The Effects of Contextual Reading and Feedback on Orthographic Development

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Abstract

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Many studies have focused on the effects of contextual and isolated word training on reading and spelling accuracy. However, fewer investigations have examined orthographic development as measured by both reading and spelling of the same items. Here, 23 students in Grade 2 were recruited to participate in a 2x2 within subject design. Students were trained on 25 different words in four conditions: they read in and out of context and with and without corrective feedback. When children read in the context/feedback and isolation/feedback condition they made the most significant gains in reading accuracy. The third highest accuracy scores were noted when children read in the context/no feedback condition and the lowest scores were observed in the isolation/no feedback condition. With regards to spelling accuracy no effect of feedback was found. However, unlike reading accuracy scores the highest spelling results were found when children read in isolation.

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Introduction

Learning to read is a complex process for young children. Yet, development of early literacy skills is imperative if students are to enjoy academic success (Ehri & Saltmarsh, 1995; Tunmer & Chapman, 2002). Children have a very small window in which to learn to read. Literacy instruction is a primary focus for the first three years of formal education, however, once children have entered Grade 3 the emphasis has shifted away from 'learning how to read', and towards using 'reading to learn' (Chall & Jacobs, 2003). But without the ability to read, students are not capable of acquiring knowledge provided in texts. Becoming literate involves both learning to decode printed words and learning to spell (Conrad, 2008; Ehri, 2005). In classrooms, teachers generally develop these skills in one of two methods. Children are either asked to read and spell words in isolation (such as reading from flashcards and or spelling to dictation), or in context (such as when reading and writing short stories). Researchers have investigated the benefits of each of these methods for developing reading skills (Landi, Perfetti, Bolger, Dunlap, & Foorman, 2006; Martin-Chang & Levy, 2005, 2006; Martin-Chang, Levy, & O'Neil, 2007) and spelling ability (Cunningham, 2006; Share, 1995, 1999, 2004). However, far fewer studies have examined the development of reading and spelling within the same experimental paradigm. The aim of this study is to clarify the role of feedback and contextual word reading on orthographic development as measured by reading and spelling accuracy.

Children require word-specific orthographic representations if they are to become fluent readers (Ehri & Roberts, 1979; Rosenthal & Ehri, 2011; Ricketts, Bishop, Pimperton & Nation, 2011; Conrad, Harris & Williams, 2013). Orthographic development has been defined as a multidimensional construct combining both word-specific orthography and general orthographic knowledge (Conrad, et al., 2013). Word-specific orthographic representations are the stored

spellings of items on a word-by-word basis (for example, understanding that there is a doubled 't' in 'written'). In contrast, general orthographic knowledge is the broader understanding and ability to implement the patterns and rules of a language, (for example understanding that in English we do not double the letter 'q' in any words). Both types of knowledge drive the reading process and help to develop reading accuracy and fluency (Shahar-Yames & Share, 2008). As children store word-specific orthographic representations, they build a broader lexicon allowing them to move away from the exhaustive dependence of phonologically decoding words (Kyte & Johnson, 2006). The greater the bank of orthographic representations the more equipped the reader is to accurately decode subsequent unfamiliar and challenging words (Ehri, 2005; Verhoeven & Perfetti, 2011). The question becomes, does decoding words in different written environments (e.g., context or lists) impact orthographic learning?

Share's self-teaching hypothesis (1995, 1999, 2004) argues that children are able to develop orthographic representations via reading. Share defines 'self-teaching' as the ability to independently phonologically decode graphemes accurately without feedback. According to Share, "this early self-teaching depends on […] letter-sound knowledge, some minimal phonological sensitivity, and the ability to utilize contextual information [meaning] to determine exact word pronunciations on the basis of partial decodings" (Share, 1995, p.160). For example, the reader who encounters the word 'neighbour', despite understanding the spoken word, might struggle when reading it in print. The reader may achieve partial decoding (e.g., /n/ /e/ /g/ /b/ /r/) but fail to read the word accurately thereby forfeiting the opportunity to develop an orthographic representation (Landi et al., 2006; Share, 1995). Reading in context becomes relevant as readers draw on the surrounding semantics and syntax to support decoding and word recognition. For example, when reading "My *neighbour* has a bigger house than mine" the young reader can infer

the word is ‘neighbour’ based on partial decoding, prior vocabulary knowledge, and the semantic and syntactic cues from the surrounding text (Tunmer & Chapman, 2002).

The impact of Context on Reading Accuracy

Ehri (2005, 2014) suggests that reading aloud greatly benefits retention of semantics and orthography. She concludes that oral reading offers the phonological component necessary in building orthographic representations and strengthens understanding of vocabulary. Furthermore, reading aloud enables the reader to map previously learned sub-lexical spelling patterns onto new words, thus building a greater mental lexicon, and allowing for greater reading accuracy and fluency to be developed.

Martin-Chang and Levy (2006) investigated this theory by examining the effects of both contextual and isolated word reading on reading fluency. They trained good and poor readers in Grade 3 to read 170 words divided into those read in isolation and those read in context. Feedback was given in both conditions. The isolation condition consisted of participants reading words in lists, the context condition provided children with target words in stories. During story reading, participants read only the target word while the experimenter read the surrounding text. After completing each training condition, transfer was tested in isolation. The results demonstrated that both good and poor readers read more accurately in context during training. However, a very different pattern emerged during transfer.

Further studies by Martin-Chang, et al. (2007) examined the effects of context and isolation on the ability to read new words. Children in Grade 2 were screened on 255 items in Experiment 1; subsets were created for each participant based on errors made during screening. The items were divided into three conditions; context, isolation, and control. All participants were also screened using two reading passages. These passages enabled the examiner to devise

individualized word sets based on the children's errors. And these same texts were later incorporated as the transfer task, although during transfer all reading was performed without assistance. The context condition provided the target words embedded within a story; a shared reading paradigm was used, whereby the participant read only the target words. Participants in the isolation condition read words from cue cards. Corrective feedback was given across conditions. Results showed that reading accuracy improved in both context and isolation throughout the 12 trials. But learning was significantly higher in the context condition. Furthermore, when the same materials were presented eight days after training, the pattern favouring context remained consistent. Finally, results of the transfer task indicated a decrease in reading accuracy, however, losses were more pronounced in isolation.

In Experiment 2, Martin-Chang et al. (2007) replicated Experiment 1, yet the transfer task employed isolated word reading regardless of the training condition. Results of Experiment 2 revealed greater accuracy of words trained in isolation. Examination of both experiments would indicate that the final results are dependent on the transfer task utilized; training in context results in greater accuracy when participants are tested in context, isolation results in greater accuracy when participants are tested in isolation. It appears that the tasks of recalling and recoding are more taxing when training and testing conditions are not consistent. This incongruent design may cause researchers to favour one condition over another, believing that one condition is superior to another when in fact there is always a loss in accuracy when transferring from context to isolation and vice versa. The outcome is dependent upon transfer task, as Martin-Chang et al. have highlighted.

Nemko (1984) also found evidence supporting the notion that isolated word training promotes reading accuracy. Grade 1 students were trained with feedback and immediately tested

without feedback. This 'training-testing procedure' of 4 words was repeated 6 times for a total score of 24 (4 words x 6 repetitions = 24). Nemko reported that the least amount of learning took place in the three conditions that involved predictable texts (trained in context, tested in context = 14.75; trained in context, tested in isolation = 14.35; trained in isolation, tested in context = 15.22), whereas the highest score was observed when both training and testing were conducted in isolation (19.39).

Similarly, Landi et al. (2006) examined the roles of context and isolation on reading accuracy in two experiments. In Experiment 1 children were screened on 82 words to determine individualized word lists. Half the words were trained in predictable sentences (context) and half were read in word lists (isolation). The context condition employed a shared reading paradigm, much like Martin-Chang and colleagues, however, the target word was always the final word of the sentence. The isolation condition required reading target words on cue cards. Landi et al. found that skilled readers were two times more accurate, and poor readers were three times more accurate, in the context condition compared to the isolation condition during training. However, further testing of individualized word sets, in isolation after a one-week delay, revealed no significant difference. Experiment 1 concluded that context improved reading accuracy during training, but isolated word training resulted in stronger word retention when participants were tested in isolation. Landi et al. replicated this pattern in Experiment 2, yet, again, the context condition was tested in isolation therefore, producing a loss in accuracy, and results favoured isolation.

In sum, Nemko (1984) and Landi et al. (2006) posit that the context surrounding a novel word reduces exhaustive, letter-by-letter decoding. However, Nemko and Landi et al., both used predictable sentences (e.g., "roses are red, violates are ____") as their stimuli and this may have

affected their interpretation of the data. Failing to adequately attend to the print may be a by-product of the target word appearing as a missing noun at the end of a sentence (Nicholson, 1991). This design leaves room for anticipated 'guessing from context' (Goodman, 1965) and removes the need to concentrate on the print in an attempt to decode. In regular, non-predicative text, such as that used by Martin-Chang and colleagues, contextual facilitation does not promote guessing, but rather encourages readers to supplement partial decodings with hints from context when the text proves difficult.

Therefore, two opposing positions exist about the facilitative factors associated with contextual reading and reading acquisition, both backed by empirical support (c.f., Landi et al., 2006; Martin-Chang & Levy, 2005; Martin-Chang & Levy, 2006, Martin-Chang et al., 2007). Landi (2013) has argued that children must "struggle" with print in order to create lasting word representations in memory, therefore, factors that are presumed to make decoding easier (such as feedback and context) should decrease long-term word learning. Martin-Chang and colleagues disagree. Martin-Chang contends that, "…if pairing whole word phonology and orthography is influential for creating word representations in memory, then situations that offer the highest support for reading accuracy, such as feedback/context, should result in superior learning" (Martin-Chang, submitted, p.12).

In a recent study Martin-Chang (submitted) addressed this issue by examining the role of feedback on contextual and isolated word reading. Students in Grade 2 were trained to read different sets of words in context and in isolation conditions, with and without feedback. Eighty-five words were trained in each of four conditions: context/feedback, isolation/feedback, context/no feedback, isolation/no feedback. The context condition employed a shared reading paradigm. The isolation condition required children to read words in lists. Participants were

presented the target words, in a new "transfer" story, after a 4-day delay. All participants read the transfer story, independently, without feedback, regardless of the prior training condition. Results concluded that training and retention did not favour the interpretation that children are required to 'struggle' with print to be successful in reading accuracy. While children made gains with repeated exposures in all conditions, the highest amount of learning occurred in conditions that offered highest support (context/feedback), and the least amount of learning ensued when children were given the least amount of support (isolation/ no feedback). Transfer scores showed that words were read equally well when the words were trained in context or isolation, although accuracy was higher for words trained with feedback.

To conclude, Martin-Chang and Levy (2006), Nemko (1984), and Landi et al. (2006) have all shown that learning in isolation can promote long term reading accuracy, however, Martin-Chang (2006; submitted) also argues that reading in context can promote long term reading above and beyond what is expected from isolated word reading alone. Results from Martin-Chang and colleagues indicate that contextual word learning promotes a far greater bank of words to be retained in the readers' lexicon. And retention scores are indicative of little to no loss of reading accuracy of newly acquired orthographic representations. In all of these studies, gains in reading accuracy might be indicative of the creation of word-specific orthographic representations in memory. However a stronger test of this hypothesis would come from experiments examining the development of spelling skills directly.

The Impact of Context on Spelling Development

There is abundant literature discussing the transferability of reading skills to spelling development and vice versa (Conrad, 2008; Ehri, 2014; Martin-Chang, Ouellette & Madden, 2014; Ouellette, 2010; Shahar-Yames & Share, 2008). Conrad (2008) found that practice of

spelling promoted both reading and spelling accuracy. And Martin-Chang et al. (2014) identified that reading speed is dependent on an ability to spell the words being read. As would be expected, studies have reported the best transfer of spelling skills from tasks that promoted spelling practice (Conrad, 2008; Ouellette, 2010), however, there also exists evidence that reading practice might be advantageous to spelling skills as well. The question remains, does contextual reading or isolated word training best facilitate spelling production?

Cunningham (2006) investigated the use of context in developing orthographic representations in memory with the use of real words. Cunningham's study simulated children's everyday reading by using real target words (e.g., "prince") within a connected text. Thirty-five Grade 1 children read 8 stories, independently. Participants were exposed to either homophonic (e.g., "peece") or real spellings ("piece") in a coherent text (e.g.,*"This peece is too big")* or a scrambled text (e.g.,*"peece This big is too").* The scrambling of the text was to ensure the removal of contextual facilitation. No feedback was provided as a means of implementing the self-teaching paradigm. All post-testing occurred 3 days later. Post-tests included an orthographic choice task, whereby children chose the target word from a list of four variations in spelling. The spelling task consisted of oral dictation of target words. An examination of the decoding accuracy during text reading indicated 83% reading accuracy in context versus 67% in the scrambled text. Cunningham also established that reading accuracy and orthographic learning were positively correlated. The results of the orthographic choice task indicated that children develop word recognition with every exposure to new words; thus leading to the development of word-specific orthographic information. The orthographic choice task revealed stronger results when participants were trained in context. However, results of the spelling task, whereby participants scored 25% in both the target word and the homophone foil, versus 50% on the

random misspellings, proved inconclusive. It was suggested that the different processes required for reading (recognition of the word) and spelling (recall and production of the word) may have impacted these results. Overall, Cunningham considered that orthographic learning may involve more than decoding skills, and perhaps requires prior orthographic knowledge.

While various other studies have shown context to be ineffective in spelling development (Cunningham, 2006; Nation, Angell & Castle, 2007; Ricketts et al., 2011), some argue that word choice may be a factor not yet investigated (Nation et al., 2007; Wang, Castle, Nickels & Nation, 2011). Share (1995) established that reading of irregular words benefits from contextual facilitation, therefore, perhaps spelling development thrives from contextual reading as well. Nation et al. (2007) examined this concept using irregular nonwords. Target words were presented in and out of context to determine the impact on acquisition and retention of newly formed lexical representations. The use of nonwords ensured that the participant had no prior knowledge of target words; given that children had no pre-exposure to the target words allowed for evidence of their learning with the first and subsequent exposures. Seven-year-old children were shown nine stories with homophonic nonwords consisting of four letters each. Exposures included both context and no context conditions. Participants in the context condition independently read stories containing an average of 94 words. Children in the no context condition were asked to sort through a stack of word cards and create two piles; real words and nonwords. The exposure phase was followed by an orthographic choice task. Analysis of the exposure phase revealed no main effect of context. Despite improvements in orthographic learning due to repeated exposures, retention dropped after a seven-day delay. Much like Cunningham, (2006) results revealed that orthographic learning was not moderated by context.

However, the use of nonwords creates ambiguity and may have removed the expected benefits associated with contextual reading.

Similarly, Wang et al. (2011) examined the effects of context on orthographic development of regular and irregular words. Experiment 1 focused on contextual and isolated reading of regular words, whereas Experiment 2 taught children irregular pronunciations of the original target words. Participants from Grade 2 participated in three phases; pre-exposure, orthographic exposure and orthographic testing. During the pre-exposure phase children learned 8 novel target words; target words and their definitions were spoken orally as participants viewed corresponding pictures. Half the words were presented on day 1, half on day 2, and all were presented on days 3 and 4. The orthographic exposure phase took place on day 5. Target words were presented in print. Participants viewed half the words in context and half in isolation, four exposures per word, and children read aloud without feedback. The orthographic testing phase took place on day 6 and included orthographic choice tasks, orthographic decision (whereby participants viewed printed words and determined whether the spellings were correct or incorrect), and a spelling task. All orthographic testing took place immediately following orthographic exposure and again after a 10 day delay.

A main effect of exposure was evident during the orthographic exposure phase with 97% and 88 % accuracy on the fourth trial for context and no context respectively. And results of the orthographic testing demonstrated no effect of context, as was similar with Nation et al. (2007). Experiment 2 replicated Experiment 1, yet focused on nonwords that were given irregular pronunciations. Here, Wang et al. found a main effect of context in reading accuracy with words learned in context scoring higher than words learned in isolation. Participants' scores over four exposures resulted in 71% accuracy when reading in context compared to 55% when reading in

isolation during the orthographic exposure phase. Similarly, the orthographic decision task found that recognition of accurate spelling was greater when participants trained in context. However, the orthographic choice task produced no main effect of context. Therefore, it would appear that context was beneficial in reading accuracy of irregular words, but the effects of context were only moderate in spelling development.

Current Investigation

To date, many studies have used small word sets (Cunningham, 2006; Wang et al. 2011) and predictable texts (Landi et al., 2006; Nemko, 1984) when testing reading or orthographic development. Furthermore, the studies conducted in this area have tended to focus on either the development of reading accuracy or the development of orthographic representations, but not both skills concurrently. Therefore, the goal of the current investigation was to examine the development of reading and orthographic development using a large word set in non-predictable text.

Hypotheses

Children develop word-specific representations when they are able to produce a pronunciation of a printed word while decoding. It was hypothesized that the benefits of reading in context would produce greater accuracy than isolated word reading during training and long-term word retention. It has been posited that context provides scaffolding that allows the reader to derive semantic cues, thereby increasing the chances of properly pronouncing the word. Retention is expected to be equally strong in both conditions of context and isolation. Similarly, feedback should provide opportunities for superior word learning. Based on the existing literature, it was hypothesized that orthographic learning would not be affected by reading the

words in context during training. However, it was unknown whether corrective reading feedback during training would impact orthographic development.

Method

Participants

Twenty-two participants in Grade 2, were recruited from a suburban elementary school in Quebec. All children were enrolled in a bilingual program whereby, students received instruction in French and English on alternating days. All students spoke English as one of their primary languages. One participant was removed from the sample due to noncompliance, and one student was removed due to low scores obtained during the screening tests. The final number of participants was 23 (9 girls and 14 boys, mean age = 7 years 10 months).

Research Design

The main manipulations in this experiment involved whether training took place in context or in isolation, and whether feedback was given or withheld when children made reading errors. A 2 (context vs. isolation) x 2 (feedback vs. no feedback) fully crossed within participant design was employed where every participant was trained in all four conditions.

The first dependent variable involved reading accuracy measured during training and again after a 7-day delay. The second dependent variable involved spelling accuracy, which was measured at two time points: prior to training (pre-test) and one day after training finished (post-test). A control condition was included where children were asked to spell words that had not been read during training. This was done to measure the effects of simply spelling the words on two different occasions.

In order to control for potential list or story specific effects (e.g., reading level of the passage, passage enjoyment) the order of the materials was counter balanced over the training

conditions and the order of the conditions was counter balanced across all students (see Appendix A for counter balance and scoring sheets).

Materials:

Screening measures. Accuracy of reading was tested with a subtest of the Wide Range Achievement Test – third edition (WRAT3; Wilkinson, 1993). The WRAT3 requires reading a set of 42 words in isolation. The list begins with single syllable high frequency words and increases in difficulty to low frequency multisyllabic words. Testing was discontinued after ten consecutive errors. Participants who could not read one of the first five words were presented with a list of 15 letters and asked to provide the corresponding phonemes. Each child received a standardized score which took the child's age and total number of words read into consideration. The WRAT3 has an internal consistency reliability of $\alpha = .89$ and an average standardized mean of 100. The level of difficulty of this study was deemed suitable for participants falling within two standard deviations of the mean (between the 80^{th} and 120^{th} percentiles). As stated above one student was removed from the sample for having a standardized WRAT3 score that fell below the 80^{th} percentile.

In addition to the WRAT3, children were also screened on 23 high frequency words required to write the training stories (see Appendix B for training stories). These high frequency words are generally known by children in Grade 2, therefore they were not included as target words in the training materials. This additional screening test was conducted to be certain that the children would be able to read the non-target words within the training passages. No participants were eliminated based on errors made when performing this task.

Standardized tests. Three standardized measures were conducted to obtain information about the participants' vocabulary skills and phonological abilities.

Vocabulary breadth. Oral vocabulary was assessed with the Peabody Picture Vocabulary Test, fourth edition (PPVT -4; Dunn & Dunn, 2007). Participants were shown a page containing four different pictures and asked to identify the picture with an assigned word spoken by the researcher. The words became increasingly more challenging. Testing required 20 to 40 minutes depending on the student's success. The internal consistency reliability of the PPVT-4 is α=.91 (Dunn & Dunn, 2007).

Phonological awareness. Two subtests of the Comprehensive Test of Phonological Processing (CTOPP 2; Wagner, Torgesen, Rashotte & Pearson, 2013) were completed to assess phonological awareness. During the Elision subtest the researcher asked the participant to repeat a spoken word, but to eliminate the initial phoneme, for example, say "bat" without the /b/. The task included 19 words in total. Three consecutive errors resulted in termination of the test. The Blending Words subtest involved participants listening to a pre-recording of a female voice sounding out words, phoneme by phoneme. Participants determined the word sounded out by blending all sounds together. There were 20 words in total. Participants were permitted to hear the recording twice. Again, testing ended after three consecutive errors. The internal consistency reliability for the combined subtests of the CTOPP 2 is α = .88 (Wagner, Torgesen, Rashotte & Pearson, 2013).

Training stimuli

Training materials (adapted from Martin-Chang & Levy, 2005) included five word lists comprised of 25 different words (see Appendix C for word lists). Target words were intentionally chosen to be slightly difficult to increase the chances that some of the words would be unfamiliar in print. The isolated training process consisted of participants viewing individual words on a computer screen with a fixation point between words. The font style was Times New

Roman at size 14. All words appeared in the center of the screen for 2 seconds. The context training process incorporated each list within a training passage ranging from 130 to 150 words (see Appendix D for training stories). According to the Flesch-Kincaid readability test, the difficulty of these stories ranged from a Grade 2.7 level to a Grade 4.0 level. Passages were presented on white bond paper, double spaced in font Times New Roman, size 14.

Procedure

Screening Phase. Upon obtaining parental consent, week 1 began with the WRAT3 screening and reading of 23 high frequency words. The high frequency words were screened to ensure that the children would not experience difficulty reading the non-target words of the training story. These tasks, combined, lasted 5 minutes. Screening took place in a quiet room in the children's school.

Weeks 2 and 3 consisted of pretesting participants' ability to spell 125 target words. Participants spelled 5 mutually exclusive lists; one list per day over a 5-day period. Each list consisted of 25 words (1 list x 25 words x 5 days = 125 target words). All pretesting of spelling tasks was conducted in small groups in a quiet room of the school, with each child sitting at their own table. Papers, pencils, and erasers were provided by the examiner. Participants were asked to remain seated until the task was completed, not to share their work, and to direct their questions to the examiner. Twenty-five words were dictated each session. The examiner provided context of each word, and repeated the word a second time. For example, the examiner stated the word "*Both - I like both chocolate and vanilla ice cream - both*." Although there was no time limit on this task, the duration ranged from 7 to 10 minutes. Scoring was on a correct or incorrect basis and this data provided a baseline for spelling accuracy.

Following a 2-day delay after exposure to each spelling task, participants were pretested on their reading accuracy for each of the five corresponding lists. Participants were pretested for reading individually and read one list a day. All the words were viewed in lists (out of context) and read without feedback, therefore the conditions were defined by how training would take place in the subsequent weeks. The duration of this task lasted two minutes. This screening measure provided baseline scores and determined how many words the participants were learning on trial one. Week 4 consisted of screening participants on the CTOPP2 and PPVT- 4. The two subtests of the CTOPP2 (Elision and Blending Words) were divided between the researcher and the research assistant (RA). Each participant spent approximately five minutes working on the Elision subtest with the RA, then proceeded to another room where they spent five minutes with the researcher completing the Blending Words portion of the test. The child was thanked for their time after each screening session, and invited to choose a small gift (hockey card, pencil, or sticker).

Training Phase. Training was conducted in four separate 5-day blocks. One condition (context/feedback, context/no feedback, isolation/feedback, and isolation/no feedback) was run during each block. Training consisted of 10 trials spread over four days. Participants began training by reading 2 word repetitions on days 1, 2, and 3. The task was doubled on day 4, so that children read 4 word repetitions. On day 5 of the same week, the children completed a spelling test.

Context condition: with and without feedback. Students read passages independently in the feedback condition. If they were in the feedback condition they received whole word corrective feedback when they made errors or when pauses lasted longer than 2 seconds. Children in the no feedback condition did not receive input from the researcher, rather they were

prompted to ‘read as if they were alone’ and continue reading the rest of the passage. If the child paused for more than 2 seconds while trying to decode a target word or if they read the word incorrectly it was recorded as an error. Children in both conditions were given praise and encouragement that was not contingent on task requirements. The children’s reading was audio taped for scoring purposes.

Isolation condition: with and without feedback. Words trained in isolation (lists) were presented on a computer screen. Each word was seen for a total of 2 seconds. Whole word feedback was provided to participants following errors or non-responses in the feedback condition. Participants in the no feedback condition read without assistance. The isolated word lists were shown twice per session just as the story contained each word twice. Participants read a total of 25 words two times during each training session, with exception on day 4 when they read each list 4 times. All sessions were audio recorded to ensure scoring accuracy.

Post Testing Phase. The final condition for every participant was the control. This condition required each student to spell a list of 25 words. After a 7-day delay children read the same list of words previously spelled. The elimination of training was to control for possible effects on reading and spelling accuracy.

The testing phase consisted of spelling tasks and those that measure retention of reading accuracy. Participants spelled all 25 words on day 5, following the 4 day training phase; participants wrote target words as dictated by the examiner. Seven days after the final training day, reading accuracy was tested using the training materials. No feedback was given during spelling or retention tasks regardless of the training condition.

Participants were trained on alternate weeks working through all five conditions; feedback/context, no feedback/context, feedback/list, no feedback/list, control, the order of the conditions was counterbalanced over all participants.

Results

All children participated in standardised tests as a means of ensuring their reading ability and eligibility for this study. Scores of all tests indicate that all children were on reading at grade level: Mean scores for reading accuracy on the WRAT3= 99.96 (*SD* 11.78). Mean scores for the PPVT-4 = 108.30 (*SD* 20.77).

Spelling and Word Reading Accuracy in Pre-Screening

Children were screened on the five word sets before the onset of training to ensure the difficulty of the target words was equivalent. During the pre-screening for spelling all of the words were dictated and put in the context of an oral sentence. Therefore, the conditions were defined on how training would take place. During the pre-screening tasks all words were read in isolation and without feedback. As seen in Table 1, mean scores were very similar for spelling and reading respectively. Two separate one way repeated measures Analysis of Variance (ANOVA) for spelling, $F(4, 88) = .877$, $MSE = (3.66)$, $p = .481$, $\eta_p^2 = .038$ and reading, $F(4, 88) = .23$, $MSE = (8.24)$, $p = .92$, $\eta_p^2 = .010$, show no significance. Post hoc comparisons, with Bonferroni corrections in place also found no significance.

Table 1

Raw number of words (max score = 25) read correctly during pre-screening as a function of feedback and context.

Condition	Spelling	Reading
Context FB	4.91	13.00
	(4.02)	(7.03)
Isolation FB	5.00	12.74
	(3.78)	(6.67)
Context NFB	4.48	12.43
	(3.87)	(7.39)
Isolation NFB	5.43	12.96
	(3.84)	(6.78)
Control	4.61	13.17
	(3.76)	(6.54)

Note. Standard deviations are shown in parenthesis.

Word Reading Accuracy in Trial 1

Table 2 indicates that reading scores were high from the onset of training. The mean scores of accuracy ranged from 13.04 to 16.57 in context and isolation with feedback. A 2 (context vs. isolation) x 2 (feedback vs. self-correction), repeated measures ANOVA was conducted to further analyze the mean scores of accuracy in the first trial. Children were reading a greater number of words correctly in the context condition compared to the isolation condition, from the start of training as determined by the significant main effect of context ($F(1,22) = 13.73$, $MSE = (146.26)$, $p = .001$, $\eta_p^2 = .38$). No main effect of feedback was found, which indicates that children received similar results in the first trial of training regardless of whether they received feedback or not ($F(1,22) = .22$, $MSE = (1.09)$, $p = .64$, $\eta_p^2 = .01$). And no significance was found in the Context x Feedback interaction ($F(1,22) = 3.10$, $MSE = (23.0)$, $p = .09$, $\eta_p^2 = .12$).

Table 2

Raw number of words (max score = 25) read correctly over ten trials of training as a function of feedback and context.

Trial	Feedback		No Feedback	
	Context	Isolation	Context	Isolation
1	16.57 (6.40)	13.04 (6.75)	15.35 (7.13)	13.83 (6.98)
2	20.09 (4.53)	17.96 (6.10)	16.22 (6.95)	15.39 (6.91)
3	20.61 (3.55)	18.70 (6.40)	16.35 (6.77)	15.87 (6.76)
4	21.96 (2.79)	21.13 (4.70)	17.26 (6.55)	16.26 (6.68)
5	21.43 (3.99)	20.82 (4.98)	17.43 (6.29)	16.61 (6.49)
6	22.91 (2.87)	22.30 (4.17)	17.91 (6.47)	16.87 (6.30)
7	23.35 (2.12)	22.96 (3.46)	18.00 (6.32)	16.78 (6.10)
8	23.57 (2.41)	23.43 (2.97)	18.43 (6.25)	17.00 (6.28)
9	24.00 (1.91)	23.70 (2.53)	17.96 (5.87)	16.96 (6.09)
10	23.91 (1.59)	23.78 (2.30)	18.68 (6.22)	17.21 (6.28)
Retention	23.87 (1.84)	23.65 (2.37)	18.70 (5.91)	17.57 (6.37)

Note. Standard deviations are shown in parenthesis.

Word Reading Accuracy in Trials 1-10

An analysis of the overall progression throughout training revealed that a greater number of words were attained more quickly in the feedback condition as seen in Figure 1. By trial 6, participants were approaching ceiling in the context/feedback condition. A 2 (context vs.

isolation) x 2 (feedback vs. self-teaching), x 10 (Trial: 1 – 10), repeated measures ANOVA confirmed significant main effects of context and feedback; context ($F(1,22) = 9.76$, $MSE = (26.74)$, $p = .005$, $\eta_p^2 = .31$) feedback ($F(1,22) = 42.29$, $MSE = (109.94)$, $p < .001$, $\eta_p^2 = .66$). However, the Context x Feedback interaction was not significant ($F(1,22) = .001$, $MSE = (32.17)$, $p < .98$, $\eta_p^2 = .00$). Improvements occurred in all trials as children continued to make gains in reading accuracy regardless of the assigned condition ($F(9,198) = 49.22$, $MSE = (7.01)$, $p < .001$, $\eta_p^2 = .69$. Also noted were two significant interactions, Feedback x Trial $F(9,198) = 23.91$, $MSE = (3.26)$, $p < .001$, $\eta_p^2 = .52$, Context x Trial $F(9,198) = 3.30$, $MSE = (2.27)$, $p = .001$, $\eta_p^2 = .13$, which highlights the rapid gains of participants in the feedback condition. The Context x Feedback x Trial interaction was also significant, $F(9,198) = 3.36$, $MSE = (2.38)$, $p = .001$, $\eta_p^2 = .13$, indicating that the context and isolated-word training conditions had different patterns of results across the trials when the children received feedback compared to in the no feedback conditions.

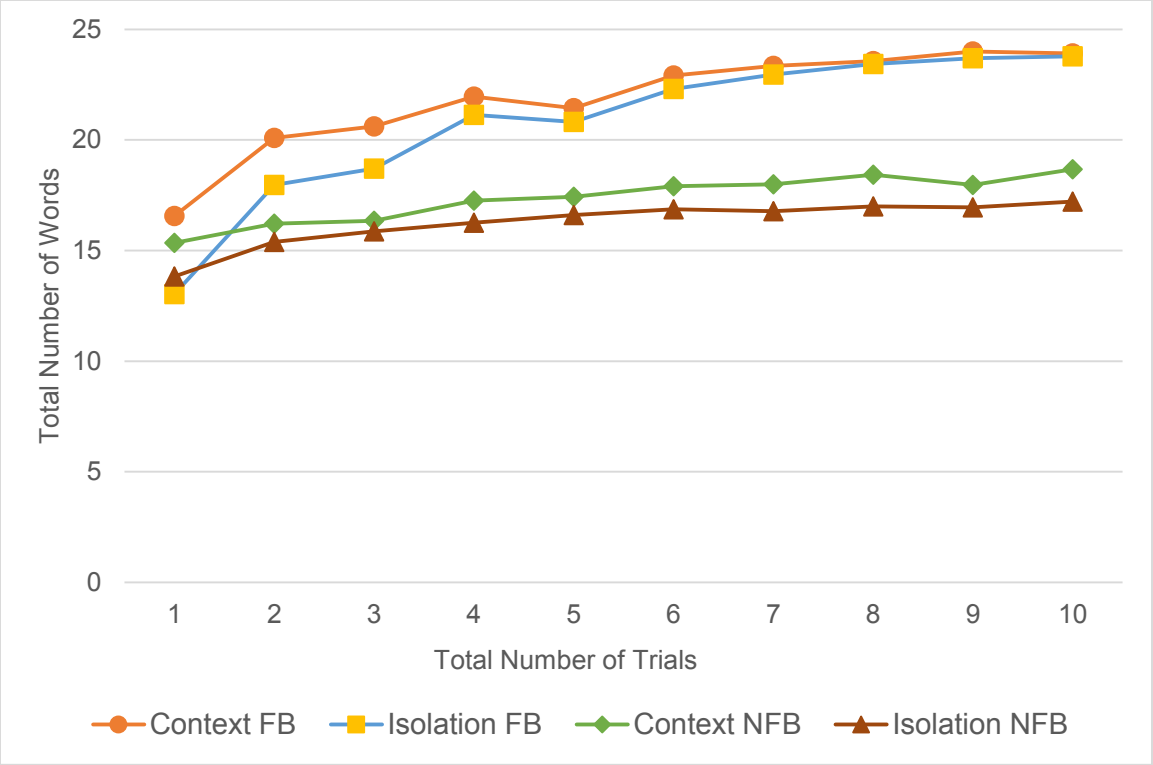


Figure 1. Mean Score of words read correctly during the ten training sessions.

Word Reading Accuracy in Trial 10

By the end of training (Trial 10) the same participants were reading slightly more accurately in context compared to when they were reading in isolation, as highlighted in Table 1. A 2 (context vs. isolation) x 2 (feedback vs. self-teaching) repeated measures ANOVA highlights these findings. The significant main effect of context ($F(1,22) = 5.43$, $MSE = (2.45)$, $p < .05$, $\eta_p^2 = .20$) remained significant on trial 10 indicating that children were able to read more words correctly in context compared to in isolation at the end of training. The main effect of feedback was also significant, ($F(1,22) = 32.16$, $MSE = (25.19)$, $p < .001$, $\eta_p^2 = .59$), indicating that children could read more words when given feedback throughout training. The Context x Feedback interaction was not significant ($F(1,22) = 2.26$, $MSE = (4.05)$, $p < .15$, $\eta_p^2 = .09$).

Testing Phase: Retention

Each training session was followed by a seven day delay at which time the participants were reassessed on the respective training materials. The point of this task was to determine if reading accuracy remained as strong after a seven day delay.

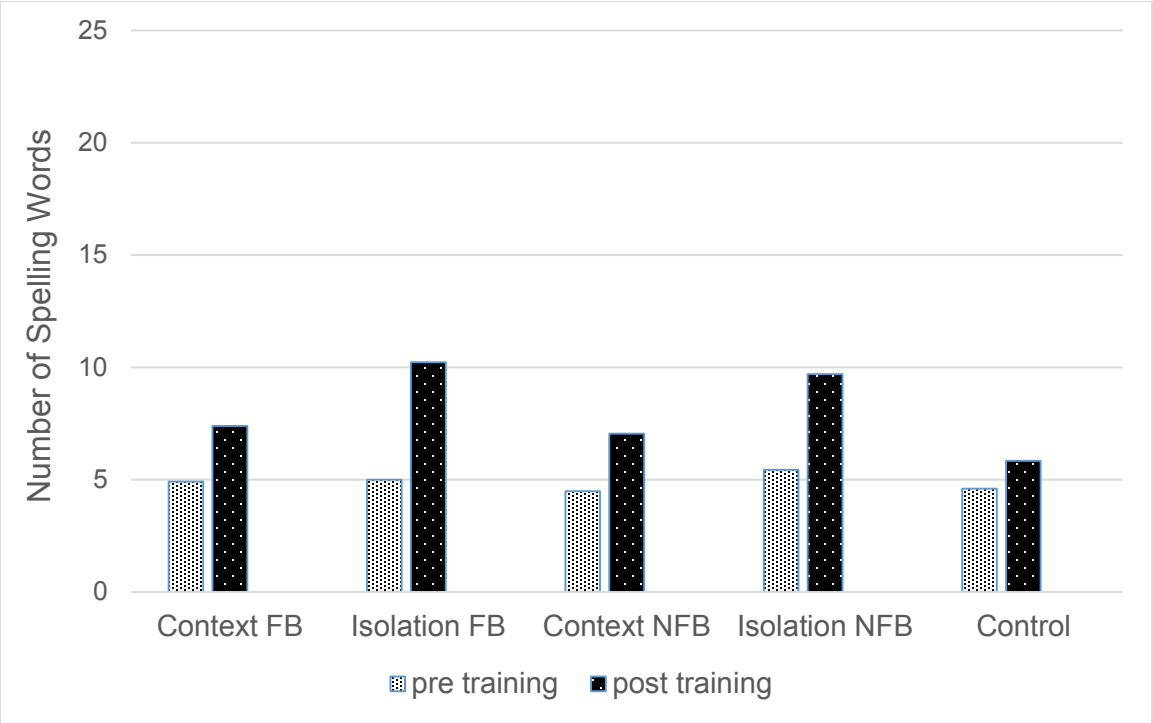
Context continued to earn the highest scores throughout retention as well as it did during training, as seen in Table 1. A 2 (context vs. isolation) x 2 (feedback vs. self-correction) x 2 (Trial 10 vs. Retention) repeated measures ANOVA revealed significance across two of the three main effects: context ($F(1,22) = 4.93$, $MSE = (4.80)$, $p = .04$, $\eta_p^2 = .18$), feedback ($F(1,22) = 33.55$, $MSE = (45.84)$, $p = .000$ $\eta_p^2 = .60$). However, the main effect of testing time was not significant ($F(1,22) = 1.95$, $MSE = (1.00)$, $p = .66$, $\eta_p^2 = .10$), indicating that the accuracy scores remained stable during the time delay. No significant interactions emerged from the three-way repeated measures ANOVA (Context x Trial ($F(1,22) = .09$, $MSE = (.94)$, $p = .76$, $\eta_p^2 = .00$, Feedback x Trial $F(1,22) = 1.07$, $MSE = (.65)$, $p = .21$, $\eta_p^2 = .07$), Feedback x Context x Trial $F(1,22) = .35$, $MSE = (.1.2)$, $p = .60$, $\eta_p^2 = .01$).

Testing Phase: Spelling

The day after final training session, (day 5) each participant performed a spelling task. Here, the conditions were defined by how the words were trained initially because all of the words were written in isolation and without feedback. As seen in Figure 2, a one way repeated measures ANOVA (context/feedback, isolation/feedback, context/no feedback, isolation/no feedback) shows a main effect of condition, $F(4, 88) = 16.71$, $MSE = (4.91)$, $p = .000$, $\eta_p^2 = .42$. Post hoc comparisons, with Bonferonni corrections in place found children spelled more words correctly after participating in the two isolated-word training conditions compared to both of the

context conditions and the control condition (all *F*'s < .02). No other pairwise comparisons reached significance (all *F*'s > .13).

Figure 2. Mean number of words spelled correctly as function of training



Discussion

The aim of the current experiment was to help clarify how external support from context and feedback impact the development of orthographic representations as measured by the reading and spelling progress made by children in Grade 2. Previous research on the merits of training children to read with various levels of support has resulted in conflicting findings (Cunningham, 2006; Landi et al., 2006, 2013; Martin-Chang & Levy, 2005; Martin-Chang & Levy, 2006, Martin-Chang et al., 2007; Nation et al., 2007; Nemko, 1984). On the one hand, there is ample evidence supporting the claim that reading with the support of context enables readers to draw on semantic and syntactic cues to decipher unfamiliar or challenging words (Cunningham, 2006; Landi et al., 2006, 2013; Martin-Chang & Levy, 2005; Martin-Chang &

Levy, 2006, Martin-Chang et al., 2007; Nation et al., 2007). However, on the other hand, some researchers have argued that the support from context does not promote the development of long term reading abilities (Landi, 2006, 2013; Nemko, 1984). Less empirical work has been conducted on the outcomes of learning to read with feedback, however, some researchers have suggested that self-teaching without feedback requires greater attention dedicated to decoding, and ultimately creates lasting orthographic representations (Landi, 2013).

The results reported here begin to unify the opposing views reported above. When focusing on how accurately the children could read during training, it becomes clear that children read with the heightened accuracy when words are presented in the conditions of greatest support. Children, invariably, performed at their best when given feedback. When feedback was withheld, children were more successful when reading in context compared to reading in isolation. All patterns observed during training were maintained after a one week retention period. These results simultaneously support Ehri's (2014) theory that giving a pronunciation to a printed word promotes the consolidation of graphemes and phonemes, and call into question the notion that children need to effortfully decode print in order to affect long term reading improvements. The results reported here suggest that participants' success is indicative of their ability to draw on context and feedback as an aid, not a crutch, thus enabling accuracy and long-term learning of words that could not be read before the commencement of training.

However, as pointed out by Martin-Chang, et al. (2014) spelling accuracy is more indicative of high quality orthographic representations than reading accuracy, because reading can be accomplished with orthographic representations that are only partially complete. The current study was novel in its approach by measuring both the reading accuracy and spelling accuracy of words that were read under conditions of varying support. If focusing on print, along

with effortful decoding, is best suited to creating lasting orthographic representations, then reading words in isolation and without feedback should have resulted in the highest spelling scores. The data partially support this conclusion as participants performed at their best after reading in the two isolated -word training conditions and at their worst in the context and control conditions.

Two other interesting findings emerged that merit future investigation. First, the data collected here show that receiving feedback carried no influence with respect to orthographic development. Second, the current findings suggest that reading words in context had no more effect on spelling than not reading them at all (control).

Implications for Self-teaching regarding reading accuracy

Children reading without feedback improved in both conditions, but more so when reading in context. This finding is consistent with literature showing that children who read for enjoyment become stronger readers (Stanovich & West, 1989); stronger readers, inevitably, have greater aptitude utilizing context to enable partial or full decoding, setting in motion the cycle of developing new orthographic representations and building broader lexicons. Nevertheless, improvements occurred in the least supportive condition (reading in isolation/ no feedback) showing that repeated exposures, as outlined by Nation et al. (2007) and Wang et al. (2011), are impactful on the reading development. And again, Share's theory of self-teaching (1995, 1999, 2004), is supported by the fact that children receiving multiple word exposures, despite receiving no assistance, eventually acquired newly formed orthographic representations that became fully specified, and embedded within the lexicon.

Classroom implications, based on findings, indicate that such practices as guided reading, pairing children with reading buddies, or online reading programs or applications providing

feedback are highly effective for young readers. Encouraging parents or siblings to engage in shared reading at home is recommended. Suggest repeated readings of favourite stories. Point out real world activities that require reading and share the experience, for example reading recipes or menus together. Encourage students to read directions for games, classroom assignments, or notices being sent home while providing assistance when necessary. Establish reading as an enjoyable activity to be shared both at home and in school; create a comfortable, unstructured environment and teach children how to assist each other when reading together. Help students to choose books at an appropriate reading level. Any opportunity to provide reading with assistance should be seized, as the benefits of reading with feedback increases reading accuracy considerably. However, reading without feedback poses no detriment to a child, therefore, offering occasions to read alone is not in vain. Teach children to love reading and facilitate the process of children viewing themselves as capable readers.

Implications for Self-teaching regarding spelling accuracy

It has been speculated that children reading in context, may at times, work on a two-step process, whereby they develop partial orthographic representations that later become refined and high quality representations with repeated exposures (Martin-Chang, submitted). Partial decoding may prove sufficient in reading as context provides cues that enable accurate reading, however, spelling words with partial representations would prove challenging and lead to potential inaccuracy. The evidence found in this study supports this notion as gains in spelling scores were minimal, and actually lowest when participants trained in context. The highest scores in spelling occurred when participants read in isolation, and feedback was insignificant regardless of the training condition. Results suggest that perhaps learning to spell in isolation with focus on sublexical units and decoding would promote higher quality orthographic

representations. Recommendations for future studies include examination of feedback focusing on phonemic breakdown of the word as opposed to whole word feedback. And perhaps the use of orthographic choice and orthographic decision tasks during testing may reveal a clearer impression of participants' orthographic development of target words.

While the current study found no effect of feedback on spelling and participants spelled better when trained in isolation, similar to Cunningham (2006), Nation et al. (2007), and Wang et al. (2011), of noteworthy importance are the improvements made in spelling accuracy across all conditions during testing, indicating that reading, alone, provides opportunities for orthographic development. And while Conrad (2008) has established that the practice of spelling best promotes spelling development, isolated word reading is not to be overlooked. Capitalizing on reading as a practice of improving spelling and reading is something to consider.

Implications for the classroom support the use of word walls, flash cards, personalized student dictionaries, or online applications which provide opportunities for isolated word reading and subsequent improvements in spelling. Spelling games, practice of spelling sight words, posting current vocabulary and spelling words within the classroom; keep it visual and continue to draw attention to newly introduced words, encouraging their use in everyday writing activities.

Limitations and future directions

Previous work suggests that the benefits of contextual reading on orthographic development are limited to irregular words (Wang et al., 2011). The current study used a large bank of real words, but did not control for their regularity. The main focus in word selection was to provide word sets above grade level, therefore, ensuring that target words were unfamiliar to participants in Grade 2. However, questions arise pertaining to the distribution of regular and

irregular words; irregular words being the more challenging to decode and therefore, requiring contextual support. Should study materials contain a higher number of irregular words, results might favour context; reading irregular words in isolation without benefit of syntax and semantics would prove highly challenging. Controlling for word regularity in future studies would allow this question to be examined more thoroughly.

Another factor to consider in the spelling measure is the type of feedback provided. As previously noted, perhaps sublexical decoding as opposed to terminal (whole word) feedback would provide dedicated attention to spelling patterns and therefore, higher quality representations.

Further limitations of the current study include the length of reading time provided in the context condition. Children were scored on a 2 second delay, however, print was available if they chose to focus on decoding the target word. It might be equally argued that isolation allowed for a 2 second delay at which time the word disappeared as the screen progressed to the next target word. The 2 seconds may have been longer than the time spent reading words in context provided decoding was fluent and accurate. Future studies should control for viewing times in both conditions.

Conclusions

In sum, learning to read requires knowledge of phonology (sound), orthography (spelling) and semantics (meaning) (Castles & Nation, 2008; Ehri, 2014; Ehri & Roberts, 1979; Ouellette & Fraser, 2009; Share, 1995, 1999, 2004). There is overwhelming evidence that phonological awareness, which is the ability to hear and segment speech into smaller units, is a key component in the acquisition of early literacy skills (Conrad, 2008; Deacon, Benere & Castles, 2012; Ehri & Roberts, 1979; Ehri & Wilce, 1987; Rosenthal & Ehri, 2011; Share, 2004).

The ability to link phonemes (smallest unit of sound) to graphemes (the letters or letter strings representing those sounds) is what sets the stage for decoding. The actual "sounding out" of words enables children to do two related things: it allows them to recognize printed words that are known in their spoken vocabulary, and it gives a print form (orthographic representation) to words that were previously only understood orally (Ehri, 2005; Verhoeven & Perfetti, 2011). It has been posited that the translation of graphemes to phonemes while reading aloud, bonds the phonological and orthographic representations of words (Ehri, 2014). Once these successfully decoded words are stored as orthographic representations, the reader no longer needs to phonologically decode them on repeated exposures (Cunningham, 2006; Drake & Ehri, 1984; Ehri & Roberts, 1979; Rosenthal & Ehri, 2011). As orthographic representations become more advanced, reading progresses from slow and effortful phonological recoding to fluent (fast and accurate) retrieval of specific words from the existing lexicon (Kyte & Johnson, 2006; Share, 1995, 2004). Greater accuracy frees the reader from decoding, allowing them to attend to unfamiliar words, and thus new words become high quality orthographic representations, creating a forward moving cycle. The long-standing question has been how can educators facilitate the development of reading and spelling accuracy.

The findings of the current study provide evidence that children reading in isolation without feedback made gains in reading accuracy, however, they fared substantially better when reading with feedback. Contextual reading contributes to the success of reading accuracy as readers draw on semantic and syntactic cues to aid in partial or full decoding. Furthermore, once assistance was provided, enhancing the phonology component of reading, children's gains increased significantly in both context and isolation.

While reading in context aids in the production of high quality orthographic representations which in turn support accurate reading, such practice does not generalize to spelling production. Although little evidence exists in determining the process of learning to spell, the current study found isolated word reading proved more successful in the production of spelling words. Perhaps word choice is a factor to be considered in future investigations, and possibly learning to spell requires focused attention to word-specific orthography.

While reading in context may promote partial development of orthographic representations, it should not be overlooked as it also allows for partial decoding, providing struggling readers with opportunities to accurately read a text. However, contextual reading does not provide the high quality representation required in spelling development, therefore the two tasks (reading and spelling) require mutually distinct instruction in order to ensure maximum development of both skills.

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Appendix A

Counter Balance

Participants	Block 1	Block 2	Block 3	Block 4	Block 5
1	Bath story NFB	Cricket list NFB	Snow story FB	Owls list FB	Bridge Control
2	Bridge story NFB	Bath list NFB	Cricket story FB	Snow list FB	Owls Control
3	Owls story NFB	Bridge list NFB	Bath story FB	Cricket list FB	Snow Control
4	Snow story NFB	Owls list NFB	Bridge story FB	Bath list FB	Cricket Control
5	Cricket story NFB	Snow list NFB	Owls story FB	Bridge list FB	Bath Control
6	Bath list NFB	Cricket story NFB	Snow list FB	Owls story FB	Bridge Control
7	Bridge list NFB	Bath story NFB	Cricket list FB	Snow story FB	Owls Control
8	Owls list NFB	Bridge story NFB	Bath list FB	Cricket story FB	Snow Control
9	Snow list NBF	Owls story NFB	Bridge list FB	Bath story FB	Cricket Control
10	Cricket list NFB	Snow story NFB	Owls list FB	Bridge story FB	Bath Control
11	Bath story NFB	Cricket list FB	Snow story FB	Owls list NFB	Bridge Control
12	Bridge story FB	Bath list FB	Cricket story NFB	Snow list NFB	Owls Control
13	Owls story FB	Bridge list FB	Bath story NFB	Cricket list NFB	Snow Control
14	Snow story FB	Owls list FB	Bridge story NFB	Bath list NFB	Cricket Control
15	Cricket story FB	Snow list FB	Owls story NFB	Bridge list NFB	Bath Control
16	Bath list FB	Cricket story FB	Snow list NFB	Owls story NFB	Bridge Control
17	Bridge list FB	Bath story FB	Cricket list NFB	Snow story NFB	Owls Control
18	Owls list FB	Bridge story FB	Bath list NFB	Cricket story NFB	Snow Control
19	Snow list FB	Owls story FB	Bridge list NFB	Bath story NFB	Cricket Control
20	Cricket list FB	Snow story FB	Owls list NFB	Bridge story NFB	Bath Control
21	Bath story NFB	Cricket list NFB	Snow story FB	Owls list FB	Bridge Control
22	Bridge story NFB	Bath list NFB	Cricket story FB	Snow list FB	Owls Control
23	Owl story NFB	Bridge list NFB	Bath story FB	Cricket list FB	Snow Control

Scoring sheets: Block 1

Participant		screen read	screen spell	1	2	3	4	5	Spell	Retention
1	Bath story NFB									
2	Bridge story NFB									
3	Owls story NFB									
4	Snow story NFB									
5	Cricket story NFB									
6	Bath list NFB									
7	Bridge list NFB									
8	Owls list NFB									
9	Snow list NBF									
10	Cricket list NFB									
11	Bath story NFB									
12	Bridge story FB									
13	Owls story FB									
14	Snow story FB									
15	Cricket story FB									
16	Bath list FB									
17	Bridge list FB									
18	Owls list FB									
19	Snow list FB									
20	Cricket list FB									
21	Bath story NFB									
22	Bridge story NFB									
23	Owl story NFB									

Block 2

Participant		screen read	screen spell	1	2	3	4	5	Spell	Retention
1	Cricket list NFB									
2	Bath list NFB									
3	Bridge list NFB									
4	Owls list NFB									
5	Snow list NFB									
6	Cricket story NFB									
7	Bath story NFB									
8	Bridge story NFB									
9	Owls story NFB									
10	Snow story NFB									
11	Cricket list FB									
12	Bath list FB									
13	Bridge list FB									
14	Owls list FB									
15	Snow list FB									
16	Cricket story FB									
17	Bath story FB									
18	Bridge story FB									
19	Owls story FB									
20	Snow story FB									
21	Cricket list NFB									
22	Bath list NFB									
23	Bridge list NFB									

Block 3

Participant		screen read	screen spell	1	2	3	4	5	Spell	Retention
1	Snow story FB									
2	Cricket story FB									
3	Bath story FB									
4	Bridge story FB									
5	Owls story FB									
6	Snow list FB									
7	Cricket list FB									
8	Bath list FB									
9	bridge list FB									
10	Owls list FB									
11	Snow story FB									
12	Cricket story NFB									
13	Bath story NFB									
14	Bridge story NFB									
15	Owls story NFB									
16	Snow list NFB									
17	Cricket list NFB									
18	Bath list NFB									
19	Bridge list NFB									
20	Owls list NFB									
21	Snow story FB									
22	Cricket story FB									
23	Bath story FB									

Block 4

Participant		screen read	screen spell	1	2	3	4	5	Spell	Retention
1	Owls list FB									
2	Snow list FB									
3	Cricket list FB									
4	Bath list FB									
5	Bridge list FB									
6	Owls story FB									
7	Snow story FB									
8	Cricket story FB									
9	Bath story FB									
10	Bridge story FB									
11	Owls list NFB									
12	Snow list NFB									
13	Cricket list NFB									
14	Bath list NFB									
15	Bridge list NFB									
16	Owls story NFB									
17	Snow story NFB									
18	Cricket story NFB									
19	Bath story NFB									
20	Bridge story NFB									
21	Owls list FB									
22	Snow list FB									
23	Cricket list FB									

Block 5

Participant		screen read	screen spell	1	2	3	4	5	Spell	Retention
1	Bridge Control									
2	Owls Control									
3	Snow Control									
4	Cricket control									
5	Bath Control									
6	Bridge Control									
7	Owls Control									
8	Snow Control									
9	Cricket control									
10	Bath Control									
11	Bridge Control									
12	Owls Control									
13	Snow Control									
14	Cricket control									
15	Bath Control									
16	Bridge Control									
17	Owls Control									
18	Snow Control									
19	Cricket control									
20	Bath control									
21	Bridge Control									
22	Owls Control									
23	Snow Control									

Appendix B

High Frequency Words

Words	Score
about	
been	
came	
come	
could	
from	
have	
into	
like	
said	
that	
them	
then	
their	
there	
they	
this	
were	
what	
when	
where	
with	
would	

Appendix C

Training Words

List 1	List 2	List 3	List 4	List 5
auntie	absolutely	announced	blanket	appeared
bath	ancient	attempting	build	area
beamed	beneath	bellowed	bundle	creatures
bowl	boards	camera	cancelled	crickets
change	both	captured	castle	detected
confirmed	bridge	children	darling	everything
continued	caused	climb	declared	exploring
enormous	clatter	convinced	entrance	halted
enough	concern	decided	exclaimed	imitated
holler	cross	entirely	front	insect
ideal	dwelled	fool	glimpse	intelligent
leapt	father	giggling	hideout	know
nephew	follow	instructor	jacket	noise
niece	hazardous	nest	mittens	noticed
nothing	hiking	picture	nanny	realized
overjoyed	laughing	rare	ought	requested
shower	monster	regarded	school	research
soaked	ogre	returned	scurried	scientist
soapsuds	overheard	seize	sheltered	snickered
splashing	relatives	shrieking	snow	student
sweater	seemed	signal	snowflakes	tune
swiftly	sternly	spied	window	unexpectedly
twins	teenagers	thrashing	winter	unusual
water	upon	towards	wrapped	while
worried	ventured	tree	wrestled	whistling

Appendix D

The Bath

Dad ran hot water from the shower to fill an enormous bowl. Auntie Sue leapt up and confirmed that the water from the shower was ideal for the twins. Her niece and nephew could now be put in their bath. Dad was worried they would holler. So he continued splashing to have enough soapsuds. When they were put in the bowl they were overjoyed and continued splashing. The twins did not holler. They were wet from their bath and Auntie Sue's niece and nephew beamed when they soaked her with soapsuds. Dad leapt swiftly out of the way but not swiftly enough. His sweater got so soaked that he had to change. He had nothing but an enormous sweater. It was not ideal, but he beamed and said, "This is fun."

He was not worried, he was overjoyed and confirmed that nothing would change.

Beneath the Bridge

Ava and Jan were hiking with their relatives. The teenagers ventured off on their own and they came upon an ancient bridge. A few of the boards caused them concern. They seemed hazardous.

"We absolutely have to cross it." Jan said sternly.

She ventured upon a board. Ava did follow, too.

There was a clatter from beneath them. Both teenagers had overheard of a hazardous monster who dwelled beneath the bridge. Then they overheard what seemed like laughing. It came from where the monster was. It was Ava's father that caused the clatter, not a cross ogre!

"You both absolutely have to follow our relatives when we are hiking," he said sternly and with concern.

But they were all laughing in the end. There was no ancient ogre who dwelled there it was Ava's father.

The Owl's Nest

Jim and Sam announced to the instructor about a rare owl they had spied shrieking and thrashing in a nest. Mr. Ted was not entirely convinced about it so he captured his camera and regarded the giggling children. Were they attempting to fool him? The children returned to the tree and announced to the instructor where they had spied it. Mr. Ted was no fool, he decided to climb the tree towards the rare owl. Jim bellowed out to signal when the shrieking owl returned. It came thrashing towards Mr. Ted as he was attempting to seize a picture. With no signal the owl decided to climb on Mr. Ted and seize his camera.

"Was it a nest?" bellowed Sam.

Mr. Ted regarded them giggling and said, "Yes, Sam. But I did not capture a picture so I'm not entirely convinced."

Snow Day

Tim was wrapped and sheltered in his blanket when his Nanny exclaimed, "School is cancelled, darling". Tim scurried out of bed to glimpse out the window.
"School is cancelled! Can I build a snow castle?" he exclaimed.
"You ought to bundle up," she declared.

Tim wrestled to bundle up in his mittens and winter jacket. He ran out the front entrance. All was wrapped in a blanket of winter snowflakes. He could glimpse snowflakes on his mittens and jacket. Tim wrestled to build a castle, but he could not. So he ran to his hideout. He saw Nanny in the window.

"You ought to come in darling!" she declared.

He was sheltered in his hideout in the snow, but he scurried out and ran to the front entrance.

The Strange Cricket

Mrs. Kim was an intelligent scientist and she liked to research everything about crickets. While out exploring the scientist noticed an unusual noise. She halted unexpectedly and realized she had detected a new insect.

But the whistling halted and a student appeared.

"Did you notice that unusual noise," Mrs. Kim requested of the student who had appeared.

"I know all about the creatures in the area" said Joe. "What was it like?" he requested of her.

"I can not hum the tune." said Mrs. Kim unexpectedly.

Joe snickered. "Then how can you research crickets?" He imitated all the creatures in the area.

"The one I detected was not like that," said Mrs. Kim and she imitated the insect.

"That was me!" Joe snickered, "I was whistling the tune while exploring. It was then that Mrs. Kim realized that she can be intelligent but she did not know everything.

Appendix E

Training Study Script

Always ask the participant if they would like to read/work with you. If they respond with a yes, proceed to room where materials are set out. If they respond no, suggest maybe working with them a little later in the day.

Context Task

Instructions

Have score sheet ready with date and participant number. Have the participant's copy of the story on the table turned over so that the text is only seen once training begins. Explain that you would like to hear the student read the story. Mention that you will help them if they get stuck. Remind them that many words are difficult and the expectation is not for them to score 100%, but emphasize that they will improve each time they read.

Start recorder before the participant reads.

Feedback

As the participant reads, allow only two seconds when they struggle with a word (count 1 Mississippi, 2 Mississippi), and offer them whole word feedback (do not break it down into sounds or syllables).

Provide encouragement throughout the reading, either by signaling with a thumbs up, or stating, "*Well done*", "*You're doing well*".

Once the child is finished reading, provide encouragement with a high five or comment such as, "*Super job*", "*You did really well*".

Thank the participant and ask them to choose a treat from the bag of stickers, pencils and tattoos.

No Feedback

Tell the student that you would like to hear them read by themselves. Remind the child that there are words from grades 2 to 4 and that you do not expect them to know them all, but they will quite likely make progress all by themselves, even without help. Mention that you can let them know what their progress is and score immediately to ensure a positive experience for the child.

Turn over the participant's story.

Provide encouragement that is not contingent on success, such as a thumbs up or a positive statement, (eg, "*You really tried your best*", "*That was great*").

Isolation Task

Instructions

Have the list ready to go on the computer, as well, prepare the score sheet with date and participant number. Demonstrate, on trial 1 with the word "tyrannosaurus", how the words will appear in the middle of the screen. Mention that some words will be tricky but that they should try their best to read them. Indicate that you will help them if they cannot read the word at all or if they mispronounce the word. Let them know that they will have two seconds to read the word and demonstrate with the second example "paper". Ask the child if they are ready to begin training.

Feedback

As the participant reads provide corrective feedback when necessary, and continue to give additional encouragement with phrases such as "nicely done". If the student appears discouraged for any reason, remind them that the words are difficult, (some are Grade 4 words), and that the student is actually doing well.

No Feedback

Have all materials ready before the participant enters the room. Remind the child that they are going to do some reading, but that you want to see how well they read alone. Remind them that they have already seen these words, and ask if they think they will do as well or better at reading during this session, as they did in the previous session. As they read, keep score discreetly, and encourage them, but do not read the words for them if they need help.

Scoring

Situate yourself slightly behind the participant, but close enough that you may hear them reading. This positioning allows you to discreetly score their responses without causing any effect on the participant. Always ensure that the clipboard used to hold score sheet is not visible.

Context:

Correct answers are left untouched so as to maintain the fluidity of the story as you follow along with the participant.

Incorrect answers: Skipped words - receive a bar through the word.

Mispronounced words – write the incorrect word on top of target word.

Isolation:

Correct answers are scored with a 1

Incorrect answers are scored with a 0

Retention Task

Ask the participant if they would like to read the story/list one last session with you? Proceed as outlined above, however no feedback is given, only encouragement. Remind the child that they have been making progress all week, and you want to see how much they recall. Perhaps enquire if they have any ideas as to how much better they will do?

When the session is done provide the participant with the number of correct words read as encouragement. Keep the focus on the number of words read correctly and the improvement. Avoid discussing the total number of words in the task.

Spelling Task

Ensure that the children are given papers, pencils and erasers. Have the children write their participant number and not their name on the spelling sheet. Remind them that some of the words are challenging and they may ask you to repeat the word as often as needed. If they do not know how to spell it, instruct them to put a line through that space, and wait for the next word. Read the word once, provide context (put it in a sentence) and read the word again. For example, "*Castle, Cinderella lived in a beautiful castle, Castle.*" If the child needs to hear the word again, go ahead and repeat the process. Allow them as much time as they need. Upon completion invite the student to take a token and thank them for their help.

Scoring

Words are scored either correct incorrect. Correct words include all letters in the appropriate placement. Tally number of words spelled accurately.