Math Difficulties

By: Jackie Cooke

It was a typical busy afternoon in my second and third grade blended classroom. "Okay class," I announced, "this afternoon, we are going to work in math stations. A few of you will be heading down to the computer lab to take your third attempt on the state math test. " I asked students to fill out Math Station Contracts. Then I had the Math Station Carriers begin to set out the station boxes. As I circulated the room to dismiss students to their stations of choice, I noticed Pavel's crestfallen look. I walked over to him and quietly asked, "What's wrong, Pavel?"

He replied, "I'm too stupid in math. All the other kids get to stay here in the room and do math stations but I have to go down to take the dumb old math test again."

"You're not stupid, Pavel. Also, you're not the only person in class who has to take the test again. Try to remember that every child has his or her own timeline for learning things and don't be so hard on yourself. You really do need to go down now to give the test another try. That is something we are required to do by the state. The school and I would get in trouble if we didn't follow this requirement. However, I do understand why you are disappointed. Let's talk together about this some more after school. There isn't time now, but we'll have all the time we want before you head down to the daycare. Tell you what. If you try to do your best on this test, when you come back to the room, I'll let you pick a friend to go out in the hall with to play the Frog Math games. Is it a deal?"

After school when Pavel and I had a chance to talk, I asked him if he'd had a good time with the Frog Games out in the hall. He said that he had fun playing with Diego, but that he still felt bad about having to take the math test a third time. "Why can't I be smart like the other kids?" he complained.

"As I said earlier, you are smart. You have lots of things you are really good at. Art for instance is something you are super at. Math is just one of those things you need to take a bit slower and have more practice with. You'll catch up with the others if you keep working at it. Would you like to hear a story about my little sister and how she was having trouble with math?"

Pavel shrugged his shoulders but didn't say anything. I took that to mean he wanted to hear the story, so I began.

The Elephant Lamp

Once Terry and Jackie were sitting in the dining room doing homework. Terry put down her head between her hands and gave a huge sigh. She had a very sad look on her face. Jackie thought to herself, "Oh no, not the cow eye's look again." Out loud she asked, "What's wrong Terry?"

"I keep getting these multiplication problems wrong on our quizzes. I hate math," Terry grumbled.

"Have you talked to Mom about it?" Jackie asked.

"No, I'm afraid she won't be proud of me. She'll probably think I'm really stupid and ground me until I start passing the tests," Terry responded.

Jackie thought for a moment and then said. "Terry, I know my times tables pretty well. I'll help you out with this problem. After we go to bed tonight, I'll teach you some ways to figure out the answers to your multiplication times tables."

Just then, Pete sidled up to the table. "I heard everything you guys said. Let me join you tonight or I'm going to tell on you."

Jackie and Terry stared at each other for a few seconds and then nodded agreement. "But you have to promise to be really quiet if you come in," Jackie warned. "We don't want Mom to know that Terry is having trouble with math."

"Groovy. See you guys later," Pete said. "I'm going to go see if I can find Tony and get him to play Monopoly with me."

Jackie pulled out some index cards and felt markers and began to write.

After dark, Jackie and Terry were dressed in their pajamas and in bed pretending to be asleep in case their parents looked in on them. They heard the secret code knock, two loud raps followed by three soft knocks.

"That must be Pete," Terry said quietly.

"Sshh," Jackie whispered as she grabbed Pete and quickly pulled him inside. They hurried across the floor and jumped into the bed. All three dove down underneath the covers. Once they were completely covered up, Jackie snapped on the elephant lamp she had secreted under the covers. "Okay, here's what we're going to do. We'll play a game. See, I made these flash cards. We'll all take turns looking at a card. If we get the answer right, we get to keep the card. If the answer is wrong, it has to go back in the pile. Terry, if you get stuck, I know some tricks for figuring out the answers to multiplication problems. I won't tell you the answers, but I'll teach you the strategy. Let's get started."

They played happily for a long time and Terry was really getting the hang of many of the strategies. All of a sudden they shrieked as cards went flying everywhere as the covers were flung back from the bed.

It was Tony. "What's going on here?" he asked. "Can't you smell that bad smell? I thought something was on fire!"

"Please don't tell on us Tony," Jackie pleaded. "We were just trying to help Terry learn her multiplication tables. I think the smell must be because the covers were getting too hot next to the light bulb."

Tony stood still thinking for a few minutes. Jackie, Terry, and Pete held their breath to see if he was going to tell on them. Finally he said, "I guess you guys were

trying to do a good thing. I won't tell on you this time but you have to promise not to put your lamp under the covers like that ever again. I'm worried it could cause a fire."

"We won't use our lamp under the covers anymore, Tony." Jackie promised.

"Okay, then. Pete, go on into our room. It's way past your bedtime and you've got school in the morning. Having trouble with your multiplication tables, Terry? I think I can teach you a game that might help, but not tonight. It will have to wait until after you're done with your homework tomorrow evening."

As Tony and Pete headed out of the room, Terry whispered to Jackie. "Drat! Too bad we had to promise about the elephant lamp. Your game was fun and it seemed like I was starting to really get it."

"Well," Jackie replied, "I did promise I wouldn't use the elephant lamp under the covers anymore, but I didn't promise not to use Dad's flashlight." She reached into her pillowcase, extracted the big, black flashlight, and pulled the covers back over their heads as she clicked on the light.

Not enough attention has been paid to the subject of mathematics disabilities. Dyscalculia (difficulty in learning or comprehending mathematics) is a term that has been used for many years when talking about math difficulties. However, the terms **learning disabilities in mathematics** and **math disability** are used more widely today. This disability was originally identified in case studies of patients who suffered specific arithmetic disabilities as a result of damage to specific regions of the brain. Recent research suggests that dyscalculia can also occur developmentally, as a genetically linked learning disability, which affects a person's ability to understand, remember, and/or manipulate numbers and/or number facts (e.g. the multiplication tables). It is estimated that 6 to 7% of the population is impacted by this form of disability.

Math learning problems range from mild to severe and manifest themselves in a variety of ways. Most common are difficulties with efficient recall of basic arithmetic facts and reliability in written computation. Sometimes these problems occur in students who have a strong grasp of spatial relations. In that case, it is important not to bog the student down by focusing only on remediatiion of computation. While important to work on, such efforts should not deny a full math education to otherwise capable students.

Language disabilities, even subtle ones, can also interfere with math learning. In particular, many language disabled students have a tendency to avoid verbalizing in math activities, a tendency often exacerbated by the way math is typically taught in America. Developing habits of explaining their thinking can greatly help students in removing obstacles to their success in mathematics.

Many children experience difficulty bridging informal math knowledge to formal school math. To build these connections takes time, experiences, and carefully guided instruction. The use of structured, concrete materials is important to securing these links, not only in the early elementary grades, but also during conceptual development stages of higher-level math.

An extremely handicapping, though less common math disability derives from

significant visual-spatial-motor disorganization. The formation of foundation math concepts using concrete materials or visualization is impaired in this small subgroup of students.

Dyscalculia: Warning signs by age

Young children

- Difficulty learning to count
- Trouble recognizing printed numbers
- Difficulty tying together the idea of a number (5) and how it exists in the world (five dogs, five bikes, five students)
- Poor memory for numbers
- Trouble organizing things in a logical way - putting round objects in one place and square ones in another

School-age children

- Trouble learning math facts (addition, subtraction, multiplication, division)
- Difficulty developing math problem-solving skills
- Poor long term memory for math functions
- Unfamiliarity with math vocabulary
- Difficulty measuring things
- Avoiding games that require strategy

Like all learning disabilities, dyscalculia is a life-long challenge. What can be done to better address the needs of students with math difficulties?

- The need for early identification of children who encounter learning difficulties in numeracy.
- A commitment to early intervention programs and frequent continuing diagnostic assessment.
- Modeling and scaffolding support.
- Frequent one-to-one teaching for new learning with concrete materials.
- Breaking the lesson into manageable parts.
- Providing positive feedback at time of action.
- Providing relevant practical experiences for students.
- Purposefully building connections between the concrete materials for one part of the content to another part of the content being learned.
- Intentional practice with drawing the content/concept being modeled with the concrete materials --- as a way of building the models in the “minds’ eye”.

- Providing support for children who continue to encounter numeracy difficulties in the later years of schooling.

Discussion Starters:
Have you ever had trouble learning a math concept? What did you do?
What ways have you helped someone who was having trouble understanding how to do something? Some people think that there are people who are just not good at math. They'll never be any good, so why bother? What do you think? Why is learning math important for all students?

Note: The young Jackie talks about showing her sister strategies to help with understanding and becoming more fluent with multiplication basic facts. Jackie has worked with Gail Gerdemann of SEPS, Science Education PartnershipS (funded by Howard Hughes Medical Institute Research grant) at Oregon State University to create a series of materials called Number Club that help students learn these strategies. SEPS has also created Math Student-Parent-Teacher Shows to help teachers work with parents to better understand how they can support their children in learning to use these strategies. All these materials are available for download on the SEPS site. Jackie and Gail's future plans include creation of more grade level Parent Presentations and creation of the Multi-digit Multiplication Number Club. Go to: http://www.octm.org/tomt/ to read the full article regarding the creation of the Number Club materials. There is a link from there to the SEPS website.

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