

“Is my child fluent in math?”

Recently, in a conversation with a parent regarding her child’s difficulty in math, I found myself talking about the importance of working toward math fluency as a way to help the student be more successful. The parent was confused by the term fluency when applied to math. She understood how fluency applied to reading. The parent consistently encourages her child to read knowing that the practice and repetition helps her child to become so familiar with certain words and articles of speech that reading these becomes automatic. When a reader reads some words automatically they are almost unaware of reading them and are able to focus on words that are more challenging or unfamiliar. This improves overall reading skill and efficiency.

The implication for mathematics is very similar, that some of the sub-processes, particularly basic facts, need to be developed to the point that they are done automatically. Educators and cognitive scientists agree that the ability to recall basic math facts fluently is necessary for students to attain higher-order math skills. If this fluent retrieval does not develop, then the development of higher-order mathematics skills — such as multiple-digit addition and subtraction, long division, and fractions — may be severely impaired. Indeed, studies have found that lack of math fact retrieval can impede participation in math class discussions, successful mathematics problem-solving, and even the development of everyday life skills. And rapid math-fact retrieval has been shown to be a strong predictor of performance on mathematics achievement tests. Grover Whitehurst, the Director of the Institute for Educational Sciences (IES), noted research during the launch of the federal Math Summit in 2003: “Cognitive psychologists have discovered that humans have fixed limits on the attention and memory that can be used to solve problems. One way around these limits is to have certain components of a task become so routine and over-learned that they become automatic.” (Whitehurst, 2003)

Author Mary Damer writes in an article for the website Illinois Loop:

*“Effective teaching research shows that there are four stages to a student's learning. The first stage is the **acquisition** stage where the goal is helping the child learn the skill accurately. This is the stage of instruction where the child learns how to sound out the word, or to write the correct answer to the math problem is, or to identify the causes of the Civil War.*

*The second stage of learning is the **fluency** stage where the learner acquires the information at an automatic level. At this stage, when the child sees the word he/she doesn't have to stop and sound it out; when the child has to write a spelling word he/she doesn't have to think about each letter as it is written; when the child solves the long division problem the subtraction portion is automatic.*

*After fluency comes the **maintenance** stage of learning, which my dad always called "over learning". At this stage of learning, the goal of instruction is to maintain a high level of performance over time. This is a critical stage for individuals with any type of memory problems. Any of us can recognize how important this stage is for our toughest subjects. Science was always my "killer" subject and I had to spend a lot of extra time rereading and working on the material or it was quickly forgotten as if I had never learned it.*

*The fourth stage of learning is the **generalization** stage during which the learner needs to perform the skill at different times and in new situations. This is the part of the learning process when those group activities and hands on projects can actually be helpful if they involve skills that the students have already learned to fluency.”*

What all this means is that fluency is an integral stage of learning and that for a child to be fluent in math, the child needs to practice solving math facts regularly and to do so with the goal being to retrieve those facts not only accurately, but faster over time. Research shows that to be fluent, children should be able to accurately solve math facts at a rate of one per every two seconds. Naturally, if the child has poor fine motor skills or is younger, that has to be taken into account on any written timed test. For example, here at the Academy, students in first grade begin addition math facts only after the teachers have assessed fine motor skills and penmanship and determined an appropriate rate at which the students should begin.

Once students begin to learn to solve math facts, the next step is to add the element of speed to the process. Students in classes begin the process of taking timed tests so that they can see how they are progressing in their fluency. It should be stressed at this point that many students will equate speed with intelligence. Both teachers and parents need to help students understand that being able to solve the math fact demonstrates intelligence. To do so quickly and more quickly than others only denotes practice. Students need to be focused on improving their own times, not competing with other's times.

Students often struggle with math fluency for two reasons. First, math fluency requires often tedious practice which most people, let alone younger children, try to avoid. For parents, this can mean more supervision and holding your child accountable which can be stressful and difficult. Second, whenever someone is timed doing an activity, the frustration level can increase, making it even harder for an individual to remain motivated to attempt such an activity. This can also be compounded if the child continues to equate speed with intelligence and he or she “feels stupid” when solving math facts. But just as the parent encouraged reading, you must encourage solving math facts. To relent when your child tries to avoid solving math facts may lessen the stress now but ultimately lead to your child being less fluent when his or her math instruction includes higher level math skills.

Is your child fluent in math? Watch your child doing his or her math work and see if he or she is able to solve some facts automatically. Check with your child and see how he or she is doing solving math facts. Check with your child's teacher to see how he or she rates your child's math fluency. Most importantly, provide the support your child will need to continue to improve fluency.