Unit 9 Research

Research indicates that the fundamental understanding of subtraction evolves from children's early counting experiences. [1] By playing with sets of items, children can recognize that taking something away from a set makes it smaller. From their numerous experiences that involve removing items from a set to make it smaller, children construct an informal conceptual basis for understanding subtraction as taking away. They use this view of subtraction to comprehend and to solve simple arithmetic tasks or word problems.

Various early math content areas should be taught according to a developmental progression of skills and concepts that build on one another. These developmental progressions show the order in which young children typically learn math concepts and skills. Educators should ensure that children are comfortable with earlier steps in the progression before being introduced to more complex steps. Understanding developmental progressions is also necessary to employ progress monitoring that tracks each individual child's success along the steps in the progression. [2] Children should be provided many opportunities to practice recognizing the total number of objects in small sets. Next, teachers should promote accurate one-to-one counting as a means of identifying the total number of items in a set. Once children can recognize or count sets, they need many occasions to use number words and counting to compare quantities. When children have developed these fundamental number skills, they are ready to begin solving basic problems.

Using their number knowledge to solve arithmetic problems gives children a context to apply and expand this knowledge and gain confidence in their math ability. Once children can determine the total number of items in a set by using number recognition or counting and can understand the concepts of "fewer," they can explore the effects of subtracting items from a set. Children can change small sets of objects by combining or removing objects (e.g., taking away two blocks from a set of five blocks) and then count to determine "how many" they have in the new set.

As children become more adept, teachers should present more difficult problems with slightly larger numbers. Children should begin posing word problems as well as solving them. It is important for children to retell a word problem in their own words as a powerful general teaching strategy to extend their knowledge.[3] Problem solving challenges children to use their math knowledge to answer and explain math-related questions. Teachers can use problem-solving tasks across classroom situations so children can see how to apply counting to solve everyday challenges, such as taking attendance to see how many children are present or absent. Once children have experience with combining or separating items in a set they can see, they can do the same with collections of objects (e.g., pennies) when the final outcome is hidden from view. The children see the initial group of objects and the objects being taken away, but they do not see the final set of objects. The children must then determine how many are hiding. Children may solve this problem by counting on their fingers or in their heads. After the children give their answer, the teacher can take the cover away, and the children can count to check the answer. Snack time can provide children with authentic comparisons of adding and subtracting or "more" and "fewer." As children receive or eat their snacks, they can count how many items they have, or "How many will you have after you eat one?"

(1) Baroody, A. J., & Wilkins, J. L. M. (1999). The development of informal counting, number, and arithmetic skills and concepts. In J. V. Copley (Ed.), *Mathematics in the early years* (pp. 48-65). Reston, VA: National Council of Teachers of Mathematics.

(2) Frye, D., Baroody, A. J., Burchinal, M., Carver, S. M., Jordan, N. C., & McDowell, J. (2013). *Teaching math to young children: A practice guide* (NCEE 2014-4005). Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, U.S. Department of Education.

(3) National Research Council. (2009) *Mathematics Learning in Early Childhood: Paths toward Excellence and Equity.* Washington, DC: National Academies Press.

Unit 9 Frequently Asked Questions

Subtraction traditionally seems more difficult for young children than addition. With that in mind, how does Starfall ensure that children meet with success when they are introduced to this concept?

The Starfall math curriculum begins preparing children for subtraction early in the year through the morning Daily Routines, in which the children practice counting backward and identifying numbers that are less than other numbers. Because subtraction is practiced in these and other real-life situations throughout the program, the children develop a basic understanding of the concept before it is formally introduced, making them much more likely to meet with success later on.

The concept of subtraction is introduced and reviewed through:

- Subtraction story songs (*Starfall.com* and *Starfall Math Melodies*)
- Subtraction strategies (*Backpack Bear's Big Math Book*)
- Illustrating subtraction word problems
- Learning center games and activities
- *Starfall.com* subtraction activities
- Dramatizations
- Board games
- Story maps

Children often try to use their fingers to subtract but end up adding the numbers rather than subtracting. What are some ways to help children use this strategy correctly?

The key to helping children understand the concept of subtraction is to be sure they understand the concept of less than. Additionally, practice with estimation, teaching number sense, and working with money help the children understand that the outcome of a subtraction problem will be less than the original number.

Children are introduced to eight different subtraction strategies, so they have others on which they may also rely. These strategies are practiced repeatedly and help to reinforce the concept of subtraction.

The online subtraction activities at *Starfall.com* concretize subtraction in a fun way. The children hear and see the concept being played out in games and activities. Providing opportunities for children to explore subtraction activities online provides the much-needed practice children require in order to become proficient in subtraction.