

## Promoting Emergent Literacy and Numeracy Through Quality Children's Literature

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### Introduction

This article describes an Action Research project involving a group of primary teachers who met with the author over a period of three years to explore a very specific genre of children's literature. The membership of the group varied over the three-year period; however, a core group of eight teachers remained constant throughout the project. The collaborative discoveries of this core group of teachers provide the basis for the professional discussion in this article.

Action Research, or Teacher Research, is an exciting form of research that promotes systematic reflection into the teacher's professional beliefs and practice (Hubbard and Power, 1993; Stremmel, 2002; Tertell, Klein and Jewett, 1998). It differs from traditional research in that it is exploratory, rather than experimental, and is largely controlled by the teacher participants. Evidence is usually of a qualitative nature and is intended to promote reflection on practice, rather than quantitative proof that one method, resource or activity is better than another. At its best, it promotes sustained inquiry into some aspect of the teacher's craft that is of particular interest to an individual, or a group of teachers. It can occur over a period of a few months or several years. The findings are always shared in some form with colleagues.

In this case, the action research project began with the question of how carefully selected books could be used to enhance the development of emergent literacy and numeracy in young children. Over the course of the three years, the teachers in this project developed a deepened understanding of how to conscientiously select and creatively use a very specific category of books that have particular value in promoting children's growth and development in the early years. . All of these teachers have subsequently shared their findings with colleagues through a variety of professional development activities ranging from staff meetings to presentations at local, provincial and international conferences.

### Starting with the children

The project we are discussing here began in a kindergarten classroom where, as a teacher, I observed children repeatedly select emergent literacy books that featured basic counting sequences. The children's favorite book was based on the familiar chant, *1 2 Buckle My Shoe* (Cranstroun, 1967). As I watched children 'read' this book I could see that their familiarity with numbers was

stronger than their familiarity with words. Consequently, the children seemed to have a security in 'reading' a book that began with numerals, especially when it led into a familiar, highly predictable chant that children could actually read. The frequency with which children self-selected this book during quiet reading time suggested that children benefited from this secure, natural entry into the magical world of print.

I was reminded of this experience when teachers in our school district questioned how to implement a comprehensive

early literacy program and a new provincial kindergarten program while also providing a balanced program based on children's natural interests and stages of development. These teachers were particularly concerned about having to borrow time from early numeracy activities that they believed were as important as early literacy activities for children in Kindergarten and Grade One.

This began an exploration of creative, interesting ways to maximize learning time by linking emergent literacy with early numeracy activities. Emergent literacy and numeracy imply the stage at which children are just "breaking

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through” into the formal language of reading and mathematics. Of particular interest was the impact of providing carefully selected children’s books, involving high levels of predictability and a focus on numbers, on children’s emergent literacy and numeracy skills.

Previous discussions linking literacy and numeracy focused on how children’s literature can be used to enhance mathematical concepts (Abrohms, 1992; Griffiths and Clyne, 1988; Leitzke, 1997; Schiro, 1997; Welchman-Tischler, 1992; Whitin and Wilde, 1992). Very little consideration was given to what I had observed in these Kindergarten children; i.e., how books that highlight number concepts might also be used to support early literacy.

In this Action Research Project, a group of teachers, working with Kindergarten and Grade 1 children in both regular and special education classrooms, met together over the course of several years to investigate how carefully selected books could be used to provide high support for both numeracy and literacy. It is hoped that the findings of this project will assist other teachers as they consider:

- what criteria to use in the selection of books that effectively support both emergent literacy and numeracy simultaneously.
- teaching strategies that maximize the potential of these books to promote both emergent literacy and numeracy.

### The Action Research Project

A collection of books, selected according to the criteria listed below, was distributed among the teachers involved in the project. (See references for a full listing of these books.) Teachers were encouraged by the author to use these books with the children in their classrooms to investigate the following major question:

*What is the impact of carefully selected resources (books, poems, chants, pup-*

*pets, finger plays, readers’ theatre, etc. involving high levels of predictability) on children’s emergent literacy and numeracy skills?*

Sub-questions included:

1. *Does the use of numerals seem to add one more source of predictability for children who need significant support in order to understand how print works; i.e., do children seem to develop concepts of print, phonemic and literacy awareness any more readily from these types of books?*
2. *Does the immersion of numerals into relevant stories, chants, poems seem to enhance children’s concept of number and number sense any more readily than counting activities that are not connected to text in this way?*
3. *Which resources (books, poems, chants), if any, seem to be more effective at enhancing both literacy and numeracy skills? In what ways (e.g., children seem more engaged, children take more risks when numerals are involved in this text)?*
4. *What activities seem to enhance the development of both literacy and numeracy skills when these resources are being presented?*
5. *Are there resources that seem to be more effective at enhancing literacy, but not necessarily numeracy skills and vice versa and in what ways?*

### The Importance of Emergent Literacy and Numeracy Experiences

An increased emphasis on providing emergent literacy and numeracy experiences for young children in our culture has created wide variations in children’s preparedness for Kindergarten and Early Primary programs. According to Cunningham and Allington (1994) children from literacy rich home and preschool environments come to school with a thousand-hour literacy advantage. Their research indicates that it is possible to help children without this advantage

catch up if a “high support” literacy classroom providing extra support in both phonemic and literacy awareness is provided for two successive years.

Phonemic awareness is defined as the ability to understand that spoken words are made up of a series of sounds. Phonemic awareness helps students understand the connection between spoken and written language, but the main focus is on the sounds of our language. Margaret Moustafa (1997) suggests that the most natural and spontaneous way to enhance children’s phonemic awareness is by immersing children in books that deal playfully with speech sounds through rhyme, alliteration and playful repetition.

Literacy awareness, on the other hand, refers mainly to how words look in print. In high support homes and classrooms, phonemic and literacy awareness are both emphasized. This combined emphasis helps children understand how sounds, letters, words and books ‘work’.

Case (1997) claims that, by the time they enter Kindergarten, young children who have grown up in poverty may be a full two years behind their more advantaged peers in these rationale counting skills. This early deficit has a cumulative effect and these children may never catch up, unless they are provided with additional support. Consequently, they are effectively barred from full participation in mathematics, science and other technical subjects that provide economic security in today’s world. Copley (1999, pp. 21-36) suggests that the nature of children’s mathematical experiences in preschool through second grade is highly predictive of later success in math, science and technology.

Mathematics educators say children need to be immersed throughout the day in a variety of numeracy activities that help them become as fluent with numbers as they are with letters, sounds and words. They remind educators that a number is a complex set of ideas and that

many programs in early primary do not allow time or opportunity for the development of these complex number concepts. *A program based largely on counting is simply inadequate to help children construct a broad sense of number* (Van de Walle, 1988,p.15). Books are not the only component of an effective emergent numeracy program; however, they provide a significant opportunity to immerse children in mathematical language and concepts in meaningful and interesting ways. They also provide an opportunity for children to link symbol awareness with their oral counting skills and their growing number sense while also promoting phonemic and literacy awareness.

### Criteria for selecting books

Books with high levels of predictability that encourage children to learn phonemic and literacy awareness in a natural way during the read aloud and shared reading activities were selected for this project. Young children also benefit from books that distinguish between the symbols of literacy and numeracy (numbers, letters and words) and focus on developing emergent numeracy concepts. Counting books in which numbers are part of the text help with this differentiation while also promoting numeracy development. Books that link number concepts both pictorially and symbolically on the same page help children make essential connections that are important for numeracy awareness. Books that highlight the benchmarks of 5 and 10, one more than, one less than, sets of objects in a variety of contexts, and purposeful one to one counting activities are powerful teaching tools in an early childhood classrooms. The professional references listed at the end of this article provide the basis for the following list of characteristics that teachers should be looking for in books promoting both literacy and numeracy simultaneously (Adams, 1990; Brown, 1999/2000; Copley, 1999; Howden, 1989; Hughes, 1983; Moustafa, 1997; Schiro, 1997).

### Books that promote literacy awareness include:

- subjects and topics that are familiar to the child
- high levels of support between pictures and text
- repetitive predictable language patterns
- the use of rhyme
- a balance between oral language and 'story' language
- clear print
- text that is located in the same place on each page
- simple sentence structures in which only one or two words change on each page
- relatively short overall length

### From the child's perspective, books that emphasize literacy awareness promote:

- one to one tracking of words
- prediction from one page to the next
- the concept of a word (e.g., distinctions between letters, numbers and words)
- an awareness of differences in word length
- rhyming words that emphasize elements of onset and rime
- sound/symbol awareness (e.g., alliteration)

### Books that provide high support for early numeracy development include:

- basic counting
- clear links between concrete, pictorial and symbolic representation of number
- promotion of basic number concepts from 1-10
- numbers seen in varied contexts and relations (various patterns, relations between two or more parts of a whole, relations of one number to others; e.g., one more than, one less than.)
- complex counting (e.g., counting backwards; counting by 2s, 5s, 10s; higher numbers)
- benchmarks of 5 and 10
- problem solving

### Quality children's literature

Books may meet many of the criteria above but still not qualify as quality children's literature. Books that are too predictable and skills-oriented can become mind numbing, rather than stimulating, to young children. The effect of such overly repetitive text can be a devaluing of both literacy and numeracy, removing the challenge, the intrigue, and the delight of well-crafted text (Brown, 1999/2000). Quality books contain topics of interest to young children, rich vocabulary, aesthetically pleasing and meaningful illustrations, elements of surprise and anticipation (Hellwig, Monroe, Jacobs, 2000).

Child psychiatrist, Bruno Bettelheim (1977), encourages teachers to select books that enchant children and enrich their lives. Children's literature should add meaning to children's lives, helping them find solutions to the problems that perturb them. Schiro (1997) contends that teachers should become more critical in selecting quality literature that also promotes quality mathematical thinking. All of the above criteria were considered and integrated into a checklist that was used by the teachers in this project to evaluate the books that were introduced to the children in their classrooms and to record activities that worked well with each book.

### What Did We Discover?

One of the first issues that emerged was whether there was a 'correct' sequence for introducing and using the materials in the classroom. Schiro (1997) recommends a sequence of *experience, respond, reflect and create* as a process for integrating children's literacy and numeracy in the classroom. In the Kindergarten and Early Primary classrooms involved in this study this sequence seemed to naturally occur in the pattern described below. This pattern would normally take between five to ten days.

**Experience:** Teacher reads the story aloud, recording repetitive chants and rhymes on chart paper for shared and repeated readings.

**Respond:** Children relate to the text in a personal way, bringing meaning to it from their own experiences.

**Reflect:** Children, with some guidance from the teacher, begin to consider and extend the literacy and numeracy concepts that are featured in this story.

**Create:** Children act on the story in some way that is personally meaningful.

**Examples from a Kindergarten Classroom**

Examples of how this sequence unfolded in one classroom with two different books, *Let's go visiting* (Williams, 1998) and *Counting my friends*, (Hooge, 1993) are outlined below and summarized on Table 1.

**Let's go visiting (1998).** Written by Sue Williams; Illustrated by Julie Vivas.

**Experience:** Teacher reads the story aloud, putting 'post it' numerals beside the number words; e.g.,

**1** *One brown foal is ready to play.*  
The 'post it' number were added to address one of the previously noted criteria (clear links between concrete, pictorial and symbolic representation of number). After several readings, the teacher records the story on chart paper and it is read as a shared reading:

*Let's go visiting. What do you say?*

**1** *One brown foal is ready to play.*

*Let's go visiting. What do you say?*

**2** *Two red calves are ready to play.*

**Respond:**

*Literacy activities:*

Teacher asks the children if the book reminds them of another book. When they mention *I Went Walking* (Williams, 1989), the teacher reads this book both as a read aloud and a shared reading.

*Numeracy activities:*

Teacher and children use sets of animals to replicate the 6 sets of animals from the story (plastic or stuffed preferably, but pictorial representations also work). Together they count all the animals in the set (21).

**Reflect:**

*Literacy activities:*

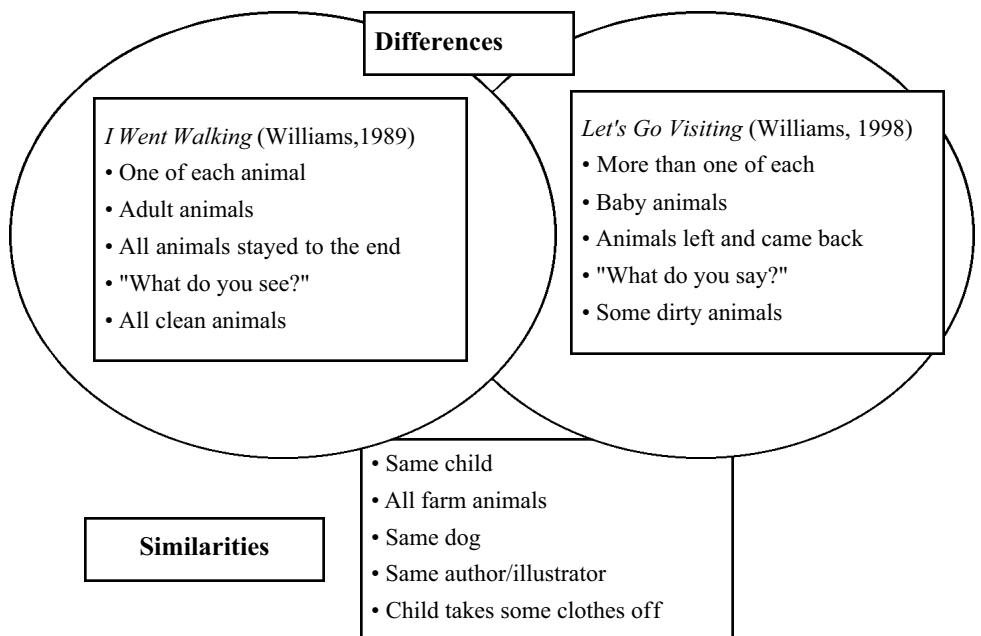
Teacher asks the children to consider the similarities and differences in the two books by Williams (*Let's Go Visiting* and

*I Went Walking*). Children and teacher create the following Venn diagram.

*Numeracy activities:*

Teacher helps the children discern that each new animal set joining the fun is one more than the last set: 1 brown foal, 2 red calves, 3 black kittens, 4 pink piglets, 5 green ducklings, 6 yellow puppies. The children ask the teacher why the author stopped at 6 sets of animals; *Why didn't she stop at 5 or go on to 10?*

After counting all the animals in the set, the teacher creates a number line to 21, large enough to accommodate the plastic, stuffed or pictorial animals. Subtraction questions are posed and children practise counting backwards on the number line; e.g., how many animals are left if the piglets go home? (e.g. *We have 21 animals altogether. If we take away the 4 pink piglets, how many animals are left?*  $21-4=17$ ); *if the ducklings fly away* ( $21-6=15$ ). The concrete animals are used to model this take-away activity, linking concrete materials and symbolic representation of take-away problems.



**Create:***Literacy activities:*

Using interactive writing, a cooperative list of baby and adult farm animal names that children can illustrate is created.

Teacher and children use shared or interactive writing to build more words from the onset/rime pairs: play/say (bay, day, hay, jay, Kay, lay, may, pay, way, stay, away)

*Numeracy activities:*

Children create 'post it' note number stories for the animals on each page; e.g.,  $1 + 1 = 2$ ;  $2 + 1 = 3$ ;  $2 + 2 = 4$ ;  $3 + 3 = 6$ .

Teacher and children make number stories with different combinations of animals; e.g., piglets and ducklings ( $4 + 5 = 9$ ), foal and calves ( $1 + 3 = 4$ ), kittens and puppies and foal ( $3 + 6 + 1 = 10$ ). The children create the number stories with the concrete animals, then the teacher uses shared or interactive writing to collaboratively create number stories on chart paper or blackboard. As a follow up, children create their own Animal Number Story Books, using animal stamps, animal cutouts, or their own drawings to illustrate.

*Counting my friends* (1993). Written by Selma Hooge; Illustrated by Michael Martchenko

**Experience:** Teacher reads the story aloud several times, encouraging children to chime in on the number words and the rhyming words; i.e., *One friend and I make two. Our bikes are green and blue.*

**Respond:** Children compare this book to other books illustrated by Robert

Martchenko (students thought this was a book by Robert Munsch since Martchenko is so often an illustrator in his books). Children consider how many friends they have and share the number with a friend. They are asked *How many children had the same (equal) number? How many had different numbers?*

**Reflect:***Literacy activities:*

Children list the names of their friends and share the list with a buddy.

Children listen as the teacher reads the book to identify all words that rhyme. Teacher lists the rhyming pairs. Children sort the rhyming pairs into two groups: words that rhyme and look alike (phone/alone; three/tree; five/drive, nine/line); words that rhyme but don't look alike (two/blue; four/more, six/tricks, seven/Kevin, eight/wait, ten/again).

*Numeracy activities:*

Teacher makes a set of characters from simple paper cut-out outlines. Each one has different colour hair and outfit. She also creates a large ten-frame (with chart paper, white plastic tablecloth, etc.). The story is reread and each time a new character appears a character is put on the ten frame. The teacher asks each time, *How many are left to join the story?*; i.e., *We have 4 children now, how many are left to join the story?* (6).

The teacher laminates the characters and the ten frame and puts it into a centre, along with the book, for activity time. The children read and recreate the story over and over again.

**Create:***Literacy activities:*

Children help the teacher generate new lists of look-alike rhyming pairs (onset and rime); e.g., phone, alone, bone, cone, tone, lone, throne; three, tree, bee, see, free, whee. Words that sound the same but have different rimes are also discussed and put into a separate list; e.g., me, be, she, tea, flea.

The teacher makes a class book with pages that read "I like to \_\_\_\_\_ with my friends." Each child fills the blank with an action word and draws a picture on their respective page.

"I like to \_\_\_\_\_ with my friends."

*Numeracy Activities:*

The teacher and children create a class big book, *Counting Our Friends*. Each child fills in the blanks to create a story for their page. For example: *I am (play - ing on a swing).*

*(2) friends come and now there are (3).* They also write it as a number story; i.e.,

$$(1) + (2) = (3).$$

I am \_\_\_\_\_ .  
 \_\_\_\_\_ friend/s come and now there are \_\_\_\_ .  
 \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

**Some Helpful Discoveries**

The teachers in this project answered each of the research questions posed above in a very positive way. They became enthused about the impact of using carefully selected quality children's books to promote emergent literacy and numeracy development. Generally, the results of a formal survey with the teachers involved in the project indicated that the impact of using texts including numerals as a source of predictability was positive in promoting both emergent literacy and numeracy. These books seemed particularly effective in increasing children's self-confidence and willingness to engage in both literacy and numeracy activities. The Action Research participants viewed the impact of learning about numeracy through relevant texts that introduce numbers in authentic contexts, as particularly powerful. *The kind of books that I introduced this year put numeracy into perspective for kids. It is meaningful math. It's not just about counting something for the sake of counting. It's counting to make sense of what the story is all about.*

Certain features of books and follow up activities were seen by teachers to enhance learning. These included:

- Matching visuals with the books
- Acting out the story
- Making their own booklets
- Pocket chart sequencing
- Sequencing the story pictures on a clothesline to retell the story
- Selecting stories that are funny; e.g., *Seven Little Hippos* (Thaler, 1994) or visually appealing; e.g., *One Grey Mouse* (Burton 1995)

Some of the teachers in this study were working with children who demonstrated challenges in developing literacy and numeracy concepts. The features that seemed particularly beneficial for these children were:

- the linking of number concepts to sets of pictures linked to a meaningful story
- books with rhyming verse or a familiar story
- books with interactive parts
- having manipulatives that children can link to text

When the children were asked directly what made certain books easy to read, many of them responded *because the numbers are on it!* One child, when asked why he favoured the book *One Grey Mouse* (Burton 1995), responded *I can read it because of the number words, colour words and the rhyming words.*

A teacher involved in this project who worked with children showing significant learning difficulties suggested *the key to students reading these kinds of books independently is giving them the opportunity to preview the book and have it read to them first by an adult - interactively - having the child beside you so that they can count the objects or*

*look at the pictures for clues. That way, when children pick up the book for independent reading, they have some background knowledge of the text and they can carry on.* This highlights the importance of having more of these kinds of books published in big book format for classroom use in shared reading activities.

The teachers and children involved in this Action Research Project helped each other learn how best to promote emergent literacy and numeracy skills using quality children's literature. Teachers used the books that are outlined at the end of this article with groups of children. They observed which books seemed to be the most motivating and what activities seemed most productive in enhancing children's emerging skills. During roundtable discussions and in formal surveys, teachers shared feedback about which strategies seem to provide support to children's learning. They willingly shared teaching and learning resources that they had personally developed to use with specific books. All of the materials were photocopied and distributed so that each teacher's repertoire of resources increased as the project progressed. One of the teachers said: *These books make learning more meaningful for students as they encourage children to become engaged with the print and number concepts in the book. The children then become active participants rather than passive listeners in the reading of the text and counting within the text.* Clearly, 'books that count' can be highly effective in promoting emergent literacy and numeracy as meaningful, active problem solving activities for young children.

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#### Author's Note:

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Table 1

	<i>Let's Go Visiting</i> (Williams 1998)	<i>Counting My Friends</i> (Hooge 1993)
<b>Experience</b>	<p>After several readings, the teacher records the story on chart paper and it is read as a shared reading; i.e.;</p> <p><i>Let's go visiting. What do you say?</i></p> <p>1 One brown foal is ready to play</p> <p><i>Let's go visiting. What do you say?</i></p> <p>2 Two red calves are ready to play.</p>	<p>Teacher reads the story aloud several times, encouraging children to chime in on the number words and the rhyming words; i.e.,</p> <p><i>One friend and I make <u>two</u>.</i></p> <p><i>Our bikes are green and <u>blue</u>.</i></p>
<b>Respond</b>	<p><i>Literacy activities:</i></p> <p>Teacher asks the children if the book reminds them of another book. When they mention <i>I Went Walking (1989)</i>, the teacher reads this book, both as a read aloud and a shared reading.</p> <p><i>Numeracy activities:</i></p> <p>Use sets of animals (plastic or stuffed) to replicate the 6 sets of animals from the story. Count all the animals in the set (21).</p>	<p><i>Literacy activities:</i></p> <p>Children compare this book to other books illustrated by Robert Martchenko (students thought it was a Robert Munsch book).</p> <p><i>Numeracy activities:</i></p> <p>Children consider how many friends they have and share the number with a friend. Teacher says, <i>How many children had the same (equal) number? How many had different numbers?</i></p>
<b>Reflect</b>	<p><i>Literacy activities:</i></p> <p>Teacher asks the children to consider the similarities and differences in the two books. Children and teacher create a Venn diagram to visually represent this comparison.</p> <p><i>Numeracy activities:</i></p> <p>Teacher helps the children discern that each new animal set joining the fun is one more than the last set: 1 brown foal, 2 red calves, 3 black kittens, 4 pink piglets, 5 green ducklings, 6 yellow puppies.</p> <p>After counting all the animals in the set, teacher creates a number line to 21. Pose subtraction questions and practise counting backwards on the number line; e.g., how many animals if the piglet go home? (<math>21-4=17</math>); if the ducklings fly away (<math>21-6=15</math>).</p>	<p><i>Literacy activities:</i></p> <p>Children list the names of their friends and share the list with a buddy.</p> <p>Children listen as the teacher reads the book to identify all words that rhyme. Teacher lists the rhyming pairs. Children sort the rhyming pairs into two groups: words that rhyme and look alike (phone/alone; three/tree); words that rhyme but don't look alike (two/blue; four/more).</p> <p><i>Numeracy activities:</i></p> <p>Teacher makes a set of characters. The story is reread and each time a new character appears a character is put on a ten frame that the teacher has created on chart paper, or plastic tablecloth. The teacher asks each time, "How many are left to join the story?"</p>
<b>Create</b>	<p><i>Literacy activities:</i></p> <p>Using interactive writing, create a cooperative list of baby and adult farm animal names that children can illustrate.</p> <p>Build more words from the onset/rime pairs: play/say (bay, day, hay, jay, Kay, lay, may, pay, way, stay, away)</p> <p><i>Numeracy activities:</i></p> <p>Children create 'post it note' number stories for the animals on each page; e.g., <math>1 + 1 = 2</math>;</p> <p><math>2 + 1 = 3</math>; <math>2 + 2 = 4</math>; <math>3 + 3 = 6</math>.</p> <p>Teacher and children make number stories with different combinations of animals; e.g., piglets and ducklings (<math>4+5=9</math>), foal and calves (<math>1+2=3</math>), kittens and puppies and foal (<math>3+6+1=10</math>), etc.</p>	<p><i>Literacy activities:</i></p> <p>Children help the teacher generate new lists of look-alike rhyming pairs (onset and rime); e.g., phone, alone, bone, cone, tone, lone, throne; three, tree, bee, see, free, whee. Words that sound the same but have different rimes are also discussed; e.g., me, be, she, tea, flea.</p> <p>The teacher makes a class book with pages that read "I like to _____ with my friends." Each child fills the blank with an action word and draws a picture on their respective page.</p> <p><i>Numeracy activities:</i></p> <p>The teacher and children can illustrate another big book of number stories: <i>Counting Our Friends</i>.</p> <p>"I am _____. ___ friend/s and I make _____."</p> <p>_____ + _____ = _____</p>