P. A. C. E.

-Parents & Administration Communicate for Education-

What's Up with *Investigations* Math?

-Frequently Asked Questions by Parents-

As you know, the Danvers elementary schools are using a new math curriculum called *Investigations*. It is a research-based program that emphasizes mathematical reasoning and real-life application. It represents a major shift in the way we expect teachers to teach, and children to learn. PACE offers parents these FAQs in an effort to continue education and dialogue concerning our new curriculum.

Q: What was wrong with the old ways that we taught math? Why do we need to change our program?

There are a number of reasons that Danvers—along with many other schools in Massachusetts and the nation—saw a need to change its mathematics program.

One reason is that the traditional ways of teaching math have simply become outdated. Over the past 20 years or so, our economy—and real-life demands for math—have changed radically, while instruction in schools has not. Mere arithmetic proficiency (the old way) worked for some of us, but it is no longer sufficient for today's students. Today, our kids need more real-life application skills that come from a strong background in mathematical reasoning and problem solving skills.

Another reason is that we need to incorporate new learning research into our math instruction. With the old ways, we used a one-size-fits-all method, never considering *how children best learn* math. The new research-based curriculum gives us more effective teaching methods to address more learning styles and give more children the opportunity to demonstrate their potential. The new curricula, like *Investigations,* meet the needs of all types of students: from gifted, to those functioning below grade level, to the various groups in between. Programs like ours also reduce ethnic, socioeconomic and gender gaps.

Furthermore, we need a change because the United States consistently scores lower than other developed nations on tests of math reasoning and problem solving. International comparative studies indicate that our old ways of teaching math do not help students learn concepts *in depth*. Instead, they encourage students to learn procedural skills, in a passive classroom routine that involves only listening and note taking. Currently, the *average* students in other countries know as much math as our *top* students! How have they done this? They have taught math that in a way that emphasizes depth over breadth. This is what our new curricula will do for us.

Lastly, our old ways of teaching math dashed the confidence of many students. If it worked for you, consider yourself fortunate, because many adults today still sadly lack confidence in math, or proclaim that they're "not good at it." Why is this? It is because old ways of teaching did not meet the needs of many students. With today's curricula, more learning styles are addressed, and students have more opportunity to internalize math in a way that makes sense to them. They end up better equipped to tackle new challenges.

Many other districts in MA are using *Investigations.* For a list of some of them, please see www.lab.brown.edu/investigations/who-implementing.

Q: How do we know that Investigations works? Is this some sort of an experiment for Danvers?

No, *Investigations* is not any kind of "experiment." It was developed by *TERC,* a well-known educational research firm based in Cambridge, Massachusetts. We know it works because it has been tested nation-wide for many years. Students who have used it for a number of years have shown good improvement in their reasoning and problem solving skills, and more of them profess confidence in math. Furthermore, *Investigations* has proved effective in various schools settings, from inner-city populations, to more affluent, high-achieving towns. Specifically, data has shown that kids do better with their computation of larger numbers, their mathematical reasoning & problem-solving, and their real-life application of skills. This has also been supported on state-wide tests, once programs are fully implemented. For more information on TERC's research, please visit http://investigations.terc.edu/research/index.cfm

Q: What does this mean for MCAS?

The recent fourth-grade MCAS results were the result of *only one year* of Investigations math. It is important to know that some gaps are *fully expected during the implementation of any new program*; this is generally referred to as an "implementation dip." Sometimes, an implementation dip is reflected in test scores. In Danvers, we are undergoing three major shifts that probably affected test scores:

Teachers: Teachers are learning a different way of teaching math! They are no longer the "imparters" of knowledge, with the students following along. Now, teachers must facilitate student learning, allowing kids a much more active role in their learning. This represents a major shift from the way most teachers were trained and have practiced up until now.

Students: Students are no longer only required to memorize facts and procedures. They are now being asked to think in new ways, and to discuss mathematical procedures to show understanding. They are even asked to write about their mathematical thinking, which proves challenging for many. In short, they are taking a more active role in their learning that, up until now, has not always been required.

Parents: Parents, too, need time to learn about the new ways of teaching and learning. We have had to learn new ways to support our kids at home. Much of the homework looks different: games, writing assignments, shorter assessments, less emphasis on memorization of facts, etc. It is all part of an effective and well-rounded program, but it is challenging nonetheless.

In short, full and fluent implementation of the program will take several years. But we have accomplished much so far. The *Investigations* program will be ever-evolving, with Danvers faculty constantly refining it so that it best meets the needs of our students.

Q: What will we do to improve math test scores?

We need to continue to work toward full implementation of the program. Student improvement will come as we learn how to use it most effectively in Danvers. In the meantime, the district is continuing to work proactively.

Currently, the district is using its *Investigations* Leadership Team to analyze MCAS math results from the last few years. This team includes at least 2 teachers from each school. They will analyze data and put together resources for teachers that will help to reinforce the program. For example, this team will develop resources for additional math practice, MCAS practice questions, and make sure that our program vocabulary matches that of the MCAS test. The team will also determine the sequence of math units that works best for Danvers.

It is important to remember that Danvers continues to do well overall on the MCAS tests. This is significant, considering that MA has some of the most rigorous testing in the nation. Fourth graders in MA are ranked first in the nation, in both math and English language arts. For more information on this, please see the National Assessment of Educational Progress website, www.nationsreportcard.gov.

Q: But I am still concerned about my child's knowledge of basic facts. He doesn't seem to have memorized them the way I did.

You are right. Your child is not spending as much time memorizing in class. Remember: we are striving for depth of understanding, as opposed to mere memorization. However, if you look carefully at your child's assignments, you will see that a great deal of time is spent focusing on the concepts *behind* the basic operations, and the procedures s/he can use to *find* the answers.

If you want to help your child become more automatic with facts, feel free to work on this at home. The Array Cards can be used as flash cards and will match what is being done in the *Investigations* program. In fact, many teachers *do* work on automaticity in school; it is just not the main thrust of the program. And, as we move toward full implementation, we will find a balance of methods that works for us. For more information about Array Cards, please visit this link:
http://www2.lab.brown.edu/investigations/author/q40.html

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Q: Will this new program prepare my child for Middle School? I've heard they don't use Investigations there.

Investigations will most certainly prepare your child for middle school. In fact, the Middle School is currently implementing a very similar program called, *Connected Mathematics*. *Connected Math* has the same philosophical base, with an emphasis on math reasoning, problem solving, and application. And, like *Investigations*, skills are spiraled from year-to-year, so that students are not learning in isolated strands that are never re-visited. Instead, skills are taught more in-depth, with more connections and reinforcement each year.

Q: How Can I Best Help My Child?

As parents, there are many things we can do.

The first is as simple as speaking positively about math to your child. Because the old ways of teaching have left many of us insecure about our math skills, it is easy to unintentionally convey low expectations to our children. To combat this, we need to communicate enthusiasm about math, integrate it into our everyday lives, and consistently encourage and praise our children's skills.

To help with homework—which sometimes looks foreign to us—we can:

- Be sure that we have read the background that the teacher has provided for us;
- See if we can see patterns in the work our children are bringing home;
- Ask probing questions of our kids when tackling homework:
    - What is the problem you're working on?
    - What did the teacher tell you to do? Or, what do the directions say?
    - What do you understand? What don't you understand?
    - Are there words or directions you are uncertain about?
    - Where do you think you should begin?
    - What do you already know that might help?
    - Can you draw a picture or make a table to work it out?
    - Let's talk through some steps, and see if we can't "talk it out."

Remember that it is o.k. to struggle with math problems! Through trial and error, children learn valuable skills.

If you are struggling with homework longer than is reasonable, simply jot a note to the teacher about the problem you had. He or she will address it the next day with the child, and even write you back if necessary.

We can also learn more about the *Investigations* program. We can attend informational meetings, and communicate with teachers when we don't understand something. In fact, dialogue is the most important tool we have!

For additional questions or comments about Investigations Math, please contact:

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