

Putting the Pieces Together for Higher Mathematical Achievement



NCEA 2011
NEW ORLEANS

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About the Presenter

Bill Smith has been an educator for almost 40 years and has taught at all levels, from the primary grades to high school. Bill has also been a teacher trainer, building administrator, a Title I Director, and a Central Office administrator. Upon his retirement from public education, Bill accepted a position as the Curriculum Coordinator and teacher mentor at a Catholic elementary school. Bill continues his work as a Professional Development Facilitator and has authored several articles on the teaching of mathematics. Bill was named the recipient of Raytheon's *Math Hero Award* for his work in mathematical education.

As well as his ongoing work with school staff, Bill has presented workshops at the state and national level, including the Annual Conference of the Association for Supervision and Curriculum Development (ASCD), Annual Conference of the National Catholic Educational Association (NCEA), and the National Conference on Differentiated Instruction.

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The Beauty of Math



A:1 B:2 C:3 D:4 E:5 F:6 G:7 H:8 I:9 J:10
K:11 L:12 M:13 N:14 O:15 P:16 Q:17 R:18
S:19 T:20 U:21 V:22 W:23 X:24 Y:25 Z:26

Use this mathematical formula to find the following percents associated with the following terms by adding the values of each letter.

K_N_O_W_L_E_D_G_E_ = %

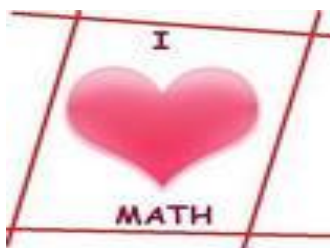
H_A_R_D_W_O_R_K_ = %

A_T_T_I_T_U_D_E_ = %

Find out how far the love of god will take you:

L_O_V_E_O_F_G_O_D_ = %

Tips for Managing Elementary Math Lessons



- ❖ Create an emotionally safe and friendly environment- success comes when kids are engaged, motivated, and challenged.
- ❖ Remember to always expect the best- teach for higher level thinking.
- ❖ Teach with enthusiasm and build on students' excitement- the more ways you teach, the more ways kids can learn.
- ❖ Build on student strengths and keep instruction personal- know your students learning profiles and teach in the way kids learn.
- ❖ Provide multiple pathways for students to demonstrate learning- anticipate and minimize barriers.
- ❖ Be organized and thoroughly prepared- quickly revisit yesterday and anticipate the day.
- ❖ Always give students clearly written and oral directions- they need to know the path.
- ❖ Use assessment to guide, inform, and instruct- it's not about grading.
- ❖ Ask the important questions and be a good listener-hear what the kids are saying and not what you're thinking.
- ❖ Build a steady pace into your lessons- maintain a smooth flow during the lesson to keep student interest high by changing activities often.
- ❖ End each lesson with debriefing activities- What, Why, and How.

Above all, *celebrate* success and *praise* mistakes.

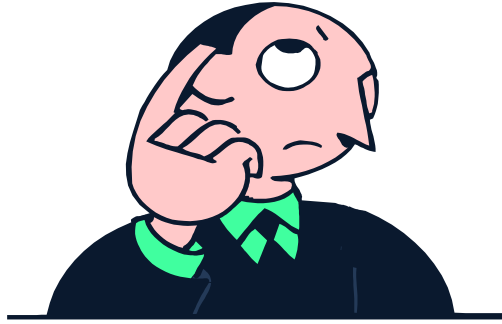
(Using Anticipation Guides)
The ABCs of Stronger Mathematical Achievement



The challenge is to find as many words that have something to do with strategies to improve mathematical achievement which begin with each letter of the alphabet. After you do as many on your own as possible, you may seek help. Follow the *Give One-Take One Rule*. Letters A and B are done for you.

A: Assessment	N:
B: Balanced Instruction	O:
C:	P:
D:	Q:
E:	R:
F:	S:
G:	T:
H:	U:
I:	V:
J:	W:
K:	X:
L:	Y:
M:	Z:

How Are We Doing



Test yourself: answer *True* or *False*

1. _____ American students are more proficient in reading than math.
2. _____ Over two-thirds of K – 5 teachers prefer teaching reading than math.
3. _____ Over 50% of American grade 8 students lack proficiency in math.
4. _____ Most states had a graduation rate of 90% or higher last year.
5. _____ The percentage of students earning a high school diploma (the graduation rate) in 2010 was greater than in 1970.
6. _____ Last year, over 50% of 9th grade students who were not promoted to 10th grade dropped out of school.
7. _____ Most states require 90 minutes of direct math instruction per day at the elementary level.
8. _____ American students consistently score in the top quarter on international tests.
9. _____ More than 25% of all students entering four year colleges last year were required to take a remedial math class.
10. _____ The number of American students pursuing advanced math degrees has declined for each of the past three decades.
11. _____ More than 50% of American doctors reported that they had difficulty with mathematics.
12. _____ Research found that eating chocolate could improve your math performance.

It's a Crisis...Mathematics Education is Not Working for Too Many of Our Students!

The Findings

Trends in International Mathematics and Science Survey (TIMSS) and the National Assessment of Education (NAEP) stress that if our nation fails to address serious mathematical gaps within American schools, our country will relinquish its technological leadership in industry, medicine, finances, and science very quickly, a trend that has already begun as the nation continues to contract for technical services from abroad.

- Problems begin at the elementary level.
- Gaps increase by the middle grades.
- It's a national crisis by high school.

84% of 11-13 year old students surveyed said that they “would rather eat their vegetables, go to the dentist, or take out the garbage than do math”!

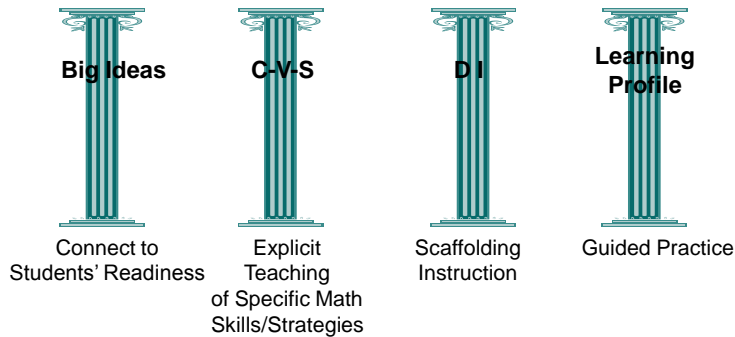
**Raytheon Corp.
Math Moves U
2006**



Building Strong Foundations for Advanced Mathematics is the Responsibility of Elementary Teachers.

What is needed is not more remediation... It's a new mindset.

Four Tiered Instructional Model
That
Better Supports the Needs of Diverse
Populations of Students.



- Teachers must remain committed to providing the best possible instruction for all students by teaching to students' strengths and building their confidence in mathematics.
- Instruction needs to develop conceptual understanding, strengthen number sense, increase computational fluency, enhance mental math skills, and improve reasoning skills by building upon students' prior knowledge.
- Teachers need to help all students make sense of the Big Ideas and efficiently apply this understanding in real context.
- Teachers need to organize instruction and content in ways that engage all students and connect to their learning styles.
- Good teaching requires tier instruction that addresses different levels of students' readiness by assigning appropriate foundational, developmental, and extension activities.
- Teachers can continue to build student confidence by scaffolding instruction and providing needed learning supports.
- Teachers need to utilize ongoing assessment to make informed decisions.
- Teachers should use classroom situations such as calendar math, lunch counts, number of the day, and interactive graphing on a daily basis to strengthen students' number sense and make contextual connections.

Create – Support – Challenge

Captain Bill's 10 Tips To Ignite Math Learning



- Before beginning a lesson put an outline of what is going to be covered on the board.
- Use math warm-ups and “Facts of the Day” to get students to think mathematically.
- Develop critical thinking activities that require students to apply reasoning and incorporate math skills.
- Use “talking alouds” to encourage students to make connections with their prior knowledge, ask questions, and communicate their thinking.
- Actively involve students in solving problems which use real-life contexts.
- Provide activities that strengthen students’ understanding and use of the language of mathematics.
- Use graphic representations and/or visual models to enhance students learning.
- Differentiate math instruction by creating multi-level math activities for ALL levels of learners.
- Strengthen student understanding by using concrete materials and include many practical examples.
- Use a balance of inquiry-based learning and problem-based learning activities to engage students.

Always **value** your students, their abilities, and their time-
Avoid “drill and kill”

Basic Number Skills Are Important...But A Strong Number Sense Is Essential



- Most students quickly learn doubles up to 10 plus 10. Next, doubles plus one and minus one can be explored. Students will quickly begin to discover new connections as they apply their own groupings.
- Utilize smart groups of related math facts to allow students to not only practice number facts but to strengthen number sense and develop proficiency in mental math.
- The use of smart groups helps students to move beyond simple procedural arithmetic; students learn how to manipulate numbers and to apply math facts and standard algorithms.
- Be sure to use manipulatives such as counters and Unifix cubes to bridge student learning.
- A number chart at the primary grades and an integer line at the upper grades are invaluable when exploring number facts.
- Students can readily discover patterns and see relationships among numbers.
- Allow time for students to experiment, apply, and discover. This not only will reinforce math facts, but more importantly, it will develop mathematical reasoning.

A Model for Teaching Multiplication Facts

- Avoid teaching the 2-12 multiplication tables without context.
- *By second grade, most students already skip count by twos, fives, and tens so a more logical approach is to build on prior knowledge then use a doubles approach.*
- Review 2s and then move onto the 4s, which is the double of the two table.
- Next, introduce the 8 table, the double of the 4s. Extend students' study by working with the 3 table and then the 6s.
- The nine table lends itself to exploring many number patterns, and it really is just the ten table minus one.

Algebra Fun with Calendars

March 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Mathe-Magician



- ❖ Write down any two digit number.
- ❖ Multiply that number by 2 (double it).
- ❖ Add 9 to your **product**.
- ❖ Subtract 1 from your **sum**.
- ❖ Divide your **difference** by 2.
- ❖ Subtract the original number from your **quotient**.
- ❖ What is your answer?
- ❖ Check a friend's answer.

What do you notice? How does it work?!

Mathe-Magician



- Write down a number between 1-9.
- Multiply that number by 2 (double it).
- Add 5 to your **product**.
- Multiply your **sum** by 50 (it's okay to use pencil and paper or even that calculator on your cell phone).
- Add 1761 to the new **product**.
- Subtract the year you were born from your **sum**.
- The results will be a 3 digit number.

What do you notice!! Will it work next year?

Mental Math with a Twist



Start with the number of quarts in a gallon_____

Add the number of eggs in half a dozen_____

Multiply your sum by the number of pennies in a dime_____

Divide by the number of centimeters in a meter_____

Multiply the quotient by the number of degrees in a right angle_____

Divide your product by the number of sides on an isosceles triangle_____

My final answer is_____

Try Again



Start with the number of sides in a quadrilateral_____

Multiply by the number of angles in a hexagon_____

Divide your product by the number of feet in a yard_____

Multiply by the lowest prime number_____

Divide your product by the number of sides in a trapezoid_____

Add the number of faces on a cube_____

My final answer is_____

What, you still want more?!



Start with the number of hours in two days_____

Divide by the number of sides in an octagon_____

Square this number_____

Divide by the number of inches in a foot_____

Subtract the numerator in any unit fraction_____

Add the minutes in a hour_____

My final answer is_____

Partial List of Strategies to Support Acquisition of Mathematical Concepts and Skills



Today's elementary math curriculum demands that students become active users of mathematics. This requires students to analyze, apply, and communicate in the language of mathematics.

Graphic organizers	Picture dictionaries
Word walls	Manipulatives
Portfolios	Skill demonstrations
Projects	Songs
Non-linguistic prompts	Exit slips
Group presentations	Interviews
Sketches	Simulations
Journals	Peer partners
Learning logs	Checklists
Response cards	Student reflections
Puzzles	Response boards
Games	Interviews
Role playing	Electronic presentations (Power Point)
Web sites	Software

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