


## Math Supports for Diverse Learners


### Math Vocabulary Development

- **In every math lesson:**
  - **Pre-teach math vocabulary**
  - **Model math vocabulary:** Use examples that children can see and manipulate as well as discuss and write about. A good mathematics program should also use culturally relevant examples to illustrate math vocabulary in action. Use multi-syllabic word strategies to help students distill root words that provide contextual clues to their meaning.
  - **Use appropriate labels clearly and consistently**
  - **Integrate vocabulary knowledge in assessments**
- **Make a game out of a vocabulary exercise** – use word association, a memory game, or some other kind of activity that helps make the experience more novel and connects it in meaningful ways that they can relate to
- **Use visual supports wherever possible**, e.g., BoardMaker software symbols or images downloaded from the web
- **Harcourt Math Multi-Media Math Glossary Grades K-6**  
[http://www.harcourtschool.com/glossary/math2/index\\_temp.html](http://www.harcourtschool.com/glossary/math2/index_temp.html)
- **Math vocabulary flash cards:**

Side 1: decimal point

Side 2: \$1.00  


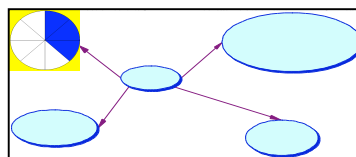
- **4-Square Cards to reinforce vocabulary:** Help students remember words through their associations to actual use and visual pictures. Especially helpful for visual/spatial learners and ELL students.

<i>Term</i>	<i>Definition</i>
<b>Supplementary Angles</b>	<b>Two angles whose sum of the measurement equals 180°</b>
<i>Example</i>	<i>Notes</i>
	<b><i>Special Supplementary Angles:</i></b> When the angles are <b><i>adjacent</i></b> and <b><i>supplementary</i></b> they form a <b><i>straight angle</i></b> – also called a

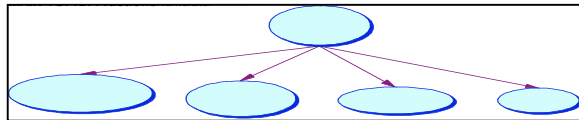
Maquire. E. SELECT Math Final Presentation. Summer 2004.

**Graphic Organizers** - can help students grasp an understanding of math terms and their relationship to each other

- **Vocabulary Mapping:** Students can make their own map on a piece of paper or using Inspiration/Kidspiration software



- **Vocabulary Discussion Chart** - Use to activate prior knowledge at the beginning of a unit and to identify misconceptions and areas that need to be addressed during the unit, e.g., brainstorm associations with words as a group using Inspiration software and an Infocus projector or use an overhead projector and markers to record responses



**Music** – embeds information in the Limbic portion of the brain (long term memory)

- **Children’s Songs or Rap Songs:** Set the components of math, such as the quadratic equation  $[-b \pm \sqrt{b^2 - 4ac}] / 2a$ , to common children’s songs, e.g., Mary had a little lamb, Pop goes the weasel, etc. See the web for sites. One college professor who is a musician composes songs to outline the concepts and theorems for the semester and the students love it.
- **Use music to create a non-threatening environment for completing assignments or tests.** Baroque music has the rate of 60 beats per minute, the same as the heartbeat. It’s very calming. A CD that promotes learning is called Remembrance, available from The Monroe Institute in Virginia or from [Onionmountaintech.com](http://Onionmountaintech.com).
- **Use real life problems wherever possible that allow for more than one answer.**

**Kinesthetic and Physical** - to help children associate concepts with activities

- **Act out the number line** on the floor. Have students take the roles of the numbers and move as requested by teacher or students, e.g., demonstrate 5 minus 2, or negative numbers.
- **Play musical quadrants** using a large XY axis on the floor. Stop the music and have the student(s) state the point they are on. (Ruth Norgard, Cleveland Middle School, Boston)
- Have two students representing the X and Y values walk to a designated point on the grid.
- **Enlarge the XY axis and project it on a white board** for group lessons. Have students get up and physically locate points.
- **Geometry lesson** – Student teams could explore the surrounding schoolyard and look for parallel lines, angles, oblong shapes, and other geometric symbols that they pass every day going to and from school.
- **Math Ball** – a soccer ball with math problems taped to each quadrant. In a circle, roll the ball from one student to another. Wherever their thumb touches, students must solve the problem, then pass it along to another student. (2<sup>nd</sup> grade, Jackie Howes, Granby, CT)
- **Create math centers** in the classroom. In *The Travel Agency*, a tent with photos from around the world, groups of students can plan trips to other countries, calculating costs for food, hotels, etc. (Jackie Howes)
- **Like the TV show The Apprentice, have students plan, design and follow through on a project.** Have them construct something, like a bridge, using simple materials, e.g., toothpicks and glue. Students must make the arch a minimum height, it must be designed to scale on a computer program, and the bridge must be able to withstand strength tests. Also, students have to budget for their building materials and "buy" them with a set amount of money. Students take roles, such as accountant, architect, project director, carpenter and transportation chief who gets the materials from the teacher. A rubric is used to assess the project, e.g., Does the bridge come within allowed costs? Does the plan show 3 different views and is it neatly done? The students in this project were linked up with civil engineers from whom they received feedback – real world experts. They also communicated with bridge-building students overseas through distance learning. (6<sup>th</sup> grade, Lottie Mosher, Fairfax, VA)

## Using Literature to Support Mathematical Concepts and Investigations

- Use books that inspire students to pursue math investigations and allow them to make personal connections with the material.
- **Non-fiction:** Experiments and recipes
- **Fiction:** Children's books that teach specific words and concepts
- Jon Scieszka + Lane Smith, *Math Curse*, Viking (Penguin Books), 1995 A humorous view of everything in life as a math problem.
- Thatcher, D. "Reading in the Math Class: Selecting and Using Picture Books for Math Investigations." *Young Children*. July 2001.
- **TERC – Lists of children's literature for Math Investigations**, grades K – 5  
<http://www.lab.brown.edu/investigations/resources/children-literature/terc/index.html>
- **Math Solutions – Connecting Math and Literacy**, New Math, Literature and Nonfiction Titles – Free resource lists are available to download in the Related Resources links in the orange box to the right of the page - [http://www.mathsolutions.com/mb/content/publications/p\\_pub\\_05.html](http://www.mathsolutions.com/mb/content/publications/p_pub_05.html)

## Text-to-Speech Software – reads the text aloud to the student

- **Read Please (PC only)** - Free download available on the web site - [www.readplease.com](http://www.readplease.com). Cut and paste text from word problems into the Read Please software to be read aloud. Options for rate of reading and choice of voices.
- **Text-to-speech on the PC** (Refer to *Text-to-Speech PC* handout.)
- **Microsoft Word on the Mac** – The *Word Speak* utility is found in the **ValuePack**, which is on the Office '98 or above (Mac) installation disks. Newer Macs in BPS have this feature installed. Select the text you want to have read aloud with the cursor, then go up to Tools, and select **Speak Selection**.
- **Mac OS X built-in speech feature** – On system X computers, go to **System Preferences** on the dock or under the blue apple (upper left on menu bar). Select **Speech**, then select **Spoken User Interface** tab. Under **Other Spoken Items** check **Selected text when the key is pressed**. (The default key is F10, but you can change it with the **Change Key option**. Click **OK**, and quit out of System Preferences. Now any selected text will be read when the F10 key is hit. (Refer to *Text-to-Speech for Mac* handout.)

## Web Sites

- **\*\*\* SELECT Math** – <http://boston.k12.ma.us/teach/technology/select/body.html>  
This award-winning web site was developed by BPS Math Teachers and Coaches, Instructional Technology staff, and The Education Development Center (EDC). It aligns the grade 6-12 math curricula to **online visual manipulative activities**. The virtual manipulative web sites used offer activities that are appropriate for elementary level students as well.
- **Do2Learn** - <http://www.do2learn.com> - **math independence for individuals with special learning needs**. Free for download: 1/2 " and 3/4" grid paper, vertical number line and addition/subtraction and multiplication tables; interactive identifying number games; Math Mahjong (matching number facts); colors
- **www.puzzle-maker.com** – for making **math vocabulary mazes (also crossword puzzles & word sentences)**
- **Discovery School's PuzzleMaker** - <http://puzzlemaker.school.discovery.com/chooseapuzzle.html>  
**Word Search, Word Search with Hidden Message, Criss-Cross Puzzle, Number Blocks, Math Square, Double Puzzle, Cryptograms, Letter Tiles**

- **The Resource Room**, [www.resourceroom.net](http://www.resourceroom.net) - **Multisensory Teaching: Positive and Negative Integers** - good activity for teaching positive and negative numbers using a thermometer
- **Teaching Mathematics With the Internet (K-6)** Classroom Connect) <http://twi.classroom.com/math/k6/> - variety of links to sites, e.g., Dinosaur Number Hunt, Greater and Lesser Animals
- **Blue Web'n** - links to educational web sites, General Math Area is <http://www.kn.pacbell.com/cgi-bin/listApps.pl?Mathematics&General/Other>, Math Tutorials are at <http://www.kn.pacbell.com/cgi-bin/listApps.pl?Mathematics&Tutorial>
- **Steffen's Educational Resources** <http://www.amphi.com/~psteffen/index.html>, **the Math** links can be accessed directly by <http://www.amphi.com/~psteffen/math.htm> - wide variety of links to math activities

## Resources

- Education Update, Association for Supervision and Curriculum Development (ASCD), June 2005
- *Making the connection between Mathematics & Literacy with Technology*, Sailaja Suresh, OIIT/ETLI
- Scholastic Online Magazine
- *Vocabulary Strategies for the Mathematics Classroom*, Dr. David Chard, Houghton Mifflin Math [www.eduplace.com](http://www.eduplace.com)