Early Numeracy Intervention Program
English Pilot Site Report
2010-2011
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The Early Numeracy Intervention Program (ENIP) is a provincial mathematics intervention program for students in grades 1, 2, and 3 who are identified as requiring support to improve their numeracy skills and advance their mathematical thinking. ENIP was piloted during the 2010-2011 school year in the Eastern School District and the Western School Board. This program is for students who are enrolled in the English mathematics program.

Three specially trained consultants work intensively with small groups of up to four students for each of the five daily 45 minute blocks of time over a period of approximately twenty to twenty-five consecutive instructional days. That means students attended a 45 minute period during each instructional day they are in the ENIP.

The Early Numeracy Intervention Program was conducted as an itinerant model; after approximately twenty to twenty-five consecutive instructional days, the Early Numeracy Intervention Program consultant moved to another targeted school to provide similar support. This cycle repeated throughout the school year. In consultation with the Early Numeracy Intervention Program coordinator, school boards determined the designated school which would offer the Early Numeracy Intervention Program each of the 5 cycles.

Participants

During the 2010-2011 school year a total of 255 students in 14 different schools took part in this intervention program. Every student that enrolled in the Early Numeracy Intervention Program made gains while they attended the program and the majority of students maintained those gains once the program was completed at their school.

Twenty-five Island teachers received First Steps in Mathematics, a professional development program designed to help teachers plan, implement and assess daily student learning and achievement of the provincially authorized mathematics curriculum.

Student Thinking

First Steps in Mathematics focuses on phases of student thinking. Throughout each of the phases there are a number of key indicators that students must master by the end of that particular phase. All children entering the Early Numeracy Intervention Program are administered a number of diagnostic tasks to determine how many of these indicators they have mastered prior to entering the program. At the end of the program the students are once again given a set of diagnostic tasks to measure gains they have achieved throughout the program.
As shown in the graph above, the majority of the students have mastered all the indicators in the Emergent Phase at the start of the program and by the end of the program most of the students have mastery of the indicators in the Matching Phase. Significant gains have also been made in the Quantifying Phase. A breakdown of what each indicator measures can be found in Appendix C of the site report.

The majority of the students had mastered between 7 - 15 indicators at the start of the program and by the end of the program the majority had mastered between 19 - 24 indicators. There were three students who were not present for the post-test which resulted in the three students being represented by only 7 indicators for the post test.
Introduction

The purpose of this report is to provide information about the first year of the provincial pilot of the Early Numeracy Intervention Program (ENIP) in Prince Edward Island during the 2010-2011 school year. The Early Numeracy Intervention Program aims to enable Prince Edward Island English students who are approaching grade level in the subject area of mathematics to gain the knowledge and skills so they can meet grade level expectations.

What is the Early Numeracy Intervention Program (ENIP)?

The Early Numeracy Intervention Program (ENIP) is a provincial mathematics intervention program for students in grades 1, 2, and 3. ENIP was piloted during the 2010-2011 school year in the Eastern School District and the Western School Board. This program is for students who are enrolled in the English mathematics program. The Early Numeracy Intervention Program is a balanced, effective, numeracy program that gives students the tools and the skills to solve problems logically, and to develop mental flexibility, independence of thought, self-efficacy, and the ability to persevere.

In this new century, expectations for mathematical literacy are high. They have to be! It is the gateway to critical jobs in science, engineering, and technology and current research shows that numeracy should begin well before children start school. Findings from six large longitudinal studies covering school entrance to grade 5 in England, the U.S., and Canada, found that the single most important factor in predicting later academic success is that children begin school with a mastery of early math and literacy concepts. Math proficiency is of paramount importance. Mastery of early math predicts not only future math achievement; it also predicts future reading achievement. (www.northwestern.edu/newscenter/stories/2007/11/duncan.html)

To become mathematically literate, our Island students must have opportunities to develop fluency with mathematical concepts, strategies, and procedures and they must develop a level of independence in their learning to empower them to use mathematics as a tool to understand their world.

Objective

The objective of the Early Numeracy Intervention Program is to improve children’s numeracy skills. The program will better enable children to catch up with their peers so that they can function productively in school, maintain gains achieved through this program, and continue to progress with regular classroom instruction.
**Rationale**

Young children already possess a rich assortment of mathematical cognitive abilities when they enter school. Through play with their toys and everyday family activities, they have spontaneously compared, sorted, arranged, and counted objects, explaining what they did and challenging others’ explanations. Cognitive and mathematical development, however, is also unpredictable in that it is very individual, and patterns of growth can be unruly: at times aligning with the child’s chronological age, or at other times, not.

**Chart 1: Development of Number Concepts Over Grades**

<table>
<thead>
<tr>
<th>Emergent Number</th>
<th>Early Number</th>
<th>Developing Number</th>
<th>Expanding Number</th>
<th>Established Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kindergarten</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade 3 on</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is a reality in classrooms across Prince Edward Island that a significant number of students struggle very early on with mathematical ideas and relationships. The research is clear, however; all students can learn mathematics (John Van DeWalle, 2005). Struggles with mathematics are not due to some inherent deficit, but to undetected misconceptions that hinder or even halt student progress. And yet, errors in thinking are a natural part of the learning process. At each phase of development, students form new beliefs, understandings, and abilities, but also typically retain or construct inaccurate mathematical ideas. Problems occur, however, when these errors in thinking are not detected by the teacher or fully rectified by the student. Clearly, the development of any intervention strategy for mathematics must be guided by the following considerations:

*How can we identify children’s strengths and weaknesses in early numeracy?*

*How can we use this information to inform the development of effective intervention plans?*

*What kinds of instructional support can we provide in grades 1, 2 and 3 so that fewer students require intervention later?*
Program Description

Overview

In the summer of 2010 three Early Numeracy Intervention Program (ENIP) consultants were hired (1 Full Time Equivalent (FTE) in the Western School Board and 1.58 FTE in the Eastern School District) to deliver the Early Numeracy Intervention Program. The Department of Education and Early Childhood Development Elementary Math and Science Specialist was appointed as the Early Numeracy Intervention coordinator. Under the direction of the ENIP coordinator, the three provincially specially trained consultants work intensively with small groups of up to four students for each of the five daily 45 minute blocks of time over a period of twenty to twenty-five consecutive instructional days. The school day for each cycle is broken down into five 45 minute periods. That means students attend a 45 minute period during each instructional day they are in the ENIP. Each 45 minute period is a complete teaching block.

All students entering this program are assessed using the same assessment tools. The assessment tools used are First Steps in Mathematics Diagnostic Tasks. The tasks are administered to students as part of the selection process for admission to the program (Pre Test) and following the intervention (Post Test).

The Early Numeracy Intervention Program was conducted as an itinerant model; after twenty to twenty-five consecutive instructional days, the Early Numeracy Intervention Program consultant moved to another designated school to provide similar support. This cycle repeated throughout the school year. In consultation with the Early Numeracy Intervention Program coordinator, school boards determined the designated schools which would offer Early Numeracy Intervention Program for each of the 5 cycles. See Appendix A for a copy of the 2010-2011 Early Numeracy Intervention Program calendar.

During the 2010-2011 school year a total of 255 students in 14 different schools took part in this intervention program. Every student who enrolled in the Early Numeracy Intervention Program made gains while they attended the program, and the majority of students maintained those gains once the program was completed. Teachers noted that students returned to the classroom with a sense of confidence and willingness to take risks in the mathematics classroom.
Pilot Participants

Figure 1: Student Participants with Eastern School District 1.0 FTE

Table 1: ESD 1.0 FTE School, Grade Level and Student Participants

<table>
<thead>
<tr>
<th>Cycle</th>
<th>School</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>West Royalty</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>Southern Kings</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Cycle 3</td>
<td>Mt. Stewart</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Cycle 4</td>
<td>Sherwood</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Cycle 5</td>
<td>Souris</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Gender of Student Participants 1.0 FTE

<table>
<thead>
<tr>
<th>School</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Royalty</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Southern Kings</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Mt. Stewart</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Sherwood</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Souris</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>59</td>
</tr>
</tbody>
</table>
Figure 2: Student Participants with Eastern School District 0.58 FTE

Table 3: ESD 0.58 FTE School, Grade Level and Student Participants

<table>
<thead>
<tr>
<th>Cycle</th>
<th>School</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>Glen Stewart</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>St. Jean</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Cycle 3</td>
<td>Glen Stewart</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Cycle 4</td>
<td>Prince Street</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Cycle 5</td>
<td>Glen Stewart</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>20</td>
<td>21</td>
<td>19</td>
<td>0</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 4: Gender of Student Participants 0.58 FTE

<table>
<thead>
<tr>
<th>School</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glen Stewart</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>St. Jean</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Glen Stewart</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Prince Street</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Glen Stewart</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>31</td>
</tr>
</tbody>
</table>
Figure 3: Student Participants with Western School Board

Table 5: WSB School, Grade Level and Student Participants

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>Queen Elizabeth</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>Parkside</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Cycle 3</td>
<td>Ellerslie</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Cycle 4</td>
<td>Greenfield</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Cycle 5</td>
<td>Alberton/St. Louis</td>
<td>1/1</td>
<td>3/4</td>
<td>4/3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>27</td>
<td>39</td>
<td>29</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6: Gender of Student Participants

<table>
<thead>
<tr>
<th>School</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen Elizabeth</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Parkside</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Ellerslie</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Greenfield</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Alberton/St. Louis</td>
<td>3/5</td>
<td>5/3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>48</td>
<td>47</td>
</tr>
</tbody>
</table>
Table 7: Provincial School, Grade Level and Student Participants

<table>
<thead>
<tr>
<th></th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Schools</td>
<td>79</td>
<td>92</td>
<td>80</td>
<td>4</td>
<td>255</td>
</tr>
</tbody>
</table>

Table 8: Gender of Student Participants

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Schools</td>
<td>118</td>
<td>137</td>
</tr>
</tbody>
</table>
Student Selection

Student selection for this intervention includes gathering and reviewing as much information about students as possible to identify those children who would benefit most by participating in the program. Selection strategies include:

- Consultation with classroom teachers
- Review of cumulative records
- Diagnostic tasks from First Steps in Mathematics©
- Inventory of pattern recognition, spatial sense, counting skills and number relationships

Student selection is determined through collaboration between the classroom teacher, Early Numeracy Intervention consultant, Department ENIP coordinator and parents, with the final decision resting with the Department Early Numeracy Intervention Program coordinator. Appendix B provides a detailed list of the Early Numeracy Intervention Program entrance criteria.

Work Students Do

The Early Numeracy Intervention consultants deliver a balanced and effective numeracy program that includes:

- Counting and grouping
- Subitizing activities
- Use of Ten Frames and Math Racks to build number relationships
- Problem Solving
- Reading and forming numerals
- Counting on
- Mental math, fact learning, mental computation
- Estimation
- Place value
- Understanding quantity (of number) e.g., 2 in 26 is 20
Transition Back to the Classroom

It is recognized that for an intervention program to be successful, there is a need for good first teaching in our classrooms. As students enter ENIP, and transition back into their classrooms, the following actions ensure each student’s continued success in mathematical learning.

- ongoing communication between classroom and Early Numeracy Intervention Program consultant
- sharing of pre and post assessment data between the Early Numeracy Intervention Program consultant, classroom teacher and school based student services team
- sharing of Early Numeracy Intervention Program consultant recommendations
- classroom teachers will be invited to view an Early Numeracy Intervention Program lesson

Measuring Individual Student Progress and Program Outcomes

First Steps in Mathematics

The Early Numeracy Intervention Program uses First Steps in Mathematics (FSiM) program offered through Pearson publishing. This program is based on five years of research from the Department of Education and Training in Western Australia. A team of university researchers and elementary teachers reviewed international research and augmented this research with more than 10,000 of their own student samples. Out of the research came six phases of mathematical thinking development through which students must progress.

Chart 2: Six Phases of Mathematical Thinking
Each phase describes the mathematical beliefs and skills that students possess as they enter the phase, the thinking and learning that preoccupies students during the phase, and the resulting new mathematical learning and skills they have at the end of the phase. Throughout each phase there are a number of Diagnostic Tasks. These Diagnostic Tasks are a series of short, easy-to-use tasks designed to uncover the critical misconceptions that typically interrupt mathematical progress. Validated through research, their precise focus quickly exposes a student’s development phase and the essential next steps needed for learning.

The Early Numeracy Intervention Program focuses on students who are working in the Matching, Quantifying and Partitioning Phases. As students meet all key indicators within each Phase, they progress into the next Phase.

**Chart 3: Grade Level and Phases Correlation**

<table>
<thead>
<tr>
<th>Pre-K</th>
<th>K</th>
<th>1 Oct/Nov</th>
<th>2 Jan</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emergent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Matching</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Quantifying</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Partitioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Throughout each of the phases there are a number of key indicators that students must master by the end of that particular phase. Below is a list of the indicators for the Emergent Phase. A complete list of the key indicators for all six phases can be found in Appendix C.

By the end of the Emergent Phase children:

- use bigger, smaller and the same to describe differences between small collections of like objects and between easily compared quantities
- anticipate whether an indicated change to a collection or quantity will make it bigger, smaller or leave it the same
- distinguish spoken numbers from other spoken words
- distinguish numerals from other written symbols
- see at a glance how many are in small collections and attach correct number names to such collections
- understand a request to share in a social sense and distribute items or portions
- connect the differences they see between collections of one, two and three with the number string ‘one, two, three …’
All children entering the Early Numeracy Intervention Program are administered a set of diagnostic tasks to determine how many of these indicators they have prior to entering the program. At the end of the program the students are once again given a set of diagnostic tasks to measure gains they have achieved throughout the program.

As shown in Figures 5, 6 and 7, the majority of the students have mastered all the indicators in the Emergent Phase at the start of the program, and by the end of the program most of the students have mastery of the indicators in the Matching Phase. Students have also made significant gains in the Quantifying Phase. A breakdown of what each indicator measures can be found in Appendix C.
Figure 6: Indicator Knowledge  Eastern School District

Figure 7: Provincial Indicator Knowledge
Figure 8, 9 and 10 illustrate the growth of students’ mathematical thinking in the Early Numeracy Intervention Program based on the number of indicators they have achieved as determined by the Pre Test and the Post Test. The majority of the students had mastered 7 – 15 indicators at the start of the program and by the end of the program the majority had achieved 19 – 24 indicators. There were three students who were not present for the post-test which results in the three students being represented by only 7 indicators for the post test.
Figure 9: Student Mathematical Thinking Growth
Western School Board

Figure 10: Student Mathematical Thinking Growth
Provincial
A random sample of students were retested in June to determine if the gains made while in the Early Numeracy Intervention Program were maintained. Students were not only able to maintain their mathematical growth but they gained on average 3.1 additional indicators.

**Consultants**

**Training**

The Department of Education and Early Childhood Development funded the Early Numeracy Intervention Program consultants training as FSiM facilitators. This extensive training gives the consultants the ability to train teachers in the FSiM program. The Department also supplied the Early Numeracy Intervention Program consultants with the necessary teaching resources for the Early Numeracy Intervention Program and the receiving school provided a teaching facility.

**Responsibilities of ENIP Consultants**

- Fulfill training and program requirements
- Maintain accurate records of student progress
- Attend and participate in teacher training sessions
- Liaison with the classroom teacher and administrator
- Work collaboratively with the Department Early Numeracy Intervention Program coordinator
- Engage in the professional learning community with other Early Numeracy Intervention Program consultants

**Teacher Training**

**Description**

Although the Early Numeracy Intervention Program was developed as a mathematical intervention program for students in grades one, two and three, with trained Early Numeracy Intervention Program consultants delivering the program, the importance of classroom teachers understanding and supporting students who have completed the Early Numeracy Intervention Program and who have transitioned back into the classroom is of vital importance. A key component of the Early Numeracy Intervention Program is to support individual classroom teachers in their understanding of the developmental framework that students move through as they learn key mathematical skills and concepts.
Professional learning sessions were offered to 25 grades one, two and three classroom teachers in selected Early Numeracy Intervention Program schools to support this pilot program. The purpose of this professional learning was to help these 25 teachers to:

- build or extend their own knowledge of the mathematics underpinning the curriculum
- understand how students learn mathematics so as teachers they can make sound professional decisions
- plan learning experiences that develop the mathematics outcomes for all students
- recognize opportunities for incidental teaching during conversations and routines that occur in the classroom

“Coaching” within the Early Numeracy Intervention Program

During the first year of the pilot, twenty-five teachers were selected by the school board/district to participate in First Steps in Mathematics (FSiM) professional learning. The FSiM program is a professional development program that is designed to help teachers plan, implement and evaluate the mathematics curriculum they teach on a daily basis. The FSiM program describes the key mathematical concepts that students need to understand to achieve the curriculum outcomes for their grade.

The three Early Numeracy Intervention Program consultants had regular contact with classroom teachers through informal conversations and formal meetings. The full time Early Numeracy Intervention Program consultant had direct contact with students for 225 minutes out of the 300 minute day. With no additional school responsibilities there was time during the day, before and after school, and during lunch for informal conversations and formal meetings to take place. Classroom teachers were also invited to view lessons delivered by the Early Numeracy Intervention Program consultants.

A wiki was created by the ENIP coordinator as an online collaborative tool for the Early Numeracy Intervention Program consultants and coordinator to utilize. This wiki houses all the ENIP forms and various mathematical instructional strategies and learning opportunities. The coordinator also provided a second wiki for collaboration and information among the classroom teachers involved with FSiM professional learning.

There are plans to include 25 additional teachers in First Steps in Mathematics professional learning during the 2011-2012 school year. Professional learning opportunities will be provided for the 25 teachers who participated in the First Steps in Mathematics professional learning during the 2010-2011 year.
Feedback

Parents, teachers and administrators were provided with evaluation questionnaires to fill out after students completed the Early Numeracy Intervention Program. The following are sample comments on the impact of the program on the child’s experience in the program.

Parents

… really likes playing the math games, he now asks to play the games instead of his other games.

… very much enjoyed the program and has definitely shown improvement since last year.

He is usually excited to do math homework and show me how much he knows.

She loves school this year, a total turnaround from last year. A confidence booster.

It has given her the confidence she needs.

I think it has made math easier to understand therefore making the school experience better.

My child now likes doing math.

She has discovered that math isn’t scary or boring but it can be fun and that she can do it.

At first … was not thrilled about being asked to take ENIP. However, since being enrolled, she has become enthusiastic about the program.

… loves math and seems to have developed quite a bit of confidence in this subject. When doing math homework, he jumps right in without hesitation, and gets right to work. He is genuinely enjoying math. Nice!

My child is really excited about the program. She loved being involved in it. She is a lot more confident in her approach to math. I noticed a big difference in her outlook on math.

He has been very positive about school and this program has really helped improve his confidence and shown much progress.
Teachers

Child was more confident, volunteered answers more often.

The students from my class who participated in the program gained a different attitude about math and their ability to do math.

More confident in math answers (i.e. Sharing with the class), vast improvement in written understanding, problem solving…

They are more independent during math class and demonstrate increased confidence.

They went from hating math class to being really excited for math class…

I find my students are more confident when it comes to math, no longer do they look down to avoid having to answer a question.

This program was perfect to give students the boost they need to achieve greater success…

Students are really proud when they have completed the activity and they know what to do.

Administrators

ENIP has had a VERYPOSITIVE impact on students, evident is an increased interest, self confidence and enjoyment in numeracy learning.

Children who said “I hate math” or “I’m not good at math” are excited and are gaining confidence because they are being taught at their level of understanding.

The ENIP teacher provides useful information to the classroom teachers (games and strategies).

We feel that ENIP has given these children in the program another opportunity to establish a solid foundation with the primary outcomes.

One mother said, “I don’t know what happened but my son says I really like math now, it makes sense.”

Initially teachers were very concerned about the impact morning ENIP sessions would have on their Balanced Literacy approach however their ability to adapt allowed things to work very well.

Thank-you so much! We are VERY PLEASED and welcome another opportunity for our children to participate.
Highlights/Successes of the Early Numeracy Intervention Program 2010-2011

Positive results of the 2010-2011 Early Numeracy Intervention Program include:

- Feedback provided from parents, teachers and administrators is very positive.
- All 255 students made gains in their mathematical thinking while enrolled in the program.
- Twenty-five Island teachers were provided with 4 days of professional learning. Two teachers stated that this was the best PD they have ever received.
- The Early Numeracy Intervention Program consultants and the ENIP coordinator developed into a strong and effective Professional Learning Community. There was significant professional growth by all those involved in the program.
- Discussions were held with all partners involved throughout the school year to collaborate, receive feedback and provide updates.
- The three ENIP Consultants and two staff from the Department of Education and Early Childhood Development were trained as First Steps in Mathematics facilitators.

Challenges

As with anything new, there are challenges to overcome along the way.

- Space in some schools was a challenge. The consultants were able to adapt and make the best out of every situation.
- The Early Numeracy Intervention Program consultants found it difficult at times to find the time to meet with classroom teachers to provide feedback and suggestions to these teachers.
- The first cycle was a challenge for the consultants in as everything was new: learning the FSiM material; working with students; and gathering resources. By the time the second cycle began things started to flow more smoothly.
- Professional Development sessions were held throughout the year for the consultants. During the meetings and PD days, same time was spent discussing and revamping forms and material.
- The schedule was revised several times throughout the year as concerns were raised and addressed.
Goals for 2011-2012

- To engage the Early Numeracy Intervention consultants in extensive study of the elementary math curriculum, and provide professional learning in the areas of coaching.
- To incorporate mathematical coaching into the Early Numeracy Intervention Program.
- To provide support, such as after school sessions, to Island teachers who participated in First Steps in Mathematics professional learning.
- To promote the philosophy of First Steps in Mathematics and the Early Numeracy Intervention Program to Island teachers and principals.

Final Comments

The first year of the Early Numeracy Intervention Program saw the program develop and change many times from the initial plan that was in place in August of 2010. Through extensive conversations, e-mails and presentations many of the concerns that were brought forward throughout the year have been addressed. The program will continue to grow and evolve to meet the needs of Island students as mathematics is becoming the learning focus of several Island elementary schools.

The addition of the mathematical coaching component of the Early Numeracy Intervention Program is another step forward in the growth of this student intervention program but we must remember that this is a student intervention program first.

The Early Numeracy Intervention Program, along with classroom mathematical teaching, will strongly support PEI students’ development to become mathematically literate. Our Island students must have opportunities to develop fluency with mathematical concepts, strategies, and procedures and they must develop a level of independence in their learning to empower them to use mathematics as a tool to understand their world.

The success of the Early Numeracy Intervention Program can be measured by the one little boy in grade two, who had to be taken out part way through a Physical Education class to participate in the program. Once the boy saw the Early Numeracy Intervention Program consultant from across the gym he ran over shouting...

“Yes, it’s math time!”
# Appendix A:
Early Numeracy Intervention Program (ENIP)
2010-2011 Cycle Dates

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation for ENIP Teachers</td>
<td>September 1, 2, 3</td>
</tr>
<tr>
<td>Training</td>
<td>September 7, 8, 9</td>
</tr>
<tr>
<td>Visit School</td>
<td>September 13</td>
</tr>
</tbody>
</table>

## Cycle 1
- School Information Meeting – Set up: September 13, 14, 15
- Pre-test: September 16, 17, 20, 21
- Cycle 1 Instruction Begins: Sept. 22
- ENIP Consultants PD Day: October 1
- Cycle 2 School Information Meeting: Week of Oct. 18
- ENIP Consultants PD After School: October 19
- Post-test: November 1, 2, 3

## Cycle 2
- Pre-test: November 4, 5, 8
- Cycle 2 Instruction Begins: Oct. 9
- FSiM Training ESD: Nov. 15
- FSiM Training WSB: Nov. 16
- ENIP Consultants PD Day: Nov. 26
- FSiM Training ESD: Dec. 2
- FSiM Training WSB: Dec. 3
- Cycle 3 School Information Meeting: Week of Dec. 6
- Post – test: Dec. 20, 21, 22

## Cycle 3
- Pre-test: Jan. 4, 5, 6, 7
- Cycle 3 Instruction Begins: Jan. 10
- FSiM Training ESD: Jan. 25
- FSiM Training WSB: Jan. 26
- ENIP Consultants PD Day: Feb. 1
- Cycle 4 School Information Meeting: Week of Feb. 7
- Post – test: Feb. 16, 17, 18

## Re-Test
- Cycle 2 Re-test: Feb. 22, 23, 24

## Cycle 4
- Pre-test: Feb. 25, 28 Mar. 1, 2
- Cycle 4 Instruction Begins: Mar. 3
- FSiM Training ESD: Mar. 8
- FSiM Training WSB: Mar. 9
- ENIP Consultants PD Days: Mar. 10, 11
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 5 School Information Meeting</td>
<td>Week of March 28</td>
</tr>
<tr>
<td>Post – test</td>
<td>Apr. 15, 18</td>
</tr>
<tr>
<td>Re-Test</td>
<td></td>
</tr>
<tr>
<td>Cycle 2 Re-test</td>
<td>Apr. 19, 20, 21</td>
</tr>
<tr>
<td>Cycle 5 Pre-test</td>
<td>Apr. 27, 28, 29 May 2</td>
</tr>
<tr>
<td>Cycle 5 Instruction Begins</td>
<td>May 3</td>
</tr>
<tr>
<td>ENIP Consultants PD After School</td>
<td>May 18</td>
</tr>
<tr>
<td>Post – test</td>
<td>June 10, 13, 14</td>
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<tr>
<td>Re-Tests</td>
<td></td>
</tr>
<tr>
<td>Admin Days</td>
<td>June 15, 16</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>June 17, 20, 21</td>
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<tr>
<td>Cycle 1</td>
<td>June 22</td>
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<tr>
<td>Cycle 3</td>
<td>June 23</td>
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<tr>
<td>Cycle 4</td>
<td>June 24</td>
</tr>
<tr>
<td>Admin. Days</td>
<td>June 27, 28, 29, 30</td>
</tr>
</tbody>
</table>
Appendix B:  
Early Numeracy Intervention Program (ENIP)  
Enterance Criteria

The ENIP will provide strategy based instruction for groups of up to four students “most at risk” of not meeting grade level numeracy outcomes in the regular English mathematics program. The following criteria will assist in determining which students will participate in this program.

1. Students in grades 1, 2 and 3 will be eligible for the five cycles offered throughout the school year.

2. Students who are struggling in numeracy and not meeting grade level curriculum expectations, but with a short term intensive numeracy program could make gains with the goal of reaching grade level.

3. Students in grade 2 and 3 entering the program should be in the Matching Phase or the Quantifying Phase of mathematical understanding as defined in the Developmental Framework of the First Steps Mathematics Program. Students in grade 1 entering the program should be in the Matching Phase of mathematical understanding as defined in the Developmental Framework of the First Steps Mathematics Program.

4. Students must demonstrate consistent/regular attendance.

5. Parents must give permission for their child to be in the program and make a commitment to daily counting and number practice.

6. Students should demonstrate a motivation to improve and exhibit on-task behavior.

7. Students that have had repeated resource or alternate interventions may not qualify for this program.

8. The following additional criteria will be considered carefully when selecting students for the program:
   • classroom teacher observations and classroom assessments
   • cumulative records
   • assessment data (Inventory of pattern recognition, spatial sense, counting skills, and number relationships), gathered by the ENIP consultants/ENIP teacher at the school level
   • diagnostic tasks from First Steps in Mathematics which target key understandings and expose critical misconceptions
   • specific instructional needs of students
   • class(es) profile

9. Final student selection is determined through collaboration between the classroom teacher, ENIP consultant/ENIP teacher, Department ENIP Coordinator and parents, with the final decision resting with the Department ENIP coordinator.
Appendix C:
Early Numeracy Intervention Program
Phases Indicators

Emergent Phase
By the end of the Emergent Phase children:

a. use bigger, smaller and the same to describe differences between small collections of like objects and between easily compared quantities
b. anticipate whether an indicated change to a collection or quantity will make it bigger, smaller or leave it the same
c. distinguish spoken numbers from other spoken words
d. distinguish numerals from other written symbols
e. see at a glance how many are in small collections and attach correct number names to such collections
f. understand a request to share in a social sense and distribute items or portions
g. connect the differences they see between collections of one, two and three with the number string ‘one, two, three …’

Matching Phase
By the end of the Matching Phase children:

a. recall the sequence of number names at least into the double digits
b. know how to count a collection, respecting the principles of counting
c. understand that it is the last number said that gives the count
d. understand that building two collections by matching one to one leads to collections of equal size and can ‘fix’ one collection to make it match another in size
e. compare two collections one to one and use this to decide which is bigger and how much bigger
f. solve small-number story problems which require them to add some, take some away or combine two amounts by imagining or pretend playing the situation and counting the resulting quantity
g. share by dealing out an equal number of items or portions to each recipient, cycling around the group one at a time or handing out two or three at a time
**Quantifying Phase**

By the end of the Quantifying Phase children:

a. without prompting, select counting as a strategy to solve problems such as: Are there enough cups? Who has more? Will it fit?

b. use materials or visualize to decompose small numbers into parts empirically, e.g., eight is the same as five with three

c. find it obvious that when combining or joining collections counting on will give the same answer as starting at the beginning and counting the lot

d. make sense of the notion that there are basic facts (4 + 5 is always 9 no matter how you work it out or in what arrangement)

e. select either counting on or counting back for subtraction problems depending upon which best matches the situation

f. can think of addition and subtraction situations in terms of the whole and the two parts and which is missing

g. write number sentences that match how they think about the story line (semantic structure) for small number addition and subtraction problems

h. realize that repeated addition or skip counting will give the same result as counting by ones

i. realize that if they share a collection into a number of portions by dealing out or continuous halving and use up the whole quantity then the portions must be equal regardless of how they look

j. understand that the more portions to be made from a quantity, the smaller the size of each portion

**Partitioning Phase**

By the end of the Partitioning Phase children:

a. So that by the end the partitioning phase children typically

b. make sense of why we can rewrite any whole number as the addition of other numbers

c. partition at least two and three digit numbers into standard component parts (326 = 300 + 20 + 6) without reference to actual quantities

d. count up and down in tens from starting numbers like 6 or 23

e. write suitable number sentence for the range of addition and subtraction situations

f. use the inverse relationship between addition and subtraction to make a direct calculation possible, e.g., re-interpret 19 – 13 as what you have to add to 13 to get 19 and counts forward from 13

g. can double count in multiplicative situations by representing one group (e.g., 4 fingers held up) and counting repetitions of that same group, simultaneously keeping track of the number of groups and the number in each group

h. find it obvious that two different shaped halves from the same size whole must be the same size and are not tricked by perceptual features

i. use successive splits to show that one half is equivalent to 2 parts in 4, 4 parts in 8, etc and expect that if you double the number of portions you halve the size of each portion

j. partition a quantity into a number of equal portions to show unit fractions and, given a particular quantity, will say that one third is more than a quarter
Factoring Phase

By the end of the Factoring Phase children:

a. use their knowledge that, for example, the 2 being in the tens place in 426 tells us that it refers to 2
groups of 10 to generate alternative partitions
b. sustain a correct whole number place value interpretation in the face of conflicting information
c. are flexible in their mental partitioning of whole numbers confident that the quantity has not changed
d. understand that a number can be decomposed and recomposed into its factors in a number of ways
   without changing the total quantity
e. find it obvious that if three rows of five is fifteen then both fifteen divided by three and one third of
   fifteen are five
f. can visualize an array to see, for example, that 5 blue counters is one third of a bag of 15 both because
   15 can be split into three parts each of five and also because one in each three counters will be blue
g. use the idea of splitting a whole into parts to understand, for example, that 2.4 is 2 + 4/10 and 2.45 as
   2 + 45/100
h. relate fractions and division, knowing for example, that 3/4 can be thought of as 3 4 and 3 things
   shared between 4 children has to be 3/4
i. know that they can choose between multiplication or division to make calculating easier
j. understand why grouping and sharing problems can be solved by the same division process
k. know, without calculating, that four piles of nine objects must be the same amount as nine piles of four
   objects, that is, see why multiplication of whole numbers is commutative
Operating Phase

By the end of the Operating Phase children:

a. represent common and decimal fractions both smaller and greater than 1 on a number line
b. generalize their understanding of whole number place value to include the cyclical pattern beyond the thousands and so can read, write and say any whole numbers
c. use their understanding of the relationship between successive places to order decimal numbers regardless of the number of places
d. use the cyclical pattern in the places to count forward and backwards in tenths, hundredths, thousandths including up and over whole numbers
e. are flexible in partitioning decimal numbers
f. realize that for multipliers smaller than 1, multiplication makes smaller and for divisors smaller than 1, division makes bigger
g. select an appropriate number of partitions to enable a quantity to be shared into two different numbers of portions (e.g., either 5 or 3)
h. construct successive partitions to model multiplication situations such as, I took half the cake home and then ate one third of that
i. produce their own diagrams to compare or combine two fractions, ensuring that both fractions (e.g., 2/3 and 1/4) are represented on identical wholes
j. split and recombine fractions, visually or mentally, to add or subtract, e.g., 1/2 + 1/4 is (1/4, 1/4) + 1/4 = 3/4
k. recognize the need to multiply in situations where the multiplier is a fractional number
l. can write suitable number sentences for the full range of multiplication and division situations involving whole numbers, decimals and fractions
References


