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Innovative Programs for Improvement in Reading Through Cognitive Enhancement:

A Remediation Study of Canadian First Nations Children

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Abstract

Forty-five Grade 3 students from a reservation school in Western Canada were divided into two remedial groups and a no-risk control group. One remedial group was given a classroom-administered cognitive enhancement program (COGENT) throughout the school year. The second group received COGENT for the first half of the year followed by a pull-out cognitive-based reading enhancement program (PREP). Children were assessed across phonological awareness, rapid naming, reading, and cognitive ability at the beginning of the year, midterm, and at the end of the school year. MANOVA results showed a significant interaction for reading measures, with students receiving classroom intervention over the school year making the greatest gains. Results are discussed in terms of group, remediation program, and individual participant improvements.

Reading development in Aboriginal children is currently a matter of considerable concern, because these children tend to lag behind their same-age peers in the general population (Department of Indian Affairs and Northern Development, 2005). Unfortunately, our knowledge about effective approaches to ameliorate children's chronic weaknesses in reading is limited. The present study was motivated by the challenge of improving the reading skills of Aboriginal children who have experienced several years of reading failure.

Much of the remediation research with poor readers in the general population has primarily focused on phonological awareness, because of the widely accepted view that phonological processing deficits are the major explanation for reading failure (e.g., Adams, 1990; Torgesen, Wagner, & Rashotte, 1994). However, there is growing agreement regarding the limitations of phonological awareness training studies. For example, in a meta-analysis of phonological awareness training studies, Bus and van IJzendoorn (1999) reported that phonological awareness explained approximately 12% of the posttest word reading variance and that the long-term effect was even smaller. Other explanations for reading difficulties have arisen, including rapid serial naming speed deficits (Schneider, Kaspert, Roth, Vise & Marx, 1997), short-term memory functioning (Gathercole, Willis, & Baddeley, 1991; Wagner, Torgesen, & Rashotte, 1994), child motivation, print exposure, and vocabulary knowledge (Whitehurst & Lonigan, 1998).

Research has also focused on improving reading skills through the application of cognitive-based training programs. Such programs are designed to improve the underlying cognitive skills necessary to become a successful reader—that is, the processes through which children learn to interpret, remember, manipulate, and make use of information (Das, Parrila & Papadopoulos, 2000). Cognitive training is based on learning through inductive rather than deductive inference. Accordingly, remediation is structured in such a way as to facilitate inductive inference and internalization of principles and strategies rather than deductive rule learning (Brown & Campione, 1996; Das, Mishra, & Pool, 1995) and, as such, is an alternative to the direct training of reading skills. One program, the *PASS Reading Enhancement Program* (PREP; Das, 2000) has been successfully used in both research and educational settings (Das, Naglieri, & Kirby, 1994; Papadopoulos, Das, Parrila, & Kirby, 2003). Another, relatively newer, program for younger children, *Cognition Enhancement Training* (COGENT; Das, 2004), has been piloted with a small group of children (Das, Hayward, Samantaray, & Panda, 2006a);

we shall describe both programs in the Method section, as both of them are examined in the present study.

Cognitive Remediation Programs

The two remediation programs to be used in this study, COGENT and PREP, are based on a cognitive model: Planning, Attention, and Simultaneous and Successive processing (PASS; Das, Naglieri, & Kirby, 1994). PASS proposes that cognition is organized in three systems. The first is the *planning* system, which involves the executive control system responsible for controlling and organizing behavior, selecting or constructing strategies, and monitoring performance. The second is the *attention* system, which is responsible for maintaining arousal levels and alertness and for ensuring focus on appropriate stimuli. The third system is the information processing system, which employs simultaneous and successive processing to encode, transform, and retain information. In *simultaneous processing*, the relationship between items and their integration into whole units of information is coded, whereas in *successive processing*, information is coded so that the only links between items are sequential in nature (see Das, Naglieri, & Kirby, 1994, for a detailed description). Several studies have shown that simultaneous processing relates strongly to reading comprehension, and successive processing to decoding words (Das, Nanda, & Dash, 1996; Kirby, Booth, & Das, 1996; Kirby & Williams, 1991), and that one of the primary characteristics of children with word decoding problems is poor successive processing abilities (Das, Mishra, & Kirby, 1994). The connection between successive processing and reading performance has been recently demonstrated in two studies of Canadian First Nations children (Das, Janzen, & Georgiou, 2006; Das, Hayward, Georgiou, Janzen & Boora, 2007); the children involved in the present study on the efficacy of remediation are from the same school population.

COGENT

The COGENT program was designed to integrate direct instruction in prerequisite reading skills and cognitive processing strategies. Following Gal'perin (1982), COGENT tasks were designed to encourage children to discriminate among different properties of objects or phenomena while at the same time establishing a basic unit of analysis for objects or phenomena. Furthermore, instruction is provided in such a way that general rules relating to similar objects or tasks are understood and combined in doing a particular task. Gal'perin explained that this type of instruction, known as systemic–theoretical instruction, ensures that the activity of the child consists of exploring the task or the problem under the guidance of the teacher. Thus, the aim of COGENT is to accelerate the mental development of children and to ensure that what is learned in one situation can be generalized and transferred to a novel situation. Transfer is ensured only when principles can be transferred rather than particular skills. Throughout COGENT training, PASS processes (attention, planning, and simultaneous and successive processing) provide the theoretical framework in which principles are learned. COGENT tasks require deliberate and controlled processing of information rather than automatic processing. The essence of COGENT training is inductive inference rather than learning deductive rules.

The COGENT program was piloted with 11 disadvantaged children living in an orphanage in India (Das, Hayward, Samantaray, & Panda, 2006). The children responded positively to program activities and the interactive learning ambience. Individual profiles showed that 10 of the 11 participants were performing at a higher level than expected for their age on a word reading task following the intervention. Examination of cognitive processing skills showed that 54% of the participants showed positive gains across the four PASS processes, and an additional 9% of participants showed gains in three of the four processes. These modest gains were achieved despite a significant number of constraining factors related to the administration of the program. For example, children were receiving instruction in English, a second language for all participants. Furthermore, only three of the five COGENT modules were completed due to the time needed to deal with these children's emotional and social difficulties related to their deprived backgrounds. Finally there was no control group.

PREP

Whereas COGENT is a newly developed program, PREP has been used in clinical and research situations for several years (see Brailsford, Snart, & Das, 1984; Carlson & Das, 1997; Papadopoulos et al., 2003). PREP was also developed out of the PASS theory and aims at improving information processing strategies, especially simultaneous and successive processing, which are believed to underlie reading. It was designed for use in one-on-one or one-on-two instructional settings for children who experienced failure in learning to read through typical classroom instruction. In contrast to COGENT, PREP avoids explicit teaching of specific reading skills. The program consists of eight tasks, which vary considerably, both in content and in what they require of the child. All tasks involve a global training component and, for most tasks, an additional, curriculum-related bridging component. The *global* component consists of structured nonreading tasks that require the application of simultaneous or successive processing strategies. These tasks also provide children with the opportunity to internalize strategies in their own way, thus facilitating transfer (Das, Mishra, & Pool, 1995). The *bridging* component involves the same cognitive demands as the global component and provides training in simultaneous and successive processing strategies that are closely linked to reading and spelling (Das, Naglieri, & Kirby, 1994).

The cumulative weight of evidence collected over 3 decades by researchers using PREP has produced positive results in improved reading performance on word reading, word decoding, and reading comprehension tasks and improvements in cognitive processing strategies in English (see Brailsford, Snart, & Das, 1984; Das, Mishra, & Kirby, 1994; Papadopoulos et al., 2003), Greek (Papadopoulos, Charalambous, Kanari, & Loizou, 2004), and Spanish (Molina, Garrido, & Das, 1997). With respect to First Nations children, a series of studies (Das et al. 2007; Janzen, 2000; Krywaniuk & Das, 1976) has showed subsequent improvements in reading skills.

Present Study

As previously mentioned, the present study was motivated by the challenge of improving the reading skills of Aboriginal children who have experienced several years of reading failure. Reading is probably the single most important skill that children need to succeed in our current educational system. Statistics reveal chronic school dropout among Aboriginal youth (Department of Indian Affairs and Northern Development, 2005). Although the reasons for such statistics are necessarily complex, one contributing factor to school failure is early reading failure and our education system's inability to properly identify and assist those with persistent reading disabilities. In fact, Aboriginal youth have reported that reading difficulties contributed to their decision to leave school (Dehyle, 1992).

The central objective of the present study was to evaluate the efficacy of a holistic, cognitive-based reading remediation program (COGENT) with Canadian First Nations children who had been identified as poor readers in Grade 3. COGENT was originally designed for children at the beginning stages of reading acquisition; however, we wished to test its efficacy with children who had remained poor readers after several years of reading instruction. We consider COGENT a precursor to PREP; thus, we were also interested in determining whether participation in COGENT better prepared children to benefit from PREP instruction. Moreover, COGENT can be administered to an entire class of 10 to 14 special needs children, whereas PREP is a pullout instructional program. These considerations determined the design of the present study.

Method

Design

We provided two classes of Grade 3 children with a classroom intervention using COGENT in the first half of the school year (October–December). In the second half of the school year (February–April), we repeated the COGENT program with one class of children (COGENT-COGENT group). For the other class of students, we provided PREP instruction in small groups (COGENT-PREP group). The control group consisted of students who did not need remedial work according to the school. Because the control was a *no-risk* group, we were able to examine whether our interventions stabilized or improved reading skills relative to an average reader peer group.

Participants

The initial group of participants in the study comprised 46 Grade 3 children attending a reservation school in Western Canada. All students resided on the reservation and had completed schoolwide reading tests (*STAR Reading Assessment*, *STAR Early Literacy Assessment*) and had been placed in classrooms based primarily on the basis of similar reading ability. This resulted in four classes of students. The children in two of these classes were able to complete the STAR Reading Assessment (Renaissance Learning, 2003a) and scored at or close to grade level, whereas the children in the remaining two classes were not able to complete the assessment. In such cases, the school then administered the STAR Early Literacy Assessment (Renaissance Learning, 2003b). All of these students were classified as "emergent" or "transitional" readers (see Appendix A for a description of these measures). Students were assigned to treatment groups based on their classroom assignments. The two classes of average or close to average readers made up the no-risk control group, and the two classes of poor readers made up the two experimental groups for this study. We had intended to randomly assign which of these two poor reader classes received the COGENT-COGENT or COGENT-PREP intervention; however, we respected one of the classroom teachers' preference that her students not be taken out of the classroom for additional instruction. Thus, her classroom was assigned to the COGENT-COGENT remediation condition, and the other class received the COGENT-PREP instruction. One student in the COGENT-PREP group left the school prior to the completion of the study, leaving the total number of participants at 45 (COGENT-COGENT, $n = 11$; COGENT-PREP, $n = 11$; No Risk, $n = 23$). The results of the STAR Early Literacy Assessment classified all children in the COGENT-PREP group as transitional readers. In the COGENT-COGENT group, 7 children were classified as transitional readers, and 4 children were classified as emergent readers. Participant demographics for each group are displayed in Table 1.

Tests and Procedure

All children completed phonological awareness, rapid naming, and reading tests, and children in the experimental groups also received cognitive assessments (described hereafter). Testing was performed at three time points: Time 1 (prior to any intervention),

TABLE 1
Participant Characteristics by Intervention Group

Variable	COGENT-PREP	COGENT-COGENT	No Risk
Number of Participants	11	11	23
Gender			
Male	5	7	9
Female	6	4	14
Age in months			
M	104.56	111.59	102.86
SD	7.17	8.16	5.69

Note. COGENT = *Cognitive Enhancement Training* (Das, 2004); PREP = *PASS Reading Enhancement Program* (Das, 2000).

Time 2 (end of first intervention period), and Time 3 (end of second intervention period). The specific testing protocols and time of testing are described below.

Phonological Awareness (Times 1, 2 & 3)

Phoneme Elision. The Phoneme Elision task from the CTOPP (Wagner, Torgesen & Rashotte, 1999) was used as a measure of phonological awareness. This task measures the extent to which an individual can say a word and then say what is left after dropping out designated sounds. The task consists of 20 items. For the first two items, the examiner says compound words and asks the examinee to say the word, and then say the word that remains after dropping one of the compound words. For the remaining items, the individual listens to a word and repeats the word, and then is asked to say the word without a specific sound. Participant's score is the number of correct responses. Wagner et al. (1999) reported test-retest reliability of .79 for Phoneme Elision for ages 8 to 17 years.

Word Segmentation. The Word Segmentation task was adopted from the CTOPP as well (Wagner et al., 1999). It consists of 20 items and measures the ability of an individual to say separate phonemes that make up a word. The examinee is told to repeat a word, then to say it one sound at a time. For example, the examiner tells the examinee to say "book" and then to say it one sound at a time. Participant's score is the number of correct responses.

Rapid Naming Speed

Object Naming. The Object Naming task from the CTOPP (Wagner et al., 1999) was used as a measure of rapid serial naming. Participants were required to state as quickly as possible the names of six objects (pencil, boat, star, key, chair, and fish). On two separate sheets, objects were arranged randomly in four rows, with nine objects in each row. Prior to beginning the timed naming, each participant was asked to name the objects to ensure familiarity. The two pages were timed separately, and the time in seconds to name the objects on both pages was the participant's score.

Color Naming. The Color Naming task was adopted from the CTOPP (Wagner et al., 1999). This RAN task consists of a set of six colors (blue, red, green, black, yellow, and brown) that are displayed in random sequence six times for a total of 36 stimuli. The individual is told to name the colors from left to right as quickly as possible, and the total time to complete the RAN task is recorded. Before naming the 36 colors, each participant was asked to name the colors in a practice trial.

Digit Naming. This task was adopted from the CTOPP (Wagner et al., 1999). This RAN task consists of a set of six digits (4, 7, 8, 5, 2, and 3) that are displayed in random sequence six times for a total of 36 stimuli. Subjects are asked to name the digits from left to right as quickly as possible, and the total time to complete the RAN task is recorded. Before naming the 36 digits, each participant was asked to name the digits in a practice trial.

Letter Naming. This task was also adopted from the CTOPP (Wagner et al., 1999). Participants were asked to name as fast as possible the names of six letters (a, n, s, t, k, and c). Letters were arranged randomly in four rows of nine letters in each row. As in the other naming speed tasks, children were asked to name the six letters in a practice trial before proceeding to the timed trials. The two pages were timed separately.

Reading (Times 1, 2 & 3). Three subtests of the Woodcock-Johnson Tests of Achievement (Woodcock, McGrew, & Mather, 2001) were used to assess reading ability. The *Word Identification* subtest involves the reading of individual words with some early items that require correct letter identification. The *Word Attack* subtest is a phonetic decoding task in which the child is required to pronounce nonsense words. In the *Passage Comprehension* subtest, students read short passages and identify a missing word. All reading tests scores were calculated using the accompanying computer scoring program. Scores in reference to a norm group reported for this paper were relative to age-norms.

Listening Comprehension (Times 2 & 3). The Woodcock-Johnson Tests of Achievement (Woodcock, McGrew, & Mather, 2001) *Oral Comprehension* subtest was used to assess oral comprehension. Students listen to short audiorecorded passages and provide a missing word using syntactic and semantic cues provided in the passage.

Cognitive Processing Tasks (Times 2 & 3). The Das-Naglieri Cognitive Assessment System (CAS: Naglieri & Das, 1997) is an individually administered test of cognitive functioning for children and adolescents ranging from 5 through 17 years of age that was designed to assess the four PASS cognitive processes (1) Planning, (2) Attention, (3) Simultaneous, and (4) Successive. The four PASS scales and the Full Scale standard scores are set at a mean of 100 and SD of 15. The Basic Battery, which was used for this research project, consists of eight subtests; two subtests per PASS scale. Descriptions of the subtests and scales as well as evidence for the reliability of the individual subtest scores and PASS Scale scores are provided in the manual (Naglieri & Das, 1997). The CAS has good psychometric properties, with average internal consistency alpha values for the Basic Battery as follows: Planning = .85; Simultaneous = .90; Attention = .84; Successive = 90; and Full Scale = .87.

The Planning subtests of the Basic Battery of CAS include *Matching Numbers* and *Planned Codes.* In the Matching Numbers subtest, children are presented with four pages containing eight rows of numbers. For each row, the child is instructed to underline the two numbers that are the same. The time and number correct for each page is recorded, and the subtest score is calculated by combining both time and number correct. The Planned Codes subtest contains two pages, each with a distinct set of codes arranged in seven rows and eight columns. At the top of each page is a legend, which indicates how letters relate to simple codes (e.g., A = OX; B = XX; C = OO). The child is instructed to fill in the correct code beneath each corresponding letter in any manner he or she chooses. The subtest score is calculated by combining both the time and number correct for each page

The Attention subtests of the Basic Battery of the CAS include *Expressive Attention* and *Number Detection.* For Expressive Attention, children 8 years and older are given three pages to complete. For the first page, the child reads color words (i.e., Blue, Yellow, Green, and Red). The words are presented in a quasi-random order. On the second page, the child is instructed to name the colors of a series of rectangles printed in aforementioned colors. On the third page, the color words are printed in a different ink color than the color the words name (e.g., the word Red may appear in blue ink). The task on the third page is for the child to name the color of ink while NOT saying the color word. The subtest score is calculated using time and number correct. The Number Detection subtest asks children to find the target stimuli (e.g., the numbers 1, 2, and 3 printed in an open font) among many distracters (e.g., the same numbers printed in a different font). The subtest score is a ratio of accuracy (total number correct minus the number of false detections) to total time taken to complete all items.

The Simultaneous subtests of the Basic Battery of the CAS include *Nonverbal Matrices* and *Verbal Spatial Relations.* Nonverbal Matrices items present a variety of shapes and geometric designs that are interrelated through spatial or logical organization. For each item the child is required to decode the relationships and choose the best of six possible answers to complete the grid. The subtest score is the total number correct. Verbal Spatial Relations measures the comprehension of logical and grammatical descriptions of spatial relationships. In this subtest, the child is presented with six drawings, arranged in a specific spatial manner, and a printed question. Then, the child is instructed to choose one of the six drawings that best answers the question within the 30-second time limit. The subtest score is calculated by adding up the total number of items answered correctly.

The Successive subtests of the Basic Battery of the CAS include *Word Series* and *Sentence Repetition*. In Word Series, the examiner reads the child a series of words and then asks him or her to repeat the words in the same order. This subtest uses the following nine single-syllable, high-frequency words: book, car, cow, dog, girl, key, man, shoe, and wall. The presentation rate is one word per second. The subtest score is the total number of words series correctly repeated. For Sentence Repetition the child is read 20 sentences aloud and is asked to repeat each sentence exactly as presented. The sentences are composed of color words (e.g., "The blue yellows the green"), which reduces the influence of simultaneous processing and removes semantic meaning for the sentences. The subtest score is the total number of sentences repeated correctly.

All children were tested individually by one of two examiners who were both trained in the administration of all protocols. The examiners were the same individuals who administered the intervention programs. To reduce bias, when testing experimental group children, we attempted to have the examiners test only those children who did not participate in their training program. In this way, examiners could test a child either from an experimental group or from the no-risk group, but not from their own remediation group. This attempt to reduce bias was mostly successful; however, school absenteeism necessitated that the same examiner who had given the remediation program to a few of the children also completed the posttest with those children. Listening comprehension was only administered at Times 2 and 3, rather than at all three testing time periods, due to an oversight. The cognitive assessment was administered to the experimental groups only at Times 2 and 3 because it was only for this time period that cognitive processing training differed between the two groups. The scoring of all tests was completed by a third person who had been trained in the administration and scoring of all measures but who was blind to group membership.

Instructor Training

The COGENT instructor, an elementary school teacher, was trained in COGENT administration at a 2-hour workshop conducted by the authors. He implemented the program following the procedures and scripts outlined in the manual. Furthermore, he met weekly with two of the authors, was observed, and was given feedback as to his implementation of the program. Classroom teachers assisted the instructor with classroom management throughout the COGENT training.

The PREP instructor was a certified speech–language pathologist who was trained by one of the authors and who administered the program according to the PREP manual specifications. In addition to biweekly meetings to discuss program implementation, two of the authors closely observed and oversaw the implementation of both programs.

Remediation Programs

COGENT. COGENT consists of five distinct modules, each designed to activate different aspects of cognition, language, and literacy. A brief description of each module is provided in the next section.

Module 1. The learning activities in this module are based on Luria's (1966, 1981) and Vygotsky's (1962) belief that language originally starts as instruction from an outside agent and then becomes internalized. The overall objective is to help children attend first to instructions from an outside agent (i.e., a teacher or facilitator) and then internalize those instructions. In terms of PASS theory, this module supports attention and simultaneous processing. Children work through a series of activities in which they first attend to instructions from a facilitator and then internalize those instructions. The child's task is to follow an increasingly complex set of instructions given by the facilitator that require attention to specific attributes, for example, "When you see an animal picture with a long name, squeeze your hand twice; when you see an animal picture with a short name, squeeze your hand once; when you see a picture of a flower, don't squeeze your hand." Children are also given opportunities to create their own exemplars in many of the activities.

Module 2. Aspects of phonological awareness and working memory are the focus of this module. Research has demonstrated that explicit practice in phonemic awareness supports word reading skills (see Catts & Kamhi, 2005). Children respond to and discriminate among smaller units of speech (i.e., words, syllables, phonemes) presented in progressively longer and faster sequences (e.g., "Clap when you hear the word that is different: gate, gate, *kate*, gate"). Children are provided with opportunities to develop their own strategies to remember the word, syllable, and phoneme sequences. In terms of PASS processing, this module enhances successive processing.

Module 3. This module was designed to enhance planning and simultaneous and successive processing. Activities focus on the understanding and use of language, particularly the understanding of syntagmatic and paradigmatic relationships following Luria (1981). Children demonstrate verb and spatial relationships expressed in sentences and short stories with animal figurines (e.g., "Show me: The kitten jumped onto the table. The kitten is hiding under the table."). Children also respond to factual and inferential questions asked by the facilitator about the sentences or stories (e.g., "What is the kitten doing?" "Why do you think the kitten is hiding?"). Again, children are given opportunities to create their own exemplars and share these with their classmates.

Module 4. Phonemic awareness is revisited in this module, but this time the focus is on onset and rime analysis, sound blending, and sound deletion. Tasks are presented to children in oral, reading, and writing formats, as practice in all three domains has been shown to be important in the development of word reading and reading comprehension (Catts & Kamhi, 2005). Children practice separating words into constituent syllables and phonemes and isolating beginning, middle, and ending sounds using puppets (e.g., "This mitten says '*s*'. Let's look at these three mittens; this mitten says *push*, and this one says *run*, and this one says *sing*. Which mitten goes with '*s*'?"). The primary focus of this module is simultaneous and successive processing.

Module 5. Letters need to be recognized quickly in order to read words quickly and automatically, so that cognitive resources are available for the comprehension of texts. There is reliable evidence that naming speed is related to the core abilities of reading (Neuhaus & Swank, 2002). In this module, we focus on automatization in the naming of shapes, colors, and objects, followed by letters of the alphabet (e.g., children are shown a single row of shapes and asked to name them as quickly as possible; adding rows of shapes increases the level of difficulty). In terms of PASS theory, Module 5 enhances successive processing. Children create their own exemplars when completing these activities and share them with their classmates.

The COGENT modules are divided into two parts; Part 1 of Modules 1–5 is completed first, followed by Part 2 of each module. The program is fully scripted, and the instructor completed all activities following the script and using the materials supplied with the manual. In most tasks, whole-class activities are followed by small-group activities to allow the facilitator to be certain that all children are acquiring the concepts being taught.

PREP. The PREP program consists of four successive processing and four simultaneous processing modules, each involving a global and a curriculum-related bridging component. The global components comprise structured nonreading tasks requiring the application of simultaneous or successive strategies, whereas the bridging components involve the same processing and strategy use in activities linked to reading and spelling. The remaining PASS processes—planning and attention—are required for all tasks. The program has scripted instructions for each task along with a system of scripted prompts for each global and bridging component to support and guide any child so that he or she can succeed with minimal assistance and maximal success. The first level of prompts remains quite general—for example, reviewing the instructions, helping a student figure out a way to remember the instructions. The third level of prompts is much more direct: A student may be asked to watch and see how another student successfully performs the task, or the facilitator may discuss a variety of ways to successfully complete the task. Program components are briefly described in Table 2.

The instructor administered the program following the instruction manual. The four successive processing components were completed first, followed by the simultaneous processing components. Children completed the program in groups of three to four.

Following pretesting at Time 1, the COGENT instructor set up a weekly schedule in the two classrooms to administer the COGENT program to all children in each class. Thirty-minute sessions were conducted three times weekly between October and December. Accounting for school holidays, cultural, and community events, a total of 24 sessions were completed for a total of 12 hours of instruction. At the end of this remediation period, children were again tested (Time 2).

The experimental group was then divided into two groups (by classroom); for one group, the COGENT program was readministered by the same instructor. Sessions were conducted twice weekly between February and April, for a total of 36 sessions and a total of 18 hours of instruction. The second group was divided into groups of three to four children and pulled out of the classroom for PREP instruction. Children were seen by the instructor twice weekly for a total of 36 sessions and a total of 18 hours of instruction. Make-up sessions were provided for any child who was absent at remediation sessions. Following the completion of the second remediation, children were again tested (Time 3). The total number of instructional hours between Time 1 and Time 3 testing was 30 hours for both experimental groups.

Results

We were primarily interested in meaningful and practical reading outcomes from this study as they apply to the remediation programs for children who have experienced reading failure over a 2- to 3-year period. Statistical analyses are usually most applicable to discovering differences with relatively large sample sizes to achieve adequate power. Given the small number of participants in our experimental groups and the no-risk control group, we anticipated that group statistics might not adequately capture group improvements. Thus, we present the statistical analyses first, followed by alternative methods of examining individual child improvements following remediation.

Statistical Analyses

For all analyses, the two treated groups were COGENT-COGENT and COGENT-PREP, grade matched with a no-risk control group. A pretest difference for age of participants was found (p = .004). The COGENT-COGENT group was about 7 months older than both the COGENT-PREP and No-Risk groups, although all children were in Grade 3 (see Table 1 for means and standard deviations).

Unless otherwise stated, standard or scaled scores were used to examine changes in dependent variables. Eta-squared (η^2) was also calculated to measure the magnitude of any significant effects and is reported here as the percentage of total variance that can be attributed to a specific effect. According to general guidelines for interpreting η^2, values between 0 and .25 would be considered small, values between .26 and .50 would be considered moderately large, and values above .50 would be considered large (Cohen, 1988). Post hoc differences were examined using the Scheffé test unless otherwise stated. Means and standard deviations for all measures at Times 1, 2, and 3 are displayed in Table 3.

Phonological Awareness Measures. A 3 × 3, Group (COGENT-PREP, COGENT-COGENT; No Risk) × Time (Times 1, 2, and 3) MANOVA with repeated measures on the dependent variables (Elision and Segmenting Words) showed a significant main effect for Time, Wilks' Λ = .557, $F(4, 39)$ = 7.759, p < .001, η^2 = .443; and Group, Wilks' Λ = .646, $F(4, 82)$ = 5.011, p = .001, η^2 = .196. The Group × Time interaction approached significance (p = .540). Univariate tests showed that the main effect was significant for both tasks, Elision (p < .001) and Segmenting Words (p = .026). At pretest, the No-Risk group showed a significant advantage over the COGENT-COGENT group on the Elision task. Following remediation, the No-Risk group showed a significant advantage over both the experimental groups. Post hoc tests for Segmenting Words revealed no significant difference among groups, which was also similar to pretest findings.

Rapid Naming Measures. A 3 × 3 (Group × Time) MANOVA with repeated measures on the dependent variables (alphanumeric and non-alphanumeric rapid naming) also revealed a significant main effect for Time, Wilks' Λ = .549, $F(4, 39)$ = 8.001, p < .001, η^2 = .451; and Group, Wilks' Λ = .679, $F(4, 82)$ = 4.372, p = .003, η^2 = .176. The Group × Time interaction was not significant (p = .327). Follow-up univariate tests showed that the main effect for Time and Group was significant at p < .001 for the alphanumeric task; however, the nonalphanumeric naming task was not significant for Time (p = .236) or Group (p = .064). Post hoc comparisons for alphanumeric rapid naming were consistent with pretest findings, where the No-Risk group was significantly faster than the COGENT-COGENT group when rapidly naming digits and letters.

Reading Measures. A 3 × 3 (Group × Time) MANOVA was con-

TABLE 2
Brief Description of PREP Program Modules and Components

Module	Global component	Bridging component
	Successive Processing	
Joining Shapes	Shapes (triangles, circles, squares, and hexagons) are arranged in rows on worksheets, and children must draw lines to join the shapes following a series of instructions and rules given by the facilitator.	Children are shown rows of letters on worksheets. Following a series of instructions and rules, children draw lines to join letters on the worksheets to make words.
Connecting Letters	Children are required to follow lines of differing colors to find which letters on the left side of the page are connected to letters on the right side of the page. Each stimulus card has five letter pairs. Children write or say the letter pairs. Children then repeat this procedure; however, the lines connecting letters are now in black ink. At the highest level of difficulty, the stimulus cards have connecting lines in black ink and include distractor lines.	Stimulus cards have colored lines with letters on the left and right sides of the line and dispersed along the line to form words. Children connect the letters and say or write the word spelled by the letters.
Related Memory	Children match front and back halves of animal pictures. Each stimulus card has three front animal halves in a column; one back half is depicted on the card. Children draw a line to connect the correct front and back half.	Children connect beginning and endings of word parts. Beginning word parts are presented in sets of three with one word ending. Only one choice creates a real word. Children draw a line between the correct beginning and ending word parts.
Window Sequencing	Children reproduce three- to six-item series of colored chips shown by the facilitator and then removed from view. At first, children reproduce series of different shape combinations (circles and squares) and color is held constant, then the series involve different color combinations (blue, yellow, black, and white) and shape is held constant. Finally, the series involve both color and shape variations.	Children are shown a series of letters that spell words (2- to 6-letter words) shown one at a time by the facilitator. Children then reproduce the letter series they were shown.
	Simultaneous Processing	
Tracking	Children are shown a line drawing of a village map along with a set of tracking cards that show the road pathway to specific houses and trees in the village. Each house can be number located, whereas trees are letter located. Children study the tracking cards and the map to locate house numbers or tree letters.	There is no bridging component for this task.
Shapes and Objects	Children categorize a group of pictured common objects into one of three abstract shapes that the object most closely resembles.	Children read, with or without facilitator support, a series of phrases or sentences written on stimulus cards and place the cards into one of three categories provided on written worksheets. Furthermore, one card in the series will not fit any category; children must also identify which card does not fit the categories.
Shape Design	Children must study a design presented for 10 seconds and reproduce the design using colored shapes. The shapes consist of large and small circles, squares, rectangles, and triangles in three different colors.	Children hear or read phrases that describe how to arrange two to five animals in relationships to each other. Children then complete the arrangement described in the phrase using animal pictures.
Sentence Verification	Children are shown a set of two or three scenic pictures that have similar content themes. For each picture set, there is a passage that describes only one of the pictures. Children then read the passage, with or without facilitator support, and find the picture that best matches the passage.	Children view a single picture scene and then read three to four sentences, only one of which describes the picture scene. Children choose which of the sentences best matches the picture.

Note. PREP = *PASS Reading Enhancement Program* (Das, 2000).

TABLE 3
Means and Standard Deviations for Phonological, Naming, Reading, Listening, and Cognitive Measures by Group at Each Time Point

	COGENT-PREP[a]						COGENT-COGENT[a]						No Risk[b]					
	Time 1		Time 2		Time 3		Time 1		Time 2		Time 3		Time 1		Time 2		Time 3	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
CTOPP Phonological Awareness[c]																		
Elision	6.27	1.55	7.00	1.09	6.82	0.75	5.27	2.50	6.64	1.96	7.82	3.80	7.70	1.36	9.57	2.63	9.78	2.49
Segmenting Words	9.09	2.70	10.00	1.61	10.09	1.04	8.55	2.02	10.18	0.75	9.82	0.75	9.91	1.20	10.78	0.60	10.52	0.79
CTOPP Rapid Naming[c]																		
Alphanumeric	7.54	1.65	8.50	1.87	8.41	1.55	6.04	1.88	7.20	2.29	6.59	2.26	8.58	2.01	9.93	1.83	9.80	2.11
Nonalphanumeric	6.00	2.38	7.00	3.73	6.95	3.44	5.68	2.15	5.82	3.09	5.32	2.32	7.91	2.50	8.15	2.56	7.33	2.75
WJ-III Reading[d]																		
Letter/Word Identification	82.09	5.26	85.45	6.23	86.73	5.38	70.09	12.74	75.64	10.51	82.18	13.42	95.17	7.48	97.30	6.80	96.48	6.52
Word Attack	89.00	9.37	90.55	9.57	92.64	5.52	81.27	9.71	88.00	10.66	92.45	13.97	101.91	6.50	102.91	7.32	105.61	5.81
Passage Comprehension	85.00	6.02	89.45	5.39	89.82	5.09	70.18	10.64	78.73	16.57	83.64	8.94	90.09	6.21	96.26	5.71	91.65	6.44
WJ-III Listening Comprehension[d]																		
Oral Comprehension			95.73	7.98	100.73	8.90			94.82	9.12	96.36	7.41			102.09	10.53	102.78	7.13
CAS Cognitive Processing[d]																		
Planning			87.91	10.38	91.45	11.42			88.20	10.46	85.10	8.05						
Attention			96.00	14.16	101.36	10.76			83.00	10.50	89.60	10.97						
Simultaneous			86.91	7.97	96.10	10.76			91.00	10.58	90.70	11.52						
Successive			90.18	9.66	90.55	4.25			99.70	11.75	95.90	18.70						

Note. COGENT = *Cognitive Enhancement Training* (Das, 2004); PREP = *PASS Reading Enhancement Program* (Das, 2000); CTOPP = *Comprehensive Test of Phonological Processing* (Wagner, Torgesen, & Rashotte, 1999); WJ-III = *Woodcock-Johnson Tests of Achievement,* 3rd ed. (Woodcock, McGrew, & Mather, 2001); CAS = *Cognitive Assessment System* (Naglieri & Das, 1997); Time 1 = pretest (September), Time 2 = posttest following first period of intervention (January), Time 3 = posttest following second period of intervention (May).
[a]n = 11. [b]n = 23. [c]Scaled scores (M = 10). [d]Standard scores (M = 100).

ducted with repeated measures on each of the dependent variables of interest (word reading, word decoding, and reading comprehension). The results showed significant main effects for Time, Wilks' $\Lambda = .217$, $F(6, 37) = 22.27$, $p < .001$, $\eta^2 = .783$; Group, Wilks' $\Lambda = .317$, $F(6, 80) = 10.34$, $p < .001$, $\eta^2 = .437$; and a Group × Time interaction, Wilks' $\Lambda = .348$, $F(12, 74) = 4.28$, $p < .001$, $\eta^2 = .41$. Follow-up univariate tests showed that the main effect for Time and Group was significant at $p < .001$ for all three dependent variables. Of specific interest was the Group × Time interaction, which was also significant for all three tasks: word reading, $F(4, 42) = 10.958$, $p < .001$, $\eta^2 = .343$; word attack, $F(4, 42) = 3.504$, $p = .014$, $\eta^2 = .143$; and reading comprehension, $F(4, 42) = 8.724$, $p < .001$, $\eta^2 = .294$. Moderate effect sizes were evident for both word reading and reading comprehension, whereas only a small effect size was found for word decoding.

Relationships among groups on reading measures were consistent with pretest findings; for word reading, the No-Risk group achieved higher scores than the COGENT-PREP group, which in turn had higher scores than the COGENT-COGENT group. On the word decoding task, the No-Risk group achieved higher scores than both the COGENT-PREP and COGENT-COGENT groups, and for reading comprehension, the No-Risk and COGENT-PREP groups achieved higher scores than the COGENT-COGENT group. However, the Group × Time interaction revealed that across all tasks, the COGENT-COGENT group made the greatest improvements. The COGENT-COGENT participants showed a linear trend in improvements for all three reading tasks from Time 1 to Time 3, whereas the COGENT-PREP group showed modest gains; however, this group was much closer to the average range for reading measures at pretest than was the COGENT-COGENT group. Figure 1 shows the interaction effects across all reading tasks.

Listening Comprehension Measure. The 3 × 2 (Group × Time) repeated measures ANOVA revealed a main effect for Group, $F(2, 42) = 3.293$, $p = .047$, $\eta^2 = .136$; however, pairwise comparisons were not significant. Moreover, the main effects for the Time and Group × Time interactions were not significant, $p = .079$ and $p = .384$, respectively. The results showed that all groups were within the average range on this task at Time 2 and Time 3 (see Table 3).

Cognitive Processing Measures. The cognitive measures were administered to the treatment groups (see Methods section) before and after the second intervention period, when one class repeated COGENT and the other class received small-group instruction with PREP. The 2 × 2 (Group × Time) MANOVA with repeated measures on the four PASS scales (Planning, Attention, Simultaneous, and Successive) revealed a main effect for Time, Wilks' $\Lambda = .477$, $F(4, 16) = 4.386$, $p = .014$, $\eta^2 = .523$. Univariate follow-up tests were significant for the Attention scale only ($p = .012$), where both groups improved from pre- to posttest. The main effects for the Group and Group × Time interactions were not significant: $p = .103$ and $p = .109$, respectively. Inspection of group means across the four scales revealed differential changes generally in favor of COGENT-PREP participants; however, the number of

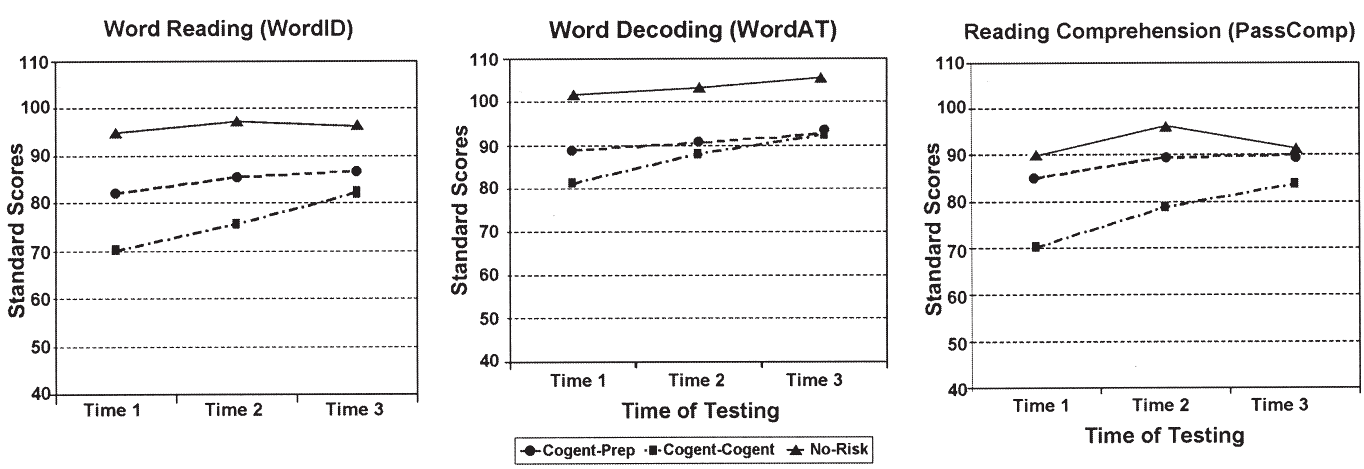

FIGURE 1. Standard score means for remediation and control groups at Times 1, 2, and 3 for word reading, word decoding, and reading comprehension. WordID = Letter/Word Identification subtest from the *Woodcock-Johnson Tests of Achievement*, 3rd edition (WJ-III; Woodcock, McGrew, & Mather, 2001); WordAT = Word Attack subtest from the WJ-III; PassComp = Passage Comprehension subtest from the WJ-III; Time 1 = pretest; Time 2 = posttest following first intervention period; Time 3 = posttest following second intervention period; COGENT = *Cognition Enhancement Training* (Das, 2004); PREP = *PASS Reading Enhancement Program* (Das, 2000).

participants was too small to achieve statistically significant differences (see Table 3).

COGENT Participant Improvements

To look more closely at the effect of the COGENT remediation in and of itself, we examined changes in reading for COGENT-COGENT group participants across two parameters: (a) reduction in the number of children who would be classified as the poorest readers based on percentile cutoffs, and (b) rate of improvement based on hours of instruction. We chose these parameters to evaluate the success of the intervention because Torgesen (2002) stated that for the most part, reading remediation programs for older children who are failing to read tend to stabilize the problem rather than close the gap.

First, we inspected percentile scores at Times 1, 2, and 3 to determine how many children remained at or below the fifth and tenth percentiles in word reading, word decoding, and reading comprehension. The results are displayed in Table 4. The majority of children were performing at or below these percentiles across all measures (word reading, n = 10 of 11; word decoding, n = 6 of 11; reading comprehension, n = 11 of 11) at pretest. At posttest, there remained only two to three children performing at or below these percentiles. The first period of intervention saw a greater reduction of children in these categories for the word decoding and reading comprehension tasks, whereas the second period of intervention resulted in the greatest reduction of children in these categories on the word reading task.

We next calculated the average gain in standard scores among reading measures based on hours of instruction. Torgesen (2002) conducted a meta-analysis of several reading programs that provided intensive (30–80 hours of instruction) remediation and reported that the average improvement across studies was a 2-point standard score point gain for word reading, a 3- to 4-point gain for pseudoword reading, and a 1.3 point gain for reading comprehension. We examined changes at the end of the first administration of COGENT, when children had received 12 hours of instruction, and at the end of the second period of intervention, when children had received an additional 18 hours of instruction (see Table 5). It can been seen that following 12 hours of COGENT instruction, improvement rates across all reading measures (word reading, word decoding, and reading comprehension) exceeded the benchmarks suggested by Torgesen. Students continued to show improvements beyond these benchmarks following the additional 18 hours of COGENT instruction in both word reading and reading comprehension.

COGENT Preparing Children for PREP

We originally designed this study to answer the question whether COGENT prepared children for PREP instruction. We were not able to answer this question due to the nature of the groups, with COGENT-PREP participants performing better than the COGENT-COGENT participants at pretest (see Table 3). This was confirmed when we inspected percentile cutoffs for individual children in the COGENT-PREP group. There were only 3 of 11 children performing at or below the fifth percentile at pretest, whereas more than half the children in the COGENT-COGENT group were performing below the fifth percentile. It was noted that at the end of the

TABLE 4
Number of COGENT-COGENT Participants Performing Below Selected Percentile Cutoffs on Reading Measures

	Time 1		Time 2		Time 3	
Measure	**< 10%ile**	**< 5%ile**	**< 10%ile**	**< 5%ile**	**< 10%ile**	**< 5%ile**
WordID	3	7	2	5	1	2
WordAT	3	3	0	1	1	1
PassComp	6	5	0	3	1	2

Note. n = 11. COGENT = *Cognitive Enhancement Training* (Das, 2004); WordID = Letter/Word Identification subtest of the *Woodcock-Johnson Tests of Achievement,* 3rd ed. (WJ-III; Woodcock, McGrew, & Mather, 2001); WordAT = Word Attack subtest of the WJ-III; PassComp = Passage Comprehension subtest of the WJ-III; Time 1 = pretest (September); Time 2 = posttest following first period of intervention (January); Time 3 = posttest following second period of intervention (May).

TABLE 5
Reading Standard Score Improvements for COGENT-COGENT Participants Based on Hours of Instruction for Each Remediation Period

		Reading score improvement		
Remediation period	**Hours of instruction**	**WordID**	**WordAT**	**PassComp**
October–December	12	4.6[a]	5.6[a]	7.1[a]
February–April	18	3.6[a]	2.5	2.7[a]

Note. COGENT = *Cognitive Enhancement Training* (Das, 2004); WordID = Letter/Word Identification subtest of the *Woodcock-Johnson Tests of Achievement,* 3rd ed. (WJ-III; Woodcock, McGrew, & Mather, 2001); WordAT = Word Attack subtest of the WJ-III; PassComp = Passage Comprehension subtest of the WJ-III.
[a]Standard score point improvements exceeding benchmarks to support utility of remediation programming suggested by Torgesen (2002).

study, no child in the COGENT-PREP group was below the fifth percentile on any of the three reading measures.

Discussion

We undertook this study to examine the efficacy of COGENT, an innovative, classroom-administered remediation program for cognitive and reading enhancement. We were interested in determining the benefits of COGENT for a group of First Nations children who had been poor readers for 2 to 3 years and were unable to benefit from general classroom reading instruction. A second purpose was to determine whether children who participated in COGENT would be better prepared to benefit from PREP, an individualized cognitive enhancement program. To answer these questions, we compared the performance of the no-risk control group (i.e., average readers) with the treatment children to see if they had improved significantly enough to "bridge" the gap or whether the interventions had merely "stabilized" their reading disabilities. Thus, our main purpose was not to compare the control and the treatment groups on improvements in reading. As mentioned earlier, the so-called control group was already performing within the average range. Here we discuss improvements across the measures used to evaluate outcomes.

With respect to phonological awareness, although there were no significant differences among groups on the Segmenting Words task, the experimental groups' means for the Elision task remained below the average range at the end of the study (see Table 3). It is possible that the particular measures of phonological awareness used in our study are not sensitive enough to reflect possible phonological difficulties or improvements, especially as word decoding skills, as measured by the Word Attack subtest, improved for the treatment groups from pre- to posttesting such that group means were within the average range. Perhaps the use of phonological awareness tasks such as the detection of alliteration (Bradley & Bryant, 1985), onset and rime discrimination, and sound deletion (Wagner, Torgesen, & Rashotte, 1999) might be better predictors for older children with persistent reading disabilities. We plan to investigate such possibilities in our next study.

On the rapid automatic naming (RAN) tasks, we had expected children participating in the COGENT-COGENT group to make greater improvements with respect to speed and automaticity, because Module 5 targeted these skills. However, relationships among groups remained similar over the course of the study, with the no-risk group performing faster than the COGENT-COGENT group, and the COGENT-PREP and COGENT-COGENT groups performing similarly. As pointed out by Georgiou & Parrila (2005), the variables that intervene in the presentation of a letter or digit and its articulation have yet to be fully identified, and their contribution to reading needs to be better understood.

We found that all groups were well within the average range on the listening comprehension measure, indicating that the treatment groups' difficulties appeared to be specifically related to their poor reading ability, and not to a general impairment in comprehension. This is of particular interest given that McArthur, Hogben, Edwards, & Mengler et al. (2000) have reported a 50% co-occurrence rate of language and reading disabilities. This raises questions regarding the specificity of language or reading disabilities when poor language development may precede a reading disability (Catts, 1993) and poor reading may contribute to language delays (Share & Silva, 1987). In future studies, we plan to conduct more rigorous tests of oral language skills, as knowledge of co-occurrence rates for First Nations children would inform both assessment and intervention practices.

We had expected the children who received the PREP remediation program to show greater gains on the cognitive processing measures because that program is focused on improvement in information processing abilities. As previously stated, inspection of the group means across the four scales did reveal differential improvements generally in favor of COGENT-PREP participants. It is likely a larger sample size and/or longer intervention period would have revealed significant group differences. In future studies with First Nations children we plan to further investigate the relationships between cognitive processing abilities, reading disabilities, and the effects of remediation.

In the next sections, we discuss the within-group improvements for the two intervention programs. There were several educationally significant findings regarding "bridging" and "narrowing" the gap for many children. In applying a stringent cutoff point to reading measures (i.e., a standard score of 90), we found that both intervention groups continued to fall below the average range in word reading and reading comprehension, but both groups were within the average for word decoding. We believe this is a noteworthy finding for First Nations children, who have been shown to have poor reading skills by comparison to Canadian national standards (Department of Indian Affairs and Northern Development, 2005).

Effects of COGENT

Examination of individual child records for COGENT-COGENT participants exceeded our expectations for children with long-standing reading failure. Our study found that even the weakest readers gained from the COGENT intervention, as shown by the significant decrease in children remaining below the fifth and tenth percentiles (see Table 4). The majority of children were performing at or below these percentiles across all reading measures at pretest. At posttest, there remained only two or three children at or below these percentiles across the three reading measures.

Tracking the effect of treatment by calculating improvement rates per hours of instruction, we found that following both intervention periods, the benchmarks suggested by Torgesen (2002) for remediation programs to be considered useful were exceeded (see Table 5). These are important findings, particularly related to word reading and reading comprehension, which have historically been the most difficult areas to effect change in children with long-standing reading failure. Given the population of children we worked with, in which there is a history of poor school attendance and differing cultural experiences related to home literacy, these improvements have an added importance.

Effects of PREP

As presented in the introduction, our previous research (Das et al., 2007) with First Nations children found that many of the children who participated in PREP instruction were prereaders, and we hypothesized that participation in COGENT, which was considered a precursor to PREP, may prepare poor readers for PREP instruction. However, demonstrating this became complicated, as very few of the COGENT-PREP participants were classified in the prereader categories using percentile cutoffs at pretest. We would have preferred giving the PREP instruction to the group of children who received only COGENT, as there were many prereaders in that group; however, we chose to respect the classroom teacher's preference to not have her students participate in pullout instruction. Although this made it impossible for us to answer one of our research questions, it did result in a good working relationship with the school, which is an important consideration when conducting research in community educational milieus.

PREP has been shown to be successful in supporting readers with both moderate and severe disabilities in the development of domain-general strategies for learning and reading (Das, Mishra, & Pool, 1995; Das, Parrila, & Papadopoulos, 2000). As discussed earlier, we had expected the PREP participants to make greater advances in cognitive processing abilities given the improvements found in earlier studies. However, these results were achieved when PREP was administered to one or two children at a time. In our present study, we administered PREP to groups of four or five students, and the instructor noticed that the children were often competitive, and there were behavior and conduct issues that needed to be addressed in every session. Clearly, PREP administration under these constraints could be detrimental to both learning and transfer of cognitive strategies. Furthermore, school absenteeism was an ongoing issue, and the instructor needed to conduct make-up sessions on a regular basis to ensure that all children completed the entire program. In previous administrations of PREP, competitiveness and consistency of attendance have not been identified as confounding factors. We hope to conduct a future study in which PREP is administered in optimal student/instructor ratios. Regular school attendance is an ongoing issue for First Nations children; this fact may pose problems for instruction of a type such as PREP, where children are encouraged to learn inductively, and the transfer of skills from one session to the next is an important part of this process. This is also an issue we wish to investigate in greater depth.

Limitations

We are encouraged by the results of our study; however, the replication of these findings with a larger experimental group will be important. As previously mentioned, groups were not randomly assigned, which may have led to some selection bias. As presented in the Results section, groups were not equivalent at pretest, with the COGENT-COGENT group being the lowest across many variables. An ideal solution to this selection problem would have been to conduct an analysis of covariance (ANCOVA). However, it would require larger sample sizes to use this form of analysis. Finally, given that PREP and COGENT were administered by different instructors, there is the possibility that some of the results could have been due to teacher effects. In terms of generalizability, we recognize that this study was conducted with a fairly unique population in terms of cultural background and schooling issues (e.g., high absenteeism). The success of COGENT despite this high absenteeism may speak for the robustness of the program; however, replication with other groups will ultimately determine the generalizability of the programs.

Conclusions

The ultimate goal of reading is to understand, enjoy, and learn from written text. Gough and Tunmer's (1986) model of reading proposed that the ability to comprehend what was read depends on both word recognition ability and language comprehension. We found with this group of First Nations children that oral comprehension abilities were well within the average range, and as word reading skills increased, so did scores on the reading comprehension measure.

In our present study, school absenteeism was a constant and ongoing issue. Although the reasons for school absenteeism are complex and beyond the scope of this article, it is nonetheless a very important consideration for researchers and educators who experience similar issues. Many remediation programs are implemented with the underlying assumption that consistency and continuity in program delivery and student learning is ensured by regular school attendance. Repetition of the COGENT program may have been a critically important feature of our study in this particular community in reducing the detrimental impact of school absenteeism on child learning. With the knowledge gained from this study, we are optimistic as we look toward future studies with First Nations children.

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APPENDIX

Description of Reading Tests Used to Assign Children to Grade 3 Classrooms

STAR Early Literacy Assessment

The *STAR Early Literacy Assessment* is a computer-adaptive assessment that measures student skills in seven content areas essential for reading readiness. These areas cover readiness, phonemic awareness, graphophonemic knowledge, phonics, structured analysis, vocabulary, and comprehension. Primary grade teachers can use the data provided by this assessment to monitor students' reading development and guide planning and instruction. There are no specific grade levels indicated for this test; instead, classifications are used based on scores within particular ranges: *Emergent reader*: scores 300–699; *Transitional reader*: scores 700–799; *Probable reader*: scores 800–900 (Renaissance Learning, 2003b).

STAR Reading Assessment

The *STAR Reading Assessment* is a computer-adaptive assessment that measures reading comprehension. Grade equivalency scores indicate the normal grade placement of students for whom a particular scaled score is typical. Administering the test takes approximately 15 min, and a teacher monitors students while they are taking the test (Renaissance Learning, 2003a).