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Social Factors Influencing Early Reading Development from Kindergarten to Grade One in English-speaking Public Schools in Ontario and Quebec

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PREDICTORS OF EARLY READING DEVELOPMENT

Social Factors Influencing Early Reading Development from Kindergarten to Grade One in English-speaking Public Schools in Ontario and Quebec

by

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Honours Bachelor of Science, Wilfrid Laurier University, 2012

THESIS

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Abstract

This research study examines the influence of providing parents with early literacy or socio-emotional instruction on their children's performance in reading and social skill development. Parents were offered four interactive workshops designed to assist them in identifying everyday opportunities to reinforce either early reading skills or early social skills development. Two reading skills approaches were explored, traditional text reading and traditional text reading with computer-assisted learning opportunities. These two reading approaches were contrasted with a set of social development workshops derived from social-emotional learning models. Children's performance was measured at three time intervals from early kindergarten to early in grade one. Although developmental increases in performance are expected to occur over time, specific additional gains were detected among children of parents who were exposed to the workshops in comparison to those who did not for DIBELS initial sound fluency, GRADE grapheme-phoneme correspondence, and GRADE listening comprehension. Additional gains were observed for children whose parents attended the social workshops for academic measures related to phonological awareness, phonological processing speed, reading accuracy, and other early reading skills, and social measures of conduct problems and prosocial behaviour, when compared to children in the reading conditions. Generally, these findings suggest that greater support of socio-emotional development could reduce the need for additional and specific academic support for some students. Additionally, parental involvement in instructional workshops on early literacy and social development may have significant effects for children's academic and social success. As early intervention programs within schools tend to be costly and can be challenging to manage in typical education environments, this study provides further evidence for the potential of involving parents in their children's educational interventions as a viable alternative to traditional intervention schemes to increase positive outcomes and reduce cost.

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Social factors Influencing Early Reading Development from Kindergarten to Grade One in English-speaking Public Schools in Ontario and Quebec

The Convention on the Rights of the Child – the most widely ratified human rights treaty in history – enshrines the right of all children to a primary education that will give them the skills they need to continue learning throughout life (Bellamy, 1999). This important policy is supported by ample evidence documenting the fundamental importance of the early period of child development with regard to cognition, learning, and behaviour in the later stages of life (Cynader & Frost, 1999; Keating & Hertzman, 1999; McCain & Mustard, 1999; Wickelgren, 1999). For example, research in developmental neuroscience shows that there is greater plasticity of the brain in early life, indicating that intervention programs should begin as early as possible (Hannon, 2003). Additionally, adverse early environments have been shown to be strong predictors of later life challenges, such as teenage pregnancy, lower educational attainment, unemployment, and criminal behaviour (e.g., Doyle, Harmon, Heckman, & Tremblay, 2009). Taken together, the research clearly demonstrates the importance of the early years of development for both short and long term effects.

Knowledge of the long term effects of early development is important because inequalities in health, cognitive functioning, and socio-emotional development start early. Without early intervention, the intergenerational transmission of these inequalities may persist throughout life (Najman et al., 2004). Targeted, early intervention programs designed for, and implemented with, disadvantaged children and their families have been shown to reduce such differences (Doyle et al., 2009), partially compensating for some of the risk factors that undermine the most critical stages of children's early development. Several longitudinal studies (e.g., Olds et al., 1997; Ramey et al., 2000; Reynolds, Temple, Robertson, & Mann, 2002; Schweinhart et al., 2005) have demonstrated that the individual benefits (cognitive development, behavioural and social competence, educational attainment, and

employment income), social benefits (decreased delinquency and criminal behaviour) and government savings (reduced social welfare spending and higher tax revenues), associated with early childhood intervention considerably outweighed the costs (Karoly, Kilburn, & Cannon, 2005).

While equity considerations are the foundation of why early intervention is so important, economic efficiency is also a practical consideration of great import to policy makers. Early investment in preventive programs often has a greater cost efficiency than later remediation (Carneiro & Heckman, 2003). Estimates suggest that for every hour of prevention that is missed, it takes 7-8 hours of remediation to address the problem (e.g., Schweinhart, Barnes, & Weikart, 1993). In other words, early effective interventions may not only create parity among young children's experiences but may also cost less to implement than addressing problems later in development. In addition, if students experience failure before being provided with an intervention, there is greater likelihood that multiple interventions will be necessary. For example, children may need additional interventions to address low esteem, and problems with behaviour, attention, and attendance. Failure to provide early interventions in key areas may enhance the Matthew Effect where children with advantages continue to develop skills while disadvantaged children experience further declines (Stanovich, 1986). For example, students who do not receive early reading intervention lose opportunities to learn from text in addition to failing to learn how to read.

By providing early intervention, the benefits are more substantial, more encompassing, and are more enduring, all of which increase the return on investment (Heckman, 2006). Specifically, Heckman (2006) found that the greatest rate of return occurs at the younger ages for a constant level of investment. Returns are evidenced in terms of improved physical, mental, and emotional well-being, higher educational outcomes, and increased income level for individuals. In addition, at a societal level positive outcomes are evidenced in terms of reduced delinquency and criminal behaviour, public expenditure savings, and increased tax revenues. Instead of arguing that the economic investment for

early intervention makes later investment obsolete, Heckman (2006) claims that there are dynamic benefits to investing at multiple stages of the life cycle, with the earliest investments resulting in the greatest returns.

The Importance of Early Literacy Intervention

Investing in early childhood education is a key first step in addressing the literacy problem within Canada. It is estimated that 1 in 5 Canadian adults experiences fundamental literacy challenges. For example, adults with literacy challenges may not be able to identify the main idea or key information from a simple text passage (Organization for Economic Co-operation and Development and Statistics Canada, 2011). These challenges arise for many reasons, including the physical, mental, and emotional differences linked to inequalities arising from divides in socioeconomic status. In addition, specific literacy-based skill training may also differentiate advantaged versus disadvantaged child groups. For example, Lee (2011) found that, after controlling for socioeconomic status, birth order, gender, and ethnicity, total vocabulary size at age 2 significantly predicted subsequent language and literacy achievement up to fifth grade. For young learners who perform more poorly in the preschool years on measures of emergent literacy skills (e.g., vocabulary, print knowledge), the literacy gap between them and their peers continues to increase as they start formal schooling (e.g., Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Juel, 1988; Lee, 2011; Shonkoff & Philips, 2000; Stanovich, 1986), and this divergence persists into adulthood (Bruck, 1998).

Learning to Read

Experimental psychology has viewed reading as a complex activity since its inception as a field. Huey (1908/1968), in the early twentieth century, suggested that, to describe reading, one is describing “very many of the most intricate workings of the human mind” (p. 6). Gates (1949) expressed a similar view several decades later, positing that reading is “a complex organization of patterns of higher mental processes . . . [that] . . . can and should embrace all types of thinking, evaluating, judging, imagining,

reasoning, and problem-solving” (p. 3). Anderson, Hiebert, Scott, and Wilkinson (1985), presented a report commissioned by the National Academy of Education, in which they compared reading to “the performance of a symphony orchestra” (p. 7).

Learning how to read is a complex activity, but it is a feat that can be accomplished with the right tools. This understanding was expressed by Fries (1963) who declared that while higher mental processes are required for reading, “every one of the abilities listed may be developed and has been achieved by persons who could not read” (p. 118). Among the many skills that the learner must acquire are linguistic knowledge and concepts about print (Dickinson et al., 2003; Pullen & Justice, 2003; Wagner & Torgesen, 1987). More specifically, the emergent literacy framework refers to inside-out skills as knowledge about letter-sound patterns, and outside-in skills as knowledge of context such as vocabulary knowledge and concepts about print (Whitehurst & Lonigan, 1998).

Current theoretical understandings of reading, based on the Simple View of Reading (Gough & Tunmer, 1986), have identified key underpinnings that can be used to direct early interventions. This theory of reading comprehension has resulted in a great deal of research on reading acquisition (e.g., Gough & Tunmer, 1986; Hoover & Gough, 1990; Tunmer & Hoover, 1992, Tunmer & Greaney, 2010; Tunmer & Chapman, 2012a, b). Contrary to previous complex conceptualizations of reading, the Simple View of Reading identifies two key components; decoding and linguistic comprehension.

The simple view does not preclude reading as a complicated process. With this view, in order to read, the reader is required to decode graphic symbols into linguistic form, as well as understand that form (Hoover & Gough, 1990). Linguistic comprehension (i.e., the process of interpreting lexical information, sentences, and discourses) is not a simple task, whether achieved during reading or listening to oral delivery of material for comprehension. Decoding, as demonstrated by the immense difficulty some have in learning it, is likewise not a simple undertaking. The simple view merely posits that the complexities of reading comprehension can be separated into and explained by these two

components (i.e., decoding and linguistic comprehension). In this model, reading comprehension is viewed as the product of decoding and linguistic comprehension ($RC = D \times LC$). Due to this relationship between the component skills, each skill is of equal significance, both being necessary but neither being sufficient on its own.

The word *decoding* tends to have different meanings to different people; some people equate it with "sounding out," while others associate it with (context-free) word recognition. Gough and Tunmer (1986) state that the term decoding refers to the use of letter-sound correspondence rules, not simply word recognition. These authors suggest that sounding-out is, at most, only a primitive kind of decoding (there is debate about this; see Gough & Hillinger, 1980), whereas skilled decoding involves reading isolated words quickly, silently, and accurately. In a study by Gough, Juel, and Roper-Schneider (1983), it was argued that novice readers tend not to use the letter-sound correspondence rules; indeed, even expert readers do not always use them (Gough, 1984). However, it has also been suggested that skill in word recognition, in an alphabetic orthography, does require knowledge of letter-sound correspondence rules (Gough & Hillinger, 1980).

As has been noted by spelling reformers, knowledge of letter-sound correspondences is not enough for word recognition in the English language (Venezky, 2004). For example, letter-sound correspondences are not sufficient to be able to read irregular words, such as *pint* and *yacht*, or even words with ambiguous pronunciations, such as 'bead' and *bread* and *steak* and *area*. Therefore, all theories of reading acquisition in English include a phase or stage when the reader is able to recognize and use larger letter-sound patterns to read words (Ehri, 1992; Frith, 1985). It is important to note that proponents of the Simple View of Reading acknowledge that simply knowing the letter-sound correspondences is not sufficient for word recognition and ultimately, linguistic comprehension; however, this is not to say that it is unnecessary. To the contrary, it is maintained that knowledge of English letter-sound correspondence rules is a necessary component for enabling recognition of the

majority of English words. Following recognition, the reader must be able to interpret the meaning of the word(s) and how sequences of words fit together (i.e., linguistic comprehension) for reading comprehension to take place.

Reading Intervention

As reading is a complicated process, it is not surprising that some students struggle with it. Shaywitz (2003) claims that unlike the phenomenon of learning to speak, which develops naturally from birth, intentional and effective instruction is necessary for most children to learn to read. Interestingly, studies which assess children in kindergarten in an attempt to identify those who are at risk of developing a reading disability early in their school careers consistently result in a much higher proportion of children identified as at-risk than the actual incidence of reading disabilities (Good, Simmons, & Kame'enui, 2001; O'Connor, Harty, & Fulmer, 2005; O'Connor & Jenkins, 1999; Wagner et al., 1997). In fact, oftentimes the number of children who struggle with learning to read is two to three times as large as the number of students who develop or become identified as having a reading disability (O'Connor et al., 2005). The best hope for children delayed in their reading development is to provide evidence-based effective reading instruction as early as possible (Shaywitz, 2003).

Specifically, a growing body of research in education suggests that one of the most effective ways of preventing reading difficulties in English is by providing relatively brief preventative reading interventions which stress the phonemic structure of words in conjunction with instruction on grapheme-phoneme correspondences (Lundberg, Frost, & Peterson, 1988; Ball & Blachman, 1991; Lundberg, 1994; Troia, 1999; Stuart, 1999, 2004; Ehri, Nunes, Willows, Schuster, Yaghoub-Zadeh, & Shanahan, 2001). Indeed, a statistical meta-analysis of 52 intervention studies, carried out by Ehri et al. (2001), confirmed the overall effectiveness of phonologically based interventions. Savage, Carless, and Erten (2009) provide further support of this finding by demonstrating that through appropriate early intervention, two thirds of otherwise poor-readers can learn to read.

More importantly, there is ample research demonstrating that early interventions have measurable long-term effects even several years subsequent to intervention completion (e.g. Bradley, 1988; Lundberg, 1994; Byrne & Fielding-Barnsley, 1995; Vellutino et al., 1996; Torgesen, 2000; Ehri et al., 2001; Coyne, Kame'enui, Simmons, & Harn, 2004). Specifically, Torgesen's (2000) analysis of five phonics-based intervention studies concluded that approximately 60%–80% of children initially reading below the 20th percentile were able to reach word-reading skills near or above the 30th percentile at post-intervention follow-up. However, some researchers have found that intervention benefits can be short lived. For example, four weeks following a vocabulary-focused reading intervention, Pullen, Tuckwiller, Konold, Maynard, and Coyne (2010) found that students who were identified as at-risk and received intervention were statistically indistinguishable from at-risk controls who did not receive the intervention. It is clear then that a key issue in reading intervention research is addressing which factors are involved in the maintenance and long-term impact of reading interventions. The evidence suggests that interventions involving domain specific knowledge (eg., phoneme-grapheme correspondences for reading) can result in major improvements for those at-risk for academic difficulties.

Added Benefit of Educational Technology

Computers and computer based devices have the potential to transform learning, from the way students are able to interact with the devices to the adaptive responses and records that some devices are capable of providing. Several reviews of the relationship between technology and reading have consisted of quasi-experimental studies and have shown small, but significant positive effect sizes for literacy gains, and researchers are, therefore, fairly optimistic about the use of technology in education (Blok, Oostdam, Otter, & Overmatt, 2002; Ehri et al., 2001; MacArthur, Ferretti, Okolo, & Cavalier, 2001).

Subsequent systematic reviews and meta-analyses also indicate positive learning gains when technology is used to support early literacy and reading skill development. For example, Tamim, Bernard, Borokhovski, Abrami, and Schmid (2011) conducted a second-order meta-analysis on 40 years of research activity regarding the comparison of student achievement between technology-enhanced classrooms and more traditional classrooms without the integration or use of technology. Based on their extensive literature search and systematic review, which resulted in the inclusion of 25 meta-analyses, encompassing 1,055 primary studies, Tamim and colleagues (2011) conclude that there is a significant positive effect favoring the utilization of technology in formal education as compared to more traditional instruction (i.e., technology free). In addition, a recent tertiary meta-analysis (Archer et al., 2014), which summarized three previous meta-analyses, also indicated that well-designed and well-delivered reading programs provided through computer technology could enhance children's learning.

Although these large scale summaries indicate potential for use of reading-based software, individual studies provide clearer exemplars of what constitutes well-designed software and how this software can be used in conjunction with ongoing traditional forms of early literacy instruction (eg., Chambers, Abrami, et al., 2008; Chambers, Slavin, et al., 2008). For example, a randomized control trial (RCT) intervention study conducted by Savage and colleagues (2013) examined the effectiveness of an intervention using a Web-based literacy system with 1,067 children across Canada. Savage and colleagues (2013) found that this technology-based intervention showed significant advantages at post-test over controls in phonological blending ability, phoneme segmentation fluency, letter-sound knowledge, and sight word reading. Furthermore, Deault, Savage, and Abrami (2009) examined response characteristics of students in the Savage and colleagues' (2013) sample and found that technology can moderate the relationship between attention and literacy and may benefit students at-risk of attention and reading difficulties. In addition, Chambers, Slavin, and colleagues (2008) drew

upon contemporary theory about how information and communication technologies (ICT) support reading through encouraging dual visual and verbal coding (Clark & Paivio, 1991) and through “offloading” between modalities to reduce working memory load, (Solso, 2001) thereby encouraging retention. These insights indicate when and how technology-based interventions promote learning.

Issues present in more recent technology-based interventions involve consideration of the pedagogical underpinnings that promote best practice with literacy software and interventions employing this software. A pedagogical role for technology was posited by Chambers, Slavin, et al. (2008). The authors described the role of technology as “adding value” to regular classroom instruction in what they refer to as embedded information and communication technology (ICT). Recent successful interventions that employ early literacy instruction using computer software do so as an adjunct or addition to ongoing instruction in the classroom (e.g., Chambers, Abrami, et al., 2008; Savage et al., 2013). Technology-based interventions may be best understood as additional instructional opportunities rather than as ‘stand alone’ instruction. In keeping with this understanding of the role of technology as an instructional tool, the present study offered training for parents regarding early literacy skill development with some parents being provided instruction that referenced traditional text and oral instructional supports while other parents received this instruction (traditional reading supports) plus instruction regarding technology-based reading software. Other parents received instruction in early socio-emotional skills development, which plays a role in many kinds of instruction, including that which is supported by educational technology.

Socio-emotional Learning and Academic Success

It has been suggested that, as early as kindergarten, children’s performance is predictive of their later achievement (Alexander, Entwisle, & Dauber, 1993; Gutman, Sameroff, & Cole, 2003). It is crucial, then, that the influences and supports that promote academic success for all students, right from the start of their school careers, be fully explored and understood. In addition to educational technology

being a potential benefit for students' academic achievement, socio-emotional aspects of the learning environment are also key contributors to learning and academic success. Interventions targeting socio-emotional development have been offered in conjunction with other academic and literacy-based interventions and sometimes independent of other interventions in an effort to promote learning gains by reinforcing the learner's self-efficacy and abilities to interact with others (Denham, 2006; Shonkoff & Phillips, 2000). Social and emotional learning (SEL) incorporates all aspects of how we establish social and emotional competencies, from understanding and managing one's own emotions to establishing and maintaining positive relationships, and making responsible decisions (Payton et al., 2008).

There is evidence that SEL is as pivotal in children being ready for school as number skills, language, and literacy (Shonkoff & Phillips, 2000) and that fostering social-emotional development is critical for early learning programs (Denham, 2006; Shonkoff & Phillips, 2000). For example after analyzing and summarizing the findings from 179 handbook chapters and reviews, compiling the data from 91 meta-analyses, and surveying 61 independent educational researchers, Wang, Haertel, and Wallberg (1993) concluded that social and emotional influences are among the top contributors to student learning. Similarly, Durlak, Weissberg, Dymnicki, Taylor, and Schellinger (2011) conducted a meta-analysis, of the findings behind the Collaborative for Academic, Social and Emotional Learning's (CASEL) school-based program of social and emotional learning. This meta-analysis, including over 270,000 students, demonstrated that learners across the elementary and high school years (K-12) who are exposed to socio-emotional competencies exhibit increases in academic performance (i.e., subject mastery & grades), social skills and attitudes (i.e., commitment & motivation), and positive behaviours (i.e., class participation & study habits) relative to students who do not receive training. Overall, the effect sizes ranged from small ($ES = .27$ for academic performance gains) to large ($ES=.69$ for social skills, attitudes and behaviours). In addition, fewer conduct problems and lower levels of emotional

distress were also demonstrated. Together, these findings indicate the importance of social-emotional programs and the importance of these programs being offered for young learners.

Upon entering early childhood programs, children are still acquiring foundational social skills. For example, very young learners must learn to manage and cope with their emotions (Cole, Michel, & Teti, 1994). These foundations are followed by the development of a sound emotional infrastructure that facilitates building solid relationships with their teachers and peers (Pitcl, Provance, & Kerslake, 2006). Students who develop these abilities early are able to comfortably engage in interactions with their peers and teachers, allowing them to be active participants in their learning rather than passive recipients of knowledge. For example, these students are more capable of working well with others in cooperative learning groups, communicating effectively, and asking for help when they need it. These skills are germane to successful learning in school but also, more broadly, to social interactions in daily living.

Over the course of the last two decades, a convincing body of evidence indicates that unless children attain minimal social competence by about six years of age, they have a high probability of being at-risk throughout life (Katz and McClellan, 1991; Pandis, 2001). Hartup (1993) suggests that peer relationships substantially influence both social and cognitive development and contribute to the effectiveness and ease with which individuals function as adults. Without comfortable peer relationships, future risks are numerous, including low achievement and other school difficulties, dropping out of school, poor employment history, and poor mental health (see Katz and McClellan, 1991). Given the evidence linking SEL and early learning and the potential life-long consequences, socio-emotional development should be considered as a key component of early education.

As with the teaching of academic skills such as literacy or mathematics, a clear and widely used definition of social and emotional learning including the scope of the skills students need to learn is required for effective SEL instruction. In general, social and emotional learning consists of developing

a set of skills necessary to succeed in school, the workplace, relationships, and citizenship (Humphrey, Kalamouka, Wigelsworth, Lendrum, Deighton, & Wolpert, 2011). However, there is currently, no clear and ubiquitous definition of SEL (Humphrey et al., 2011). Socio-emotional learning has functioned as an umbrella term for several domains of psychology and neuroscience, each with a specific goal (e.g., encourage prosocial behaviour, minimize or eliminate aggressive behaviour, practice effortful control, emotion regulation) and various types of interventions (e.g., bullying prevention, conflict resolution, social skills training, character education; Social and Character Development Research Consortium, 2010; Zins, Bloodworth, Weissberg, & Walberg, 2007). Considering the variety of domains that SEL fits into, it is not surprising that there is also wide variation in the focus and scope of SEL frameworks and interventions: some focus on one set of skills (e.g., acknowledging and expressing emotions) while others focus on several different skill sets, and some include executive functioning or cognitive regulation (e.g., attention skills, working memory) while others do not (Social and Character Development Research Consortium, 2010). Given the diversity in definitions of SEL and corresponding programs, an important first step in developing any SEL intervention involves identifying and defining the theoretical model that should be employed.

Socio-emotional Learning in the Present Study

The SEL framework for the current study draws on “developmental-contextual models,” which consider development as taking place in a nested and interactive set of environments ranging from those which are proximal (e.g., family, peer system, classroom, school) to those which are more distal (e.g., cultural and political) contexts (Bronfenbrenner & Morris, 1998). This framework represents the core domains of SEL skills. These skills are grouped into three conceptual categories: emotional processes, social/interpersonal skills, and cognitive regulation. Emotional processes include emotional knowledge and expression, emotional and behavioral regulation, and empathy and perspective-taking. Social/interpersonal skills include recognizing and understanding social cues, interpreting others’

behaviors, navigating social situations, interacting with peers and adults in a positive manner, and other prosocial behaviors. Cognitive regulation includes inhibiting inappropriate responses, attention control, working memory, and cognitive flexibility or set shifting.

These three categories of SEL skills have been associated with both short- and long-term outcomes, from academic performance (e.g., grades, standardized tests of academic skills; Durlak et al., 2011) to behaviour modification (e.g., taking others' perspectives, getting along well with other children, solving conflicts, and exhibiting less aggression and conduct problems; Payton et al., 2008) and emotional health and well-being (e.g., lower levels of depression and social isolation; Payton et al., 2008). The skills addressed in the current study include recognizing and managing our emotions (self-awareness), developing caring and concern for others (understanding others), establishing and maintaining positive relationships (relationship development), making responsible decisions, and handling challenging situations constructively and ethically. These are the skills that allow children to calm themselves when angry, resolve conflicts respectfully, make ethical and safe choices, make friends, and be positively contributing members with their families and communities (Collaborative for Academic, Social, and Emotional Learning, 2005; Elias, 1997; Zins & Elias, 2006).

Expanding SEL Programming

Although research indicates that SEL programs that are incorporated into routine educational practice while using a sequenced step-by-step training approach, employing active forms of learning, focusing sufficient time on skill development, and conveying explicit learning goals are associated with positive social, emotional, behavioral, and academic outcomes for children and adolescents (e.g., Durlak et al., 2011), the range of effect sizes vary from high to low, even for the most promising interventions. For example, Durlak and colleagues (2011) found that mean effect size for social and emotional skills ranged from 0.69 to 0.01 across different programs. These effect sizes are likely limited by a range of factors including wide variation in implementation quality and the difficulty of

finding large blocks of dedicated time for SEL programming. Perhaps most importantly, and often overlooked, is the fact that SEL programs are rarely integrated into classrooms and schools in ways that are meaningful, sustained, and embedded in the day-to-day interactions of students, educators, and school staff. Additionally, it should be recognized that relatively small effects from school-based SEL interventions should be expected, as there are so many other variables and experiences that influence a child's socio-emotional development. For example, for interventions that start in kindergarten (see Durlak et al., 2011), most children involved have had four to five years of life prior to the start of the intervention and even with effective intervention, a child's socio-emotional development has already been forming over the course of those years and substantial behavioural changes are likely to take time to become apparent. Furthermore, a strictly school-based intervention would be anticipated to have somewhat limited effects as a child's socio-emotional development is likely to be substantially contributed to by their home environment and interactions with others outside of school. This study proposes to involve parents in this process using a broader, more inclusive approach to SEL, prior to students entering grade one, in order to facilitate early integration of these skills into their everyday life in ways that are both meaningful and sustained.

Parental Involvement

Bronfenbrenner and Morris (1998) stated that the two most important developmental systems to influence young children are families and schools, with family being the primary and most important system, due to the potential for it to be a lifelong resource. Addressing parental involvement is critical when considering educational interventions because the home environment has been consistently shown to be a strong predictor of both academic achievement (e.g., Galindo & Sheldon, 2012; Sénéchal & LeFevre, 2002) and socio-emotional development (e.g., Raver & Knitzer, 2002). In fact, decades of studies, reviews, and meta-analyses have demonstrated that family involvement is one of the most influential factors contributing to student achievement across grades (Epstein & Sheldon, 2006;

Henderson & Mapp, 2002; Jeynes, 2005; Snow, Burns, & Griffin, 1998; Wang, Haertel, & Walberg, 1993). Very few developmental topics have produced such consistently positive, significant, and stable effects over time, subject areas, developmental level, and geographic context as parental participation and support (Jeynes, 2003, 2005; Nye, Turner, & Schwartz, 2006). Additionally, early intervention programs within schools are frequently successful, but they also tend to be costly. Most commonly, in intervention studies, the intervention is provided via small group or one-on-one instruction, which can be challenging to manage in typical education environments. Involving parents in their children's educational interventions may be a viable alternative to traditional intervention schemes to increase positive outcomes and reduce cost.

Parental involvement is multifaceted and can be assessed in a variety of ways. Galindo and Sheldon (2012) assessed three indicators of parental involvement – involvement at home, involvement at school, and parents' educational expectations for their children. They found that family involvement and parents' educational expectations were significantly and positively associated with reading gains. On average, students whose parents had higher educational expectations and who showed more involvement at school had higher reading gains during kindergarten, regardless of their levels of achievement at the start of the school year (Galindo & Sheldon, 2012). Each unit increase in family involvement was associated with a 0.97 point increase in reading achievement (effect size of 0.05). Overall, Galindo and Sheldon (2012) demonstrated the important role family involvement plays in kindergarten students' achievement gains, even after controlling for other influential student and family background measures, including students' previous achievement. In contrast to Galindo and Sheldon (2012), Fan and Chen (2001) and Jeynes (2005) demonstrated a greater influence of home-based parental involvement as compared to school-based parental involvement on children's learning.

A child's learning could be influenced by parental involvement in numerous ways. For instance, there is an abundant body of literature which demonstrates that children who experience more reading

with parents and who have access to more books within the home typically achieve higher scores on reading achievement tests and literacy assessments than do children from less reading-rich environments (Faires, Nichols, & Rickelman, 2000; Ginsburg-Block, Manz, & McWayne, 2009; Scarborough & Dobrich, 1994; Sénéchal & LeFevre, 2002).

Parental involvement does not only influence reading development directly, but also does so indirectly through its influence on socio-emotional development. Family involvement at home is associated with children's school readiness competencies, including indicators of socio-emotional competence such as more frequent prosocial interactions and fewer antisocial interactions with peers (Fantuzzo, McWayne, Perry, & Childs, 2004; Pianta & Rimm-Kaufman, 2006; Raver, 2002). Parental responsiveness, warmth, and sensitivity, and support for a child's emerging self-control and autonomy have been found to be powerful predictors of children's socio-emotional, communicative, and cognitive development and competence (Chazan-Cohen et al., 2009; Landry, Swank, Smith, Assel, & Gunnewig, 2006; Merlo, Bowman, & Barnett, 2007; NICHD Early Child Care Research Network, 2002). When parents provide developmentally sensitive support for their child's autonomous problem solving, socio-emotional and cognitive development is enhanced through supporting the child's assertiveness, self-directedness, and communication with peers (Pomerantz, Moorman, & Litwack, 2007).

The impact of parental involvement may also extend to motivational support for children navigating the challenges of learning. Parents who encourage their children to learn and support them through challenging tasks may prepare their children for future success. Bellamy (1999) noted that students who are motivated leave school better equipped to succeed, and even excel, in the future; they are more empowered to generate improvements in their own lives and, subsequently, the lives of their children.

Lastly, a family's socioeconomic status (SES; a global index of family resources), generally evaluated by assessing family income and level of parental education or occupation, has been long

known to be highly predictive of children's development (e.g., Sameroff & Chandler, 1975; Scott-Jones, 1984). After analyzing the extensive literature regarding the influence of socioeconomic disadvantage on children's development, McLoyd (1998) concluded that children's early cognitive and language functioning, social competence, academic achievement, as well as their emotional and behavioral adjustment are all strongly linked to SES. Measures of SES that incorporate multiple variables and variables which are less likely to fluctuate, such as parental education and occupation, are typically more reliable measures of the family environment, as family economic status has the potential to vary more widely across years (McLoyd, 1998).

Parental education, especially that of the mother (Haveman & Wolfe, 1995), has been consistently found to be a key element in children's social and academic development (Molfese, DiLalla, & Lovelace, 1996). This may be because parents with higher educational levels have the resources and knowledge of developmental needs to provide stimulating home environments. For example, Hart and Risley (1995) demonstrated the impact of socioeconomic status (as defined through income and educational training) on children's learning. They assessed the language environments (direct vocabulary exposure was tape recorded within the home from 0-36 months of age) of children from families with professional occupations (e.g., lawyers, professors), middle-income status, and families on social assistance and found that by 3 years-of-age, children of high socioeconomic status parents had been exposed to three times more words than children in families of low socioeconomic status.

Given the important role that parents can play in supporting their children's development, the current study will examine the impact on children when parents are provided with instruction and support. Specifically, parents will be provided with resources to support their children's early literacy and socio-emotional development. An important outcome will be examining whether parents use these resources. Two measures of use include examination of parental self-reports and tracking data from

websites. These two sources of information will permit exploration of the influence that parental involvement has on their children's development.

The Present Study

The present study examined the impact of providing parents with early literacy or socio-emotional instruction on their children's performance in reading and social skill development. Parents were provided four workshops designed to assist them in identifying everyday opportunities to reinforce either early reading skills or early social skills development. Two reading skills approaches were explored, traditional text reading and traditional text reading with computer-assisted learning opportunities. These two reading approaches were contrasted with one social development series derived from existing SEL models. Children's performance was measured over three time intervals from early kindergarten to early in grade one.

Hypotheses

This design yielded four hypotheses:

- 1) It is expected that performance scores would be higher among students whose parent(s) attended at least one of the instructional workshops provided as part of the study than students whose parents did not attend any of the workshops offered.
- 2) a) If domain specific knowledge is key to success in academic contexts, it is expected that early literacy performance scores will be higher for students in the reading and the reading plus technology conditions than those in the social condition. Similarly, students in the social condition are expected to outperform students in the reading and the reading plus technology condition in measures of social skill development.
b) However, if it is the case that social skills training leads to global academic gains, it would be expected that there would be no significant differences among the three groups for the academic/reading measures.

- 3) Developmental gains in both academic and social skills will be assessed at two points in time, immediately after the workshop intervention and at long-term follow-up (at the beginning of grade 1). It is expected, based on developmental trajectories, that there will be gains in both domains (reading and social development) across children in all conditions at each of these two time points relative to a baseline pre-test at the beginning of senior kindergarten.
- 4) In addition to the developmental gains, an exploratory analysis will be conducted to assess the magnitude of gains, specifically, comparisons will be made for the proportion of increase in performance evident immediately following the workshop intervention and the proportion of gains made at long-term follow-up. When long term gains are assessed as a function of parental attendance at workshops, it is expected that gains will be larger immediately following parental exposure to the workshops.

In addition to the four hypotheses, the study will also examine parental attitudes toward the workshop interventions and use of content specific materials provided at the workshops, in brochures, and on the websites.

Design

This study is part of a larger longitudinal project examining the effects of additional literacy or social supports given to the same group of children each year from kindergarten to grade 4. The current study employs a 2 (parental attendance) X 3 (condition) X 3 (time) mixed model design. The between subjects factors are parental attendance (attending or not attending at least one workshop) and condition (reading, reading plus technology, and social). The within subjects factor is time measured at pre-test (beginning of senior kindergarten), immediate post-test (at the end of senior kindergarten), and long-term follow-up (at the beginning of grade 1). The dependent measures include socio-emotional skills and academic/reading skills. Descriptive analyses will also be conducted for parental attitudes toward

the workshop interventions and use of content specific materials provided at the workshops, in brochures, and on the websites.

Method

Participants

Both parents and children were involved in this study. In total 576 parents participated. Maternal education will be used as an indicator of socio-economic status. Of the 548 participants which we have maternal education information for, 78.9 % had a college education or higher (see Table 1 for frequencies by condition). Postal code for each family was also collected as a second indicator of SES.

In total, 586 children (308 males, 278 females) participated in the study. Males and females did not differ in age – calculated at beginning of kindergarten (M_m : 5.33 (.33) and M_f : 5.32 (.32), respectively). Children attended one of 21 schools, which were randomly assigned to one of the three conditions (8 reading, 7 reading plus technology, 6 social). Schools were located in two provinces (6 Ontario, 15 Quebec) with 114 children in Ontario and 472 children in Quebec. See Table 2 for summary of participant data. All schools were located in medium to large school boards within both provinces.

All children were included in the study following consent from their parent(s) or legal guardian(s) and assent prior to any of the testing protocols. Ethical treatment of participants was followed in accordance with CPA/APA guidelines.

Measures

Measures were collected from the parents and child participants directly. These included surveys and standardized test instruments. In addition, visit counts were available from the three websites designed to hold supporting materials for each of the three workshop types (i.e., reading, reading plus technology and social).

Demographic survey. The parents and legal guardians were asked to complete a Demographic Survey (see Appendix A) at the beginning of the study when they completed the consent form. Twelve questions provided background information about the languages used in the families' households, the literacy environment provided in the children's homes, the ways that the families communicate with the children's schools, and the families' SES levels.

The parent's highest attained level of education was coded using the coding schemes from the Hollingshead Four-Factor Index of Socioeconomic Status (Hollingshead, 1975), based on a 7-point scale for the parent's educational attainment. Using this coding scheme, a lower number on the scale indicates a lower SES and a higher number indicates a higher SES (Hollingshead, 1975).

Baseline academic assessment battery. The pre-test battery was comprised of 10 measures assessing 7 major concepts: receptive vocabulary, expressive vocabulary, phonological awareness, phonological processing speed, reading accuracy, early reading skills, and global academic performance. These are described below.

Receptive vocabulary.

Peabody Picture Vocabulary Test – 4 (PPVT-4), form A (Dunn & Dunn, 2007). Receptive vocabulary was assessed with the PPVT-4. Form A was used in this study. In this test children were presented with four pictures per page and were asked to point to the picture that corresponded to a word spoken by the experimenter. The words become more difficult as the test progresses. The published split-half reliability ranges from .73 to .84. Standardized scores were used in the data analyses.

Expressive vocabulary.

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) - Word Use Fluency subtest (Good & Kaminski, 2007). This measure assesses a child's vocabulary and oral language. Students were presented with a word and asked to use that word in a sentence. If a student paused on a word for five seconds, the examiner moved on to the next word. Credit was awarded for number of words correctly

used in a sentence. Children were presented with a minimum of ten words. If one minute had not passed from the start of the assessment at this point, additional words were provided up until one minute had been fulfilled, at which point the assessment was concluded. This measure has a reported alternate form reliability ranging from .65 to .71 (Kaminski & Good, 1996, 1998).

Phonological awareness.

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) – Phoneme Segmentation Fluency subtest (Good & Kaminski, 2007). This measure assesses students' ability to fluently break three- or four-phoneme words into their individual phonemes. The words to be segmented were presented orally by an examiner or using an audio recording. For example, if the word presented was *ship*, students had to say /sh/ /i/ /p/. Credit was awarded for each phoneme or segment of the word produced. The number of correct phonemes produced within 1 minute determines the final score. This fluency based measure has alternate-form reliability of .88 and predictive validity coefficients ranging from .73 to .91 (Kaminski & Good, 1996). The Spearman–Brown split half reliability coefficient for this measure in the present sample at pretest was .97.

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) – Initial Sound Fluency subtest (Good & Kaminski, 2007). This subtest of the DIBELS is a measure of a student's ability to recognize and produce the initial sound in an orally presented word. For this measure, the examiner showed the student four pictures, named each picture, and asked students to identify (i.e., either point or say) the picture that began with the sound produced by the examiner. Students were also asked to produce the beginning sounds of some words presented orally by the examiner. The subtest was discontinued if a student answered the first five items incorrectly. The amount of time taken to identify or produce the correct sounds was used to convert the raw score into the number of initial sounds correct per minute. Alternate-form reliability of this measure is .72 (Good et al., 2004).

Comprehensive Test of Phonological Processing (CTOPP) - Blending Words subtest (Wagner, Torgesen, & Rashotte, 1999). This measure assesses a child's phonological blending ability. This subtest was used to examine students' ability to blend words. In this test, the children listened to a series of disjointed sounds and then blended the sounds together to make a whole word. The Spearman–Brown split-half reliability coefficient for this measure in the present sample at pretest was .86.

Phonological processing speed.

Comprehensive Test of Phonological Processing (CTOPP) - Rapid Digit Naming subtest (Wagner et al., 1999). This measure assesses a child's phonological processing speed. This subtest was used to examine students' digit processing speed. This task involves asking the children to read rows of numbers as quickly and accurately as they can. Total administration time for this subtest is approximately two minutes (including practice). Children are shown practice letters or numbers before beginning the actual tasks and if they cannot name each number on the practice sheet after they have been given feedback, then the task is not carried out (Wagner et al., 1999). For this subtest, Form A was presented first and if the participants made five or more errors on Form A, then they were not tested on Form B. If they made fewer than five errors then they were also given Form B. With each form, participants are timed and the number of errors made is recorded. One error is recorded each time a participant names a number incorrectly or if they miss a number. High reliability has been reported for the Rapid Digit Naming subtest (Cronbach's alpha has an average of .87; Wagner et al., 1999). Test-retest reliability was also high ($r = .80$; Wagner et al., 1999).

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) – Letter Naming Fluency subtest (Good & Kaminski, 2007). This subtest of the DIBELS measure assesses a child's ability to name letters (alphabetic awareness). Students were presented with an array of upper-case letters arranged in a random order and were asked to name as many letters as they can. If a student paused on a letter for

three seconds, the examiner provided the letter name. One point was awarded for each letter correctly named without assistance within one minute to determine the final score. This measure has alternate-form reliability of .88 (Good, Wallin, Simmons, Kameʻenui, & Kaminski, 2002).

Reading accuracy.

Wide Range Achievement Test (3rd ed.; WRAT-3) - Word Reading subtest (Wilkinson, 1993).

This letter and word sub-section of the WRAT-3 reading test was administered to students as a written decoding measure. First, students were asked to read 15 letters of the alphabet aloud. If they were able to read the letters with fewer than five errors, they were asked to move on to the word section and try to read as many words as possible. After 10 consecutive errors, students were asked to stop and the test was terminated. Reported Spearman reliability of this test is .92.

Group Reading Assessment and Diagnostic Evaluation (GRADE), form A level K (Williams, 2001). The GRADE is a standardized, nationally normed instrument designed to be administered to either the whole class or individually. For this testing battery, level 1 form A was used. Eleven subtests of this measure were used in the present study including, same words, different words, rhyming, print awareness, sound matching – begins with, sound matching – ends with, letter recognition, listening comprehension, phoneme-grapheme – initial, phoneme-grapheme – final, and word reading. The GRADE is reported to have strong internal consistency (r s ranging from .95 to .99) and retest reliability (r = .80; Williams, 2001). Reviews of the GRADE (Fugate, 2003; McBride, Ysseldyke, Milone, & Stickney, 2010; Waterman, 2003) have concluded that this tool is a reliable and valid measure of early reading ability.

Global academic assessment measures.

Wide Range Achievement Test (3rd ed.; WRAT-3) - Mathematics subtest (Wilkinson, 1993). The oral and written section of the WRAT-3 mathematics subtest was administered as a control measure to isolate specific intervention effects on literacy. First, children were administered the oral section which

asked questions assessing their knowledge of number concepts such as counting, more/less, addition and subtraction. If a child made 1 or fewer mistakes, he/she was asked to proceed with the written section and complete as many math equations as they could. The reported Spearman reliability of this test is .89.

Immediate follow-up academic assessment battery. At post-test, children were assessed with the same test battery as pre-test, with the exception that the PPVT-4 was not conducted.

Long-term follow-up academic assessment battery. As children entered grade 1, a third test battery was administered. This test battery also included measures from the DIBELS, WRAT, CTOPP, and GRADE, as well as two additional measures. Although common measures were used, some subtests or versions varied at the grade 1 level. For example, more age-appropriate versions of the following measures were used: the phoneme segmentation fluency subtest of the DIBELS measure, the phoneme blending subtest of the CTOPP, and the GRADE measure. The two new measures included: Fry's Word List and Woodcock-Johnson III.

Reading accuracy.

Fry's word list (Fry, Kress, & Fountoukidis, 2000). To assess the students' word reading skills, we adapted a test using words from the Fry's Instant Word List (Fry, Kress, & Fountoukidis, 2000). Twenty words were randomly selected from Fry's first 200 words. The same 20 words were used at pre- and posttest. Each of the selected 20 words was placed on individual index cards and shown one at a time to participants. The students read each word presented to them and received a point for each word correctly read. The maximum score for this test was 20. The Spearman-Brown split-half reliability of this test in the present sample at pretest was .89.

Woodcock-Johnson III Tests of Achievement (WJ III ACH) – Word Attack and Spelling subtests (Woodcock, McGrew, & Mather, 2001; 2007). Two subtests of this measure were used: the word attack and spelling. The word attack subtest measures grapheme-to-phoneme translation of pseudo words. The

reported split half reliability for this subtest is .87 (Schrank, McGrew, Woodcock, 2001). The spelling subtest measures mapping phonology to orthographic representations of words. The reported split half reliability for this subtest is .90 (Schrank, McGrew, Woodcock, 2001).

Social skills assessment. Social skills were assessed through two measures, the Strengths and Difficulties Questionnaire and the Self-Regulation Assessment Tool. Both of these measures were completed by classroom teachers at baseline (pre), immediate (post), and long-term follow-up.

Strengths & Difficulties Questionnaire (SDQ). The Strengths and Difficulties Questionnaire is comprised of 25 statements which are scored on a three-point scale (not true, somewhat true, or certainly true). The questionnaire yields five subscales, which measure emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour (five items each). The first four subscales generate a difficulties score and a prosocial, strength score (Goodman, 1997). The reported Cronbach's alpha for the subscales equals .80 or greater for the difficulties subscales and .73 overall (Goodman, 2001).

Self-Regulation Assessment Tool (S-RAT). The S-RAT is comprised of twenty statements scored on a four-point scale. Fifteen items are scored on a four-point scale, including not yet, with support from adults, with some independence, on his/her own. The remaining five items used a four point scale of not true, somewhat true, mostly true, and very true. Teachers used the prompt, "compared to the typically developing child, rate the following statements for the student being assessed" to make their assessments. This measure was developed locally by the Waterloo Region District School Board, mental health unit in collaboration with researchers at Wilfrid Laurier University.¹

¹ The S-RAT was designed primarily as a tool to detect significant social concerns and was administered at only one of the sites. With such a small sample size and specific target audience, it could not be used to discriminate among children in the present sample.

Parent workshops. Four workshops were offered to the parents of the kindergarten students at each school involved in the study. General information about the workshops was conveyed through flyers sent home with each child and emails were sent to those parents who had provided email contact information to the researchers. Workshops were offered after pre-testing and before post-testing, at approximately one-month intervals. Each workshop was approximately one hour in duration and consisted of an interactive PowerPoint presentation with accompanying activities and discussion points interspersed throughout. Parents were encouraged to participate in the discussions and ask questions. Workshop content varied by condition (reading, reading plus technology, and social), but was consistently organized in such a way as to cover typical developmental trajectories. Workshops for schools assigned to the reading condition covered topics such as shared reading, phonological awareness, meta-linguistic awareness, and building vocabulary (see Appendix B for a more detailed summary of content and interactive activities). Workshops for the reading plus technology condition covered the topics included in the reading condition plus topics such as Internet safety, navigational design for children's reading software, assessing early reading software programs for content and age/skill appropriateness, evaluating children's reading software design, and setting boundaries for technology use. Finally, the four social workshops covered topics such as identifying and expressing emotions appropriately, self-awareness, understanding others, responsible decision-making and foundations for building healthy relationships (See Appendix B for a summary table of topics by workshop condition and session; see read.piplearning.ca, tech.piplearning.ca, and social.piplearning.ca for a complete summary of each program). Interactive activities were varied. For example, in the reading condition workshops, parents reviewed children's books to evaluate content, for example rhyming books to better understand simple and more complex rhymes and alphabet books to see firsthand good versus poor examples of introduction to letter sound correspondence. In the technology condition, parents had an opportunity to explore high quality games first hand. In the social condition,

parents played charades to guess emotions to learn how verbal, physical and behavioural information are all foundations that need to be taught about emotions. Overall, activities engaged parents directly with topics being introduced and gave parents activities that they could later engage in with their child(ren).

Brochures. At each parent workshop, parents were provided with a small (one-page, double-sided) brochure that covered the main topics of the presentation, included reminders of activities they could do with their children, and provided links to additional resources (See Appendix C for a sample brochure and read.piplearning.ca, tech.piplearning.ca, and social.piplearning.ca for the full set of brochures).

Parent surveys. Immediately after each workshop, parents were asked to complete a brief (one-page) survey regarding their opinions on the quality and usefulness of the workshop. The survey for the first workshop in all conditions was identical and asked parents six questions. The first question identified the child's gender followed by the parent's gender and the parent's ability to understand, speak, read, and write in English. This was followed by two open-ended questions, asking for feedback about the quality of the presentation and potential topics for future presentations and a five-point Likert-type scale assessing the usefulness of the session (with anchors 1 = not at all useful and 5 = very useful). Subsequent surveys asked parents whether they had attended previous workshops, read brochures from or visited the websites for previous workshops, as well as content questions from the previous workshop(s). Parents were also asked the five-point Likert-type scale assessing usefulness and the open-ended question regarding potential improvements for subsequent presentations. In addition, within each condition, parents were asked whether they had engaged in activities specific to content delivered (depending on condition; See Appendix D for a sample of the reading surveys for each session).

Websites. Websites were developed for each condition (reading, reading & technology, and social) with information regarding early development specific to each of the conditions, links to copies of the brochures, short 10 minute videos summarizing the workshop topics, and links to additional resources (See the following websites: read.piplearning.ca, tech.piplearning.ca, and social.piplearning.ca). Access to these websites was provided free of charge for all parents and teachers participating in the research study. Reminders to use the websites and web addresses were provided during presentations and through the brochures. Number of visitors to each website was recorded automatically through the web software.

Procedure

This study involved parents, children, and teachers. Consent forms and flyers advertising the study were sent home and posted around the schools where principals had agreed to participate in the study. Parents completed and handed in the consent form and the pre-test demographic survey prior to their child's participation in the study. Parents were invited to attend each of the four workshops based on the condition assigned to their child's school. Workshops were typically one hour in length and offered once per month over a four month period after pre-testing of the children and before post-testing of the children. The four workshops dealt with one of the three topics (reading, reading plus technology, or social). Workshops were offered at varying times depending on the preferences of parents and the schools with most being offered immediately after school and later in the evening. Two opportunities were provided to attend each workshop at each school. Parents were notified about the workshops by emails and letters sent home prior to each workshop. Two developmental/educational psychologists delivered the workshops. In the presentations, they also identified concrete activities parents could use to engage their children in literacy or social-emotional skills at home. While the parents attended workshops, trained undergraduate and/or graduate students engaged children in

activities and crafts in another room. At the end of each workshop, parents were asked to complete the corresponding post-workshop survey.

Depending on the measure, children were tested individually or in small groups. All testing was carried out either during instructional hours, after-school, or during professional development days and occurred at the child's school or at Wilfrid Laurier University, depending on the preferences of the principals, teachers, and parents. Pretesting took approximately one and a half hours to complete, and the measures were completed in random order. All measures were conducted individually, except for the GRADE, which was sometimes administered in small groups. Children were provided with stickers for completing different elements of the pretesting battery. Baseline assessment (in kindergarten) and long-term follow-up (in grade 1) typically occurred early in the school year and post-testing or immediate follow-up occurred near the end of the school year (in kindergarten). Protocols for post-testing and long-term follow-up paralleled protocols for pre-testing.

Teachers were asked to complete the two social measures at pre- and post-testing intervals. Teachers completed these on their own time and received a small monetary compensation for their participation.

Results

Two aspects of the data were examined. Consistent with the hypotheses, children's social and academic performance outcomes were assessed for children in each of the three conditions (reading, reading plus technology, and social). Academic outcome measures included the following: the DIBELS word use fluency, phoneme segmentation fluency, initial sound fluency, and letter naming fluency subtests, the CTOPP phoneme blending and rapid digit naming subtests, the WRAT word reading and mathematics subtests, and the GRADE. Social outcome measures included SDQ and S-RAT.

In addition to these primary analyses examining children's performance outcomes, descriptive summaries of parental attitudes toward the workshop interventions and use of content specific materials

provided at the workshops, in brochures, and on the websites were examined. Qualitative analyses were conducted on parental responses to open-ended survey questions, using an open-coding methodology, however, given the limited number of responses provided by parents, these analyses were exploratory.

Hypotheses One and Two

Analyses relevant to hypotheses one and two were conducted simultaneously through three sets of two multivariate analyses of variance. Differences in performance between children whose parents attended workshops versus those who did not were assessed at the beginning of kindergarten to assess baseline performance, the end of kindergarten to evaluate performance immediately following the workshops, and at the beginning of grade 1 to examine long-term outcomes. Comparisons within each analysis were made among participants in the three parent training conditions (reading, reading plus technology, and social skills training). Three 2 (Attendance) X 3 (Condition) MANOVAs were conducted. Both attendance and condition served as between-subjects factors. The first two MANOVAs examined social outcomes for each of the two social measures separately. The dependent variables for one analysis included the five subscales of the Social Difficulties Questionnaire (i.e., emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial). The dependent measures for the second MANOVA included the three subscales for the S-RAT (socio-emotional, cognitive, and excessive negative emotions; only for post-test and long-term follow-up). These two social measure MANOVAs were conducted separately due to overlap in some of the items within each of the scales. The third MANOVA assessed academic outcomes. Dependent variables for this third MANOVA included the 13 cognitive-linguistic measures assessed at the end of Kindergarten (DIBELS phoneme segmentation fluency, WRAT reading, GRADE listening comprehension, GRADE reading, CTOPP rapid digit naming, CTOPP blending, DIBELS initial sound fluency, DIBELS letter naming fluency, DIBELS word use fluency, WRAT math, GRADE phonological awareness, GRADE early literacy, and GRADE phoneme grapheme correspondence) and the 11 cognitive-linguistic measures in Grade 1 (the

age-appropriate versions of same six variables listed first for kindergarten set, as well as GRADE word meaning, GRADE vocabulary comprehension, WJ pseudo-word reading, WJ spelling, and Fry's word list). Outcomes for each hypothesis are presented separately below. Comparisons involving the CTOPP rapid digit naming and CTOPP phoneme blending were not possible for analyses involving kindergarten data as a result of too few cases being available.

The following results should be interpreted with caution, as the majority of parents who consented for their child(ren) to take part in the study, did not attend any of the workshops that were offered (76.9%). For the small subset of those that did attend (23.1 % of the sample), most only attended one of the four workshops that were offered (see Table 3) and the parents who did attend, the highest attendance was for the first workshop (17.4 % of the sample; see Table 4). Due to this low attendance outcome and the variability in attendance across workshops, it was decided that the attendance condition should be a dichotomous variable of parents having attended at least one workshop versus not having attended any of the workshops. This decision was made because, due to workshop data being collected in such a way as to allow for anonymity, we were unable to track individuals across sessions. Furthermore, the numbers of attenders versus non-attenders were not stable across the sessions to allow us to analyze by session. All subsequent analyses are conducted with attendance as a function of having attended at least one workshop session.

Hypothesis One

To examine whether performance scores would be higher among students whose parent(s) attended at least one of the instructional workshops provided as part of the study than students whose parents did not attend any of the workshops, comparisons were made as a function of parental attendance for each of the social and cognitive-linguistic outcome measures respectively. In addition, performance was assessed at three points in time, first at the beginning of kindergarten to assess

baseline performance, second at the end of kindergarten as an immediate follow up to the intervention, and then at the beginning of grade 1 as a long-term follow-up.

Social measures.

Baseline assessment. Using Pillai's Trace criterion to compare performance for the SDQ subscales, at pre-test, there was no significant main effect for attendance nor was the interaction of attendance by condition significant, largest $F(2,202) = 1.40$, $p = .179$ for the interaction of attendance by condition (see Table 5 for means).

Immediate follow-up. Using Pillai's Trace criterion to compare the SDQ subscales, at immediate follow-up, there was no significant main effect for attendance nor was the interaction of condition by attendance significant, largest $F(2,202) = 1.11$, $p = .353$ for the interaction of condition by attendance (see Table 5 for means). Similarly, there was no significant main effect of attendance for the S-RAT subscales, $F(3,60) = .367$, $p = .777$, and the interaction could not be conducted due to low sample size.

Long-term follow-up. Using Pillai's Trace criterion, the multivariate analysis examining the SDQ subscales indicated no main effect for attendance at long term follow-up, $F(5,295) = 1.625$, $p = .153$ nor was there a significant interaction, $F(10,592) = 1.046$, $p = .403$ (see Table 5 for descriptive information). Similarly, there was no significant main effect of attendance for the S-RAT subscales, $F(3,53) = 2.14$, $p = .106$, and the interaction could not be conducted due to low sample size.

In summary, evidence of differences in the social development of children based on parental attendance to instructional workshops was not evident at baseline assessment, immediately following the workshop presentations, or by long-term follow-up in grade 1.

Cognitive-linguistic measures.

Baseline assessment. Using Pillai's Trace criterion, the multivariate analysis for the baseline cognitive-linguistic assessment indicated a significant main effect of attendance, $F(1,241) = 2.32$, $p =$

008. The attendance by condition interaction was not significant, $F(2,241) = 1.30$, $p = .154$. Subsequent analyses of performance as a function of attendance, indicated significant main effects for DIBELS word use fluency, $F(1,241) = 4.74$, $p = .030$, CTOPP blending, $F(1,241) = 7.15$, $p = .008$, and GRADE listening comprehension, $F(1,241) = 4.12$, $p = .043$. There were no significant effects as a function of attendance for any of the other measures, largest $F(1,241) = 3.10$, $p = .079$ for the phonological awareness GRADE score. Specifically, children of parents who attended at least one workshop had lower performance outcomes on the DIBELS word use fluency, CTOPP blending, and GRADE listening comprehension ($M = 16.28$, $M = 14.35$, $M = 3.92$) than those of parents who did not attend ($M = 22.44$, $M = 17.39$, $M = 4.40$, respectively; see Table 6 for descriptive information). These outcomes suggest that parents who subsequently elected to attend workshops were those who may have observed some challenges being faced by their children.

Immediate follow-up. Using Pillai's Trace criterion, the multivariate analysis for the immediate cognitive-linguistic assessment indicated a significant main effect for attendance, $F(1,401) = 3.55$, $p < .001$, potentially qualified by a marginally significant condition by attendance interaction, $F(2,401) = 1.54$, $p = .055$. Given the main effect was significant, univariate analyses were conducted for the main effect first, as this main effect addresses the impact of attendance directly. Subsequent exploratory analysis of the interaction is presented in the section examining hypothesis two below.

Univariate analyses for attendance, indicated significant main effects for four cognitive-linguistic measures: DIBELS initial sound fluency, $F(1,401) = 5.30$, $p = .022$, WRAT reading, $F(1,401) = 3.96$, $p = .047$, GRADE listening comprehension, $F(1,401) = 7.38$, $p = .007$, and GRADE phoneme grapheme correspondence, $F(1,401) = 5.28$, $p = .022$. There were no significant effects as a function of attendance for any of the other measures, largest $F(1,401) = 2.32$, $p = .129$ for the DIBELS phoneme segmentation fluency score. Specifically, children of parents who attended at least one workshop had higher performance outcomes on the DIBELS initial sound fluency, GRADE listening comprehension,

and GRADE phoneme grapheme correspondence measures ($M = 24.84$, $M = 4.73$, $M = 5.58$) than those of parents who did not attend ($M = 21.05$, $M = 4.23$, $M = 5.08$, respectively). Interestingly, although attending parents at baseline were indicative of children whose performance scores were lower on measures such as word fluency, blending, and listening comprehension, by immediate follow-up, these same children were outperforming their peers for related measures of initial sound fluency and listening comprehension. However, children of parents who attended at least one workshop had lower performance outcomes on the WRAT reading measure ($M = 89.27$) than those of parents who did not attend ($M = 93.01$; see Table 6 for descriptive information).

Long-term follow-up. Using Pillai's Trace criterion, the multivariate analysis indicated a significant main effect for attendance, $F(1,359) = 1.87$, $p = .043$, at long term follow-up. There was no significant attendance by condition interaction, $F(2,359) = 1.10$, $p = .344$. Subsequent univariate analyses of performance as a function of attendance, indicated significant main effects for the GRADE listening comprehension measure, $F(1,359) = 10.35$, $p = .001$, and a trend for the Woodcock Johnson pseudo-word reading scores, $F(1,359) = 3.75$, $p = .054$. Specifically, children of parents who attended at least one workshop had higher performance outcomes on the GRADE listening comprehension measure ($M = 4.61$) than those of parents who did not attend ($M = 3.85$). Additionally, the trend for the WJ pseudo-word reading measure also supported an advantage for children of parents who attended ($M = 109.62$) over those children whose parents did not attend ($M = 105.99$). None of the remaining cognitive-linguistic measures yielded significant differences as a function of parental attendance, largest $F(1,359) = 2.37$, $p = .125$, for the phoneme blending score for the CTOPP (see Table 6).

In summary, only a few differences in cognitive-linguistic performance were detected between children of attenders and non-attenders at each time point. However, an important pattern was observed over the three time intervals. Initially attending parents represented children who were found to have lower scores at baseline. These children showed mixed outcomes at immediate post-test with some

gains in measures similar to those where they showed earlier challenges but ongoing difficulty in additional reading measures. At long term post-testing these children showed no deficits in performance relative to their peers, but did show some improvements.

Hypothesis Two

The first component of hypothesis two examined whether cognitive-linguistic performance scores would be higher for students in the reading and the reading plus technology conditions than those in the social condition and whether students in the social condition would outperform students in the reading and the reading plus technology condition in measures of social skill development. The second component of hypothesis two examined whether social skills training, as a foundation for all skill development, would lead to no significant differences among the three groups for the cognitive-linguistic measures. The three 2 (Attendance) X 3 (Condition) MANOVAs described above were used to assess these hypotheses.

Social measures.

Baseline assessment. Using Pillai's Trace criterion, the multivariate analyses of the pre-test SDQ social measure, there was no significant main effect for condition nor was the interaction of attendance by condition significant for either measure, largest $F(2,202) = 1.40, p = .179$ for the interaction of attendance by condition for the SDQ. This lack of difference at baseline supports the random assignment procedures.

Immediate follow-up. Using Pillai's Trace criterion, the multivariate analyses of the post-test SDQ social measure, at immediate follow-up, there was no significant main effect for condition nor was the interaction of attendance by condition significant, largest $F(2,202) = 1.11, p = .353$ for the interaction of condition by attendance. Similarly, there was no significant main effect of condition for the S-RAT subscales, $F(6,122) = .928, p = .478$, and the interaction could not be conducted due to low sample size (see Table 7 for descriptive information).

Long-term follow-up. For long term follow-up, using Pillai's Trace criterion, the multivariate analysis indicated a significant main effect for condition, $F(10,592) = 2.01, p = .03$, and no interaction. Subsequent univariate analyses yielded significant main effects for two of the five subscales of the SDQ: the conduct problems subscale, $F(2,305) = 3.09, p = .047$, and the prosocial subscale, $F(2,305) = 6.66, p = .001$. The hyperactivity subscale showed marginal significance, $F(2,305) = 2.80, p = .063$. There were no significant main effects of condition for the remaining two social measures (peer problems or emotional symptoms, largest $F(2,305) = 2.28, p = .104$).

Post-hoc Tukey-b comparisons for the conduct problems and hyperactivity subscales indicated that children whose parents received the reading plus technology training demonstrated higher conduct problem scores ($M = 1.67$) and hyperactivity scores ($M = 4.09$) than those in whose parents received the reading only instruction ($M = 1.37; M = 3.35$, respectively). In addition, the reading plus technology differed from both the socio-emotional and shared reading conditions on reports of prosocial behaviour and these did not differ from each other, with children in the reading and technology condition scoring lowest on the prosocial scale ($M = 7.26$) compared to their peers in the reading ($M = 8.77$) and socioemotional ($M = 8.35$) conditions (see Table 7 for descriptive information).

Comparisons among conditions for the S-RAT measure yielded a main effect of condition using Pillai's Trace criterion, $F(6,108) = 2.49, p = .027$. Subsequent post hoc Tukey's comparisons did not indicate significant differences between any groups, however, therefore the more liberal LSD comparisons were conducted and these indicated that scores on the excessive negative emotions subscale were higher (indicating better behaviour) for those in the socio-emotional condition ($M = 15.38$) than for students in the reading plus technology condition ($M = 13.90$). The sample was too small to analyze the attendance by condition interaction (see Table 7 for descriptive information).

In summary, evidence of differences in the social development of children based on training condition of the instructional workshops was not evident at baseline assessment or immediately

following the workshop presentations. However, by long-term follow-up in grade 1, evidence of differences in measures of social development emerged among children of parents in the different training conditions (reading, reading plus technology, and social), with children of parents selected to receive the reading plus technology instructional workshops having poorer scores on these measures relative to children of parents who were selected to receive the reading only instruction. The socio-emotional instruction group generally demonstrated either equivalent or greater social development compared to the reading and reading plus technology groups.

Cognitive-linguistic measures.

Baseline assessment. At pre-test, there was no significant main effect of condition, nor a significant interaction of attendance by condition, Pillai's Trace, largest $F(2,241) = 1.30, p = .154$. Again, this lack of difference at baseline supports the random assignment procedures.

Immediate follow-up. Using Pillai's Trace criterion, the multivariate analysis for the immediate cognitive-linguistic measures indicated significant main effects for condition, $F(2,401) = 2.46, p < .001$, potentially qualified by a marginally significant condition by attendance interaction, $F(2,401) = 1.54, p = .055$. Given the main effect was significant, univariate analyses were conducted for the main effect first, followed by exploratory analyses of the interaction. Subsequent univariate analyses of the scores as a function of condition, indicated significant main effects for DIBELS letter naming fluency, $F(2,401) = 9.66, p < .001$, WRAT reading, $F(2,401) = 4.07, p = .018$, WRAT math, $F(2,401) = 3.01, p = .050$, GRADE reading, $F(2,401) = 8.71, p < .001$, GRADE phonological awareness, $F(2,401) = 6.15, p = .002$, GRADE early literacy skills, $F(2,401) = 4.77, p = .009$, and a trend toward significance for the phoneme grapheme correspondence score of the GRADE, $F(2,401) = 2.81, p = .061$. There were no significant effects for DIBELS initial sound fluency, DIBELS phoneme segmentation, DIBELS word use fluency, or GRADE listening comprehension, largest $F(2,401) = 1.81, p = .164$ for the DIBELS initial sound fluency measure.

Post-hoc Tukey-b comparisons indicated that for the DIBELS letter naming fluency, WRAT reading, GRADE reading, GRADE phonological awareness, and GRADE early literacy skills subtests, children in the socio-emotional condition ($M = 42.66$, $M = 95.80$, $M = 5.45$, $M = 4.83$, $M = 5.11$) outperformed students in both the reading only ($M = 32.89$, $M = 90.19$, $M = 4.67$, $M = 4.13$, $M = 4.57$) and reading plus technology ($M = 33.38$, $M = 89.58$, $M = 4.48$, $M = 4.09$, $M = 4.30$) conditions. The reading only and reading plus technology conditions did not differ from each other (see Table 8).

For the WRAT math subtest, post-hoc Tukey-b comparisons indicated that children in the socio-emotional condition ($M = 92.44$) scored higher than those in reading plus technology condition ($M = 88.68$). The reading only condition ($M = 91.88$) did not differ from either the reading plus technology or socio-emotional conditions. The trend toward significance for the phoneme grapheme correspondence subtest of the GRADE also supported this pattern, with students in the socio-emotional condition ($M = 5.58$) outperforming those in the reading plus technology condition ($M = 5.01$) and the reading only condition ($M = 5.13$) not differing from either the socio-emotional or the reading plus technology conditions (see Table 8).

Exploration of the trend toward the significant interaction of attendance by condition indicates for the DIBELS letter naming fluency subtest, $F(2,401) = 3.99$, $p = .019$, participants in the social condition, both attenders ($M = 38.79$) and non-attenders ($M = 44.75$), outperformed those in both the reading only and reading and technology conditions. However, for students in the reading only condition, those of workshop-attending parents ($M = 36.92$) scored higher than those of non-attenders ($M = 30.91$). Interestingly, for students in the reading plus technology condition, students of non-attending parents ($M = 35.20$) outperformed those students of parents who attended at least one workshop ($M = 27.70$), but the mean score for participants in the non-attending, reading plus technology group was still lower than that of the reading only, attending group (see Figure 1). For the DIBELS word use fluency subtests, $F(2,401) = 4.45$, $p = .012$, students in the reading only condition

scored higher on this measure if their parent attended at least one workshop ($M = 27.10$) than if they didn't attend ($M = 23.23$). For students in the social condition, students of non-attenders ($M = 31.52$) outperformed those of attenders ($M = 20.98$). Students in the reading plus technology condition performed similarly whether their parents were attenders ($M = 22.59$) or non-attenders ($M = 23.57$; see Figure 2). In general, the social group, whether attenders or not outperformed the reading and the reading plus technology groups on the DIBELS letter naming and word use fluency subtests.

Long-term follow-up. Using Pillai's Trace criterion for the long-term follow-up cognitive-linguistic measures, there was a significant main effect for condition, $F(2,359) = 1.76, p = .018$, but no significant interaction, $F(2,359) = 1.10, p = .344$. Subsequent univariate analyses of the scores as a function of condition, indicated significant main effects for WRAT reading, $F(2, 359) = 3.53, p = .030$, WJ spelling, $F(2,359) = 6.19, p = .002$, Fry's word list, $F(2,359) = 6.07, p = .003$, GRADE listening comprehension, $F(2,359) = 3.06, p = .048$, GRADE reading, $F(2,359) = 3.33, p = .037$, GRADE word meaning, $F(2,359) = 5.96, p = .003$, GRADE vocabulary comprehension, $F(2,359) = 4.66, p = .010$. There were no significant effects for DIBELS phoneme segmentation, CTOPP phoneme blending, CTOPP rapid digit naming, or WJ pseudo-word reading, largest $F(2,359) = 2.79, p = .063$ for the CTOPP phoneme blending score.

Post-hoc Tukey-b comparisons for the cognitive-linguistic variable meeting statistical significance in the cognitive-linguistic measures indicated that children in the socio-emotional condition scored higher on the WRAT reading measure, Fry's word list, GRADE listening comprehension, and GRADE reading ($M = 91.00, M = 8.78, M = 4.51, M = 4.08$) than those in the reading and technology condition ($M = 84.75, M = 5.62, M = 3.64, M = 3.39$). The reading only condition ($M = 87.44, M = 7.00, M = 4.08, M = 3.90$) did not differ from either the reading plus technology or socio-emotional conditions. For the WJ spelling, GRADE word meaning, and GRADE vocabulary comprehension, children in the socio-emotional ($M = 105.46, M = 4.21, M = 3.79$), and

reading only conditions ($M = 102.87$, $M = 3.94$, $M = 3.61$) outperformed students in the reading plus technology condition ($M = 98.65$, $M = 3.30$, $M = 2.96$) and the reading only and socio-emotional conditions did not differ from each other (see Table 8 for descriptive information).

In summary, evidence of differences in the cognitive-linguistic development of children based on training condition of the instructional workshops was not evident at baseline assessment. Therefore, there was no initial advantage across conditions for the cognitive-linguistic assessments. However, when assessed shortly after the workshop presentations, evidence of differences in measures of cognitive-linguistic development emerged among children in the different training conditions (reading, reading plus technology, and social), with children of parents selected to receive the socio-emotional instructional workshops demonstrating higher performance on these measures relative to children of parents who were selected to receive the reading plus technology instruction. The socio-emotional instruction group generally demonstrated either equivalent or greater scores on these cognitive-linguistic measures in comparison to the reading only group, with the reading group either performing at the same level or greater than the reading plus technology group. The interaction indicated that although the social group outperformed the other two groups, students in the reading only group performed better if their parent(s) attended at least one workshop. These same patterns emerged at long term follow-up, with the social group showing an advantage on the cognitive-linguistic measures and the reading plus technology group showing a disadvantage across all significant measures both immediately following the workshops and at long-term follow-up.

Hypothesis Three

To examine whether developmental gains in both academic and social skills would exceed baseline scores immediately following the workshop presentations and at long-term follow-up, comparisons were made as a function of parental attendance and condition for each of the social and cognitive-linguistic outcome measures at each of the three testing times, respectively.

In order to compare across time to assess this hypothesis, a series of eleven 2 (Attendance) X 3 (Condition) X 3 (Time) mixed-model repeated measures ANOVAs was conducted for each of the measures that was assessed at all three time points. For these analyses, attendance and condition served as between-subjects factors and time served as a within subjects factor. The dependent variables included the five subscales of the Social Difficulties Questionnaire (i.e., emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial), DIBELS phoneme segmentation fluency,² WRAT reading, GRADE listening comprehension, GRADE reading, CTOPP rapid digit naming, and CTOPP blending. It is important to note that the SDQ subscales, CTOPP rapid digit naming, and CTOPP blending had too few cases to analyze, and thus were not included in these analyses across the three time periods.

Social measures. For each of the social assessments, the sample size included at least one cell with less than ten cases in it, therefore, these subscales could not be assessed over the three time periods (see Appendix E for exploratory analyses of SDQ subscales conducted with $n < 10$).

Cognitive-linguistic measures.

Overall models. Using Pillai's Trace criterion, the model for the DIBELS phoneme segmentation fluency indicated a significant main effect of time, $F(2,330) = 150.86, p < .001$, qualified by significant time by attendance, $F(2,330) = 4.04, p = .018$, and time by condition, $F(4,662) = 2.89, p < .022$, interactions. There was no significant main effect of attendance or condition for this measure. The model for the WRAT reading also indicated a significant main effect of time, $F(2,333) = 13.53, p < .001$, as well as condition, $F(2,334) = 3.09, p = .047$, but not for attendance, or the interactions. The listening comprehension subscale of the GRADE showed a significant main effect of time, $F(2,336) =$

² There is an 8 point difference for maximum potential score on the grade 1 version of the DIBELS phoneme segmentation fluency as compared to the kindergarten version, but no student at long-term follow-up exceed the maximum potential score for the kindergarten version of the same measure. Therefore the potential for an additional 8 points for this measure did not afford an advantage at long-term follow-up.

24.82, $p < .001$, which was qualified by a significant time by attendance interaction, $F(2,336) = 7.39$, $p = .001$. There was no significant main effect of attendance or condition for the GRADE listening comprehension subtest. The model for the GRADE word reading subscale showed significant main effects of time, $F(2,333) = 58.28$, $p < .001$, and condition, $F(2,334) = 6.76$, $p = .001$. There was no main effect of attendance, nor any significant interactions for this measure (see Table 9 for means).

Time effects. For the DIBELS phoneme segmentation fluency subtest, post-hoc comparisons for the main effect of time indicated that scores increased significantly from baseline ($M = 16.31$) to immediate follow-up ($M = 27.36$) and again from immediate to long-term follow-up ($M = 30.44$). However, for the WRAT reading, GRADE listening comprehension, and GRADE reading measures, post-hoc comparisons for the main effect of time indicated that scores increased significantly from baseline ($M = 88.19$, $M = 3.92$, $M = 4.19$) to immediate follow-up ($M = 91.74$, $M = 4.45$, $M = 4.88$), but decreased from immediate to long-term follow-up ($M = 89.50$, $M = 4.19$, $M = 3.99$, respectively). There was no significant increase between baseline assessment and long-term follow-up scores for the WRAT reading or GRADE reading assessments ($p = .264$ and $p = .209$, respectively).

Condition effects. Consistent with the previous analyses for hypothesis two, for both the WRAT reading and GRADE reading assessments, post-hoc Tukey-b comparisons for the main effect of condition indicated that word reading scores for children in the social condition ($M = 93.13$, $M = 4.84$) were higher than those for children in the reading only ($M = 88.11$, $M = 4.08$) and reading plus technology ($M = 87.82$, $M = 4.08$) conditions, with no differences between the reading and reading plus technology conditions.

Attendance effects. Using Pillai's Trace criterion, the models for DIBELS phoneme segmentation fluency, WRAT reading, GRADE listening comprehension, and GRADE reading indicated no significant main effects of attendance for any of the cognitive-linguistic measures, largest $F(1,334) = 3.11$, $p = .079$.

Interactions.

Time by Attendance effects. The pattern of outcomes for the time by attendance interaction for the DIBELS phoneme segmentation fluency (see Figure 3) and GRADE listening comprehension (see Figure 4) measures were similar. Specifically, in both attendance conditions (attending or not attending), participants increased scores from baseline to immediate to long-term follow-up (DIBELS phoneme segmentation fluency: $M = 14.93$, $M = 29.04$, $M = 30.79$ vs. $M = 16.91$, $M = 26.62$, $M = 30.29$; GRADE listening comprehension: $M = 3.96$, $M = 4.29$, $M = 4.03$ vs. $M = 3.82$, $M = 4.81$, $M = 4.56$ for attenders and non-attenders, respectively). However, the pattern of performance for the children of parents who attended at least one workshop showed lower performance at baseline, but higher performance at immediate and long-term follow up as compared to children of non-attenders.

Time by Condition effects. For DIBELS phoneme segmentation fluency, the interaction of time by condition (see Figure 5) indicates that in all three training conditions (reading, tech, and social), participants increased scores from baseline to immediate to long-term follow-up ($M = 16.68$, $M = 29.46$, $M = 30.29$ vs. $M = 15.75$, $M = 27.36$, $M = 28.25$ vs. $M = 16.55$, $M = 25.70$, $M = 32.68$ for reading, tech, and social, respectively). The interaction occurs at immediate follow-up where the technology condition surpasses social, but is lower than reading, but at long-term follow up, the social condition surpasses both the reading only and reading plus technology conditions.

In summary, gains in academic development exceeded baseline scores immediately following the workshop presentations. Long-term follow-up scores typically decreased from scores at immediate follow-up, but only differed significantly in a few measures suggesting some maintenance of skill development over time.

Hypothesis Four

To explore the impact of parental attendance on the magnitude of developmental gains relative to the timing of the parental intervention, comparisons were made for the proportion of increase in

performance evident immediately following the workshop presentations and at long-term follow-up relative to baseline performance. An exploratory analysis was also conducted for the proportion of increase at long-term follow-up relative to immediately following the workshop presentations.

Comparisons were made using three sets of difference scores to calculate the relative increases in performance across each of the three assessment time points (baseline, immediate follow-up, and long-term follow-up). In order to compare across each of the three time points with respect to each other, difference scores were calculated for each of the social and cognitive-linguistic outcome measures that were assessed at all three time points. For the social outcome measures, this included the five subscales of the Strengths and Difficulties Questionnaire (emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial). For the cognitive-linguistic outcome measures, this included the DIBELS phoneme segmentation fluency, WRAT word reading, GRADE listening comprehension, GRADE reading, CTOPP rapid digit naming, and CTOPP blending subtests.

The first set of difference scores was calculated by subtracting the outcome score at baseline assessment from the outcome score of the same measure assessed at immediate follow-up. The second set of difference scores was calculated by subtracting the outcome score at baseline assessment from that of the same measure assessed at long-term follow-up. The last set of difference scores was calculated by subtracting the outcome score at immediate follow-up from that of the same measure assessed at long-term follow-up. Increases in performance were indicated by positive means for the DIBELS phoneme segmentation fluency, WRAT word reading, GRADE listening comprehension, GRADE reading, CTOPP blending, and prosocial subscale of the SDQ and negative means for the CTOPP rapid digit naming subtest and emotional symptoms, conduct problems, hyperactivity, and peer problems subscales of the SDQ, as lower scores on these measures correspond to increases in performance (i.e., faster naming of digits and lower behavioural difficulties).

In order to compare the proportion of increase in performance across each of the three time points, as a function of parental attendance, a series of One-Way ANOVAs was conducted. Parental attendance (to at least one of the workshops) served as the between-subjects factor for these analyses. The dependent variables included the five subscales of the Social Difficulties Questionnaire (i.e., emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial), DIBELS phoneme segmentation fluency, WRAT word reading, GRADE listening comprehension, GRADE reading, CTOPP rapid digit naming, and CTOPP blending.

For the comparisons across each of the three time points relative to each other, 63 % of the sixty means indicated increases in performance, with the remaining 37 % indicating declines. From baseline assessment to immediate follow-up, eighteen of the twenty means indicated increases, whereas from baseline to long-term follow-up, six of the twenty means indicated declines. Fourteen of the twenty means indicated declines in performance from immediate to long-term follow-up (see Table 10 for the social and cognitive-linguistic means).

Social measures. The ANOVA examining the influence of attendance for the emotional symptoms subscale of the SDQ revealed a significant main effect of attendance for the magnitude of increase from baseline assessment to immediate follow-up, $F(1,118) = 5.97, p = .016$. Specifically, children of non-attenders demonstrated a greater increase in emotional symptoms from baseline to immediate follow-up ($M = .22$) than did children of attenders ($M = -.60$). There was no significant main effect of attendance from either baseline or immediate follow-up to long-term follow-up for the emotional symptoms subscale, largest $F(1,133) = 1.22, p = .272$ (see Table 10 for means).

Additionally, the ANOVA examining the influence of attendance for the SDQ prosocial subscale revealed a significant main effect of attendance for the magnitude of increase from immediate to long-term follow-up, $F(1,144) = 5.04, p = .026$. Specifically, children of attenders ($M = .31$) demonstrated a greater increase in prosocial behaviour from post-test to long-term follow-up than did children of non-

attenders ($M = -.64$). There was no significant main effect of attendance from either baseline assessment or immediate follow-up to long-term follow-up for the prosocial subscale, largest $F(1,135) = .213, p = .645$. The remaining One-Way ANOVA's revealed no significant main effects of attendance for the magnitude of increase on the SDQ conduct problems, hyperactivity, or peer problems subscales across any of the three time periods, largest $F(1,133) = 3.43, p = .066$ for the conduct problems subscale.

In summary, children of parents who attended at least one of the workshop presentations showed a decrease in emotional symptoms from baseline assessment to immediate follow-up, whereas non-attenders showed an increased in reported emotional symptoms from baseline to immediately after the workshop presentations. Additionally, children of attending parents showed an increase in prosocial behaviour at long-term follow-up relative to performance immediately after the workshops, whereas children of non-attenders showed a decrease in prosocial behaviour between those two time points. Therefore, where improvements in social behaviour were evident, children of parents who attended at least one instructional workshop demonstrated advantages compared to those children of parents who did not attend.

Cognitive-linguistic measures. The ANOVA examining the influence of parental attendance revealed a significant main effect of attendance for the magnitude of increase on the GRADE listening comprehension and DIBELS phoneme segmentation fluency subtests from baseline assessment to immediate follow-up, $F(1,388) = 15.39, p < .001$ and $F(1,382) = 8.98, p = .003$, respectively (see Table 10 for means). Specifically, children of attenders demonstrated a greater increase from baseline to immediately after the workshop presentations on both the GRADE listening comprehension and DIBELS phoneme segmentation fluency measures ($M = .08, M = 13.65$) than did children of non-attenders ($M = .02, M = 9.11$, respectively).

The ANOVA examining the influence of parental attendance revealed a significant main effect of attendance for the magnitude of increase on the GRADE listening comprehension and CTOPP phoneme blending subtests from pre-test to long-term follow-up, $F(1,345) = 5.13, p = .024$ and $F(1,232) = 23.06, p < .001$, respectively. Specifically, children of attenders demonstrated a greater increase on the CTOPP phoneme blending scores and a lesser decrease in listening comprehension scores from pre-test to long-term follow-up ($M = .07, M = -.01$) than did children of non-attenders ($M = -.09, M = -.05$). There was no significant main effect of attendance from either pre-test to post-test or from post-test to long-term follow-up, largest $F(1,83) = .297, p = .587$.

The series of One-Way ANOVAs examining the influence of parental attendance revealed no significant main effect of attendance for the magnitude of increase on the WRAT reading, GRADE reading, or CTOPP rapid digit naming subtest over the three time periods (baseline assessment to immediate follow-up, baseline assessment to long-term follow-up, immediate follow-up to long-term follow-up), largest $F(1,308) = 2.49, p = .116$ for the CTOPP rapid digit naming subtest. Additionally, no significant effect of attendance was evident for the GRADE listening comprehension subtest from immediate to long-term follow-up, largest $F(1,379) = 1.11, p = .293$, nor was a significant effect of attendance evident for the DIBELS phoneme segmentation fluency measure at long-term follow-up relative to either baseline or immediate follow-up, largest $F(1,339) = 2.18, p = .141$.

In summary, where increases in cognitive-linguistic development were evident from pre- to post-test, children of parents who attended at least one workshop showed greater increases than non-attenders. Additionally, children of parents who attended at least one workshop also had a greater increase in cognitive-linguistic performance when increases were evident from pre-test to long-term follow-up compared to non-attenders.

Parents and the Workshops

The workshops were available in interactive live presentations and also remotely through condensed video vignettes with supporting summary brochures. Following the first year of the study, it was decided that it might be beneficial to have tracking data for the websites. In total 1150 views of the websites occurred between baseline assessment and long-term follow-up during the second year of the study. Given a sample size of 340 recruited in the second year, at an average of 3.38 views per parent, this would represent approximately 3 views per parent.

Following each workshop, parents were asked to complete a brief survey regarding the presentation. The number of questions on each survey varied by workshop session, from nine questions on the first workshop survey to twelve on the fourth workshop survey (see Appendix D). Surveys were primarily used for feedback regarding the quality, timing, and content of each of the workshops. Parental perceptions on usefulness of the workshops was assessed following each workshop. Usefulness was rated on a Likert-type scale from 1 to 5, with 1 being not at all useful to 5 being very useful. Overall, for workshops 1, 2, 3, and 4, parents reported the workshops from somewhat (3) to very (5) useful ($M_{WS1} = 4.20$, $M_{WS2} = 4.50$, $M_{WS3} = 4.33$, $M_{WS4} = 4.71$), with an overall mean score of 4.44 indicating that the workshops were generally perceived as considerably useful. Few parents responded to the open-ended questions, among those who did, most were positive in their evaluations (e.g., “I learned quite a bit and thought the presentation was excellent”) with some suggesting ways to make the presentation more relevant (e.g., including resources for families whose native language is not English).

Discussion

The present study examined the introduction of hands-on parent workshops, combined with media-based supports, as instructional tools to facilitate children’s socio-emotional or early literacy development. Given the complex design of the larger Pan-Canadian study from which it was derived,

the present study represents information pertaining to the first year of data collection. This study is an exploratory study, which provides an important foundation in two key areas of inquiry. First, the study will inform outcomes obtained in subsequent years of the larger longitudinal study. Second, and germane to the purpose of the present study, the current findings explore parental responses to the introduction of workshops and web-based materials designed to facilitate their promotion of early developmental skills. Overall, the findings present a complex picture both with respect to parental involvement and the impact of parental attendance on learning gains demonstrated by their children.

The unique characteristics of the parental intervention, such as the discussion and practice-based instruction offered to the families, made the program one that was likely a new type of experience for the parents involved. The short-term approach (up to four workshops, each lasting approximately one hour) and the associated activities, included both within the workshops and on the websites listed on the brochures that went home at the workshops, also made the study unique in its contribution to the field of literacy interventions. In total, four hypotheses were tested. Results suggested mixed support for each of these hypotheses, however, some patterns emerged that are both suggestive and interesting. The following discussion addresses each hypothesis individually, followed by an integrated discussion of overarching themes and observations.

Hypothesis One: Influence of Parental Attendance to Instructional Workshops on Children's Early Academic and Social Development

Following the parent workshops, children were assessed on a variety of social and cognitive-linguistic measures. It was hypothesized that outcome scores would be higher among students whose parent(s) attended at least one of the instructional workshops provided as part of the study than students whose parents did not attend any of the workshops offered. The findings showed mixed support for this hypothesis. While children of parents who attended at least one workshop had higher performance outcomes on three of the cognitive-linguistic measures at immediate follow-up and one of these three

measures at long-term follow-up than those of parents who did not attend, children of parents who attended at least one workshop also had lower performance outcomes on the WRAT reading measure at immediate follow-up than those of parents who did not attend. There was no effect of attendance found at immediate or long-term follow-up for any of the remaining cognitive-linguistic-measures. There was also no effect of attendance found for any of the social measures at immediate or long-term follow-up. As children of parents who ended up attending at least one workshop had lower performance outcomes at baseline assessment on the DIBELS word use fluency and CTOPP blending subtests compared those of parents who did not attend, it is possible that attendance effects were present, but not evident at immediate and long-term follow-up for these measures. Overall, parental attendance had generally positive effects on children's phonological awareness and listening comprehension scores, but these effects were short-lived.

Hypothesis Two: Influence of Instructional Workshop Domain Training on Children's Early Academic and Social Development

As research indicates that domain specific knowledge is key to success in academic contexts, it was expected that early literacy performance scores would be higher for students in the reading and the reading plus technology conditions than those in the social condition. Similarly, students in the social condition were expected to outperform students in the reading and the reading plus technology conditions on measures of social skill development. However, as research has suggested that social skills training leads to global academic gains, it was also possible that there would be no significant differences among the three groups for the academic/reading measures.

Overall, the findings showed greater support for the latter hypothesis, with the global academic gains from socio-emotional skills training potentially outweighing academic gains acquired from domain-specific skills training. The findings of the current study indicated that children in the socio-emotional condition outperformed students in the reading plus technology, or reading only and reading

plus technology conditions on six of the cognitive-linguistic measures at immediate follow-up and on four of the cognitive-linguistic measures at long-term follow-up. However, there were also four cognitive-linguistic measures at immediate follow-up for which there were no significant differences among the three groups for the academic/reading measures. Additionally, there was no effect found for domain training on the socio-emotional measures at immediate follow-up, but by long-term follow-up, children in the socio-emotional condition were outperforming those in the reading conditions with higher levels of prosocial behaviour and lower levels of conduct problems being reported for these children. Overall, these findings provide some nominal support for the value of socio-emotional skills training for global academic gains.

Hypothesis Three: Confirming Developmental Gains Across Time

Developmental gains in both academic and social skills were assessed at two points in time, immediately after the workshop intervention and at long-term follow-up (at the beginning of grade 1). It was expected, based on developmental trajectories, that there would be gains in both domains (reading and social development) across children in all conditions at each of these two time points relative to a baseline pre-test at the beginning of senior kindergarten. Limitations in the methodology prohibited investigation of this question for social development as the number of completed assessments for the social measures was too small for these subscales to be analyzed across two factors and over three time periods. Within the cognitive domain, however, measures were available for comparison over a short and longer term interval. Short term changes were observed. Scores at immediate follow-up showed consistent support for developmental increases over time. Specifically, scores increased from baseline to immediate follow-up for all four of the cognitive measures that were able to be compared across time and condition. At long-term follow-up gains were also evident, however these were limited to two measures: the DIBELS phoneme segmentation fluency and GRADE

listening comprehension subtests. Discussion of this less robust outcome at long term follow-up will be discussed in the general discussion section below.

Hypothesis Four: Impact of Time Period Following Workshops on Magnitude of Developmental Gains

In addition to the developmental gains, an exploratory analysis was conducted to assess the magnitude of gains. Specifically, comparisons were made for the proportion of increase in performance evident immediately following the workshop intervention and the proportion of gains made at long-term follow-up. When long term gains were assessed as a function of parental attendance at workshops, it was expected that gains would be larger immediately following parental exposure to the workshops. The findings show limited support for this hypothesis. From baseline to immediate follow-up, children of attenders demonstrated a greater decrease in emotional symptoms as well as greater increases in performance on the DIBELS phoneme segmentation and GRADE listening comprehension measures. A greater increase in performance was also evident for attenders on the CTOPP blending measure and a lesser decrease in performance on the GRADE listening comprehension measure compared to children of non-attenders from baseline to long term follow-up. Performance differences were not evident between children of attenders and children of non-attenders on the majority of social and cognitive measures from baseline to immediate or long-term follow-up. Although, when differences were present, performance scores indicated a positive influence of parental attendance, further research comparing magnitude of gains is needed to clarify this relationship.

Examination of Parental Perceptions of the Workshops

Four workshops were offered, after baseline assessment and before immediate follow-up, to the parents of the kindergarten students at each school involved in the study. Each workshop consisted of an interactive PowerPoint presentation with accompanying activities and discussion points interspersed throughout. Workshop content varied by condition (reading, reading plus technology, and social), but

was consistently organized in such a way as to cover typical developmental trajectories (e.g., shared reading, phonological awareness, meta-linguistic awareness, and building vocabulary). Workshops included activities to engage parents directly with the workshop material and provide ideas for fun games that they could later engage in with their child(ren).

Following the workshops, parents were asked to rate the workshops in terms of their utility, rated on a Likert-type scale from 1 to 5, with 5 being very useful and 1 being not at all useful. Overall, responses indicated that parents found the workshops to be somewhat to very useful, with the average usefulness reported as very useful, indicating that the workshops were generally well perceived. For parents who responded to open-ended questions, most were positive in their evaluations including comments such as, “I learned quite a bit and thought the presentation was excellent” and “I’m sure I’ll be engaged each time.” Some parents provided suggestions for ways to make the presentation more relevant or accessible (e.g., including resources for families whose native language is not English and changing the timing of the workshop to later in the evening). Overall, among parents who selected to attend the workshops, the content was found to be relevant and applicable, however, accessibility across diverse populations is an important consideration for revision. Although these exploratory findings suggest that the workshops might prove a valuable opportunity for parents, further more rigorous evaluation of the content and design of the workshop would be advantageous.

General Discussion

The current study combined three important aspects of literacy intervention research. By describing the patterns of gains from reading and socio-emotional training in association with parental attendance to brief instructional workshops, a richer understanding of the roles of parental involvement and domain-specific knowledge in children’s early literacy and social development may be acquired.

The workshops of this study were comprised of lessons on early literacy and socio-emotional development, provided by a team of professional developmental psychologists, reinforced with

exemplars and opportunities to practice implementing newly learned material, combined with both online and paper resources for more examples and more in depth investigation. Based on previous literature, it was expected that if parents were provided training to foster their children's development, this would impact their children's performance in those areas. For example, Huebner (2000) found that following instruction in dialogic reading, parents altered their style dramatically, with a substantial increase in the average number of dialogic reading behaviors observed. Based on reported outcomes such as these, the present study also inferred that performance outcomes across groups could be attributed, at least in part, to the workshops having an influence on parental behaviour and those changes in parental behaviour ultimately impacting children's outcomes. Direct observation of parent behaviours however, was not available. Future research should directly examine the influence of parent workshops on parental behaviours and on performance outcomes for children.

Influence of Parental Attendance

Addressing parental involvement in educational interventions is critical because the parent's role and the home environment have been consistently shown to be a strong predictor of both academic achievement (e.g., Galindoa & Sheldon, 2012; Sénéchal & LeFevre, 2002) and socio-emotional development (e.g., Raver & Knitzer, 2002). Consistent with the research, the current study found that parental involvement did indeed play a role in children's academic and social development in some cases. In particular, children did not differ on the majority of assessments prior to the workshops presentations, but shortly after the workshop presentations, differences in measures of cognitive-linguistic development were evident between children of parents who did and did not attend workshops. Additionally, where increases in cognitive-linguistic development and improvements in social behaviour were evident, children of parents who attended at least one instructional workshop demonstrated advantages compared to those children of parents who did not attend. These findings are especially important because children of parents who ultimately attended at least one of the workshops

initially had lower performance outcomes on some of the cognitive-linguistic measures compared to children of parents who did not attend.

Selective attendance of parents at the workshops may be an indicator of parental sensitivity to their children's needs. As a slight disadvantage existed for students of parents who ended up attending the workshops, this may indicate that parents self-selected for their participation in the workshops based on whether they thought their children would need or benefit from help from their parents receiving instruction on early literacy or socio-emotional development. The parents who attended the workshops may have been aware that their children were struggling and sought to help them by attending the workshops that were offered. As children of attenders eventually demonstrated improvements on both social and cognitive-linguistic measures, it is possible that these children needed extra support. Perhaps parents were aware of their children's needs and chose to attend the workshops in an effort to help alleviate these troubles for their children.

Interestingly, parents who attended at least one workshop had lower performance outcomes on the reading measure at immediate follow-up than those of parents who did not attend. This can also be potentially be explained by the self-selection hypothesis. If these students were already struggling, it could be that they were improving on their lower level skills, such as phonological awareness and listening comprehension, which was supported by the results of this study, but the acquisition of these skills took longer for them (as they already had some barriers to success with literacy) than it did with the non-attenders, who were not struggling. The children of attenders may not have yet achieved success on higher level skills at the point of post-testing (shortly after the workshops), whereas children of non-attenders may have had the ability to develop these skills through their regular classroom instruction.

As early intervention programs within schools tend to be costly and can be challenging to manage in typical education environments, this study provides further evidence for the potential of

involving parents in instructional interventions. Literature has consistently indicated that parents are interested in supporting their children's development (e.g., Evans, 1998). Providing instruction to parents extends the opportunities for learning beyond the classroom and provides a viable addition to traditional school-based intervention programs.

Influence of Domain-Specific Knowledge Instruction for Parents

Reading intervention researchers continue to elucidate the factors involved in the maintenance and long-term impact of reading interventions and how best to incorporate those factors within the classroom and at home. Evidence suggests that interventions involving domain specific knowledge (e.g., phoneme-grapheme correspondences for reading) can result in major improvements for those at-risk for academic difficulties (e.g., Torgesen, 2000). This extends to research targeting socio-emotional development, as training in this domain can result in increases in social skills and attitudes (i.e., commitment & motivation) and positive behaviours (i.e., class participation & study habits) relative to students who do not receive training (Durlak et al., 2011). The results of the current study support previous research demonstrating academic and social improvements from increased domain knowledge in these areas. Dissimilarities were found in the reading and social-emotional development among children of parents in the three training conditions, with children of parents selected to receive socio-emotional instruction generally demonstrating either equivalent or greater socio-emotional development compared to those who received instruction in either reading or reading plus technology and the reading only group showing some significant gains on the cognitive-linguistic measures. These findings demonstrate the value of domain knowledge in socio-emotional development.

However, for the literacy-specific improvements anticipated from training parents in early reading development, the current study found that although domain knowledge is important, socio-emotional skills training may play a larger role. Some significant literacy gains did occur for children in the reading only group, but these gains were outnumbered and often outweighed by children in the socio-

emotional condition. This finding could potentially be explained by the research which suggests that socio-emotional skills training promotes global learning gains (e.g., Denham, 2006; Shonkoff & Phillips, 2000). For example, Durlak et al. (2011) found that learners who were exposed to socio-emotional competencies not only exhibited increases in social skills and attitudes (i.e., commitment & motivation), but also showed improvements in their academic performance (i.e., subject mastery & grades) and positive behaviours (i.e., class participation & study habits) relative to students who did not receive training. Such socio-emotional training has been suggested to promote learning gains by reinforcing the learner's self-efficacy and abilities to interact with others (Denham, 2006; Shonkoff & Phillips, 2000). Furthermore, developing foundational social skills, such as managing and coping with one's emotions (Cole, Michel, & Teti, 1994), combined with a sound emotional infrastructure that facilitates building solid relationships with teachers and peers (Pitcl, Provance, & Kerslake, 2006) allows children to comfortably engage in interactions with their peers and teachers, permitting them to be active participants in their learning. These students are subsequently able to work well with others in cooperative learning groups, communicate effectively, and ask for help when they need it, all of which contribute to success both socially and academically.

As the reading plus technology group produced performance scores on the cognitive-linguistic measures that were almost always below those of the socio-emotional group and frequently below those of the reading group, this brings into question the findings regarding the added benefit of technology in early literacy instruction. Previous systematic reviews and meta-analyses (e.g., Archer et al, 2014; Tamim et al, 2011) concluded that there is a significant positive effect favouring the utilization of technology in formal education as compared to more technology-free instruction. In keeping with the potential role of technology as an instructional tool, the present study offered training for parents regarding early literacy development with some parents receiving instruction regarding technology based reading software in addition to the instruction on early literacy development.

However, as Archer et al. (2014) indicated, technology-based instruction must be well-designed and well-delivered in order to be able to enhance children's learning. As the children of parents who received the reading plus technology instruction generally performed more poorly than children of parents who received solely the early literacy or socio-emotional development instruction, it is possible that parents who received this added 'technology for early literacy' instruction, were unsuccessful at either choosing or utilizing the appropriate programs for their children's early literacy development. For the cases involving appropriate software programs choices, it is possible that these programs were not implemented effectively. Chambers, Slavin, et al. (2008) described the role of technology as "adding value" to regular classroom instruction in what they referred to as embedded information and communication technology (ICT). Indeed, recent successful interventions that employ early literacy instruction using computer software do so as an adjunct or addition to ongoing instruction in the classroom (e.g., Chambers, Abrami, et al., 2008; Savage et al., 2013). It is possible that parents interpreted the workshops aimed at supporting the addition of technology-based early literacy instruction to supplement their children's learning, as meaning that technology can and should be used as 'stand alone' instruction. Alternatively, parents may not have been sufficiently familiar with the technology and software programs to appropriately support their children's learning. Access to technological devices may have been limited as well, which may have in turn limited the use and benefit of the added technology instruction. Finally, parents may have attended these workshops in particular because their children were already spending a good deal of time with technology and these parents may have wanted to use this resource better. Greater focus on technology, if combined with limited knowledge about software or instruction however, may have resulted in children in this group not having enough exposure to and practice with traditional literacy resources. Future research should monitor parental knowledge, and parental implementation of technology directly to better understand

how parents utilized information from the workshops for instruction in cognitive-linguistic and socio-emotional development.

Further support for the importance of parental involvement and socio-emotional skills training can be seen in the interaction of parental attendance with training condition for the DIBELS letter naming fluency scores, which indicated that although the social group outperformed the other two conditions, students in the reading only group performed better if their parent(s) attended at least one workshop. This result could be explained by the direct influence of enhanced training in domain-specific knowledge and skills or indirectly through the socio-emotional competencies gained from parental involvement. Parental involvement and socio-emotional competence has been linked to children's socio-emotional, communicative, and cognitive development (Chazan-Cohen et al., 2009; Landry, Swank, Smith, Assel, & Gunnewig, 2006; Merlo, Bowman, & Barnett, 2007; NICHD Early Child Care Research Network, 2002). When parents provide developmentally sensitive support for their child's autonomous problem solving, the cognitive development of the child is enhanced through encouragement of the child's assertiveness, self-directedness, and communication with peers (Pomerantz, Moorman, & Litwack, 2007). The influence of parental involvement may also extend to motivational support for children navigating the challenges of learning. Parents who encourage their children to learn and support them through challenging tasks may better prepare their children for future success.

Understanding Long Term Outcomes: Summer Loss

Cognitive-linguistic performance at immediate follow-up exceeded that of baseline assessment, whereas at long-term follow-up, scores typically decreased from scores at immediate follow-up. This indicated that there was maintenance of skill development over time in some areas, but there was also a loss of skill over time. As long-term follow-up was conducted at the beginning of grade 1, the decline in scores from immediate to long-term follow-up may be explained by 'summer loss' which occurs in

achievement scores over summer vacation. Cooper, Nye, Charlton, Lindsay, and Greathouse's (1996) meta-analytic review of 39 studies indicated that the decline in achievement scores over summer was equal to about one month on a grade-level equivalent scale, or one tenth of a standard deviation relative to spring test scores. For the current study, when significant declines in performance existed, they were either less so for the children of attenders than for those of non-attenders, or children of attenders had increases in performance where non-attenders showed declines. This finding suggests that 'summer loss' could potentially be lessened or mediated by parental involvement in fairly brief interventions.

Again, if it holds true that the parents who chose to attend the workshops were those who noticed their children experiencing social or literacy difficulties and were making an effort to assist them with these matters, these children may have benefited from their parents continuing to reinforce learned skills and foster the development of new skills over the summer. Consistent with this expectation, parents who chose not to attend the workshops may not have seen the need for extra social or literacy support over the summer, so the typical 'summer loss' occurred for these children. Interpreting long term outcomes must be sensitive to both parental beliefs and behaviours and environmental or contextual variables. The present study highlights both of these variables as possibly important contributors that require attention in any interpretation of outcomes.

Limitations & Future Directions

There were two major limitations of this study, the first being low parental attendance and the second, lack of assessment of parental behaviour, including website use. The first major limitation of this study to be addressed was low parental attendance. Although participant recruitment was high, parental attendance to workshops was low. The majority of parents who consented for their child(ren) to take part in the study, did not attend any of the workshops that were offered (76.9%). For the small subset of those that did attend (23.1 % of the sample), most only attended one of the four workshops that were offered. Although parental attendance was a limitation, it was informative for future parental

interventions. The low parental participation indicates the need to find more effective means of encouraging parents to attend instructional workshops on their children's development or to create alternate ways to support parents, possibly through occasional emails with recommendations, reminders, and sample exercises. Scheduling workshops that are accessible for all parents is challenging. Parents may experience concerns finding or affording transportation to workshop locations or difficulties regarding the timing of the workshops. Although the workshops in the present study were held at the schools from which participants were recruited, it is possible that a more flexible venue, such as a local community centre or library might have been conducive to greater parental attendance as these locations may better reflect additional plans (recreational activities) that families would be pursuing. The workshops were most often held after school during the week. Although early and late evening times were offered, these may have conflicted with work, recreation or other family commitments. Future studies could poll parents to determine times that would work best for them or try to offer the workshops on the weekends or offer online webinars, so that parents could attend from home. Another possibility for low attendance, is that parents felt that they did not need the instruction that was being offered and decided not to attend. Future studies could include a survey for parents regarding reasons for choosing to attend or not. Additionally, although workshops were intended to be interactive and involve parents in active-learning, children were not involved, so future studies may benefit from combining a practice time with the children to help reinforce the workshop material.

The second major limitation of this study was lack of assessment of parental behaviour. A major assumption of this study was that changes in parental behaviour would result from exposure to the workshops and ultimately, this would impact children's performance outcomes. It is possible that the results were due to extraneous factors, such as additional support from school staff, extracurricular activities that the children were involved in, or possibly other avenues that the parents took for assisting their children. With the large sample size and division of participants across provinces and schools, it is

likely that the results pertaining to parental attendance to the workshops were indicative of some influence of the workshops, but since parental behaviours were not assessed, we cannot be certain the workshops indeed had an influence on parental practices, nor can it be determined what aspects of the workshops were influential or what types of changes in parental behaviour corresponded to increases in children's performance outcomes. Future research should examine the mechanisms of influence from instructional workshops for parents to performance outcomes for children and the variables that affect the level of influence that this type of instruction can have.

Moreover, although informational resources were provided, such as the websites and brochures, user information was not tracked, such as which parents were visiting the website, how many times they visited, which modules they visited most, how they were used, or how useful parents found these resources to be. Future studies offering additional resources to supplement in-person interactions may benefit from an assessment of use, such as parent selection of material (e.g., did they access all of the modules or were they selective), perceived usefulness, and pre- and post-assessment of behaviours that may change due to the instruction. For example, in the current study, it may have been the case that parents who were not able to make it to the workshops were the parents visiting the websites, but this type of instruction was not enough to enhance children's score to such a point as to match the children of parents who attended the in-person workshops. Alternatively, the visitors of the websites may have been primarily parents who attended the workshops and this may have been the driving force for the differences in their children's scores as compared to those of non-attenders. Having this type of information could aid in determining the influence of the supplemental material, which may have had differential added value across conditions.

Finally, one additional limitation involved potential self-selection bias. Participants could not be randomized to the attendance condition because it would not be ethical to turn away a parent who wanted to take part in the workshops. Due to this potential bias, it is possible that the samples and, therefore, results

were not representative of all families. Self-selection may have been further influenced by school staff. School staff may have encouraged some families to participate and not others, which may also help explain the discrepancies in performance scores on the cognitive measures between children of attenders and non-attenders at pre-test. Although self-selection is a limitation of this study, it is potentially unavoidable in research examining parental involvement. In the present study, the pre-test scores of attenders were below those of non-attenders, which provides confirmation of the importance of providing workshops especially for children experiencing challenges.

Practical Implications

Given that the Organization for Economic Co-operation and Development in combination with Statistics Canada (2011) found that roughly half of Canadians were functionally illiterate, it is crucial that we determine the factors that best support literacy development. Illiteracy starts a cycle that is incredibly difficult to escape from, and although research has consistently shown that home literacy environment is a strong predictor of early reading development, most current models of literacy intervention do not incorporate parental involvement.

Considering the important role parents play in supporting their children's development, the current study contributed to the literature by demonstrating that parental involvement in brief instructional interventions can have positive significant effects on phonological awareness and listening comprehension skills, as well as on the maintenance of these skills over time. The reading and reading plus technology workshops directly addressed phonological awareness (e.g., phoneme blending and phoneme segmentation), so it appears as though the workshops had an influence on the parents behaviour which had an influence on their children's behaviour and ultimately their performance outcomes, but further research is needed to clarify the mechanism through which these types of interventions impact early literacy and social development. Nevertheless, this implies that there is potential for schools or communities to implement programs to teach parents and/or guardians specific strategies to use at home, which may

assist parents and/or guardians in contributing to their children's literacy development more effectively, as well as improve communication and understanding among teachers, parents, and the community. As early intervention programs within schools tend to be costly and can be challenging to manage in typical educational environments, this study provides further evidence for the potential of involving parents in their children's educational interventions as a viable alternative to traditional intervention schemes to increase positive outcomes and reduce cost.

Apart from teaching specific reading skills, it has been suggested that promoting socio-emotional development may be a key influence on student learning as well. As socio-emotional development training at the level of the parent still had significant effects for student learning and development, this has led to a deeper understanding of the role of socio-emotional development in academic success. This in turn, has the potential to inform the design of optimal intervention programs that may be implemented before school and within the classroom. Greater support of socio-emotional development could reduce the need for additional and specific academic support for some students.

Considering the important roles of domain-specific knowledge, socio-emotional development, and parental involvement on children's early academic success, this study examined the influence of providing parents with resources to support their children's early literacy and socio-emotional development. Although the majority of parents chose not to access the resources that were offered (workshops with professionals in the field of early childhood development and the associated websites), for those who did, the results indicated a positive influence of parental involvement on children's academic and social success. Many families would likely benefit from suggestions for low-cost activities to do at home with their children to promote literacy and socio-emotional skill development, so more specific manuals than the brochures or more appealing online resources that were offered as part of this study may be useful. The parent focus was fairly unique in this intervention and it suggests that it may

be useful to have more funding and policies designed for involving parents in literacy and socio-emotional interventions, rather than focusing solely on the children, which is often how the programs are offered.

This study also highlights the need to creatively design flexible interventions that can reach wider groups of parents. The model used in the current study, in-person workshops offered at children's schools after school hours, engaged limited numbers of parents. Perhaps simple changes to venue could attract more parents (holding workshops in community centers or coffee shops). Alternatively, changes in delivery altogether, such as offering online webinars, or the current online materials accompanied by a question and answer session online might encourage parents to access and use the instructional resources at times convenient for them.

Conclusions

The current study indicated that instructional workshops for parents regarding children's early literacy and socio-emotional development may support phonological awareness and listening comprehension for children in kindergarten to grade 1. The study also indicated that a parent-focused literacy intervention that incorporates socio-emotional skill development may exceed the literacy and overall academic benefits compared to a strictly reading-based intervention or one that incorporates technology. However, given the limitations noted above, these interpretations must be considered with caution. The current study, however, does provide substantial support for ongoing study and investigation of parental interventions to support early learning. Making such interventions useful and enjoyable for parents or families by incorporating opportunities for active learning and addressing suggestions for improvement from parent feedback will likely be key to the success of programs such as this one. The most important next step for evaluating these interventions would be to collect data on the specific use of the intervention material and to continue to evaluate the long-term effects of these parent-focused early literacy and socio-emotional development interventions.

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Table 1

Frequencies of Maternal Education of Participants by Condition

Highest level of education obtained by mother	Reading (<i>n</i> = 231)	Reading plus technology (<i>n</i> = 202)	Social (<i>n</i> = 153)
Elementary only	1	1	3
Some secondary	4	6	4
Secondary diploma	24	20	11
Technical training	20	15	7
College	75	52	41
Bachelors	76	49	59
University higher degree	27	35	18

Table 2

Participant Age in Years and Gender by Condition

Condition	Gender		Age (years)	
	Male (<i>n</i> = 308)	Female (<i>n</i> = 278)	Male	Female
Reading	105	126	5.35 (.35)	5.32 (.31)
Reading Plus Technology	118	84	5.29 (.32)	5.28 (.33)
Social	85	68	5.34 (.30)	5.35 (.30)

Note: Ages calculated at start of kindergarten.

Table 3

Number and Percentage of Parents Who Attended the Workshops by Total Number of Workshops

Attended

Number of Workshops Attended	Number of Parents	Percent of Participant Population
0	449	76.6
1	75	12.8
2	39	6.7
3	15	2.6
4	7	1.2

Table 4

Number and Percentage of Parents Who Attended the Workshops by Workshop Session

Workshop Session	Number of Parents Who Attended	Percent of Participant Population
1	102	17.4
2	61	10.4
3	41	7.0
4	22	3.8

Table 5

Socio-emotional performance outcomes as a function of attendance assessed at baseline, immediate follow-up, and long-term follow-up.

Measure	Baseline		Immediate follow-up		Long-term follow-up	
	Attendees	Non-attendees	Attendees	Non-attendees	Attendees	Non-attendees
SDQ						
Emotional symptoms	2.06 (1.83)	1.86 (1.88)	1.74 (1.62)	1.48 (1.96)	1.71 (1.61)	1.64 (1.85)
Conduct problems	1.89 (1.82)	1.74 (1.72)	1.54 (1.34)	1.45 (1.91)	1.38 (1.36)	1.25 (1.58)
Hyperactivity	3.66 (2.68)	3.80 (2.46)	3.28 (2.24)	3.00 (2.70)	3.41 (2.60)	3.51 (2.70)
Peer problems	1.38 (1.40)	1.57 (1.75)	1.18 (1.40)	1.32 (1.75)	1.09 (1.54)	1.40 (1.69)
Prosocial	8.13 (1.54)	7.98 (1.79)	8.24 (1.52)	8.03 (2.18)	8.56 (1.68)	8.10 (2.02)
S-RAT						
Cognitive	---	---	23.00 (N/A)	20.66 (4.14)	13.00 (N/A)	18.91 (4.93)
Socio-emotional	---	---	30.00 (N/A)	32.43 (8.10)	19.00 (N/A)	30.62 (7.43)
Excessive negative emotions	---	---	14.00 (N/A)	14.45 (2.77)	8.00 (N/A)	14.71 (2.44)

Note. Cells with N/A as standard deviation had a sample of one, so standard deviation was not available.

Table 6

Cognitive-linguistic performance outcomes as a function of attendance assessed at baseline, immediate follow-up, and long-term follow-up.

Measure	Baseline		Immediate follow-up		Long-term follow-up	
	Attendees	Non-attendees	Attendees	Non-attendees	Attendees	Non-attendees
DIBELS						
Phoneme segmentation fluency	19.17 (12.55)	21.58 (14.60)	28.60 (17.76)	25.53 (18.26)	31.17 (16.39)	28.82 (18.72)
Initial sound fluency	19.13 (9.44)	16.49 (9.54)	24.84 (12.89)	21.05 (15.01)	---	---
Letter naming fluency	33.76 (16.12)	37.26 (17.46)	34.86 (18.22)	37.09 (20.10)	---	---
Word use fluency	16.28 (16.09)	22.44 (19.74)	23.33 (17.97)	26.01 (19.10)	---	---
WRAT						
Reading	90.25 (18.50)	95.37 (17.50)	89.27 (16.05)	93.01 (19.93)	88.29 (15.11)	87.39 (17.16)
Math	94.24 (10.34)	96.20 (12.81)	90.85 (11.01)	90.86 (13.66)	---	---
GRADE						
Listening comprehension	3.92 (1.44)	4.40 (1.59)	4.73 (1.56)	4.23 (1.74)	4.61 (2.19)	3.85 (1.76)
Reading	4.11 (1.95)	4.19 (2.01)	4.81 (1.91)	4.89 (2.13)	3.90 (1.60)	3.76 (1.86)
Phonological awareness	4.04 (1.59)	4.48 (1.58)	4.42 (1.57)	4.33 (1.94)	---	---
Early literacy skills	4.42 (1.64)	4.71 (1.89)	4.74 (1.88)	4.62 (2.08)	---	---
Phoneme grapheme correspondence	5.17 (1.90)	5.15 (1.92)	5.58 (1.79)	5.08 (1.96)	---	---
Word meaning	---	---	---	---	3.91 (1.88)	3.80 (2.00)
Vocabulary comprehension	---	---	---	---	3.56 (1.82)	3.44 (2.05)
CTOPP						
Rapid digit naming	75.74 (20.29)	77.62 (27.93)	---	---	70.94 (21.42)	68.96 (22.36)
Phoneme blending	14.35 (7.12)	17.39 (7.29)	---	---	11.54 (2.34)	11.13 (2.73)
Woodcock-Johnson						
Pseudo-word reading	---	---	---	---	109.62 (13.71)	105.99 (15.76)
Spelling	---	---	---	---	103.42 (11.34)	101.96 (12.68)
Fry's Word List	---	---	---	---	7.04 (5.99)	7.12 (6.73)

Note: Raw scores are listed for the DIBELS and CTOPP subtests, as well as for Fry's Word List. Standard scores are listed for the

WRAT and Woodcock-Johnson subtests. Stanines are listed for the subtests of the GRADE.

Table 7

Socio-emotional performance outcomes as a function of condition assessed at baseline, immediate follow-up, and long-term follow-up.

Measure	Baseline			Immediate follow-up			Long-term follow-up		
	Reading	Technology	Social	Reading	Technology	Social	Reading	Technology	Social
SDQ									
Emotional symptoms	1.70 (1.64)	1.87 (1.97)	2.27 (1.91)	1.42 (1.43)	1.59 (2.00)	1.63 (1.90)	1.69 (1.71)	1.78 (1.94)	1.44 (1.76)
Conduct problems	1.63 (1.60)	1.66 (1.68)	2.12 (1.96)	1.30 (1.42)	1.55 (1.92)	1.50 (1.70)	.96 (1.12)	1.67 (1.91)	1.37 (1.57)
Hyperactivity	3.72 (2.53)	3.37 (2.47)	4.16 (2.63)	3.28 (2.25)	3.00 (2.70)	3.10 (2.56)	3.16 (2.38)	4.09 (2.80)	3.35 (2.92)
Peer problems	1.15 (1.35)	1.52 (1.74)	1.78 (1.64)	1.23 (1.59)	1.28 (1.76)	1.29 (1.53)	1.02 (1.30)	1.94 (2.13)	1.16 (1.39)
Prosocial	8.07 (1.60)	8.02 (1.82)	8.06 (1.63)	8.14 (1.92)	8.13 (2.24)	8.04 (1.69)	8.77 (1.46)	7.26 (2.41)	8.35 (1.70)
S-RAT									
Cognitive	---	---	---	18.0 (5.51)	20.9 (3.94)	21.1 (3.94)	16.8 (7.00)	18.7 (4.40)	19.6 (5.18)
Socio-emotional	---	---	---	29.0 (12.7)	32.5 (8.22)	33.1 (6.26)	35.2 (6.11)	28.4 (8.70)	32.2 (4.56)
Excessive negative emotions	---	---	---	12.8 (4.54)	14.3 (2.87)	15.0 (1.70)	15.5 (.84)	13.9 (3.20)	15.4 (1.20)

Table 8

Cognitive-linguistic performance outcomes as a function of condition assessed at baseline, immediate follow-up, and long-term follow-up.

Measure	Baseline			Immediate follow-up			Long-term follow-up		
	Reading	Tech.	Social	Reading	Tech.	Social	Reading	Tech.	Social
DIBELS									
Phoneme segmentation fluency	21.7 (14.7)	21.0 (14.3)	20.2 (13.4)	27.9 (20.2)	26.3 (17.5)	25.5 (17.2)	30.4 (17.8)	25.01 (18.4)	32.6 (17.5)
Initial sound fluency	18.6 (11.1)	14.8 (8.0)	18.6 (9.4)	22.1 (11.5)	20.4 (11.6)	24.3 (18.7)	---	---	---
Letter naming fluency	32.0 (16.8)	35.7 (17.5)	39.5 (16.5)	32.9 (17.7)	33.4 (20.1)	42.7 (19.0)	---	---	---
Word use fluency	20.4 (17.9)	20.2 (20.4)	21.2 (18.4)	24.5 (19.1)	23.3 (19.0)	27.8 (18.2)	---	---	---
WRAT									
Reading	93.0 (18.0)	93.7 (18.3)	94.6 (17.7)	90.2 (19.0)	89.6 (19.8)	95.8 (17.3)	87.4 (17.1)	84.7 (16.2)	91.0 (15.7)
Math	95.2 (8.9)	95.1 (13.4)	96.4 (12.9)	91.9 (12.4)	88.7 (14.1)	92.4 (11.6)	---	---	---
GRADE									
Listening comprehension	4.25 (1.56)	4.17 (1.45)	4.34 (1.66)	4.29 (1.68)	4.22 (1.71)	4.65 (1.69)	4.08 (1.81)	3.64 (1.90)	4.51 (2.05)
Reading	3.85 (1.89)	3.99 (2.00)	4.60 (2.00)	4.67 (2.10)	4.48 (2.03)	5.45 (1.96)	3.90 (1.84)	3.39 (1.75)	4.08 (1.68)
Phonological awareness	4.21 (1.59)	4.32 (1.49)	4.48 (1.67)	4.09 (1.52)	4.13 (1.87)	4.83 (1.94)	---	---	---
Early literacy skills	4.40 (1.59)	4.48 (1.74)	4.90 (2.02)	4.57 (2.03)	4.30 (1.87)	5.11 (2.10)	---	---	---
Phoneme grapheme correspondence	4.83 (1.91)	5.06 (1.94)	5.46 (1.85)	5.13 (1.85)	5.01 (2.04)	5.58 (1.81)	---	---	---
Word meaning	---	---	---	---	---	---	3.94 (1.97)	3.30 (1.90)	4.21 (1.93)
Vocabulary comprehension	---	---	---	---	---	---	3.61 (2.04)	2.96 (1.90)	3.79 (1.09)
CTOPP									
Rapid digit naming	80.9 (27.9)	79.1 (28.0)	72.7 (21.9)	---	---	---	66.6 (19.9)	74.7 (25.8)	68.8 (20.4)
Phoneme blending	15.7 (6.9)	17.3 (7.1)	16.3 (7.8)	---	---	---	11.56 (2.52)	10.64 (2.44)	11.40 (2.87)
Woodcock-Johnson									
Pseudo-word reading	---	---	---	---	---	---	107.0 (14.1)	104.9 (17.5)	109.3 (14.3)
Spelling	---	---	---	---	---	---	102.9 (12.1)	98.6 (11.9)	105.5 (12.1)
Fry's word list	---	---	---	---	---	---	7.00 (6.59)	5.62 (6.02)	8.78 (6.55)

Note: Numbers are raw scores for DIBELS and CTOPP subtests and Fry's Word List; standard scores for the WRAT and Woodcock-Johnson subtests; and stanines for the GRADE.

Table 9

Cognitive-linguistic performance outcomes as a function of condition and attendance assessed at baseline, immediate follow-up, and long-term follow-up.

Measure	Baseline			Immediate follow-up			Long-term follow-up		
	Reading	Tech.	Social	Reading	Tech.	Social	Reading	Tech.	Social
DIBELS phoneme segmentation fluency									
Attenders	17.0 (13.9)	11.9 (11.0)	15.5 (12.2)	30.1 (19.3)	30.4 (14.2)	27.5 (17.2)	31.3 (17.0)	30.7 (14.9)	30.5 (17.5)
Non-attenders	16.5 (15.2)	17.0 (14.8)	17.2 (14.2)	29.2 (20.6)	26.4 (17.3)	24.7 (17.2)	29.8 (18.8)	27.5 (18.5)	34.0 (16.7)
WRAT reading									
Attenders	88.1 (15.1)	83.0 (20.2)	85.6 (17.4)	89.5 (16.0)	85.0 (17.9)	92.5 (15.7)	87.9 (17.7)	84.2 (16.6)	89.4 (15.3)
Non-attenders	86.5 (18.5)	87.1 (20.5)	94.4 (15.8)	90.0 (20.4)	90.6 (20.4)	97.6 (16.6)	87.3 (18.1)	89.4 (20.1)	94.3 (18.0)
GRADE listening comprehension									
Attenders	4.06 (1.63)	3.41 (1.35)	3.91 (1.55)	4.97 (1.47)	4.83 (1.63)	4.68 (1.61)	4.22 (2.09)	4.38 (2.32)	4.93 (2.31)
Non-attenders	3.72 (1.54)	3.86 (1.64)	4.28 (1.77)	4.04 (1.71)	4.12 (1.68)	4.71 (1.77)	3.91 (1.83)	3.96 (2.10)	4.22 (1.88)
GRADE reading									
Attenders	4.00 (1.81)	3.45 (1.66)	4.64 (2.15)	4.74 (1.91)	4.21 (1.95)	5.52 (1.76)	3.84 (1.90)	3.55 (1.62)	4.14 (1.62)
Non-attenders	3.74 (2.00)	4.15 (2.00)	4.71 (1.90)	4.59 (2.20)	4.52 (1.99)	5.51 (2.05)	3.78 (1.98)	3.91 (2.27)	4.43 (2.08)
CTOPP rapid digit naming									
Attenders	---	59.3 (N/A)	---	---	49.7 (N/A)	---	---	47.0 (N/A)	---
Non-attenders	118.4 (48.1)	85.1 (37.7)	61.4 (16.2)	87.1 (18.6)	74.0 (30.6)	62.4 (16.1)	80.5 (19.5)	59.1 (15.8)	54.8 (12.2)
CTOPP phoneme blending									
Attenders	---	.81 (N/A)	---	---	.96 (N/A)	---	---	.65 (N/A)	---
Non-attenders	.59 (.35)	.72 (.24)	.77 (.25)	.84 (.17)	.85 (.14)	.86 (.14)	.56 (.15)	.55 (.12)	.53 (.20)

Table 10

Difference scores for proportion of increase in socio-emotional and cognitive-linguistic performance outcomes as a function of attendance from baseline to immediate follow-up, from baseline to long-term follow-up, and from immediate follow-up to long-term follow-up.

Measure	Baseline to immediate follow-up		Baseline to long-term follow-up		Immediate to long-term follow-up	
	Attendees	Non-attendees	Attendees	Non-attendees	Attendees	Non-attendees
Social						
SDQ emotional symptoms	-.60 (1.79)	.22 (1.87)	-.32 (1.63)	-.01 (1.60)	.33 (1.46)	.48 (1.94)
SDQ conduct problems	-.28 (1.34)	-.09 (1.44)	-.52 (1.43)	-.10 (1.13)	-.13 (.92)	.20 (1.86)
SDQ hyperactivity	-.09 (1.70)	.04 (1.64)	-.17 (1.85)	.08 (2.18)	.16 (1.95)	.91 (2.53)
SDQ peer problems	-.28 (1.38)	.11 (1.70)	-.21 (1.42)	-.11 (1.47)	.20 (1.69)	.37 (2.03)
SDQ prosocial	.17 (1.32)	.27 (1.10)	.40 (1.59)	.27 (1.74)	.31 (1.52)	-.64 (2.65)
Cognitive						
DIBELS phoneme segmentation fluency	13.65 (14.52)	9.11 (13.30)	15.97 (15.20)	13.28 (15.61)	1.79 (12.14)	4.00 (14.60)
WRAT reading	4.05 (13.74)	3.53 (10.70)	2.06 (14.56)	1.06 (11.56)	-2.21 (7.63)	-1.75 (11.60)
GRADE listening comprehension	.08 (.11)	.02 (.13)	-.01 (.15)	-.05 (.14)	-.08 (.13)	-.07 (.13)
GRADE reading	.11 (.19)	.09 (.18)	-.05 (.19)	-.04 (.20)	-.15 (.18)	-.14 (.19)
CTOPP rapid digit naming	-9.67 (N/A)	-9.20 (22.00)	-7.99 (14.99)	-11.93 (22.21)	-10.38 (10.70)	-10.28 (24.45)
CTOPP phoneme blending	.15 (N/A)	.12 (.21)	.07 (.22)	-.09 (.23)	-.22 (.22)	-.25 (.18)

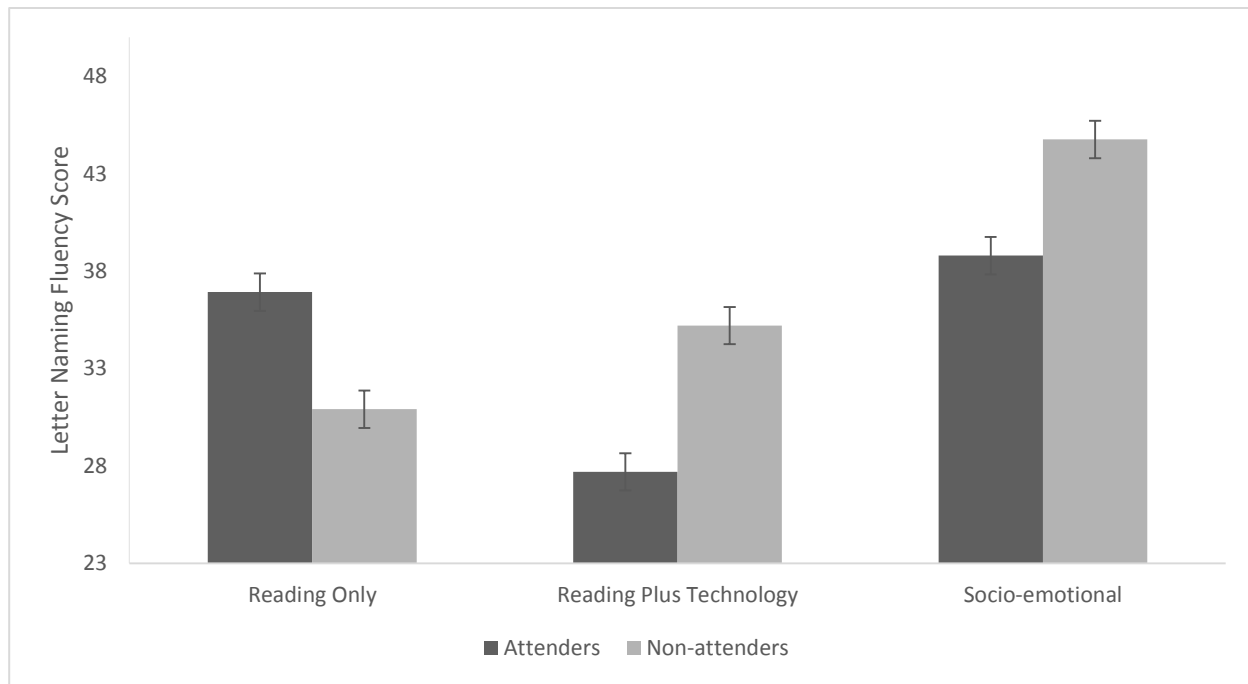


Figure 1. DIBELS letter naming fluency raw scores across condition at immediate follow-up. Standard errors are represented in the figure by the error bars attached to each column.

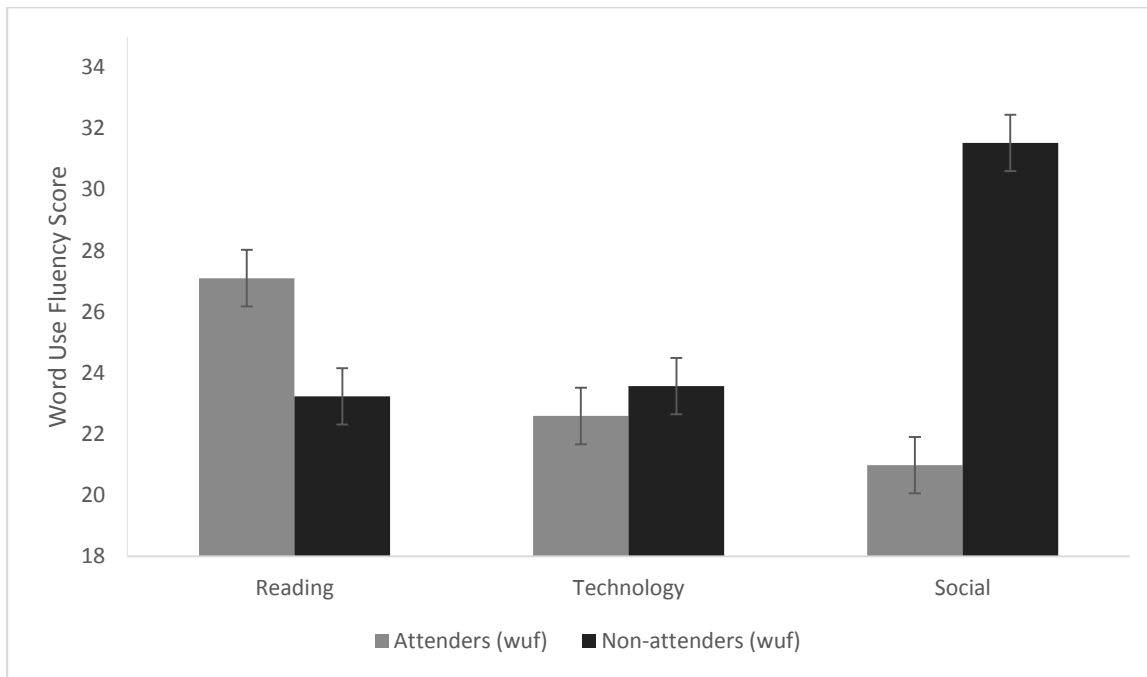


Figure 2. DIBELS word use fluency raw scores across condition at immediate follow-up. Standard errors are represented in the figure by the error bars attached to each column.

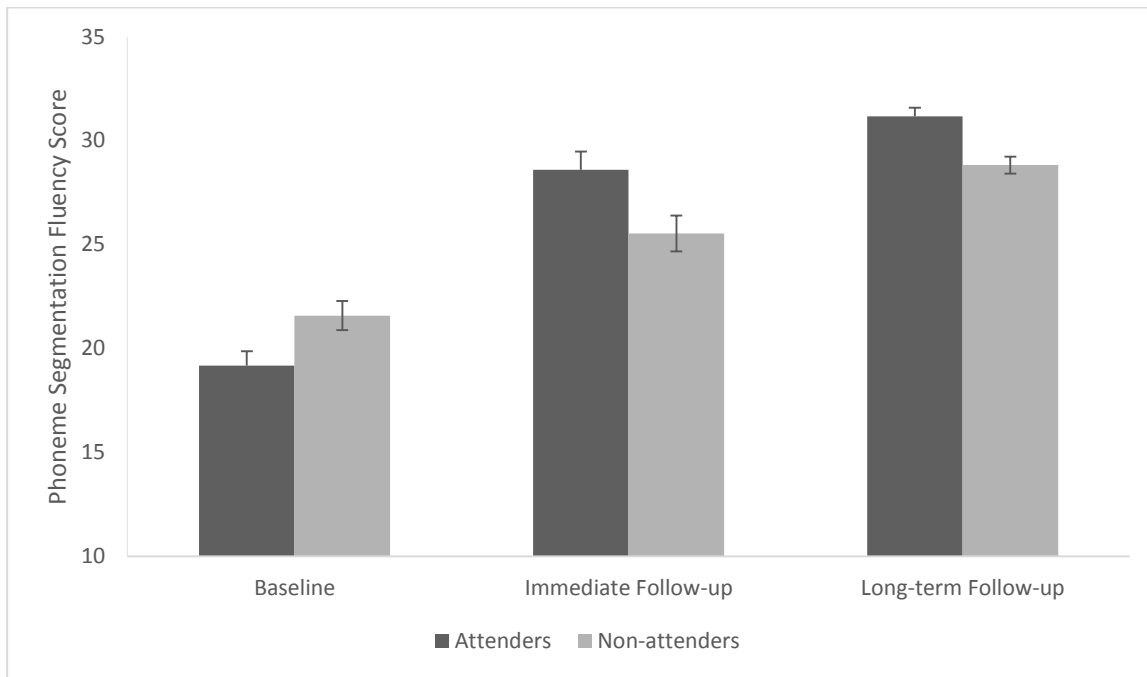


Figure 3. DIBELS phoneme segmentation fluency raw scores across time and attendance. Standard errors are represented in the figure by the error bars attached to each column.

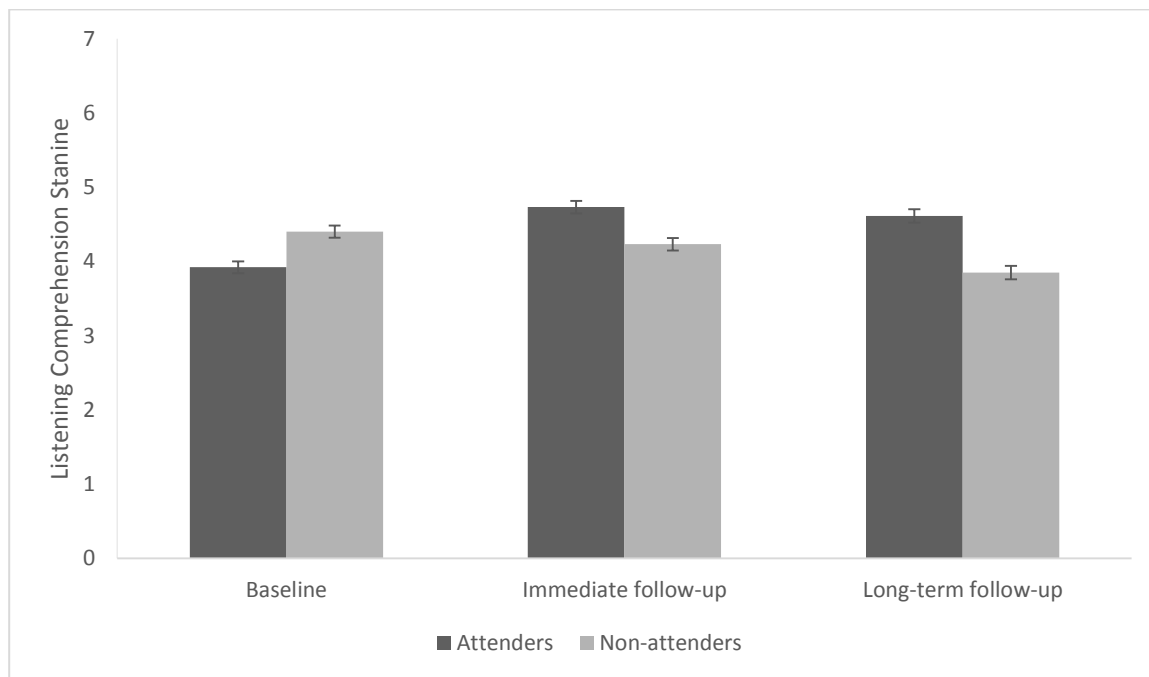


Figure 4. GRADE listening comprehension stanine scores across time and attendance. Standard errors are represented in the figure by the error bars attached to each column.

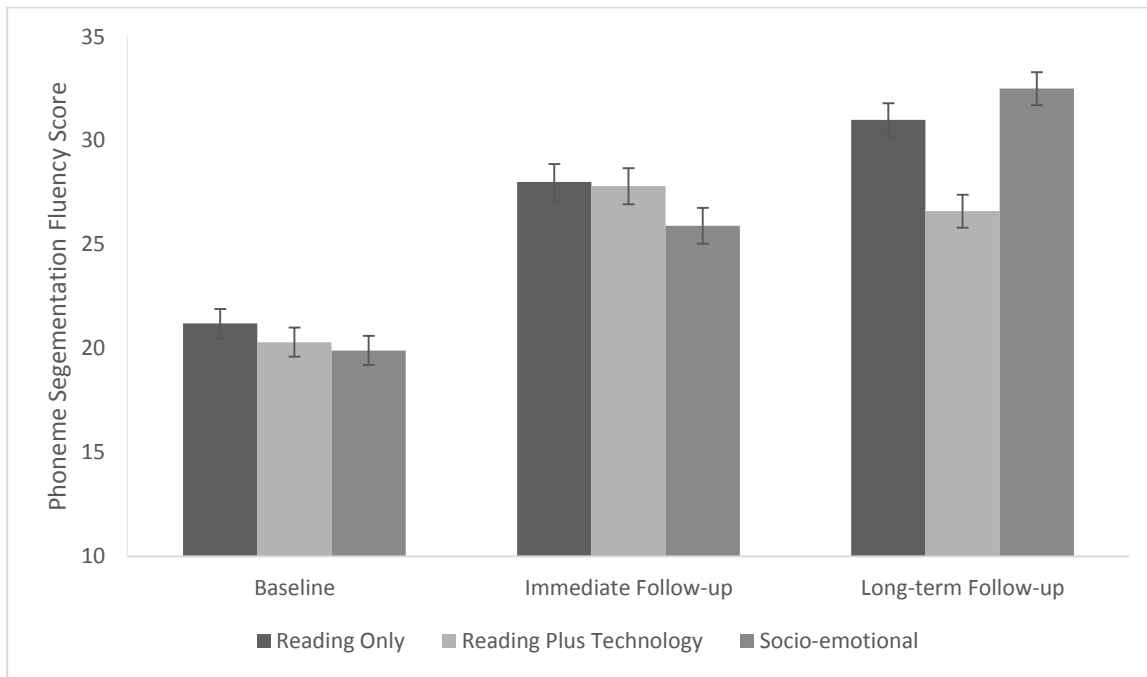


Figure 5. DIBELS phoneme segmentation fluency scores across time and condition. Standard errors are represented in the figure by the error bars attached to each column.

Appendix A – Parent Questionnaire

Parent Questionnaire

This questionnaire usually takes less than 5 minutes! It is an important part of the research program that your child is taking part in, and your time to complete this is much appreciated. This information will better help us understand how children' reading skills develop. You are of course entirely free to not complete this questionnaire.

Please circle either **YES** or **NO**.

1) Did your child attend any form of pre-school, daycare (CPE) or similar? YES / NO

Can you briefly describe the type and nature of this pre-school education your child received?

How long did children attend this pre-school education? Number of months _____

2) Does your child have normal (or corrected to normal) hearing? YES / NO

Give details here:

3) Does your child have normal (or corrected to normal) vision? YES / NO

Give details here:

4) Has your child been diagnosed with a problem in motor skills? YES / NO

If YES, when was it first identified?

5) Has your child been diagnosed with any learning problems? YES / NO

If YES, when was it first identified?

6) How often do you read to your child in English?

- Everyday
- 2-3 times per week
- Once a week
- Once a month or less
- Never

French?

- Everyday
- 2-3 times per week
- Once a week
- Once a month or less
- Never

Other?

- Everyday
- 2-3 times per week
- Once a week
- Once a month or less

Please specify language: _____

How many books on average do you read to your child when you do read to them? _____

7) What is/are Mother's first language _____

8) What is/are Father's first language _____

9) What is the language used at home between:

mother and father _____ (write language used here)

mother and child _____ (write language used here)

father and child _____ (write language used here)

Please check those that apply to you.

10) Mother's education experiences

- Elementary school only
- Did not receive school graduation diploma
- Left school with graduation diploma
- Technical training
- College/CGEP
- University Bachelor's degree
- University higher degree

What is your postal code? _____

Your Name: _____

Your Child's Name: _____

Please place this questionnaire in the provided envelope and return it with your child.

Thank you again for your time completing this.

Appendix B – Workshop Description by Session

Condition	Main Topic	Sample Activities
Reading		
Workshop 1	Shared reading	Discussion about parents observations about children’s books; practice with dialogic reading
Workshop 2	Phonological awareness	Evaluate alphabet books for best characteristics (e.g., large, clear letters and appropriate letter sound correspondences); discuss characteristics to avoid
Workshop 3	Meta-linguistic awareness	Introduce taxonomy of reading skills (Grant, et al., 2012), hand clapping to sound out syllables; discuss how to modify some common games to word games (e.g., I Spy something that starts with the /m/ sound)
Workshop 4	Building vocabulary	Discuss topics that interest children and how that can facilitate learning new words; practice trying to teach new words by asking questions to start the child thinking about the story topic and linking the content to everyday life
Reading Plus Technology		
Workshop 1	Shared reading AND what to look for in reading software and internet safety	Discuss computer games and recommended use; identify educational software and websites
Workshop 2	Playing with letters and language AND navigational design for children’s computer games	View Reader Rabbit clips; play pre-loaded games; discuss ease of use or difficulties encountered
Workshop 3	Meta-linguistic awareness AND assessing early reading software programs for content and age/skill appropriateness	Discuss age-appropriate skills and variability; view and comment on software clip examples
Workshop 4	Building vocabulary AND evaluating children’s reading software design	Discuss how software design can enhance the quality of instruction or detract from it; assess several programs for quality of design

Social

Workshop 1 Self-awareness

Play charades using emotion words to expand emotional vocabulary and practice identifying a variety of emotions; draw stick people that are happy or angry and discuss the characteristics of the drawings that might indicate those emotions

Workshop 2 Understanding others

View a picture of a situation and then describe it from the possible perspectives of the people in the picture; identify thoughts that should be suppressed in work/social situations and thoughts that should be shared out loud in personal relationships and discuss the reasons for this suppression or expression

Workshop 3 Responsible decision-making

Discuss scenarios in which responsible decision making would be beneficial; simulate guiding your child through problem-solving in these situations

Workshop 4 Building healthy relationships

Practice providing positive encouragement; play telephone game and follow with discussion of why communication is so important

Appendix C – Sample Brochure

*Reading
Module 2*

In this module we will be talking about how to help your child learn about the alphabet and how to play with language through rhymes. We will show you how learning to play with language can help your child listen to the sounds of language, not just the meaning.



*Learning the
Alphabet*

Learning the alphabet is an important skill for early reading and involves two components:

1. Knowing Letter Names
2. Knowing Letter Sounds

Knowing how to sing the ABC song does not equal knowing the alphabet.

ABC Books

Parents use alphabet books to teach pre-reading skills.

It is important to:

- Read alphabet books aloud to children
- Point out key letters
- Emphasize initial sounds

Not all alphabet books are good.

- Some do not provide good/consistent matches for letter sounds (Ex. Cat and Cow are better pictures for "C" than Cheetah or Cheese)
- Some have confusing words that the child may not know (Ex. O is for octagon)
- Some are confusing because of surrounding letters (Ex. A is for Airplane)

*Characteristics of
good Alphabet Books*

- Key letter should be in large print, at least the same size as pictures
- Key letter should be in simple font
- Few words
- Simple objects
- Most common letter-sound matches
- Common, unambiguous objects as the focus

Poetry

Poetry and nonsense rhymes are a good way of learning to listen to the sounds of language and learning new words.

Children use a variety of strategies to figure out what a new word is when learning oral language.

- They use real word context (Ex. What is the adult pointing to? What is the adult talking about?)
- They know that new words often go with new, unknown images.
- They use language as a context (Ex. A word that behaves like a noun must label an object. A word that behaves like a verb must label an action word.)



Rhymes

Mother Goose Rhymes

- Jack and Jill
- Jack be nimble

www.mothergooseclub.com

Limericks

- There once was a lady named sue
- There was an old man of Peru
- There was a young lady from Leeds

www.poemhunter.com/edward-lear/poems/

Poems

The Tiger by William Blake

Lewis Carroll

- Jabberwocky
- The Crocodile

A. A. Milne

- Halfway Down
- Lines and Squares



Website:

read.piplearning.ca

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Reading Module 2

Playing with Letters and Language





A

is for apple

B

is for bed





C

is for cat

Appendix D – Post-workshop Parent Surveys

Parent Survey – R1

Participant Number: _____ Date: _____

This questionnaire usually takes about 5 minutes! It is an important part of the research program that your child is taking part in, and your time to complete this is much appreciated. This information will better help us understand how children' reading skills develop. You are of course entirely free to not complete this questionnaire.

Child's Gender: boy girl

I am the child's: mother father other (please specify):

For each of the following **English** language skills, please rate how well **you** can currently perform the skill.

	ability									
	not at all									very fluent
Understanding	1	2	3	4	5	6	7	8	9	10
Speaking	1	2	3	4	5	6	7	8	9	10
Reading	1	2	3	4	5	6	7	8	9	10
Writing	1	2	3	4	5	6	7	8	9	10

We would like these sessions to be most useful for you. Are there any topics, or questions that you would like us to cover in particular detail in the areas of reading? Please don't hesitate to offer any ideas.

Can you rate this session on how useful this session was for you?

Not at all useful Somewhat Useful Very Useful

1 2 3 4 5

Are there things we can do to improve the presentations?

Thank you again for your time completing this.

Parent Survey – R2

Participant Number: _____ Date: _____

- Did you attend Workshop 1 at the school? Yes No
- Did you read the brochure for Reading for Module 1? Yes No
- Did you visit the website? Yes No
- Do you recall the acronym PEER for reading strategies? Yes No
- Do you recall the acronym CROWD for reading strategies? Yes No

How often per week have you and your child done shared reading?

Never	Once a Week	2 Times a Week	3-6 Times a Week	Everyday

- Is your first language English Yes No
- Did you use any of the recommended strategies we talked about in Module 1 Yes No

If yes, what language did you use:

- ___ English
- ___ another language (name the other language _____)
- ___ both English and another language (name the other language _____)

THINKING ABOUT TODAY’S WORKSHOP (WORKSHOP # 2)

Can you rate this session on how useful this session was for you?

- Not at all useful Somewhat Useful Very Useful
- 1 2 3 4 5

Are there things we can do to improve the presentations?

Thank you again for your time completing this.

Parent Survey – R3

Participant Number: _____ Date: _____

- Did you attend Workshop 1 at the school? Yes No
- Did you attend Workshop 2 at the school? Yes No
- Did you read the brochure for Reading for Module 2? Yes No
- Did you visit the website? Yes No
- Did you look at any alphabet books and assess whether they were good or bad? Yes No
- Did you look at the poems from the handout? Yes No

	Never	Once a Week	2 Times a Week	3-6 Times a Week	Everyday
How often per week have you and your child read alphabet books together?					
How often per week have you and your child read poems together?					

Is your first language English Yes No

Did you use any of the recommended strategies we talked about in Module 2 Yes No

If yes, what language did you use:

____ English

____ another language (name the other language _____)

____ both English and another language (name the other language _____)

THINKING ABOUT TODAY’S WORKSHOP (WORKSHOP # 3)

Can you rate this session on how useful this session was for you?

Not at all useful Somewhat Useful Very Useful

1 2 3 4 5

Are there things we can do to improve the presentations?

Thank you again for your time completing this.

Parent Survey – R4

Participant Number:_____ Date:_____

- Did you attend Workshop 1 at the school? Yes No
 Did you attend Workshop 2 at the school? Yes No
 Did you attend Workshop 3 at the school? Yes No
 Did you read the brochure for Reading for Module 3? Yes No
 Did you visit the website? Yes No
 Do you recall the 8 skills of the reading taxonomy? Yes No
 Did you work on any of these 8 skills with your child? Yes No

How often per week did you and your child play games or activities related to one of the 8 skills of reading taxonomy?

Never	Once a Week	2 Times a Week	3-6 Times a Week	Everyday

Is your first language English Yes No

Did you use any of the recommended strategies we talked about in Module 3 Yes No

If yes, what language did you use:

___English

___ another language (name the other language_____)

___ both English and another language (name the other language_____)

THINKING ABOUT TODAY’S WORKSHOP (WORKSHOP # 4)

Can you rate this session on how useful this session was for you?

Not at all useful		Somewhat Useful		Very Useful
1	2	3	4	5

Are there things we can do to improve the presentations?

Thank you again for your time completing this.

Appendix E – Hypothesis Three Results: Analyses with $n < 10$ **CTOPP – Rapid Digit Naming**

Using Pillai's, the model for the CTOPP rapid digit naming showed a significant main effect of condition, $F(2,50)=7.99, p=.001$, qualified by a significant time by condition interaction, $F(4,100)=4.43, p=.002$. There was no significant main effect of time or attendance.

Noting that lower scores indicated better performance (faster speeds), post-hoc Tukey's b comparisons for the main effect of condition indicated that the CTOPP rapid digit naming scores for children in the socio-emotional ($M=59.54$) and reading plus technology ($M=71.91$) conditions outperformed those in the reading only condition ($M=95.33$). The reading plus technology and socio-emotional conditions did not differ from each other.

The interaction of time by condition indicates that across all three time points (pre, post, and long-term follow up), participants in the social condition consistently outperformed those in the reading plus technology condition and participants in the reading plus technology condition consistently outperformed those in the reading only condition. Additionally, for both the reading and reading plus technology conditions, performance increased (scores decreased) from pre- to post- to long-term follow-up ($M_{Tech(Pre)}=84.09$ s, $M_{Tech(Post)}=73.04$ s, $M_{Tech(Long-term)}=58.60$ s vs. $M_{Read(Pre)}=118.39$ s, $M_{Read(Post)}=87.12$ s, $M_{Read(Long-term)}=80.49$ s, respectively). However, participant performance in the social condition showed an initial decrease in performance at post-test with an increase in performance scores at long-term follow up ($M_{Soc(Pre)}=61.37$ s, $M_{Soc(Post)}=62.44$ s, $M_{Soc(Long-term)}=54.81$ s).

CTOPP – Blending

Using Pillai's, the model for the CTOPP phoneme blending (proportion of correct) resulted in a significant main effect of time ($F(2,49)=13.19, p<.001$). There was no significant main effect of

attendance or condition nor any significant interactions, largest $F(4,100)=1.51$, $p=.206$, for the time by condition interaction.

Post-hoc comparisons for the main effect of time indicated that CTOPP phoneme blending proportion scores increased significantly from pre-test ($M=.72$) to post-test ($M=.85$), but decreased below pre-test scores at long-term follow-up ($M=.54$).

SDQ Prosocial Subscale

Using Pillai's, the model for the conduct problems subscale of the SDQ indicated a significant main effect of time $F(2,67)=3.20$, $p=.047$. There was no significant main effect of attendance or condition, nor any significant interactions.

Post-hoc comparisons for the main effect of time indicated that conduct problem scores significantly increased from pre-test ($M=7.95$) to long-term follow up ($M=8.32$). There was no significant increase from pre-test to post-test ($M=8.18$), or from post-test to long-term follow-up.

SDQ Conduct Problems Subscale

Using Pillai's, the model for the conduct problems subscale of the SDQ indicated a significant main effect of time $F(2,66)=4.56$, $p=.014$. There was no significant main effect of attendance or condition, nor any significant interactions.

Post-hoc comparisons for the main effect of time indicated that conduct problem scores had decreased significantly from pre-test ($M=1.82$) at post-test ($M=1.38$) and long-term follow-up ($M=1.38$). There was no significant change from post-test to long-term follow up.

SDQ Emotional Symptoms, Hyperactivity, and Peer Problems Subscales

Using Pillai's, the multivariate models for the emotional symptoms, hyperactivity, and peer problems subscales of the SDQ indicated no significant main effects or interactions, largest $F(2,65)=3.00$, $p=.057$ for the main effect of time for the emotional symptoms subscale.