

Advancing Learner-Informed Practices in Early Reading:
A Collaborative Response to Intervention (RTI) Partnership

by

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B.Ed., University of Victoria, 2008
M.Ed., University of Victoria, 2015

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Abstract

This study examined the efficacy of teacher-implemented interventions to accelerate foundational reading skills in 48 children (mean age 5 years, 3 months) in their first year of school, within a Response to Intervention (RTI) framework. Formal RTI is currently being used across the United States to inform early and efficient intervention for children who are at risk for reading difficulties. While there is growing awareness of the benefits of early screening, effective classroom instruction, and evidence-based intervention, such a formalized, multi-tiered approach is not as prevalent in Canada. Four participating kindergarten teachers received professional development on comprehensive and evidence-based early reading instruction. Throughout a school year complicated by unprecedented challenges due to Covid-19 (i.e. extended student absences, teacher shortages, teacher burnout), teachers embedded explicit teaching of phonological awareness and phonics skills into their existing literacy programs for all students in the classroom at Tier 1, and monitored students' progress monthly using curriculum-based measures (CBMs) of reading. Students who did not demonstrate gains in response to instruction, as per results on CBMs, were identified for intensified Tier 2 small-group intervention. Results suggest that timely professional learning coupled with evidence-aligned resources and ongoing facilitation throughout the school year for classroom teachers can accelerate kindergarten students' emergent literacy skills. Additionally, whereas results indicated a statistically significant difference between students who received Tier 1 classroom instruction and students who received supplemental Tier 2 intervention with regard to Letter-Word Skills at the beginning of the school year, group means were not significantly different at the end of the school year. Situating teachers at the heart of implementation and using multiple means of concurrently-gathered intervention and implementation data, these findings offer

valuable insight into designing effective, multi-tier interventions for all students. Finally, despite the exceptional circumstances due to the Covid-19 pandemic, this study demonstrates that purposeful instruction and supplemental intervention targeting foundational literacy skills can effectively close the gap for our priority students.

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Dedications

This research is dedicated to the brave teachers who came along on this incredible journey (and stuck with it through a year like no other), and the countless educators who work diligently every day, striving to make a difference for their students. Thank you for the invitation to learn alongside you and your students. It's an honour.

Introduction

Formal and systematic Response to Intervention (RTI) is currently being used across the United States (U.S.) to inform early and efficient intervention for children who are at risk for reading difficulties (RD). While there is growing awareness of the benefits of early screening, evidence-based classroom instruction, and intensive intervention, such a formalized, multi-tiered approach is not as prevalent or consistent in Canada (McIntosh et al., 2011). RTI approaches in Canada are often the result of localized teacher driven, or grassroots approaches, in contrast to educational reform or policy-driven tactics present in individual states (McIntosh et al., 2011). Further, education is under provincial jurisdiction in Canada, resulting in a variety of policies around best practices for how school- or district-level services respond to students' academic needs within inclusive classroom environments. In British Columbia (B.C.), the Ministry of Education recognizes that evidence of potential learning disabilities, "should document systematic attempts to address the student's difficulty through instructional adaptations as well as the extent of the student's ongoing difficulties in spite of the variations in instructional approaches" (British Columbia Ministry of Education, 2016). While this is an important nod toward a multi-tiered support structure such as RTI, this language is not well operationalized in practice, as multiple approaches and adaptations do not guarantee a systematic, evidence-based approach to intervention (Fuchs & Vaughn, 2012). In actuality, the B.C. provincial guidelines lack any explicit direction to facilitate consistent approaches across school districts beyond a simple definition of RTI in an overview of the most recent curriculum update (British Columbia Ministry of Education, n.d.). Respective school districts are autonomous in developing a structure and method for supporting student needs and training teachers accordingly. Fortuitously, the absence of a provincial mandate allows professionals and specialists within

individual school districts to thoughtfully and innovatively implement RTI, considering the specific structures within the local context. McIntosh et al. (2011) argue that school teams in Canada, specifically, can optimally prioritize the implementation of quality classroom instruction, assessment for screening and progress monitoring purposes, and organize a continuum of support; conversely, RTI approaches in the U.S. often involve a focus on employing decision-making aspects of RTI for student eligibility criteria with regard to special needs designations. School teams in Canada can also be methodical in their planning for implementation, initially developing a small-scale pilot concerning one well-researched academic domain, such as reading, to gather data on efficacy and address associated barriers prior to scaling up across the school district for more widespread impact. Given that literacy is not a privilege but a basic and essential human right, and that reading instruction remains a high stakes educational issue, the present study focuses on RTI implementation in the context of reading in early years classrooms (Ontario Human Rights Commission, 2022).

Multi-tiered support systems such as RTI allow school teams to identify student needs early and provide responsive instructional interventions accordingly (Jimerson et al., 2016). RTI frameworks involve a continuum of support for students, commonly across three tiers, each offering an increasing intensity of intervention specific to student needs. Tier 1 includes universal, differentiated instruction for all students and Tier 2 offers supplemental targeted intervention for priority students, those who are identified through screening and progress monitoring assessments as being at risk for RD. Tier 3 provides intensive, individualized interventions for students demonstrating persistent difficulties, despite prior interventions. Within an RTI framework, every child has the right to a quality, inclusive education, and there is a substantial knowledge base on effective reading instruction within inclusive classrooms;

however, research suggests that reading programs utilized by elementary school teachers often do not have evidence-based studies supporting their use (Kretlow & Helf, 2013). Teacher preparation programs lacking in evidence-based instruction contribute to this ongoing issue, while others argue that the persistent gap between science of reading and instruction in school settings is due to an ineffective present model of translational science (e.g., Solari et al., 2020). Nevertheless, results from a U.S. national survey by Kretlow and Helf (2013) revealed that while most teachers reported using curricula informed by scientific evidence, there was a large percentage of teachers who reported having no curricula at all, instead relying on teacher-created materials and internet resources. Additionally, many teachers reported low fidelity and inconsistent implementation of some critical components of reading instruction, including phonemic awareness (e.g., students' ability to distinguish and manipulate the individual sounds in spoken words) and the alphabetic principle (e.g., students' understanding of the correspondences between letters and sounds). While the science of reading has sparked a recent resurgence of discussion around what specifically constitutes best practices in reading instruction and intervention, communications on the topic frequently include misinformation, and provincial curriculums are just starting to catch up and provide ministerial guidance (Petscher et al., 2020). Classroom reading instruction must reflect the complex nature of reading skill acquisition, involving instruction on foundational core components, a systematic delivery, and ongoing monitoring to ensure adequate progress. Further, teachers must become attuned to each individual student in the classroom, demonstrating a responsive approach to teaching to ensure that instruction is leading to adequate academic progress.

The present study offers a meaningful contribution to a limited body of research pertaining to implementation of multi-tiered systems of support in the Canadian context, and

through detailed analysis of intervention data and supplemental teacher perspective gathering, provides a comprehensive account of teacher adoption of RTI approaches. These approaches involved universal screening for students who may be at risk for RD, evidence-based early reading instruction in the classroom, ongoing use of progress monitoring tools, and intensive small-group intervention for those students who did not respond to classroom instruction. Essentially, these approaches all fall under the umbrella of learner-informed practices, which involve teachers tuning into individual students' response to instruction to facilitate differentiated instruction and tiered interventions, if necessary. In his review of implementation research regarding evidence-based reading interventions, Savage (2012) stated that teachers and their practice are at the core of implementation and that they have not been sufficiently considered within research to date. Inherent in the present study was the understanding that teacher practices and perspectives are fundamental with regard to the acceptance and general success of implementation of new initiatives in Canadian schools. If we wish to have widespread uptake of best practices in early reading instruction, assessment, and intervention within a multi-tiered framework, we must start with respectful understanding of the local context and a collaborative approach in supporting teachers' professional development.

What follows is a review of both the historical and current literature on learner-informed and evidence-based practices in early reading. The first section situates this study within an empirically grounded conceptual model of reading, while the second section provides a detailed review of what constitutes effective early reading instruction and intervention. The third section addresses why research has not been translated into current practice through a discussion on the operational definition of implementation science. Subsequently, the case is made for RTI approaches to structure responsive student supports, reinforced by contemporary, but limited,

research on classroom-based preventative early reading initiatives implemented within multi-tiered systems in contexts comparable to Canada. Following the literature review, the rationale and research questions of the present study will be presented, followed by the methodology of data collection and statistical analysis used to address these questions. Results pertaining to efficacy will then be presented, augmented by teacher perspectives of implementation feasibility, and finally, the interpretations and implications for theory, research, and practice, discussed.

Background

Simple View of Reading

Many children struggle with reading, despite considerable research and professional development aimed at establishing best practices for early reading instruction and intervention. Consequently, the examination of specific skills associated with reading continues to be a current focus in the field of educational psychology. Given wide scale empirical support, the Simple View of Reading (SVR) has been broadly adopted as a theoretical framework for reading (e.g., Aouad & Savage, 2009; Catts et al., 2006, 2015b; Foorman et al., 2015; Munger & Blachman, 2013). To best support students who demonstrate difficulties learning to read, teachers must understand the construct of reading and the precise components within decoding and linguistic comprehension, as described by the SVR. This model can guide instructional practice and assist educators in making knowledgeable decisions regarding appropriate and timely interventions. As noted in recent research by Pollitt and Harrison (2021), the SVR offers a sensible model for evaluation of assessment approaches in elementary-aged readers. Further, Westwood (2009) argues that if teachers directly assess the component skills involved in reading, as per the SVR, they are in a much stronger position to make educationally sound decisions and to differentiate their instruction to more adequately meet individual students' needs.

Gough and Tunmer's (1986) SVR model posits that reading comprehension (RC) is the product of decoding (D) and linguistic comprehension (LC; $RC = D \times LC$). The model is supported by studies indicating individual differences in reading comprehension are strongly associated with variability in performance across measures of decoding and oral language (Johnston & Kirby, 2006; Nation & Snowling, 2004); further, the results from these studies infer that instruction in decoding and oral language can contribute to students' comprehension of text. Some students with poor LC have been found to demonstrate deficits in reading comprehension despite average-range decoding abilities (Catts et al., 2006). However, research indicates intensive intervention targeting early deficits in pre-decoding (i.e., phonological awareness [PA]) and listening comprehension skills has the potential to diminish or eradicate later reading difficulties (Aouad & Savage, 2009). Similarly, Kendeou et al. (2009) confirmed that oral language and decoding skills develop early in a child's life, and that each cluster of skills makes a considerable, unique contribution to reading comprehension activities in elementary school. These findings were supported by a more recent study by Catts et al. (2015b), where the SVR was utilized as the framework for the longitudinal prediction of reading comprehension. The results indicated that kindergarten-level precursors to decoding (i.e., letter knowledge and PA) and oral language accounted for almost 80% of the variance in third grade reading comprehension. This is consistent with considerable research over the past few decades establishing a strong relationship between students' early PA and processing skills and later performance in the area of decoding and spelling, even through high school (e.g., Calfee et al., 1973; Ehri et al., 2001b; Torgesen et al., 1994; Wagner & Torgesen, 1987). Moreover, longitudinal research has provided evidence that the positive impact of early identification and

intervention targeting reading skills can have long-term effects (Partanen & Siegel, 2014; Suggate, 2016).

Since its introduction over three decades ago, however, research has also questioned the utility of the SVR model regarding its limited ability to account for complex variables associated with the reading comprehension. For example, Cutting and Scarborough (2006) examined the relative contributions of word recognition, language proficiency, and other cognitive skills to measures of reading comprehension. They found support for the SVR model with decoding and oral language skills contributing to reading comprehension, but they speculated that certain features of language proficiency may be more crucial than others (e.g., lexical vs. sentence-level processing); further, they felt that the nature of these disparities might depend on the specific tool used to measure reading comprehension. Discussion regarding the contributions of other cognitive skills to reading comprehension, such as naming speed and reading fluency, is also well documented in the literature (e.g., Johnston & Kirby, 2006; Silverman et al., 2013). As reading research progresses, findings have suggested an elaboration of the SVR (e.g., Castles et al., 2018; Language and Reading Research Consortium, 2015). Recently, Duke and Cartwright (2021) offered the field the active view of reading, an expanded model that addresses bridging processes (i.e. print concepts, reading fluency, morphological awareness) and considers self-regulatory factors such as motivation, executive function skills, and strategies that play a role in reading. These researchers recognized the utility of the SVR in simplifying the complex construct of reading for teachers and proposed the more complex active view of reading to acknowledge and incorporate advanced research into our shared theoretical understanding, with the lens of supporting teachers with holistic and evidence-aligned reading instruction and intervention. Research evaluating components of this contemporary model has already

determined that “intervention in bridging processes and self-regulation contributed uniquely to reading outcomes beyond effects of word recognition and language comprehension interventions” (Burns et al., 2023, p. 37). We can expect that future studies will continue to test the strength and utility of the active view of reading.

Though it has been thoroughly examined and questioned, the SVR model remains a relevant structure within which we can examine the multifaceted construct of reading. Complementing past studies, an assessment of the SVR by the Language and Reading Research Consortium and Chiu (2018) affirmed the model’s strength in describing reading as the product of word reading and listening comprehension through an examination of grade three reading comprehension. Through the components of the SVR, these researchers assessed how well pre-kindergarten oral language and code-related skills (phonological processing and letter knowledge) predicted later reading comprehension. Consistent with past research, both oral language and code-related skills in prekindergarten predicted reading comprehension five years later, highlighting the value of early language and literacy skills for reading proficiency. Further, this study reinforced that timely assessment, instruction, and intervention in these foundational skills is paramount, which is particularly relevant to the present study, as it aimed to more responsively support students’ early reading skills from the moment they enter school in kindergarten. The SVR continues to present an accessible and practical framework to guide school-based assessments to inform classroom instruction and subsequent intervention for students at risk for RD, clarifying for teachers that students need evidence-based instruction to support development of both word-level reading skills and language skills. Given its well-supported and research-based conceptualization of reading, the SVR model adequately provides a theoretical foundation for the purpose of this study.

Evidence-Based Practices

Educators and educational researchers often tend to promote specific assessment practices, intervention strategies, or programs as research-based or as grounded in best practices, demonstrating respectable intention in attempting to address the gap between research and practice; however, evidence-based interventions are clearly distinguished from best and recommended practices in special education in that they are empirically validated (Cook & Cook, 2011). Further, the efficacy of evidence-based practices in education is dependent upon the quality and quantity of the evidence, itself. Gersten et al. (2005) suggested that for a study to have impact, it is imperative that researchers clearly describe the specific context, conceptualization, and design of a study, including a precise description of the intervention for replication and a report on fidelity of implementation. Similarly, Savage (2012) argued for well-executed and well-replicated trials with subsequent meta-analyses to establish that a practice is evidence-based.

Research examining the adoption and implementation of evidence-based interventions in schools reports that selection decisions often tend toward programs that are heavily marketed, compatible with past practices, and lacking in scientific support (Forman et al., 2009; Hallfors & Godette, 2002). Further, according to Hallfors and Godette (2002), when schools purchase and utilize evidence-based programs and interventions, they are rarely implemented with high fidelity (e.g., delivered as intended). Though the research-based curricula examined in this study was introduced across a variety of educational contexts, the sentiment remains true when examining the implementation of academic instructional strategies and interventions in schools. Cook et al. (2008) suggested involving teachers in the conversation to offer critical information

about if and how specific evidence-based interventions will be utilized in their classrooms with students.

Generally, there remains considerable variability regarding criteria and definitions for evidence-based practices across the field of educational psychology. Cook and Cook (2011) defined evidence-based practices as, “practices that are supported by multiple, high-quality studies that utilize research designs from which causality can be inferred and that demonstrate meaningful effects on student outcomes” (p. 73). This definition will be adopted to guide the present study, particularly in the following analysis of literature pertaining to reading instruction. Despite several decades of research on the components of effective instruction and evidence-based intervention in reading, there continues to be considerable variability in how children learn to read in B.C. schools. The following review of what constitutes evidence-based reading instruction is situated within a rich history of research, followed by relevant connections to research on early reading instruction and intervention within a current context.

Historical Review of Reading Research

Reading is a complex, lifelong skill that draws on a range of cognitive, language, and academic skills, and children enter school with vast differences in their oral language abilities, early literacy skills, and past experiences with text. Given the substantial body of literature pertaining to the specific components that contribute to reading, two groups have made concerted efforts to synthesize studies on how to best teach children to read: The National Reading Panel (NRP, 2000) and the National Early Literacy Panel (NELP, 2008). Despite decades of successive research and academic discourse, these reports have been steadfast in their impact and authority with regard to best practice in reading instruction. Involving comprehensive, evidence-based reviews of thousands of studies, both of these reports offered influential information on

reading and early literacy instruction, particularly with regard to identifying the specific skill areas that children need to develop in order to become independent, capable readers: phonemic awareness, phonics, fluency, vocabulary, and reading comprehension (NELP, 2008; NRP, 2000; Shanahan & Lonigan, 2010). From the first day of kindergarten, classroom teachers are responsible for providing quality instruction on all of these core components of reading for all children.

Phonological and Phonemic Awareness

Phonological awareness is the ability to recognize, identify, and manipulate the sequenced sounds and groups of sounds within spoken words, whereas phonemic awareness is the same skill set applied to phonemes, the smallest units of sound in spoken words. Assessment and instruction in PA include rhyming and manipulation of syllables, and phoneme-level tasks can involve isolation, identification, categorization, blending, segmentation, and deletion of individual sounds. In the Ehri et al. (2001b) report of evidence from the NRP (2000) meta-analysis on phonemic awareness, findings indicated that instruction on phonemic awareness, specifically, exerted a moderate, statistically significant impact on reading, and that both word reading and reading comprehension benefited. Of all critical components examined by the NRP, phonemic awareness was found to be the most predictive of reading skills.

Though these particular findings offered substantive evidence for instruction in phonemic awareness, the predictive relationship between PA and reading skills has been thoroughly examined and discussed for many years, documented across multiple study designs, contexts, developmental perspectives, and demographics of participants (e.g., Bus & van IJzendoorn, 1999; Calfee et al., 1973; Vandervelden & Siegel, 1997; Wagner & Torgesen, 1987;). Calfee et al. (1973) tested students from kindergarten through the twelfth grade on their ability to match

and segment phonemes in words, revealing that simple phonological processing skills were significantly related to reading performance through high school; furthermore, these researchers identified distinct phonological processing deficits in older struggling readers, clearly highlighting the need for early development and mastery of these skills as well as targeted intervention in later grades. An additional contribution by Ball and Blachman (1991) found that when participants were taught phoneme segmentation in conjunction with letter-name and letter-sound instruction, it had an immediate impact on their reading and spelling skills. In studying the longitudinal impact of PA on reading, Torgesen et al. (1994) found that children who had a foundation of PA prior to receiving reading instruction typically learned to read more easily than children with deficits in this area.

Subsequent evidence suggests that explicit phonemic awareness instruction targeting the sounds and patterns shared by different words can increase the effectiveness of whole language environments and programs (Iversen & Tunmer, 1993; Ryder et al., 2008). In a study by Ryder et al. (2008), students identified as struggling readers within a whole language classroom received supplementary instruction in phonemic awareness and phonemically based decoding strategies over 24 weeks. This group outperformed a matched control group at posttest on measures of PA, decoding, word recognition, word reading accuracy, and reading comprehension, demonstrating the impact of phonological processing and alphabetic coding on reading achievement. Further, follow-up data collected two years after the completion of the phonemic awareness instruction showed that not only did the intervention group continue to outperform the control group in isolated word recognition and reading comprehension, the effects were generalized to word recognition in text.

Finally, the NRP (2000) found that phonemic awareness instruction had positive effects for both typically-developing readers as well as students at risk for RD, and classroom teachers were effective in teaching phonemic awareness to their students (Ehri et al., 2001b). This finding is particularly relevant to the present study; whereas many studies have examined the results of specific interventions targeting phonemic awareness deficits in struggling reader populations, this result established that universal teaching of this core component is beneficial and impactful for all students within the classroom. More recent longitudinal research has had similar results. Kjeldsen et al. (2019) followed the reading development of a group of students from kindergarten to Grade 9, half of whom received specific PA training in kindergarten. Not only did the students who received kindergarten PA training outperform the control group in Grades 1 through 9, most students who were at-risk at the beginning of kindergarten and received kindergarten PA training were performing at the level of mainstream readers in Grade 9. Current research even suggests that well-developed PA may have a role in decreasing the impact of formal learning interruptions (i.e. due to the Covid-19 pandemic) on the development of early reading skills (Boulet et al., 2023). Bearing in mind evidence that classroom phonemic awareness instruction is often incidental rather than purposeful and explicit, it is imperative teachers recognize the value of teaching PA, and phonemic awareness specifically, as the foundation for reading instruction moving forward (Bursuck & Blanks, 2010).

Phonics and the Alphabetic Principle

An expected but important result from the NRP (2000) meta-analysis on phonemic awareness was the assertion that phonemic awareness instruction was more effective when it was taught in conjunction with the alphabetic principle than when taught in isolation, supporting earlier findings by Ball and Blachman (1991; Ehri et al., 2001b). Byrne and Fielding-Barnsley

(1989) described the alphabetic principle as “usable knowledge of the fact that phonemes can be represented by letters, such that whenever a particular phoneme occurs in a word, and in whatever position, it can be represented by the same letter” (p. 313), though the definition is often simplified as knowledge of grapheme-phoneme, or letter-sound correspondences. Similarly, phonics instruction explicitly teaches students the alphabetic principle in combination with strategies to read words using letter sounds, digraphs, and blends (Ehri et al., 2001a). If we consider the task of decoding printed words, as required by children learning to read, it is unsurprising that phonemic awareness and phonics instruction complement one another. The comprehensive review and meta-analysis by Bus and van IJzendoorn (1999) established that when combined, phonics and phonemic awareness intervention in letter-sound correspondence and blending was most effective for reading.

After years of disagreement in research as to whether phonics has a place in early reading instruction, findings from the NRP (2000) meta-analysis on phonics confirmed that phonics instruction had moderate overall effects on reading, benefitting word-level reading as well as reading comprehension (Ehri et al., 2001a). According to Ehri et al. (2001a), systematic phonics instruction contributed to reading skill development more than any other control group instruction and effects persisted after instruction had finished. Systematic approaches to phonics instruction involve sequential teaching of a predetermined set of phonics components, and there are various methods with regard to content, sequencing, and mode of delivery. In a study further exploring the benefits of systematic phonics instruction with kindergarten students, de Graaff et al. (2009) found that a systematic phonics group made more progress than both a non-systematic phonics group and a control group on measures of phonemic awareness and reading, confirming the earlier NRP results. Despite the role of phonics in ongoing discussions regarding pendulum

swings in best practice reading instruction, research on phonics as a critical component of reading instruction is well-established and steadfast (e.g., Castles et al., 2018; Moats, 2019).

Vocabulary

Though there was an insufficient database of research examining vocabulary instruction for the NRP (2000) to conduct a formal meta-analysis, there are many studies substantiating the importance of vocabulary knowledge for reading. In a summary of results, the NRP reported that while oral vocabulary is necessary for students to transition from oral language to written text, reading vocabulary is fundamental for comprehension processes. A subsequent meta-analysis by Elleman et al. (2009) found that vocabulary instruction benefited students with reading difficulties more than three times as much as typical students on comprehension measures. Consequently, the NRP recommendations for direct instruction, providing students with repeated exposure to and practice with new terminology, and maximizing learning opportunities in language-rich environments to facilitate vocabulary acquisition and comprehension remain relevant.

Although research has established that vocabulary instruction has a positive impact on vocabulary acquisition, and therefore on reading, questions remain around specific strategies for instruction and methods of measurement (Hairrell et al., 2011). While there is no single method of vocabulary instruction that is effective for all students, a variety of methods used effectively can result in student learning. Biemiller and Boote (2006) tested the influence of repeated readings of story books with word explanations on word meaning acquisition, finding that direct whole-class instruction can increase the vocabularies of both students with initially low vocabularies and those with more knowledge of words. An alternative method was explored in a study by Boulware-Gooden et al. (2007), who found that the direct teaching and guided use of

metacognitive strategies increased student performance on a measure of vocabulary. Regardless of which specific evidence-based method is utilized, purposeful teaching of vocabulary to all kindergarten children is an essential component of effective reading instruction.

Fluency

Capable readers can read text with fluency, accuracy, phrasing, and expression, and there is a common understanding amongst practitioners that fluency is an essential aspect of reading (NRP, 2000). Reading with fluency involves accuracy and automaticity in underlying sublexical processes, lexical processes, and the integration of those processes in reading words at the level of connected text (Wolf & Katzir-Cohen, 2001). Within Wolf and Katzir-Cohen's working definition of reading fluency, once a student fully develops foundational phonological, orthographic, and morphological processes, oral reading presents as smooth and effortless, and comprehension can fully be activated and engaged. Other researchers in the field have postulated that oral reading fluency is an indicator of overall reading competence, and that reading fluency is the key link between word recognition and comprehension (Bashir & Hook, 2009; Fuchs et al., 2001; Katzir et al., 2006); however, in spite of this evidence, fluency is often excluded from classroom reading instruction. Overall, research on reading fluency supports direct and guided instruction in contrast to simply providing opportunities for students to read independently, as well as regular assessment of reading fluency and accuracy to monitor progress in this area (NRP, 2000).

Reading Comprehension

Comprehension is the essence of reading, and students demonstrate reading comprehension when they can make meaning from written text. Harris and Hodges (1995) define reading comprehension as, "intentional thinking during which meaning is constructed

through interactions between text and reader” (p. 39). Reading comprehension is a complex process that requires active metacognitive engagement on the part of the learner. Indeed, it is a multifaceted construct with regard to its conceptualization, measurement, and instruction, and there are many interpretations of what specific skills contribute to reading comprehension. As previously discussed, the SVR is one model that informs assessment and intervention that is strongly supported by research. With regard to reading comprehension instruction methods, the NRP (2000) stated that formal instruction of comprehension strategies can lead to improved understanding of text and use of information. When taught by prepared, trained teachers, reading comprehension strategies can benefit readers in terms of demonstrating comprehension through recall, questioning, and synthesizing of texts (NRP, 2000). In a past study examining the child and instruction interactions in effective reading comprehension instruction, McDonald Connor et al. (2004) found that children achieved greater growth in classrooms where more time was spent on teacher-led reading comprehension activities than in classrooms offering student-managed reading comprehension activities; furthermore, findings revealed that teachers spent less than one minute per day on average providing explicit instruction in reading comprehension strategies, indicating a sizeable gap between research and practice. These past findings corroborate that, in parallel to discussions on previous components of reading, teachers need to offer skillful, purposeful instruction on reading comprehension that is flexible and adaptable for classroom practice. Ultimately, children need to be taught how to read and how to best understand what they read.

Delivery Principles

Beyond identifying the core components of effective reading instruction, the NRP (2000) also discussed how those skills are best taught in school. A common theme across effective

reading instruction strategies is that teaching must be intentional (e.g., deliberate instruction of specific skills through purposeful strategies) and systematic (e.g., instruction follows a carefully planned sequence) (NRP, 2000). Intentional and systematic curriculum delivery requires teachers to place value upon the core components of reading, to be organized in terms of planned lessons and prepared materials, to be progressive in how content is introduced and built upon, and to be flexible and receptive to student questions, feedback, and progress. Accessing students' prior knowledge, making connections between similar concepts, frequent reviews of shared content, and many opportunities for practice in authentic contexts allows students to strengthen understanding of new content and demonstrate applied skills. Further, and arguably most importantly, practitioners must be open to adapting their practice, including the implementation of current, evidence-based practices to best meet the needs of all learners in their classrooms. Although many aspects of effective instructional delivery have previously been discussed in the context of the core components, research supports engaging, direct, and scaffolded reading instruction for all students (NRP, 2000).

Student engagement is a multi-layered construct, and current conceptualizations of engagement can include behavioural, emotional, and cognitive components that involve student interest level, compliance with expectations, motivation, and effort (Fredricks et al., 2004). Likewise, highly engaging instruction captures and maintains student attention, and research has demonstrated positive correlations between attention and achievement-related outcomes (Fredricks et al., 2004). Student engagement can be strengthened by planned activities that require active involvement from students, use of interesting materials, and many opportunities for meaningful learning in relevant and real-life contexts.

Additionally, direct instruction is a key delivery principle across all areas of education, but it is especially vital in early reading instruction. It is not enough for students to have repeated exposure to language in text format, and while some students may need it more than others, all students benefit from direct, explicit teaching of reading skills and strategies at their respective levels (Denton et al., 2003; Nelson-Walker et al., 2013). Direct instruction is teacher-led and straightforward, and according to Denton et al. (2003), explicit instruction is when “the teacher models and teaches skills and concepts clearly, rather than requiring the student to make inferences that may lead to confusion in less-proficient learners” (p. 202). The effects of direct and explicit instruction have been extensively investigated in research, demonstrating positive outcomes on student progress in reading (Foorman et al., 1998; NRP, 2000; Rupley et al., 2009). In a comprehensive review of effective reading instruction for struggling readers, Rupley et al. (2009) discuss the role of direct and explicit teaching as an integral part of learning the core components of reading. These authors suggest that direct teaching does not only involve explicit explanations of content, but also encompasses teacher guidance of student learning through modeling, demonstrating, and offering opportunities for guided practice with gradual release of responsibility. As part of a teacher’s repertoire of instructional methods and when adapted to best meet the needs of individual students, direct and explicit teaching can increase the likelihood that students learn essential reading skills (Rupley et al., 2009).

Finally, the concept of scaffolding as a method of instruction has existed for many years, often discussed in its capacity to support learning with tasks that require skills beyond a student’s independent ability. Accordingly, scaffolded instruction involves a system of temporary supports for the accomplishment of or participation in academic tasks that students otherwise may not be able to complete or take part in (van de Pol et al., 2010). Often, scaffolded

instruction is seen as a continuum between teacher demonstration and independent student performance with various stages involving guided learning and practice in between. The temporary characteristic of scaffolded supports is dependent on student progress; once a student demonstrates that they are capable of demonstrating a skill with a certain level of support, that support is adapted or removed to meet the student's current level of performance, with the goal of increasing student independence (van de Pol et al., 2010). In addition to its competence in providing supports specific to student need, scaffolded instruction is considered effective in promoting student learning, particularly when there is an appropriate level of adaptivity and challenge involved in the scaffolded supports (van de Pol & Elbers, 2013). To effectively utilize scaffolded instruction in practice, however, teachers need to consider and decide upon when to initiate support, how much support to provide, and on what to focus (Rodgers et al., 2016). With regard to reading instruction, specifically, Torgesen (2002) stated that scaffolded reading instruction for students at risk for RD should consist of careful sequencing of activities and task-oriented teacher-student dialog including questions, prompting, and cueing. Similarly, Rupley et al. (2009) suggested that use of appropriate scaffolding can teach students reading comprehension strategies through modeling and guided facilitation as opposed to a unidirectional transfer of information. Best practices in early reading instruction involve delivery that is intentional, systematic, engaging, explicit, and sufficiently supportive to enhance learning for all students in the classroom. These pedagogical aspects are critical, as suggested by the NRP (2000), and are essential to consider within the present study, as teachers' instructional approaches can impact the efficacy of the interventions targeting students' early reading skills.

Early Reading Instruction

Classroom instruction is unquestionably the foundation of all multi-tiered support frameworks, and it is kindergarten classroom teachers who have the initial opportunity within the school system to provide students with essential reading skills that will serve them through the rest of their formal education. Further, kindergarten teachers have the responsibility to deliver direct, explicit instruction for students to develop skills that are foundational to reading. Unique to teaching in early learning environments such as kindergarten classrooms, however, is the opportunity to teach these critical skills through regular opportunities for students to purposefully and meaningfully play with language in the classroom amongst their peers. With regard to curricular learning standards, it is expected that children will have consolidated foundational reading competencies and content including PA and phonemic awareness, concepts of print, letter knowledge, making connections to text, retelling elements of texts, and recognizing some familiar words by the end of their kindergarten year (British Columbia Ministry of Education, n.d.).

Given that most students are not yet reading connected text independently in kindergarten classrooms, the instructional emphasis is primarily on direct and explicit teaching of foundational early reading skills including PA, emergent phonics, and vocabulary. Aptly, there is an incredible number of resources available to teachers targeting development of these particular skills within a literacy-rich environment. With the lens that many teachers lack the specialized knowledge and training to successfully teach systematic phonics, Ehri and Flugman (2018) studied the capacity of a mentoring program to improve teacher effectiveness and student reading achievement. Utilizing ongoing support from a mentor, teachers provided sequential, progressive lessons to all kindergarten students on letter sounds and combinations of sounds, and

how to blend sounds to read and write words. While some students were still not meeting grade-level expectations by the end of the school year, reading scores showed sizeable gains throughout the study that far exceeded reported effect sizes from comparable research; therefore, the authors argued that similar results could potentially be obtained from providing pre-service teachers with the knowledge and instructional practices to implement a systematic, research-based phonics curriculum in the classroom.

Recent research suggests that beyond the basic task of repeating or memorizing definitions, evidence-based vocabulary instructional approaches that engage students in learning include explicit teaching of the strategies for learning words (Graves et al., 2017). All students benefit from explicit teaching of key academic vocabulary to grasp the meaning of text through finding the words in context, discussing definitions, and extending the meaning through a variety of engaging activities (Foorman & Wanzek, 2015). The instructional approach with regard to fluency involves high levels of scaffolding, emphasizing to emerging readers what it sounds like to read connected text with fluency, phrasing, and expression. More specifically, it is recommended that kindergarten teachers offer regular opportunities to engage meaningfully with connected text through read-alouds, and shared, repeated readings of chants, poems, finger plays, morning messages, and familiar song lyrics (British Columbia, n.d.). Similarly, when providing instruction on reading comprehension, kindergarten teachers employ scaffolding to engage students in meaningful discussion about texts, allowing opportunities for students to connect to text, modeling comprehension and self-monitoring strategies through think-alouds. Generally, kindergarten students in today's classrooms should be actively participating in comprehensive, evidence-based reading instruction that will form the foundation for further literacy learning, though educators need also to be purposeful in their planning and delivery for optimal skill

development. Regardless of individual students' proficiency with reading connected text, all students should receive instruction in all components of reading; however, the core components primarily of interest to the present study were PA and emergent phonics (e.g., letter knowledge), given their foundational role in reading skill development and their status as predictors of later reading proficiency. Further, the collaborative approach to professional development within the present study examined teachers' existing practices in early reading instruction, providing supplemental and ongoing support to ensure that teachers were delivering developmentally-appropriate instruction on these essential early reading skills.

Early Reading Intervention

Research on evidence-based reading instruction is paralleled by an extensive collection of studies and meta-analyses examining the efficacy of reading interventions (e.g., Denton et al., 2022). It is imperative that kindergarten classroom and learning support teachers recognize the significance of developing students' PA skills and letter knowledge, specifically the segmenting and blending of phonemes, as the foundation for reading intervention. Findings suggest that for kindergarten students identified as at-risk for RD, both systematic, commercial intervention programs and school-designed practice interventions can demonstrate efficacy in boosting early reading performance (Simmons et al., 2011). Ball and Blachman (1991) designed a strong, quasi-experimental study to evaluate the effects of phoneme awareness training on kindergarten students' reading and spelling skills. Their results strengthened the notion early on that explicit, small-group instruction can effectively teach children the skills to segment phonemes in words. These results have been substantiated and supported by many additional studies since (e.g., Bus & van IJzendoorn, 1999; Vandervelden & Siegel, 1997; Wang & Algozzine, 2008). More recently, a study by Menzies et al. (2008) was effective in documenting the implementation of

evidence-based strategies to decrease the incidence of reading difficulties among a group of at-risk students in grade one. These researchers focused their design around ongoing progress monitoring, intense small-group instruction, and an explicit instructional approach along with adequate support for teacher collaboration and ongoing assistance from a literacy coach. While qualitative data indicated that some aspects of the implementation were challenging for classroom teachers and support staff, the research-based strategies proved to be very successful, as most of the first-grade students in the sample were reading at grade-level by the end of the year. This study illustrated that implementation of a few evidence-based and learner-informed strategies can have a considerable impact on student learning, pertinent to the RTI approaches adopted by classroom teachers within the present study. As stated by Lane et al. (2002) the goal of PA intervention is to provide conspicuity with regard to the sound structure of language, particularly for those students who do not naturally develop skills in this area. For students with severe reading deficits, current research even suggests targeted, intensive interventions in PA can result in a rate of growth equal to the rate of growth of students without reading deficits (Burns et al., 2020).

Students who are identified in later grades to receive intervention in reading can have complex learning profiles including significant deficits in foundational literacy and language skills (Foorman & Torgesen, 2001; Snowling & Hulme, 2011). While reading intervention in later grades is often comprehensive, with the flexibility to target all five components of reading instruction as described above, typical Tier 2 interventions for kindergarten students involve additional intensive instruction targeting PA and letter-sound correspondences specifically, given their complementary foundational role in reading skill acquisition. The overall framework and individual tiers of RTI will be described in more detail in a subsequent section. As described

above, findings in early intervention research consistently suggest that supplemental kindergarten intervention provides a critical advantage for developing students' PA and alphabetic proficiency (Simmons et al., 2011). Within the second tier of an RTI model, evidence-based reading intervention is closely aligned with the delivery principles of reading instruction and involves additional explicit teaching on the core components of reading, only with increased intensity. Just as best practices in reading instruction involve a systematic and thoughtful delivery, reading interventions are individualized, specialized, goal-directed, guided by student performance, and of course, evidence-based (Vaughn & Bos, 2015). Given the specialized nature of these interventions, most academic support in Tier 2 is provided by the school-based learning support teacher or inclusive educator; similarly, oral language interventions may be provided by a speech-language pathologist. Nonetheless, all reading intervention for students at risk for RD must be delivered in a timely, intensive, targeted, and responsive manner.

In order to effectively and reliably identify students who are at risk for RD, administration of screening measures needs to be timely, and appropriate reading interventions need to be provided early in elementary school (Foorman et al., 2003); not only do early intervention efforts get the best value in closing a gap while it is small, but recent research also suggests that children in kindergarten are more motivated and engaged during reading intervention than in subsequent grades (Erickson, 2023). Students who are identified by screening measures as at risk or those who do not respond to classroom-based instruction as per progress monitoring tools need immediate access to intervention-level supports. Essentially, intensive and targeted instruction is at the foundation of all effective reading intervention. It is the responsibility of interventionists, often learning support or inclusive education teachers, to

deliver service at a level beyond that which is offered by teachers to all students in the classroom. Effective methods of increasing instructional intensity involve frequent sessions with smaller and more homogeneous groupings taught by skilled interventionists, targeting specific reading skills (Foorman & Torgesen, 2001; Fuchs & Fuchs, 2006). To explore the effects of group size, Elbaum et al. (2000) looked primarily at the efficacy of one-to-one, adult-led reading interventions for elementary students, such as Reading Recovery. While findings supported prior statements that one-to-one interventions can have a substantial impact for students with serious RD, results also indicated that evidence-based interventions implemented by highly qualified teachers can offer the same academic benefit to students whether delivered one-to-one or in groups of two to six students. Similar results have been reported across research on treatment intensity (Cavanaugh et al., 2004; NRP, 2000; Ross & Begeny, 2015); however, practitioners should be cautioned that group size will only impact intervention intensity if it changes the number of student-teacher interactions (Nelson-Walker et al., 2013). Results on the efficacy of small group intervention have significant practical implications, as they support an increase in the number of students exposed to intensive, targeted instruction in schools, relative to one-to-one support.

A research synthesis by Cavanaugh et al. (2004) specified that daily interventions with targeted sessions between 15-30 minutes have the highest effect sizes for kindergarten students at risk for RD. Moreover, in examining attributes of effective and efficient reading intervention for kindergarten students identified as at risk for RD, Simmons et al. (2007) conducted a randomized experiment comparing three levels of intervention differing in instructional time and program design. In an evaluation of 15-minute blocks versus 30-minute blocks, while the two were comparable in increasing at-risk students' phonemic awareness proficiency, the 30-minute

block was significantly more effective in improving the alphabetic skills for the lowest performing students. Researchers noted the additional time was necessary for the children most at risk, as it allowed for increased opportunities for practice and reinforcement of the learned skills. Predictably, with regard to program design, this study also concluded that highly specified instruction was more effective than moderately specified instruction, highlighting the importance of utilizing instructional time strategically to accelerate learning and maximize the impact of interventions.

Students who are at risk for RD need individualized instruction informed by assessment results; furthermore, small-group interventions require teachers to differentiate their instruction to best meet the needs of individual learners. Though schools often collect data on student achievement across academic domains, including reading, the challenge lies in linking assessment and instruction for students who need more intensive support (Coyne et al., 2016). Data should be the driving factor behind decisions around identification of students who are at risk for RD and discontinuation of more intensive interventions when students demonstrate sufficient progress or meet grade-level benchmarks. Practitioners and interventionists need to be skilled in assessing student performance and progress, then organizing, interpreting, and utilizing such data to inform and tailor instruction (Coyne et al., 2016). This strong evidence base on best practice in reading intervention is pertinent with regard to the present study, as the study examined the efficacy of small-group intervention as a component of learner-informed practice within a multi-tiered framework. If students do not respond to reading instruction within the classroom academic program, school teams must intervene with additional supports, and those supports must offer a level of service above and beyond classroom teaching.

Screening and Progress Monitoring

Given the knowledge base on reading intervention efficacy and the tremendous value placed upon reading skills for success in school and life, valid and reliable assessment tools are required within an RTI model for monitoring student progress and for early identification of students who are at risk for RD. Amongst its comprehensive and systematic review on early literacy, the NRP (2000) report clearly indicated that preventative interventions, or those provided for students identified as at risk for RD, are significantly more effective than remedial interventions for students already experiencing RD. Universal student screening at Tier 1 should commence at the beginning of kindergarten, targeting foundational oral language and PA skills, given their aptitude for predicting more advanced reading skills (NRP, 2000). Considering the role of language in reading skill acquisition, Snowling and Hulme (2011) recommended administering screening measures of expressive vocabulary and non-word repetition to capture language and phonological difficulties, respectively. Similarly, in exploring the early identification of RD within an RTI framework, Catts et al. (2015a) confirmed that screening measures of letter naming, PA, rapid naming, and non-word repetition administered to students at the beginning of kindergarten accurately predicted capable and struggling readers at the end of grade one. Student growth in letter naming significantly increased the ability of the model to predict reading outcomes. While letter naming and PA are often utilized in existing kindergarten screening batteries, Catts et al. suggested that additional measures such as rapid naming and non-word repetition may improve their accuracy. More recently, Clemens et al. (2020) found that a measure of letter sound fluency administered in the fall of kindergarten, when compared to other curriculum-based measures (CBM) in PA or alphabetic knowledge, was strongly predictive of subsequent word reading performance in kindergarten. These findings are relevant to the present

study as they emphasize the role of letter-sound knowledge and provide evidence for the inclusion of letter sound fluency in fall screening measures for kindergarten students; hence, the present study utilized such a measure to track students' progress and indicate level of risk.

To effectively and reliably identify students who are at risk for RD, administration of screening measures needs to be timely, and appropriate reading interventions need to be provided early in elementary school (Foorman et al., 2003); however, there are advantages and challenges associated with the various approaches for selecting students who may benefit from interventions. For example, while screening measures administered at the beginning of kindergarten have been the least accurate in selecting students for intervention, waiting to screen or delaying intervention poses additional risks in lost instructional time (McAlenney & Coyne, 2011). Students enter kindergarten with varying levels of skill across components of language and literacy, often attributed to prior early learning experiences and individual differences, and many students make considerable gains in these areas in response to kindergarten instruction (Catts et al., 2015a). In an effort to address discrepancies in how schools utilize RTI frameworks to allocate services and respond for students who are identified as at risk on screening measures, Al Otaiba et al. (2014) compared the efficacy of typical RTI and dynamic RTI models. Screening measures of letter sound, word reading and decoding were administered to students in fall of first grade. Students in the typical RTI group all began receiving general, Tier 1 reading instruction in the classroom, regardless of screening results. If students had not demonstrated sufficient progress after eight weeks, they were eligible to receive Tier 2 supports and interventions. In contrast, students in the dynamic RTI group were assigned to tiers based upon original screening results; students with scores below the 40th percentile were considered immediately eligible for Tier 2 intervention, forgoing the opportunity to progress with general

classroom instruction. Results revealed that students in the dynamic RTI group significantly outperformed the typical RTI group on measures of reading at the end of grade one, suggesting it is possible to accurately identify students for more intensive intervention from initial screening results. Although typical RTI methods can potentially decrease the occurrence of false positives, it is not necessary to delay interventions if students qualify for support beyond classroom instruction.

Evidence-based progress monitoring tools, such as Dynamic Indicators of Basic Early Literacy Skills (DIBELS), can provide informative data specific to how students are responding to classroom teaching and intervention, effectively supporting individualized, responsive instruction to improve student early reading skills (Good & Kaminski, 2011; Wang & Algozzine, 2008). While using this type of measure for universal screening has become a more common practice in recent years, research suggests that teacher use of academic progress monitoring tools is uncommon, and that it is not regular practice for teachers to be making decisions based in response to assessment data (Silva et al., 2020). All students will benefit from best practices in reading instruction in the classroom, but for those students who are at risk for RD, high quality instruction is crucial; furthermore, some students will require additional opportunities for explicit, targeted instruction and extensive practice to learn and apply the skills to blend and segment sounds in words, and to efficiently decode and comprehend text. In order to identify those students who are at risk and who may benefit from additional intervention, practitioners often administer a CBM or norm-referenced measure, selecting those students who score below a specific benchmark, typically the 20th or 25th percentile, to receive Tier 2 interventions (Catts et al., 2015a; Fuchs & Fuchs, 2006).

CBM is an approach designed for screening or assessing students in specific academic skill areas and monitoring progress or responsiveness to intervention. It was designed and developed by teachers, for teachers, and follows a specific set of standardized procedures focusing on measures that are technically adequate, time efficient, and easy to teach (Deno, 2003). Correspondingly, CBMs are a practical and cost-effective approach to assessment and progress monitoring. CBMs of reading, for example, are commonly reported in the research as sensitive, flexible, efficient, and reliable. A literature synthesis on these measures reported acceptable reliability with a diverse range of criterion measures through multiple studies across a variety of participants, procedures, materials, and researchers (Wayman et al., 2007). CBM approaches to reading assessment are being used increasingly in Canadian schools to capture student reading skills in phonemic awareness, decoding, oral reading fluency, and reading comprehension. Accordingly, CBMs were utilized within the present study to monitor student progress in response to instruction and to identify students who would benefit from supplemental intervention.

Implementation Science

Despite considerable research on instruction, intervention, and assessment for students who are at risk for RD, as described above, evidence-based strategies are seldom transferred to and utilized effectively within classroom settings (Coffey, 2023; McGoey et al., 2014). This lack of translation from research into current practice evident in Canada is consistent across multiple, comparable educational contexts, including the U.S., Australia, and New Zealand. Chapman et al. (2018) suggest that, “because of the different theoretical understandings of what reading is and how it should be taught, many teachers have not had the opportunity to refresh their teaching skills in line with contemporary scientific research on best practice in literacy instruction” (p. 6).

Drawing on research documenting that, despite knowledge of evidence-based practices, teachers often have difficulties implementing them in the classroom, Chapman et al. made the case for revamped professional development in literacy teaching in New Zealand.

While implementation as a general concept has been fairly well researched, implementation science in educational psychology is a relatively new field aiming to address the existent research to practice gap through systematic examination of the factors and barriers impacting teachers' introduction and sustained application of evidence-based interventions in the classroom (Fixsen et al., 2005). This can involve investigation of how to transition core components of an intervention into a practice setting, how to adjust the intervention to fit the local context, and how to ready the culture and climate of an organization prior to introduction (Forman et al., 2013). This is particularly relevant to the present study, as the study involved a purposeful consideration of teacher perspectives on the school district's implementation of a new approach to supporting reading skill development in kindergarten classrooms. Originating in the field of medicine, implementation science provides the foundation of knowledge for researchers to purposefully design and employ empirical interventions using methods that ensure their effectiveness in authentic, real world contexts. Frameworks for implementation can involve stages for exploration, adoption, installation, implementation, and sustainability (Blase et al., 2012). A scientific focus on implementation has the potential to directly connect theory and practice by presenting evidence that initiates and sustains change in real-world contexts (Kelly, 2012).

Educational contexts are complex, however, and implementation issues can be related to the nature of the intervention, the users who are involved in the process, and the institutional context itself (Cook & Odom, 2013). Forman et al. (2016) recommend that partnerships at the

district and school levels need to be made and sustained, ideally so teachers and administrators buy-in and feel joint ownership of initiatives. Additional literature discusses multiple barriers to the use of evidence-based practices in the classroom, including lack of teacher training, lack of time, lack of resources, and lack of support (e.g., Long et al., 2016; McGoey et al., 2014). School schedules, student attendance and behaviour management can also impact implementation fidelity (LaRusso et al., 2016). With regard to implementer-level factors, research posits that teacher attitudes can be viewed as both barriers and proponents of effective implementation, elements of teacher choice and autonomy can impact implementation fidelity, and the likelihood of effective implementation increases when teacher efforts are supported by administrators, district leaders, and ministry policy (Beycioglu et al., 2010; Johnson et al., 2014; Klingner et al., 2003). Evidence also suggests that successful implementation of an intervention to students at risk for RD should involve ongoing teacher collaboration with a literacy coach (Menzies et al., 2008). Training and coaching have been shown to have a general positive impact on teacher practice; furthermore, the level of teacher implementation strategies can significantly increase when additional performance feedback is provided (Reinke et al., 2014). Recent research even suggests that teacher stress and well-being are factors associated with the approval and application of evidence-based practices (Larson et al., 2018). Collectively, this research is consistent with that on implementation of RTI frameworks at the school level. In order to increase the use of evidence-based approaches in schools, researchers and practitioners need to consider who will be conducting the implementation on a daily basis, and how to best support those individuals. Consequently, the professional learning and instructional support provided to teachers within the present study was ongoing, collaborative and responsive.

Through exploration of the barriers and support factors involved when implementing a pilot RTI model in Ontario, Canada, Pyle et al. (2011) reinforced that teacher empowerment has an important role in the successful implementation of new programs or pedagogical approaches. For the purpose of their qualitative study, these researchers operationalized an existing definition of teacher empowerment: “the confidence to make and the power to enact situationally appropriate instructional decisions that improve the quality of education for students” (Pyle et al., 2011, p. 259). While teacher perceived barriers such as isolation and interpretation of progress monitoring data were mitigated by supports involving opportunities to collaborate and additional instruction, respectively, all participating primary teachers expressed persistent feelings of powerlessness, hereby impacting the uptake of new instructional strategies to support their students’ literacy learning. Considering the finding that teachers’ feelings of empowerment were tied to their respective school environment, these researchers concluded that context is critical when implementing a new initiative, and that teachers are more likely to enthusiastically adopt practices when they have the opportunity to connect with their colleagues and when they feel integral to the initiative. A noteworthy limitation of this study was that it included only a partial implementation of an RTI structure, impacting teachers’ perceived ability to intervene for those students who were at risk for RD. Teachers expressed frustration that there was no Tier 2 programming to address the needs of those students who were not responding to Tier 1 instruction, particularly because gaining the ability to improve all students’ literacy learning was the primary motivating factor for participation in the pilot.

Finally, while the development of best practices in implementation remains vital for addressing the gap between research and practice, high fidelity implementation does not have an impact without a foundation of solid instructional and intervention research. Fidelity is often

measured by observation or self-report, and it is hypothesized that higher levels of fidelity lead to better student outcomes (van Dijk et al., 2023). In a review of evidence-based reading interventions, Savage (2012) stated that the definition of implementation science, involving the application of clinical research into routine practice, is flawed in that it assumes that the field has well-designed studies to employ. Although Savage argues for advancement through additional programmatic studies with well-designed RCTs, it is imperative that future studies in reading instruction and intervention are purposefully and thoughtfully designed to consider the complex and diverse nature of real classrooms. Additionally, it is necessary that rigorous studies measure and report on implementation fidelity to support and substantiate statistical findings (Dunst et al., 2013; Greene, 2015). These are some of the necessary steps toward diminishing the gap between research and practice. Meaningful research in educational psychology must demonstrate awareness of the needs within the specific context it is aiming to benefit, students and practitioners alike. The present study was situated within real kindergarten classrooms, and was responsive, in both rationale and design, to support students' early reading skill development within a local school district. No single strategy or intervention is going to work for all students or teachers; however, adoption of evidence-based, learner-informed practices within an RTI framework has the potential to support all students more effectively.

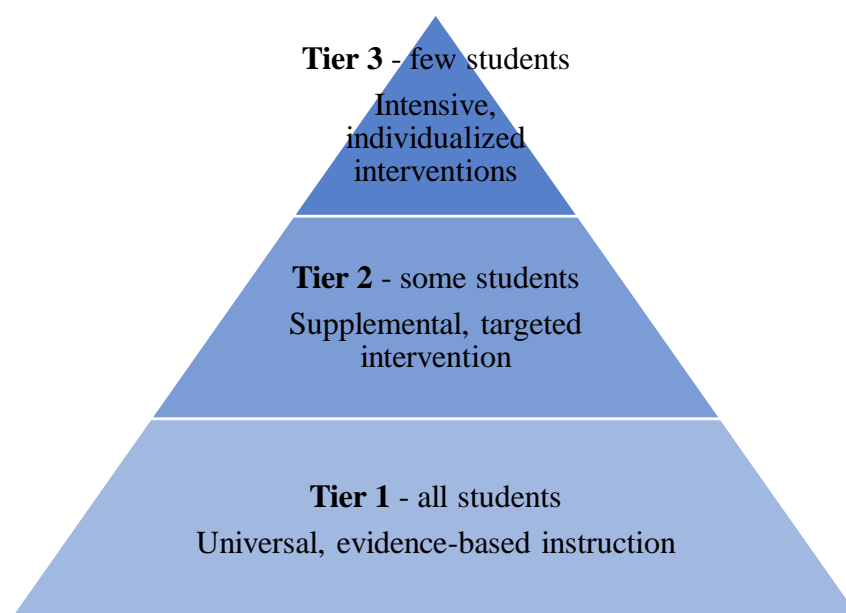
Response to Intervention (RTI)

Response to Intervention provides a framework that systematizes student learning from general classroom instruction to targeted intervention, utilizing screening and assessment measures to ensure responsiveness to individual student needs within an inclusive environment. Whereas the original introduction of RTI was geared toward identification of students with learning disabilities to complement the existing IQ-achievement discrepancy model, a more

current focus is on the capacity of RTI to deliver results for all students, especially those who may struggle academically (Jimerson et al., 2016). Put succinctly by Jimerson et al. (2016), “RTI involves universal screening, evidence-based instructional programming and curricula, routine progress monitoring of all students, increasingly intensive supplemental support and intervention for struggling students, and effective teaming practices” (p. 1). The intensity of academic intervention increases within each subsequent tier, achieved by (a) more systematic, explicit instruction, (b) more frequent instruction, (c) sessions of longer duration, (d) smaller and more homogeneous groupings, or (e) utilizing instructors with greater expertise (Fuchs & Fuchs, 2006). For the purpose of the present study, RTI was operationalized as a framework for a learner-informed, responsive approach to teaching reading in order to support all students within the school community. Figure 1, below, shows a common three-tiered operationalization of RTI with increasingly intensive and strategic levels of support.

Figure 1

Response to Intervention framework



Originally present exclusively in special education contexts in the U.S., RTI has been studied extensively since its introduction as an alternative to IQ-achievement discrepancy for identifying students with learning disabilities in the Individuals with Disabilities Education Improvement Act (IDEA, 2004; Fuchs & Fuchs, 2006). Research on the efficacy of such multi-tiered frameworks has revealed variable results over the years with regard to student achievement, teacher perspectives, and implementation fidelity. Likewise, the purpose of RTI, its essential components, and its methodologies for implementation have been thoroughly analyzed and actively contended over the years (e.g., Fuchs & Deshler, 2007; Fuchs & Vaughn, 2012). As previously indicated, individual states in the U.S. have adopted RTI or similar systems to provide support to all students through early intervention; however, considerable inconsistencies lie in localized policies and procedural approaches to implementation, leading to vast differences in measured impact across the country.

An early report by Torgesen (2007) presented data from a large number of schools in Florida that received professional development in differentiated classroom instruction, screening and progress monitoring, and responsive intervention to implement RTI as an instructional model to reduce the number of students experiencing reading difficulties by grade three. Results across 318 elementary schools illustrated significant year-to-year reductions of students identified as having learning disabilities over a three-year period. Torgesen posited these findings could potentially be explained by, (a) the immediate impact of RTI in reducing the number of students with serious reading difficulties, or (b) the provided professional development having boosted teachers' confidence in their ability to support student needs more adequately within the classroom, leading to fewer referrals for special education services. Despite these positive results, Torgesen recognized that in the absence of sufficiently powerful

evidence-based early interventions for students who are struggling, RTI models may actually delay the identification of students who require further assessment or more intensive and individualized intervention. Subsequent research has strengthened the earlier notions of RTI as an effective model for timely and effective intervention for students who are at risk for RD, when evidence-based interventions are implemented with fidelity (Bursuck & Blanks, 2010; Catts et al., 2015a). Correspondingly, there is also a large body of research that documents key elements and strategies that lead to successful implementation of RTI (e.g., Hoover & Love, 2011). Catts et al. (2015a) demonstrated that use of a universal screening tool in kindergarten effectively identified students who were at risk for RD, allowing for timely intervention to occur. Jimerson et al. (2016) co-authored a comprehensive handbook of RTI detailing the research foundations of science and practice including implications for application in classroom contexts, noting that RTI is an evolving science that continues to be refined.

Naturally, research also recognizes that RTI is not without imperfections. Noteworthy results include a nationwide evaluation of RTI for elementary school reading by Balu et al. (2015) that examined prevalence of RTI practices, organization of instruction- and intervention-level supports, and impact on student reading outcomes. Evaluators found that assignment to Tier 2 or Tier 3 intervention services had no statistically significant impact on performance for students in grades two and three on a year-end comprehensive measure of reading. Findings also indicated that, for first grade students who performed just below the at-risk cut point on a fall screening measure, Tier 2 or Tier 3 service had a negative effect on year-end performance. While at first glance these results appear to emphasize the ineffectiveness of RTI, they warrant interpretation with caution. Further analyses have scrutinized the original evaluation, questioning its comprehensiveness, design, generalizability, and therefore, the quality of its

findings (Fuchs & Fuchs, 2017; Gersten et al., 2017; Shinn & Brown, 2016). A primary weakness concerns the extent to which individual schools adhered to evidence-based practices within the RTI structure. Though the majority of participating schools reported “full implementation” of RTI for more than three years, the evaluation report illustrated strong, statistically significant differences across collection and use of assessment data, allocation of resources, and employment of interventions (Dougherty Stahl, 2016). An important additional feature of this study, as noted by Dougherty Stahl (2016), was that all participating schools were implementing RTI without expertise or guidance from external specialists or researchers, in contrast to many published studies on RTI implementation. When this key aspect of the study is considered, the results offer much more than a simple statement on the efficacy of RTI. Future researchers and education stakeholders are given a glimpse into how, in the absence of implementation fidelity systems, schools may interpret RTI approaches in contradiction of research and policy and operate accordingly. The results offered pertinent information for the development of the present study, leading the researcher to design professional learning for participating teachers that was collaborative and ongoing, including measures to confirm appropriate levels of fidelity. Furthermore, it was this notion that led Fuchs and Fuchs (2017) to recommend that a simpler framework, such as one that involves only two tiers instead of three, may bolster schools’ implementation fidelity of the most important components of RTI: universal screening, sound classroom instruction, progress monitoring, and intensive intervention.

Regarding teacher perspectives, researchers have gathered rich data on educator views concerning RTI implementation, knowledge of instructional methods, RTI practices, data collection, and effect of RTI on teaching practices, as well as barriers and supportive factors

(e.g., Foorman et al., 2020). For example, in a qualitative analysis exploring teachers' perceptions after the first year of RTI implementation, results indicated that teachers positively viewed the reform effort and reported development of skills to enhance instruction; however, teachers also voiced concerns about lack of time to communicate and collaborate with colleagues and difficulties in adjusting their practice when students were not adequately responding to instruction (Greenfield et al., 2010). Similarly, an exploratory mixed method study examining teachers' thoughts on RTI implementation suggested that teachers may be more confident in using assessment tools to measure and identify students for early intervention than in their capability of preventing academic difficulties through their classroom instruction (Wilcox et al., 2013). Despite a lack of generalizability due to a restricted participant group, these results highlight the clear need to support teachers in developing effective Tier 1 instruction including formative assessment tools. Further, these results are consistent with those from Regan et al. (2015), who found that while teachers viewed the educational practices within RTI as feasible to implement, teachers truly lacked understanding of practices and needed additional guidance on how to implement these approaches effectively. More recently, Al Otaiba et al. (2019) explored both general and special education teacher knowledge of RTI implementation through a factor analysis of a survey, concluding that while teachers reported stronger knowledge about Tier 1 implementation, leadership, and school-level systems, they reported less knowledge about data-based decision-making processes. In other words, teachers felt they understood how to gather information about students' needs through screening and progress monitoring but were not clear on what to do with that information in response. All of these findings are meaningful for planning teacher professional development to facilitate RTI approaches involving learner-informed practices and are consistent with some previous research on teacher comprehension of

data-based decision-making processes (e.g., Meyer & Behar-Horenstein, 2015). Research on this component of RTI reflects the discrepancies across contexts, however, as Shapiro et al. (2012) analyzed consistency between grade-level team decisions and reading assessment data, finding that over a two-year period, teams showed increased agreement with data from curriculum-based measures to assign students to appropriate tiers within an RTI model. Many studies have also examined the nature of professional development that best supports teacher and school administrator acquisition of specific skillsets beneficial to RTI practices (e.g., Castillo et al., 2016, 2018; Spear-Swerling & Cheesman, 2012).

Research has clearly demonstrated RTI frameworks have the potential to strengthen the effectiveness of reading instruction and intervention for those students who need it most; however, the framework is only as robust as the practices, methods, and measures utilized to support students within and through the tiers. It also goes without saying that any structure is only as strong as its foundation. School districts must prioritize how and what teachers are teaching in order to confidently identify those students who might need more intensive supports, in contrast to those students who haven't been provided with adequate instruction. Evidence-based classroom instruction involving screening and progress monitoring is unquestionably the underpinning of any structure that successfully supports all learners.

Implementation of Classroom-Based Early Reading Interventions

Despite decades of established theory on effective reading intervention and the extant gap between research and practice, it is, in fact, possible to shift teacher instruction toward more learner-informed and evidence-based practices in early reading. Existing studies have demonstrated success in implementing preventative early reading interventions in typical kindergarten classrooms within RTI frameworks, though few represent the Canadian context.

Carson et al. (2013) investigated the influence of an intensive, whole-class, teacher-delivered PA intervention in New Zealand, where literacy curriculum typically consists of whole-language approaches supplemented by instruction in letter-sound knowledge. Researchers presented the following rationale for the study: Despite New Zealand's high standing for literacy achievement on a global scale, research has revealed sizeable gaps between the abilities of strong and struggling readers across the country. Consistent with the researchers' hypotheses, findings revealed that added explicit PA instruction at the phoneme level for just 10 weeks significantly improved kindergarten students' PA, reading, and spelling skills, both for typical students as well as those with verbal language delays. Further, this research was extended by Gillon et al. (2019), who found that a 10-week teacher implemented intervention aimed at developing kindergarten students' PA, letter, and vocabulary knowledge significantly accelerated the targeted skills as well as decoding novel words; however, these findings offer some additional insight into the efficacy of teacher-delivered intervention for at-risk students, as participants were children who entered school with lower oral language ability. All participants responded to the intervention in similar ways, regardless of gender, ethnicity, or additional speech and language needs, speaking to the benefits of this type of intervention for all learners in inclusive kindergarten classrooms.

Similarly, New Zealand's Early Literacy Research Project conducted by Chapman et al. (2018) endeavored to provide teacher professional development on systematic word-decoding strategies, effectively changing early primary teacher practice to a more scientific approach. This research intended to address persistent concerns about the literacy skills of New Zealand children, and the decline in literacy performance despite numerous initiatives aimed at improving national outcomes. While results for the initial cohort showed that the intervention was unsuccessful, the researchers adapted the professional development delivery and materials for the

second cohort, leading to drastic improvements in classroom instruction and consequently, student performance. The changes to teacher professional development involved more systematic guidance and the addition of a coach to provide observations and feedback to teachers throughout the study. These findings on effectively shifting teacher practice are consistent with those of Al Otaiba et al. (2016), who found that ongoing professional development to support already effective teachers with differentiating Tier 1 instruction can significantly improve reading outcomes for students in kindergarten. Likewise, research supports performance feedback as an effective strategy to bolster teachers' implementation of PA interventions in early learning environments (Albritton et al., 2018). Overall, the Early Literacy Research Project delivered strong longitudinal evidence for the New Zealand Ministry of Education to consider in developing a nation-wide strategy to challenge deeply embedded instructional practices, shifting toward systematic and explicit instruction in foundational, word level reading skills.

In Australia, Kelly et al. (2019) evaluated the effectiveness of a kindergarten classroom instructional program designed to target PA and alphabet knowledge. Students in an experimental group received explicit, systematic, and developmentally-appropriate instruction in phonics and PA with an emphasis on phonemic awareness, whereas the control group received parallel instruction targeting semantics and grammar. As hypothesized, the program improved the PA and alphabet knowledge of participants in the experimental group. Additionally, participants in the experimental group showed significant gains in both non-word reading and spelling compared to the control group, despite the fact that teachers did not provide direct instruction on word-level reading or spelling skills. These results are consistent with those in the NRP (2000) meta-analysis, which reported that across a variety of conditions and contexts, teaching students to manipulate the sounds in language assists them in learning to read. Further,

Kelly et al. demonstrated that it is feasible for teachers to efficiently deliver an additional instructional program within the classroom that can significantly improve kindergarten students' early reading and spelling skills. These findings strengthen earlier results from Schuele et al. (2008) who conducted a classroom-based evaluation of two-tiered instruction for accelerating PA skill development in kindergarten students. Researchers noted that while supplemental, teacher-led small-group intervention significantly improved the literacy outcomes of low-achieving children, particularly on a measure of spelling, classroom teachers needed additional support to provide appropriate phoneme-level activities and to facilitate supplemental intervention so it was not denying students the opportunity to benefit from universal literacy instruction.

In relation to learner-informed practices, and in response to research on RTI largely focusing on evaluating students' response to intervention and instruction and not the instruction itself, Scanlon et al. (2008) explored the influence of teacher instruction on kindergarten students' risk status in the classroom. These researchers found that while professional development for teachers, supplemental intervention for students, and a third condition involving both of the aforementioned treatments were effective in reducing the number of students considered at-risk by the end of the school year, specific characteristics of classroom instruction had a distinct impact. Specifically, "instructional improvements were not accomplished via the implementation of a highly prescriptive program nor by the adoption of entirely new curricula but rather by encouraging teachers to analyze and respond to the instructional needs of their lower achieving students" (p. 359). Similarly, Al Otaiba et al. (2011) found that kindergarten students in classrooms with teachers that are skilled in individualizing instruction specific to students' language and literacy skills achieve greater gains than those students in typical

classrooms on measures of reading. Implementing data-based individualization through student progress monitoring facilitates informed teacher adaptations to practice and subsequent assessment of the impact on student outcomes (Lindstrom et al., 2019). This is directly applicable to the present study's emphasis on building teachers' capacity for learner-informed practices. In other words, when teachers regularly and purposefully gather data on students' early reading skills, they are more adequately prepared to differentiate their instruction to meet student needs and ensure adequate progress in skill development for all learners.

As previously mentioned, examples of successful implementation of classroom-based early reading interventions in Canadian contexts are scarce; however, recent research from Alberta is highlighting the impact of the Covid-19 pandemic on reading development and the role of evidence-based instruction in remediating skill gaps for primary students. While initial research from Georgiou (2021) suggested that, a) by September 2020, reading skills of students in grades 2 and 3 were four to eight months behind where they should have been, based on historical data, and b) 60% of students who were identified as struggling readers obtained lower reading scores in September 2020 than they did in January 2020, current research is bringing more hopeful outcomes. After three years since schools were shut down at the beginning of the Covid-19 pandemic, student reading scores across all grade levels have improved and are comparable to performance prior to the pandemic (Georgiou & Parrila, 2023). Georgiou and Parrila attribute this tremendous recovery to evidence-based practices that were in place well before the Covid-19 pandemic (see Georgiou et al., 2020), early screening and intervention, updated provincial curriculum, government funding for research and intervention resources, and timely discussions around how to effectively address learning losses. Other government bodies, particularly the B.C. Ministry of Education, who is currently misaligned with every one of the

aforementioned practices, would be wise to pay close attention to our neighbouring colleagues and the impact of evidence-aligned practices on their young learners.

The Present Study

The rationale for the present study arose from the relative lack of consistency regarding the implementation of multi-tiered support structures to identify, address and support the reading skill development of all learners in B.C. classrooms. Despite a considerable effort on behalf of academics, researchers, and practitioners to facilitate evidence-based reading instruction in the classroom, countless numbers of students continue to have RD, many of these starting in kindergarten. Through specific training on use of CBM progress monitoring measures and year-long, consistent access to individualized consultation from district facilitators, this study aimed to provide teachers with the necessary supports to develop a more responsive and scientific approach to early reading instruction.

Inherent in this study's methodical design and approach were features that directly addressed limitations and barriers brought forth by Canadian teachers in prior research on implementation of RTI approaches (e.g., Pyle et al., 2011). For example, individualized instructional consultations replaced communal professional development, hereby acknowledging and valuing teachers' respective current practices, and allowing teachers to share specific details of existing strategies or foci. Further, facilitators had the opportunity to respond collaboratively with supplementary evidence-based suggestions in response to both teacher practice and measured student needs throughout the school year. This study provided detailed accounts of classroom contexts and evidence-based classroom instructional strategies and resources, as well as specific information on intervention and decision-making processes. Ultimately, it captured evidence of efficacy from both teachers and achievement data of teacher-employed, learner-

informed practices within an RTI framework, documenting the implementation of a pilot project, the Collaborative RTI Pilot, within a local school district. District facilitators for this pilot project were the researcher, who held a district-level curriculum coordinator role within the participating school district, and a school psychologist colleague. The current study aimed to compare the performance of kindergarten classrooms, on key reading and reading related outcomes, experiencing business-as-usual approaches to early reading instruction, with staggered implementation of supported, evidence-based comprehensive early reading instruction. Additionally, it compared the progress of students who, due to risk status based upon early reading and reading related CBMs, were eligible to receive supplementary small-group targeted intervention to those who continued to receive classroom instruction. Finally, it should be noted that students participating in the pilot may have been identified through ongoing progress monitoring as requiring a more individualized, intensive approach to remediate their reading skill deficits, and the school-based team responded accordingly; however, the third tier of the RTI model was not a focus of the present study, since the participating school district had existing systems to support the few students who required individualized interventions. Alongside the supported implementation of learner-informed practices within the pilot, teachers could be more confident in their ability to distinguish between students who are low responders and those who had simply not received adequate instruction and intervention. Throughout the study, teachers provided all students with the opportunity to respond to appropriate evidence-based instruction as needs were identified, rather than postponing in anticipation of an assessment and designation; this “wait to fail” approach is an ongoing issue that RTI models aim to directly address (Jimerson et al., 2016).

Research Questions

The overarching goal of the present study was to investigate the impact of teacher adoption of RTI approaches involving universal screening, evidence-based classroom instruction, ongoing progress monitoring, and intensive intervention on kindergarten students' early reading skills. A supplemental component was to elicit responses from teachers, as they provided valuable insight on how to facilitate and support ongoing implementation of RTI approaches in schools. Specifically, the present study examined quantitative data within and across kindergarten classroom cohorts to ascertain if learner-informed practices within an RTI framework can adequately address the early reading needs of all kindergarten learners in the classroom. Additionally, it tested the efficacy of a multi-tiered system of support in identifying and intervening for students at risk for RD. Given current literature on both RTI approaches and evidence-based reading instruction, it was anticipated that students would demonstrate early reading skill gains in response to instruction and intervention, accordingly. The research questions below address the main goals and hypotheses of this study with regard to the efficacy of RTI approaches.

1. Does supported evidence-based early reading instruction (involving explicit, purposeful teaching of PA, emergent phonics, and vocabulary) accelerate the acquisition of reading skills as compared to within classroom business-as-usual (BaU) early reading instruction in kindergarten students?

H1a. Direct, explicit teaching of PA, emergent phonics, and vocabulary will boost reading skill performance in kindergarten students at Tier 1, when compared to BaU classroom instruction.

H1b. Kindergarten students in classroom groups with extended time in the supported evidence-based early reading instruction phase will demonstrate greater gains than kindergarten students in classroom groups with extended time in the BaU phase.

2. Is an RTI approach that identifies kindergarten students in need of supplemental intervention and delivers intervention effective in raising reading outcomes between pre-testing and post-testing?

H2. RTI approaches involving screening, progress monitoring, and supplemental intervention will effectively increase reading achievement and minimize risk between pre-testing and post-testing for priority students.

Teacher Perspective Gathering

While the main focus of the present study was the efficacy of RTI approaches, an additional and secondary component involved gathering the perspectives of participating teachers on implementation processes to consider what worked, what did not, and why. Specifically, the teacher feedback process aimed to provide valuable information on a) mechanisms that support the feasibility of classroom teachers adopting learner-informed practices to deliver a responsive, evidence-based early reading program in the classroom within an RTI structure, b) classroom teachers' perceptions of their early reading instruction, learner-informed practices, and associated student learning, before, during and after adoption of RTI practices, and c) the associated facilitators and barriers with classroom-, school- and district-level adoption of RTI practices.

Method

Participants

The present study was conducted in a small, rural school district in B.C., Canada. Two elementary schools, four kindergarten teachers (two at each school), and two learning support teachers (one at each school) were purposefully selected through a nomination and review process employed by a team of district administrators and other professionals at the school board. The chief criterion was related to school administrators' and teachers' openness to RTI approaches supporting early reading skills, as this required schools in this district to shift existing practices and restructure their learning support model to include kindergarten students who were at risk for RD. While the school district was keen to include teachers who would champion the initiative and its associated learner-informed practices moving forward, the participating teachers and their existing early reading practices were considered to be fairly representative of kindergarten teachers within the school district. Student participants were recruited from two English kindergarten classes at each of the two schools. Ethics approval for the study was obtained from both the University of Victoria's Human Research Ethics Board and the school district prior to student recruitment and the first stage of data collection. Parents or legal guardians provided consent for their child to participate in the study (see Appendix A); furthermore, kindergarten students were read a short script with a description of the study and were given the opportunity to provide verbal assent to participate. To clarify, while all students across the four kindergarten classrooms participated in the district pilot project, only those with provided consent participated in the present study. While teachers had already been recruited and had committed to their participation in the Collaborative RTI Pilot, the researcher obtained consent prior to the initial interview at the beginning of the school year.

Participants included 49 kindergarten students (26 boys, 23 girls; *M* age at pre-testing = 63 months, *SD* = 3.00 months, range = 57-69 months) across two schools in the above-mentioned B.C. school district. School populations ranged from approximately 225 to 425 students. No formal demographic data was collected on student participants or their families, but both schools were in predominantly middle-class neighbourhoods, where median family incomes before taxes ranged from \$92,000 to \$110,000. One student received additional services as an English Language Learner, one student had a diagnosis of Autism Spectrum Disorder, and multiple students were brought forth to the School-Based Teams throughout the year for concerns around attention or behaviour impacting classroom learning; regardless, all students with consent, with the exception of two students who did not participate in classroom instruction due to complex needs, were included in the present study as this was intended to be an authentic examination of RTI implementation in classrooms.

Also included in this study were six teacher participants: four kindergarten teachers and two school-based learning support teachers. Teacher experience ranged from approximately 8 to 33 years, all were qualified to teach in B.C. public schools and learning support teachers had additional coursework in teaching students with exceptionalities and Level B assessment to qualify them for this specialist role. None of the kindergarten teachers had received any post-degree training in evidence-based reading instruction, and all had spent the majority of their teaching careers working within this particular school district.

Procedures

The present study followed a quasi-experimental pre-post intervention design with staggered treatments and repeated measures. This design offered both scientific and practical advantages to address the research questions, in examining the treatment effects of early reading

instruction and interventions across and within classrooms and tiers of support, while also considering teacher feedback to ascertain the feasibility of implementation. The staggered implementation enabled the researcher to examine the impact of supported, evidence-based early reading instruction across classrooms at Tier 1, while also examining whether earlier intervention is more effective for those students at risk for RD. Data collection commenced at the start of the school year (September 2021) and concluded at the end of the school year (June 2022).

Research Data Collection

Pre-Post Testing. Pre-testing using norm-referenced measures of early reading and reading related skills occurred at the same point for all participants in each classroom condition, and these measures were repeated across conditions at post-test using alternate forms, if available. Pre-testing was in September and post-testing was in June. For respective pre- and post-testing sessions, participants completed all tasks individually in a single session lasting approximately 40 minutes in a quiet room in their school during the regular school day. Tasks were administered in a fixed order by research assistants with advanced training in assessment supervised by the researcher, and the research assistants received additional training and practice specific to the battery of measures used in the present study.

Teacher Interviews. As Savage (2012) stated, “an implementation of science of reading needs to focus on what teachers do and also why they do and do not do things, as well as on the cultural aspects of the profession as much as on interventions themselves” (p. 293). To supplement and augment the intervention efficacy data, teacher feedback was collected primarily through semi-structured teacher interviews with participating kindergarten and learning support teachers at three time points: pre-, mid-, and post-implementation, in September, January, and

June of the school year. Interview questions focused primarily on gathering information regarding facilitating factors and barriers impacting the implementation of both Tier 1 evidence-based early reading instruction and RTI approaches across Tiers 1 and 2. For the interview script, see Appendix B. All interviews were conducted by the researcher, either in person or virtually using a video conferencing platform. Interviews were approximately 15-30 minutes in duration, and focused primarily on specific questions with subsequent probes influenced by participants' responses. Questions were used to encourage teachers to elaborate on their experiences throughout the study to achieve a comprehensive account of the impact the RTI approaches along with associated facilitating factors and barriers, from multiple perspectives. All interview discussions were electronically recorded, so note taking did not interrupt the natural flow of conversation, and gathered words were largely those expressed by teachers, transcribed verbatim. Additional information relevant to the study arose from spontaneous communications with kindergarten teachers throughout the school year, and this was documented throughout the study by the researcher.

Facilitator Notes. Additional information arose from unplanned and unprompted conversations with kindergarten and learning support teachers within the professional environment. Given the nature of the ongoing mentorship and support throughout this study, teachers occasionally sought out advice or checked in, if needed. The researcher's concurrent role within the curriculum department at the school district board office put them in the position to be the primary contact for supporting teachers' Tier 1 early reading instruction. These interactions were transcribed by hand verbatim in a researcher journal and considered for analysis to provide a holistic account of the teachers' experience throughout the implementation

process. This information will be presented in the results and interpreted in the discussion to complement the teacher interviews, accordingly.

Teacher Data Collection

Curriculum-based measures of early reading (and reading related skills such as phonemic awareness), specifically DIBELS and PRESS LSF, were administered to all kindergarten students as part of the district pilot project monthly, from October through May, to monitor student progress and intervention response. All tasks were administered as per CBM protocols by respective kindergarten teachers in an alternate space outside of the classroom during school time. Prior to the initial administration in October, all kindergarten teachers participated in a half-day training session with district facilitators, focused on rationale, administration, standardization, and scoring, with additional time for practice and feedback (see Appendix C). District facilitators directly observed teacher administration for several students in October, providing feedback, and were available to support with administration or scoring during all subsequent sessions. For most scheduled progress monitoring days, district facilitators were in the school and sitting nearby to assist with administration or scoring questions. Otherwise, district facilitators were available by phone or video conferencing. Research has demonstrated that tester experience can threaten assessment fidelity, and that procedural errors, though unwitting, can be mitigated by monitoring and feedback (Reed & Sturges, 2013). Kindergarten teachers kept the original progress monitoring booklets in their possession throughout the school year, and had access to district facilitator-created spreadsheets with all progress monitoring data that they could refer to at their convenience. District facilitators reviewed the teachers' scoring of CBMs for accuracy on a monthly basis. Learning support teachers also received training from

district facilitators on diagnostic measures used to confirm priority students' early reading skills and create homogeneous, skill-focused intervention groups.

Measures

Pre-Post-Test Measures

PA. Select subtests from the Comprehensive Test of Phonological Processing, Second Edition (CTOPP-2; Wagner et al., 2013) were utilized to measure kindergarten students' PA and associated skills. Subtests included: Elision, Blending Words, Sound Matching, Rapid Letter Naming, Rapid Color Naming, and Rapid Object Naming. Elision required students to delete spoken syllables and phonemes from words to form new words, Blending Words required students to synthesize sounds to form words, and Sound Matching required students to identify spoken words (using picture cues) that share the same initial or final sounds. On the Rapid Naming measures, students rapidly named visual stimuli in sequence from an array. Reliability of subtests within the CTOPP-2 battery demonstrate average internal consistency coefficients exceeding .80, and the average internal consistency coefficients for the composites were all .85 or higher. Raw scores were converted to standard scores ($M = 100$, $SD = 15$), and PA Composite Scores were calculated based on the CTOPP-2 normative sample ($M = 100$, $SD = 15$).

Vocabulary. To consider the role of language in the SVR and establish foundational language skills across kindergarten classrooms, receptive vocabulary was measured using the Peabody Picture Vocabulary Test, Fourth Edition (PPVT-IV; Dunn & Dunn, 2007). On this test, the examiner said a word, and the students selected the picture that best illustrated that word's meaning. With regard to evidence of reliability, the internal consistency for the PPVT-4 exceeds .89 with regard to age across both forms. Raw scores were converted to standard scores based on the PPVT-IV normative sample ($M = 100$, $SD = 15$).

Early Reading. Kindergarten students' alphabetic knowledge and basic understanding of symbolic and written text was measured with the Letter and Word Identification and Reading Comprehensions subtests from the Kaufman Test of Educational Achievement, Third Edition (KTEA-3; Kaufman & Kaufman, 2014). On the Letter and Word Identification measure, students identified letters by name or sound, gradually increasing in difficulty to identifying words. Letter and Word Identification was a primary variable of interest in the present study, as word reading requires a consolidation and operationalization of foundational skills (i.e. phonics and PA). The Reading Comprehension measure required students to match a symbol or word with its corresponding picture, then gradually increased in difficulty to require reading a simple instruction and responding by performing the action. The KTEA-3 is a commonly-utilized, statistically-sound instrument, with overall reliability ranging from .87 to .95. Raw scores were converted to standard scores based on the KTEA-3 normative sample ($M = 100$, $SD = 15$).

Benchmark and Progress Monitoring Measures

CBM-Reading. The complete battery of University of Oregon's DIBELS Eighth Edition (2018), including both benchmark measures and progress monitoring tasks, was utilized as the primary screening and progress monitoring measure in the present study. DIBELS offers a set of measures that capture student achievement across core components of reading, including Letter Naming Fluency, Phonemic Segmentation Fluency, Nonsense Word Fluency, and Word Reading Fluency, and this system is used widely across schools in the U.S. (Good & Kaminski, 2011). Additionally, DIBELS provides norm-referenced benchmark scores specific to levels of risk that assist practitioners with identifying students who may be at risk for reading difficulties, as well as multiple forms of measures at each grade level from Kindergarten through Grade 8 for frequent administration to monitor student progress. While DIBELS kindergarten-level

measures generally have been found to have basic psychometric properties ranging from good to strong, researchers have stated more recent concerns regarding their predictive validity and diagnostic accuracy (e.g., Morris et al., 2017; Shapiro et al., 2012). A classification validity study conducted by Nelson (2008) explored a range of kindergarten DIBELS cutoff scores to determine those that produced both sensitivity and specificity of 75%. Additionally, this researcher examined the overall diagnostic accuracy of each kindergarten DIBELS task, both together and respectively. Findings noted that cutoff scores identifying students as at-risk reflected higher specificity (.67-.92) and lower sensitivity (.56-.67), and produced considerable false positive rates when compared to a similar norm-referenced measure. To mitigate an excessive number of false positive cases, Nelson suggests the assessment of additional reading related skills to complement DIBELS, such as letter sound fluency. Smolkowski and Cummings (2016) completed a comprehensive evaluation of the sixth edition of DIBELS across a sample of students from kindergarten to grade three, finding that generally, DIBELS decision thresholds are suitable for identifying students who may need additional intervention. Specific to kindergarten, however, was the result that the phoneme segmentation fluency measure did not meet criteria for diagnostic accuracy. The accuracy of the complementary kindergarten measures led Smolkowski and Cummings to reason that they likely improve teachers' ability to make decisions based on comprehensive results. It should be noted that a major limitation of this study was the participant group consisted only of English-proficient students, so results may not generalize to more diverse classrooms. More recent results from Burns et al. (2022) focused on students who scored below the 50th percentile on a reading screener, and found that the sixth edition of DIBELS demonstrated high sensitivity in identifying students at risk for PA difficulties. A description of the teacher-administered progress monitoring measures follows.

All measures were administered as per DIBELS protocols, as a component of the beginning-, middle-, and end-of year batteries as well as in the monthly progress monitoring battery, with the exception of Letter Naming Fluency, which was only administered as part of the beginning-, middle-, and end-of-year battery.

Letter Naming Fluency. Letter Naming Fluency (LNF) required students to provide names for as many letters as they could from a set of 100 randomly selected uppercase and lowercase letters in 1 minute. Raw scores were recorded for analysis.

Phonemic Segmentation Fluency. When administering the Phonemic Segmentation Fluency (PSF) task, teachers presented a simple word orally (without visual stimuli) and asked students to break the word up into individual sounds. Students were presented with a maximum of 30 words, segmenting as many sounds as they could in 1 minute. Raw scores were recorded for analysis.

Nonsense Word Fluency. Nonsense Word Fluency (NWF) required students to decode or identify the sounds within as many of the 50 pseudowords as they could in 1 minute. Raw scores were recorded for analysis, including both Correct Letter Sounds (CLS) and Words Read Correctly (WRC).

Word Reading Fluency. Word Reading Fluency (WRF) required students to read as many words as they could from a list of 85 common phonetically regular and irregular words in 1 minute. Raw scores were recorded for analysis.

Additional Measure of Letter Sound Fluency. The Letter Sound Fluency (LSF; Minnesota Center for Reading Research, 2019) measure within the PRESS framework was administered to complement both the norm-referenced measures administered by research assistants at pre- and post-testing, and the CBMs administered by teachers each month. Research

supports the consideration of multiple measures when making decisions about student placement within multi-tiered systems of support, and measures of LSF, specifically, have demonstrated in both past and recent research, their ability to predict year-end kindergarten reading outcomes (Al Otaiba et al., 2011; Clemens et al., 2019, 2020). Raw scores were recorded for analysis.

Intervention Description

Foorman et al. (2016) describe the importance of researcher-practitioner partnerships as the first of seven elements crucial to the successful implementation of early literacy intervention, specifying that in order for partnerships to be solidified and maintained, they must be mutually beneficial. The present study captured the implementation of a Collaborative RTI Pilot, an initiative collaboratively proposed and lead by the researcher and a school psychologist colleague within a local school district. Together, the researcher and school psychologist facilitated the year-long pilot initiative, planning and providing any necessary training and professional development for teachers, as well as ongoing consultation about assessment and evidence-based strategies in response to measured student needs. According to Bursuck and Blanks (2010), school psychologists can play a key leadership role in promoting academic achievement among all students through promotion of school-based processes that facilitate informed decisions about students' access to evidence-based reading instruction and intervention within RTI frameworks. Further, it has been suggested that through shared investment in prevention and intervention, implementation of RTI has the potential to align priorities and facilitate collaborative action among teachers and school psychologists (McIntosh et al., 2011). Within the present study, district facilitators, the researcher in a curriculum coordinator role and a school psychologist colleague, also provided support with decision-making processes regarding students who, as per progress monitoring data, should have been prioritized for more intensive

intervention in Tier 2. The Collaborative RTI Pilot was designed to be a thoughtful, evidence-based response to mitigate district concerns around student performance in reading through a shift in teacher practice across Tier 1 and supplementary, targeted intervention at Tier 2, as opposed to a temporary, reactive increase in general learning support. Research suggests that when implemented with fidelity, evidence-based, learner-informed approaches within an RTI model can meet the academic needs of most students within the classroom, and this pilot initiative anticipated demonstrating exactly that, starting with the district's earliest learners in kindergarten.

The present study held teachers at the heart of implementation, using multiple means of concurrently gathered intervention and implementation data to enhance the integrity of the findings. The primary focus was on quantitative data to inform outcomes, while teacher responses represented the classroom-informed contexts and processes for implementation. Specifically, while the quantitative data addressed the research questions on the efficacy of supported, evidence-based early reading instruction and supplemental small-group intervention, teacher feedback on implementation provided valuable discourse as to whether this approach was practicable and realistic for teachers. To successfully scale-up across the district, teacher perspectives needed to be gathered on whether or not this study's methodology warranted further reflection or modifications prior to additional recruitment and implementation. Each classroom followed a specific schedule of progression through the intervention phases (Business as Usual, Tier 1+, and Tier 2) as per the original study design, to facilitate comparisons in analyzing the efficacy of the respective instruction and intervention components; however, the design was later adapted in response to impactful shifts in teacher practice. This will be elaborated upon, below. For overviews of both the original and adapted designs, see Appendix D.

Intervention Schedule Across Classrooms

The following section includes a short description of each kindergarten classroom's progression through the intervention phases and typical kindergarten teacher practice in early reading instruction, with subsequent pertinent details on the intervention phases and accompanying intervention supports. Classrooms descriptions are presented in the order they entered the Tier 1+ phase of the study, and teachers were assigned to classroom conditions firstly by alternating schools, as per the original study design, and secondly, based on teacher preference. It is important to note that in B.C., early reading instruction is embedded within the English Language Arts curriculum, and teachers have considerable autonomy in how they teach the curriculum. While B.C. Ministry of Education policies and local school boards can make valuable recommendations on which resources should be implemented at the school level, teacher autonomy ultimately influences which programs and strategies are utilized with students, creating variability in instruction and intervention across classroom contexts. The participating teachers in the present study genuinely cared about every one of their students and worked diligently to foster their learning, applying knowledge and strategies they gleaned from their teaching programs, past professional development, and collaboration with colleagues. Figure 2, below, presents an overview of intervention implementation over the course of the school year, as well as brief definitions of intervention phases. Descriptions of intervention phases will be elaborated upon in the subsequent section.

Figure 2

Intervention implementation across classrooms

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Classroom A	Tier 1+ Direct, explicit instruction of PA & phonics Ongoing consultation with district facilitators					Tier 2 Supplemental small-group targeted intervention for priority students				
Classroom B	BaU Typical early reading instruction and activities	Tier 1+ Direct, explicit instruction of PA & phonics Ongoing consultation with district facilitators					Tier 2 Supplemental small-group targeted intervention for priority students			
Classroom D	BaU Typical early reading instruction and activities	Tier 1+ Direct, explicit instruction of PA & phonics Ongoing consultation with district facilitators					Tier 2 Supplemental small-group targeted intervention for priority students			
Classroom C	BaU Typical early reading instruction and activities					Tier 1+ Direct, explicit instruction of PA & phonics Ongoing consultation with district facilitators			Tier 2 (Condensed) Supplemental Intervention	
	Pre-Testing	CBM Progress Monitoring								Post-Testing

Classroom A

Classroom A was the only classroom that did not experience a BaU condition. Rather, Classroom A was the lone cohort to commence the school year in the Tier 1+ condition, the phase that involved teacher professional development on evidence-based early reading instruction, provided resources, and ongoing implementation support from district facilitators. The rationale for this aspect of the design was offering one experimental group to satisfy the school district's request for an example of full implementation of RTI approaches for the entirety of the school year. Specifically, district-level administrators were seeking data on the efficacy of

an exemplar model of implementation, and Classroom A met this criterion. Classroom A experienced supported, evidence-based classroom instruction within Tier 1+ throughout the entirety of the school year, with the addition of supplemental Tier 2 intervention in mid-February, after 20 weeks of Tier 1+ instruction, for those students who were eligible as per risk categorization based upon performance on progress monitoring measures. Typically, students are eligible for Tier 2 services as soon as possible, as informed by screening and progress monitoring results. Delaying Tier 2 service until February was justified by multiple research-based purposes. Firstly, it demonstrated awareness of the vast differences in children's language and literacy skills upon entry into school, allowing students the opportunity to respond to direct and explicit classroom instruction, which many children may not experience prior to kindergarten. While universal screening for RD at the beginning of kindergarten can identify students with an acceptable level of accuracy, growth or response to instruction adds to the prediction of reading outcomes (Catts et al., 2015a; Miciak & Fletcher, 2020). Using CBM data from later in the kindergarten year reduced false positives and floor effects of the measures used, increasing the likelihood that students selected for Tier 2 intervention were at risk for RD (McAlenney & Coyne, 2011; Sittner Bridges & Catts, 2011). This will be addressed and discussed further, specific to the results of the present study, below.

Teacher A's typical, Business as Usual (BaU) early reading instruction included a play-based approach to all core components of reading (NRP, 2000), with daily read-alouds, storytelling, morning messages, class discussions, and letters and sounds introduced throughout the year. Upon reflecting on the provided professional development on comprehensive and evidence-aligned early reading instruction, Teacher A expressed that while they were already aligned in their instruction targeting vocabulary, fluency, and comprehension, they could benefit

from additional resources and support to provide direct and explicit PA and phonics instruction for students, with phonemic awareness being self-identified as “probably a huge missing piece of [their] program”. They would typically provide opportunities for rhyming and clapping syllables in students’ names but did not provide instruction at the phoneme level. Teacher A had also acquired multiple phonics-based resources over the past few years but was uncertain of which to use and how to implement in a way that was most effective. For example, a couple of years prior to this project, Teacher A was advised by a colleague to teach phonemes but was told not to introduce graphemes at all until late spring.

Classroom B

Classroom B began the school year in the BaU comparison condition, transitioning to Tier 1+ in mid-October, as displayed in Figure 2, following the administration of the beginning of the year screening measure. Thus, the kindergarten teacher and facilitators could collaboratively review student performance, discussing evidence-based strategies to support student skill development where it was needed. While teachers could access a spreadsheet with all of their students’ monthly progress monitoring data at any point through the year, the review with district facilitators prompted specific collaborative problem-solving discussions. Teachers spoke to the benefit of knowing which students they needed to pay closer attention to when providing explicit PA and phonics instruction to ensure attention, engagement, and response to instruction. Additionally, controlling for differences across classrooms with norm-referenced measures of early reading administered in early September, the presence of the initial BaU phase allowed Classroom B to be compared to Classroom A with regard to performance on the initial screening measure in October. Classroom B continued in the Tier 1+ condition for the remainder

of the school year, with the introduction of Tier 2 for eligible students in mid-March, allowing for twenty weeks of Tier 1+ instruction, consistent with Classroom A.

Similar to Teacher A, Teacher B's typical classroom instruction involved all core components of reading instruction (NRP, 2000) through daily read-alouds, storytelling, and focused instruction, and Teacher B felt they provided explicit instruction in all areas with subsequent opportunities for students to play and explore using new skills. Teacher B had previously attended some professional development on the science of reading and on phonemic awareness instruction. They acknowledged that distinguishing between PA and phonemic awareness can be tricky sometimes and shared that their instruction focused mostly on rhyme and larger units of sound, without providing explicit teaching at the phoneme level. This was an area that they admittedly, "[hadn't] dedicated much time to" and "[needed] to make more of a concerted effort". In contrast to Teacher A, Teacher B was confident in their phonics instruction, following a systematic approach including explicit teaching of letter sounds and letter formation with accompanying songs and actions, as well as ongoing assessment tracking students' mastery of letter-sound correspondences.

Classroom D

In the original design, Classroom D represented the most control-like cohort within this study, remaining in the BaU phase until February; however, after a mid-October early literacy-focused conversation with a colleague who teaches kindergarten in a neighbouring school district, Teacher D introduced systematic, explicit phonemic awareness instruction in their classroom, following a resource that district facilitators were providing to teachers in the Tier 1+ phase of the study. While district facilitators knew this could likely impact student performance in Classroom D and therefore, the statistical comparisons between intervention phases, ethically,

it was unacceptable to discourage Teacher D from implementing instructional strategies that would support their students' early reading skills. Therefore, the study design was adapted as follows. Since this situation coincidentally occurred within a day of Classroom B's transition into the Tier 1+ phase, district facilitators booked a professional development session for Teacher D, and Classroom D entered the Tier 1+ phase alongside Classroom B. The Tier 1+ transition for Classroom C, which was originally scheduled to happen in December, was delayed until February, hereby maintaining a control-like cohort in the study. Consequently, parallel to the sequence of Classroom B, Classroom D commenced the school year in the BaU condition, transitioning to Tier 1+ in mid-October. Classroom D continued in the Tier 1+ condition for the remainder of the school year, with the introduction of Tier 2 for eligible students in mid-March, allowing for twenty weeks of Tier 1+ instruction, consistent with Classrooms A and B. These changes are reflected in Figure 2.

Consistent with Teachers A and B, Teacher D's BaU practice involved instruction across all core components of reading instruction (NRP, 2000), including read-alouds, poem of the week, nursery rhymes, and whole class discussions; however, Teacher D expressed frustration that, "university never taught [them] how to teach reading". PA instruction was described as unintentional, and consisted of some isolated rhyming and alliteration activities and games throughout the school year. Teacher D used the same resource to teach phonics as Teacher B, and like Teacher B, was very familiar with and confident in that particular approach; therefore, they were very purposeful in establishing letter-sound relationships and tracking student response to this instruction, accordingly.

Classroom C

With the adapted design as described above, Classroom C followed a similar progression to the preceding classrooms, starting the school year in an extended BaU condition, transitioning to Tier 1+ in early February, as seen in Figure 2. This BaU condition allowed for comparisons to be drawn between BaU and Tier 1+ across all four classrooms; however, whereas Classrooms A, B, and D experienced 20 weeks of Tier 1+ classroom instruction prior to the introduction of Tier 2 intervention for those students at risk for RD, Classroom C's Tier 1+ was condensed. While this design choice impacted the ability to accurately compare Classroom C Tier 1+ data with the other cohorts, the offering of Tier 2 intervention was prioritized. The district facilitators felt that ethically, students in Classroom C considered at risk for RD should be afforded the same opportunity to receive Tier 2 intervention prior to the end of the school year.

Teacher C's BaU early reading instruction involved activities across all core components of reading instruction (NRP, 2000), including purposeful vocabulary instruction across content areas such as science and social studies, storytelling, and daily read-alouds. While Teacher C felt that their existing PA instruction was, "hopping all over the place" and confused PA and phonics within the conversation, they also provided opportunities for students to practice reading using emergent decodable texts that were available in the classroom. Because Teacher C's classroom was a multi-age kindergarten and Grade 1 classroom, they also provided opportunities for students to practice encoding through word work on chalkboards, alongside phonics instruction involving sound books and finding letters in peers' names.

Intervention Phases

Intervention phases consisted of BaU classroom early reading instruction, supported, evidence-based Tier 1+ classroom early reading instruction, and supplemental, intensive, small-

group early reading intervention in Tier 2. Respective phases involved specific conditions, resources, and supports for teachers, as described below.

Business as Usual (BaU) Phase

The Business-as-Usual comparison phase consisted of typical kindergarten early reading instruction and activities within a literacy-rich early years classroom environment. While teachers were gathering data on student skills via CBM screening and progress monitoring measures starting in October regardless of experimental condition, teachers in BaU did not alter their instruction beyond the scope of what they would typically do in the classroom. Typical kindergarten teacher practices were briefly described in the preceding section.

Tier 1+ Phase

Fostering learner-informed practices incorporating the core components of reading instruction was the essence of the Tier 1+ condition. Essentially, the ‘plus’ in Tier 1+ referred to universal Tier 1 instruction with an additional layer of support for teachers, involving individualized professional learning, provided resources, scaffolds for implementation, and ongoing consultation and collaboration with district facilitators. Instructional consultations during the professional learning session gathered information on teachers’ respective current practices and strategies with regard to early reading skill development. Moreover, the professional learning within this condition was responsive in nature, customized to supplement the classroom teachers’ existing practices. While it was common that kindergarten teachers in this particular school district utilized programs to teach and track student progress in emergent phonics, primarily consisting of letter recognition and letter-sound correspondences, a prevailing area of concern prior to this study was PA, for multiple reasons. Firstly, recent and relevant anecdotal evidence suggested that teachers may commonly confuse phonics and PA, hereby

believing phonics instruction in teaching letter sounds was adequately addressing student phonological needs. Additionally, some teachers may not have had a solid understanding of the complex underpinnings of fluent reading, and their pivotal role in providing the foundational building blocks through explicit teaching. Lastly, teachers may well have been providing students with exposure to tasks and activities that would typically develop emergent PA, such as rhymes or wordplay; however, instruction lacking in purpose and intent often neglects the needs of those students who do not naturally acquire these specific skills, and teachers may miss an invaluable opportunity to provide additional instruction or appropriate intervention. Tier 1+ involved ongoing collaboration and consultation with district facilitators, particularly around the interpretation of screening and progress monitoring results, and how teachers could tap into new knowledge and resources supporting evidence-based instruction and adapt their practice in response to student needs. Finally, because of contextual factors specific to participating classrooms, including teacher autonomy, past district-level professional development opportunities, and provincial curricula, Tier 1+ allowed for the researcher to build in a level of control, ensuring all students had the opportunity to receive comparable comprehensive early reading instruction across classrooms.

Tier 1+ Professional Development

While the examination and unpacking of effective professional development was not within the scope of this study, teacher professional development was a key part of the RTI implementation process captured within the present study. Reading is a complex process involving knowledge across multiple domains, including PA, phonics, language, and vocabulary; therefore, teachers must have a sound understanding of these facets and associated theoretical underpinnings in order to not only effectively teach reading, but also to adapt and differentiate

instruction if students are not appropriately responding to instruction (Hudson et al., 2021). In line with current research on professional development to support teachers' implementation of reading instruction and intervention (e.g., Goldfeld et al., 2021; McMaster et al., 2021), teachers received professional learning both through an individualized in-person session and ongoing support and consultation. Ideally, the session would have included multiple teachers to facilitate collaboration and discussion so teachers could benefit from a learning community, but the staggered treatments within the study design required each teacher to receive professional development at a specific time point in the school year.

The in-person professional development session was fairly casual since only the district facilitators and a single teacher were present in a room at the school board office, involving a slide deck to guide the conversation and facilitate learning of conceptual information related to reading and reading instruction (see Appendix E). Professional development sessions for respective classroom teachers contained the same content, involved the same discussion topics, and were the same length of time. Teachers were encouraged to ask questions throughout the session, and facilitators elaborated on classroom application or examples of strategies, accordingly. As learning and conversation progressed through the core components of reading instruction (NRP, 2000), facilitators prompted teachers to describe and elaborate on their current practice in teaching those specific skills, so as to guide the support moving forward. While there was considerable variability in how teachers responded, and therefore, where conversation was focused within each professional development session, every teacher expressed a need for additional resources and support to explicitly teach PA in their classrooms.

Tier 1+ Early Reading Resources

Kindergarten teachers autonomously used a variety of materials to provide students with literacy-rich learning opportunities in the BaU phase; however, in the Tier 1+ condition, facilitators provided teachers with additional resources targeting specific foundational skills within a comprehensive, evidence-based early reading program. All participating teachers received the same resources from district facilitators to support their early reading instruction, though classroom teachers varied in their uptake and implementation of the various resources. Instructional focus was on ensuring teachers had the knowledge and skills to explicitly and directly teach comprehensive early reading skills in the early learning environment. For the purpose of the district pilot, the facilitators purposefully chose not to provide a comprehensive program including all core components for classroom instruction. Many programs are inflexible for differentiating scopes and sequences to provide students with more responsive instruction, which can be time consuming for classroom teachers on top of regular planning and preparation. As described by Denton (2012), while programs may provide some assurance that key evidence-based objectives are being delivered in a sequential manner, teachers typically need to adapt the content or implementation of the program to best meet the needs of the specific learners in the classroom; however, Denton cautions that when teachers opt out of programs, they assume responsibility for ensuring that students receive effective instruction in the critical components of reading.

There are many examples of evidence-based resources that can be effectively utilized within an RTI model to provide foundational skills for all learners, or to intervene for students who are at risk for RD. As described above, kindergarten teachers in the participating school district had adopted a variety of practices and resources to provide learning opportunities within

their classroom literacy programs. Facilitator-supported Tier 1+ instruction, nonetheless, involved incorporating evidence-based curricular components, instructional strategies, and delivery from existing resources such as Heggerty, Firm Foundations and Talking Tables.

Heggerty. While district facilitators originally intended to supplement kindergarten teachers' existing PA resources with specific activities or strategies, teachers were very clear that in order to provide direct, explicit teaching of PA and phonemic awareness, they required a structured and scaffolded resource. The Heggerty Phonemic Awareness Kindergarten curriculum (Heggerty & VanHekken, 2022) offered teachers a comprehensive resource with 35 weeks of daily, 10-minute lessons with scripts to facilitate explicit teaching of skills (see Appendix F for lesson sample). Additional scaffolds with this resource included physical actions for skills, professional learning videos to support teachers with conceptual understanding of phonemic awareness and implementation fidelity, and access to daily lesson videos where instruction was provided by skilled Heggerty educators. While district facilitators were initially uneasy at the thought of teachers using videos for instruction, particularly with the present study's focus on building teacher capacity in teaching foundational reading skills, the daily lesson videos proved instrumental as a temporary scaffold for implementation of PA instruction. At a time when teachers and students were wearing masks due to the Covid-19 pandemic, daily lesson videos ensured that students received some direct instruction from an educator not wearing a mask, teachers could learn from observing and participating in Heggerty lessons led by experienced educators, and teachers could sit with students, more closely listening for active participation, and modelling and scaffolding the instruction for those priority learners. Over a few months, teachers naturally resumed leading PA instruction using the Heggerty curriculum so they were better able to differentiate instruction in terms of pacing and targeting specific skills.

Firm Foundations. Developed by a team of school psychologists and teachers in a local school district, this kindergarten program was designed to support teachers in facilitating students' acquisition of foundational early literacy skills orally and through play in the classroom (North Vancouver School District, n.d.). This particular program is not well-researched; however, it provides a learning continuum for the development of early literacy skills, and presents activities, strategies, and interventions to be facilitated in play-based early learning classroom environments. Aligned with the present study's focus on facilitating learner-informed practices, Firm Foundations also includes Performance Assessments that are designed to facilitate responsive instruction (Siegel, 2018). In fact, it was utilized as the Tier 1 intervention in a past district-wide RTI initiative led by Siegel (2020), with the intent that an effective reading program in the classroom would mitigate need for intervention in later grades. This program's focus on explicit teaching of PA and phonics was especially important as the participating district in this initiative was transitioning from primarily whole language instruction to a structured literacy approach. Results indicated that not only is it possible to identify students who are at risk for RD in kindergarten and that evidence-based, classroom-based interventions are critical, but also that a small number of people working collaboratively with teachers and school-based administrators can make significant changes in the system. A copy of Firm Foundations was provided to each kindergarten teacher at the start of the Tier 1+ condition, to supplement direct and explicit Heggerty instruction with additional, play- and game-based opportunities for practicing PA and phonics skills.

Talking Tables. The Talking Tables Oral Language program is a teacher-developed kindergarten intervention widely used in local elementary schools for students who begin their schooling at risk for literacy and language-based learning difficulties. Through explicit teaching

of skills, repetition, immediate feedback, and highly-interactive activities and games, this program aims to develop oral fluency and functional vocabulary, build PA, practice social language skills, and strengthen auditory skills (Clifton et al., 2006). PA tasks are targeted through developmental progression of rhyming, blending, segmenting, and deletion of compound words, syllables, and phonemes. Talking Tables also uses many research-based strategies, such as Elkonin Sound Boxes, and is comprehensive in its organization, facilitating straightforward implementation in classrooms (McCarthy, 2008). Every 20-25 minute lesson includes explicit instructions for the teacher and all necessary materials prepared for ease of use with students, and the program is frequently used by learning support teachers and speech-language pathologists. Recent research by Hodgins and Harrison (2021) demonstrated that school-based, teacher-delivered PA intervention using Talking Tables can accelerate at-risk kindergarten students' PA across a variety of skills. Though this program was originally intended for use with small groups, specific strategies were adapted for whole-classroom instruction to support PA and oral language instruction in the Tier 1+ condition of the present study.

Tier 2 Phase

Priority students who fell within the range indicative of risk for RD were eligible to receive small-group intervention in Tier 2. The rationale to provide Tier 2-level intervention for students in kindergarten was strengthened by research specific to access to RTI models, which postulates that students given kindergarten access to RTI overall have significantly higher outcomes than those who are delayed this service until grades one or two (O'Connor et al., 2014). All students, regardless of risk status as per scores on screening and progress monitoring measures, continued to receive evidence-based Tier 1+ instruction in the classroom throughout the Tier 2 condition. This was an important distinction to establish among participating school

teams, as learning support for students demonstrating RD often supplants classroom reading instruction, instead of being a supplementary layer of support (Jimerson et al., 2016).

Tier 2 intervention was more intensive in nature, and smaller, more homogeneous groupings of 2-3 students allowed for instruction to target specific components of early reading, particularly phonemic awareness, as per the intervention protocols that will be discussed in detail, below. Consistent with intervention research, small group sessions were provided by the school-based learning support teacher three to four times per week, with each session approximately 15-20 minutes in length. Progress monitoring for this group occurred on a weekly basis with multiple forms of skill-focused measures to ensure adequate acceleration and to facilitate teacher use of individualized instruction to target specific skill deficits and rearrange groupings, if necessary. While the duration of Tier 2 service varied dependent on overall study design, concurrent Tier 1+ and Tier 2 conditions within kindergarten classrooms facilitated the addition of within-cohort comparisons on the efficacy of small-group early reading intervention. For the purpose of the Collaborative RTI Pilot, Path to Reading Excellence in School Sites was utilized as the Tier 2 small-group intervention for students who met initial criteria as at risk for RD. The following section will describe both the Tier 2 selection process and intervention.

Selection Process. Consistent with DIBELS benchmark cut scores and existing research (e.g., Catts et al., 2015a), those students who achieved scores at or below the 20th percentile on CBM progress monitoring measures were initially flagged for Tier 2 intervention by district facilitators and school teams including classroom teachers and learning support teachers; however, in line with current research on screening assessments, district facilitators and school teams employed additional layers into the selection process (e.g., O’Keeffe et al., 2023; Truckenmiller et al., 2021). First, learning support teachers utilized a diagnostic measure (i.e.

phonemic awareness or phonics inventory) as an additional gate prior to commencing intervention. This individually administered, skill-based tool either confirmed student eligibility for small-group, targeted intervention, or confirmed that students had skills not adequately captured in a one-minute measure such as PSF or LSF. The next step in the process involved consultation with kindergarten teachers to consider classroom assessment information and discuss any students of concern. This allowed district facilitators and teachers to review CBM progress monitoring data beyond a single point, considering trends and inconsistencies, facilitating meaningful discussion on progress and problem solving, accordingly. This process was chosen for multiple reasons. First, kindergarten screening measures can produce high numbers of false positives, and a gated screening process can mitigate misdirected services, ensuring students who receive intervention are those who need it most. This is an important factor to consider in public school systems, where intervention time in schools is underfunded, and therefore, limited. Second, classroom teachers had valuable information on student learning and progress in response to their instruction; therefore, district facilitators wanted to build a team approach to student selection, avoiding the situation where one professional is seen as the gatekeeper to services. Lastly, a diagnostic measure not only confirmed eligibility, but provided valuable information on student skills, allowing learning support teachers to build homogeneous, skill-focused groups and develop a responsive plan for intervention.

District facilitators and school teams focused on February CBM scores to start the student selection process for Tier 2 intervention for eligible students in Classrooms A, B, and D, specifically the Phonemic Segmentation Fluency (PSF; Good & Kaminski, 2011) and Letter Sound Fluency (LSF; Minnesota Center for Reading Research, 2019) measures as they were indicators of students' phonemic awareness and emergent phonics skills. Priority students in

classroom C participated in a condensed four-week targeted intervention at the end of the school year. Despite that LSF and Correct Letter Sound (CLS) scores from the Nonsense Word Fluency (NWF; Good & Kaminski, 2011) measure capture similar skillsets, the district facilitators chose LSF because that measure was more consistent with kindergarten teachers' existing assessment practices; Therefore, LSF scores and trends in specific students' progress were more easily interpreted by teachers. This choice was aligned with previous research highlighting that kindergarten students' responses on the NWF task varied within assessment sessions and over time (Ritchey, 2008).

Note that priority students in Classroom A started receiving intervention in mid-February, while students in Classrooms B and D didn't start receiving intervention until mid-March. District facilitators and school teams started the selection process for Classrooms B and D early to address scheduling conflicts due to a two-week spring break holiday in March. District facilitators and school teams calculated cut scores based on the 20th percentile of each measure, resulting in 7 as the PSF cut score and 4.6 as the LSF cut score. This identified 10 students across classrooms A, B, and D who had scores below the cut score, on PSF, LSF, or both measures across the three classroom groups. Diagnostic measures showed that three identified students had phonemic awareness and phonics skills not captured by the CBMs. One student in particular was noted as being highly distractible, which may have impacted their performance on the fluency tasks. Those three students did not receive intervention at this first opportunity, and their progress continued to be monitored on a monthly basis. Through the teacher consultation process, with skill-based need confirmed by diagnostic measures, an additional four students were added to the Tier 2 intervention groups, creating an initial Tier 2 intervention group consisting of 11 students. Tier 2 intervention was discontinued when students responded to

intensified intervention, demonstrating gains on monthly CBM measures above the progress monitoring cut score for that specific testing time.

Tier 2 Reading Intervention Program

Path to Reading Excellence in School Sites (PRESS) offers a research-based approach for supporting literacy achievement for students in kindergarten through grade five within an RTI framework, developed by researchers at the University of Minnesota (Minnesota Center for Reading Research, 2019). This resource includes evidence-based instruction for the classroom and tiered interventions, as well as suggestions for data-driven decision-making and embedded professional development. The intervention manual encompasses the five essential components of comprehensive reading instruction, as described previously in the background section, and includes multiple forms of measures to inform instruction and monitor student progress.

Participating learning support teachers in the present study used the PRESS resource, specifically the Phonemic Awareness Inventory and Decoding Inventory as diagnostic measures, the intervention lesson plans that were designed for Tier 2 implementation, and the progress monitoring forms associated with respective targeted skills. Progress monitoring measures were administered approximately weekly, with some flexibility due to teacher and student absences. If students demonstrated mastery on a specific skill (above 90%, as per the PRESS intervention manual), they progressed to the next skill group. District facilitators planned to utilize the internal checklist to ensure intervention fidelity, and respective learning support teachers regularly checked in with district facilitators to get input on regrouping students for acceleration and to problem solve for students who were not demonstrating gains in response to intervention.

Instructional Consultations

As described above, the initial professional development session with both district facilitators and respective classroom teachers also served as an initial instructional consultation. Savage stated, “one needs to explore the rich picture of the quality of teaching when exploring implementation” (2012, p. 292). The primary goals of the individualized instructional consultation were to glean detailed information on current practices in early reading instruction, and subsequently, to provide explicit instruction to respective teachers on how to implement supplemental evidence-based strategies to facilitate comprehensive development of early reading skills. Further, with the exception of Classroom A that commenced the school year in the Tier 1+ condition, district facilitators were able to involve screening and progress monitoring data in these sessions to ensure a responsive focus on students’ strengths and learning needs. These consultations were purposefully individualized, to directly address potential teacher concerns of undervaluing current instructional and assessment practices, as identified in Pyle et al. (2011). Pyle et al. found that lack of recognition of the value of present assessment methods and lack of acknowledgement and credibility with regard to their existing abilities as educators were not considered within the provided professional development process and resources, whereas the present study facilitated opportunities for teachers to receive personalized professional learning to complement specific areas or strategies within their existing practices.

An additional goal of the instructional consultations was to establish a communication structure to facilitate more effective collaboration between teachers and district facilitators moving forward. Because the initial sessions gave a mutually agreed upon focus for ongoing support, both teachers and district facilitators knew they could continue to check in and discuss

those particular resources or instructional strategies, problem solving regarding student response to instruction, accordingly.

Implementation Fidelity Across Phases and Classrooms

To ensure that evidence-based instruction and interventions were implemented with fidelity, district facilitators regularly checked in and followed up with all teachers. Since the BaU phase was typical classroom instruction, it did not require confirmation of fidelity; however, the researcher planned to complete a monthly checklist to confirm evidence-based instruction in the Tier 1+ phase (see Appendix G) and the Planning and Implementing Fidelity Check Basics tool once per month, as per the PRESS Intervention Manual, throughout the Tier 2 phase. Unfortunately, this plan did not come to fruition. Despite awareness of research on the impact of poor implementation on student progress and achievement (e.g., McKenna & Parenti, 2017; van Dijk et al., 2023), the district facilitators felt strongly that using a formalized tool to assess teacher implementation fidelity would ultimately have been a misstep in this study, given that it was a year heavily impacted by the Covid-19 pandemic. Plainly speaking, measures of fidelity were sacrificed to maintain essential professional relationships between teacher participants and district facilitators, as well as to preserve teacher participation in the study. Despite this departure, the present study maintains an essential component of implementation: “the continuous evaluation of its progress and quality to determine what works and what needs improvement” (Damschroder et al., 2009, as cited in Komesidou et al., 2022).

Data Analyses

In order to achieve the goals of the present study, multiple analyses were conducted across norm-referenced pre-post data, CBM progress monitoring data, and teacher perspectives. Initially, descriptive results were analysed to provide important information about all

participants' reading and reading related achievement at pre-testing. Further, to control for any existing differences between classroom groups, a one-way analysis of variance (ANOVA) was conducted to determine if kindergarten students' oral vocabulary skills, as measured by PPVT-IV, were different between classroom groups at the beginning of the school year. To address the first research question, investigating the impact of comprehensive, evidence-based instruction on kindergarten students' early reading skills, an Analysis of Covariance (ANCOVA) was used to analyze whether the post-intervention reading and reading related scores, respectively, adjusted for pre-intervention reading and reading related scores, respectively, differed between the four kindergarten groups. Additional analyses with uncorrected t-tests were also conducted. Follow-up analyses involved unpaired sample t-tests to examine within-classroom response to interventions. Similarly, a paired sample t-test examined differences between pre- and post-test reading and reading related scores within the group of students who received Tier 2 interventions, in order to investigate the second research question concerning the efficacy of RTI approaches in identifying and intervening for priority learners at-risk for RD. Independent-samples t-test analyses were then conducted to examine the differences between Tier 1 and Tier 2 groups at pre-testing and post-testing, respectively, to provide results on whether and to what extent the gap had been closed for priority learners. Supplemental analyses included the evaluation of ongoing progress considering CBM progress monitoring data, as well as themes that emerged from the teacher feedback process throughout the present study, and they provide valuable, context-specific information for future implementation efforts.

Results

Results are presented in the following order. First, results of the preliminary data analysis, including information on missing data points, distributions, and outliers are presented to

provide context for further analyses, as well as a description of kindergarten students' profiles and oral vocabulary at pre-testing. The next set of results address the intervention efficacy research questions, respectively, based on analyses involving ANOVA, ANCOVA, and paired-samples and independent-samples t-tests. Teacher feedback will then be presented to provide insight into factors impacting implementation of RTI approaches and to document teacher perceptions of intervention efficacy. Unless otherwise specified, all tests of statistical significance are based on a significance level of $p < .05$. Additionally, it should be noted that there were no corrections for multiple comparisons in the following analyses.

Preliminary Analysis

All data was investigated for inconsistencies, outliers, or missing data prior to analysis. While the complete data set showed no error of entry, there were a few missing values in the CBM monthly progress-monitoring data, due to extended student absences for illness or travel. Similarly, two students did not have scores on the Rapid Color Naming task and three students did not have scores on the Rapid Object Naming task at pre-testing due to excessive errors. All students completed all tasks at post-testing. Finally, as per DIBELS discontinuation procedures, many students did not participate in the Nonsense Word Fluency or Word Reading Fluency tasks during the October beginning-of-year benchmark, because they did not score above zero on the Phonemic Segmentation Fluency task (Good & Kaminski, 2011).

Variability across emergent literacy skills is expected within students' first year at school, as reaffirmed by recent studies in similar contexts (e.g., Perkins, 2019). Given this study's focus on foundational, word-level reading skills, outcome measures involved in the main analysis were thoroughly screened for normality, specifically Letter and Word Identification (KTEA-3; Kaufman & Kaufman, 2014) and the Phonological Awareness Composite, which is comprised of

standard scores from three subtests: Elision, Blending Words, and Sound Matching (CTOPP-2; Wagner et al., 2013). Visual examination of the boxplots and Normal Q-Q Plots for these variables revealed several possible outliers, but one case stood out as an extreme outlier, with particularly elevated scores across the full battery of reading and reading related measures. Further inquiry revealed that this specific student has a diagnosis of Autism Spectrum Disorder (ASD) and is likely hyperlexic, a condition involving very advanced word-level reading skills that is often comorbid with ASD (Ostrolenk et al., 2017). Since this student's extraordinary word-level reading skills were not typical at the kindergarten level, inclusion of these scores would skew the results and impact interpretation; thus, the decision was made to remove this specific case from the data set.

Distributions of the Letter and Word Identification variable appeared approximately normal at pre-testing with a marginal negative skewness, whereas the same measure at post-testing was noticeably kurtosed. After confirming positive kurtosis in the post-test variable with significant Shapiro-Wilk statistics, it was decided that the statistical tests involved in the main analysis were robust enough to accommodate this non-normal distribution; thus, transforming the variable was not necessary. Distributions of the Phonological Awareness Composite appeared approximately normal at both pre- and post-testing, though the variable at pre-testing had slight positive skewness and kurtosis. Descriptive statistics across all norm-referenced measures at pre- and post-testing including numerical methods of assessing normality for all variables are available in Table H1 and Table H2 (See Appendix H).

Kindergarten Students' Profiles at Pre-Testing

Descriptive results at pre-testing are presented in Table 1. While there was some variability of scores across measures, indicating the range of abilities at school entry, all

participants fell within the average and high average range on the PPVT-IV test. The mean values for performance on all reading and reading related measures were within the low-average to average range across the sample. Descriptive results at post-testing are available in Table H2 (see Appendix H).

Table 1

Descriptive statistics across early reading and reading related measures at pre-testing

Measure	N	Mean (<i>SD</i>)	Min.	Max.
Vocabulary				
PPVT-4	48	109.89 (9.97)	87	130
Phonological Awareness				
CTOPP-2 Eli.	48	94.43 (9.66)	70	110
CTOPP-2 BW	48	86.02 (14.41)	70	140
CTOPP-2 SM	48	89.43 (9.95)	70	105
CTOPP-2 RCN	46	97.16 (17.47)	55	120
CTOPP-2 RON	45	97.95 (18.18)	55	125
CTOPP-2 Comp.	48	87.93 (10.90)	62	120
Early Reading				
KTEA-3 L&W	48	86.64 (16.56)	45	129
KTEA-3 RC	48	87.61 (11.77)	70	127

Note. PPVT-4 = Peabody Picture Vocabulary Test – 4th Edition; CTOPP-2 Eli. = Comprehensive Test of Phonological Processing – 2nd Edition, Elision Subtest; CTOPP-2 BW = Comprehensive Test of Phonological Processing – 2nd Edition, Blending Words Subtest; CTOPP-2 SM. = Comprehensive Test of Phonological Processing – 2nd Edition, Sound Matching Subtest; CTOPP-2 RCN = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Color Naming Subtest; CTOPP-2 RON = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Object Naming Subtest; CTOPP-2 Comp. = Comprehensive Test of Phonological Processing – 2nd Edition, Composite Score; KTEA-3 L&W = Kaufman Test of Educational Achievement – 3rd Edition, Letter and Word Identification Subtest; KTEA-3 RC = Kaufman Test of Educational Achievement – 3rd Edition, Reading Comprehension Subtest.

Oral Vocabulary at Pre-Testing

Overall, kindergarten participants' oral vocabulary scores were average. Further analysis was conducted at the classroom level to examine the differences in oral vocabulary in each classroom, given how important vocabulary and language are to emergent literacy development. A one-way ANOVA was conducted to determine if kindergarten students' oral vocabulary skills, as measured by PPVT-IV, were different between classroom groups at the beginning of the school year. Participants were classified into four groups: Classroom A ($n = 14$), Classroom B ($n = 12$), Classroom C ($n = 8$), and Classroom D ($n = 14$). The data met the following assumptions: no outliers, normal distribution for each classroom group, and homogeneity of variances. While students' oral vocabulary scores varied across groups, the differences between groups were not statistically significant, $F(3, 44) = 2.199$, $p = .102$, $\eta^2 = .130$, showing that students in all classrooms demonstrated similar levels of language development at the start of the school year.

Question 1

Does supported, evidence-based early reading instruction (involving explicit, purposeful teaching of PA, letter knowledge, and vocabulary) accelerate the acquisition of reading skills as compared to business-as-usual (BaU) early reading instruction in kindergarten students?

In order to address this primary research question, the one-way ANCOVA was conducted across multiple measures to analyze whether the post-intervention mean scores, adjusted for pre-intervention mean scores, differ between the four kindergarten groups. Results are presented below for the Letter and Word Identification and Phonological Awareness Composite variables, respectively, and include all participants. Within-classroom results for Tier 1+ instruction follow.

Overall Tier 1+ Instruction Effects Across Classrooms

The Letter and Word Identification variable met most assumptions for the ANCOVA analysis, including a linear relationship between pre- and post-intervention word reading scores for each classroom group, homogeneity of regression slopes, and homoscedasticity and homogeneity of variances. Standardized residuals for one of the four classroom groups and for the overall model were not normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$); however, the one-way ANCOVA is fairly robust to deviations from normality so the decision was made to proceed with the analysis. There was also one outlier in the data, as assessed by one case with standardized residuals greater than ± 3 standard deviations. Unadjusted and adjusted means are presented in Table 2, below. After adjustment for pre-intervention Letter and Word Identification scores, there was no statistically significant difference in post-intervention Letter and Word Identification scores between the classroom groups, $F(3, 43) = .431, p = .732$, partial $\eta^2 = .029$.

Table 2

Unadjusted and adjusted means and variability for post-testing Letter and Word Identification scores with pre-testing Letter and Word Identification scores as a covariate

	N	<i>Unadjusted</i>		<i>Adjusted</i>	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SE</i>
Classroom A	14	88.5	11.1	91.4	2.4
Classroom B	12	93.6	12.4	92.5	2.6
Classroom C	8	91.3	16.2	88.2	3.2
Classroom D	14	90.4	7.1	90.1	2.4

Note. N = number of participants, *M* = Mean, *SD* = Standard Deviation, *SE* = Standard Error

Similarly, the Phonological Awareness Composite variable met the following assumptions: a linear relationship between pre- and post-intervention scores for each classroom group, homogeneity of regression slopes, normal distribution of standardized residuals for the classroom groups and for the overall model, homoscedasticity and homogeneity of variances, and there were no outliers in the data. Unadjusted and adjusted means are presented in Table 3, below. After adjustment for pre-intervention Phonological Awareness Composite scores, there was no statistically significant difference in post-intervention Phonological Awareness Composite scores between the classroom groups, $F(3, 43) = 1.163$, $p = .335$, partial $\eta^2 = .075$.

These initial results suggest that the quasi-experimental pre-post intervention design did not yield any significant results across classroom groups, conceivably due to the staggered implementation of intervention. The differences in when students received intervention likely masked the effects of the overall intervention for the entire group. This initial investigation into

the effects of universal, evidence-based early reading instruction across classroom conditions was followed by within-classroom analyses to gain additional insight into students' performance in response to instruction and intervention.

Table 3

Adjusted and unadjusted means and variability for post-intervention Phonological Awareness Composite scores with pre-intervention Phonological Awareness Composite scores as a covariate

	N	Unadjusted		Adjusted	
		M	SD	M	SE
Classroom A	14	91.6	13.5	92.9	2.6
Classroom B	12	90.0	14.8	90.5	2.8
Classroom C	8	91.1	15.6	86.3	3.4
Classroom D	14	86.1	11.9	87.2	2.6

Note. N = number of participants, M = Mean, SD = Standard Deviation, SE = Standard Error

Tier 1+ Instruction Effects Within Classrooms

A follow-up series of paired-samples t-tests was conducted to determine whether there was a statistically significant mean difference between pre- and post-intervention Letter and Word Identification scores within respective classroom groups. While the initial ANCOVA analyses examined overall pre-post-test performance across all classrooms and found no statistically significant differences, follow-up analyses examined pre-post differences within each specific classroom. Respective classroom-specific variables met assumptions of no outliers

and normal distribution, apart from one. For Classroom B, there appeared to be one outlier in the data that was more than 1.5 box-lengths from the edge of a boxplot, but further inspection of its value did not reveal it to be extreme; therefore, it was kept in the analysis.

Students in Classroom A achieved higher letter-word scores at post-intervention ($M = 88.5$, $SD = 11.1$), compared to pre-intervention scores ($M = 79.0$, $SD = 14.8$), a statistically significant mean increase of 9.5, 95% CI [1.748, 17.252], $t(13) = 2.647$, $p = .020$, $d = .71$. Classroom B students achieved higher letter-word scores at post-intervention ($M = 98.7$, $SD = 21.9$), compared to pre-intervention scores ($M = 92.5$, $SD = 25.8$), demonstrating a mean standard score increase of 6.231, 95% CI [-3.128, 15.590], though the difference was not significant, $t(11) = 1.451$, $p = .173$. Classroom C participants achieved lower letter-word scores at post-intervention ($M = 91.3$, $SD = 16.2$), compared to pre-intervention scores ($M = 92.4$, $SD = 16.7$), a mean standard score decrease of 1.125, 95% CI [-5.231, 2.981], and the difference was not significant, $t(7) = -.648$, $p = .538$. Lastly, for Classroom D, while participants achieved higher letter-word scores at post-intervention ($M = 90.4$, $SD = 7.1$), compared to pre-intervention scores ($M = 86.21$, $SD = 14.0$), a mean standard score increase of 4.143, 95% CI [-2.498, 10.784], the difference was not significant, $t(13) = 1.348$, $p = .201$. In summary, Classroom A, the lone group to start the supported Tier 1+ phase at the beginning of the school year, was the only group to achieve a statistically significant increase in Letter and Word Identification scores. This result suggests the effects of increased time in the Tier 1+ phase, along with timely access to Tier 2 intervention for priority learners. In contrast, Classroom C, the group with an extended BaU phase and delayed transition into the Tier 1+ phase, was the only group that demonstrated a decrease in scores between pre- and post-testing.

Similarly, a series of paired-samples t-tests was used to determine whether there was a statistically significant mean difference between pre- and post-testing Phonological Awareness Composite scores within respective classroom groups. Participants in Classroom A and Classroom B, groups that started the Tier 1+ phase in the Fall, achieved higher PA scores at post-intervention with mean standard score increases of 5.0, 95% CI [-.671, 10.671] and 2.583, 95% CI [-4.878, 10.045], respectively, compared to pre-intervention scores. Participants in Classroom C and Classroom D, however, demonstrated respective mean standard score decreases of 1.875, 95% CI [-7.264, 3.514] and 0.643, 95% CI [-5.370, 4.084] compared to pre-intervention scores. There were no significant pre-post PA score differences within respective classroom groups. Consistent with the Letter and Word Identification variable results, however, Classroom A, the first group to start the Tier 1+ phase, demonstrated the greatest gains in Phonological Awareness Composite scores, when compared to the other classroom groups. Classroom C, the most control-like group in the study, was the only classroom group to demonstrate decreased mean scores across both the Letter and Word Identification and Phonological Awareness Composite variables.

Whole Group Tier 1+ Instruction Effects

Table 4, below, displays results from a series of paired samples t-tests including all classroom groups as a whole across all norm-referenced measures, highlighting respective mean differences and any significant changes between the beginning and end of the school year. Despite the initial ANCOVA results showing no statistically significant differences between specific classroom groups, this analysis served to provide results on the impact of RTI approaches for all students in the study, regardless of entry into intervention phases at specific time points. There was a significant overall difference between students' pre- and post-test

scores on the Letter and Word Identification measure irrespective of intervention phase, $t(47) = 2.827, p = .007$, suggesting that intervention, at any time point, was related to a significant improvement in performance at post-test.

Table 4

Descriptive statistics across language, reading, and reading related measures pre- and post-test

Measure	M (SD) at Pre-Test	M (SD) at Post-Test	Mean Difference	<i>t</i>	<i>p</i>
Vocabulary					
PPVT-4	109.89 (9.97)				
Phonological Awareness					
CTOPP-2 Eli.	94.48 (9.63)	93.96 (10.21)	-.52	-.391	.698
CTOPP-2 BW	85.42 (14.06)	87.19 (15.09)	1.77	.900	.372
CTOPP-2 SM	90.00 (9.84)	92.60 (12.38)	2.60	1.297	.201
CTOPP-2 RCN	96.85 (17.43)	96.56 (14.95)	-.33	-.196	.845
CTOPP-2 RON	98.00 (17.98)	99.06 (13.47)	1.33	.620	.539
CTOPP-2 Comp.	87.94 (10.43)	89.54 (13.48)	1.60	1.166	.250
Early Reading					
KTEA-3 L&W	85.56 (16.72)	90.77 (11.27)	5.21	2.827	.007*
KTEA-3 RC	86.27 (13.41)	85.04 (12.86)	-1.23	-.706	.484

Note. * $p < .01$. PPVT-4 = Peabody Picture Vocabulary Test – 4th Edition; CTOPP-2 Eli. = Comprehensive Test of Phonological Processing – 2nd Edition, Elision Subtest; CTOPP-2 BW = Comprehensive Test of Phonological Processing – 2nd Edition, Blending Words Subtest; CTOPP-2 SM. = Comprehensive Test of Phonological Processing – 2nd Edition, Sound Matching Subtest; CTOPP-2 RCN = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Color Naming Subtest; CTOPP-2 RON = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Object Naming Subtest; CTOPP-2 Comp. = Comprehensive Test of Phonological Processing – 2nd Edition, Composite Score; KTEA-3 L&W = Kaufman Test of Educational Achievement – 3rd Edition, Letter and Word Identification Subtest; KTEA-3 RC = Kaufman Test of Educational Achievement – 3rd Edition, Reading Comprehension Subtest.

Question 2

Is an RTI approach that identifies children in need of supplemental intervention and delivers intervention effective in raising reading outcomes between pre-testing and post-testing?

The main analysis to address the question of efficacy of Tier 2 intervention for priority students consisted of a series of paired-samples and independent-samples t-tests using norm-referenced pre- and post-testing data, focused on word-level reading skills as captured by the Letter and Word Identification measure (KTEA-3; Kaufman & Kaufman, 2014). Further analyses, considering additional early reading and reading related skills, as well as CBM progress-monitoring data, are included below.

Supplemental Intervention Effects Within Tier 2 Group

A paired-samples t-test was used to determine whether there was a statistically significant mean difference between pre- and post-testing Letter and Word Identification scores, for the Tier 2 participants ($n = 11$) who were identified as at risk and received supplementary small-group intervention. Two outliers were detected that were more than 1.5 box-lengths from the edge of the box in the boxplot; however, inspection of their values did not reveal them to be extreme and they were kept in the analysis. The assumption of normality was not violated. Tier 2 participants achieved higher Letter and Word Identification scores at post-testing ($M = 85.9$, $SD = 11.2$), compared to pre-testing scores ($M = 73.1$, $SD = 12.8$), a statistically significant mean standard score increase of 12.818, 95% CI [2.932, 22.705], $t(10) = 2.889$, $p = .016$, $d = 0.87$. This significant gain in word-level skills suggests a strong response to the small-group intervention offered by school-based learning support teachers.

Supplemental Intervention Effects Between Tier 1 and Tier 2 Groups

Additional independent-samples t-test analyses were conducted to examine the differences between Tier 1 and Tier 2 groups at pre-testing and post-testing, respectively, ultimately testing the efficacy of RTI. For clarification, Tier 1 participants were those who only received BaU and Tier 1+ classroom instruction without any additional interventions, whereas Tier 2 participants were those who participated in BaU and Tier 1+ classroom instruction, but also received supplemental Tier 2 small-group intervention. While significant differences between Tier 1 and Tier 2 students at pre-testing were expected, given the student selection process identifying students who needed targeted support, follow-up analyses comparing the two groups at post-test examined Tier 2 students' response to intervention. The following analyses included 37 Tier 1 students and 11 Tier 2 participants.

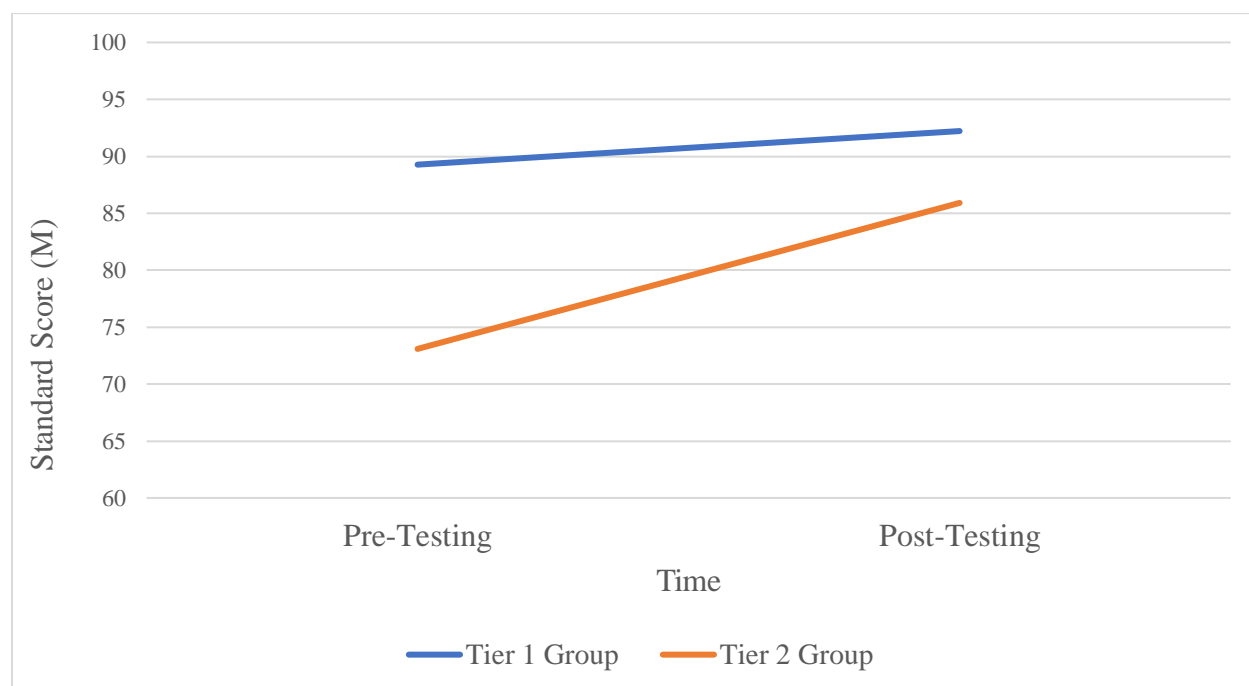
Pre-Testing Results. In examining the pre-testing Letter and Word Identification variable, there were no outliers in the data, scores for Tier 1 and Tier 2 groups were normally distributed, and there was homogeneity of variances. As anticipated, pre-testing Letter and Word Identification scores were higher in the Tier 1 group ($M = 89.27$, $SD = 2.64$) than in the Tier 2 group ($M = 73.09$, $SD = 3.85$), a statistically significant difference, $M = 16.18$, 95% CI [5.53, 26.83], $t(46) = 3.058$, $p = .004$.

Post-Testing Results. For the Letter and Word Identification variable at post-testing, there were two significant outliers in the data, one in the Tier 1 group and one in the Tier 2 group, as assessed by inspection of a boxplot. This is not unexpected in this population, given the participants' age, profiles, and varied responses to instruction and intervention. Further, scores for Tier 1 and Tier 2 groups were not normally distributed, as assessed by Shapiro-Wilk's Test ($p < .05$), as described in the preliminary analysis, again, indicating varying response to

intervention and additional evidence as to the varying needs of young learners; however, because the independent-samples t-test is fairly robust to deviations from normality and the Tier 1 and Tier 2 groups were similarly skewed and kurtosed, it was determined that this non-normality would not affect Type 1 error substantially, and the test was run. This variable also met the assumption of homogeneity of variances. At post-testing, Letter and Word Identification scores were still higher in the Tier 1 group ($M = 92.22$, $SD = 1.81$) than in the Tier 2 group ($M = 85.91$, $SD = 3.37$), but the difference between groups was no longer significant, $M = 6.31$, 95% CI [-1.34, 13.95], $t(46) = 1.661$, $p = .104$. This suggests that Tier 2 intervention mitigated the extent of the differences between groups from pre- to post-testing, as displayed in Figure 3.

Figure 3

Tier 1 vs. Tier 2 mean Letter and Word Identification scores



While the results of the main analysis, above, highlight the pre- and post-testing gains of students who received Tier 2 intervention, relative to both their own pre-testing scores and the Tier 1 group, respectively, the subsequent analyses facilitate a more complete picture of how an RTI approach that identifies children in need of supplemental intervention and delivers intervention is effective in raising reading outcomes between pre-testing and post-testing. It is pertinent to consider the impact of Tier 2 intervention on reading related skills in addition to the word-level analyses, above, as well as to examine how the monthly CBM scores reflected student gains throughout the year, as that was the information used to make important decisions about access to student services. The following results include an additional within-group analysis for students who received Tier 2 small-group intervention and an examination of monthly CBM progress monitoring data.

Supplemental Intervention Effects on PA

To complement the results on the Tier 2 group's word-level reading skills captured in the main analyses, an additional paired-samples t-test was used to determine if there was a statistically significant mean difference between pre- and post-testing Sound Matching scores (CTOPP-2; Wagner et al., 2013). The Sound Matching measure was selected here, as opposed to the Phonological Awareness Composite variable, to capture the skills most closely aligned with the targeted intervention activities. As a group, Tier 2 participants did not show significant differences in performance, likely due to low power, given the small group size ($n = 11$), and the limitations of a norm-referenced, omnibus developmental measure in its ability to capture change in this population. While specific students showed significant gains in these skills between pre-testing and post-testing, there was considerable variability across the Tier 2 group as a whole.

Beyond the main and supplemental analyses presented above, what follows are additional results based on progress monitoring data. Screening and progress monitoring are essential components of RTI, offering teachers meaningful data to drive responsive instruction and knowledgeable decisions around allocation of supplemental interventions. Given the present study's focus on the efficacy of RTI approaches in authentic classroom settings, analyses need to consider the measures utilized by teachers for data-based decision making.

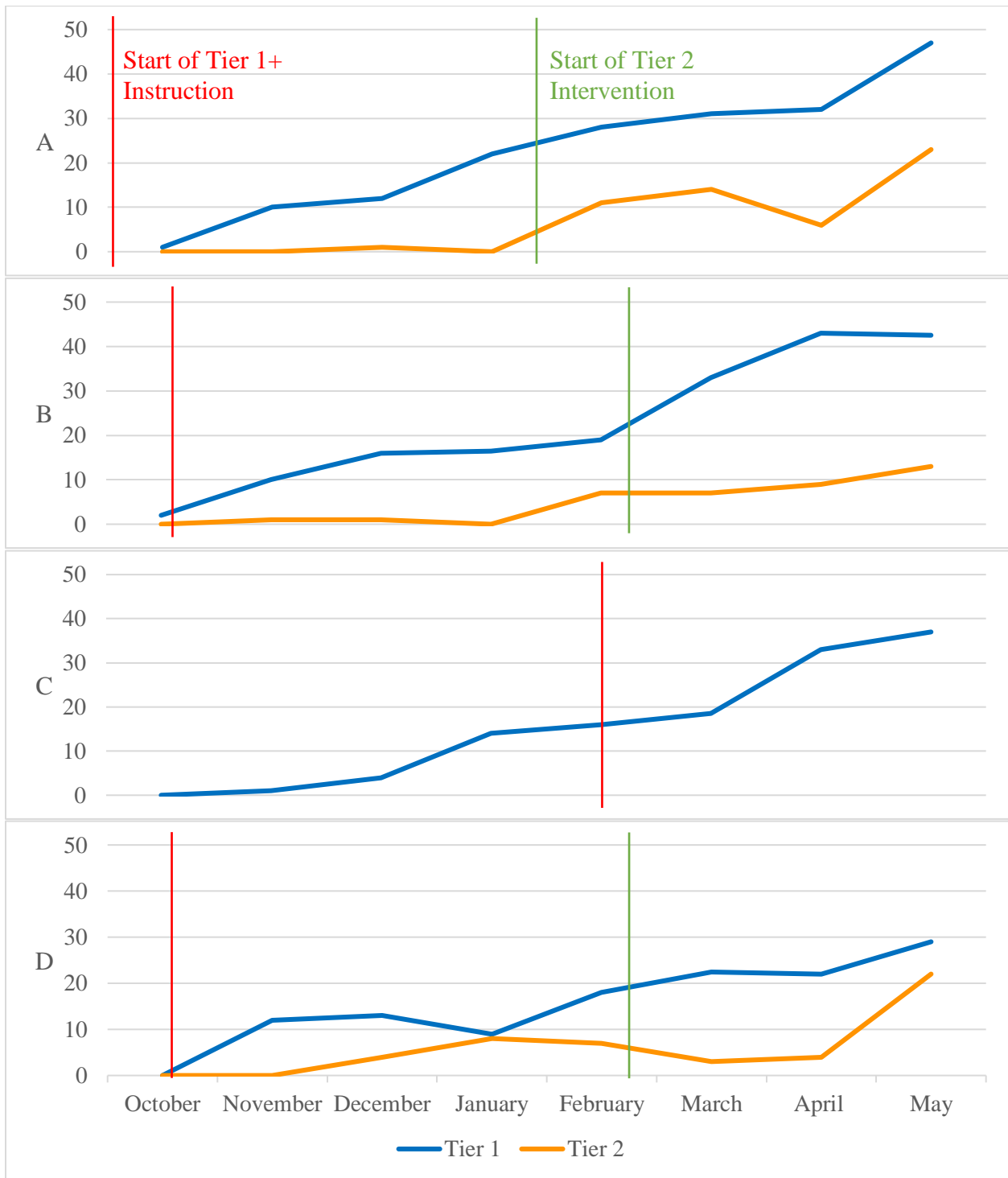
Evaluation of On-Going Progress

The following CBM progress monitoring data, collected monthly by classroom teachers and district facilitators, complements pre-post-testing norm-referenced data, offering additional insight into response to instruction and intervention. In evaluating the efficacy of an RTI approach that both identifies and serves priority students at risk for RD at various times throughout the school year, analyses must include more time-sensitive data between pre- and post-testing. Results based on CBM progress monitoring data offer insight beyond student gains, taking into account specific time points during the school year students demonstrated gains. When trends are cross-referenced on changes in students' scores with students' access to services throughout the study, the results are particularly meaningful. All teachers administered CBM progress monitoring measures monthly to all students, and results are considered valid.

Figure 4, below, displays Tier 1 and Tier 2 groups' median Phonemic Segmentation Fluency scores across respective classroom groups. Consistent with results from the main analysis of norm-referenced pre-post measures, there is an observable initial increase in students' phonemic awareness skills within classrooms that had earlier access to comprehensive, evidence-based instruction in the Tier 1+ phase. Note that Classroom C does not include a Tier 2 group, as limited data was available for analysis.

Figure 4

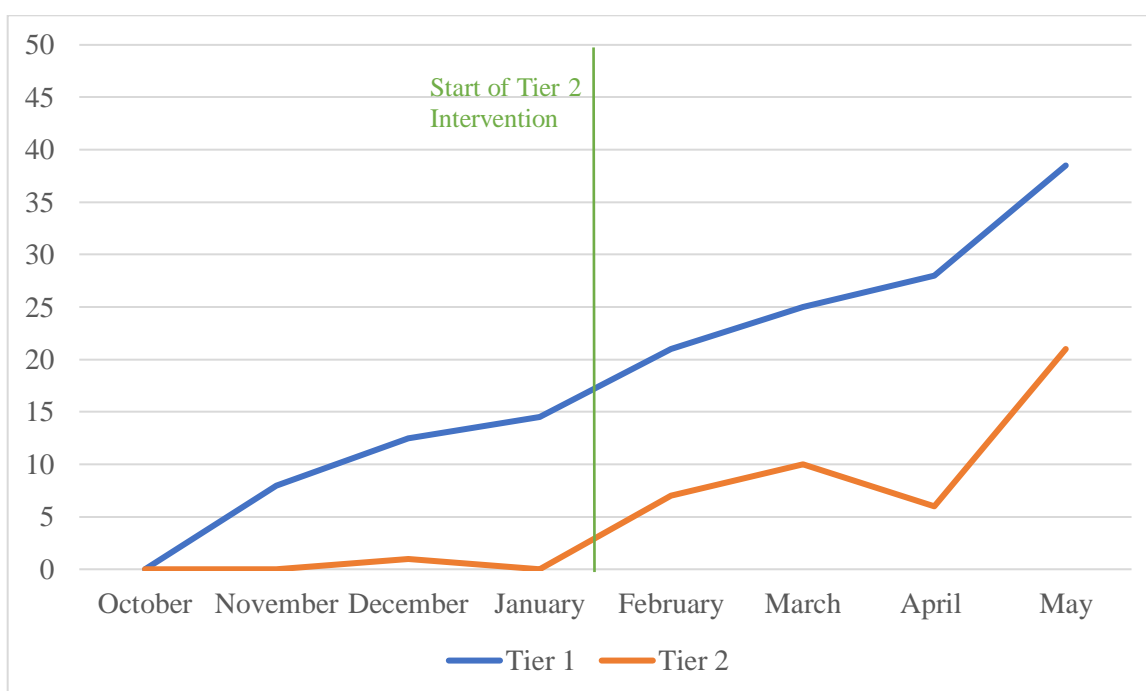
Tier 1 vs. Tier 2 median PSF scores across classroom groups



Additionally, the following graph displays the median Phonemic Segmentation Fluency (PSF; Good & Kaminski, 2011) scores for all participants in the Tier 1 group and Tier 2 group, respectively, across the school year. Tier 2 participants in Classrooms A, B, and D started receiving small-group targeted intervention as early as February. As you can see in Figure 5, as a group, Tier 2 participants did not respond to classroom BaU and Tier 1+ phonemic awareness instruction, as demonstrated by low scores in October through January, but subsequent gains represented a vital boost to skills with the supplemental Tier 2 small-group intervention. Without access to Tier 2 intervention, one could postulate that students who were non-responsive to classroom-based phonemic awareness instruction would continue to have difficulty acquiring these essential skills. Note that both Tier 1 and Tier 2 groups had median scores of zero in October. The clearly discrepant April score will be discussed below.

Figure 5

Tier 1 vs. Tier 2 median PSF scores



Beyond examining intervention efficacy across classrooms and phases as already presented, teacher feedback on intervention implementation was elicited and recorded, as an important additional issue addressed by the present study concerns the factors facilitating or impeding implementation of RTI approaches. Specifically, teacher perspective gathering aimed to include information on a) support mechanisms that classroom teachers might need to adopt learner-informed practices to deliver an inclusive, evidence-based early reading program in the classroom within an RTI structure, b) classroom teachers' perceptions of their early reading instruction, learner-informed practices, and associated student learning, before, during and after adoption of RTI practices, and c) the associated facilitating factors and barriers with classroom-, school- and district-level adoption of RTI practices.

Complementing the intervention efficacy results, the implementation feedback results provided valuable insight into what has been learned about how learner-informed and evidence-based practices can be promoted in classrooms, schools, & school districts. Considering the critical role that teachers have in the implementation of classroom- and school-based interventions, the interviews yielded information regarding potential supports and barriers to implementation for scaling up and broadening RTI implementation across the school district. Member checking took place at the end of the school year, pre-, mid-, and post-implementation interview transcripts were analysed for emerging themes, and the researcher shared preliminary findings with teacher participants to ensure an appropriate level of accuracy and credibility of the analyses prior to any presentation of results.

Teacher Feedback

Overall, in analyzing the teacher interviews, several themes emerged as they related to past research on implementation science and the challenges of conducting educational research

in authentic contexts. There was often considerable overlap between themes and time points in the year; therefore, separating and distinguishing them for analysis proved challenging. The following results are presented in terms of the themes that emerged from the data. Table 5, below, includes the words of the participating teachers as well as themes that arose during the transcript review process. Subsequent discussion will consider the teachers' feedback and insights, the facilitator observations and notes, and the researcher's interpretation of the findings that emerged from the iterative analysis process between the intervention data and implementation feedback.

Tier 1+ Support Mechanisms

With regard to Tier 1 instruction, teachers spoke specifically about the Heggerty resource and its value in supporting purposeful, systematic PA instruction, noting the contrast between structured PA lessons and past practices that were more haphazard in nature. Teachers identified modelling and demonstrations to be particularly helpful in the process of learning and trying this new resource, suggesting that ongoing mentorship and consultation with colleagues facilitates implementation, even in a year where in-person interaction could cause feelings of discomfort.

Similarly, teachers communicated the importance of collaboration in facilitating implementation of new practices, both with colleagues and district facilitators. Shared comments highlighted the value of insight from other professionals, and the value of establishing a learning community with common goals. Teachers were hopeful that beyond the Covid-19 pandemic, there would be additional opportunities to collaborate with colleagues within their school and across the district on early literacy instructional strategies. Teachers also reported the value of diagnostic assessments in providing pertinent information for targeted intervention, and that, aligned within findings by Castro-Villarreal et al. (2014), ongoing collaboration and

communication between classroom teachers at Tier 1, as well as learning support teachers at Tier 2, was helpful in supporting priority students and teachers alike.

Classroom Teachers' Perceptions

Comments at pre-implementation reflected frustration about past practices that involved students waiting until the next school year to receive intervention, and the tension that arose when the systems for support didn't align with personal beliefs and values regarding early intervention. At mid-implementation, however, teachers expressed enjoyment and pride in witnessing the progress that students were making throughout the school year, while acknowledging that monthly CBMs were a challenging departure from typical practice. Identified challenges regarding progress monitoring measures aligned with those from past research, and included time to administer, difficulties with interpretation, and perceived irrelevancy of results (e.g., Rowe et al., 2014).

With regard to early literacy skill assessments, teachers shared their satisfaction with existing practices that were primarily focused on letter knowledge, phonics, and concepts of print. While teachers reported that their current beginning of the year assessments were helpful for knowing where to start, progress monitoring and later, reporting to families, there was not any mention of differentiation or additional support for students who demonstrated difficulties. When asked about how they typically found out about new resources, teachers reported that sources included colleagues, social media, books, and professional development opportunities. Teachers indicated that they would then choose resources that aligned with their current practice and what they felt worked for students. In post-implementation interviews, teachers expressed gratitude for the opportunity to have a role in supporting students in their first year of school, particularly supporting priority students beyond the scope of classroom instruction.

Facilitating Factors and Barriers

In mid- and post-implementation interviews, teachers reported educative resources with scaffolds, ongoing support from district facilitators, release time, and collaboration as facilitating factors for RTI implementation. Teachers shared countless examples of student gains, both in terms of early reading skills and confidence, in response to Tier 1+ classroom instruction and Tier 2 intervention. One teacher expressed that they had not seen that level of student performance at the end of kindergarten in previous years.

Barriers reported by teachers mirrored researchers' findings from past studies on RTI implementation, specifically lack of training, time, and resources (e.g., Castro-Villarreal et al., 2014). The lack of time to receive training, to prepare resources, to collaborate with colleagues, to gather student assessment data, and to reflect on practice and associated student response were major factors identified by teachers. Teachers spoke to limitations around budgets and the costs associated with new resources. Multiple teacher participants also communicated feelings of frustration around a lack of professional learning on evidence-based early reading instruction prior to the commencement of this study, noting that theory on how children learn to read and the rationale for the explicit teaching of PA were absent from pre-service teacher training. Lastly, teachers reported heightened levels of stress, particularly at mid-implementation, likely due to increased illness and uncertainty during an impactful wave of the Covid-19 pandemic. Teachers shared feelings of exasperation and exhaustion, and how their current state of stress and overwhelm impacted their ability to implement new practices, which aligns with a past examination of the relationship between stress and intervention fidelity (Larson et al., 2018).

Table 5

Themes and quotes from teacher feedback at pre-, mid-, and post-implementation of RTI approaches

	Theme	Associated Teacher Quotes
Pre-	<p>Barriers – finding resources, judging efficacy of resources, cost of resources, time to learn and figure out implementation within existing program, lack of adult support in the classroom, limited energy, lack of evidence-aligned professional development and collaboration opportunities, pre-service teacher training, teacher autonomy</p>	<p>“I kind of alternate between buying new clothes for myself or buying things for the classroom.”</p> <p>“It’s nice to do these kinds of things. It’s making me think about think, kind of re-evaluate which programs I’m using and how I’m using it. And if they’re beneficial. Like, is this the best program I can be using?”</p> <p>“If it’s something that really interests me and I think it will be of value, then I usually figure out some way to make it happen.”</p> <p>“I’m pretty much open to trying new things, but they have to be easy to implement, like, I don’t have time to read a whole textbook.”</p> <p>“The importance of proper reading and literacy training in post-secondary, because I do feel that I was done a disservice [...] Preparing teachers for what early literacy and reading looks like, I think, really needs to be looked at more.”</p> <p>“In the classroom teacher role we have an idea of the things we need to teach but we don’t know how to explicitly do that.”</p> <p>“Everyone does their own thing, like every teacher is able to do their own program, you know, their own systems.”</p>
	<p>Assessed early literacy skills (current practice) – letter knowledge, letter sounds, recognizing student names, printing name, concepts of print</p>	<p>“Like we sit down and we practice all the sounds together, like with the flash cards and the actions, and do the songs.”</p> <p>“By the time you learn like 3 or 4 letters they can start sounding out words and they think that’s great and amazing and they have a lot of confidence in their skills.”</p> <p>“Like, is it for reporting purposes or for instruction? Yeah, it’s for reporting purposes. I like to take a baseline. I do use it for reporting and just so I can see their progress as they go throughout the year.”</p>

	Finding new resources – colleagues, social media, books, professional development opportunities	<p>“I just sort of see something and it makes me start thinking more [...] I think, yeah, that looks interesting, or not so much for me.”</p> <p>“People who have had more experience than me [...] and then after having used certain programs kind of knowing what worked or what didn’t work.”</p>
Mid-	Progress monitoring – toward learner-informed practices	<p>“They’re way too frequent [...] but then on the flip side, I am finding out things about the kids that I wouldn’t have assessed for or known to assess for and being surprised by that too.”</p> <p>“I’ve enjoyed seeing the progress that children have been making [and] seeing more in depth where children need extra help.”</p> <p>“It’s, like, not usually how I’d assess the kids.”</p> <p>“It’s good to know whether [they’re] on track using a different style of assessment.”</p> <p>“I can see the progress when I’m doing the assessments, I can see things are starting to improve, like even if it’s only one more letter.”</p>
	PA instruction – purposeful, systematic	<p>“That was big learning for me because like, we did the phonics but not really [phonemic awareness], you know it was kind of always a little bit like, here’s a rhyme, but not so intentional.”</p> <p>“I like the video component of [Heggerty] [...] because then I can go and sit and guide some of the kids.”</p> <p>“It’s good to have reminders to focus on the integrity and the different skills in there.”</p> <p>“The developmental readiness piece too, like I’m curious on how that and the Tier 2 interventions are going to mesh. [...] And I was talking to some of the grade one teachers and the kiddos that weren’t so interested last year in letters and sounds still aren’t interested, so maybe it’s not such a developmental thing.”</p> <p>“I think the value is that they’re learning from, like, a structured program, instead of me picking and choosing things I’ve found.”</p>
	Implementation supports – district facilitators, school-based collaboration,	<p>“It’s really nice to know that I can reach out to you [...] and in our school, there’s always people around who can help.”</p>

	collaboration across schools, release time	<p>“I think yes, in the future when we aren’t in this crazy situation, it would be especially [helpful] getting together with other K teachers and talking [...] and seeing what they’re doing.”</p> <p>“Even just like quick little conversations with [district facilitators] when you’re coming in [...] Highlighting other students’ information that maybe I hadn’t noticed.”</p>
	Teacher stress – compounding effects of Covid-19 pandemic	<p>“I’m worried that if I add anything else to my plate, it’s all gonna [sic] come tumbling down.”</p> <p>“Everything was a bit more than I was expecting.”</p> <p>“It’s not the year to be trying out new things.”</p> <p>“It’s been so hard. I’m still so stressed out and tired, but knowing I have three days off is helping a lot.”</p>
Post-	Response to direct & explicit instruction	<p>“I’ve never seen that before in kindergarten, [...] and they’re sounding out words and they’re like, they’re getting all the sounds in there. It might not be the correct spelling, but all the sounds are there!”</p> <p>“I can’t even keep up with them and I think [phonemic awareness instruction’s] got a lot to do with that and just being more aware of the fundamental skills that need to be taught so they can just take off.”</p> <p>“She gave me a card at the end of the year, and she had written it all herself. Ah, this is so amazing.”</p> <p>“We get really fixated on that notion of reading without really understanding what are those underlying skills that you need to achieve reading well and long term.”</p>
	Facilitating factors – educative resources, openness to trying something new, scaffolds, ongoing support, provided and prepared materials, district facilitators	<p>“If you’d just given me that [resource] and then, just go do it, I don’t think I would have picked it up at all, but to sit down with [district facilitators] and have that session and the background was helpful and it made me believe in it.”</p> <p>“That’s what I told them. I said, ‘I’m learning too, so we’re all gonna [sic] make mistakes together. So let’s just try.’”</p> <p>“It was nice to sit down and score them and not be rushed and have time to reflect on how each kid is doing.”</p>

		<p>“It was so easy to implement and to use [...] and it kind of taught me a lot of stuff that I hadn’t been doing, or that I’d been doing just hit and miss. So it was more intentional.”</p> <p>“Those structural pieces are important, right? You need to know who your people are.”</p>
	<p>Timely and responsive intervention – closing the gap, essential skills, Tier 1 & Tier 2 collaborative approach to supporting priority learners</p>	<p>“When I started teaching kindergarten, I was always annoyed that there wasn’t enough support and recognition for how important kindergarten was, and like, if we can catch these kids early, it won’t be a problem later.”</p> <p>“For kindergarten, I think the learning for us too was that even though the kids might know their letter names [...] and sounds, the ones that were missing that phonological stuff was surprising. And it was like, oh, maybe this is kind of what’s missing [...] And vice versa.”</p> <p>“Just having the other educational partner that sees [students in small-group intervention] and you can reflect back and forth, have collaboration about [those kids]. That was something I haven’t really done before, especially in kindergarten [...] Usually it’s not until next year they start getting noticed.”</p> <p>“I like how there’s frequent assessment and monitoring of the skills so you can really see and target where the kids are having difficulty.”</p> <p>“Oh yeah, value for sure. When you realize those kids wouldn’t have had that before. I’m so glad to be a part of that.”</p>

Discussion

In a published commentary titled “Educational Research: The Hardest Science of All”, Dr. David Berliner wrote, “we do our science under conditions that physical scientists find intolerable” (p. 18, 2002). This particular ecologically valid educational research occurred in authentic kindergarten classrooms during the second year of the Covid-19 pandemic. The primary goal of the present study was twofold: 1) to examine the impact of teacher adoption of RTI and learner-informed approaches involving universal screening, evidence-based classroom instruction, progress monitoring, and intensive intervention on kindergarten students’ early reading skills, and 2) to consider the feasibility of implementation based on elicited responses from teachers. As previously stated by McIntosh et al. (2011), the absence of federal or provincial policies allows for localized and responsive grassroots approaches to RTI in Canadian school districts; nonetheless, considering the multifaceted nature of classroom-based educational research, the results of this study, including intervention data and gathered teacher perspectives from a small, rural school district, are incredibly complex and must consider the fulsome context.

The main question addressed by this research concerned evidence-based early reading instruction and its ability to facilitate reading skill development when compared to typical kindergarten classroom reading instruction. Despite overall sample results showing no effect of staggered treatments across the four kindergarten classrooms, as we might expect, given the differences in when groups received intervention, follow-up results clearly suggest that supported evidence-based early reading instruction, involving explicit, purposeful teaching of phonemic awareness, accelerates the acquisition of early reading skills as compared to business-as-usual (BaU) instruction in kindergarten students. This is consistent with existing Canadian RTI research focused on universal, evidence-based early reading instruction (e.g., Siegel, 2018).

Classroom A, the single classroom starting the year in the supported Tier 1+ phase and the classroom with the earliest access to Tier 2 intervention for priority learners, was the only classroom to achieve a statistically significant increase in letter-word knowledge from pre-testing to post-testing. Further, though this study did not include a true control group, due to ethical considerations that will be discussed below, Classroom C was the last group to enter the Tier 1+ phase in February; participants in Classroom C demonstrated the least growth on word reading and PA measures over the course of the school year. These findings align with previous research demonstrating that timely intervention is key, and the earlier, the better (e.g., Catts et al., 2015a; Stuckey et al., 2022).

In fact, in contrast to the other three classroom groups, standard scores of Classroom C participants decreased across the following norm-referenced measures: Letter and Word Identification, Phonological Awareness Composite, and Sound Matching. This finding was particularly interesting, as Classroom C was a multi-age kindergarten and grade one classroom; therefore, given provincial curricular expectations in English Language Arts, kindergarten participants in that environment were likely exposed to and participating in more advanced reading instruction and learning opportunities, leading one to hypothesize that these students might demonstrate increased skills compared to other participating kindergarten classrooms. This was not the case in the present study, which is consistent with past research presented in Australia on single-age and multi-age groupings in kindergarten and their effect on literacy achievement (e.g., Corrigan et al., 2006).

In addressing the efficacy of an RTI model in its ability to accurately identify students who are at risk for reading difficulties and intervene accordingly, the present study offers a strong small-scale example. Considering that the goal of foundational reading instruction is for

students to consolidate phonemic awareness skills and phonics knowledge into efficient decoding, the Letter and Word Identification measure was the focus of the main analysis. Not only did Tier 2 participants demonstrate statistically significant word-level gains between the beginning and end of the school year, they demonstrated considerable growth in relation to peers who did not receive intervention. While we would expect significant differences between Tier 1 and Tier 2 groups at the beginning of the year, the absence of the significant gap between these two groups in word-level skills by year-end is an incredibly meaningful result, particularly in a school district where intervention with kindergarten students has been limited and contested. This study adds to a solid evidence base, showing that responsive and timely kindergarten intervention can close the gap for our priority learners before they experience a level of difficulty, despite persistent and unprecedented implementation challenges due to the Covid-19 pandemic.

Implementation of RTI Approaches

The overarching finding that purposeful and evidence-aligned classroom reading instruction for all kindergarten students layered with timely and intensive small-group intervention for students who need it is consistent with well-established trends in the literature (e.g., O'Connor et al., 2005; Siegel, 2018; Simmons et al., 2008). Consistent with McIntosh et al.'s (2011) next steps for RTI implementation in Canada, the results of this study also suggest that focusing on quality classroom instruction, screening, and ongoing progress monitoring can facilitate more responsive instruction and intervention through a preventative approach to supporting all students' reading skills. Relevant to these results, however, is the caution that, "teams should not make the assumption that because an evidence-based practice is purchased, and personnel are trained, it will be implemented with fidelity" (McIntosh et al., 2011, p. 35).

While determining the critical properties of effective professional development was beyond the scope of this study, the individualized teacher professional development sessions on evidence-based early reading instruction coupled with provided resources, scaffolds for implementation, and ongoing support led to observable shifts in practice, consistent with previous studies (e.g., Brady et al., 2009); however, implementation fidelity across implementation of evidence-based practices and administration and interpretation of CBM progress monitoring measures to facilitate learner-informed practices were ongoing challenges in this study, due to a variety of factors including teachers' autonomy, training, and capacity for learning and changing practices accordingly during a very difficult year.

Ongoing Teacher Consultations

District facilitators were available for ongoing consultation and collaboration once teachers entered the Tier 1+ phase of the study, with the intent of offering ongoing support for implementation and maintaining fidelity. Interestingly, kindergarten teachers rarely reached out for support with instructional practices; rather, most of the communication from kindergarten teachers surrounded logistical details for progress monitoring assessments, letting district facilitators know how many students were away and scheduling follow-up visits. District facilitators scheduled classroom observations and ensured they followed up with kindergarten teachers whenever they were at the school. This was occasionally successful at facilitating conversation focused on students' response to instruction or a plan for moving forward, but most often, kindergarten teachers presented as stressed and overwhelmed, very likely due to the Covid-19 pandemic context, and district facilitators were hesitant to add or change anything that could be perceived as additional work. An unexpected result was that teachers expressed gratitude for the support from district facilitators in the mid- and post-implementation interviews,

identifying ongoing consultation with district facilitators as a facilitating factor for RTI implementation. In contrast to kindergarten teacher engagement, school-based learning support teachers implementing the Tier 2 interventions were regularly contacting the district facilitators with questions around the intervention materials, seeking advice on building homogeneous groups, or seeking collaboration to problem-solve next steps for students who had not adequately responded. This suggests that specific aspects of the learning support job, such as schedule flexibility or group size, may impact teachers' ability to communicate and collaborate, as their time during the school day is not as constrained, or that Tier 2 interventions may be more difficult to implement, given their inherent intensity and specificity.

Screening and Progress Monitoring

Early and universal screening for RD is crucial; nevertheless, it was an entirely new practice for the schools involved in the present study. While post-implementation interviews captured general kindergarten teacher acceptance of the screening progress monitoring process, particularly through the lens of “catching kids early” to provide timely intervention, the practice of monthly assessments proved challenging throughout the study with regard to administration fidelity, sensitivity, application, and frequency. This was also an aspect of the study that was constantly impacted by challenges associated with Covid-19. Beyond initial training with district facilitator observations and feedback, teachers seemed to have some difficulty adjusting and adhering to the standardized nature of the progress monitoring measures, and required additional support early in the year, including subsequent sessions of observation and modelling. Due to frequent and extended student absences, district facilitators assisted teachers with completing catch-up assessments for students who were away, and consequently, district facilitators began to observe subtle discrepancies in the scores over time, depending on who

administered the measures. In the few instances where this came to light, teacher-administered scores were consistently lower than district facilitator-administered scores, likely due to difficulties associated with pacing and maintaining momentum on timed measures. This was particularly evident on the Phonemic Segmentation Fluency (PSF; Good & Kaminski, 2011) task. Once students gained skills and began to respond at a more rapid pace, it appeared to become increasingly challenging for teachers to record student responses and provide the next stimuli accordingly. Despite well-established technical adequacy and reliability in the literature, there is a very limited body of research exploring specific examiner errors in administration of CBMs and training to mitigate these faults. Harrison et al. (2018) highlighted common errors made by novice examiners on academic achievement measures, noting that errors increased on subtests requiring greater examiner inference or interpretation. Additionally, in their study investigating whether student performance on oral reading fluency measures may be influenced by factors of the testing situation, Cummings et al. (2014) demonstrated that examiner variability does exist, separate from instrumentation of the assessment measure. While to date, there are no studies on this phenomenon with regard to additional reading related CBMs, this is one likely explanation for the discrepant April PSF score outside the trend in Figure 4, above.

In alignment with previous research on kindergarten screening (e.g., Smolkowski & Cummings, 2016), PSF proved to have inadequate sensitivity at the beginning of the school year, as the majority of students scored zero on the October task. While this improved as the year progressed and students received instruction, this initial floor effect impacted teachers' interpretation and ability to provide differentiated phonemic awareness instruction to support students who needed it most. Smolkowski & Cummings suggest that research on reading CBM should account for the scope and sequence of curricula, as this could impact the validity of

screeners and their associated decision thresholds. The results of this study offer an extension for practice, as teacher feedback in the first half of the school year indicated that not all of the skill-based information gathered in the assessments was useful for adapting or differentiating instruction. One participating teacher commented that the skills captured in CBMs did not match classroom instruction. This teacher reportedly told students, “I really don’t expect you to know these things. We’re just helping [district facilitators] with a project.” Similarly, research on the relationship between assessment acceptability and fidelity in academic intervention is limited, but Rowe et al. (2014) propose that integrity around data collection and application could be linked to teacher acceptance of tools, recommending teacher-approved assessment tools for uptake of learner-informed practices. Teacher participants in this study were not consulted on the choice of assessment measures. A teacher also expressed frustration at the standardized nature of CBMs, specifying that they appreciate being able to provide cues and prompts during their classroom-based assessments, as needed. Other participating teachers conveyed a preference for specific DIBELS subtests over others, namely PSF and NWF, as they complemented current classroom-based assessment methods (i.e. knowledge of letter-sound correspondences) by offering additional insight into foundational skills. The monthly PSF data was particularly helpful early in the second half of the school year, as school teams were beginning to make decisions around which students would receive Tier 2 interventions. Overall, these results suggest that additional professional development and ongoing support from reading specialists are needed to embed RTI approaches and learner-informed practices within teachers’ skills and competencies.

The intent of such frequent administration with a comprehensive battery of measures was to drive responsive instruction and elucidate feedback on which skills and time points were most

valuable for facilitating differentiated classroom instruction and supplemental intervention. All participating teachers reported that monthly administration (for all students and with all measures) was too frequent, that it took up too much time, and that they were very unlikely to continue this practice after the culmination of the study with or without release time. These results are comparable with a recent study that gathered teacher perspectives on the barriers and facilitators to the implementation of kindergarten and Grade 1 screening tools. The teachers in Komesidou et al.'s (2022) study reported that the screening timeline was challenging and that it placed additional and unrealistic demands on their workload. They also shared frustration regarding the limited training for screening, leaving many teachers feeling rushed and underprepared, as well as concerns around high numbers of false positives.

Teachers in the present study claimed that more frequent assessments did not facilitate more changes to their practice in response to student performance, suggesting that every few months would be adequate. This is in contradiction to research linking beginning-of-the-year skill trajectories and year-end outcomes for phonemic awareness and letter knowledge (Cameron et al., 2020). Cameron et al.'s findings support initial screening, but also stress the importance of ongoing progress monitoring to address potential false negatives and for formative use to inform responsiveness to instruction and whether instructional changes are needed. Similarly, O'Keeffe et al. (2023) recommend screening for all students, ongoing progress monitoring for all students if resources allow, and a two-step gated process where additional measures are administered only to students who score below benchmark on initial screening to confirm risk level prior to implementing intervention. This process is comparable to how learning support teachers in the present study used diagnostic assessments to validate progress monitoring data and create homogeneous, skill-focused groups prior to commencing intervention sessions. In future,

choosing one or two measures capturing key early reading skills would address kindergarten teacher concerns and may support them with implementing learner-informed practices moving forward, alleviating time limitations and increasing value for application.

Covid-19 Pandemic Context

Unprecedented circumstances and challenges associated with the Covid-19 pandemic impacted every aspect of this study in its planning and implementation. Challenges included school and teacher recruitment, extended student and teacher absences due to illness, teacher-on-call shortages, and teacher burnout. Teacher mental health and well-being during the Covid-19 pandemic is a current area of focus on educational research, bringing to light job demands that have contributed negatively, such as uncertainty, workload, concerns for others' well-being, health struggles, and multiple roles (Kim et al., 2022). Specifically, as a group, teachers in the present study needed additional support from district facilitators for 22 out of 32 total monthly assessment sessions, due to TTOC shortages and student absences. Further, on multiple occasions the teachers-on-call booked to release classroom teachers for administering CBM progress monitoring measures were re-assigned part way through the day to other classrooms in the district where teachers were absent and unreplaced. High levels of general stress were evident in every interaction with classroom and learning support teachers, to the extent that anything perceived as above and beyond the scope of typical job requirements could push teachers over the edge. Even so, one classroom teacher nearly withdrew from the study in November due to stress, and only agreed to continue participation when district facilitators offered to administer monthly progress monitoring assessments. Another classroom teacher reduced her teaching contract in November, taking one day off a week to address mental health needs beyond the scope of this study. District facilitators had to consider the impact of these

factors when communicating and interacting with participating teachers, and in order to protect professional relationships and retain participating teachers, district facilitators had to be very thoughtful and cautious in their approach to providing feedback and guidance to maintain implementation fidelity.

Complicating things further, both district facilitators were impacted by ongoing illness in their own families, recording over 45 days of absences combined throughout the school year. During one particularly heightened wave of Covid-19 over the winter holiday, the return to school was delayed by a week, and one district facilitator received direction to not be present in schools for approximately one month due to rising tension around the continuation of the present study at such a turbulent time. Over the course of the study, more than one teacher expressed that this was “not the year” to undertake an initiative such as this; however, one could argue that, considering frequent learning interruptions due to the Covid-19 pandemic, there had never been a more crucial time to implement practices that ensure all students have access to effective early reading instruction.

Implications of the Present Study

It is well established that students experiencing difficulties with PA and emergent phonics skills in the early elementary years are at higher risk for RD and more broad academic difficulties later in school (Catts & Hogan, 2021; Stanley et al., 2018). Early detection and intervention are crucial for students at risk; likewise, the present study reaffirms that explicit instruction is for all learners. Nobody said it better than Snow & Juel (2005):

The findings from a wide array of sources – studies of reading development, studies of specific instructional practices, studies of [what] teachers and schools found to be

effective – converge on the conclusion that attention to small units in early reading instruction is helpful for all children, harmful for none, and crucial for some. (p. 518)

The key outcomes from the results of the present study are threefold. First, RTI approaches including screening and progress monitoring, evidence-based early reading instruction, and Tier 2 intervention are feasible to implement at the school district level, with thoughtful and responsive implementation. Second, intensive, small-group intervention targeting foundational reading skills in kindergarten is effective at closing the gap for priority learners at risk for RD. Third, data comparing classroom conditions suggests that evidence-aligned instruction on core components of reading instruction, particularly phonemic awareness and phonics, can accelerate all students' acquisition of reading skills in kindergarten. Considered as a whole, these results have numerous implications for theory, research, and practice.

For Theory

Findings from the intervention efficacy data in the present study continue to develop our collective knowledge of what specifically constitutes an evidence-based practice in both classroom and intervention contexts so that teachers are using instructional techniques demonstrated by research as most likely to improve student learning and outcomes. While teachers were given time to explore and were provided with multiple resource options to support direct and explicit instruction of PA and phonics, the resource most easily taken up with consistency and confidence was Heggerty (Heggerty & VanHekken, 2022). All students in the Tier 1+ phase received direct and explicit instruction in PA, thanks to a resource that scaffolded PA instruction for both teachers and learners. Further, when considered as a whole, participating kindergarten students demonstrated significant gains on a measure capturing word-level reading skills, compared to same-age peers. Drawing on Cook and Cook's (2011) definition of evidence-

based practice that was adopted to form part of the theoretical foundation for this study, direct and explicit instruction are practices that, 1) are clearly supported by supported by multiple, high-quality studies utilizing research designs from which causality can be inferred, and most importantly, 2) demonstrate meaningful effects on student outcomes. Recognizing that many evidence-based practices are not taken up by teachers due to countless barriers, the scaffolds present in Heggerty made it accessible, practical, and flexible for adoption within existing literacy programs. While direct and explicit teaching involve clear explanations of content, they also encompass teacher guidance through modeling, demonstrating, and guided practice, working toward independent competencies (Rupley et al., 2009). Additionally, mask wearing, on the part of both teachers and students, posed challenges for differentiated and responsive PA instruction, as teachers were unable to model articulatory gestures for students, observe student sound production, and even gauge student participation. This was alleviated by the daily video component of the Heggerty resource. While research on the impact of mask wearing on PA instruction is nonexistent at present, a recent meta-analysis indicated that computer programs and parent involvement can be useful resources to supplement teacher instruction and build students' PA skills (Rice et al., 2022).

Considering the local context and teacher feedback on implementation, the present study also contributes to theory on implementation science in education through examination of real classroom- and school-level change. In a discussion on terms related to the general process of bringing research to practice, Hegermoser Sanetti and Collier-Meek (2019) refer to the active process of adoption, integration, and use of a practice in a school as, "making it happen". Through the stages of recruitment, planning, training, facilitating, problem solving, and documenting, district facilitators made the Collaborative RTI Pilot happen, despite that what

occurred in actuality was slightly different than what was planned. Further, a collaborative effort between district facilitators demonstrated that, consistent with research, school psychologists can be change agents in school districts, having an instrumental role in the implementation of RTI and facilitation of evidence-based interventions, beyond psychoeducational assessments and reports (e.g., Kilanowski, L., 2021; Silva et al., 2020). In the face of uncertainty and ongoing challenges, teachers persisted in their participation throughout the school year, as district facilitators had established an understanding that the plan could adapt if need be. If we wish to examine the efficacy of evidence-based practices, we must continue to examine their application with real students in real classrooms. There is a substantial body of scientific knowledge pertaining to screening and progress monitoring assessments, as well as evidence-based reading instruction and targeted interventions; however, research supporting the implementation of these practices into real classrooms is minimal. The details around implementation in the present study offer a valuable contribution in this ongoing investigation.

For Research

The present study offers a robust examination of a small-scale, real life, grassroots implementation of RTI in a Canadian context. A primary focus of this study was facilitating learner-informed practices in kindergarten classroom teachers, following the notion that the more teachers know about their students' learning and skills, the better equipped teachers are to respond with instruction. A current focus in research is teacher perspectives regarding the value and practicability of implementing universal screening, progress monitoring, and data-based decision making, as well as the perceived facilitating factors and barriers of implementation. Despite challenges implementing the screening and progress monitoring measures, when asked about the value of the Collaborative RTI Pilot, teachers spoke to the benefit of knowing exactly

how their students were doing with specific early reading skills and the confidence that they were providing instruction to target those skills. This feedback was supported by data on intervention efficacy, across both universal classroom instruction and Tier 2 intervention.

This study also extended the research of Siegel (2018) in a neighbouring school district. Siegel argued that consistent, evidence-based instructional practises implemented with high fidelity can result in significant boost of early reading achievement, without the need to pull children out of daily classroom activities. The present study went one step further, adding the layer of Tier 2 intervention for those students who did not respond to evidence-based classroom instruction and successfully intervening for those priority learners, demonstrating that intensified intervention is a critical component of the RTI framework. Kindergarten students who demonstrated a level of risk for RD responded well to structured and intensive interventions targeting foundational reading skills within authentic school settings. This finding adds to growing evidence on the efficacy and practicality of teacher-delivered, school-based early reading intervention.

For Practice

Feedback on implementation provided a rich description of teacher perspectives that were instrumental to complete a holistic examination of efficacy, and to address identified barriers prior to scaling up and broadening to a district-wide implementation of learner-informed practices and RTI approaches across all schools. While teachers were under substantial stress due to factors associated with the Covid-19 pandemic, they managed to shift their instruction toward evidence-based practices, supporting all learners with development of essential early reading skills. While a number of strategies were utilized to support the teachers in a change process to adopt new instructional strategies and beliefs specific to early reading instruction,

personalised professional development followed by ongoing consultation involving demonstrations, discussions, and check-ins were most important and beneficial. Nevertheless, teachers identified a few key areas to consider for next steps in implementation. First, kindergarten teachers unanimously agreed that monthly screening with a full battery was too often, as the value the data offered to facilitate responsive instruction was not worth the time they took to administer. This is easily mitigated by using fewer measures, prioritizing those capturing key foundational reading skills such as PSF, and NWF or LSF. This process could also be built into school calendars to facilitate a team approach, employing specialists such as learning support teachers to support with the screening process. Additionally, teachers openly spoke to the value of collaboration time with colleagues in facilitating implementation of new practices. While this time was mostly limited to consultation with district facilitators in the present study, due to release time shortages and comfort levels around gathering in person during the Covid-19 pandemic, this is a meaningful recommendation for future RTI implementation efforts.

Additionally, it is worth acknowledging that these results are particularly important and informative in the school district where this study took place, as kindergarten-level Tier 2 interventions did not typically occur prior to this initiative. The exception is that at some schools, kindergarten students may have been able to access some supplementary learning support in May and June of the school year, typically targeting only emergent phonics skills. Results from the present study have made a case for more timely and responsive intervention incorporating explicit phonemic awareness instruction, and preliminary results at the completion of the Collaborative RTI Pilot have already informed new early literacy structures, including district-wide, biannual universal screening for all students in kindergarten through Grade 3, early

literacy interventionists at every elementary school, a primary literacy professional learning series focused on evidence-based reading and writing instruction, and evidence-based resources in every elementary school. An unintended result that was meaningful in the participating school district was the PPVT scores at pre-testing. Since the start of the Covid-19 pandemic, there has been an ongoing narrative, particularly amongst kindergarten teachers, that students “aren’t where we’d expect them to be.” In other words, teachers have reported that compared to previous years, current kindergarten students are entering the school system with lower language abilities, impacting literacy learning. The PPVT score ($m = 109.89$) suggests otherwise, allowing for the conversation with kindergarten teachers to refocus on sound literacy and language instruction for all students.

Limitations of the Present Study

The purpose of the present study was to examine the efficacy and feasibility of a small-scale RTI implementation on kindergarten students’ early reading skills. While the results are very promising, they must be interpreted within the boundaries of the design. First, the quasi-experimental pre-post intervention design with staggered treatments was adapted to account for a kindergarten teacher’s sudden shift toward evidence-based instruction, considerably impacting the size of the comparison group ($n = 8$). Therefore, the small sample size limited statistical power to detect true effects of the interventions. While it was impossible within the current study, controlling teachers’ early reading practices within the BaU phase would allow for more specific comparisons to be made across classrooms. An additional factor around this change in design was the multi-age comparison classroom. Without detailed information on how kindergarten students were selected for this classroom over a straight kindergarten classroom, it’s difficult to control for group differences. For example, in some circumstances, children are

selected for advanced multi-age classrooms because they have early birthdays or demonstrate academic readiness. While PPVT scores assist in ruling out variability of language skills, there are other foundational skills that could impact interpretation of analyses. District facilitators also noted some discrepancies on the CBM scores, depending on whether teachers or district facilitators administered the measures. Lastly, the comparison classroom was never a true control group, despite it being the most control-like classroom in the study. Even having a waitlist control group with this population, with what we know about early intervention, could do harm.

Given the participants' demographic and context within a small, rural school district, the kindergarten students in this study represented a fairly limited sample from largely middle-class family backgrounds. Generalizability was further impacted by the fact that participating teachers were not randomly selected. One possible strategy to address this limitation of non-randomization for future studies would be maintaining a pool of potential participants who are interested in participation, then randomly selecting from this pool of participants. Furthermore, despite the researcher practicing reflexivity within the process through reflection and thoughtful examination of the researcher's own assumptions, preconceptions, and influence within the process, the dual-role relationship ultimately influenced the researchers' ability to assure fidelity with the implementation of interventions. In the researcher's professional role in the participating school district, the researcher provides support, mentorship, and professional learning opportunities to teachers working in elementary schools. It was integral to the Collaborative RTI Pilot that professional relationships were maintained, particularly during a very trying year.

There was an opportunity in this study to delve more deeply into teacher perspectives on implementation of evidence-based and learner-informed practices using qualitative methodology. However, factors related to when this study was conducted (i.e. COVID) and the logistical demands of implementing the interventions impacted how these perspectives were captured and thus limited the inclusion of qualitative methodologies and analyses.

Suggestions for Future Research

First and foremost, future research on implementation of RTI approaches in authentic classroom, school, and district environments needs to adequately control for and capture implementation fidelity, across administration of screening and progress monitoring measures and the application of evidence-based strategies and resources in the classroom, consistent with recommendations from van Dijk et al. (2023). Ideally, the Covid-19 pandemic's broad impact will not be a major factor to consider in future studies, as it was in the present study.

Investigations of RTI approaches involving larger and more diversified samples of teachers and students across multiple grade levels may yield efficacy results that could be generalized or applied to a broader population. Similarly, longer-term implementation plans would provide additional opportunities to build relationships with teachers, involve them in planning, and establish structures for collaborative decision making and problem solving, potentially leading to greater adherence to evidence-based practices and therefore, promoting reading growth for all learners. Lengthening the implementation timeline is consistent with recommendations from recent research (Komesidou et al., 2022; Snowling et al., 2022; Varghese et al., 2021).

Regarding implementation, and as noted as a limitation of the current study, future studies might focus specifically on the implementation of RTI practices from teachers' personal and professional perspectives applying qualitative methodologies. The use of rating scales to

complement interviews could more adequately capture teacher perceptions of and confidence in their early reading instruction at pre-, mid-, and post-implementation, also reducing the potential of researcher bias. Further, future research could consider teacher attitudes toward professional learning with knowledge gains and shifts in practice, since recent research has suggested that prior teacher attitudes impact implementation success more than teacher perception of specific new practices (Ehlert et al., 2022). Examination of RTI implementation must ensure that evidence-based practices are not only feasible for teachers, but are also meaningful and valuable alongside their existing practices.

Conclusion

The present study provides a valuable contribution to a limited body of research pertaining to adoption of learner-informed early reading practices within an RTI framework in the Canadian context. Given the many complexities and moving parts within classroom settings, purposeful and responsive implementation plans are necessary in examining the practical value of specific learner-informed practices and interventions within a multi-tiered framework. Furthermore, very few studies have incorporated teacher perspectives of implementation strategies, facilitating factors, or barriers with regard to RTI approaches in Canada, despite the teacher's central and influential role in the process. Teachers shared critical feedback throughout the present study that has led to meaningful change in a local school district and contributed to RTI research. Most importantly, despite the exceptional circumstances present throughout this study, results demonstrate that implementation of RTI approaches is feasible, and that while valuable for all students at Tier 1, purposeful, evidence-based instruction and timely Tier 2 interventions targeting foundational literacy skills can effectively close the gap for our priority learners.

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Appendix A

Consent Forms



University of Victoria | Faculty of Education | Department of Educational Psychology & Leadership Studies
 PO Box 1700 STN CSC Victoria BC V8W 2Y2 Canada
 T 250-721-7799 | F 250-721-6819 | harrison@uvic.ca

Early Reading Study

You are invited to participate in a study entitled **Advancing Learner-Informed Practices in Early Reading: A Collaborative Response to Intervention (RTI) Partnership**.

My name is Shelby Pollitt. I am a Graduate Student in the Department of Educational Psychology and Leadership Studies at the University of Victoria. As a graduate student, I am choosing to conduct research as part of the requirements for a PhD in Educational Psychology. I am also a Curriculum Coordinator in the Curriculum Transformation Department in the Sooke School District.

You are receiving this consent form because your child is currently in a kindergarten classroom participating in SD62's Collaborative Response to Intervention (RTI) Pilot initiative. The purpose of this research project is to study the effects on students' early reading skill development when teachers use learner-informed practices, such as progress monitoring measures and responsive instruction, within a multi-tiered support model. Research of this type is important because it helps guide teacher professional development and district supports to ensure students' needs are met in a timely and effective way at school. This particular study will also provide valuable information about the kinds of methods that we use in schools to assess, monitor progress, and provide instruction to support students' foundational reading skills.

If you provide consent to allow your child to participate in this research, your child will participate in two short assessment sessions, one at the beginning of the school year and one at the end of the school year, lasting approximately 30 minutes each. Students will be working in the Learning Assistance room or in another quiet area of the school, during school time. Students will complete a variety of language and emergent reading tasks that are similar to the kinds of language and literacy activities in the classroom. While your child's instructional time could be minimally lost or disrupted due to participation in this research, I will work with teachers to ensure that students are not missing critical activities in the classroom.

There are no known or anticipated risks to your child by participating in this research, and the potential benefits may include enhanced early reading skills including phonological awareness skills, letter knowledge, and vocabulary, which may lead to improved readiness for reading.

Your child's participation in this research must be completely voluntary. Your decision to participate or to decline participation will not affect your child's access to services or their grades at school. If you decide to let your child participate, you may withdraw your child at any time without any consequences or any explanation. If you do withdraw from the study, your

child's data will not be used, and it will be destroyed. In terms of protecting your child's anonymity, all data will be coded. No name will be attached to the data, and no names will be reported when the research is published. Your child's confidentiality and the confidentiality of the data will be encrypted and stored on one password-protected computer. All data will be kept for a period of five years, and then a shredding machine will be used to destroy all paper materials and data files stored on the computer will be erased. It is anticipated that the results of this study will be shared with others in my research paper, in the Sooke School District, and in a published article.

If you have any questions, you may contact me by emailing shpollitt@sd62.bc.ca. You may also contact my supervisor at the University of Victoria, Dr. Gina Harrison, at (250) 721-7783. In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria at (250) 472-4545 or ethics@uvic.ca.

Your signature below indicates that you understand the above conditions of participation in this study, that you have had the opportunity to have your questions answered by the researcher, and that you give consent for your child to participate in this research project.

Sincerely,

Shelby Pollitt

Graduate Student

Department of Educational Psychology & Leadership Studies

Faculty of Education

University of Victoria

Telephone: (250) 516-1711

Permission to Participate in the Early Reading Research Project

Name of Child _____
(Please Print)

Parent's Name _____ Parent's Signature _____
(Please Print)

Date _____

A copy of this consent will be left with you, and a copy will be taken by the researcher.



Faculty of Education | Department of Educational Psychology &
Leadership Studies
PO Box 1700 STN CSC Victoria BC V8W 2Y2 Canada
T 250-721-7799 | F 250-721-6819 | harrison@uvic.ca

Early Reading Study

Thank you for your interest in my study entitled, “**Advancing Learner-Informed Practices in Early Reading: A Collaborative Response to Intervention (RTI) Partnership**”. I am a Graduate Student in the department of Educational Psychology and Leadership Studies at the University of Victoria. As a graduate student, I am choosing to conduct research as part of the requirements for a PhD in Educational Psychology. I am also a Curriculum Coordinator in the Curriculum Transformation Department in this school district.

The purpose of this research project is to study the effects on students’ early reading skill development when you use learner-informed practices, such as progress monitoring measures and responsive instruction, within a multi-tiered support model. Research of this type is important because it helps guide teacher professional development and district supports to ensure students’ needs are met in a timely and effective way at school. This particular study will also provide valuable information about the kinds of methods that we use in schools to assess, monitor progress, and provide instruction to support students’ foundational reading skills. This study includes kindergarten students from your classroom, and all kindergarten students are eligible to participate in the study. Also, this study considers teacher perspectives on the implementation of this new district initiative, and I look forward to hearing your thoughts.

First, I am requesting your help in distributing and collecting parent consent forms, and having access to those students granted parental permission to participate during usual instructional time. If selected, students will work individually with a researcher on a collection of language and early reading tasks in a quiet room or area of the school. Specifically, these tasks will assess phonological awareness, vocabulary, letter knowledge, and early reading skills. Two sessions of about 30 minutes are required from each student, one at the beginning of the school year and one at the end of the school year. I will contact you at the e-mail or phone number you have provided in order to arrange a time to drop-off parent consent forms and to answer any additional questions you may have about the study in-person.

Additionally, since this research will examine barriers and facilitating factors in the implementation process, you will be asked to participate in three interviews outside of instructional time. These will occur at the beginning of the school year, mid-year, and at the end of the school year, lasting approximately 30 minutes each, in a private space that works for you, such as your classroom. I will ask you questions about your early reading instructional approaches and your experiences participating in the Collaborative RTI Pilot, including perceived successes and challenges. To help inform the quality of future professional learning opportunities, I will also be gathering information about the supports you may find helpful in meeting your learners’ early reading needs.

There are no known or anticipated risks to you by participating in this research, and the potential benefits include professional learning on assessments and instructional approaches to provide additional strategies for supporting your students' early reading skills.

Your participation in this research must be completely voluntary. If you decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study, your data will not be used, and it will be destroyed. In terms of protecting your anonymity, all data will be coded. No name will be attached to the data, and no names will be reported when the research is published. Your confidentiality and the confidentiality of the data will be encrypted and stored on one password-protected computer. All data will be kept for a period of five years, and then a shredding machine will be used to destroy all paper materials and data files stored on the computer will be erased. It is anticipated that the results of this study will be shared with others in my research paper, in the Sooke School District, and in a published article.

If you have any questions, you may contact me by emailing shpollitt@sd62.bc.ca. You may also contact my supervisor at the University of Victoria, Dr. Gina Harrison, at (250) 721-7783. In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria at (250) 472-4545 or ethics@uvic.ca.

Your signature below indicates that you understand the above conditions of participation in this study, that you have had the opportunity to have your questions answered by the researcher, and that you give consent for your participation in this research project.

Thank you again for your interest in this project.

Sincerely,

Shelby Pollitt

Graduate Student
Department of Educational Psychology & Leadership Studies
Faculty of Education
University of Victoria
Telephone: (250) 516-1711

Permission to Participate in the Early Reading Research Project

Teacher's Name _____ Teacher's Signature _____
(Please Print)

Date _____

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Appendix B

Semi-Structured Interview Questions

Pre-implementation:

1. When you are teaching foundational literacy skills, what guides your instruction?
2. How do you decide on the types of new strategies or programs that you will use in your classroom?
3. How do you collect learner information and what do you do with it?
4. What are some barriers or obstacles you have faced when implementing new strategies or programs in the classroom?
5. Is there anything else you would like to add?
6. Do you have any questions for me?

Mid-implementation:

1. What have been your experiences with implementing the Collaborative RTI Pilot in your classroom?
2. In your opinion, what has been the value of implementing the Collaborative RTI Pilot in your classroom?
3. What school- or district-based supports have been effective in strengthening your efforts at implementing the Collaborative RTI Pilot?
4. Do you feel that any additional school- or district-based supports would be helpful in implementing the Collaborative RTI Pilot? Such as?
5. Is there anything else you would like to add?
6. Do you have any questions for me?

Post-implementation:

1. What have been your experiences with implementing the Collaborative RTI Pilot in your classroom?
2. In your opinion, what has been the value of implementing the Collaborative RTI Pilot in your classroom?
3. What kind of school- or district-based supports have been effective in strengthening your efforts at implementing the Collaborative RTI Pilot?
4. Do you feel that any additional school- or district-based supports would be helpful in implementing the Collaborative RTI Pilot? Such as?
5. Will you continue to use approaches from the Collaborative RTI Pilot next school year?
Why or why not?
6. Is there anything else you would like to add?
7. Do you have any questions for me?

Appendix C

CBM Teacher Training

Screening & Progress Monitoring

Assessment Inservice

September 2021

Learner-Informed Practices

- **Screening:** preventative interventions (those provided for students identified as at risk for reading difficulties) are significantly more effective than remedial interventions for students already experiencing reading difficulties
- **Progress Monitoring:** regular and purposeful progress monitoring facilitates differentiated & scaffolded instruction specific to students' needs
- **Curriculum-Based Measurement (CBM)** provides a teacher-developed approach that is technically adequate, time efficient, and accessible

Test Administration

Preparation

Rapport & Momentum

Behaviours, Cueing & Feedback

Standardization

Test Administration

Preparation

- Arrange seating & have materials ready
- Plexiglass?
- Complete personal (cover) information
 - Student name
 - Class (your last name)
 - Assessment date
- Ideally a quiet room & comfortable setting
- Ensure you haven't scheduled assessments during fire drills, assemblies, etc.

Test Administration

Rapport & Momentum

- Rapport refers to the process of establishing a comfortable working relationship with the examinee (Anastasi, 1988)
- Start with welcoming, general conversation
- As much as possible, remain friendly, relaxed, warm, and natural in your demeanor
- Be reassuring, encouraging, and patient with their efforts, but know when to move on to maintain momentum

Test Administration

Behaviours, Cueing & Feedback

- Speak clearly, and be honest & direct about what will happen in the session
 - e.g., "We are going to be doing a few jobs together, and I just want you to try your best."
- Students should not be given feedback on their performance during or after a subtest. You can give general encouragement between subtest
 - e.g., "Nice effort! I can see you're working to do your best."

Test Administration

Standardization

- Read instructions **verbatim** (bolded font) and follow the “actions” provided within the examiner script (e.g., point to the first letter).
- Follow the specific **prompts** and **discontinue rules**.
- Follow exact **time limits** (1 minute for all).
- Offering additional practice, corrections, or off-script explanations is not allowed.
- You may repeat the instructions & practice once, if necessary.

The Measures



DIBELS

General Scoring & Notation

- When 60 seconds have elapsed, put a bracket (i.e.,]) after the last item completed.
- Score last response given.
- Don't penalize students for articulation or dialect errors.
- If a student skips an entire line, let them continue, but cross out the line.
- Mark "Total Correct" at bottom of page.

Scoring & Notation

Letter Naming Fluency (LNF)

- No notation necessary for correct responses.
- If a student makes an error or skips an item, put a slash (i.e., /) through the incorrect item.

Scoring & Notation

Phonemic Segmentation Fluency (PSF)

- Underline the sound segments in the word the student produces that are correctly identified.
- Make a slash (/) through sounds identified incorrectly or skipped. Circle the item if the student repeats the word correctly, but without segmentation.
- Schwa sounds (/u/) added to consonants are not counted as errors.
- Tip → You may want to consider voice recording for this subtest.

Scoring, cont'd...

Phonemic Segmentation Fluency (PSF)

Word	Student Says	Scoring Procedure	Correct Segments
track	"t...r...a...ck...s"	<u>/t/</u> /r/ /a/ / <u>k/</u>	<u>4</u> /4
top	"s...t...o...p"	<u>/t/</u> /o/ / <u>p/</u>	<u>3</u> /3
top	"st...o...p"	/s/ / <u>o/</u> / <u>p/</u>	<u>2</u> /3
top	"s...t...o...l...p"	<u>/t/</u> /s/ / <u>p/</u>	<u>2</u> /3
top	"s...t...o...l...p"	<u>/t/</u> /o/ / <u>p/</u>	<u>3</u> /3

Scoring, cont'd...

Phonemic Segmentation Fluency (PSF)

Word	Student Says	Scoring Procedure	Correct Segments
sun	"ssssuuunnnn"	<u>/s/</u> / u/ / <u>n/</u>	<u>3</u> / 3

Word	Student Says	Scoring Procedure	Correct Segments
track	"tr...ack"	/t/ /t/ / <u>a/</u> /k/	<u>2</u> / 4
bet	"b...et"	/b/ /e/ /t/	<u>2</u> / 3

Word	Student Says	Scoring Procedure	Correct Segments
track	"tra...ack"	/t/ /t/ / <u>a/</u> /k/	<u>2</u> / 4
bet	"be...e...et"	/b/ / <u>e/</u> /t/	<u>3</u> / 3

Scoring & Notation

Nonsense Word Fluency (NWF)

- Underline the letters that the student produces correctly. Underline multiple letters for partially blended words and whole words for fully blended words.
- Make a slash (/) through sounds/words produced incorrectly.
- Blended letter sounds must be correct and in the correct position (beginning, middle, end) to receive credit.

Scoring, cont'd...

Nonsense Word Fluency (NWF)

Word	Student Says	Scoring Procedure	Score	
			CLS	WRC
rab	"/r/.../a/...rab"	<u>/r/</u> /a/ /b/	<u>3</u> /3	<u>1</u> /1
mot	"/m/.../o/.../t/...mot"	<u>/m/</u> /o/ /t/	<u>3</u> /3	<u>1</u> /1

Scoring & Notation

Word Reading Fluency (WRF)

- No notation necessary for correct items on the scoring book.
- Put a slash (/) through words produced incorrectly.
- Words read correctly but in the wrong order are scored as incorrect.
- A word is incorrect if the student skips the word. If the student skips an entire line, cross out the line.

Scoring, cont'd...

Word Reading Fluency (WRF)

Words	Student Says	Scoring Procedure	Score
joy draw cloud	"/j/ /oy/ draw cloud"	joy draw cloud	<u>2</u> / 3
joy draw cloud	"/j/ /oy/ joy draw cloud"	joy draw cloud	<u>3</u> / 3

Feedback & Fidelity

- We recommend that you administer the assessments to all students, then do your scoring afterward.
- Please let us know how long it takes for you to administer the measures and do scoring.
 - Was a day too long? Not long enough?
- For the first few assessment sessions, we will be at the schools to observe a few student assessments, as well as to provide assistance or answer questions, as needed.



Appendix D

Collaborative RTI Pilot School Overviews (Original & Adapted)

Collaborative RTI Pilot Overview

May/June 2021	2021 – 2022	September	October	November	December	January	February	March	April	May	June	
—	Kindergarten Class A (School 1)	Tier 1 +						Tier 1 + Tier 2				
—	Kindergarten Class B (School 2)	BaU	Tier 1 +					Tier 1 + Tier 2				
—	Kindergarten Class C (School 1)	BaU				Tier 1 +				Tier 1 + Tier 2		
—	Kindergarten Class D (School 2)	BaU						Tier 1 +			Tier 1 + Tier 2	
—	Assessments	<i>Norm-referenced: CTOPP PVT TOPA-2+ +PRESS LSF (Researcher)</i>	DIBELS 8 th Beginning of Year +PRESS LSF (SBT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher)	DIBELS 8 th Middle of Year +PRESS LSF (SBT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th End of Year +PRESS LSF (SBT) PRESS Progress Monitoring (LAT)	<i>Norm-referenced: CTOPP PVT TOPA-2+ +PRESS LSF (Researcher)</i> PRESS Progress Monitoring (LAT)	
A, B, C & D Pilot Overview for School Teams □ Admin, Teacher, LAT, IS	Professional Learning Inservice & Teacher Interviews	<i>Interview #1</i> A, B, C & D Assessment Inservice □ Teachers, LAT A Early Reading Inservice □ Teacher	<i>B</i> Early Reading Inservice □ Teacher		<i>C</i> Early Reading Inservice □ Teacher	<i>Interview #2</i> A & C Intervention Inservice □ LAT	<i>D</i> Early Reading Inservice □ Teacher B & D Intervention Inservice □ LAT				<i>Interview #3</i>	

BaU □ Business as Usual Tier 1 + □ Supported, Evidence-based Early Reading Instruction Tier 2 □ Targeted, Intensive Intervention
 LAT □ Learning Assistance Teacher SBT □ School-Based Team Member/Teacher

Collaborative RTI Pilot Overview

May/June 2021	2021 – 2022	September	October	November	December	January	February	March	April	May	June	
—	Kindergarten Class A (School 1)	Tier 1+ (Sept. 20 th to Feb. 25 th)						Tier 1+ Tier 2				
—	Kindergarten Class B (School 2)	BaU	Tier 1+ (October 25 th to March 18 th)					Tier 1+ Tier 2				
—	Kindergarten Class C (School 1)	BaU				Tier 1+ (February 7 th to May 13 th)				Tier 1+ Tier 2		
—	Kindergarten Class D (School 2)	BaU						Tier 1+ (October 25 th to March 18 th)			Tier 1+ Tier 2	
—	Assessments	<i>Norm-referenced: CTOPP PVT TOPA-2+ +PRESS LSF (Researcher)</i>	DIBELS 8 th Beginning of Year +PRESS LSF (SBT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher)	DIBELS 8 th Middle of Year +PRESS LSF (SBT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th Progress Monitoring +PRESS LSF (Teacher) PRESS Progress Monitoring (LAT)	DIBELS 8 th End of Year +PRESS LSF (SBT) PRESS Progress Monitoring (LAT)	<i>Norm-referenced: CTOPP PVT TOPA-2+ +PRESS LSF (Researcher)</i> PRESS Progress Monitoring (LAT)	
A, B, C & D Pilot Overview for School Teams □ Admin, Teacher, LAT, IS	Professional Learning Inservice & Teacher Interviews	<i>Interview #1</i> A, B, C & D Assessment Inservice □ Teachers, LAT A Early Reading Inservice □ Teacher	<i>B</i> Early Reading Inservice □ Teacher <i>D</i> Early Reading Inservice □ Teacher			<i>Interview #2</i> A & C Intervention Inservice □ LAT	<i>B & D</i> Intervention Inservice □ LAT <i>C</i> Early Reading Inservice □ Teacher				<i>Interview #3</i>	

BaU □ Business as Usual Tier 1 + □ Supported, Evidence-based Early Reading Instruction Tier 2 □ Targeted, Intensive Intervention
 LAT □ Learning Assistance Teacher SBT □ School-Based Team Member/Teacher

Appendix E

Tier 1+ Professional Development

Tier 1 + Early Reading Inservice

September 2021

What do we know about learning to read?

40+ years of high quality research on:

- how skills develop
- what skills and knowledge are predictive of reading proficiency
- what instructional strategies are most effective

Simple View of Reading



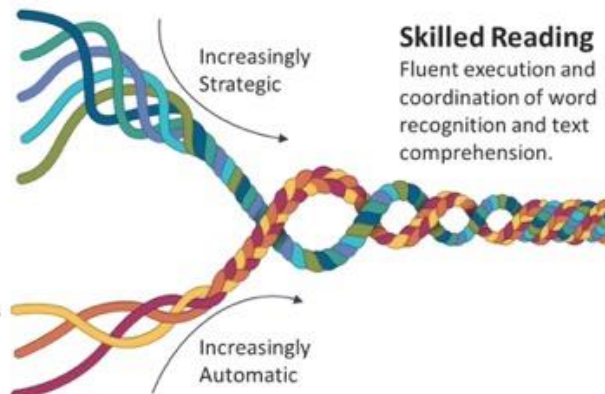
A Framework for Reading

Language Comprehension

- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge

Word Recognition

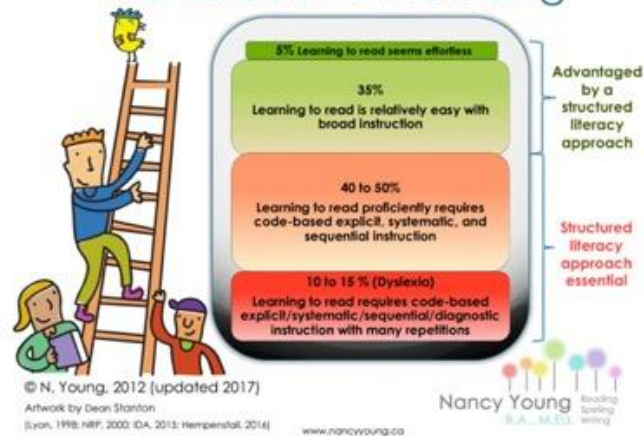
- Phonological Awareness
- Decoding (and Spelling)
- Sight Recognition



Scarborough, H. (2001). Connecting early language and literacy to later reading (dys)abilities: Evidence, theory, and practice. Pp. 97-110 in S. B. Neuman & D. K. Dickinson (Eds.) *Handbook of Early Literacy*. NY: Guilford Press.

Reading Instruction

The Ladder of Reading



Evidence-aligned instruction is...

- **Purposeful** → deliberate instruction of specific skills through intentional strategies, including activating prior knowledge
- **Systematic** → instruction follows a carefully planned sequence, and similar concepts are connected
- **Direct & Explicit** → educator models and teaches skills and concepts clearly
- **Scaffolded** → supports for learning tasks beyond a student's independent ability

Core Components of Reading Instruction

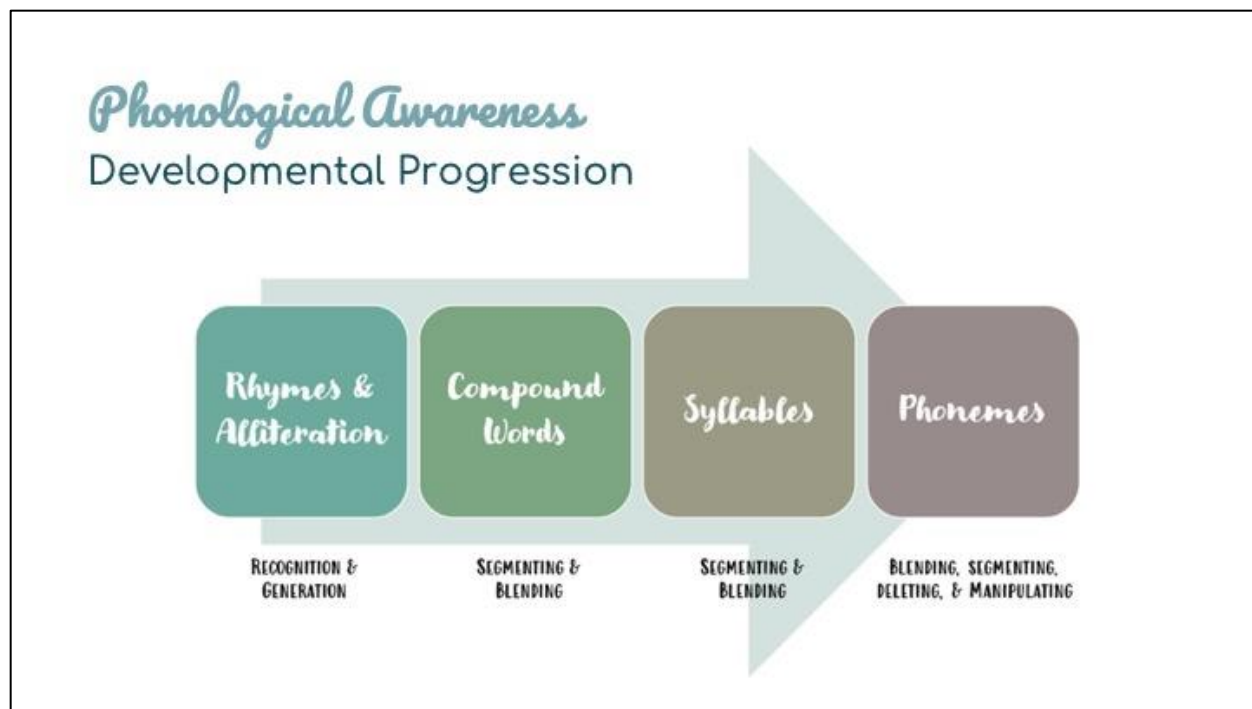


Phonological Awareness

- the ability to recognize and manipulate sounds and chunks of sounds in words
- an auditory skill that is independent of print & text
- phonological awareness is NOT phonics

A tip for remembering the difference → phonological awareness instruction can be done in the dark!





Phonological Awareness

Phonological awareness (or more specifically, phonemic awareness) is a strong predictor of reading proficiency.

Phonological awareness is something that can be taught!

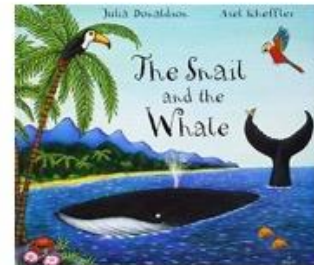
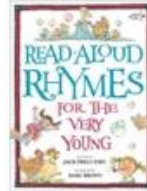


Phonological Awareness

Rhyme

Repetition of similar sounds in two or more words, most often at the end of words → i.e. cat/hat, head/bed, oak/poke

- Expose - hearing and repeating rhyme
- Discriminate - recognizing rhyme
- Generate - producing rhyme



✿ Activity: "I spy..."

Compound Words

Words that are formed by the combination of two smaller words

→ i.e. basketball, watermelon, footprint

- Segment - break apart
- Blend - put together



✿ Activity: "Tap, Tap, Clap"

Syllables

Pieces of a word that only have one vowel sound
(a chunk of sounds in a word)

→ i.e. octopus has three syllables: oc-to-pus

- Segment - breaking apart
- Blend - putting together
- Delete - leaving a piece out



🌸 Activity: Movement (hopping, clapping, bouncing a ball)

Phonemes

The smallest units of sounds in words

→ i.e. the word 'moose' has three phonemes

- Isolate/identify *
- Blend - put together *
- Segment - break apart *
- Delete - leave a sound out
- Manipulate - switch sounds



🌸 Activity: Humpty Dumpty Word Detectives

Phonics

- Knowledge of letter-sound correspondences
 - Alphabetic principle in combination with strategies to read words using letter sounds, digraphs, and blends
- Most effective when taught systematically, and when combined with phonemic awareness instruction
 - [NLPS](#)
 - [Keys to Literacy](#)

Vocabulary

- Vocabulary instruction leads to vocabulary acquisition
 - Direct, explicit instruction
 - Repeated exposure to and practice with new terminology
 - Maximizing learning opportunities in language-rich environments

Fluency

- Capable readers can read text with fluency, accuracy, phrasing, and expression
- Once a student develops foundational phonological, orthographic, and morphological processes, oral reading presents as smooth and effortless, and comprehension can be fully activated and engaged
- Research supports direct and guided instruction

Comprehension

- The essence of reading
- Direct instruction of strategies can lead to improved understanding of text and use of information
 - Research has found that children achieved greater growth in classrooms where more time was spent on teacher-led reading comprehension activities than in classrooms offering student-managed reading comprehension activities

Appendix F

Heggerty Phonemic Awareness Lesson Sample



KINDERGARTEN
Curriculum
2022 Edition

Sample Lessons

Phonemic Awareness

35-weeks of Explicit and Systematic Phonological and Phonemic Awareness Lessons

The #1 Phonemic Awareness Curriculum
EQUIPPING TEACHERS TO EMPOWER READERS SINCE 2003

Scope and Sequence: Kindergarten

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Rhyme	Rhyme Repetition		Rhyme Recognition								Rhyme Production																								
Initial Phoneme Isolation	Isolate Initial Consonants		Isolate Initial Consonants: Series of Words			Isolate Initial Consonants and Short Vowels			Isolate Initial Consonants, Short Vowels, and Long Vowels			Isolate Initial Digraphs		Isolate Initial Phoneme of a Blend																					
Blend	Compound Words		Syllables		Body-Coda	Onset - Rime		Blending Two Phonemes	Blending Three Phonemes								Blending Three Phonemes: Digraphs		Blending Four Phonemes: Blends			Blending Three or Four Phonemes													
Phoneme Isolation: Final or Medial Sounds	Final Phoneme Isolation				Final Phoneme Isolation: Series of Words			Medial Phoneme Isolation: Short Vowels			Medial Phoneme Isolation: Long Vowels	Medial Phoneme Isolation: Short & Long Vowels		Final Phoneme Isolation: Digraphs	Final Phoneme Isolation: Consonants and Digraphs		Medial Phoneme Isolation																		
Segment	Compound Words		Syllables		Onset - Rime			Segment Words into Two Phonemes	Segment Words into Three Phonemes						Segment Words into Three Phonemes: Digraphs		Segment Words into Four Phonemes: Blends			Segment Words into Three or Four Phonemes															
Add	Compound Words		Syllables		Add Initial Phoneme										Add Initial Phoneme: Digraphs	Add Initial Phoneme: Mixed Rhymes		Add Final Phoneme																	
Delete	Compound Words		Syllables		Delete Initial Phoneme										Delete Initial Phoneme: Digraphs	Delete Initial Phoneme: Mixed Rhymes		Delete Final Phoneme																	
Substitute	Compound Words		Syllables		Substitute Initial Phoneme										Substitute Initial Phoneme: Digraphs	Substitute Initial Phoneme: Mixed Rhymes		Substitute Final Phoneme		Substitute Vowel/Medial Phoneme															
Alphabet Knowledge	26 Letters & Sounds: Alphabetical Order				26 Letters & Sounds: Random Order				Letters & Sounds: Random Order/As Needed				Multiple Sounds of Consonants & Vowels				Consonant Digraphs	L Blends	S Blends	LS Blends	R Blends	L, S, R Blends	Review of Consonants, Digraphs, Vowels, and Blends												
Phoneme - Grapheme Connection											Map Initial Phonemes	Map Final Phonemes	Map Medial Phonemes	Connect Phonemes to Graphemes																					
Language Awareness	Sentence Repetition: Counting Words		Sentence Completion: Counting Words		Nursery Rhymes																														

Lesson Overview: Weeks 7 - 10

Kindergarten Curriculum

Objectives:

- *Students will recognize words that rhyme.
- *Students will isolate the initial short vowel and consonant sounds in spoken words.
- *Students will isolate final sounds in a word or series of words.
- *Students will blend body-coda and onset-rime into a spoken word.
- *Students will segment a spoken word into onset-rime.
- *Students will manipulate words by adding, deleting, and substituting initial phonemes to make a new word.

What to Expect:

- *During these four weeks, students will be building phonological awareness by blending body-coda and blending and segmenting onset-rime. The onset is all of the sounds before the vowel, the rime is the vowel and everything after. The body is all of the sounds up to and including vowel, the coda is the sound(s) after the vowel (Example: ne-t). Blending body-coda is typically easier than blending onset-rime.
- *During these four weeks, students will also start working at the phoneme level by adding, deleting, and substituting the initial phonemes in words.
- *Use the explicit language located in the *Skill Focus* throughout all lessons to support students' understanding of each skill.

- *Teacher administration directions for each skill are included throughout all lessons.
- *Hand motions are written in for some skills to support students' understanding of the skill being practiced.
- *Use the teacher model embedded into Monday's Lesson of Week 7 for Blending, Segmenting, and Manipulation tasks to best support students with understanding the skills they are practicing over the next four weeks.
- *QR codes are provided each week with a lesson demonstration, hand motion videos, and some include short teacher support videos as well.

<h3>Rhyme Recognition</h3>	<p>► SKILL FOCUS: When words rhyme, we hear the same middle and final sounds.</p> <p>WEEKS 7-8: Students will listen to two words and identify if they rhyme by listening for words with the same middle and final sounds. Students give thumbs up or thumbs down to indicate if words rhyme or not. Encourage students to repeat the word pair first, then show thumbs up or down.</p> <p>WEEKS 9-10: Students will engage in Rhyme Categorization. The teacher will say, "Which words rhymes with ___?" and give students two options. Students will provide the rhyming word.</p> <p>**To provide error correction for rhyme recognition, teachers can isolate the rime of the words and ask students if both of the rimes sound the same.</p> <p>EXAMPLE: jam, pot /j/-am, /p/-ot; Listen, -am, -ot. Do they sound the same? They do not; jam, pot are not rhyming words.</p>
<h3>Initial Phoneme Isolation</h3>	<p>► SKILL FOCUS: We are listening for the first sound we hear in a word.</p> <p>WEEKS 7-8: Students will listen to a series of words and isolate the first sound they hear.</p> <p>WEEKS 9-10: Students will isolate the initial phonemes in words that begin with short vowel sounds as well as consonant sounds.</p> <p>**To reinforce the understanding of isolating the first sound in a word, teachers can use Elkonin boxes with colored chips to offer a visual for support for phoneme location. ■ □ □</p>
<h3>Blending Body-Coda and Onset-Rime</h3>	<p>► SKILL FOCUS: When we blend, we put two parts of a word together to make one word.</p> <p>WEEKS 7-8: Students will blend two parts of a word, the body and coda. The body is all of the sounds up to and including vowel, the coda is the sound(s) after the vowel (Example: ne-t). Blending body-coda is typically easier than blending onset-rime.</p> <p>WEEKS 9-10: Students will blend two parts of a word, the onset and rime. The onset is all of the sounds before the vowel, the rime is the vowel and everything after (Example: n-et)</p> <p>► Blending Hand Motion: Place palms together to create "choppers." As the teacher, you will chop your hands from right to left, one chop each for part of the word. Students mirror the teacher by chopping and then sliding their hands to say the whole word.</p>

Overview, Weeks 7 - 10

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Week 7

page 1 of 3

Kindergarten Curriculum



	Monday	Tuesday	Wednesday	Thursday	Friday																																																																						
<h3>Rhyme Recognition</h3> <p>► I will say two words; say the words back to me. Show me thumbs up if the words rhyme and thumbs down if they don't rhyme.</p> <p>Teacher Note: When words rhyme, ask students to identify the rhyming part.</p> <p>Ⓢ EXAMPLE: t: take, make → s: take, make (thumbs up) n: What is the rhyming part? → s: -ake</p>	<p>► SKILL FOCUS: When words rhyme, we hear the same middle and final sounds.</p> <p>take, make jam, pot fun, sun cape, tape couch, chair</p>	<p>joke, tag mark, park wedge, ledge car, bike shed, led</p>	<p>save, gave desk, help fill, bill one, mess shin, fin</p>	<p>dish, wish lump, bump disk, watch card, sip light, might</p>	<p>fan, can dad, cup rest, pest shirt, purge mug, rug</p>																																																																						
<h3>Initial Phoneme Isolation</h3> <p>► We will listen for the first sound we hear in words. I will say three words, listen carefully and tell me the first sound you hear in all three words.</p> <p>Ⓢ EXAMPLE: t: bunny, bump, baby → s: /b/</p> <p>*Students say sound, not letter name</p>	<p>► SKILL FOCUS: We are listening for the first sound we hear in three words.</p> <table border="1"> <thead> <tr> <th>WORDS</th> <th>INITIAL SOUND</th> <th>WORDS</th> <th>INITIAL SOUND</th> <th>WORDS</th> <th>INITIAL SOUND</th> <th>WORDS</th> <th>INITIAL SOUND</th> <th>WORDS</th> <th>INITIAL SOUND</th> </tr> </thead> <tbody> <tr> <td>bun, bump, baby</td> <td>/b/</td> <td>football, fish, fell</td> <td>/f/</td> <td>joke, jacket, jungle</td> <td>/j/</td> <td>yummy, young, yard</td> <td>/y/</td> <td>player, pair, present</td> <td>/p/</td> </tr> <tr> <td>winter, wide, work</td> <td>/w/</td> <td>map, make, mouse</td> <td>/m/</td> <td>rape, round, rattle</td> <td>/r/</td> <td>cage, candle, catch</td> <td>/k/</td> <td>window, week, water</td> <td>/w/</td> </tr> <tr> <td>king, kitten, kind</td> <td>/k/</td> <td>pack, pencil, past</td> <td>/p/</td> <td>visit, voice, vine</td> <td>/v/</td> <td>happy, hope, her</td> <td>/h/</td> <td>banana, better, bake</td> <td>/b/</td> </tr> <tr> <td>zip, zoom, zero</td> <td>/z/</td> <td>game, give, gone</td> <td>/g/</td> <td>teeth, talk, turtle</td> <td>/t/</td> <td>dime, dessert, dentist</td> <td>/d/</td> <td>nickel, name, neck</td> <td>/n/</td> </tr> <tr> <td>guitar, good, golf</td> <td>/g/</td> <td>sister, song, silly</td> <td>/s/</td> <td>near, never, neat</td> <td>/n/</td> <td>letter, last, lucky</td> <td>/l/</td> <td>guest, gum, give</td> <td>/g/</td> </tr> </tbody> </table>					WORDS	INITIAL SOUND	WORDS	INITIAL SOUND	WORDS	INITIAL SOUND	WORDS	INITIAL SOUND	WORDS	INITIAL SOUND	bun, bump, baby	/b/	football, fish, fell	/f/	joke, jacket, jungle	/j/	yummy, young, yard	/y/	player, pair, present	/p/	winter, wide, work	/w/	map, make, mouse	/m/	rape, round, rattle	/r/	cage, candle, catch	/k/	window, week, water	/w/	king, kitten, kind	/k/	pack, pencil, past	/p/	visit, voice, vine	/v/	happy, hope, her	/h/	banana, better, bake	/b/	zip, zoom, zero	/z/	game, give, gone	/g/	teeth, talk, turtle	/t/	dime, dessert, dentist	/d/	nickel, name, neck	/n/	guitar, good, golf	/g/	sister, song, silly	/s/	near, never, neat	/n/	letter, last, lucky	/l/	guest, gum, give	/g/										
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<h3>Blending Body-Coda</h3> <p>► Monday Model: I will say two parts of a word and blend them together to make one word. Then, it is your turn.</p> <p>Tuesday - Friday: I will say two parts of a word; say the parts back to me and blend them together to make one word.</p> <p>Ⓢ EXAMPLE: t: jō - b* → s: jō - b*, job</p> <p>*Say sound, not letter name</p>	<p>► SKILL FOCUS: When we blend, we put two parts of a word together to make one word.</p> <p>The teacher provides modeling for this new skill and the students repeat.</p> <table border="1"> <thead> <tr> <th>TEACHER</th> <th>STUDENT</th> <th>2 PARTS</th> <th>WHOLE WORD</th> <th>2 PARTS</th> <th>WHOLE WORD</th> <th>2 PARTS</th> <th>WHOLE WORD</th> <th>2 PARTS</th> <th>WHOLE WORD</th> </tr> </thead> <tbody> <tr> <td>jō - b</td> <td>job</td> <td>hi - z</td> <td>his</td> <td>lā - k</td> <td>lake</td> <td>li - t</td> <td>light</td> <td></td> <td></td> </tr> <tr> <td>mū - d, mud</td> <td>mū - d, mud</td> <td>jē - p</td> <td>jeep</td> <td>tā - g</td> <td>tag</td> <td>cā - j</td> <td>cage</td> <td></td> <td></td> </tr> <tr> <td>rē - d, red</td> <td>rē - d, red</td> <td>dā - t</td> <td>dot</td> <td>bō - m</td> <td>boom</td> <td>bū - s</td> <td>bus</td> <td></td> <td></td> </tr> <tr> <td>bā - ck, back</td> <td>bā - ck, back</td> <td>fā - s</td> <td>face</td> <td>rū - g</td> <td>rug</td> <td>fē - t</td> <td>feet</td> <td></td> <td></td> </tr> <tr> <td>hā - d, had</td> <td>hā - d, had</td> <td>rī - m</td> <td>rim</td> <td>mā - d</td> <td>made</td> <td>tā - p</td> <td>tap</td> <td></td> <td></td> </tr> <tr> <td>tā - k, take</td> <td>tā - k, take</td> <td>tā - d</td> <td>toad</td> <td>nō - z</td> <td>nose</td> <td>nō - d</td> <td>nod</td> <td></td> <td></td> </tr> </tbody> </table> <p>► Blending hand motion: Place palms together to create "choppers." As the teacher, you will chop your hands from right to left, one chop each for the body of the word and the final sound. Students mirror the teacher by chopping and then sliding their hands to say the whole word.</p>					TEACHER	STUDENT	2 PARTS	WHOLE WORD	2 PARTS	WHOLE WORD	2 PARTS	WHOLE WORD	2 PARTS	WHOLE WORD	jō - b	job	hi - z	his	lā - k	lake	li - t	light			mū - d, mud	mū - d, mud	jē - p	jeep	tā - g	tag	cā - j	cage			rē - d, red	rē - d, red	dā - t	dot	bō - m	boom	bū - s	bus			bā - ck, back	bā - ck, back	fā - s	face	rū - g	rug	fē - t	feet			hā - d, had	hā - d, had	rī - m	rim	mā - d	made	tā - p	tap			tā - k, take	tā - k, take	tā - d	toad	nō - z	nose	nō - d	nod		
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<h3>Phoneme Isolation: Final Sounds</h3> <p>► I will say a word; say it back to me and punch up the last sound you hear.</p> <p>Ⓢ EXAMPLE: t: lob → s: lob /b/</p> <p>*Students say sound, not letter name</p>	<p>► SKILL FOCUS: We are listening for the last sound we hear in a word.</p> <table border="1"> <thead> <tr> <th>WORD</th> <th>FINAL SOUND</th> <th>WORD</th> <th>FINAL SOUND</th> <th>WORD</th> <th>FINAL SOUND</th> <th>WORD</th> <th>FINAL SOUND</th> <th>WORD</th> <th>FINAL SOUND</th> </tr> </thead> <tbody> <tr> <td>lob</td> <td>/b/</td> <td>dress</td> <td>/s/</td> <td>ease</td> <td>/z/</td> <td>coat</td> <td>/t/</td> <td>hive</td> <td>/v/</td> </tr> <tr> <td>shed</td> <td>/d/</td> <td>mat</td> <td>/t/</td> <td>dove</td> <td>/f/</td> <td>leg</td> <td>/g/</td> <td>buys</td> <td>/z/</td> </tr> <tr> <td>wife</td> <td>/f/</td> <td>live</td> <td>/v/</td> <td>mug</td> <td>/g/</td> <td>shark</td> <td>/k/</td> <td>tube</td> <td>/b/</td> </tr> <tr> <td>tug</td> <td>/g/</td> <td>toes</td> <td>/z/</td> <td>shop</td> <td>/p/</td> <td>page</td> <td>/j/</td> <td>wage</td> <td>/j/</td> </tr> <tr> <td>wit</td> <td>/t/</td> <td>tough</td> <td>/f/</td> <td>leak</td> <td>/k/</td> <td>load</td> <td>/d/</td> <td>mice</td> <td>/s/</td> </tr> <tr> <td>sage</td> <td>/j/</td> <td>hook</td> <td>/k/</td> <td>mass</td> <td>/s/</td> <td>loom</td> <td>/m/</td> <td>food</td> <td>/d/</td> </tr> </tbody> </table> <p>► Final Sound hand motion: Punch it out - Teacher slides left arm across body when saying the first part of the word, and punches left fist straight up in the air when saying the final sound. Students mirror the teacher, and will use their right arm.</p>					WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND	lob	/b/	dress	/s/	ease	/z/	coat	/t/	hive	/v/	shed	/d/	mat	/t/	dove	/f/	leg	/g/	buys	/z/	wife	/f/	live	/v/	mug	/g/	shark	/k/	tube	/b/	tug	/g/	toes	/z/	shop	/p/	page	/j/	wage	/j/	wit	/t/	tough	/f/	leak	/k/	load	/d/	mice	/s/	sage	/j/	hook	/k/	mass	/s/	loom	/m/	food	/d/
WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND	WORD	FINAL SOUND																																																																		
lob	/b/	dress	/s/	ease	/z/	coat	/t/	hive	/v/																																																																		
shed	/d/	mat	/t/	dove	/f/	leg	/g/	buys	/z/																																																																		
wife	/f/	live	/v/	mug	/g/	shark	/k/	tube	/b/																																																																		
tug	/g/	toes	/z/	shop	/p/	page	/j/	wage	/j/																																																																		
wit	/t/	tough	/f/	leak	/k/	load	/d/	mice	/s/																																																																		
sage	/j/	hook	/k/	mass	/s/	loom	/m/	food	/d/																																																																		

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Appendix G

Tier 1+ Fidelity Checklist

Teacher (Code): _____

Date: _____

Descriptor	Yes	No	Comments
Teacher attended professional development session on Evidence-Based Early Reading Instruction.			
Teacher provides daily explicit instruction on all five core components of reading.			
Teacher places instructional emphasis on foundational phonological awareness and alphabetic knowledge skills.			
Teacher fosters active student engagement in learning and scaffolds instruction.			
Evidence exists of various evidence-based programs and resources being used as designed.			
Teacher demonstrates a shift in practice in response to data from progress monitoring measures.			

Appendix H

Outcome Variable Distributions

Table H1

Descriptive statistics at pre-testing

Measure	Mean (<i>SD</i>)	Min.	Max.	Skewness	Kurtosis	Shapiro-Wilk	
						Statistic	Sig.
Vocabulary							
PPVT-4	109.89 (9.97)	87	130	-0.062	-0.538	0.988	.917
Phonological Awareness							
CTOPP-2 Eli.	94.43 (9.66)	70	110	-0.623	-0.077	0.942	.028
CTOPP-2 BW	86.02 (14.41)	70	140	1.874	3.797	0.779	<.001
CTOPP-2 SM	89.43 (9.95)	70	105	-0.410	-.788	0.926	.007
CTOPP-2 RCN	97.16 (17.47)	55	120	-0.760	-.055	0.920	.005
CTOPP-2 RON	97.95 (18.18)	55	125	-0.776	.013	0.930	.010
CTOPP-2 Comp.	87.93 (10.90)	62	120	0.622	1.302	0.960	.134
Early Reading							
KTEA-3 L&W	86.64 (16.56)	45	129	-0.208	0.230	0.973	.390
KTEA-3 RC	87.61 (11.77)	70	127	1.031	1.747	0.932	.012

Note. PPVT-4 = Peabody Picture Vocabulary Test – 4th Edition; CTOPP-2 Eli. = Comprehensive Test of Phonological Processing – 2nd Edition, Elision Subtest; CTOPP-2 BW = Comprehensive Test of Phonological Processing – 2nd Edition, Blending Words Subtest; CTOPP-2 SM. = Comprehensive Test of Phonological Processing – 2nd Edition, Sound Matching Subtest; CTOPP-2 RCN = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Color Naming Subtest; CTOPP-2 RON = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Object Naming Subtest; CTOPP-2 Comp. = Comprehensive Test of Phonological Processing – 2nd Edition, Composite Score; KTEA-3 L&W = Kaufman Test of Educational Achievement – 3rd Edition, Letter and Word Identification Subtest; KTEA-3 RC = Kaufman Test of Educational Achievement – 3rd Edition, Reading Comprehension Subtest.

Table H2

Descriptive statistics at post-testing

Measure	N	Mean (SD)	Min.	Max.	Skewness	Kurtosis	Shapiro-Wilk	
							Statistic	Sig.
Phonological Awareness								
CTOPP-2 Eli.	48	93.96 (10.21)	65	105	-1.161	0.878	0.865	<.001
CTOPP-2 BW	48	87.19 (15.09)	60	120	0.268	-0.796	0.965	.163
CTOPP-2 SM	48	92.60 (12.38)	60	130	-0.096	1.513	0.944	.022
CTOPP-2 RCN	48	96.56 (14.95)	55	115	-1.442	1.542	0.832	<.001
CTOPP-2 RON	48	99.06 (13.47)	55	120	-1.303	1.919	0.891	<.001
CTOPP-2 Comp.	48	89.54 (13.48)	58	120	-0.171	-0.152	0.981	.632
Early Reading								
KTEA-3 L&W	48	90.77 (11.27)	52	123	-0.806	4.722	0.870	<.001
KTEA-3 RC	48	85.04 (12.86)	58	116	0.417	0.036	0.974	.346

Note. PPVT-4 = Peabody Picture Vocabulary Test – 4th Edition; CTOPP-2 Eli. = Comprehensive Test of Phonological Processing – 2nd Edition, Elision Subtest; CTOPP-2 BW = Comprehensive Test of Phonological Processing – 2nd Edition, Blending Words Subtest; CTOPP-2 SM. = Comprehensive Test of Phonological Processing – 2nd Edition, Sound Matching Subtest; CTOPP-2 RCN = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Color Naming Subtest; CTOPP-2 RON = Comprehensive Test of Phonological Processing – 2nd Edition, Rapid Object Naming Subtest; CTOPP-2 Comp. = Comprehensive Test of Phonological Processing – 2nd Edition, Composite Score; KTEA-3 L&W = Kaufman Test of Educational Achievement – 3rd Edition, Letter and Word Identification Subtest; KTEA-3 RC = Kaufman Test of Educational Achievement – 3rd Edition, Reading Comprehension Subtest.