	***1***	2	3	4	5
cleaned	***1***	2	3	4	5
finger	1	***2***	3	4	5

3. What is a phoneme?

a) A single letter
b) A single speech sound
c) A single unit of meaning
d) A grapheme
e) Not sure

4. How many phonemes or distinct speech sounds are in each word?

straight	1	2	3	4	***5***	6	7
box	1	2	3	***4***	5	6	7
cat	1	2	***3***	4	5	6	7
know	1	***2***	3	4	5	6	7
grass	1	2	3	***4***	5	6	7
sea	1	***2***	3	4	5	6	7
thank	1	2	3	***4***	5	6	7
racing	1	2	3	4	***5***	6	7

5. What is the third phoneme or speech sound in each of the following words?

educate	***u***
tough	***gh (f)***
chalk	***k***
witch	***tch (ch)***
stood	***oo***
prayer	***ay***
higher	***er***
explain	***s (x = /k/ /s/)***

6. What word contains a short vowel sound?

a) treat
b) start
c) slip
d) cold
e) point

7. What word contains a long vowel sound?

a) some
b) cup
c) hoot
d) lame
e) ploy

8. A combination of two or three consonants pronounced so that each letter keeps its own identity is called?

a) silent consonant
b) consonant digraph
c) diphthong
d) consonant blend

9. Two combined letters that represent one single speech sound are a

a) schwa
b) consonant blend
c) phonetic
d) digraph
e) diphthong

10. Briefly explain the difference between phonological awareness, phonemic awareness, and phonics.

Phonological awareness is "…awareness of the phonological structure of a word at the syllable level, onset-rime level, and phoneme level" (Gillon, 2004, p. 9)**.**

Phonemic awareness –"…a conscious awareness of the smallest unit of sound in a [spoken] word and an ability to manipulate the sounds (e.g., delete the /h/ from* hat *and replace with the phoneme /p/ to get* pat*)" (Nicholson & Dymock, 2015, Glossary)**.**

"Phonics refers to teaching sound-letter correspondences for reading and spelling" (Gillon, 2004, p. 11)