

## Research Supporting GEMDAS® *Algebra Success*® Strategies

### Marzano Study (2001): Incorporates ALL of the Top 5 Instructional Strategies that Affect Student Achievement:

1. Identifying Similarities and Differences
2. Summarizing and Note Taking
3. Reinforcing Effort and Providing Recognition
4. Homework and Practice
5. Nonlinguistic Representations

Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement*. Association for Supervision and Curriculum Development.

### Positivity and Building on Success Helps with Confidence and Academic Achievement

- “[Students] persist because success and understanding are motivating in their own right.”

Bransford and Brown. (1999). *How People Learn: Brain, Mind, Experience, and School*. The National Academies Press. Retrieved May 28, 2010, from [http://www.nap.edu/openbook.php?record\\_id=6160&page=100](http://www.nap.edu/openbook.php?record_id=6160&page=100).

- “Expectancy theory (Betancourt & Weiner, 1982; Dweck, 1986; Licht, 1983), which states that when a person feels success is possible, he or she is likely to exert greater effort, persist for a longer period of time, and attribute a greater proportion of success to the effort exerted than is someone who does not expect success (Carr, Borkowski, & Maxwell, 1991; Deshler, Schumaker, & Lenz, 1984; Garner, 1990, Yasutake, Bryan, & Dohrn, 1996).

Corral, Nadine, Shirin, Antia D. (1997). *Self-Talk: Strategies for Success in Math*.

- “Students' confidence in their ability to do the work is reinforced as they observe their progress toward the goal.”

Schunk, Dale H., Meece, Judith L. (1992). *Student Perceptions in the Classroom-Book*. Retrieved May 28, 2010 from <http://www.questia.com>.

### The Importance of Active Participation and Student Engagement

- “Students characterized engaging classroom activities as those that were interesting, gave them opportunities to learn new things, and were enjoyable....When students elaborated on the academic aspects of classrooms that they felt positive about, they spoke about active learning.”

Ares, Nancy, Gorrell, Jeffrey. (2002). *Middle School Students' Understanding of Meaningful Learning and Engaging Classroom Activities*. *Journal of Research in Childhood Education*. Volume: 16. Issue: 2. 263+



## Research Supporting GEMDAS® *Algebra Success*® Strategies (Continued)

### The Importance of Multi-modal / Multi-sensory Techniques

- Howard Gardner's multiple-intelligences theory:
  - Visual / Spatial (pictures, charts, graphs, posters)
  - Bodily / Kinesthetic (movement, physical activity)
  - Musical (songs, chants, rhymes, lyrics)
  - Linguistic (encouraging to say & see words)
  - Logical / Mathematical (explore patterns & relationships)
  - Interpersonal (learn through interaction)
  - Intrapersonal (most independent learners)

*<http://www.infed.org/thinkers/gardner.htm>*

### Visual Aids

- “The importance of vision in forming lasting impression cannot be overemphasized. Experimental evidence clearly demonstrates the great importance of visual aids in teaching.”

*Huebener, Theodore. (1960). Audio-Visual Techniques in Teaching Foreign Languages-Book. Retrieved May 28, 2010 from <http://www.questia.com>.*

- “Clearly and effectively, audio-visual aids can: arouse interest; develop a common background for new learnings; supply a concrete basis for new vocabulary, concepts, and generalizations;...present information and improve retention of it; develop skills; help for attitudes, opinions, and values.”

*Rivlin, H. N. (1961). Teaching Adolescents in Secondary Schools: The Principles of Effective Teaching in Junior and Senior High Schools (2nd ed.). New York: Appleton-Century-Crofts. Retrieved May 28, 2010 from <http://www.questia.com>.*

### Chants / Rhymes / Raps

- “In a series of experiments involving high-school students and geometry lessons . . . instruction [was provided] in visual/visual (text/graphic) or audio/visual (speech/graphic) formats. The results indicated that the mixed audio/visual format was more effective than the visual/visual format...”

*Jonassen, David H. (2004). Handbook of Research on Educational Communications and Technology-Book. Retrieved May 28, 2010 from <http://www.questia.com>.*

- “...the effective size of working memory may be increased by presenting information in a mixed (auditory and visual mode) rather than in a single mode. In this manner, there would be an increase in the capacity of working memory, thereby allowing an increase in the amount of information that could be processed.”

*Jonassen, David H. (2004). Handbook of Research on Educational Communications and Technology-Book. Retrieved May 28, 2010 from <http://www.questia.com>.*

## Research Supporting GEMDAS<sup>®</sup> *Algebra Success*<sup>®</sup> Strategies (Continued)

### The Importance of Metacognitive Strategies

- “Children are seen as learners who assemble and organize material. As such, cognitive development involves the acquisition of organized knowledge structures including, for example, ... early number sense,.... In addition, cognitive development involves the gradual acquisition of strategies for remembering, understanding, and solving problems.”

*Bransford and Brown. (1999). How People Learn: Brain, Mind, Experience, and School. The National Academies Press. Retrieved May 28, 2010, from [http://www.nap.edu/openbook.php?record\\_id=6160&page=100](http://www.nap.edu/openbook.php?record_id=6160&page=100).*

- “...The broader the range of strategies that children know and can appreciate where they apply, the more precisely they can shape their approaches to the demands of particular circumstances.”

*Bransford and Brown. (1999). How People Learn: Brain, Mind, Experience, and School. The National Academies Press. Retrieved May 28, 2010, from [http://www.nap.edu/openbook.php?record\\_id=6160&page=100](http://www.nap.edu/openbook.php?record_id=6160&page=100).*

- “Research examining the relationship between metacognitive knowledge and achievement indicates that children who are aware of why, when, and how strategies should be used are more likely to be able to use those strategies successfully” (Pressley 1994).

*Hacker, Douglas J., Dunlosky, John, Graesser, Arthur C. - editors. (1998). Lawrence Erlbaum Associates. Metacognition in Educational Theory and Practice Mahwah, NJ. Retrieved May 28, 2010 from <http://www.questia.com>.*

### The Importance of Repetition

- “Frequent repetition of problems allows students to become ‘experts’ with the facts. Whatever we practice, we master, and because basic computation is the foundation for more advanced mathematics, gaining fluency is especially important at this stage.”

*Major, Sarah M. (2005). Multiplication and Division-Book. Retrieved May 28, 2010 from <http://www.questia.com>.*

- “Skill learning requires 24 practices to reach 80 percent proficiency....Students who practice score 21 to 44 percent higher on standardized tests than students who don’t practice.”

*Sprenger, Marilee. (2005). How to Teach So Students Remember-Book. Retrieved May 28, 2010 from <http://www.questia.com>.*