



Teaching Math to Students with Down Syndrome

Mathematical attainment levels vary significantly among students with Down syndrome; however, most students have number skills approximately two years behind their reading levels. One reason is that mathematical concepts involve abstract reasoning and the performance of simultaneous cognitive operations. Achievements are improving with better education, higher standards, and inclusion in a classroom with students' typically developing peers. However, most students with Down syndrome do not progress much beyond the concrete operational level of cognition, making abstract concepts (for example, using 'x' and 'y' to represent numbers in algebra) difficult to master.

General Teaching Tips

1. Use the Same Steps as With Any Child

Children with Down syndrome learn about numbers in the same way as other children and do best when included in classroom activities **with support**. They will benefit from visual supports, smaller chunks of information at a time, and extra practice. Practice can be done creatively and in small doses to avoid frustration.

2. Build on visual learning strengths

Children with Down syndrome are visual learners. The use of visual supports such as number lines are very helpful. They can be used for the teaching of many numeric concepts including sequencing numbers, simple addition and subtraction, and matching numbers with the words that represent them. The **Numicon System** is also recommended for visual learners, which is based upon a ten-set and uses a 100-frame.

Numicon uses colored tiles that provide additional visual discrimination along with easy-to-use manipulatives.

3. Support Delayed Motor Skills

Fine motor delays and challenges can make use of math manipulatives frustrating for some children and can become counterproductive. Minimize the need for using fine motor skills such as handwriting during math work. For example, provide a scribe to write numbers or use number tiles or a keyboard.

4. Support Auditory Processing and Working Memory

Auditory processing and working memory deficiencies make learning difficult. **Working memory** is the memory that a student uses to hold on to information long enough to interpret the meaning and use it to complete a task. It plays an important role in concentration and in following instructions. Children with working memory difficulties can be helped by the use of visual supports for learning whenever possible as these will reduce the load on the memory system. Increasing wait time is also important.

5. The Case for Memorizing Facts

Memorizing addition fact families (facts adding up to 10) and multiplication facts can be very valuable, but also take some time. Once these are memorized, however, it can save valuable time and free up some working memory for more complex operations.

6. Early and Frequent Calculator Use

Some students may learn more complex operations with practice, but others that have difficulty with short-term memory and rote learning may be better suited to use a calculator. Students should be systematically taught to use the calculator as soon as they are introduced to numerals. The focus should be on entering the numbers correctly, tracking one's place in number entry, and a clear understanding of how to set up the problems that can be solved with the calculator. Take the time to focus on which computation is needed to solve the problem and rely on the calculator for the calculation.

7. Build on Social Strengths

Children with Down syndrome have strengths in social learning. To build on this strength, turn-taking games are an effective way to teach number sense, and being part of a group 'takes the pressure to perform' away and children are getting effective models while they wait for their turn.

References:

Hughes, J. (2006) Learning About Number and Maths. *Down Syndrome News and Update*, 6(1), 10-13. DOI:10.3104/practice.374

Gillian Bird and Sue Buckley, *Number skills development for Children with Down Syndrome 5-11 years* (2001).

Deanna Horstmeier, *Teaching Math to People with Down Syndrome and Other Hands-on Learner: Basic Survival Skills* (2004).

Deanna Horstmeier, *Teaching Math to People with Down Syndrome and Other Hands-on Learners: Advanced Survival Skills* (2004).

Videos

Numicon

<https://www.youtube.com/watch?v=EIGN3ekzpic>

<https://www.youtube.com/watch?v=WSLcxwY6eYU>