

**EARLY LITERACY  
RESEARCH PROJECT**

**REPORT TO THE NEW ZEALAND  
MINISTRY OF EDUCATION**  
**Operational Milestone Report**  
**February 2017**

Alison W. Arrow, James W. Chapman,  
Christine Braid and William E. Tunmer  
Massey University  
February, 2017



Proactively Released

## Contents

<b>Executive Summary.....</b>	<b>1</b>
<b>Introduction .....</b>	<b>4</b>
Building teacher knowledge to increase word-level instruction .....	4
Professional Development in Literacy Teaching.....	5
A Framework for the Teaching of Word-Level Knowledge.....	7
Summary.....	11
Research Questions addressed in this milestone report.....	12
<b>Section 1: Teacher practice and changes in teacher practice.....</b>	<b>13</b>
<i>Professional learning .....</i>	<i>13</i>
Description of workshops and provided professional learning.....	13
<i>Participant teacher and school description .....</i>	<i>23</i>
Teacher overview in year 2 of project .....	23
<i>Teacher knowledge and practice .....</i>	<i>23</i>
Teacher knowledge.....	24
Teacher practice .....	27
Discussion of changes in teacher practice.....	36
<i>Key findings on teacher knowledge and practice .....</i>	<i>38</i>
<b>Section 2: Child change .....</b>	<b>40</b>
<i>Design of child cohorts.....</i>	<i>40</i>
<i>Participants and schools in each of the cohorts .....</i>	<i>41</i>
<i>Tests and measures used .....</i>	<i>42</i>
Time 1 .....	42
Time 3 .....	43
Time 6 .....	45
<i>Results.....</i>	<i>48</i>
Control and Intervention comparisons at end of second year of school .....	48
Comparison and Intervention groups starting in 2016 .....	51
<i>Key findings on children's progress.....</i>	<i>60</i>
<i>Teacher-child interactions.....</i>	<i>62</i>
Summary.....	66
<b>Summary and conclusions .....</b>	<b>68</b>
Changes in teacher knowledge and practice.....	69

The effect on children's outcomes .....	71
Conclusion.....	73
<b>References.....</b>	<b>74</b>
<b>Appendix A.....</b>	<b>77</b>
<b>Appendix B .....</b>	<b>79</b>
 Table 1: Summary of phases, teaching activities and aligned resources.....	15
Table 2: Productive prompts given at Time 1 and Time 2 .....	28
Table 3: Updated research design for cohorts of children .....	40
Table 4. Summary data for Groups by School Decile Bands.....	83
Table 5. Summary data for Groups by Ethnicity.....	84
 Figure 1: Cognitive Foundations of Learning to Read (Tunmer & Hoover, 2014) .....	8
Figure 2: Mean scores for Knowledge and ability questions .....	25
Figure 3: Change in teacher performance of language constructs survey .....	26
Figure 4: Boxplot showing change and distributions of teaching practice .....	30
Figure 5 Pseudoword phoneme score results by group and decile level .....	54
Figure 6: Burt word test results by Group and School Decile Band.....	55
Figure 7: Spelling results by Group and School Decile Band.....	56
Figure 8: Pseudoword reading results by Group and Decile Band .....	56
Figure 9: Attempts to read unknown words.....	58
Figure 10: Burt word test results for Group by Ethnicity.....	59
Figure 11: Spelling results for Group by Ethnicity.....	59
Figure 12: Pseudoword reading results for Group by Ethnicity.....	60

## Executive Summary

This project involves a two cohort longitudinal study. In this report we present results from the second year of the study including year 2 of the first cohort and year 1 of the second cohort. We first present the overall goal and the rationale for the Early Literacy Project being undertaken by researchers at Massey University. The Early Literacy Project's goal is to examine how much added-value is obtained from improving teacher knowledge to increase the emphasis on word-level knowledge for reading in the earliest period of learning in which children transition from non-readers to beginning readers. This transition is much more difficult for children who have fewer essential reading-related skills (alphabet knowledge, phonological awareness) at school entry, particularly when the instructional approach emphasises using meaning-based contextual cues to read unfamiliar print words. A code-based instructional approach in which children are directed to use phonic, word-level knowledge to read unfamiliar print word is effective for children with fewer skills at school entry.

Teacher knowledge is necessary for effective early literacy instruction, and there is a small body of research evidence to suggest that the required language construct knowledge is low for New Zealand teachers. To provide children with code-based instruction in which children are directed to use phonic knowledge for reading unfamiliar words, a professional learning and development (PLD) programme with teachers was deemed necessary. We are simply named this the workshop programme which was 6 days of PLD over the course of one year. The workshop programme consisted of five modules which focussed on phonic elements (letter-sounds, digraphs, vowel patterns, syllables and morphemes) as well as providing explicit instruction.

There were two phases to the second year of the project. In the first phase we continued to follow the cohort of children who participated as Intervention or Comparison group children in 2015. In the second phase we had a new cohort of five-year-old New Entrants across three groups. The first group was a new Intervention group, from the classrooms of teachers participating in the revised 2016 workshop programme. The second group of children were drawn from the classrooms of teachers who

participated in the original 2015 workshop programme. We called this group Intervention + and the purpose of including this group was to investigate if the 2015 Intervention teachers built on their knowledge into 2016. The final group was a new Comparison group drawn from the classrooms of teachers in participating schools who had not attended the workshop programme in either year.

There were, again, no differences between the 2015 Intervention and the 2016 Comparison groups. This was disappointing but as a result of the lack of effect of the workshop programme in 2015 the workshop programme was revised for 2016. This revision included the development of a scope-and-sequence curriculum to support teachers in understanding the developmental progression of phonic knowledge. Schools were also provided with a set of resources that included decodable texts, to support in them in providing systematic instruction. The revision also included a stronger focus on providing explicit instruction prior to reading books during reading time. It was hoped that the explicit instruction was based on the systematic sequence provided, but it was often based on what occurred in the book selected. This meant that teachers were tending to combine explicit instruction with analytic phonic approaches. Such an approach is not the most effective approach to phonic-based instruction for the most at-risk beginning readers, but it represents a significant shift in teacher practice. As well as illustrating a shift in teacher practice the results show growth in teacher knowledge in phonic knowledge and morphological knowledge.

The key finding presented in this report is that there were significant differences between the 2016 Intervention group and the 2016 Comparison group. We analysed the year end data by means of a series of 3x3 multi-variate analyses with group (Intervention, Intervention +, Comparison) and decile band (low, mid, high) as the two factors. The children who had teachers from the 2016 workshop programme significantly outperformed the Comparison group children on all measures. The Intervention + group of children were not significantly better or worse than either the Intervention group or the Comparison group, but their outcomes sat between the Intervention and Comparison scores. Consistent with expectations, it was children in low-decile schools who made the greatest amount of progress relative to their Comparison low-decile peers. For most measures the low-decile

Intervention group children were achieving at or above the same level as children in the mid and high level Comparison group.

We also conducted a series of 3x2 multi-variate analyses with group with group (Intervention, Intervention +, Comparison) and ethnicity (Māori, Pākehā) as the two factors. There were too few Pasifika students to include in such an analysis. Although the results show a trend towards improved outcomes for Māori children in the Intervention group the low number of students across factors meant that the differences were not statistically significant.

To clarify how the teacher knowledge and practice directly influenced children's outcomes we briefly describe three schools with teachers in the 2016 Intervention workshop programme. Teacher knowledge did increase for all schools but it was how they made use of the scope-and-sequence, explicit instruction and provided resources that appear to make a difference for children. Teachers who considered the *what* and the *how* of teaching reading to children made differences to child outcomes across all measures. In other cases, where explicit instruction was based on the current book selection, and not systematic, there were less obvious effects on child outcomes.

The ultimate aim of the Early Literacy Project is to have teachers and school providing reading instruction that is systematic in its content and explicit in its approach. The current findings show that moving to a systematic and explicit method of instruction is challenging for teachers and made difficult by the 'natural language' texts available for use in most classrooms. Such reading books have an unstructured approach to word forms, with few repeated patterns that allow for practice and reinforcement of taught phonic knowledge.

The overall finding, however, is that when children are consistently encouraged to use word-level cues when trying to read unfamiliar words they make accelerated progress when compared to their peers who do not receive that consistent emphasis. Outcomes for students are increased when teachers take a systematic approach to teaching phonic knowledge for use in word-level cues as well as using resources with children that allow them to practice and reinforce that learning. The difference in outcomes, as expected, is accentuated within low-decile schools. As Snow and Juel (2005) concluded,

explicit attention to alphabetic coding skills in early reading instruction is helpful for all children and crucial for some.

## Introduction

### Building teacher knowledge to increase word-level instruction

Effectively teaching reading skills to children requires that teachers have a high level of understanding of the basic structure of the English language, including an understanding of the sound–symbol correspondences of written English and how these influence reading development. Many children learn to read regardless of the method of instruction and/or their teachers' levels of understanding of the structure of English. However, for those children who present with early and often ongoing reading difficulties, teacher knowledge in this area is likely to be the critical element that influences the child's future success or failure in learning to read.

Before teachers are able to teach children to read or to develop the foundation skills for learning to read, it is important that they are not only knowledgeable about the code of written and spoken English, but also have knowledge of research-based literacy assessment and instructional procedures (Gersten et al., 2008; Spear-Swerling & Zibulsky, 2014). The importance of teacher knowledge for child development has been highlighted by Piasta, Connor, Fishman, and Morrison (2009), who found that time spent on explicit decoding instruction was only effective for child word-learning growth when teacher knowledge of phonology, orthography, morphology, literacy acquisition, and instruction was high. Spending more time on explicit decoding instruction was not effective in promoting reading development if the teacher's research-based knowledge was low.

It is likely that many teachers have implicit linguistic knowledge that may not easily be made explicit. For example, while teachers may be able to count syllables or identify correct vowel sounds in words (implicit knowledge), they may not have sufficient explicit linguistic knowledge to teach these elements effectively to their children. Joshi et al. (2009) and Washburn, Binks-Cantrell, Joshi, Martin-Chang, and Arrow (2015) found, for example, that pre-service teachers, in-service teachers, and teacher



educators could complete implicit phonological tasks but that they often were unable to make their understandings explicit, and they often provided incorrect responses to tasks such as defining *phoneme awareness* or being able to identify specific morphemes in words. In similar studies in New Zealand, Carroll (2006; Carroll, Gillon, & McNeill, 2012) investigated teachers', specialist teachers', teacher aides', and pre-service teacher trainees' phonological awareness skills, including those skills requiring syllable recognition, phoneme segmentation, and phoneme identification. Most teachers were able to complete the implicit task of syllable recognition, but they had greater difficulty in understanding phonemes.

To adequately meet the needs of all children, knowledge of effective literacy practices must also be part of a teacher's toolbox for literacy instruction. This is an area of teaching practice that has not been examined properly due to the different theoretical understandings of what reading is and how it should be taught. In one study, Piasta et al. (2009) found that the quality of teaching practices closely reflected levels of teacher knowledge. In conjunction with this finding, others have found that even when teachers do have sufficient knowledge of appropriate instructional areas or practices, they seldom implement or plan for them in their lessons (McNeill & Kirk, 2014; Spear-Swerling & Zibulsky, 2014). McNeill and Kirk, for example, found that for the teaching of spelling, teachers were generally familiar with a variety of evidence-based practices, but tended not to use them because they felt that they lacked the explicit knowledge of how to use them in practice. Many of the teachers felt that they lacked the knowledge required for accurately explaining the rationale behind different spelling patterns. Additionally, Fielding-Barnsley (2010) found that pre-service teachers in both early childhood and primary education programmes knew the importance of teaching phonic knowledge to beginning readers but lacked sufficient explicit knowledge required to explicitly teach such knowledge to their children.

### **Professional Development in Literacy Teaching**

In this research project, teacher professional development is directed towards developing in teachers a high level of the teacher knowledge that is required for effective teaching based on children's

location on the developmental continuum. Teacher knowledge of English orthography and morphology can help teachers move beyond the limitations of a stand-alone phonics programme (Snow, Griffen, & Burns, 2005) and incorporate phonics into reading programmes. When the patterns for word decoding and word spelling are understood, it is easier to work with children to learn the essential skills for reading and spelling (McNeill & Kirk, 2014). Children who do not acquire an understanding of the patterns, either through explicit teaching or implicit learning, start to lag behind in their literacy development. They become reliant on identifying unfamiliar words in text by guessing or using non-text cues (e.g., illustrations), strategies which characterise poor readers (Nicholson, 1991; Nicholson, 1993a, 1993b; Pressley, 2006).

Teaching word-level knowledge requires explicit knowledge of words but also the ability to provide explicit, systematic, instruction about words. This explicit approach is also necessary for the teaching of the language-based strategies to teachers. Previous studies on the nature of professional development for teachers has found evidence of the effectiveness of explicit and specific examples and practice for teachers (Desimone, Porter, Garet, Yoon, & Birman, 2002) as well as the provision of web-based support (Pianta, Mashburn, Downer, Hamre, & Justice, 2008) and time to implement changes to practice (Klingner, Vaughn, Hughes, & Arguelles, 1999).

Intensive, long-term yet frequent professional learning is also found to be a component of effective professional learning programmes (Darling-Hammond & Richardson, 2009). They argue that PLD should be content-based, include active learning through practice and reflections, and be collaborative and collegial. In addition Darling-Hammond, Chung Wei, Andree, Richardson, and Orphanos (2009) illustrate that programmes which include the above elements have positive outcomes for children when they run from 30 to 100 hours, over a 6 to 12 month period of time (Biancarosa, Bryk, & Dexter, 2010; Chappuis, Chappuis, & Stiggins, 2009; Neuman & Wright, 2010).

## A Framework for the Teaching of Word-Level Knowledge

In this project, we have adopted the Cognitive Foundations of Learning to Read<sup>1</sup> framework (Tunmer & Hoover, 2014; see Figure 1). This framework combines the cognitive elements underpinning the development of the language comprehension and word recognition components of the Simple View of Reading (Gough & Tunmer, 1986), and is based on the assumption that learning to read follows a developmental progression from pre-reader to skilled reader that involves qualitatively different but overlapping phases. Skill in comprehending written text depends on the ability to recognize the words of the text accurately and quickly; the development of automaticity in word recognition in turn depends on the ability to make use of letter-sound relationships in identifying unfamiliar words; and the ability to discover mappings between spelling patterns and sound patterns in turn depends on letter knowledge, phonemic awareness, and knowledge of the alphabetic principle. The literacy learning needs of beginning readers necessarily vary because they differ in the amount of reading-related knowledge, skills, and experiences they bring to the classroom on school entry, in the explicitness and intensity of instruction they require to learn skills and strategies for identifying words and comprehending text, and in their location along the developmental progression from pre-reader to skilled reader.

---

<sup>1</sup> Hereafter shortened to Cognitive Foundations framework

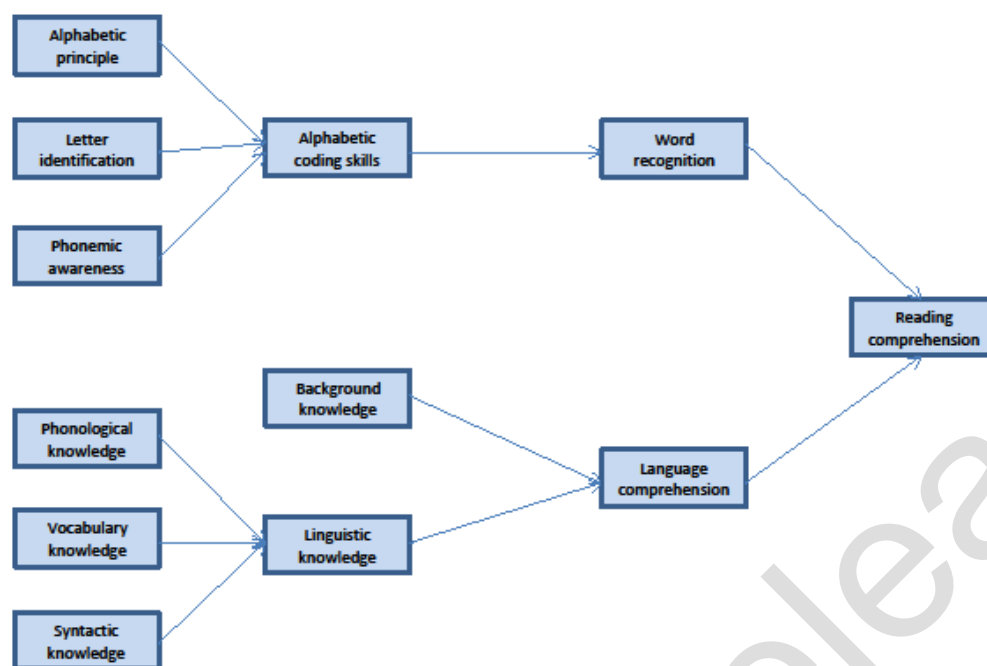


Figure 1: Cognitive Foundations of Learning to Read (Tunmer & Hoover, 2014)

Progress in learning to read is dependent on the child-by-instruction interactions that occur during instruction (Arrow & Tunmer, 2012). Child-by-instruction interactions can be described using Byrne's (2005) division of labour for acts of learning framework that takes into account differences children bring to the process of learning to read. Within this framework, the division of labour assumes that any act of learning is a product of both the environment and the learner. Byrne (2005) argued that different acts of learning could be located along different points of the continuum representing the division of labour between the learner and the environment. At one end of the continuum, acts of learning require less structured and often fragmentary environmental input for learning to occur (such as learning spoken language), whereas the other end of the continuum represents learning that requires rich and highly structured input from the environment (such as learning calculus).

For some beginning readers, the processes of acquiring literacy skills are highly learner dependent because some children grasp the idea of what is needed to discover orthographic patterns after relatively small amounts of explicit teaching of phonologically-based skills and strategies. Other

children, however, are more environment dependent, and benefit much more from a fairly structured and teacher-supported introduction to reading. At school entry, learner-dependent children typically come from more advantaged backgrounds and bring with them higher levels of essential reading-related knowledge. On the other hand, environment-dependent children tend to come from low-income backgrounds and have more limited amounts of essential reading-related knowledge

Therefore, differentiated teaching, where teachers use evidence-based assessment procedures and instructional strategies caters to the different literacy learning needs of beginning readers from the outset of schooling. The structure of the Cognitive Foundations framework provides the basis for diagnostic reading assessment. For example, if beginning readers are not progressing satisfactorily in learning to derive meaning from print (i.e., reading comprehension), it is because they are having problems understanding the language being read (i.e., language comprehension), problems recognizing the words of text quickly and accurately (i.e., word recognition), or both. Weakness in word recognition skill stems from insufficient explicit instruction in alphabetic coding skill or inadequate opportunities to practice and receive feedback on applying alphabetic coding skills while actively engaged in reading. If alphabetic coding skills are still weak despite exposure to explicit instruction and practice, it is because of inadequate knowledge of the alphabetic principle, letter knowledge, or phonemic awareness.

The structure of the framework is not intended to suggest that the development of the more advance cognitive elements cannot occur until all of the more fundamental elements are fully developed. Although some level of mastery of the more fundamental elements of the framework is needed to develop mastery of the more advanced ones, the elements tend to develop congruently and reinforce each other in a reciprocally facilitating manner. The elements of the framework should therefore not be taught in isolation from each other but instead should be taught in a more integrated manner; beginning readers should be given plenty of opportunities to practice and receive feedback on applying their newly acquired skills while engaged in performing the more advanced cognitive functions specified in the model.

Teaching the fundamental elements of the framework for initial mastery is recommended through the use of a structured, systematic and explicitly taught scope-and-sequence (Hempenstall & Buckingham, 2016). This scope-and-sequence should be underpinned by a robust model of reading development, such as Ehri's (2014) widely accepted phase theory of word learning. Ehri's phase theory provides a developmental progression of word learning to the word recognition component of the Cognitive model. In this model children begin learning to read by making use of letter names that they know, and then progress into making use of letter-sounds. Children begin to make use of increasingly larger phonic units (digraphs, morphemes, syllables) until reading appears automatized. Reading is not, of course, ever fully automatic, and even fluent adult readers must stop to read unknown words, and will often do so by looking for known morphological or syllabic patterns.

There is a large body of research indicating that explicit, systematic instruction in the code relating spellings to pronunciations positively influences reading achievement, especially during the early stages of learning to read (Hattie, 2009; Snow & Juel, 2005; Tunmer & Arrow, 2013). From an examination of findings covering a wide range of sources that included studies of reading development, specific instructional practices and effective teachers and schools, Snow and Juel (2005) concluded that explicit attention to alphabetic coding skills in early reading instruction is helpful for all children and crucial for some.

## Summary

The Cognitive Foundations framework combined with Ehri's (2014) phase model can be used to provide guidance in recognising the developmental progression in learning to read. Teachers must be able to recognise the developmental progression to make instructional decisions that take into account children's existing reading-related knowledge. Knowledge of the specific phonic elements required for effective word learning is also necessary. It is our contention that the teacher knowledge required for this is low for New Entrant teachers in New Zealand. This, along with a history of multiple-cue, constructivist approaches meant that many teachers do not provide explicit phonic instruction in their reading instruction.

The lack of explicit phonic instruction in the new entrant classroom is less problematic for children who come to school with already high levels of reading-related knowledge. They will continue to learn to read by building on this existing body of knowledge. Children, predominantly from low-decile homes, who have low levels of reading-related knowledge, need explicit teaching in the phonic elements required to transition from being a non-reader to a beginning reader. These children are those who require explicit, structured and systematic instruction in phonic elements. By increasing the phonic knowledge of teachers and providing explicit guidance in the developmental progression we anticipate that teachers will be better equipped to meet the needs of all learners, not just learner-dependent children. In particular, we anticipate that teachers who engage in teaching phonic knowledge in explicit and systematic ways to children in low-decile schools will result in children with reading and spelling outcomes that match mid and high decile school children.

## Research Questions addressed in this milestone report

1. Will increased literacy gains continue through to the end of Year 2 and Year 3 for those children in the Intervention classrooms compared to those in the Comparison classrooms?
2. Will teacher knowledge of supplementary word-level decoding teaching strategies and teacher confidence in teaching beginning readers increase among those teachers who receive the professional development workshop programme?
3. Will Year One children in the Intervention classrooms show increased literacy gains at the end of their first year in school compared with children in the Comparison classrooms?
4. Will the literacy intervention show greater gains for children from low decile schools and for Māori and Pasifika children compared to children from higher decile schools and from Pākehā backgrounds, and to children similar schools and backgrounds in the Comparison schools?



## Section 1: Teacher practice and changes in teacher practice

### Professional learning

#### Description of workshops and provided professional learning

The professional learning and development programme (PLD) is the vehicle for providing the literacy instruction that is central to the research project. The PLD programme was designed to provide research-based strategies for teachers to supplement instruction in their existing literacy programmes; it was not designed to be a replacement programme. Based on teachers' experience with the PLD programme in 2015, we made changes to the PLD programme in 2016 that provided more systematic guidance to how to implement the strategies into effective practice. We found that simply providing the strategies with no framework for who to select them for, and how to use them, was not enough for the 2015 cohort of teachers.

Changes to how we approached the PLD workshops were made to demonstrate more explicitly the very specific ways in which greater emphases on the development of word level skills can be made in a differentiated approach that allows for those children who need more instruction to obtain greater benefits. We emphasised the research-based view that phonics instruction provides a 'kick-start' to phonological decoding for children who come to reading with few of the necessary cognitive entry skills; that is, those children who have little understanding of the interaction between the graphemes of printed words, and phonemes of spoken words (Tunmer & Greaney, 2010).

Such provision of both explicit content knowledge and a 'how-to' guide for putting into practice rather than leaving teachers to try implementation on their own has resulted in more effective outcomes for children (Desimone et al., 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001; Pianta et al., 2008; Stahl, Keane, & Simic, 2013). Recent New Zealand research on literacy has also found that 'programme' type provision does lead to improved outcomes for children, particularly in low decile schools (Shine project, Quick 60 project). The explicit 'how-to' guide we developed was the Early

Literacy Project Curriculum (ELP). This guide provided a scope-and-sequence framework within which teachers could identify the learning needs of their children within one of Ehri's (2014) four developmental phases. Ehri's phases have been specifically adapted for this programme to enable a focus on the foundation skills that most children need for the first six months of formal education and that some children need for a longer period of time. In the ELP Curriculum, for each phase, there was a suggested sequence for content instruction (e.g., letter-sounds, blends, digraphs, syllables, suffixes) and the strategies required alongside that content so that children could learn how to both read and spell words containing those elements. It also provided a sequence of high-frequency words to teach children to learn to read by sight. The ELP curriculum document provided guidance on how to teach elements for the whole class and also for more personalised differentiated instruction. It also provided lists of existing resources, programmes, and text types that are often already in New Zealand classrooms and how they align with children's level of reading development. Alongside this scope-and-sequence was guidance on what to look for in assessment data to best align children into the phases.

The curriculum was supplemented by a lesson plan template that illustrated how teachers make instructional decisions based on specific needs. We also provided recommendations on how to choose reading materials that were aligned to the use of explicit instruction (see Table 1). Table 1 also provides a summary of the content and strategy knowledge required at each phase.

One of the challenges in making the shift in instructional approach relates to the nature of resources available to schools. Many of the beginning books currently available to schools contain, within one book, a myriad of spelling patterns and words that children may not have previously come across. When trying to support beginning readers it is necessary for teachers to focus on meaning-based cues as the print words themselves are too difficult for children to use phonic-based strategies with. Existing resources and book series are seldom aligned with the teaching strategies that are required for effective learning the earlier phases of reading development.

Some schools that had literacy funds purchased more appropriate resources, but others were unable to. To assist those schools to acquire resources that was consistent with research-led content in

Table 1: Summary of phases, teaching activities and aligned resources

Group: Phase 1	Group: Phase 2	Group: Phase 3	Group: Phase 4
<ul style="list-style-type: none"> <li>Alphabet names &amp; sounds: see in print and words</li> <li>Syllable and rime awareness</li> <li>1:1 matching</li> <li>Concepts about print</li> <li>Attempts at writing and spelling</li> </ul>	<ul style="list-style-type: none"> <li>Letter sounds (vowels)</li> <li>Consonant blends</li> <li>High frequency sight words</li> <li>Basic punctuation</li> <li>Spelling letters for sounds</li> <li>Decoding, using blends and paying attention to all letters</li> <li>Blending and segmenting phonemes</li> </ul>	<ul style="list-style-type: none"> <li>Trigraphs &amp; vowel structures</li> <li>Syllable spelling patterns</li> <li>Morphemes</li> <li>Advanced Word attack using chunks/or unitizing for decoding instead of sounding out</li> <li>Spelling using chunks including morphemes</li> <li>Cross-checking across meaning and syntax for decoding attempts</li> <li>Checking for meaning</li> </ul>	<ul style="list-style-type: none"> <li>Syllable structures</li> <li>Morphological knowledge including role of meaning</li> <li>Comprehension strategies</li> <li>Syntactic structures</li> <li>Analogy for decoding unfamiliar words</li> <li>Morphemes for identifying meaning of unfamiliar words</li> <li>Purpose of reading beyond learning to read</li> </ul>
Explicit teaching activities			
<ul style="list-style-type: none"> <li>Explicit syllable and rime awareness instruction</li> <li>Matching spoken word to printed unit reinforced with predictable texts</li> <li>Initial sound sorting</li> <li>Teaching names and sounds</li> </ul>	<ul style="list-style-type: none"> <li>Explicit instruction in blends, sounds, sight words and strategy use</li> <li>Reinforce with decodable text</li> <li>Sounding and blending</li> <li>Segmenting and blending</li> <li>Say it and move it</li> <li>Irregular and regular high frequency words</li> </ul>	<ul style="list-style-type: none"> <li>Explicit instruction in patterns, strategy use, sight words and cross-checking attempts</li> <li>Reinforce with a combination of decodable and levelled text</li> <li>Irregular and regular high words</li> <li>Analogy use</li> <li>Teaching letter patterns</li> <li>Question clusters</li> <li>Direct comprehension instruction</li> </ul>	<ul style="list-style-type: none"> <li>Explicit instruction reinforced with levelled text</li> <li>Question clusters</li> <li>Direct comprehension instruction</li> <li>Story mapping</li> <li>Text structure</li> <li>Summarisation</li> </ul>

Independent extension and home activities			
<ul style="list-style-type: none"> <li>Alphabet ring cards with letters that are already learned and being learned attached.</li> <li>Mum &amp; Dad encouraged to read child's library book to them and find letters in it.</li> </ul>	<ul style="list-style-type: none"> <li>Decodable texts or teacher created sentences to re-read</li> <li>Alphabet &amp; high-freq words on rings to practice for fluency</li> </ul>	<ul style="list-style-type: none"> <li>Texts with taught units within – levelled texts</li> <li>Spelling words with taught units (not tested, just practiced)</li> <li>Whisper reading</li> </ul>	<ul style="list-style-type: none"> <li>Texts with taught units within</li> <li>Spelling words with taught units (not tested, just practiced)</li> <li>Silent reading</li> <li>Asking questions about story and discussing</li> </ul>
Centre/rotation activities			
<ul style="list-style-type: none"> <li>Handwriting using letters</li> <li>Using phonic apps to practice sounds of letters</li> <li>Dictating stories to teacher, peer, or into book apps</li> <li>Reading known picture books and shared reading books – finding known letters</li> </ul>	<ul style="list-style-type: none"> <li>Creating words with letters</li> <li>Sentence construction with h-f words and punctuation cards</li> <li>Handwriting using letters and words</li> <li>Partner reading decodable texts</li> <li>Phonics apps</li> </ul>	<ul style="list-style-type: none"> <li>Games or apps to reinforce larger units</li> <li>Handwriting and spelling using learned units</li> <li>Genre writing using learned units and sight words</li> <li>Partner reading</li> </ul>	<ul style="list-style-type: none"> <li>Games or apps to reinforce larger units</li> <li>Handwriting and spelling using learned units</li> <li>Genre writing using learned units and/or summarise story</li> <li>Partner or silent reading</li> </ul>
Resource types to use			
<ul style="list-style-type: none"> <li>Letters (magnetic, plastic, foam, flash cards)</li> <li>Letter-sound flip-charts (e.g., Smart Kids)</li> <li>Smart Kids phonics 1</li> <li>Yolanda Soryl stage 1 resources</li> <li>Predictable texts</li> <li>Alphabet books</li> <li>Sounds like Fun (Allcock)</li> </ul>	<ul style="list-style-type: none"> <li>Decodable texts (Yolanda Soryl EW readers 1 &amp; 2; Word detective; Letterland; About Words; Jolly Readers; Little Learners)</li> <li>Alphabet cards &amp; resources</li> <li>High-frequency word cards</li> <li>Punctuation cards</li> <li>Smart Phonics 2 kit</li> <li>Yolanda Soryl stages 3-5</li> <li>Sounds like Fun</li> </ul>	<ul style="list-style-type: none"> <li>Levelled texts (yellow +; Word detective)</li> <li>Syllable and morpheme apps or games</li> <li>Smart Phonics 3 kit</li> <li>Yolanda Soryl stages 6-7 (if available)</li> </ul>	<ul style="list-style-type: none"> <li>Levelled texts (Green +; all trade books including Ready to Read)</li> <li>Comprehension activities and resources</li> <li>Syllable and morpheme apps or games</li> </ul>

the PLD sessions, we purchased materials to support the teaching of letter-sound, blends and digraph content knowledge and blending strategies. Also included were decodable readers that enabled the reinforcement and practice of taught letter-sound, blend or digraph patterns. There were also two additional sets of decodable text series supplied. Decodable texts are specifically levelled so that only previously taught letter-sounds, blends, digraphs or high-frequency words were encountered by the beginning reader.

Resources were sent to schools based on the level of children's need at the earlier phases of development where the resources are most necessary. In this way, those schools which had children with less need at the earlier phases were sent fewer resources, and those schools children who had greater need were sent more. The resources sent to schools were combinations of:

- Magnetic-letter sets (consonants, vowels, blends, consonant and vowel digraphs, word families) and small decodable readers that children can keep. These were sourced from *Smart Kids*, based in Auckland;
- A set of decodable texts (controlled phonic-knowledge introduction texts) sourced from *Little Learners Love Literacy*, based in Australia;
- A small set of phonic-knowledge emphasis texts from the *Word-Level Readers* sourced from Gilt-Edge publishers, based in Wellington.

### *Workshop programme*

Although the approach taken within the workshops was changed the focus content did not change. The PLD modules were developed to correspond with the developmental nature of reading, as illustrated in the Cognitive Foundations framework (see Figure 1). The content of the first four modules was specifically linked to the element of the framework (vocabulary and phonological awareness; alphabetic principle; alphabetic coding; linguistic comprehension). The final module drew the content of the previous modules together to show how differentiated instruction can be implemented in the classroom. This module also drew on the participants' experiences in applying

the teaching approaches covered in the previous modules. The timeline and focus content of each workshop is presented below.

1. **March 2016.** Introduction, understanding the research and theory for the project, explicit teaching, initial teacher knowledge building in phonological awareness and phonic concepts (digraphs, vowel patterns, morphemes);
2. **May 2016.** Initial phonic teaching (consonants and simple vowels, blends and digraphs), integrating content and strategy use for reading, explicit vocabulary teaching;
3. **August 2016.** Later phonic teaching (vowel digraphs, syllable types, early morphemes) and integrating the content and strategy use into text reading;
4. **September 2016.** Language comprehension for reading comprehension including syntax, punctuation, early strategy use;
5. **November 2016.** Lesson learned and using the learning for differentiated instruction.

### *Module 1: Introduction and the importance of language*

In this module teachers were introduced to the cognitive development of reading framework, and the associated assessment framework. This first module included an introduction to effective instruction, including the roles of direct explicit instruction and implicit learning at different phases of reading development. The emphasis in this section was on the need for explicit, systematic and structured instruction for children who are most at risk of having difficulties in learning to read, and meeting National Standards expectations at the end of year 1. In contrast, for children who are not at risk, more implicit instruction is just as useful as they don't require explicit instruction in the foundational knowledge required.

A key element of effective instruction is to distinguish between the linguistic content children need to learn for reading and spelling unfamiliar words and the strategies they need to

learn to make use of that content as well as the strategies they need to learn to ensure accuracy and fluency. The linguistic content and how children learn to use that content can be captured, for word recognition, using Ehri's (2014) phases of word recognition and learning. To support instructional decision making within the phases the module also included a session on using a range of assessments for screening, diagnostic purposes and for progress monitoring; an assessment booklet with samples of assessment tools and an explanation of assessment was also provided.

### *Module 2: Understanding letter knowledge and phonological awareness: learning how to read words*

In this module teachers were introduced to the role of vocabulary in decoding and language comprehension, as well as an introduction to the nature of phonological awareness. Vocabulary knowledge at the beginning of school not only appears to have an immediate impact on the development of word recognition skills but also has a strong direct relation to future reading comprehension performance (Senechal, Ouellette, & Rodney, 2006; Tunmer & Chapman, 2012a; Tunmer & Chapman, 2012b). Children with limited understanding of the words of spoken language will encounter difficulty constructing meaning from text. During the early stages of learning to read, oral language factors, such as vocabulary knowledge, do not "show up" as major influences on reading comprehension because the inability to recognize the words in text limits the ability to understand text. However, this does not suggest that instruction in foundation skills should be delayed until children have acquired fast, accurate word recognition skills (Tunmer & Chapman, 2012b).

In the second half of this module the specific developmental processes of letter-sound knowledge and its relationship with phonological awareness were covered, emphasising the way that they interact to contribute to alphabetic coding skills. This content captured the main learning requirements of the first two phases in the ELP Curriculum. A large body of scientific research indicates that comprehending text in an alphabetic orthography depends on the ability to recognize the words in text accurately and quickly; that the development of automaticity in word recognition

in turn depends on the ability to make use of letter-sound relationships in identifying unfamiliar words; and that the ability to discover mappings between spelling patterns and sound patterns in turn depends on the ability to detect phonemic sequences in spoken words (Pressley, 2006). In this module teachers were provided with content knowledge distinguishing between vowels and consonants, how the sounds are similar and how they differ, as well as how children make use of sounding out for learning to read words independently.

### ***Module 3: Developing word knowledge for fluency***

In this module teachers were introduced to different word reading strategies that children need to learn, and how they are used in conjunction with each other. The teachers were given specific instruction in the different long vowel sounds and digraphs, distinguishing between blend sounds and digraphs, and identifying morphemes and different syllable types in words. The content in this module covered the learning required in phases 2 through to 4 in the ELP Curriculum. Once children reach this point of development explicit instruction is seldom needed for further word recognition and decoding; in the ELP Curriculum this aligns with the end of phase 3 and into phase 4. By this point children should be fluent readers who are building vocabulary and reading comprehension by way of deeper understandings of text. They can now competently attempt to identify unfamiliar words of varying complexity without needing instruction in all unfamiliar print words prior to reading a text.

### ***Module 4: Reading comprehension as the goal***

In this module teachers were introduced to direct instruction in comprehension instruction and how this can be introduced in junior classrooms. This module covered explicit reading comprehension strategy instruction and its place in the year 1 classroom and provided teachers with instruction in understanding the text (genre structure and how to teach it). However, as linguistic comprehension is necessary for reading comprehension it also covered sentence construction and explicit instruction in sentences (de Jong & van der Leij, 2002; Ouellette & Beers, 2010; Tunmer &



Chapman, 2012b). Initial comprehension instruction for beginning readers is less directed than word reading and vocabulary building.

### *Module 5: Differentiated instruction as the goal*

In this module teachers were focused on ideas for reconceptualising how to use whole class and small group instruction for the differentiated classroom from the start of the school year. Such changes had been introduced from Module 1 through the use of the templates guiding teachers to rethink their small group and whole class instruction including not only the *how* but also the *what* was taught in it. A large part of this module involved revisiting the previous modules and recapping how the phases work together and what it means for practice. During this module teachers also shared their experiences, provided feedback and completed the teacher knowledge survey.

### *Coaching visits*

In 2015 we anticipated using the online website as the place where we would provide coaching, answer questions and communicate with teachers in the workshop programme. However, we found that engagement with the online forum was minimal with 35 of 45 teachers accessing the site at least once with no access from any teacher from one school. Although there were over 1000 views throughout 2015, there were less than 10 posts that that can reflect levels of interaction. We attempted the online coaching approach at the beginning of 2016 but we observed even less success. To overcome the lack of interaction with the online coaching approach, we sent someone to engage in face to face support. This person visited each of the 2016 workshop teachers on four occasions. This coach was a retired but experienced literacy teacher and teacher educator who had previously held the role of Resource Teacher of Reading, and as such was familiar with children's specific literacy needs.

A small number of schools requested that they not be visited as they felt they were already working well with the project materials or because there were conflicting activities on that meant

they were not able to come to arrangement with the coach over the timing of the visit. The nature of the coaching visits was negotiated prior to the coach visiting the teachers. In some cases, the coaching involved a discussion about what the teachers were doing and what they would like extra guidance on. However, it was noted that the most effective visits for facilitating discussion were those that included the coach observing instruction in the classroom. During such coaching visits the observed teachers' practices were observed and follow up discussions took place covering what they taught, how it aligned with the Early Literacy Project scope and sequence, and requests to try more explicit instruction.

## Participant teacher and school description

Thirty-eight schools from the 2015 cohort continued with the project during 2016; this included all schools from 2015 except for the one school that withdrew after Time 1 in 2015.

Teacher numbers are given below.

### Teacher overview in year 2 of project

- Intervention teachers from 2015 – 40 teachers from 20 schools
- Intervention teachers in 2016 transferred from Comparison teachers in 2015 – 27 teachers from 11 schools
- Intervention teachers in 2016 new to previous Comparison schools – 7 teachers from 5 schools
- Comparison teacher stayed Comparison for 2016 – 1 teacher
- Comparison teacher new to previous Intervention school – 9 teachers from 8 schools

**Total teachers in 2016: 84 from 38 schools**

### Teacher knowledge and practice

The teacher data collected and described below come from the 34 teachers who participated as Intervention teachers in 2016. These 34 teachers were located in 13 schools across the mid-lower North Island. There was a mode of two teachers per school attending the workshop, with a minimum of one teacher and a maximum of seven.

Two forms of data were collected from teachers; knowledge of the basic language constructs, and teacher practices. Teacher knowledge of linguistic elements was assessed twice at the beginning of the first and second workshops. Teacher practice was measured in four ways, 1) through a coded analysis of video observations, 2) a teacher prompt to reading error task, 2)

workshop field notes from workshops 2-5, and 4) coach observations. The video observations were recorded between mid-March and April 2016 and again in October 2016. The teacher prompt task was given at the same times as the teacher knowledge survey.

Technical data from the teacher knowledge and practice measures are presented in Appendix A.

## Teacher knowledge

### *Teacher knowledge survey*

The teacher knowledge survey was based on a measure of teachers' knowledge of basic language constructs validated by Binks-Cantrell, Joshi and Washburn (2012). Basic language constructs considered essential for early reading success include phonological and phonemic awareness, the alphabetic principle (phonics), and morphology (Binks-Cantrell et al., 2012). Based on extensive research during the late 1980s and 1990s (e.g., Adams, 1990; Moats, 1999), the National Reading Panel (2000), in the United States, stressed the importance of teachers having an explicit knowledge of such concepts for the effective teaching of decoding skills in a direct, systematic way to enable the successful acquisition of early reading skills for all beginning readers (Binks-Cantrell et al., 2012).

The original Binks-Cantrell et al. (2012) scale included 46 questions that examined teachers' understanding of basic language constructs in terms of knowledge and skills in relation to phonological and decoding elements. For example, the question "A phoneme refers to..." is defined as a knowledge question in relation to phonemic understanding within the phonological domain.

Skill-based items, for example, required teachers to count the number of phonemes in a word, such as *moon*, as well as count the number of syllables and morphemes in words such as *observer* and *frogs*. Binks-Cantrell et al. (2012) reported that the teacher knowledge measure has a Cronbach's alpha coefficient of 0.90 and good construct validity. In our survey of teacher knowledge, 38 items were assessed in terms of phonemic, phonic, phonological, and morphological skills/knowledge. We analysed responses to items in relation to knowledge and skill ability.

### Change identified

#### Identified Changes Over Time

Twenty surveys with full responses from Workshop 1 and Workshop 5 were analysed. (Not all teachers took the survey, and some failed to answer all questions.) When the questions were analysed in terms of questions that tapped into teacher knowledge (maximum score of 12) and teacher ability (maximum score of 26) there was significant progress for each (see Figure 2; \* represents statistically significant change). For teacher knowledge there was a mean score of 5.15 at Time 1, whereas at Time 2 the mean score increased to 8. This represents progress from less than 50% accurate to 67% accuracy on questions that require explicit understanding of the concepts. There was also a significant increase positive responses to the ability questions; the mean increased from 17.85 to 20.5. These questions required teachers to identify examples of elements (e.g., a phoneme). Although there was a significant change in ability, the level of implicit ability was high at Time 1 before starting, at 68% accuracy in response.

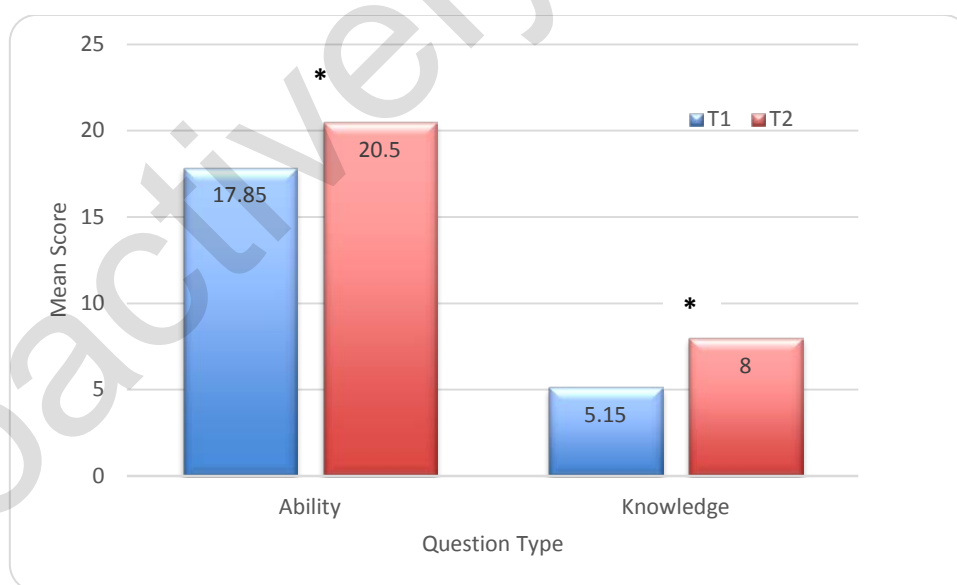


Figure 2: Mean scores for Knowledge and ability questions

Across the combined knowledge and ability questions for the four language constructs significant improvement (see Figure 3; \* represents significant change) was found in all but phonological knowledge which was at ceiling, meaning most teachers had very good phonological knowledge prior to starting the workshop programme. The gains in phonemic knowledge were significant, but it was the change in both phonic and morphological knowledge that is most striking. Just as striking is the low level of knowledge and ability for these language constructs at the start of the workshop programme. The mean score was well below 50% accuracy in the question responses at Time 1.

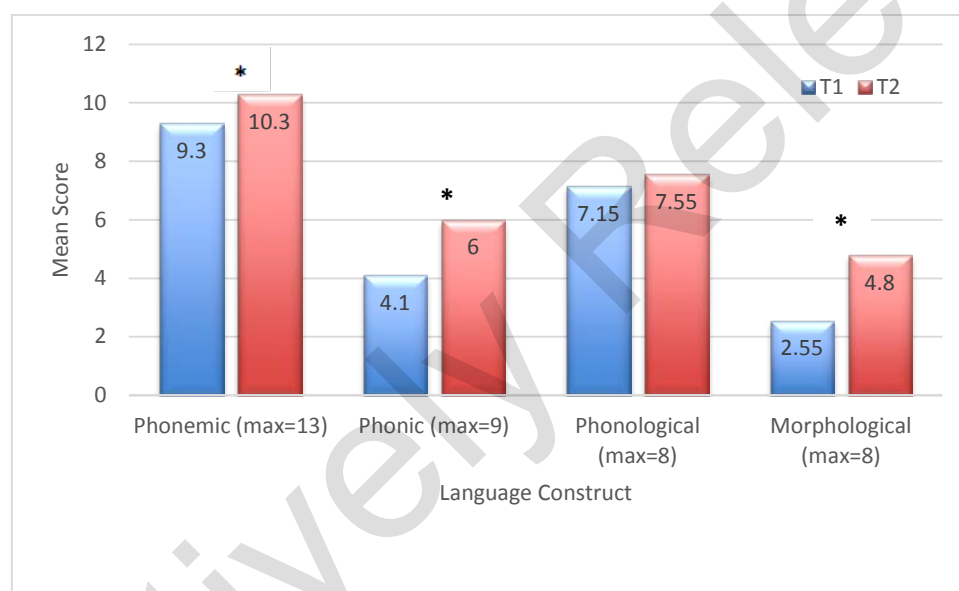


Figure 3: Change in teacher performance of language constructs survey

Overall, teacher knowledge was good in both explicit knowledge and ability for phonological language constructs. This was followed by phonemic knowledge, which had significant growth over the year. Both phonic knowledge and morphological knowledge were the most difficult language constructs for teachers for both knowledge and ability. Many teachers did not know about different spelling patterns or how morphemes affect words. There was significant growth in both of these constructs over the course of the workshops.

## Teacher practice

### *Teacher prompt task*

In the teacher prompt task teachers were asked to respond to examples of a child's miscue in a number of sentences, each of which was taken from Ready to Read books at four different levels. Teachers were asked to provide up to three prompts they would use to assist the child to identify an unfamiliar word based on the error made. While a prompt is not the time for explicit teaching and its success is dependent on what teachers have previously taught, this task provides evidence of what cues teachers direct children to use to correctly read words in connected text. Responses from 22 teachers were analysed.

The prompt task was made up of five examples, across different text levels (magenta to green) common for the first year at school, and with different types of error (See Table 2). The teacher responses were first scored as being productive or non-productive (Greaney, 2001). A prompt was scored as productive when it would lead the child towards successful correction of the error. Productive teacher prompts involved three aspects. These three aspects were:

1. Word cue: The prompt had to guide the child to use information inherent in the word on which they made the error.
2. Timely: The prompt had to be timely not follow unproductive prompts, such as, "what did Dad do?"
3. Teacher support: The prompt had to provide support for the child's level of reading without assuming they knew more than their reading level would suggest (Brown, 2003).

### *Change in prompts responses*

To illustrate how well the teacher prompts met the criteria for a productive prompt the number of teachers, out of 22, who responded in a productive manner is presented in Table 2. The productive overall column represents the total number of teachers who met the criteria for a

productive prompt across any of the three aspects of word cue, timeliness and appropriate teacher support. The teachers' prompt selection was rated as productive overall if all three aspects were used, shown in the final columns of Table 2. The results show that teachers used more productive prompts after the workshop programme. This is illustrated in the change from Time 1 to Time 2 for the Yellow and Green level errors. However, for the same errors teachers tended to only provide word cues as a second or third prompt and not the first, as represented by the low number of teachers meeting the criteria in the timeliness aspect.

**Table 2: Productive prompts given at Time 1 and Time 2**

	Word cue		Timely		Support		Productive overall	
	T1	T2	T1	T2	T1	T2	T1	T2
Q1 Magenta: Omission 1:1 Dad turned -- the hose Dad turned on the hose	16	16	4	13	2	13	2	8
Q2 Red level: Substitution We can get a photo We can take a photo	13	21	3	13	0	11	0	7
Q3 Yellow level: Middle of word We put crooms by the door We put crumbs by the door	3	18	1	7	1	14	1	8
Q4 Blue: Incomplete attempt I will be the I ____ I will be the leader.	14	20	9	17	7	20	6	17
Q5 Green: Overgeneralized past tense He weared the hat everywhere He wore the hat everywhere	8	16	2	4	2	6	2	4

Overall, productive prompt provision improved over the year. However, it is noteworthy that less than half of teachers met all three criteria for a productive prompt. The one exception to this overall finding was for the Blue level error. For this type of error, teachers appeared more likely to use prompts that might direct a child to sound out a word using the phonic patterns in words.



Teachers were less likely to respond in such a manner to correct the error in the Green level sentence. Many of the prompts to this error started with asking the child if it made sense. While this might prompt some children to change their reading of the word, others may not be concerned with the grammatical error or the grapho-phonetic error in which their pronunciation does not match the print on the page. Thus, a word cue prompt would direct a child's attention to the error and how to correct it.

In summary, there were positive changes to the way teachers' prompt children at all levels of text difficulty. The changes in teacher prompts reflect changes to teachers' understanding of how children learn to read. Most importantly, teachers more readily directed learners to using the orthographic print detail appropriate to the learning phase and the error.

#### *Video observations of small group instruction*

During the course of the year all teachers were videoed up to three times during reading instruction time. The videoed sessions range from 10 minutes to 1 hour in length. Only those parts of the recording that captured instruction with a small group of children (often called a guided reading group) were used for coding.

Six elements of small-group instructional practice were coded on a continuum of very implicit to very explicit. These six aspects are the learning focus, use of instructional strategies, how code knowledge is addressed, choice of text, promotion of reading strategies, and materials used. Each element was coded on a scale of 1-4; a mean score was calculated for each teacher. The type of practice promoted for success in early reading, particularly for any children likely to experience difficulty, is teacher-child managed and explicit teaching (Byrne, 2005; Connor, Morrison, & Katch, 2004; Hattie, 2009; Prochnow, Tunmer, & Arrow, 2015). In this case, scores of 1 to 4 generally reflect patterns of practice outlined here:

1. Implicit teaching, based on needs arising from text
2. Mixed implicit and explicit teaching, based on needs arising from text

3. Explicit teaching, planned, based on text selection
4. Explicit teaching, planned, needs based with text to support

### *Changes in video observations of practice*

Video observations are analysed from 19 complete sets of pre-workshop (Time 1) and post-workshop (Time 2) videos. Not all teachers had a complete set of videos for reasons including not consenting to being videoed, not being available due to other school commitments, and issues with video quality. There was a significant shift towards explicit, planned teaching across the year (see Figure 4). At time 1 (pre-workshop) the mean implicit-explicit score was 1.70, ranging from .40 to 2.90. This means that much of the small-group instruction was based on the text as it was read, with any phonic or word-based instruction occurring as the need arose during the reading lesson. This is more challenging for children who are just learning to read as they will often come across unfamiliar words that they need support with throughout their reading of a text. Children are supported to read new words in context, but they are not often able to generalise the reading of those supported words to the same words in different contexts (including across pages of the same book) or to other books or materials.

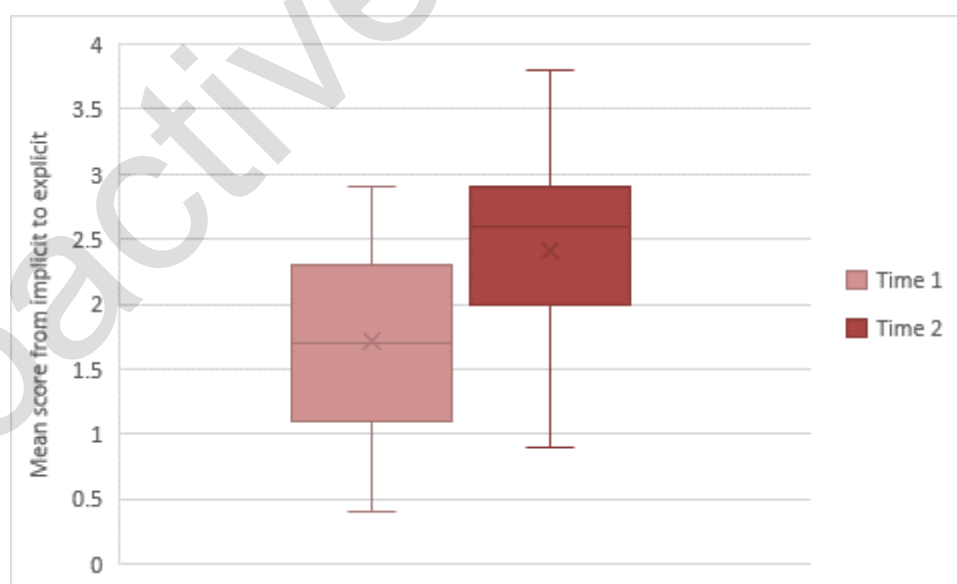


Figure 4: Boxplot showing change and distributions of teaching practice

By Time 2 the mean implicit-explicit score had moved from 1.70 to 2.40, and ranged from .90 to 3.80. This indicates that teaching included explicit teaching of phonic patterns or sight words, often at the beginning of the reading lesson. This explicit teaching is based on what the teacher has decided will be challenging in the selected text. The text will normally be selected as it is at the group reading level, not because it enables practice of specific sight words or phonic patterns that the group of children may need to learn. At this mean score there would be some initial explicit teaching to support the reading of the text, but that much of this explicit teaching is the teaching of words in the text rather than generalizable phonic content and strategy, such as blending. Some of the explicit teaching at the beginning may also be revision of what the teacher expects the children to have already mastered, but not explicit instruction in any material specifically.

There were three teachers whose scores (of 1.00 and 1.20) did not change over the course of the year. Their teaching remained implicit and any explicit teaching of words or phonic patterns was done during the reading of the book rather than taught as strategies beforehand. In observing these videos, it becomes clear that the children are struggling to decode a large number of words in the text. The number of different word patterns and decoding strategies that then were taught in the middle of this reading interrupted any flow of reading and made reading difficult for the children.

### *Coach observations*

The coach presented a review document with feedback on what had been observed in classrooms and from the discussions he had with teachers. This document is used as supporting qualitative evidence for change in teacher practice from an objective perspective. A number of key points that relate to the context of classroom practice were identified by the coach. These points are listed below.

- In all classrooms literacy took 2 or more hours of class time, and always in the morning.

- All schools and classrooms used a commercial phonological awareness or phonics programme.
- Most schools use commercially produced alphabet/blend/digraph cards to encourage familiarity with letters, blends and digraphs; these cards were frequently used during writing and spelling time, but infrequently at reading time.
- School-level assessment of foundational skills (letter-knowledge, phonological awareness) was *ad hoc* and often only as part of a commercial phonics programme (often Yolanda Soryl's phonics programme or Jolly Phonics).
- It was noted that teachers tended to assume that children had learnt content or strategies by being taught them, or exposed to them, but were not assessed to follow-up if they had as there was little evidence of this.
- Children's reading is often stalled because of challenges they face in identifying sounds for the spelling patterns they come across in unfamiliar words. This observation illustrates that the book series that teachers are using are not systematic in their introduction to new phonic patterns and words. Teachers must spend large amounts of their time supporting children to read unknown words as well as those they had provided explicit instruction for beforehand.
- Despite material and practice covered in the PLD sessions, teachers were still observed giving primarily context-based cues when children had difficulty (e.g., look at the picture, prompt the meaning, or give the word) instead of providing opportunities to practice or reinforce phonic content and strategies.
- Follow-up reading activities were mixed, and while they often reinforced small group instruction it often had elements (colouring or cutting) that used more cognitive effort and time than the reading aspect of the activity itself.

### *Teacher anecdotes about the ability to change practice*

The teacher workshops provided for feedback on the implementation of project materials.

The first hour of each workshop allowed for reflection and feedback. Written notes were compiled capturing what teachers said about changes in their practice and the challenges or supports to changing elements of practice. The feedback anecdotes from the workshops are used as supporting qualitative evidence of teachers' experiences and their changes in teaching practice.

The teachers' feedback in 2016 reflected three main themes: (1) explicit instruction; (2) the scope-and-sequence, developmental approach to planning and providing instruction; and, (3) the nature of resources to support this approach to teaching.

1. **Explicit Instruction.** Many teachers have mentioned that they are now much more explicit about what they are teaching than they have been previously.

"... have definitely moved to telling and defining ... instead of asking" (Teacher, Wgtn Module 4)

"...specifically teaching instead of assuming [knowledge]" (Teacher, Hawera Module 4)

This explicit teaching of small aspects of the reading process, such as letter-sounds, blends, how to blend sounds, led several teachers to notice that the children were more successful, and felt more successful when they were focused on a small element of the knowledge of the learning to read process at a time. It meant that the children recognised what they were learning and were able to talk about what they were learning explicitly.

"Children get more excited as they learn the 'bits'" (Teacher, Wgtn Module 2)

"they get excited by what I consider the small things and easy" (Teacher, PN Module 5)

Teachers also commented that they felt that they were noticing when children did not have all the knowledge that they needed and so the teachers were beginning to feel comfortable stepping 'back' to provide explicit instruction in the content or strategies children were having difficulty with.

"found a child [I] thought read at yellow but couldn't so taking back [to teach earlier skills]"

2. **Scope and sequence to guide what explicit instruction to give.** Many teachers found the scope-and-sequence curriculum and other resources we provided helpful.

"we use the curriculum [ELP scope and sequence] all the time ... it is well worn"  
(Teacher, Wgtn Module 4)

One result of teachers' introduction to the scope and sequence curriculum led to teachers rethinking what they teach to children in a New Entrants class. They also began to talk about children's progress in terms of what they could do instead of what book levels they were at.

"...stuff I didn't expect to teach 5 year olds." (Teacher, Hawera Module 5)

"It's how they approach reading instead of getting through the levels" (Teacher Hawera, Module 5)

One of the resources we included was a lesson plan that guided teachers to make choices based on the scope and sequence. The plan also showed how to provide explicit instruction in steps that follow the gradual release of responsibility for learning from the teacher to the learner (Fisher, Frey & Lapp, 2011).

"a lot more systematic, structured, explicit" (Teacher, Hawera Module 2)

“... break instruction right down to the base level into small steps ... instead of assuming [that the children have the ability to use skills]” (Teacher, Hawera Module 3)

Making changes with a new approach to teaching reading was not without its challenges. Many teachers noted the difficulty in finding the time required for planning and sourcing materials that reinforced what they planned to teach. Some also expressed concern about children who still didn't make progress, and what they could do about it.

3. **Resources for teaching.** The provision of resources to support the explicit, structured and systematic approach to teaching knowledge was valued by most teachers.

“...quite different planning as now basing around sounds rather than book and children have no difficulties with it” (Teacher, Hawera Module 3)

“...thinking more about choosing the text” (Teacher, PN Module 2)

“... been using foam letters more before the book ... feels they make the connection better” (Teacher, Hawera Module 4)

However, not all teachers appreciated the resources. Some of the teachers did not consider the set of decodable texts (Pocket Rockets, Smart Kids) we provided to teachers to be useful. The main concern was that there was little meaning to be obtained from that particular format of decodable text. Although this is true, the purpose of such texts is to practice decoding skills rather than make meaning; such texts can be followed up by texts that have a stronger story line.

## Summary

The feedback given during the workshops grouped around three big ideas 1) explicit instruction, 2) having a developmental scope-and-sequence, and 3) having resources that supports teaching. Most teachers reported that they had become more explicit in their teaching. For most this meant that they had a clear understanding of what they were teaching during their reading time. This was a shift for some who had primarily taught “a book” instead of any specific skill or strategy. The introduction of a developmental scope-and-sequence appears to have facilitated the choice of what was taught by providing a framework to the phonic content that is necessary to become a reader. The phonic content that teachers now taught included letter sounds, blends, digraphs and trigraphs, syllables and morphemes.

Suitable resource choices to enact the teaching decisions were a frequent topic of discussion. The project provided resources, including decodable readers, to support teachers in selecting texts that supported the teaching of phonic content. The teachers who used the resources found them to be helpful. Other teachers are finding it more difficult due to the perception that they are working in “two paradigms like when you have a good reader who is a poor decoder” (Teacher, PN Module 3) or when school leadership dictates that children must be assessed on a particular ready to read text and thus teachers “... spend a week reading a Ready to Read with children so they can be assessed on it with a running record” instead of focusing on the skills required for reading it. In addition, some teachers felt that their practice was already sufficiently phonics based and that adding more explicit word-level teaching strategies was not necessary as the implicit approach they used was working well for the children they taught.

## Discussion of changes in teacher practice

There was a consistent pattern of change in both teacher knowledge and teacher practice. Over the course of the workshop programme teachers improved their knowledge and ability to complete tasks that map onto the phonic, phonemic and morphological language constructs. We



also found that teachers generally have very good phonological and phonemic knowledge. This level of knowledge was not entirely expected, based on previous research on teacher knowledge in this area (Brady et al., 2009; Carreker et al., 2007; Washburn et al., 2015). However, all schools used a phonics programme, mostly to assist with the development of phonological awareness. Accordingly, it might not be surprising that teachers' knowledge was relatively high.

Phonic knowledge and morphological knowledge were, initially, weak compared to phonological and phonemic knowledge. Low levels of phonic knowledge indicate poor understanding of how words are constructed. As teachers did not understand how words are constructed they are unable to support children to make use of phonic knowledge to read unfamiliar words. This was reflected in the teacher prompt activity in which, at Time 1, teachers tended to use meaning based prompts when children made decoding errors, instead of directing children's attention to how to correct their decoding attempt. This approach changed at Time 2, but word level prompts were continued to take place following contextual or picture prompts. In some ways this finding mirrors those of McNeill and Kirk (2014). They reported that New Zealand teachers knew they needed to use word-level instruction for spelling instruction, but did not know how to or did not feel confident in their knowledge to do so. The change over the course of the workshop programme can be attributed, in part, to the workshops themselves but also by the provision of the curriculum scope and sequence that guided teachers to what word-level content (letter-sounds, blends, digraphs, long-vowel patterns, morphemes and syllables) to teach and when to teach it.

The overall pattern of teacher change is led by a change to more explicit instruction. This varies across teachers and schools. In some cases, it means that the teacher is following a systematic sequence of instruction and providing explicit instruction about an element of content or strategy prior to guided practice in isolation and guided practice within a piece of text. To support this explicit instruction, they seek out reading materials that provide multiple examples of that phonic element for children to practice using this new knowledge for reading. For others, this means explicitly pre-

teaching a letter sound or pattern or strategy prior to reading a text selection that includes it. This occurs because the teacher has chosen the text because it is the level that they have identified the child to be. The difficulty in approaching explicit instruction in this way is that the selected levelled book may have multiple phonic patterns that need teaching. As time constraints and child concentration don't allow teachers to teach all patterns the children end up relying on the teacher to help them with all other words they don't know how to read. A decodable text can reduce this difficulty as it only contains phonic patterns that a child would normally have already been introduced to.

It was also noted that even when teachers became more explicit in their teaching prior to children reading a piece of text the explicit teaching more often took the form of revision of words in the text or of phonic units (letter-sounds, blends, digraphs). When explicit teaching is taking the form of revision it can lead assumptions by teachers that children have learned what is being 'revised' even when they have not. Such a situation also leads to the teacher noticing that the child hasn't learned what they thought was taught, and deciding that explicit teaching of 'bits' doesn't work, and so goes back to the implicit teaching that they previously engaged in.

### Key findings on teacher knowledge and practice

- Teachers implicit and explicit knowledge was already high in phonological knowledge, most likely due to previous experiences with commercial phonics programmes;
- The workshop programme led to growth in teacher knowledge in phonic and morphological knowledge;
- Teacher reference to word-level cues to support children's reading errors grew in number following the workshop programme;

- Teachers became more aware of the phonic components of words to be taught to become fluent readers;
- Teachers generally engaged in increased explicit instruction of the phonic components prior to reading texts;
- Reading resources that adequately support the teaching of the phonic components were a challenge over the course of the workshop programme;
- The provision of an explicit scope and sequence curriculum document supported teachers to make decisions about what phonic components to teach.

## Section 2: Child change

### Design of child cohorts

During 2016 the new cohorts of new entrant children participated in Time 1 (February), Time 2 (June) and Time 3 (November) data collection rounds, using the same assessment measures that the 2015 cohorts of children participated in. There are three cohorts of children starting in 2016, illustrated in Table 3. Our initial cohorts of children (now nearly seven years old) participated in Time 4 (February), Time 5 (June) and Time 6 (November) data collection rounds. Table 3 presents the labels we use in the following results section to name the cohorts.

**Table 3: Updated research design for cohorts of children**

		2015	2016	2017
<b>Intervention</b>				
2015	Cohort 1			
Intervention	1 <sup>st</sup> Group Intervention Teachers	X	X	X
	1 <sup>st</sup> Group Intervention Children			
Intervention +	Cohort 2			
	1 <sup>st</sup> Group Intervention Teachers		X	X
	2 <sup>nd</sup> Group Intervention Children			
2016	Cohort 3			
Intervention	1 <sup>st</sup> Group Comparison Teachers		X	X
	3 <sup>rd</sup> Group Intervention Children			
<b>Comparison</b>				
2015	Cohort 1			
Comparison	1 <sup>st</sup> Group Comparison Teachers	X	X	X
	1 <sup>st</sup> Group Comparison Children			
2016	Cohort 2			
Comparison	2 <sup>nd</sup> Group Comparison Teachers		X	X
	2 <sup>nd</sup> Group Comparison Children			

<sup>1</sup> "X" denotes years in which children's assessments are done.

## Participants and schools in each of the cohorts

The current sample size for the 2015 Intervention Cohort is 173 children and the sample size for the 2015 Comparison Cohort is 127 children. The 2016 Intervention cohort began with 135 children in February 2016. The Intervention+ cohort began with 116 children. The smaller 2015 Comparison cohort 2, which is expected to have no different experiences in instruction to the 2016 Comparison is comprised of 59 children. This makes a total of 289 children currently in the project as a child in a classroom of a teacher receiving the intervention workshop material for the first time and the 135 children who are in the classrooms of teachers who received the workshop in 2015. The total number of children in any analysis varies due to child movement across and within schools. In some cases, children missed one assessment period or a number of measures within a time of assessment.

### *Overview of children in the project*

- Intervention children from intervention in 2015 – 173
- Intervention children new to project in 2016 – 135
- Intervention + cohort children new to project in 2016 – 116
- Comparison cohort children from 2015 – 127
- Comparison cohort of children new to project in 2016 – 59
- **Total children: 610**

## Tests and measures used

The tests and measures used, and reported on, for Times 1 and 3, and Time 6 are described below. Reading book levels were also requested from schools but we had insufficient numbers of reported book levels prior to completing this report.

### Time 1

*Letter names:* This is a composite of both upper case and lower case letter name knowledge.

*Letter sounds:* This is also a composite of both upper case and lower case letter sound knowledge.

*Reading and spelling:* The reading measure is assessed using the Clay Observation Survey Word List C. Spelling is measured using a researcher designed test of 18 short words. It is anticipated that most children will not be able to read or spell any of these words correctly at school entry.

*Phonological awareness:* We use the Comprehensive Test of Phonological Processing to assess phonological awareness. Three subtests are used are matching, blending and deletion (elision) which measure syllable, onset-rime and phoneme awareness.

- In the matching task children have to identify a word, out of three that starts, or ends, with the same sound as another provided word. This task has pictures to reduce memory load. An average score of 6.5 illustrates that children are able to match words that start with the same sound, but not match words based on final sounds.
- In the blending task children have to blend together given sounds and produce the target word. The sounds start off as syllables to blend, then onset-rimes to blend, then phonemes. The average score of 6.3 indicates that children are generally able to blend syllables but not yet blending onsets and rimes.

- In the deletion, or elision, task children have to delete a sound from a given word. The first items require children to delete a syllable from a 2-syllable word, the following items require the deletion of the first phoneme from a word, and the remaining items ask children to delete phonemes from various positions in words. The mean score of 4.23 indicates that children are generally able to delete a syllable from a multi-syllable word, but not delete phonemes.

*Receptive vocabulary:* We have used the British Picture Vocabulary Scale to assess average levels of receptive vocabulary across the sample. The mean score is slightly lower than anticipated, at the standardised score of 98. However, this is within normal levels of vocabulary knowledge. As with all measures, some of the variability can be illustrated by decile levels, with the children in the low decile band schools having an average standardised score of 93, mid-range decile school children having an average standardised score of 100 and high decile school children having an average standardised score of 102. It is important to reiterate that these scores all sit within the normal range.

### Time 3

*Phonological awareness:* As described for Time 1.

*Alphabetic coding knowledge:* To measure alphabetic coding we used four tasks that measured phonic knowledge.

- The first was a test of 20 common consonant blends provided in lower case for children to provide the blended sound for.
- The second was a test of the 5 most common digraphs (ph, sh, ch, wh, th) which required children to provide the accurate sound for.
- The next measure assesses how well children apply phonic knowledge in their spelling attempts for the same spelling test used in Time 1. The words in this test are 18 real words

that of the form of CVC (consonant-vowel-consonant) but may include a long vowel spelling or an initial or final consonant blend or digraph. In this scoring method for the 18 spelling words each word is given a score from 0-4. A score of 0 represents no attempt to spell the word or no match between what was written and the sound representation of the word, for example spelling 'gdv' for CAKE. A score of 1 is given if one salient sound is accurately represented, a score of 2 is given if two sounds are accurately recorded and a score of 3 represents an accurate phonological representation but not conventional spelling. A score of 4 is given for accurate, conventional spellings. The maximum spelling score is 32.

- The pseudoword phoneme score comes from a pseudoword spelling test in which children are asked to read 30 made-up words of increasing complexity. The complexity comes from the word construction, from CVC words (jit) through to words containing consonant blends and both vowel and consonant digraphs (fleach). To assess alphabetic coding this was scored so that each accurate attempt to decode a spelling pattern (consonant, short vowel, long vowel, digraph) was scored. From the 30 words a possible phoneme correct score is 101.

*Language processing:* Language processing measures how well a child can hold units of sound, or words in their working memory, as well as how the interaction between working memory and vocabulary works. Nonword repetition assesses the former and the mispronunciation task assesses the latter. These are not outcome tasks but can tell us a little about the influences on the outcomes.

- The nonword repetition task comes from the CTOPP test battery used for the phonological awareness assessments. In this task children are played a recording of a nonword and asked to repeat it. This continues until they are incorrect in their repeated pronunciation three times in a row. The maximum score is 34.
- In the mispronunciation task children are played a recording of an incorrectly pronounced word and asked what word the person in the recording meant to say. There are 40 items in this task of equal difficulty.



*Reading and Spelling:* Three outcome measures are used for Time 3. Two tasks ask children to read or spell words and another, the pseudoword test measures how well children are able to use the content and strategies for decoding that were a key element of the workshop with teachers. Reading book level should also be included but we had difficulty in getting book levels for the sample in its entirety.

- The Burt word reading test is used as a standardised measure of children's word reading out of context. It tends to be a good representation of the sight word reading knowledge of children rather than how well they can attempt to read unfamiliar words accurately.
- The pseudoword reading test is used as a reading measure, but this time the scoring used in total word accuracy in which any word read correctly is scored as 1 and any incorrect words scored as 0. This provides a measure of how well children bring together both phonic knowledge and the strategy of sounding and blending unfamiliar words. This scoring system requires the blending of sounds in one fluently provided word rather than the correct sounding out without blending.
- The spelling score is taken from the spelling test described in the alphabetic coding section, but this score represents accurate conventional spelling; all correct words are scored as 1 and incorrect as 0.

## Time 6

*Foundations of literacy:* By time 6 the foundations of literacy that may still have some variability, or in which children may not yet be at ceiling in the test are the Elision subtest of the CTOPP test and the pseudoword reading phoneme score. Both are already described.

*Word Recognition:* At the end of year 2, word reading and spelling is measured with four tasks.

- The Burt word test as a measure of single word reading without context

- Connected text reading accuracy is measured with the Neale Analysis of Reading (NARA, McKay & Barnard, 1999). In this measure children read passages of increasing length and difficulty until they make more than 16 errors per passage. The raw score is used in these analyses, using the raw score calculation from the NARA which begins with a score of 16 per passage and errors per passage are deducted until the 16 errors in one passage threshold is reached. The maximum score over 6 passages is 100.
- The pseudoword reading words correct score is again used to measure decoding (implicit and explicit) without context or prior knowledge of a sight word to influence it.
- Spelling accuracy is measured the Wide Range Achievement Test (WRAT-4) spelling test. This test has words of increasing difficulty with a maximum of 45 words. Children are given the words alone and in a sentence and asked to spell it until they get 10 consecutive words incorrect in a row. The raw score of words correct is used in these analyses.

*Language comprehension:* These assessments are used to measure language comprehension, which along with word recognition has been found to predict reading comprehension.

- Listening comprehension is measured using alternative passages from the NARA which have been recorded as sound files using a native New Zealand speaker. Children are asked to listen to the passage and answer between 4-8 comprehension questions per passage. The test is stopped when the child gives 6 or more incorrect responses to the questions. The raw score of correct responses is used in this measure with a maximum score of 44.
- The mispronunciation task described for the Time 3 measures was again used.

*Reading comprehension and fluency:* Reading comprehension is the main outcome measure for the children at Time 6. Reading fluency is included as it was measured alongside reading comprehension and can influence comprehension if a child reads too fast or too slow.

- The reading comprehension measure is the number of questions correctly answered after reading the NARA passages used for connected text reading accuracy. The passages had between 4 and 8 questions per passage that children were asked to answer. Any plausibly correct response to the question was acceptable. The maximum reading comprehension score was 44.
- Reading fluency was measured as the number of words read per minute when reading each NARA passage that had 16 or less accuracy errors within it. Across the 6 passages there were a total of 505 words that could be read.

## Results

In this section we present the 2016 end of year 2 results for Cohort 1 children. We then look at the school entry data for the 2016 cohorts, followed by results for the Cohort 2 children for the end of their first year of school.

### Control and Intervention comparisons at end of second year of school

In this section we present Year 2 project results from the analyses of data for each of the two cohorts in the study. Cohort 1 children commenced school at the beginning of February, 2015, and were in their second year of schooling in 2016. Cohort 2 children started school at the beginning of February, 2016. These results should be interpreted in light of our report on results for the first year of the project, in which we presented data that showed no obvious impact of the teacher PLD intervention on children's reading and reading-related scores (see Chapman, Arrow, Tunmer & Braid, 2016).

#### *Cohort 1 Sample Description at the end of Year 2*

At the start of the project in 2015, Cohort 1 comprised 359 children. Attrition reduced the sample to 304 children at the end of Year 1. One Comparison school withdrew from the project during the year, which had a marked impact on the attrition rate. Further, not all children had complete data. Incomplete data resulted from child absences on some assessment occasions, and difficulty in obtaining key background information from schools (e.g., ethnic background, reading book levels).

At the end of Year 2, 264 Cohort 1 children remained in the project: 156 (59%) were in the Intervention group and 108 (41%) were in the Comparison group. Regarding gender, the Intervention group had 58% males and 42% females, whereas the Comparison group was more evenly matched with 51% males and 49% females.

Regarding ethnic background, data were still unavailable for 20 children in Cohort 1. Based on the data supplied from schools, the following percentages were in each group:

- Intervention: Pākehā = 63%; Māori = 24%; Pasifika = 9%; Other = 5%
- Comparison: Pākehā = 62%; Māori = 27%; Pasifika = 4%; Other = 7%

In terms of decile rankings of schools in which the children were enrolled, the data were as follows.

- Intervention: low decile = 23%; middle decile = 58%; high decile = 19%
- Comparison: low decile = 31%; middle decile = 44%; high decile = 25%

As was the case at the end of the first year of the project, not all children had complete assessment data. Despite repeated efforts, we have been unable to obtain all reading book level data for all children in the project. Other cases of incomplete assessment data are due mainly to children being absent when research assistants visited schools to conduct assessments.

### *Research questions*

In keeping with the main aims of this research project, three key questions were addressed by the end of Year 2 data for Cohort 1:

1. Did the Intervention group outperform the Comparison group?
2. Did low decile children in the Intervention group outperform low decile children in the Comparison group?
3. Did Māori children in the Intervention group outperform Māori children in the Comparison group? (There were too few children from other ethnic backgrounds to consider in the data analyses, and the focus on Māori children is consistent with one of the primary research goals.)

### *Results*

Our primary analysis design for treating these data was a series of Group by Decile (2 X 3) multivariate analyses of variance. There were significant main effects for Group for all analyses, with the Comparison children continuing to outperform the Intervention children. Our view that the

Intervention child might catch up and start to outperform the Comparison children was not supported.

Our contention, presented in our report for Year 1 of the project (Chapman et al., 2016), that there were significant implementation issues that warranted changes to aspects of the PLD workshops appears to have been supported by these results.

We conducted additional analyses in terms of those Cohort 1 Intervention children who had a project teacher during their entire Year 1 of schooling. We were aware that during the course of the year a number of children in the Intervention group experienced a change in teacher who was not associated with the project. We were also aware, as presented in our report for the first year of the project (Chapman et al., 2016), that children who had a change to a non-project teacher obtained significantly lower scores on end of year 1 literacy outcome variables than those Intervention children who continued to have a project teacher throughout the year.

This change in teacher grouping resulted in the Comparison children still tending to obtain higher scores than the Intervention children. However, the magnitude of these differences was considerably reduced when children with non-project teachers were excluded from the analyses. Importantly, univariate results for the Burt word test, reading accuracy, reading comprehension, reading rate were no longer statistically significant at the .05 level between the Comparison and Intervention children.

Nonetheless, our hypothesis that during Year 2, the Cohort 1 Intervention children would start to show improvements in reading outcome and process results relative to the Comparison children was not supported. This finding is disappointing and not consistent with earlier research. Given these results, we see little purpose in presenting detailed technical findings in the Appendix. The data are available, of course, if required. We discuss this result later in the report.

## Comparison and Intervention groups starting in 2016

### *Cohort description*

The Cohort 2 children (n= 311) commenced school in February 2016 and comprised three groups:

1. A new Intervention group of children with teachers who had been in Comparison schools during 2015 and who chose to participate in the PLD workshops during 2016 (n = 113).
2. A second Intervention group (Intervention<sup>+</sup>) of children whose teachers were involved with Cohort 1 Intervention children and who had participated in the 2015 PLD (n = 137).
3. A Comparison group of children in schools that chose not to participate in the 2016 PLD workshops but which were agreeable to the collection of child data (n = 61).

### *Skills and knowledge children are starting school with*

The purpose of this summary is to establish whether or not the three Cohort 2 groups (2016 Intervention, 2016 Intervention +, 2016 Comparison) entered school with similar levels of foundational knowledge related to literacy learning. We analysed school entry assessments by means of a series of multivariate analyses of variance. The multivariate “clusters” of variables were as follows:

- Letter identification: Letter names & letter sounds, upper & lower case
- Phonological awareness: elision, matching, blending
- Reading & spelling: Clay word test, spelling

We also examined British Picture Vocabulary Scale (BPVS) standardized scores using a univariate analysis of variance.

An examination of school entry assessment mean scores revealed that the three groups (Intervention, Intervention<sup>+</sup>, Comparison) were functionally equivalent on school entry. Although the Comparison group had slightly higher scores than the Intervention group on a number of variables, none was statistically significant. On the other hand, the Intervention group obtained a slightly

higher score for the BPVS than the Comparison or Intervention<sup>+</sup> groups, but the *post hoc* individual comparisons of means revealed that these differences were not statistically significant.

There were no Group by School Decile interaction effects. Although children in lower decile schools tended to obtain lower scores than those in higher decile schools, the differences were similar across all three groups. The technical data from the MANOVAs for school entry are presented in Appendix B.

### *Cohort 2 Sample End of Year 1 Characteristics*

At the end of their first year in school, the Cohort 2 sample characteristics were as follows.

The total sample dropped slightly from 311 to 298, which is a 4% attrition rate and substantially lower than the attrition rate that occurred for Cohort 1.

School decile band characteristics for each sample in this cohort were as follows:

- Intervention = 109: low decile = 36%; middle decile = 35%; high decile = 29%
- Intervention<sup>+</sup> = 132: low decile = 25%; middle decile = 67%; high decile = 8%
- Comparison = 60: low decile = 25%; middle decile = 35%; high decile = 40%

For ethnic background, only Pākehā and Māori children are included; the percentages are presented in terms of the total of children in those two groups combined for each of the three project groupings.

- Intervention = 109 (males = 57%, females = 43%; Pākehā = 77%; Māori = 23%)
- Intervention<sup>+</sup> = 132 (males = 45%, females = 55%; Pākehā = 72%; Māori = 28%)
- Comparison = 60 (males = 63%, females = 37%; Pākehā = 71%; Māori = 29%)

Not all children had complete assessment or background data.

### *Research questions*

In keeping with the main aims of this research project, three key questions were addressed by the end of Year 2 data for Cohort 1:



1. Did the Intervention group outperform the Comparison group?
2. Did low decile children in the Intervention group outperform low decile children in the Comparison group?
3. Did Māori children in the Intervention group outperform Māori children in the Comparison group? (There were too few children in from other ethnic backgrounds to consider in the data analyses, and the focus on Māori children is consistent with one of the primary research goals.)

## Results

We ran a series of 3 X 3 multivariate analyses of variance for each cluster of variables to determine whether or not the Intervention groups outperformed the Comparison group. Factors in these analyses were Group (Intervention, Intervention<sup>+</sup>, Comparison) by Decile band (Low, Middle, High). The clusters of variables are indicated in the section on the assessment tasks.

### Results: Decile Band

#### 1. *Phonological awareness.*

There were significant multivariate main effects for Group and Decile ranking, and a significant Group by Decile ranking interaction effect. These effects were due mainly to the Intervention group obtaining significantly higher scores than the Comparison group on each of these three assessments. The Intervention<sup>+</sup> group outperformed the Comparison group only on the blending variable. Further, the low decile Intervention group significantly outperformed the low decile Comparison group on each of the three phonological awareness variables.

#### 2. *Alphabetic coding.*

The multivariate main effects for Group and Decile ranking, and the Group by Decile ranking interaction effect were all highly statistically significant. Univariate individual comparisons of means revealed that on each of the four alphabetic variables, the Intervention group significantly

outperformed both the Comparison group as well as the Intervention<sup>+</sup> group. These effects were due largely to the significantly superior performance of the low decile Intervention children compared to their counterparts in both the Comparison and Intervention<sup>+</sup> groups. As a key indicator of how well children making use of their phonic knowledge to attempt new words, the pseudoword phoneme results are illustrated in Figure 5

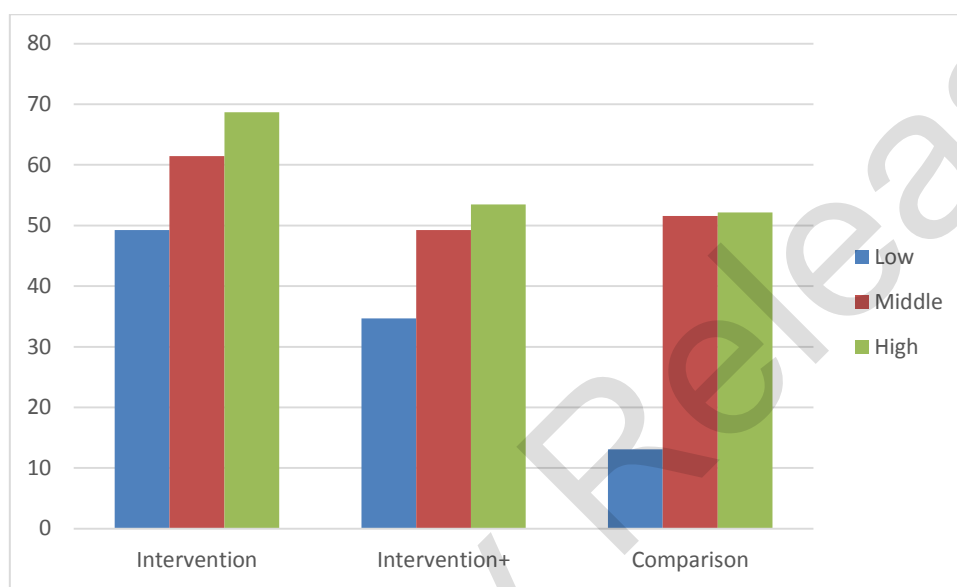


Figure 5 Pseudoword phoneme score results by group and decile level

### 3. *Language processing.*

As with the other clusters of variables, the multivariate analysis resulted in significant main effects for Group and Decile ranking, as well as a significant Group by Decile ranking interaction effect. The key result in these analyses was that the Intervention children significantly outperformed both the Comparison and Intervention<sup>+</sup> children on the mispronunciation task. Intervention children in all three decile bands obtained higher scores on this variable than their decile band counterparts in the Comparison and Intervention<sup>+</sup> groups: the low decile Intervention children were especially stronger than the low decile Comparison children.

#### 4. Reading & Spelling outcomes.

The Intervention group obtained significantly higher scores than the Comparison group on all three variables in this outcomes cluster for reading and spelling, and higher scores than the Intervention<sup>+</sup> group for Spelling and Pseudoword reading. The Group by Decile ranking interaction effect showed that the low decile Intervention children had considerably higher reading and spelling outcome scores than the low decile Comparison children.

Because of the importance of the reading and spelling outcome assessments, the results are illustrated in Figure 6, Figure 7 and Figure 8.

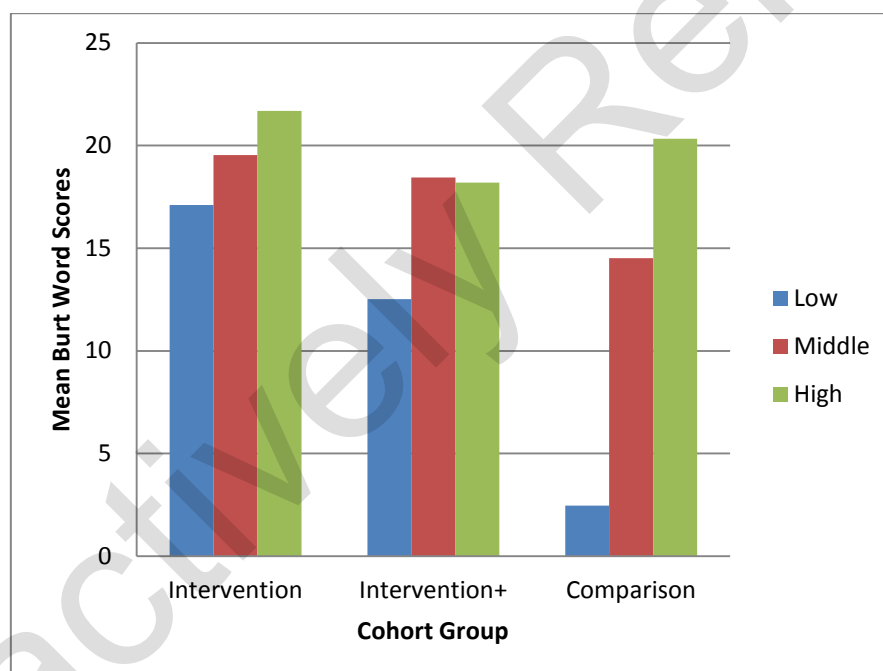


Figure 6: Burt word test results by Group and School Decile Band

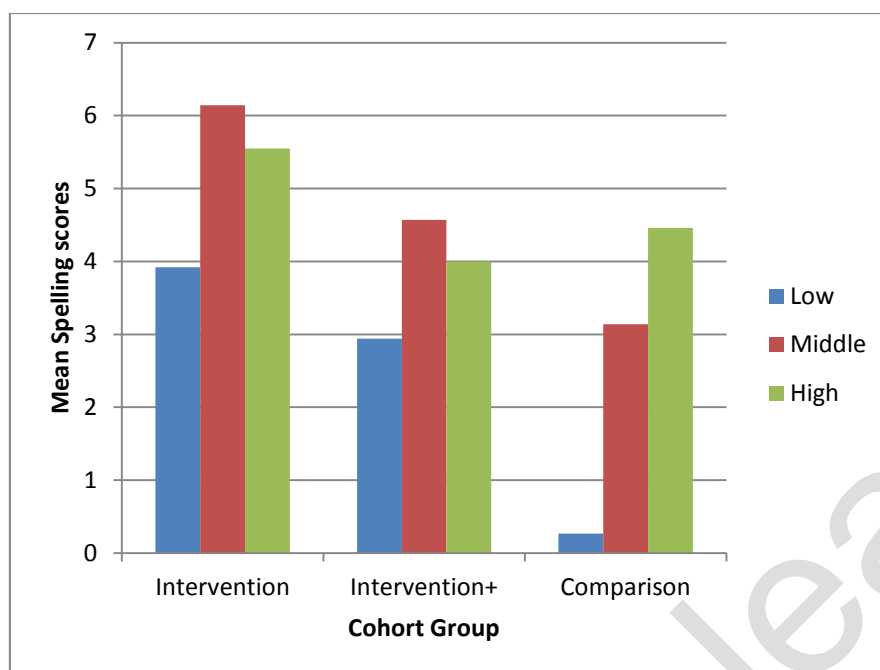


Figure 7: Spelling results by Group and School Decile Band

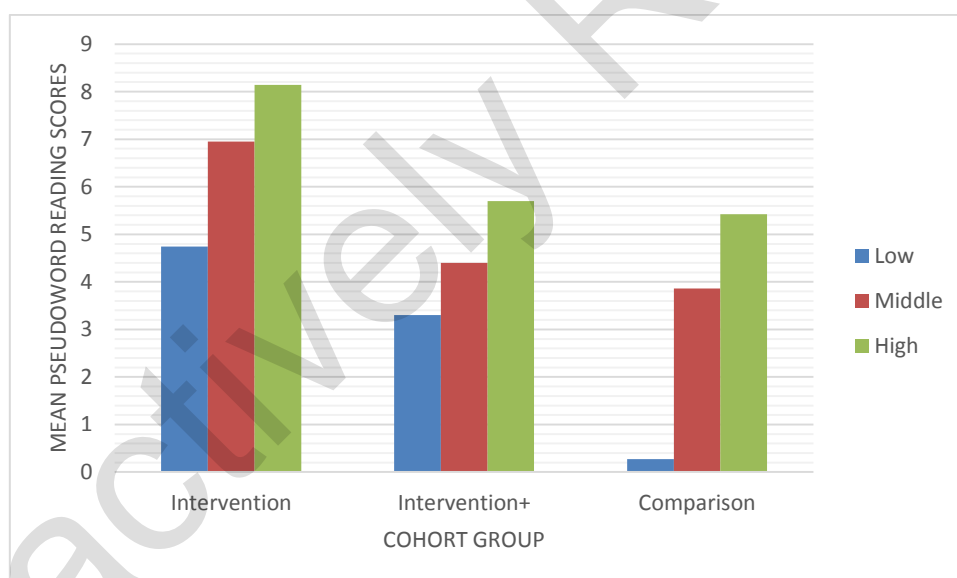


Figure 8: Pseudoword reading results by Group and Decile Band

These results indicate that the Cohort 2 Intervention group outperformed the Comparison group and generally performed better than the Intervention+ children. Technical statistical results and tables are presented in Appendix B.

### Results: Māori & Pākehā Ethnicity

To assess the impact of the Year 2 PLD programme on Māori children, we performed multivariate analyses of variance on the same clusters of variables reported above for Decile band. Because we have already reported results comparing the three groups, our focus in these analyses is on the performance of Māori children in the Intervention groups in contrast to those in the Comparison group.

#### 1. *Phonological awareness.*

Although Māori children in the Intervention group obtained higher scores than Māori in the Comparison group on all three phonological awareness variables, the differences did not reach levels of statistical significance.

#### 2. *Alphabetic coding.*

Similarly, Māori children in the Intervention group obtained considerably higher scores on each of the alphabetic coding variables, but the differences were not statistically significant. The pseudoword phoneme score, representing attempts to read unknown words is illustrated in Figure 9. This measure is an important indicator of how well any unknown words are attempted, not just pseudowords.

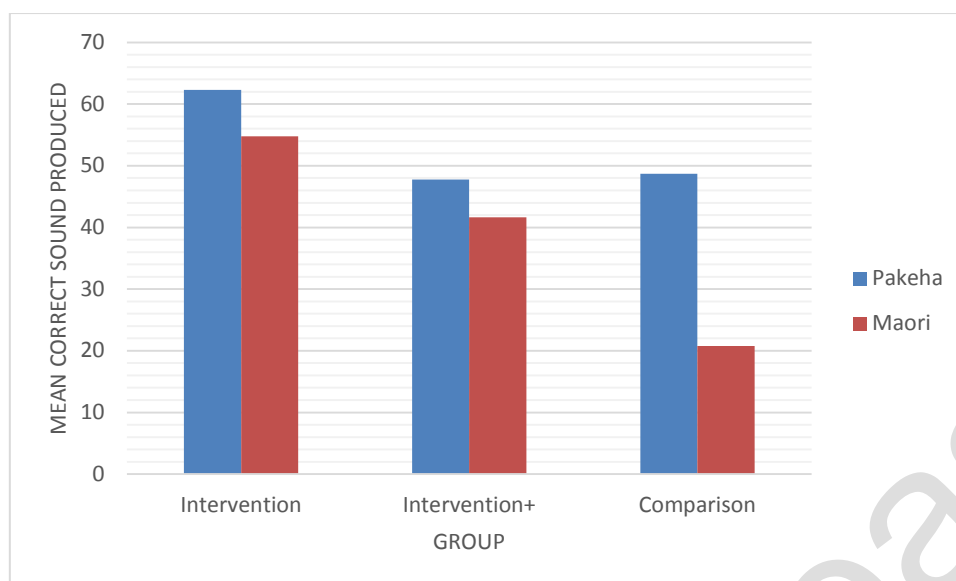


Figure 9: Attempts to read unknown words

### 3. *Language processing.*

There was one interesting effect from the analyses of language processing variables. For some inexplicable reason, the Intervention<sup>+</sup> Māori children obtained higher scores for the mispronunciation task than Māori children in the Comparison group. Beyond that result, there was no clear result in favour of Māori Intervention children on the two variables.

### 4. *Reading & Spelling outcomes.*

The results for reading and spelling outcome assessments were similar to those for the other clusters of variables. Māori children in the Intervention obtained higher scores than Māori children in the Comparison group, but the differences failed to reach levels of statistical significance.

Results for the outcome measures in terms of Ethnicity are illustrated in Figure 10, Figure 11 and Figure 12.

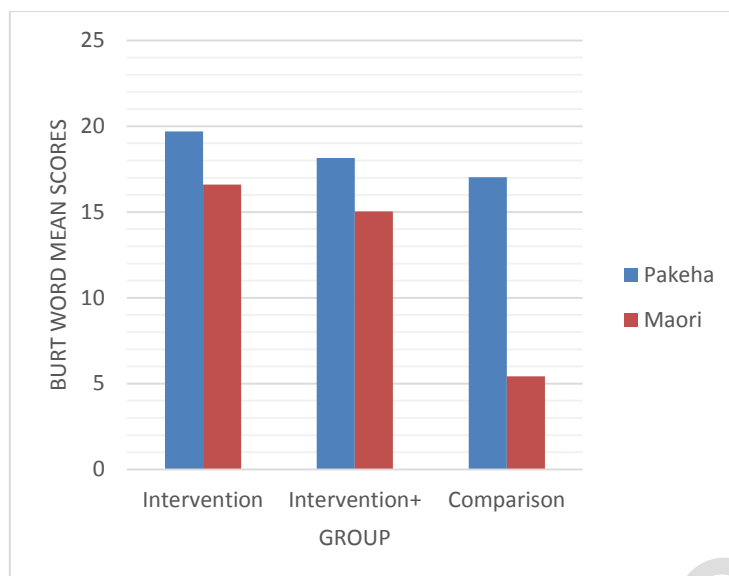


Figure 10: Burt word test results for Group by Ethnicity

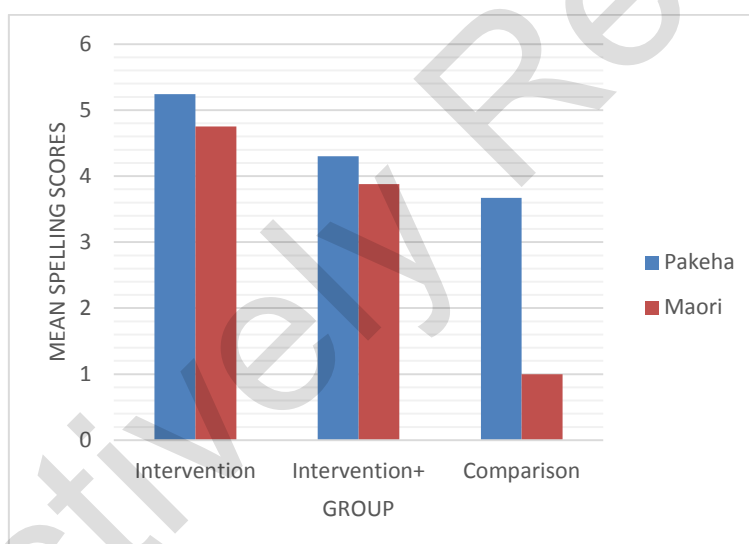


Figure 11: Spelling results for Group by Ethnicity

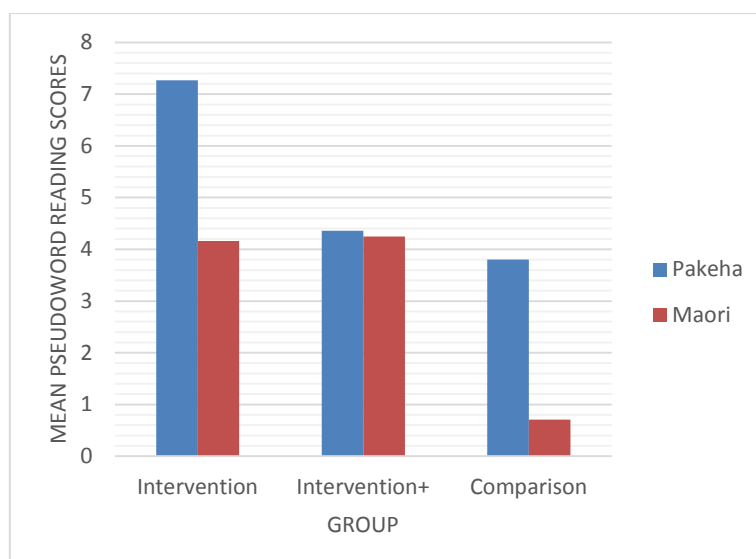


Figure 12: Pseudoword reading results for Group by Ethnicity

Overall, although Māori children in the Intervention groups performed considerably better than Māori children in the Comparison group, the differences did not reach levels of statistical significance. The relatively small sample size of Māori Comparison children ( $n = 14$ ) is likely to have been a major factor in the lack of statistically significant results for Māori Intervention children in the end of year 1 data for the second Cohort of children.

### Key findings on children's progress

- No advantage has been found for the children in the 1<sup>st</sup> Intervention cohort from 2015, compared to the 2015 Comparison group;
- By the end of year 1 the 2016 Intervention group was significantly better than the Comparison group on the foundational phonological awareness measures; the Intervention + group was significantly better than the Comparison group on blending, which is the key phonological awareness skill for sounding and blending unknown words;



- By the end of year 1 the 2016 Intervention group was significantly better than the Comparison group and the Intervention + group on the skills required for attempting to read unfamiliar words;
- Children in the 2016 Intervention group were significantly better on all reading and spelling outcome measures;
- Children in low-decile Intervention schools are achieving at or above the same level as children in mid and high decile Comparison schools;
- Māori children in Intervention and Intervention + schools are achieving at or above the same level as Pākehā children in Comparison schools;
- Children in the Intervention + group are achieving better than the Comparison group in low-decile schools only.

## Teacher-child interactions

In this section we describe three school settings from the project which illustrate three levels of teacher practice, change, and had different effects on child outcomes. This section takes the form of case-studies of three schools. Within each the nature of change in practice, and teacher knowledge is discussed in the context of how the children in their classes are achieving relative to the achievement of children from the same classrooms in the previous year. In each school there were at least three teachers who were part of the workshop programme and attending workshops. They had a range of years of experience both as teachers and as teachers of new entrant children. One school was teaching in a flexible learning environment and the other two were generally single cell but with a great deal of communication occurring between teachers at all times across the school day. All three schools are described using pseudonyms.

### *Kowhai School*

The teachers in this school taught classes across the junior levels but all attended workshops and had children who were a part of the project. The school was in a lower decile band and although were single cell classrooms at least two classrooms worked together during reading and writing time. The teachers at Kowhai were committed to trying new ways to support the diverse needs of their learners and were supported by the principal. The participating teachers included the team leader, who took on more elements of the curriculum scope and sequence than the other two teachers as a pilot test for practice. The teachers made use of commercial phonics programmes, primarily Letterland, and one teacher used aspects of the Yolanda Soryl phonics programme in their literacy teaching.

The linguistic knowledge of teachers at Kowhai did not change a great deal over the course of the year, although they were already at ceiling on the phonological knowledge task at the start of

the year. Kowhai School was already assessing phonological awareness of children at school entry but it was unclear how they used this information. All teachers noted that phonics teaching was integrated it was also taught in a stand-alone session. A range of text series were used by teachers, and they began using some of the decodable texts provided by the project. The main texts used were PM texts and the Sails range, with Ready to Read texts used only once children were confident at any given level. The *Little Learners Love Literacy* books were increasingly used during the year.

At Kowhai School the teachers reported that they tried to implement some changes to their programmes, specifically in the level of explicitness in their instruction, but also in what they focused on during reading time. The explicit teaching of vowels, blends, digraphs, the strategy of sounding out, and the strategy of ‘flipping vowels’ were all noted as being changes to their practice. This focus at a word level for reading was illustrated in the increase in the attempts to read pseudowords for the 2016 children compared to the 2015 children. The teachers tended to add the suggested approaches from the workshops to their existing practices. This meant that they continued with existing guided reading as well as adding explicit word-level instruction. The explicit focus lesson template was used by teachers with varying degrees of success. For example, one teacher with lower levels of teacher knowledge reported that she tried to implement explicit instruction but decided it didn’t work and went back to implicit teaching practices. The mix of attempts to change practice and moving back to guided reading is reflected in the finding that the 2016 cohort children did not transfer their phonic knowledge to word reading. The 2016 children did not end the year with higher word reading scores than the 2015 children from Kowhai School.

Key variables	2015 <i>n</i> =12	2016 <i>n</i> =16
Pseudoword phonemes	21.42	50.00 *
Burt word reading	13.5	14.75
Spelling	3.58	3.94

Note: Independent-samples t-tests were used to look for significant differences

### *Rimu School*

The teachers at Rimu school taught across the lower two years of school in a flexible learning environment. The school was a low decile school with a diverse cross-section of children. The teachers in this school were committed to finding new ways to support their learners. They used a commercial phonics programme that is taught separate to the small group reading instruction. The teachers in this school included the team leader who supported teachers to reflect on, and change their practices, as did the principal. The principal-level support included a generous book budget for instructional reading.

The teachers began using the curriculum scope and sequence to guide their grouping and planning discussion. This included using a range of assessments including phonological awareness and phonics (adapted from Yolanda Soryl's programme), alphabet and sight words. Teachers used these assessments to identify the children's needs and taught to those needs explicitly. Although the school provided a generous book budget the teachers found that the texts they needed for the children most at need were simple decodable texts but that these were difficult to find. The reading books provided by this project, *Little Learners Love Literacy*, were used frequently. In addition, at least one teacher would construct her own texts that encompassed the desired phonic content. This was supplemented by carefully selected PM texts and a small number of other texts the school had purchased.

The linguistic knowledge of teachers at Rimu increased slightly over the year, ending with slightly higher levels of knowledge than those at Kowhai and Rata. This may explain why Rimu School was better able to begin using the curriculum scope and sequence from the start of the programme; the teachers had sufficient knowledge to begin using it immediately. These teachers were enthusiastic about the curriculum scope and sequence, and commented in each workshop how they used it as the basis for all teaching. This change in approach and the effect on children is demonstrated in the changes in outcomes for children at Rimu School in 2016 compared to the

children in 2015. There were significant increases in all areas of literacy knowledge for children who had been exposed to the literacy programme. As one teacher noted regarding the use of the lesson plan templates and explicit instruction: “More detailed planning but simpler to teach. The structure is good. Good for children as structure helps with learning. Not worrying about what do I need to learn.”

Key variables	2015 <i>n</i> =13	2016 <i>n</i> =6	
Pseudoword phoneme score	23.54	80.83	*
Burt word reading	16.77	31.67	*
Spelling	3.77	6.83	

Note: Independent-samples t-tests were used to look for significant differences

### *Rata School*

The teachers in this high-decile school taught classes across the junior levels but all attended workshops and had children who were a part of the project. The teachers from this school had a strong emphasis on reading for meaning and the use of meaning and context cues for reading. There was no specific phonics programme used by the school but they did use one of Joy Allcock’s spelling programmes to guide letter-sound selection for the ‘Sound of the day.’ The ‘Sound of the day’ was integrated into reading and writing along with a specific part of the day set aside to talk about the sound of the day. The main texts used by the teachers in the school were Ready to Read texts but PM texts were used for struggling readers. Sails texts were also often cited by teachers at Rata. The teachers at Rata School were happy with the way that they taught reading but were interested in improving the spelling of their children.

The teachers at Rata School made more growth in their knowledge of linguistic units than those at Kowhai and Rimu, but also started with lower levels of knowledge than the teachers at Rimu School. They became more explicit in their teaching overall but continued using analytic phonic approaches. They did use explicit teaching for phonic patterns as they appeared in texts, but did not

make text choices based on the phonic pattern or sound of the day. This approach meant that many children used ineffective word identification strategies. As a result, ongoing support was required for identifying unfamiliar words. Two of the teachers at Rata did not become more explicit in their instructional practices and remained implicit in their teaching of reading through texts.

The continued use of the implicit instructional approach to supporting children in identifying unfamiliar words in text is reflected in the lack of change in child scores in pseudoword sound scores between 2015 and 2016. The lack of a systematic approach to choosing texts to support instruction in sounds and an emphasis on meaning cues meant that the children were likely to be left confused about how to attempt reading and spelling when mention of phonic elements was added. At Rata School this confusion is reflected in the lower word reading scores for the 2016 cohort of children compared to the 2015 cohort of children.

Key variables	2015 <i>n</i> =16	2016 <i>n</i> =20
Pseudoword phonemes	67.88	68.6
Burt word reading	28.94	23.55
Spelling	7.25	5.55

Note: Independent-samples t-tests were conducted with no significant differences

## Summary

The finding at Rata was similar to that at Kowhai but also mirrors the overall findings of this project in 2015. In that case the 2015 Intervention teachers were unsure how to integrate phonic teaching into their practice and the lack of improved outcomes for those children. The case-studies described here provide an insight into how teachers went about integrating the scope-and-sequence and the approaches recommended by the workshop programme. The different case-studies reflect schools that were supported to make changes for the benefit of their school community (Rimu), schools that wanted to make changes but were unsure how to integrate them into their existing practices (Kowhai) and schools that were not enthusiastic about including phonic instruction into their reading programmes.

The ways that these different schools made use of the scope-and-sequence and the associated approaches and strategies are reflected in the outcomes for the children compared to the children from the previous year cohort. Teachers who changed their approaches in line with the materials presented in the PLD workshops had children who improved their literacy learning outcome. Those teachers who were unable or unwilling to make changes have children who did not show improvements in their literacy learning.

## Summary and conclusions

This report addressed four research questions:

1. Will increased literacy gains continue through to the end of Year 2 for those children in the Intervention classrooms compared to those in the Comparison classrooms?
2. Will teacher knowledge of supplementary word-level decoding teaching strategies and teacher confidence in teaching beginning readers increase among those teachers who receive the professional development programme?
3. Will Year One children in the Intervention classrooms show increased literacy gains at the end of their first year in school compared with children in the Comparison classrooms?
4. Will the literacy Intervention lead to greater gains for children from low decile schools and for Māori and Pasifika children compared to children from higher decile schools and those from Pākehā backgrounds, and to children in similar schools and backgrounds in the Comparison schools?

We previously reported (Chapman et al., 2016) that the original Intervention Cohort from 2015 did not show the anticipated increased literacy knowledge gains over a Comparison group. Although we anticipated that some gains may start to occur during Year 2, this was not the case. As a result of the Year 1 findings, we made some changes to the workshop programme that better enabled teachers to provide word-level decoding strategies. Specifically, and following feedback from teachers at the end of Year 1, we provided a scope-and-sequence curriculum that provided a framework for providing systematic and explicit instruction. Providing the scope-and-sequence curriculum replaced our earlier approach of asking teachers to co-construct their own scope and sequence to enact in the classroom. Extra focus on explicit instruction on the word-level phonic knowledge and strategies was also provided. This report provides the results of that extra focus for a



new cohort of teachers attending the workshop programme, and the children from their classes. We use findings from the 2016 cohort of teachers to address the second research question in this report.

In this report we have presented results that show that the changes to teacher practice as a result of the workshop programme are associated with higher levels of phonic knowledge, phonological awareness, strategies required for decoding, and both the reading and spelling of real words. This effect was significant for low-decile children in the classrooms of teachers participating in the 2016 teacher workshop programme. The remainder of this section will address research questions 3 and 4. We discuss changes in teacher knowledge and practice, followed by consideration of the effect of these changes for children in terms of their alphabetic coding skills and their performance on reading and spelling assessments.

### Changes in teacher knowledge and practice

At the start of the project there were a number of patterns emerging from the data we collected on teacher knowledge and practice. All schools used at least one phonics programme. Schools that implemented aspects of Yolanda Soryl's Phonics and Early Words programmes would normally have teachers who have attended one workshop on phonics. This particular programme emphasises teaching phonics outside of small-group instructional reading ([https://www.yolandasoryl.com/html/Phonics\\_faq\\_general.htm](https://www.yolandasoryl.com/html/Phonics_faq_general.htm)), as a contrast to implicit, embedded phonics whereby phonic elements are taught as teachers think the needs arise. Perhaps as result of all schools having at least one commercial phonics programme, and many having taken Yolanda Soryl's one-day course, teacher knowledge on the *phonological* language construct was high.

In contrast to phonological knowledge, teacher *phonic* and *morphological* knowledge was low. Teachers tended to be unable to explain what a morpheme was, identify a morpheme, or explain spelling patterns. Over the course of the workshop programme this knowledge improved, and with it, the likelihood that the same teachers could and would provide word-level prompts with

phonic explanations for reading errors. The provision of the scope-and-sequence curriculum document gave teachers a framework for understanding the developmental progression of these forms of knowledge and for making decisions about children's needs. For example, teachers noted that they were beginning to notice when children did not know vowel patterns, and noted that they needed to take them 'back' to learning them.

The ability of teachers to follow a systematic sequence of instruction in these word-level elements was hampered by way they had previously been teaching reading. Focusing on reading as meaning-making instead of decoding for meaning-making compromised teachers' ability to make *a priori* decisions about explicit instruction of phonic or word-level content. Most teachers were used to selecting a book to use in the reading lesson and providing some phonic instruction as it arose in the text as well as supporting children to use meaning-based cues. Some teachers provided explicit instruction to children prior to their reading a text while others did so during the reading.

We asked teachers to choose the phonic content they planned to teach, based on the scope-and-sequence. We asked that they then teach this explicitly and follow this explicit instruction by reading a book that contained that phonic content. Decodable texts are the best text choice to follow explicit instruction of phonic content as they will only include phonic content that has already been taught, if following a scope-and-sequence. In reality, the existing book series available to teachers made the implementation of a scope-and-sequence with explicit instruction difficult. Nonetheless, by the end of the year many teachers started to use the decodable texts provided from the project and some aspects of the scope and sequence. In contrast, the previous workshop programme teachers were not provided with a specific framework to base decision making processes on (they were given the content but not in a summary document like the scope-and-sequence curriculum), or with resources to enact it. Their changes in practice were dependent on how well they were resourced with teaching materials such as decodable texts.

Not all teachers agreed with the purpose or content of the workshops. In some cases, this lack of agreement may have been due to teachers' experiences in higher-decile schools. In other cases, it may have arisen from teaching experiences with older children who often do not need instruction in transitioning from non-readers to beginning readers to fluent early readers over the course of a single school year. The focus of the workshop programme was primarily on that transition. We emphasised the transition from non-readers to beginning readers, with much less attention to supporting children who were already fluent early readers.

In terms of the scope-and-sequence curriculum, the workshop programme focused children's learning needs as outlined in the early phases of reading development. Although research clearly indicates that all readers benefit from explicit instruction in word-level cues, children who start school with more advanced foundational knowledge (such letter name and sound knowledge and phonological awareness) can learn with less explicit instruction (Connor et al., 2004).

### **The effect on children's outcomes**

Although there was some variability, in general we found significant changes in teacher knowledge and practice. Our main research question for this project was whether changes in teacher knowledge and practice change would influence children's reading outcomes. This was not the case for the first cohort of children in 2015. Children in the 2016 Intervention teacher classrooms, however, showed significantly greater achievement gains compared to their Comparison counterparts. In particular, there were marked, positive effects for children in low-decile schools.

The 2016 Intervention group read significantly more words on the Burt word reading test than the Comparison group. This effect was primarily due to the substantially greater number of words that low-decile Intervention group children could read compared to the low-decile Comparison group children. There were less obvious differences in the higher decile comparisons for the Burt word reading test. This may be because the children from the mid and high decile schools began school with higher levels of foundational literacy knowledge and skills. When children begin

school with high levels of knowledge they are less reliant on the teacher to support them in learning as they already have high levels of essential reading-related knowledge that they bring to learning to read (Arrow & Tunmer, 2012; Byrne, 2005).

Importantly, the low-decile Intervention children were catching up to their mid to high decile peers in this measure of sight words. Additionally, their achievement on the pseudoword reading test indicates that they have strategies available to them to read unknown words. Although the workshop programme did not explicitly cover teaching spelling the children in the Intervention group, across all decile levels had significantly greater spelling ability. They were better able to both represent the appropriate sounds in their spelling attempts and to spell words using conventional spelling patterns. This finding supports our initial contention that children who start school with lower levels of the foundation skills required for learning to read require explicit instruction, practice and feedback on the use of alphabetic, or phonic, coding. In this project the low-decile group began school with lower levels of knowledge. After receiving explicit instruction, they were significantly better than similar children in low-decile Comparison schools.

The children in the Intervention group performed significantly better on the outcome measures than the Comparison group children. Underpinning these outcomes were the significantly better skills on the foundation skills of phonological awareness and alphabetic coding. These are the skills required to independently identify unfamiliar words in print, as illustrated in the Cognitive Foundations of Learning to Read model (Figure 1). The pseudoword phoneme assessment indicates how well children can recognise letter pattern – sound correspondences in words. The phonological awareness measure of blending provides information on how well children can perform blending. The two elements are necessary for sounding out and blending. The mispronunciation task provides evidence that children in the Intervention group are better able to hold those phonological patterns in memory and to use them to provide plausible sounding words in relation to decoding errors. This ability, called *set for variability* (Tunmer & Chapman, 2012a), allows children to use their oral

vocabulary knowledge to fix word decoding errors. All the skills and forms of knowledge combine to enable children to begin reading efficiently and to focus on the ultimate goal of making meaning from text.

## Conclusion

Providing children with instruction that emphasises word-level knowledge for reading unknown words in text has led to significantly higher outcomes in reading and spelling. This effect is particularly strong for children attending low-decile schools. The provision of such instruction is enhanced when teachers have a specific scope and sequence curriculum or developmental framework that enables them to identify the developmental progression of phonic knowledge required for reading. However, providing timely and systematic explicit instruction is hampered by the lack of appropriate text resources that help to facilitate such teaching.

The workshop programme was designed to support teachers to move children from being non-readers to beginning readers. The programme was designed to have less focus on moving children to being early fluent readers. For many children attending mid to high decile level schools this process can take six months or less, and they progress regardless of the nature of the instruction they receive (Connor et al., 2004). For children in low-decile schools this process can take much longer, unless they receive instruction that explicitly draws their attention to word-level information. The second cohort of Intervention children has shown that children in low-decile schools can progress from being non-readers to beginning readers at the same pace as children from mid to high decile level schools, if they receive explicit phonic-orientated instruction in their first year of school.

## References

- Arrow, A. W., & Tunmer, W. E. (2012). Contemporary reading acquisition theory: The conceptual basis for differentiated reading instruction. In S. Suggate & E. Reese (Eds.), *Contemporary debates in childhood and education* (pp. 241-249). London: Routledge.
- Biancarosa, G., Bryk, A. S., & Dexter, E. R. (2010). Assessing the value-added effects of literacy collaborative professional development on student learning. *Elementary School Journal*, 111(1), 7-34.
- Brady, S., Gillis, M., Smith, T., Lavalette, M., Liss-Bronstein, L., Lowe, E., . . . Wilder, T. D. (2009). First grade teachers' knowledge of phonological awareness and code concepts: Examining gains from an intensive form of professional development and corresponding teacher attitudes. *Reading and Writing*, 22(4), 425-455. doi: 10.1007/s11145-009-9166-x
- Byrne, B. (2005). Theories of learning to read. In M. J. Snowling & C. Hulme (Eds.), *The Science of Reading: A Handbook* (pp. 104-119). Malden, MA: Blackwell.
- Carreker, S. H., Neuhaus, G. F., Swank, P. R., Johnson, P., Monfils, M. J., & Montemayor, M. L. (2007). Teachers With Linguistically Informed Knowledge of Reading Subskills are Associated with a Matthew Effect in Reading Comprehension for Monolingual and Bilingual Students. *Reading Psychology*, 28(2), 187-212. doi: 10.1080/02702710601186456
- Carroll, J. (2006). Phonological awareness: Investigating the phonological awareness of NZ primary schools' educators. *Set: Research Information for Teachers*(3), 44-49.
- Carroll, J., Gillon, G., & McNeill, B. (2012). Explicit phonological knowledge of educational professionals. *Asia Pacific Journal of Speech, Language and Hearing*, 15(4), 232-244.
- Chappuis, S., Chappuis, J., & Stiggins, R. (2009). Supporting Teacher Learning Teams. *Educational Leadership*, 66(5), 56-60.
- Connor, C. M., Morrison, F. J., & Katch, L. E. (2004). Beyond the Reading Wars: Exploring the Effect of Child-Instruction Interactions on Growth in Early Reading. *Scientific Studies of Reading*, 8(4), 305-336.
- Darling-Hammond, L., Chung Wei, R., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. Stanford University: National Staff Development Council.
- Darling-Hammond, L., & Richardson, N. (2009). Teacher Learning: What Matters? *Educational Leadership*, 66(5), 46-53.
- de Jong, P. F., & van der Leij, A. (2002). Effects of Phonological Abilities and Linguistic Comprehension on the Development of Reading. *Scientific Studies of Reading*, 6(1), 51-77.
- Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of Professional Development on Teachers' Instruction: Results from a Three-year Longitudinal Study. *Educational Evaluation and Policy Analysis*, 24(2), 81-112. doi: 10.3102/01623737024002081
- Ehri, L. C. (2014). Orthographic Mapping in the Acquisition of Sight Word Reading, Spelling Memory, and Vocabulary Learning. *Scientific Studies of Reading*, 18(1), 5-21. doi: 10.1080/10888438.2013.819356
- Fielding-Barnsley, R. (2010). Australian pre-service teachers' knowledge of phonemic awareness and phonics in the process of learning to read. *Australian Journal of Learning Difficulties*, 15(1), 99-110. doi: 10.1080/19404150903524606
- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What Makes Professional Development Effective? Results From a National Sample of Teachers. *American Educational Research Journal*, 38(4), 915-945. doi: 10.3102/00028312038004915
- Gersten, R., Compton, D. L., Connor, C. M., Dimino, J., Santoro, L., Linan-Thompson, S., & Tilly, W. D. (2008). *Assisting students struggling with reading: Response to Intervention and Multi-Tier Intervention in the Primary Grades* (No. NCEE 2009-4045). Washington, DC: National Center

- for Educational Evaluation and Regional Assistance, Institute of Education Sciences, U.S Department of Education. Retrieved from <http://ies.ed.gov/ncee>
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education*, 7, 6-10.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.
- Hempenstall, K., & Buckingham, J. (2016). *Read about it: Scientific evidence for effective teaching of reading*. Australia: Centre for Independent Studies.
- Joshi, R. M., Binks, E., Hougen, M., Dahlgren, M. E., Ocker-Dean, E., & Smith, D. L. (2009). Why elementary teachers might be inadequately prepared to teach reading. *Journal of Learning Disabilities*, 42(5), 392-402.
- Klingner, J. K., Vaughn, S., Hughes, M. T., & Arguelles, M. E. (1999). Sustaining Research-Based Practices in Reading A 3-Year Follow-up. *Remedial & Special Education*, 20(5), 263.
- McKay, M. F., & Barnard, J. (1999). *Neale Analysis of Reading Ability* (3rd ed.). Melbourne, Australia: ACER.
- McNeill, B., & Kirk, C. (2014). Theoretical beliefs and instructional practices used for teaching spelling in elementary classrooms. *Reading and Writing*, 27(3), 535-554. doi: 10.1007/s11145-013-9457-0
- Neuman, S. B., & Wright, T. S. (2010). Promoting language and literacy development for early childhood educators. *Elementary School Journal*, 111(1), 63-86.
- Nicholson, T. (1991). Do children read words better in context or in lists? A classic study revisited. *Journal of Educational Psychology*, 83(4), 444-450.
- Nicholson, T. (1993a). The case against context. In G. B. Thompson, W. E. Tunmer & T. Nicholson (Eds.), *Reading acquisition processes* (pp. 91-104). Clevedon, England: Multilingual Matters.
- Nicholson, T. (1993b). Reading without context. In G. B. Thompson, W. E. Tunmer & T. Nicholson (Eds.), *Reading acquisition processes* (pp. 105-122). Clevedon, England: Multilingual Matters.
- Ouellette, G., & Beers, A. (2010). A not-so-simple view of reading: How oral vocabulary and visual-word recognition complicate the story? *Reading and Writing*, 23(2), 189-208.
- Pianta, R. C., Mashburn, A. J., Downer, J. T., Hamre, B. K., & Justice, L. (2008). Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly*, 23(4), 431-451. doi: <http://dx.doi.org/10.1016/j.ecresq.2008.02.001>
- Piasta, S. B., Connor, C. M., Fishman, B. J., & Morrison, F. J. (2009). Teachers' Knowledge of Literacy Concepts, Classroom Practices, and Student Reading Growth. *Scientific Studies of Reading*, 13(3), 224 - 248.
- Pressley, M. (2006). *Reading instruction that works: The case for balanced literacy instruction* (3rd ed.). New York: Guilford Press.
- Prochnow, J. E., Tunmer, W. E., & Arrow, A. W. (2015). Literate Cultural Capital and Matthew Effects in Reading Achievement. In W. E. Tunmer & J. W. Chapman (Eds.), *Excellence and Equity in Literacy Education: The Case of New Zealand* (pp. 145-167). London: Palgrave Macmillan UK.
- Senechal, M., Ouellette, G., & Rodney, D. (2006). The misunderstood giant: On the predictive role of early vocabulary to future reading. In D. K. Dickinson & S. B. Neuman (Eds.), *Handbook of Early Literacy Research* (Vol. 2, pp. 173-182). New York: Guilford Press.
- Snow, C., Griffen, P., & Burns, M. S. (Eds.). (2005). *Knowledge to support the teaching of reading*. San Francisco, CA: John Wiley & Sons.
- Spear-Swerling, L., & Zibulsky, J. (2014). Making time for literacy: teacher knowledge and time allocation in instructional planning. *Reading and Writing*, 27, 1353-1378. doi: 10.1007/s11145-013-9491-y
- Stahl, K. A. D., Keane, A. E., & Simic, O. (2013). Translating Policy to Practice: Initiating RTI in Urban Schools. *Urban Education*, 48(3), 350-379. doi: 10.1177/0042085912451755

- Tunmer, W. E., & Chapman, J. W. (2012a). Does set for variability mediate the influence of vocabulary knowledge on the development of word recognition skills? *Scientific Studies of Reading*, 16(2), 122-140.
- Tunmer, W. E., & Chapman, J. W. (2012b). The Simple View of Reading Redux: Vocabulary Knowledge and the Independent Components Hypothesis. *Journal of Learning Disabilities*, 45(5), 453-466. doi: 10.1177/0022219411432685
- Tunmer, W. E., & Greaney, K. T. (2010). Defining Dyslexia. *Journal of Learning Disabilities*, 43(3), 229-243.
- Washburn, E., Binks-Cantrell, E., Joshi, R. M., Martin-Chang, S., & Arrow, A. (2015). Preservice teacher knowledge of basic language constructs in Canada, England, New Zealand, and the USA. *Annals of Dyslexia*, 1-20. doi: 10.1007/s11881-015-0115-x



## Appendix A

### Summary technical data for teacher knowledge and practice

Time 1 (pre-workshop) and Time 2 (post-workshop programme) scores were compared with a series of paired-samples t-tests.

**Teacher survey knowledge:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(19) = 5.28, p < .01$ . The Time 2 scores were higher than the time 1 scores.

Time 1:  $M = 17.85, SD = 3.77$

Time 2:  $M = 20.50, sd = 3.59$

**Teacher survey ability:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(19) = 5.28, p < .01$ . The Time 2 scores were higher than the time 1 scores.

Time 1:  $M = 5.15, SD = 2.54$

Time 2:  $M = 8.00, SD = 2.34$

**Teacher knowledge phonemic construct:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(19) = 2.87, p = .01$ . The Time 2 scores were marginally higher than the time 1 scores.

Time 1:  $M = 9.30, SD = 2.60$

Time 2:  $M = 10.30, SD = 2.06$

**Teacher knowledge phonic construct:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(19) = 4.96, p < .01$ . The Time 2 scores were higher than the time 1 scores.

Time 1:  $M = 4.10, SD = 1.77$

Time 2:  $M = 6.00, SD = 1.65$

**Teacher knowledge phonological construct:** Time 1 and Time 2 paired samples found no significant difference between the two time points,  $t(19) = 2.03, p = ns$ . The Time 2 scores not were higher than the time 1 scores as the scores were at ceiling (maximum score of 8) at both times.

Time 1:  $M = 7.15, SD = 0.59$

Time 2:  $M = 7.55, SD = 0.76$

**Teacher knowledge morphological construct:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(19) = 3.12, p < .01$ . The Time 2 scores were higher than the time 1 scores.

Time 1:  $M = 2.55, SD = 2.69$

Time 2:  $M = 4.80, SD = 2.42$

**Teacher video data coding:** Time 1 and Time 2 paired samples found a significant difference between the two time points,  $t(18) = 4.68, p < .001$ . The Time 2 scores were higher than the time 1 scores.

Time 1:  $M = 1.72, SD = 0.68$

Time 2:  $M = 2.41, SD = 0.80$

## Appendix B

### Summary Technical Data for Cohort 2 School Entry Results

Entry scores were treated by means of a series of multivariate analyses of variance (MANOVAs). The results are as follows:

**Letter Identification** (Letter Name Upper Case; Letter Name Lower Case; Letter sound Upper Case; Letter Sound Lower Case) revealed the following: Group,  $F(8,572) = 1.05$ ,  $p = .40$ ; Decile Band,  $F(8,572) = 2.78$ ,  $p = .005$ ; Group X Decile Band,  $F(16,1152) = 1.60$ ,  $p = .06$ . The Group and Group X Decile Band effects were not statistically significant. The Decile Band effect was statistically significant, with the low decile children tending to consistently obtain lower scores than the middle or high decile groups.

**Phonological Awareness** (Elision, Matching, Blending): Group,  $F(6,572) = 1.22$ ,  $p = .30$ ; Decile Band,  $F(6,572) = 2.53$ ,  $p = .02$ ; Group X Decile Band,  $F(12,861) = 1.15$ ,  $p = .31$ . The Group and Group X Decile Band effects were not statistically significant. The Decile Band effect was statistically significant, with the low decile children tending to consistently obtain lower scores than the middle or high decile groups.

**Reading/Spelling** (Clay word test, Spelling): Group,  $F(4,570) = 0.80$ ,  $p = .88$ ; Decile Band,  $F(4,570) = 1.23$ ,  $p = .30$ ; Group X Decile Band,  $F(8,570) = 1.48$ ,  $p = .16$ . Scores on these tests had a very strong floor effect. None of the effects was statistically significant.

**BPVS Standard Scores** treated by means of a univariate analysis of variance: Group,  $F(2,285) = 3.21$ ,  $p = .04$ ; Decile Band,  $F(2,285) = 13.43$ ,  $p = .00$ ; Group X Decile Band,  $F(4,285) = 1.18$ ,  $p = .32$ . The main effect for Group was statistically significant, with the Comparison group obtaining lower scores than the two Intervention groups, though the individual comparisons of means did not reach levels of statistical significance. Low decile children obtained lower scores than middle and high decile children. The Group X Decile Band interaction effect was not statistically significant.

### Summary Technical Data for Cohort 2 End-of-Year 1 Results

End of Year 1 results were treated by means of a series of MANOVAs. The results for each cluster of variables are as follows. We present the Group by Decile Band analyses followed by the Group by Ethnicity analyses for each cluster of variables.

#### Phonological awareness (Elision, Matching, Blending)

Decile Band: Group,  $F(6,572) = 3.90$ ,  $p = .001$ ; Decile Band,  $F(6,572) = 4.92$ ,  $p = .001$ ; Group X Decile Band,  $F(12,861) = 2.09$ ,  $p = .02$ .

Univariate analyses for all three variables were statistically significant:

- Elision. Group,  $F(2,287) = 4.91$ ,  $p = .008$ ; Decile Band,  $F(2,287) = 9.62$ ,  $p = .000$ ; Group X Decile Band,  $F(4,287) = 4.77$ ,  $p = .001$ .
- Matching. Group,  $F(2,287) = 7.07$ ,  $p = .001$ ; Decile Band,  $F(2,287) = 5.40$ ,  $p = .005$ ; Group X Decile Band,  $F(4,287) = 2.94$ ,  $p = .021$ .

- Blending.  $F(2,287) = 11.14, p = .000$ ; Decile Band,  $F(2,287) = 14.54, p = .000$ ; Group X Decile Band,  $F(4,287) = 2.92, p = .022$ .

The Intervention group obtained significantly higher scores on each variable than the Comparison group. Children in low decile schools obtained lower scores than those in high decile schools. Comparison children in low decile schools obtained significantly lower scores than Intervention children in low decile schools.

For Ethnicity (Pākehā, Māori) the focus was on the Group X Ethnicity interaction effect, reported as follows:

Group X Ethnicity,  $F(6,496) = 0.66, p = .680$ . Because the multivariate effect was not significant, Group X Ethnicity interaction univariate analyses are not reported.

#### **Alphabetic Coding** (Blends, Digraphs, Spelling Sounds, Pseudoword Phonemes)

Decile Band: Group,  $F(8,568) = 5.70, p = .000$ ; Decile Band,  $F(8,568) = 5.62, p = .000$ ; Group X Decile Band,  $F(16,1144) = 3.77, p = .000$ .

Univariate analyses for all three variables were statistically significant, except for the Pseudoword phonemes interaction effect:

- Blends. Group,  $F(2,286) = 12.69, p = .000$ ; Decile Band,  $F(2,286) = 10.39, p = .000$ ; Group X Decile Band,  $F(4,286) = 4.53, p = .001$ .
- Digraphs. Group,  $F(2,286) = 12.00, p = .000$ ; Decile Band,  $F(2,286) = 11.83, p = .000$ ; Group X Decile Band,  $F(4,286) = 4.33, p = .002$ .
- Spelling Sounds. Group,  $F(2,286) = 17.59, p = .000$ ; Decile Band,  $F(2,286) = 16.96, p = .000$ ; Group X Decile Band,  $F(4,286) = 3.90, p = .004$ .
- Pseudoword phonemes. Group,  $F(2,286) = 12.65, p = .000$ ; Decile Band,  $F(2,286) = 19.00, p = .000$ ; Group X Decile Band,  $F(4,286) = 1.71, p = .148$ .

The Intervention group obtained significantly higher scores on each variable than the Comparison group. Children in low decile schools obtained lower scores than those in high decile schools. Intervention children in low decile schools obtained significantly higher scores on each variable than Comparison children in low decile schools.

For Ethnicity (Pākehā, Māori) the results from the Group X Ethnicity interaction effect are as follows:

Group X Ethnicity,  $F(8,492) = 1.55, p = .139$ . Because the multivariate effect was not significant, Group X Ethnicity interaction univariate analyses are not reported. Nonetheless, an examination of univariate analyses indicated that there was a tendency for Intervention Māori children to obtain higher scores than Comparison Māori children on all variables, especially for the Pseudoword phonemes assessment.

#### **Language processing** (Non-word repetition, Mispronunciation)

Decile Band: Group,  $F(4,576) = 6.86, p = .000$ ; Decile Band,  $F(4,576) = 2.45, p = .045$ ; Group X Decile Band,  $F(8,576) = 5.42, p = .000$ .

Results from the univariate analyses are as follows:

- Non-word repetition. Group,  $F(2,288) = 1.68, p = .189$ ; Decile Band,  $F(2,288) = 1.49, p = .227$ ; Group X Decile Band,  $F(4,288) = 8.07, p = .000$ .
- Mispronunciation. Group,  $F(2,288) = 14.11, p = .000$ ; Decile Band,  $F(2,288) = 3.74, p = .025$ ; Group X Decile Band,  $F(4,288) = 2.14, p = .076$ .

The Non-word repetition effects were largely due to the high decile Intervention group obtaining high scores, and the low decile Comparison and high decile Intervention<sup>+</sup> groups obtaining low scores.

For the Mispronunciation task, the Intervention group obtained higher scores than the other groups. The marginal interaction effect was due largely to the low decile Comparison children obtaining particularly low scores.

For Ethnicity (Pākehā, Māori) the results from the Group X Ethnicity interaction effect are as follows:

Group X Ethnicity,  $F(8,500) = 2.31, p = .057$ . Given the borderline level of statistical significance, we examined the univariate results.

- Mispronunciation. Group X Ethnicity,  $F(2,250) = 4.14, p = .017$ .
- Non-word repetition. Group X Ethnicity,  $F(2,250) = 0.10, p = .906$ .

The significant effects for the mispronunciation task were due to the relatively high scores obtained by Intervention Pākehā children.

### **Reading & Spelling outcomes (Burt word test, Spelling, Pseudoword reading)**

Decile Band: Group,  $F(6,570) = 4.63, p = .000$ ; Decile Band,  $F(6,570) = 5.72, p = .000$ ; Group X Decile Band,  $F(12,850) = 2.24, p = .009$ .

Results from the univariate analyses are as follows:

- Burt word test,  $F(2,286) = 8.49, p = .000$ ; Decile Band,  $F(2,286) = 13.92, p = .000$ ; Group X Decile Band,  $F(4,286) = 2.85, p = .024$ .
- Pseudoword reading,  $F(2,286) = 7.29, p = .001$ ; Decile Band,  $F(2,286) = 6.76, p = .001$ ; Group X Decile Band,  $F(4,286) = 0.41, p = .804$ .
- Spelling,  $F(2,286) = 13.71, p = .000$ ; Decile Band,  $F(2,286) = 12.85, p = .000$ ; Group X Decile Band,  $F(4,286) = 1.56, p = .184$ .

The Intervention group obtained significantly higher scores than the Comparison group on all three variables, and higher scores than the Intervention<sup>+</sup> children for Pseudoword reading and Spelling. The interaction effect for the Burt word test was due largely to the low decile Intervention children obtaining substantially higher scores than the low decile Comparison children.

For Ethnicity (Pākehā, Māori) the results from the Group X Ethnicity interaction effect are as follows:

Group X Ethnicity,  $F(6,494) = 3.08, p = .006$ . An examination of the univariate analyses revealed that the Burt word test resulted in a marginal statistically significant effect:

Burt Group X Ethnicity,  $F(2,248) = 2.60, p = .08$ . Māori children in both the Intervention and Intervention<sup>+</sup> groups obtained scores very close to those of Pākehā children in those groups, and very much higher than Māori children in the Comparison group.

Variables	Groups																	
	Intervention						Intervention <sup>+</sup>						Comparison					
	Low Decile N=38-39		Middle Decile N=36-37		High Decile N=29-31		Low Decile N=31-33		Middle Decile N=88		High Decile N=10		Low Decile N=15		Middle Decile N=21		High Decile N=24	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Phono Awareness																		
Elision	11.44	6.07	11.11	6.61	14.52	3.62	9.74	5.80	12.70	5.28	9.50	5.66	4.47	5.01	11.71	4.86	12.75	6.10
Matching	15.46	7.17	16.24	7.06	18.35	4.98	14.35	7.05	15.40	6.70	13.10	4.82	7.73	4.48	13.71	5.98	17.00	7.43
Blending	15.21	5.97	15.92	7.16	19.19	4.45	11.71	6.33	16.00	5.45	14.30	5.06	7.40	3.81	14.10	5.34	16.17	6.41
Alphabetic coding																		
Blends	10.42	8.65	9.97	7.48	15.93	5.16	5.91	7.33	9.51	7.52	6.00	7.80	0.40	1.06	8.67	8.08	12.25	8.14
Digraphs	2.26	1.90	3.38	1.57	2.97	1.74	1.52	1.72	2.23	1.78	1.40	1.96	0.13	0.52	1.90	1.97	3.17	1.81
Spelling sounds	43.21	17.93	50.86	16.09	51.83	11.38	34.64	21.92	43.64	19.35	40.20	18.34	11.13	13.87	36.62	19.41	46.08	18.01
Pseudo phonem	49.26	30.90	61.46	26.33	68.69	18.55	34.70	30.30	49.23	26.73	53.50	23.18	13.07	16.17	51.57	28.91	52.17	26.89
Language processing																		
Nonword rep	13.77	6.23	12.08	4.04	17.03	3.39	14.67	4.74	13.95	3.69	10.70	5.96	10.33	5.02	14.86	2.76	15.08	3.88
Mispronunciation	8.08	5.40	11.67	8.75	9.45	4.02	7.12	4.85	6.93	4.10	5.70	2.79	3.93	2.25	6.71	3.24	7.04	3.22
Reading & Spelling																		
Burt word test	17.37	11.95	19.54	12.20	21.69	9.81	12.52	10.84	18.44	10.64	18.20	10.60	2.47	3.27	14.52	7.67	20.33	10.07
Pseudowords	4.74	6.25	6.95	6.34	8.14	6.84	3.30	5.40	6.95	6.36	8.14	6.84	0.27	1.03	3.86	6.39	5.42	4.87
Spelling	4.03	3.01	6.14	3.83	5.55	2.31	2.94	2.15	4.57	3.37	4.00	2.91	0.27	0.80	3.14	2.63	4.46	2.89

Table 4. Summary data for Groups by School Decile Bands.

Variables	Group											
	Intervention				Intervention <sup>+</sup>				Comparison			
	Pākehā N=70-71		Māori N=19-21		Pākehā N=82-84		Māori N=32		Pākehā N=35		Māori N=14	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Phono awareness												
Elision	12.79	5.34	11.71	6.38	12.29	5.10	11.66	5.96	12.00	6.16	7.43	5.37
Matching	17.23	6.52	15.10	5.09	15.68	6.40	13.81	6.55	15.03	7.53	11.00	5.64
Blending	17.21	6.23	14.67	5.66	15.72	5.21	13.16	6.54	14.37	5.85	9.71	5.55
Alphabetic coding												
Blends	11.76	7.80	11.53	7.49	8.92	7.37	7.06	8.00	9.66	8.24	3.00	6.45
Digraphs	2.96	1.76	2.42	1.58	2.05	1.81	2.00	1.87	2.34	1.94	0.71	1.54
Spelling sounds	49.16	15.49	45.95	16.83	43.23	18.83	37.34	21.99	41.03	19.87	17.93	17.89
Pseudo phonemes	62.29	26.21	54.79	22.49	47.74	27.31	41.66	30.39	48.69	26.24	20.79	28.79
Language processing												
Nonword rep	14.09	5.13	13.71	5.69	13.98	4.32	13.59	4.62	14.06	4.68	12.93	4.39
Mispronunciation	10.57	6.49	6.86	4.98	6.87	4.00	7.66	4.79	6.71	3.17	5.07	2.97
Reading & spelling												
Burt word test	19.70	11.18	17.12	11.94	18.16	10.47	15.03	12.21	17.03	9.25	5.43	7.98
Spelling	5.24	2.87	5.00	3.62	4.30	3.05	3.88	4.20	3.69	2.82	1.00	1.80
Pseudowords	7.27	6.56	4.16	6.07	4.36	5.32	4.25	6.13	3.80	4.42	0.71	1.98

Table 5. Summary data for Groups by Ethnicity.



Proactively Released