Selecting Counting Books

By Jacqueline McDonald, PhD
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"Can we count? Can we count?" three-year-old Chris asks as she drags a large counting book along the rug. "The mombat book! The mombat book, please."

It's a class favorite and pretty soon Chris's preschool pals take up the chant, "The mombat book! The mombat book!" They settle down as the teacher opens up *One Woolly Wombat* and asks, "How many?"

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Chris and most of her friends can consistently count small sets of seven or eight items. They should not spend great amounts of time repeating these already acquired skills. Can counting books do more than "count to 10"? The book *Principles and Standards for School Mathematics* of the National Council of Teachers of Mathematics (NCTM) suggests that children need to "count with understanding" (NCTM 2000, 78). But what should one look for as an indicator of growing knowledge and understanding? The following questions provide examples of children's developing understanding, suggest many effective counting books, and can help teachers in selecting counting books and planning math activities for children ages three to seven.

Are there quantities beyond 10 in the book? Ten is overtaught, and this can make it hard to identify to what number a child can meaningfully count. When faced with 7 markers, a young child will point and count, "1, 2, 3, 4, 5, 6, 7..." and then start over with the first marker and continue, "...8, 9, 10!" while touching items he has already counted. Likewise, when faced with a group larger than 10, such as 13, it is not unusual to see a child count, "1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 1, 2, 3!"

Look for counting books that include sets larger than 10. *I Can Count the Petals of a Flower* (see "Featured Counting Books" for information on all books mentioned in the article) includes many examples of flowers with more than 10 petals. Going beyond the book, children can create their own flower counting books using garden catalogs.

Does the book have opportunities for the child to conserve number? Conserving number is the ability to recognize that two sets have the same number of items even when other attributes of the sets have been changed. For example, in the classic Piagetian interview (Copeland 1974), the interviewer lays out eight items in a row and a child creates a second row by matching items one to one. When the interviewer asks if the rows have the same number of items or if one has more, the child will explain that the rows have the same number. The interviewer then spreads out one row and asks again if the rows have the same number. The child who does not conserve number will say the spread-out row has more. When asked to explain, she will indicate its length as proof of "more." The child who does conserve number will explain that the rows are still the same because "you did not change how many."

Ten Black Dots has a number of illustrations that children can copy, arranging dots in the configuration of numbers (there are six dots in the numeral 6, seven dots in the numeral 7, and so on). Using paper dots, student scan make the shapes shown in the book. The goal of this conversation task is to have the same number of dots as the picture in the book. To do this, children must look at the shape and attend to "How many?" If the child makes an eight but it has more or fewer markers than the picture in the book, ask questions such as these: "Are they exactly the same?" "How many dots are in the 8 in the book?" "Do you have the same, more, or less?" "How can you make yours the same?"

Does the book illustrate sets of unlike objects? We do too much teaching of quantity with sets that are made of the same items. For example, we count sets of fish, books, balls, and dogs but rarely count a

set that includes a mix of all four items. Math educators use the term *abstraction* to describe this concept. Counting is abstract and a quantity such as four can refer to four fish, four books, four balls, four dogs, or a group that has one of each.

In *12 Ways to Get to 11*, illustrations show 12 ways to form a group or set of 11, such as, "On the boat are two masts, a big and a little sail, four life preservers, a flag, a ladder and an anchor." On the chalkboard, record a list of places children say they like to go. Select a target number such as 15. Choosing from their list of favorite places, let the class (of 26) create its own book, 26 Ways to Get to 15. Children enjoy the opportunity to create these unusual counting books.

Does the book include *skip counting* experiences? We expect young children to master counting by 2, 5, 10, and 100. Such skip counting is valuable for developing an understanding of place value, addition and subtraction strategies, and early multiplication. The book *Sea Squares* concentrates on square numbers, such as 4 x 4 ("Four slippery seals, with four slippers each…") but children can create a *count by* book for 4 ("1 seal with 4 flippers; 2 seals with 4 flippers each, 3 seals with 4 flippers each…" and so on).

Marching in a parade is an experience that children can draw on to make their own count by books: "The band is marching in rows of 10. Can you draw a band with 30 people in it?"

Does the book explore number and quantity in other cultures or languages? Numbers and number systems are not the exclusive properties of western European culture; counting books can explore the use of number in other countries, cultures, languages, and sometimes even explore different symbols for numbers.

Moja Means One introduces counting words in Swahili: *saba* means 7 and *moja* means 1. Phonetic pronunciation is included for each word, and the illustrations are examples of common items from the Swahili culture and environment. *Alef Is One* introduces not only the Hebrew word for each

number but also the character used in the written language.

Comparing and contrasting are valuable tools for exploring these cultural counting books. Ask children, "How are these numbers like or not like the numbers we use in our classroom every day?" Charts, Venn diagrams, and similar representations allow children to organize their knowledge in comparing and contrasting experiences.

Is a place value or grouping model used with numbers larger than 10? The concept of 10 is a valuable organizing construct for counting books. In *Anno's Counting Book* the author/illustrator adds one block to an empty 10 frame in each succeeding illustration. When using numbers larger than 10, a second frame is started. This model of quantity provides a subtle reminder that 12 is a group of 10 plus 2 more. An understanding of place value develops through the primary grade years. An important reflection of this understanding is the ability to deconstruct a number such as 12 into 10 plus 2 more. Look for counting books that include models of numbers as "10 plus."

Can problems that use *counting on* strategies be formed using the illustrations? At first children add two sets by counting one set and then the second and then recounting the entire new set. For example, when solving 4 + 3 a child will count out 4 items, then count out 3 items, and then recount the entire set of 7. When a child "counts on" he remembers the quantity in one set (in this example, 4) and starts at that point in counting the new combined set ("…4, 5, 6, 7").

Counting on can be encouraged in many counting books with simple questions such as, "How many birds are on this side of the picture? How many birds are on the next picture? How many birds altogether? Can you remember how many birds are on this page? Now, how do you count on from there?" These questions work well with a two-page illustration but can be modified by counting birds in the tree and birds in the air, and so on. While many children will not be ready to count on, this simple

extension of a counting book adds challenge and richness for those who are ready for new strategies for addition.

Can comparative language such as *more* and *less* and other nonnumerical language be used in studying the illustrations? While counting is a direct attempt to quantify a situation, it is important to remember that there are many ways of indicating quantitative relationships without being numerically specific. Mathematical terms such as *more, less, greater*, and *smaller* are frequently used to describe such relationships. Heller's *A Cache of Jewels* introduces collective nouns such as *bunch, fleet, swarm*, and *flock*.

These terms add richness to the children's use of language and number. In addition, using such terms can help children understand the need ancient people faced as their use of number grew more sophisticated. Questions like "If we each have a 'flock,' can we swap evenly? Do I have more? Do you have more?" lead to inexact answers. Thus the need for more precise language caused quantifying concepts to evolve.

Are there opportunities for a child to develop hierarchical relationships? It is common for young children to think of objects categorically. Piaget presented young children with a bouquet of flowers that was mostly roses (Copeland 1974). When asked if there were more roses or more flowers, young children invariably said, "More roses." The children think of simple categories: roses and flowers. An object is one or the other. Rarely does a young child think hierarchically: a rose is a rose *and* a flower. Therefore, there are more flowers. *Only One* is a book that allows a young child to look at a variety of simple hierarchical relationships: "There may be 9 players, but there is only 1 team." Children can be encouraged to find other examples and again create their own books or posters.

Does the book use 0 appropriately? Zero is not a counting number and we do not count with it. If we do, in daily experiences at least, we always get the wrong amount. (There are exceptions to this statement that will be seen in middle school mathematics and computer programming experiences). That said, children do need to explore 0 as a tool for describing situations in which there is "none of something" being discussed. *Ten Dogs in the Window: A Countdown Book* begins the adventure with 10 dogs in a pet store window. Some counting books can be examined backwards, leading down to the page that has nothing. Additional experiences with 0 can be created as children explore other countdown situations and create appropriate artwork, stories, poems, and books.

Conclusion

No single book can or should embody all of these ideas, but counting books involve much more than counting. Children need access to a wide and varied collection of counting books. In discussing the "Number and Operations Standard" for children in pre-K to grade 2, *Principles and Standards for School Mathematics* states, "Throughout the early years, teachers should regularly give students varied opportunities to continue to develop, use and practice counting as they quantify collections of objects, measure attributes of shapes, identify locations and solve problems" (NCTM 2000, 80). The wise use of counting books is a powerful part of these opportunities.

References

Copeland, R.W. 1974. *How children learn mathematics: Teaching implications of Piaget's research.* New York: Macmillan.

NCTM (National Council of Teachers of Mathematics). 2000. *Principles and standards for school mathematics.* Reston, VA: Author.

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Featured Counting Books

Alef Is One, by Katherine Janus Kahn. 1989.

Annos' Counting Book, by Mitsumasa Anno. 1977.

A Cache of Jewels, by Ruth Heller. 1987.

I Can Count the Petals of a Flower, by John and Stacey Wahl. [1976] 1991 rev. (Available from www.nctm.org.)

Moja Means One, by Muriel Feelings. Illus. by Tom Feelings. 1971.

One Woolly Wombat, by Rod Trinca and Kerry Argent. Illus. by Kerry Argent. 1987.

Only One, by Marc Harshman. Illus. by Barbara Garrison. 1993.

Sea Squares, by Joy N. Hulme. Illus. by Carol Schwartz. 1991.

Ten Black Dots, by Donald Crews. [1968] 1995.

Ten Dogs in the Window: A Countdown Book, by Claire Masurel. Illus. by Pamela Paparone. 1997.

12 Ways to Get to 11, by Eve Merriam. Illus. by Bernie Karlin.