

# Dyslexia Prevention in Multilingual Children: A Longitudinal Outcomes Study<sup>1</sup>

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## 1. Introduction

Reading research in the past three decades has confirmed the complex but symbiotic relationship that exists between reading and writing and oral language (Butler & Cheng, 1998). Developmental dyslexia, *a failure to learn to read that is not due to brain injury*, is now recognized as a problem in psycholinguistic processing (Wolf, 2001; Smythe & Everatt, 2002). In this disorder, a deficit in phonological processing affects reading decoding, while deficits in syntax, semantics, vocabulary, and reading decoding negatively impact on reading comprehension (Kamhi & Catts, 1989; Torgesen, 1998; deMontfort Supple, 1998, 2000). Reading deficits are known to profoundly retard vocabulary, verbal fluency, spelling, and general knowledge development (Cunningham & Stanovich, 1998; Lyon, 2003), and are also highly prevalent. For example, the American National Institute for Child Health and Human Development has found that reading disabilities or dyslexia is the most prevalent neurobehavioural disorder in children (one in five), affecting both boys and girls nearly equally (McElgunn, 1996).

Reading disabilities *do not* represent a developmental lag, but rather a *persistent* deficit that begins in kindergarten and continues to adulthood, with lifelong serious emotional, psychological, and economic consequences (Grossen, 1998; Alexander, 1999; Lyon, 2003). Shaywitz (1996), for example, has argued that dyslexia may represent the low end of a reading disabilities continuum rather than a separate disability, as they both stem from a language system disorder, namely, the phonological system. Others have demonstrated that reading weaknesses can develop into dyslexia or a reading disability when neglected (Mathes & Denton, 2002, Kirby, 2003). Regardless of their origin, reading disabilities represent a pernicious and chronic problem that needs to be addressed.

Students with intrinsic disorders impinging on language and/or cognitive development are the obvious reading disabilities victims, but less evident are minority group and minority language students (Lundberg, 2002) and those from low socio-economic status families (Cummins, 1984; Good-Erickson, 1985; Collier, 1989; Gamlin, 1989; Genesee, 1994; Cloud, 1994; Hus, 1997; Hawkins, 1998). In the population of children with significant reading disabilities, for example, there is a disproportionate representation of children who are poor, racial minorities, and non-native speakers of English (Good-Erickson, 1985; Lundberg, 2002). A Canadian government survey of children and youth conducted from 1996 to 1997, corroborated that children in lower income families suffer from higher frequencies of academic failure and grade retention (Statistics Canada, 1998).

## 2. Can reading disabilities be prevented?

Aided by advancements in technology, researchers around the globe, representing fields such as neuroscience, genetics, and psycholinguistics are now able to map out the neuroanatomy of dyslexia.

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They have found that common brain areas are affected (Stein, 2001; Wolf & Bowers, 2001; Eden, 2003) and common deficits are present despite variations in the phonological structures of different languages (Goswami, 2002; Eng, 2002). Non-invasive brain imaging techniques have shown that the brains of dyslexic individuals work differently from those of good readers (Shaywitz, Pugh, Jenner, Fulbright, Fletcher, Gore, & Shaywitz, 2000; Stein, 2001). An even more exciting discovery is that the brains of illiterate subjects show different resonancing images from those of literate subjects. This suggests that the reading experience modifies brain activity (Eden, 2003). Indeed, literacy deprived environments, and inadequate instruction, may actually underlie the development of dyslexia, and behaviourally, these children would not be discriminated from those with a genetic predisposition (Mathes, 2003; Reid Lyon, 2003). Researchers have also hypothesized that that brain activity of dyslexics can be 'normalized through quality instruction' (Mathes, 2003).

Researchers in dyslexia agree that reading competence is now more essential than ever, however, they have also given hope to many affected individuals and their families by emphasizing that treatment for reading disability is now available. Deficit strands that operate all through the continuum of reading disabilities have been identified, and it is now possible to predict at very young ages which children are at high risk for developing dyslexia (Mathes, 2003; Harrison, 2000; Goswami, 2000). Typically, very young children with poor phonological processing and phonological awareness skills later comprise the reading disabled children in classrooms everywhere. However, early identification and intervention studies, both small and large scale, confirm that the course of reading disabilities can be reversed (Swank & Catts, 1994; Swank & Larivée, 1998; Stuart, 1999; Hiebert & Taylor, 2000; Hus, 2001, Berninger, Vermeulen, Abbott, McCutchen, Cotton, Cude, Dorn, Sharon, 2003).

Leu (2000) points out that literacy is crucial for success, but advances in technology and the accompanying literacy exigencies make it difficult to predict our children's future literacy needs. Kirby (2003), notes the pivotal role reading plays in our society and adds that although the need for effective reading is essential, the number for whom learning to read is difficult, in both children and adult populations, is larger than ever. These realizations resonate around the globe (Lyon, 2003), and form the background for the present report. This outcomes study focuses on reading results of a three-year prevention/intervention early reading project that was initiated for young (kindergarten to grade 2) high-risk multilingual students from low socio-economic-status (SES) families, in an attempt to prevent dyslexia.

### **3. Dyslexia in the present study**

The use of the term dyslexia here is similar to that used by professionals in the United Kingdom (Peer, 2001; Smythe & Evertat, 2002). In this study *dyslexia* refers to serious reading and writing difficulties in multilingual or minority language children from low SES families, most of whom enter school with low levels of language of instruction proficiency and literacy experience. Scores of these students do not reach literacy levels needed to meet high school academic demands. Generally, they cannot overcome these grave literacy problems without specific intensive interventions. As these literacy deficits tend to persist and negatively impact on their academic journey, the children become functionally dyslexic, with deficits in phonological/phonemic development, word recognition/decoding, speed, fluency, and comprehension. Their deficits and their literacy course are behaviourally indistinguishable from those with genetic based developmental dyslexia. The more severe of them and those that are fortunate enough to have been signalled to a school professional, occupy the same special education classes, requiring the same tremendous amount of school resources, and all the while exhibiting slow and laboured progress, as the genetic-based dyslexic students.

### **4. School & student characteristics**

The project elementary school, part of one of the largest English school boards on the island of Montreal, is located in an economically depressed area, largely made up of an immigrant and second generation multiethnic population. The school is hemmed in by large thoroughfares, railways, a large industrial zone, and an old quarry, making access difficult.

English is the major language of instruction, and French is taught as a second language, in a 50/50-immersion arrangement, starting from kindergarten. Students at this school are mainly from families at the low end of the socio-economic spectrum and are non-native speakers of both school languages, English and French. Very few are ‘recent immigrants’. Because of their low SES and non-native English language backgrounds<sup>2</sup> these students constitute a high-risk population for development of dyslexia and academic distress. Indeed, reading disabilities and educational failure have traditionally plagued this school. Many students do not acquire language and reading proficiency to a degree that successfully supports an academic program, and up to graduation, many still remain at early phases in the reading and writing developmental continua (Hus, 2001).

## 5. The longitudinal study & outcomes research questions

The early reading project was both ‘an attempt to catch them before they fall’, that is, an attempt at *prevention* of dyslexia and *intervention* for those who were obviously lagging behind their class peers. The project objectives, described in Appendix 1, included an outcomes study. The entire kindergarten cohort formed the *Treatment Group* in this study. Students who were from a non-early reading kindergarten program and in grade 1 at the time the study was initiated formed the *Comparison Groups*. The outcomes research examined reading performance of both the Treatment Group and the Comparison Group at the end of their respective grades 1 and 2, and a sample of the comparison group was also examined at the end of their grade three. Appendix 2 shows the years and grades in which the two groups were studied. The project focused on reading in English, the major language of instruction in their academic setting.

The study asked these central questions, (1). Is early and continuous explicit reading instruction a noted advantage in literacy development and prevention of dyslexia in these high-risk multilingual students? (2) How do students without early and explicit reading instruction fare? (3) Are reading lag measures related to what children can actually do in reading? (4) How do students without experience in the school languages prior to kindergarten fare in literacy development? and (5) How do we know that the intervention really worked?

## 6. Method

### 6.1. Participants

The Treatment Group consisted of 62 students who were followed from kindergarten to grade 2. The Comparison Group included 49 students who were followed from grade 1 to grade 3. The entire study cohort, 111 students, consisted of almost equal numbers of boys and girls (54 boys and 57 girls). Since the program at the school is based on an ‘inclusive education’ philosophy, and the entire spectrum of learning aptitudes is represented in all classes, no students who participated from the start of the project were excluded.

### 6.2. Tests and materials

Reading testing for both the Treatment and the Comparison group was accomplished using a standardized class reading test (Young, 1999). In the first section, a word recognition task, children choose from a group of words the correct match to a picture. The second part, a comprehension-based task that precludes decoding, requires a word choice, out of six, to complete sentences. Test results were used to answer the first two study questions.

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<sup>2</sup> See Hus (2001) for a home languages overview.

<sup>3</sup> An attempt was made to use some kindergarten classes as a control group for this project, however, parents were up in arms, worrying that their children would miss out on the benefits of the Early Reading Project. It was therefore decided to include a comparison group by monitoring and measuring reading progress of the grade 1 students of the same school year (1999-2000). These students are similar in ethnic and linguistic background to the Treatment Group but had no early reading intervention in kindergarten or explicit reading instruction in later grades.

To examine the relationship between reading lags and actual reading performance, the third study question, a developmental reading continuum, First Steps (1994), was completed by a teacher for a sample of students. This instrument consists of six phases, each characterized by key reading behaviour indicators or descriptors which must all be mastered before the student is considered to have moved to the next reading developmental phase (Appendix 3 contains brief descriptions of the six phases).

Finally, to answer question (5), students' affect toward reading was examined using a reading attitude survey that asked students to rate the statement: "Reading is one of my favourite activities". The rating categories included, *strongly agree*, and *strongly disagree*.

### 6.3. Procedure

The Group Reading Test was given to the Treatment group at the end of their grades 1 and 2, and to the Comparison Group at the end of their grades 1 and 2 (see Appendix 2 for the corresponding school years). The test scores yielded **Reading Ages**. In addition **Reading Lags** were calculated for each student in both groups by noting differences between their chronological ages and their reading ages. These measures were used to calculate reading progress within groups and between groups.

Six Treatment Group students from the same grade 2 class and followed by the same teacher from kindergarten were chosen for further investigation using the First Steps Developmental Reading Continuum. Four were selected because they showed varied reading test results, and two because they were from recent immigrant families with no school language experience prior to kindergarten (to answer question 4). The teacher had no knowledge of these students' test results while completing the Continuum with the aid of a trained and experienced First Steps teacher who was also naïve as to the students' test results.

Finally, at the end of the same school year, a grade 2 Treatment Group class and one Comparison group class (now in grade 3) was asked to complete the Reading Attitude Survey. Percentages of students in each group that *strongly agreed* that reading was their favourite activity were calculated.

Comparison Group teachers were not trained or in any way questioned about their reading programs during the project years, but they were fully aware of the project's focus on explicit reading instruction with support in the lower classes. They were however free to ask for assistance at any time if they had concerns about specific students. They collaborated, nonetheless, when it came to testing their students and were interested in their test performance. Some tried to intervene with students who were obviously distressed, but they complained that there were too many of them.

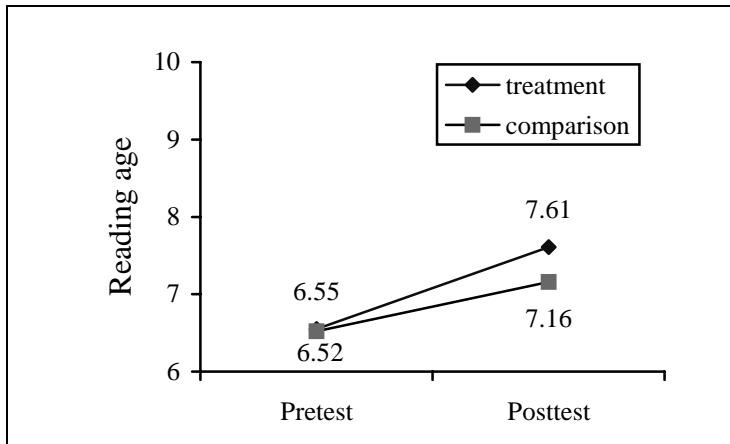
Test results were not given to teachers at any time, but students with serious lags, from either group, were placed on a list for additional help from resource teachers and tutors, and at the start of the following school year, their teachers were made aware of their reading distress.

## 7. Results

### 7.1. Reading test analyses of variance (ANOVAs)

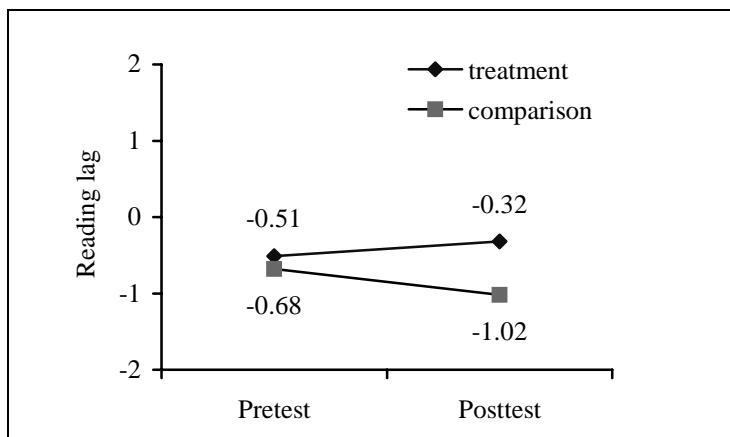
Repeated measures ANOVAs were performed using both Reading Ages and Reading Lags as dependent variables. Although boys and girls were compared in these analyses, no significant differences were found using either dependent variable.

Reading Age ANOVA results showed significant main effects of Time,  $F(1, 109) = 242.39$ , ( $p < .001$ ), and Group,  $F(1, 109) = 5.45$ , ( $p < .02$ ). A significant Time X Group interaction also occurred,  $F(1, 109) = 15.06$ , ( $p < .001$ ) indicating that the Treatment Group improved significantly more than the Comparison Group. The interaction effect is found in Figure 1.



**Figure 1.** Time X Group Interaction with Reading Age as dependent variable

Reading Lags ANOVA results showed that Time effect was not significant ( $p < .152$ ), but a significant Group main effect was found  $F(1, 109) = 13.50$ , ( $p < .001$ ). A Time X Group interaction was present, indicating that the Comparison Group lagged significantly more in Time 2 compared to the Treatment Group. Figure 2 illustrates this interaction effect



**Figure 2.** Time X Group Interaction with Reading Lags as the dependent variable.

### 7.2. Reading ages and reading lag distributions

The Grade 1 and Grade 2 reading lags were categorized to yield an overview of reading age and reading lag distributions in each group. Based on clinical experience four categories were established, each representing a range of Reading Lags. Those students whose Reading Ages were equal to or better than their real age, and those whose Reading Lags were equal to or less than one year represented reading levels that are ‘acceptable’ (labelled OK), i.e. it was felt that they could support an academic program in English. Reading Ages that lagged more than one year, and those that lagged more than two years, represented unacceptable reading levels in that they would not support an academic program easily or without intensive specific interventions. Children who require special education resource, for example, often exhibit lags of two to three years. Table 1 contains the categories and results for grade 1 and grade 2 respectively.

**Table 1.** Treatment and Comparison Group Grade 1 & 2 Reading Lag distributions

Groups	Age Range	Reading Age Range	Reading Age ≥ Real Age	Reading Age ≤ 1 year lag	Reading Age > 1 year lag	Reading Age ≥ 2 year lag	Percent reading OK
<b>Treatment (n=62)</b>							
<b>In grade 1</b>	6.8-7.7	5.7-7.8	8 (13%)	45 (73%)	9 (15%)	0 (0%)	86%
<b>In grade 2</b>	7.5-8.6	5.5-9.3	24 (39%)	28 (45%)	7 (11%)	3 (5%)	84%
<b>Comparison (n=49)</b>							
<b>In grade 1</b>	6.8-8.2	5.0-8.1	6 (12%)	33 (67%)	9 (18%)	1 (2%)	80%
<b>In grade 2</b>	7.8-8.8	6.1-8.8	3 (6%)	20 (40%)	23 (47%)	3* (6%)	46%

\*One of the students exhibited a three-year lag.

In grade 1, more treatment group students showed lags of less than one year than in the comparison group. Overall, however, the distributions are similar, with a large majority in both groups reading in the OK zone.

The Grade 2 distributions are radically different from those in Grade 1 in both groups. The treatment group's overall percent of students reading in the OK zone is relatively stable, i.e., similar to their grade 1 results. However, the distributions have now changed as the percentage reading at or above real age is markedly higher than in grade 1, indicating that many who showed a lag of less than one year, have now caught up to their standard test peers. The comparison group, on the other hand showed a radical drop in its overall percent of those reading in the OK zone, mainly caused by a significant change in the distribution from a lag of less than one year to a lag greater than one year.

### 7.3. *Developmental reading continuum<sup>4</sup> results*

Based on their reading test performance, six Treatment Group students were selected for these analyses, performed by a 'naïve' teacher (see section 6.3). Two of the six were inexperienced in the school languages prior to kindergarten (ESL) and had no literacy in any of their home languages (Asian languages for both). Two others showed reading lags, one lag was greater than one year, and the other was less than one year. The last two exhibited Reading Ages that were above their real ages. Information on the six, including their reading test results and their developmental reading continuum results, is presented in Table 2.

These results were consistent with the reading test results in that those who showed larger Reading Lags were less advanced on the First Steps reading continuum. The ESL students' results were comparable to or better than were those of students with English-language experience. Student 6, the youngest and multilingual, was the most advanced on the reading continuum. He exhibited an identical Reading Age as Student 5 for whom English was a major home language, but showed more advanced reading on the continuum, accounting for the larger difference between his real age and reading age. Student 3, in the earliest reading phase of the six, was the most compromised. This student was unable to acquire a second language despite a multilingual family environment (different first languages were reported for each parent, and each was used within the extended family context, as is French). This indicated the presence of an intrinsic language learning problem that obviously impacted on his reading.

<sup>4</sup> See Appendix 3 for a brief description of the phases and their major or key indicators.

**Table 2.** Reading Developmental Continuum Analyses for six Treatment students

<b>Student Profiles</b>	<b>Reading Test Result</b>	<b>First Steps Developmental Reading Continuum Phases</b>
<b>Student 1:</b> an ESL girl aged 7.10.	Reading Age: 7.3 Reading Lag: < 1 year	<b>Phase 2:</b> Experimental Reading. Missing: 1/7 key indicators to complete phase 3 (Early Reading).
<b>Student 2:</b> an ESL boy aged 7.8.	Reading Age: 8.7 Reading Lag: 8 months > real age	<b>Phase 3:</b> Early Reading. Missing: 4/9 key indicators to complete phase 4 (Transitional Reading)
<b>Student 3:</b> boy aged 8.2. functionally monolingual English (multilingual family)	Reading Age: 7.1. Reading Lag: > 1 year.	<b>Phase 1:</b> Role-Play Reading. Missing: 2/5 key indicators to complete phase 2.
<b>Student 4:</b> boy aged 8.1 and English is a major home language.	Reading Age: 7.4 Reading Lag: < 1 year.	<b>Phase 3:</b> Early Reading. Shows no key indicators in phase 4.
<b>Student 5:</b> boy aged 8.4 and English is a major home language.	Reading Age: 9.3. Reading Lag: 11 months > real age.	<b>Phase 3:</b> Early Reading. Missing: 4/9 key indicators to complete phase 4.
<b>Student 6:</b> a boy aged 7.6, multilingual; English not a mother tongue for both parents.	Reading Age: 9.3. Reading Lag: 1.9 years > real age.	<b>Phase 3:</b> Early Reading. Missing: 1/9 key indicators to complete phase 4.

#### 7.4 Reading attitude survey<sup>5</sup>:

One grade 2 class from the Treatment Group and one grade 3 class from the Comparison Group were asked to rate the statement, “Reading is my favourite activity”. The survey results are in Table 3.

**Table 3.** Reading attitude in Treatment and Comparison Group students

<b>Groups</b>	<b>Strongly Agree</b>
<b>Treatment (n = 22)</b>	82%
<b>Comparison (n = 26)</b>	39%

The results corresponded to the reading test results in both groups. Only 39% of students from the Comparison group, now in grade 3, strongly agreed that reading was a preferred activity. Their group showed the most reading distress while in grade 2. In contrast, 82% of students from the Treatment Group strongly agreed that reading was their favourite activity (see Table 1 in section 7.2 for the groups’ reading distributions).

## 8. Discussion

This outcomes study attempted to answer several questions. The reading test results were used to answer the first question: Is early and continuous explicit reading instruction a noted advantage in literacy development and prevention of dyslexia in these high-risk multilingual students? The reading lag distribution showed that by the end of grade 1, a majority of students Treatment Group were reading at an acceptable level. However, the real benefit of the intervention occurred by the end of grade 2, when many of the students who had lagged a year or less were now reading at their age level or better. This result would not have occurred had the intervention been limited to kindergarten and/or

<sup>5</sup> See Appendix 2 for the school years in which these classes were surveyed.

grade 1, a common approach among researchers (Hiebert & Taylor, 2000). The results obviate the fact that in this group consolidation of fundamental reading skill acquisition requires several years. They also underscore the importance of following high-risk students through the first grades, the years that form the foundation for reading acquisition, a base that determines later reading achievement (Hiebert & Taylor, 2000; Joshi, Dahlgren, & Boulware-Gooden, 2002; Mathes, 2003).

In addition, the findings highlight the importance of providing explicit instruction and continuous support to multilingual children who, unlike monolinguals, are burdened with sorting out several phonologies, arrive at school with limited literacy exposure and limited experience in the language used to teach reading. The cognitive load of these multilingual children increases substantially since they have to cope with reading instruction in English, a language with one of the most opaque orthographies in the world (Eng, 2002; Goswami, 2002). Consequently, explicit instruction in the alphabetic code, a need for many if English reading acquisition is to be successful (Swan & Lariveé, 1998; Harrison, 2000; Hiebert & Taylor, 2000), is indispensable for multilingual populations (Smythe & Everatt, 2002).

In response to the second study question – How do students without early and explicit reading instruction fare? – the Comparison Group was found to have serious problems. The majority of the members of this group were reading at a reasonable level by the end of grade 1. However, by the end of grade 2, 54% of them showed pronounced reading lags. Without explicit instruction, their grade 1 achievement, probably due to some exposure to word identification skills, deteriorated substantially. This finding, although unfortunate, adds to the growing evidence that multilingual children require direct instruction in reading skills if regression is to be avoided. The majority in this group is well on the way to developing dyslexia, or reading disabilities. Their academic futures are rather grim, considering that environmental factors, including poor instruction, actually cause differences in neurological and cognitive developments that later result in learning difficulties (Molfese, D., Molphese, V., Key, Modglin, Kelley, & Terrell, 2002; Molfese, D., Molphese, V., 2002). As Mathes (2003) notes, a reading problem is a reading problem, regardless of causation.

The third study question asked whether reading lag measures related to what children could actually do in reading, and the fourth asked how students without experience in the school languages prior to kindergarten fared in literacy acquisition. The developmental reading continuum, applied to Treatment Group students, was used to answer both these questions. The results were consistent with the reading test findings. Those students with greater reading lags were found to be less advanced on the Continuum. The use of Reading Lags, in addition to Reading Ages was helpful in explaining the reading development discrepancy between two students with the same Reading Ages, both above their real ages. The one reading well above his real age (Student 6), the younger of the two, was the most advanced of the six students. His case serves to remind us that as with language aptitude, ultimately individual talent determines how easily reading is acquired. However, one wonders whether the expression of this talent would have occurred without the three year explicit reading intervention.

The developmental reading continuum results showed clearly that given explicit instruction in the alphabetic code ESL students do acquire reading despite the initial limitations. Interestingly, the ESL student (1), with less than a year reading lag, outperformed the English monolingual student (3) who showed a lag greater than one year, and the most restricted reading development. This demonstrates firstly that given a supportive environment, ESL status, without individual learner problems, does not by itself result in reading distress, and secondly, that despite greater English oral language proficiency, individual learner problems do hamper reading acquisition. Again, one can only guess at how much greater a reading lag student (3) would have shown without the benefits of the three-year reading intervention. ESL student (2) demonstrated a reading advantage as his reading age was eight months above his real age, and well advanced in his reading development. Here again, despite an ESL status, this student outperformed one for whom English was a major home language. These ESL students' performance lend credence to the notion that early explicit reading teaching facilitates literacy development in ESL students by expediting the acquisition of the phonological system and the phonemic code, which in turn may actually facilitate their English language acquisition.

One of the project teachers noted that “as there is great diversity amongst students so we find great diversity among teachers. Each has a unique way of translating children’s capacities and needs, and

each develops a unique style in teaching approaches, selection of materials, and methodology. In this project the explicit teaching of the phonemic code and metalinguistic skills was integrated into a variety of language activities to promote *love* of reading [and writing].” To answer the last question – How do we know that the early and longitudinal reading intervention really worked? – and to evaluate this teacher’s claim, a measure of her children’s affect toward reading was needed. While a huge majority of the Treatment Group students strongly agreed that reading is their favourite activity, thus demonstrating their *love* for reading, a large majority of the Comparison Group students, most showing reading distress, strongly disagreed, clearly demonstrating ‘reading aversion’. These results tell the whole story, when reading is hard, it is hard to love reading.

## 9. In conclusion

Reading disabilities or reading incompetencies are often at the root of educational failure, behaviour disorders, and early school dropout in schools around the globe. The Quebec Ministry of Education, for example, has recognized the existence of this systemic reading pathology and its correlated increase in the number of functionally illiterate adults in Quebec society. The ministry’s Educational Plan<sup>6</sup> underscores the centrality of literacy acquisition in the new English Language Arts Program: "The new ...program for the elementary schools of Quebec is first and foremost a literacy program" (p.72). Literacy is described as the crucial "medium that makes active participation in democratic life and a pluralistic culture possible" (p.72).

The project and outcomes described here constitute an attempt at preventing dyslexia in high-risk multilingual students, so that they too could be productive and active participants in our society. This project’s merit lies in the fact that it attempted intervention across several grades rather than at one discreet point only. Hiebert and Taylor (2000) note that well designed and focused reading instruction during primary grades increases significantly high-risk students’ reading proficiency, and when intervention stops, early reading success begins to fade. This outcomes study lends further support to their findings.

Hiebert and Taylor conclude that, “for children who enter school with low levels of literacy, the ability to attain standards of highly proficient reading may depend on a series of differentiated interventions across the primary grades.” (p.477). Although intuitively sound, this conclusion merits investigation. Further research is needed to determine how long explicit reading teaching is required so that reading regression and dyslexia are prevented in this population. In addition, more research is needed to determine what are the best practices for these students at each developmental level. As Hiebert and Taylor suggest, reading instruction practices should be built on knowledge of fundamental reading processes, and aim at prevention rather than remediation, a central goal in this early longitudinal intervention project.

The focus of the Quebec English Language Arts program is on "the development of *fluent* readers and writers of oral, written and visual discourse..." (p.72). Indeed, lack of reading fluency is typical of reading disabilities (Fawcett & Nicolson, 2001), and fluency instruction in reading is recommended in any remediation plan (Torgesen, Rashotte, & Alexander, 2001). Further research is needed to determine what the critical period is for the acquisition of accurate, rapid, and fluent reading beyond which the reading process is destined to remain slow and laboured, in this population.

Finally, since vocabulary knowledge predicts reading comprehension, it is vital to determine the vocabulary needs of this population. Hiebert & Taylor (2000) ask how an early reading start can be translated into success in the middle grades. A follow-up intervention and outcomes study is planned to answer this crucial question as well as the research needs noted here.

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<sup>6</sup> As laid out in the approved version of the *Quebec Education Program* (2001).

## Appendix 1

### *Project objectives and major activities*

**i. In Kindergarten:** The Kindergarten program objectives included developments in socialization and play, general knowledge, and oral language. This project expanded the program by including reading and writing objectives to support reading and writing readiness for the first and second grades. This was achieved by introducing the phonological/orthographic code in explicit, structured daily lessons and activities using a commercial program designed by a teacher (Lloyd, 1998). Children from families with limited English language literacy received practice with the aid of trained older students.

**ii. In grades 1 and 2:** The language arts program, based on quality literature (as advocated by Whole Language approach), was integrated with explicit reading and writing activities to enhance development in phonology, syntax, morphology, semantics, and orthography.

**iii. Early identification of learning disabled students:** Those who were seriously struggling in literacy development compared to their class peers were identified and additional intervention was provided. Those who didn't benefit from the phoneme/grapheme approach (intellectually/cognitively impaired, and some with autism) were taught via a phono/logo based program developed at University of Toronto's Ontario Institute of Studies in Education (OISE, 1984).

**iv. Comparison Students:** Those who were in grade 1 at the time the study was initiated and who were from a non-early reading program, formed the Comparison Group. Their progress was used as a point of comparison to determine the advantages of explicit reading measures used in this project.

**v. Outcomes research:** Reading performance was examined in both the Treatment Group and the Comparison Group at the end of grades 1 and 2, and in a sample of the comparison group at the end of grade 3.

## Appendix 2

### *Treatment & Comparison Groups Project and Data Collection Years*

The Study Cohort size: N=111; Boys=54 & Girls=57

<b>Treatment Group (n=62)</b>	<b>Comparison Group (n=49):</b>
1999-2000=kindergarten	*1999-2000=grade 1
*2000-2001=grade 1	*2000-2001=grade 2
*+2001-2002=grade 2	+2001-2002=grade 3

The asterisks in this table mark the years that the two groups were both in Grades 1 and 2. These are the grades that are the major focus in this report. The plus signs indicate the year one class from each group completed a reading attitude survey.

## Appendix 3

### *First Steps Developmental Reading Continuum phases (in brief)*

**Phase 1: Role-Play Reading:** includes six major or key indicators. The reader displays reading like behaviour; shows natural interest in books.

**Phase 2: Experimental Reading:** includes five major keys: readers have some sight vocabulary; know print contains a constant message.

**Phase 3: Early Reading:** includes seven keys: Readers focus on accurate reading of unfamiliar text; reflect on text meaning.

**Phase 4: Transitional Reading:** includes nine keys: Readers integrate reading strategies; adapt to variety of texts, comment on and critique texts; read for pleasure.

**Phase 5: Independent Reading:** includes eight keys. Reading here is automatic; readers decode unfamiliar words; connect new information to own knowledge.

**Phase 6: Advanced Reading:** includes 18 keys: Readers are confident in handling new texts, and responding to authors; critical response to text and complexity; apply cultural and literary repertoire to construct meaning and recognize bias.

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