I hate math

What we want young children NOT to learn

by Alyse C. Hachey

Many early childhood teachers don't like mathematics and feel they're not good at it. These negative feelings often stem from their memories of how they experienced math instruction in school (Jackson and Leffingwell 1999).

Think back to your own school days, perhaps filled with timed tests or high pressured assignments designed to ensure you had the math basics. I remember that first thing every morning in third grade, we had to write the complete multiplication tables up to 12 in under two minutes. We could not move to the next table until we had mastered the previous one. While most of my friends had moved to the sixes and above, I was still working on the threes.

It's almost 30 years later, and yet I can still remember how mortifying it was that I was "bad at math." For years after, I struggled with feelings of self-doubt. Math was my most dreaded subject in school—as a student and a teacher.

Research shows that I am not alone. Many teachers recall being taught mathematics in an environment filled with tension and frustrations. Long into adulthood, feelings of math anxiety and failure persist (Tobias 1993). These negative feelings can affect later teaching practice. The feelings can cover a wide range: from a general lack of confidence in the ability to use mathematics correctly, to beliefs about mathematics teaching and learning that are contrary to appropriate practice, to a lack of interest in the teaching of mathematics at all (Harper and Daane 1998).

Hating math and passing it on

The early years lay the foundation for future attitudes toward mathematics (Philippou and Christou 1998). Young children in their everyday life gradually develop an intuitive and practical arithmetic that they use to successfully and confidently solve problems (Ginsburg 1989).

Yet spontaneous positive attitudes may just as easily be repressed and replaced with boredom or increasing worry about performance on school mathematic tasks. As Deborah Ball (1995) asserts, traditional mathematics has focused on "copy and practice" what the teacher does rather than the exciting, challenging kind of problem posing that inspires discussion and passion about the content.

As a result, early childhood mathematics instruction today may be similar to what I experienced all those years ago—filled with tedious, irrelevant, and uninteresting experiences (Gates 2002).

Young children approach mathematics in a natural and inquisitive manner. Yet many early childhood teachers, stuck with their negative math mindset, do not approach mathematics instruction in the same way as their students. This is a problem because young children tend to internalize their teachers' enthusiasm – or lack thereof (Jackson and Leffingwell 1999). Mathophobic teachers like myself may be unaware that just a lack of interest in mathematics is hurtful. We may unconsciously model our lack of conviction in the importance of math. Perhaps more damaging, teachers often engage in traditional instructional methods (Philippou and Christou 1998). These methods focus on assessment of outcomes – that is, increasing rote performance rather than enhancing early, real-world, mathematical knowledge. Teaching to a test or standard masks the essence of mathematics—a way of organizing and communicating about the natural world. Teaching to a test also fails to help children develop intrinsic interest in mathematics as a useful and valuable life endeavor.

Moreover, continuing stressful school environments that focus on task performance over emotional safety may lead to math anxiety issues (Gierl and Bisanz 1995). So the vicious cycle continues: high pressure tasks, unimaginative instruction, and negative teacher attitudes combine to create the next "I hate math" generation.

But we can break the cycle

1. Acknowledge our mathophobic feelings.

The first step in breaking the "I hate math" cycle is to acknowledge the emotional mathematical baggage we as teachers carry. That is not to say that overcoming math anxiety, or math aversion, is easy. They are real psychological phenomena (Sperry Smith 2009). But just identifying any negative feelings related to mathematics teaching and learning and reflecting on their source can be liberating.

2. Redefine ourselves as competent mathematicians.

This step is as simple as realizing we possess enough mathematical knowledge to create positive mathematical experiences for our early childhood students. The same teachers who are quick to say, "I stink at math" and "I hate math" are the ones who also regularly (and successfully) use mathematics in everyday life. They cook, play card games, and solve problems in hobbies and home maintenance. All of these real-world activities are mathematically based and use mathematical concepts and processes that are developmentally appropriate for early childhood.

3. Carefully examine our past teaching practice.

Take the time to critically look at how negative feelings toward mathematics may be influencing what—and how—we teach. Reflect on the following:

- Have I set developmentally appropriate mathematics instructional goals?
- Are the methods I use designed to engage and inspire my students?

- Do I capitalize on opportunities to deepen my students' intuitive knowledge? Or do I shy away from potentially math-rich moments?
- Do I model the relevance and importance of mathematics to everyday life for my students?

Finding the answers will require self-reflection and a bit of research. Helpful information is available in articles and workshops from the National Association for the Education of Young Children (www.naeyc.org) and the National Council of Teachers of Mathematics (www.nctm.org).

4: Create a new vision of what early childhood mathematics should be.

Put aside preconceived notions of what mathematics instruction is. Redefine what early childhood mathematics should be: another tool for building confident, capable problem solvers and informed decision makers.

How to re-envision early childhood mathematics

Use the following suggestions to help you reframe mathematical experiences for the children you teach.

- View mathematics as process rather than a rigid set of facts to be memorized.

Early childhood mathematics is not a set of facts to be memorized or routines to be applied to specific problems. Instead, the focus is on sense-making and problem-solving. Here the process of solving a problem is just as important as a correct answer.

Vision in practice: Respond to cues from students, rather than impose knowledge on them. Letting children explore problems in ways that are meaningful to them, rather than imposing a specific method, allows for a deeper understanding of, and confidence in, the intuitive mathematics they generate. This means shifting from traditional instructional methods (in which the teacher shows and tells, and the students copy and practice), to instruction where teachers challenge and question, and students generate and evaluate mathematical ideas.

- Capitalize on children's natural tendency to use mathematics to make sense of their physical and social world.

Mathematical thinking is embedded in the routines of daily life from infancy. Mathematics at its essence is the organization of the world around us. Every time a child helps cook, asks the time, or plays a game, the child experiences mathematics in action. Children intuitively use mathematics as a way of organizing information to make decisions about and understand their world. Mathematics comes from common sense as children construct, revise, and integrate ideas.

Vision in practice: Carefully observe your students to find ways to continue to spark interest and a desire for active exploration. When curiosity is aroused, natural engagement and excitement in the usefulness of mathematics as a decision-making tool often follows.

MANY TEACHERS RECALL BEING TAUGHT MATHEMATICS IN AN ENVIRONMENT FILLED WITH

TENSION AND FRUSTRATIONS.

Expand your definition of what constitutes mathematics and rediscover your own mathematical curiosity. This allows for the generation of more "teachable moments"—opportunities to highlight the math that is all around us. These moments can prompt your students to realize that mathematics is a common and familiar activity that they are capable of doing.

This means focusing on and reinforcing the mathematical names and claims children use. Children may say, for example, "I have three," "That's about half," and "She has more." When we hear such claims, we can prompt children to mathematically evaluate them.

By paying attention to these three practices (mathematical naming, claiming, and evaluating), we use classroom talk as a natural vehicle for engaging young children in mathematical reasoning (Ball, Lewis and Thames 2008).

- Present mathematical activities in multiple ways, throughout the day and across the curriculum.

Young children do not naturally perceive their world as separate subject areas like math, reading, and science. Nor is math limited to formulaic expression. Instead, mathematical patterns occur in the songs children sing, the books they read, and their charting of the weather. Geometry and spatial sense are found in the art children create, the movement games they play, the puzzles they do, and the models they build. Number is found in the chants children say, the sports they play, and the scenes they act out.

Vision in practice: Throw away dittos and seat work. Doing the "Hokey Pokey" and making mosaics are ways to explore the mathematical concept of parts-to-whole, for example. Quilting and charting weather allow for mathematical pattern exploration. Model building and classroom obstacle courses allow for opportunities to investigate mathematical concepts such as *estimation*, *measurement*, and *symmetry*.

Math should not be teacher explanation and student rote practice. Instead, use everyday, hands-on activities and routines to introduce and develop important mathematical ideas. Carefully plan multi-subject projects and investigations that

build in meaningful practice of mathematics through discussion, sharing, listening, music, movement, and visual and artistic expression.

- Focus on play as a way to introduce mathematical language, concepts, and methods.

Play offers rich opportunities for children to develop mathematical knowledge. Intrinsically motivated children often exhibit persistence and creativity in problem-solving during play. This problem-solving translates to the generation and practice of mathematical concepts.

Vision in practice: Seek the fun in mathematics. "Fiddling around" mathematically can be academically and personally rewarding. Engaging adults and peers in games, challenges, and problem-solving provides opportunities for pleasurable and satisfying use of mathematical ideas.

Provide sustained periods that allow children to engage in playful activities. Enhance play-based mathematical learning by asking questions that seek clarification, extend thinking, and connect to past mathematical experiences.

5: Positively change mathematical teaching practice.

Give thought in lesson planning to development of not just skill but also mathematical attitude. Deliberately build in opportunities for student success while minimizing the potential for stress and frustration. Move from rote and rule-based activities to meaningful and authentic mathematics experiences in everyday life. In short, make mathematics an important and valued part of classroom life.

It's time to break the negative cycle and stop the next generation from hating math. We as early childhood teachers have the power to reach this goal.

DELIBERATELY BUILD IN OPPORTUNITIES FOR STUDENT SUCCESS WHILE MINIMIZING THE POTENTIAL FOR
STRESS AND FRUSTRATION.

References

Ball, D.L. 1995. Transforming pedagogy: Classrooms as mathematical communities. A response to Timothy Lensmire and John Pryor. *Harvard Educational Review* 65 (4): 670-677.

Ball, D.L.; J. Lewis; and M.H. Thames. 2008. Making mathematics work in school. *Journal for Research in Mathematics Education Monograph* 14: 13-44.

Gates, P. 2002. *Issues in Mathematics Teaching*. New York: Rouledge.

Gierl, M.J. and J. Bisanz. 1995. Anxieties and attitudes related to mathematics in grades 3 and 6. *Journal of Experimental Education* 63 (2): 139-159.

Ginsburg, H.P. 1989. *Children's Arithmetic: How They Learn It and How You Teach It.* Austin: Pro-Ed.

Harper, N.W. and C.J. Daane. 1998. Causes and reduction of math anxiety in preservice elementary teachers. *Action in Teacher Education* 19 (4): 29-38.

Jackson, C.D. and R.J. Leffingwell. 1999. The role of instructors in creating math anxiety in students from kindergarten through college. *Mathematics Teacher* 92 (7): 583-600.

Philippou, G.N. and C. Christou. 1998. The effect of a preparatory mathematics program in changing prospective teachers' attitudes towards mathematics. *Educational Studies in Mathematics* 35: 189-206.

Sperry Smith, S. 2009. *Early Childhood Mathematics*. New York: Pearson.

Tobias, S. 1993. *Overcoming Math Anxiety.* New York: W.W. Norton & Company.

About the author

Alyse C. Hachey, Ph.D., is associate professor in the teacher education department at Borough of Manhattan Community College, City University of New York. She is an educational psychologist whose teaching and research interests focus on early childhood cognition and curriculum development.

Editor's note: Two recent articles in *Texas Child Care* contain activities in which children learn math concepts. See "Using symbols to build math skills" in the Summer 2007 issue and "Money: Learning about dollars and cents" in the Fall 2007 issue.

Check the index in this issue, or online at www.childcarequarterly.com, for math-related activities such as cooking, making a quilt, blocks, and puzzles.