

## Best Practices in Teaching MATH

- **Increase collaboration and communication within and across grades.** Program consistency, clarity of curriculum expectations for achievement, and widespread responsibility for and commitment to student success are essential. Strong administrative leadership and support is critical.
- Align **curriculum content maps** with **State Framework, Terra Nova objectives**, and other initiatives that identify **challenging, attainable, and high expectations** for *all* students (for advanced, proficient, and partially proficient students), and that incorporate important **higher level thinking skills** (learning to learn skills, self-regulated learning, Habits of Mind).
- **Identify currently used or available instructional materials** (basic and supplemental), **events, and technology**--on curriculum content maps, if applicable. Also identify needed materials and technology.
- **Maintain a collaborative model of regular teachers working with Title I, resource, and special education teachers (either in class model-side-by-side or pull out).** Schedule and/or assign instructional assistants to students of greatest need. Use these positions flexibly within and across grade levels.
- **Increase the amount of instructional time allocated to math instruction.** Given the “right” instructional conditions, more time can mean significant gains.
- **Increase the degree of on task behavior and motivation to learn.** Help students develop the belief that they “can do math.” Model enjoyment of math by emphasizing everyday applications of math so students can see the relevance.
- **Teachers assume the role of facilitators of learning** rather than dispensers of knowledge so that students become involved in discovering mathematical reasoning and procedures. After discovery, ensure that students acquire, integrate, and internalize correct mathematical processes. Students need to memorize important rules and procedures after they fully understand the concepts.
- **Increase student active engagement**, discussing and interacting with other people (adults, peers) and technology in stimulating, interesting activities. Increase teacher use of instructional strategies that require students to summarize, evaluate, and share what they are learning; that help students memorize important concepts, rules, and procedures (mnemonics, pegboards, etc.); that provide ample opportunities for students to apply skills in a variety of conditions or situations so that successful transfer is attained.
- **Increase use of instructional strategies that help students understand mathematics** such as manipulative materials; cooperative group work; and use of calculators, computers, rulers. Help develop students’ understanding using multiple representations (concrete, geometrical, graphical, numerical, and symbolic). **Decrease the use of instructional strategies** such as rote practice, rote memorization of rules and formulas, drill worksheets, repetitive written practice, and computation out of context.
- **Increase teacher use of varied task structures** (direct instruction or whole group activities, small groups or partner activities, learning centers, independent practice or projects, etc.), differentiated instruction, and appropriate adaptations and accommodations to ensure that instruction is at the appropriate level of challenge.

- **Improve appropriateness and effectiveness of homework.** Develop and implement effective homework policies. Homework should be individualized and interactive, if possible; incorporate systematic review of major concepts, skills (or extension of--); provide adequate opportunities for internalization (massed to spaced practice). Homework should be graded, commented on, and discussed.
- Encourage use of **software** that provides individualized practice in target areas and at appropriate level of challenge.
- **Increase attention to mathematics as reasoning** by requiring students to draw logical conclusions, justify answers and solution processes, reason inductively and deductively (graphing), estimate, and rely on their own knowledge and resources rather than rely solely on authorities such as the teacher or answer key.
- **Increase problem solving** that involves a variety of structures and solution paths rather than single answers and single methods to find answers, open-ended problems, and extended problem-solving projects. Have students solve word problems with everyday, “real world” problems and applications.
- **Teach students specific problem-solving strategies** and provide adequate practice in applying the strategies to each type of problem. Help students learn to recognize cue words to determine the operation to be used.
- **Emphasize mathematics as communication by increasing discussion of mathematics** including teacher questioning of students, requiring justification of thinking, encouraging students to make conjectures, inviting students to investigate and formulate questions from problem situations. Also have students read mathematics and listen to mathematical ideas. Decrease fill-in-the-blank worksheets, answering questions that need only yes or no responses, and answering questions that need only numerical response.
- **Increase student writing about mathematics** through math journals, describing solution processes or steps, and writing own word problems.
- **Increase the use of assessment practices that enhance mathematical understanding** such as assessing learning as an integral part of instruction, focusing on a broad range of mathematical tasks, taking a holistic view of mathematics rather than focusing on a large number of specific and isolated skills, and developing problem situations that require applications of a number of mathematical ideas. Use multiple assessment techniques, including written, oral, and performance rather than only using written tests. Avoid having assessment be simply counting correct answers on tests for the sole purpose of assigning grades.
- **Develop a system for systematic evaluation of student progress**--assess regularly, share assessment data, make instructional decisions based on assessment data (e.g., student portfolios, skills checklists, informal inventories). [Assessment should be identified on curriculum maps]
- **Preassess individual student strengths and weaknesses and provide appropriate remediation for target areas of weakness.** Provide additional opportunities for students with identified disabilities and for those who need timely remediation before they fall too far behind including before-, after-school, and summer.
- **Provide students with adequate instruction and practice like they are assessed** and help students develop **test-taking skills.** [Periodically require students to respond to “standardized test-like” formats,

questions, and time limits.] Balance assessments by including **holistic, higher-order problem solving as well as computation skills**.

- **Guide students in making mathematical connections by integrating math** into other subject areas (especially science), connecting math to the real world examples to develop skills in authentic contexts, and by connecting topics within math rather than learning isolated topics.

- **Help student acquire understanding of numbers, operations, and computation** by developing number and operation sense; understanding the meaning of key concepts such as place value, fractions, decimals, ratios, proportions, and percent; using various estimation strategies; developing thinking strategies for basic facts; and using calculators for complex calculation rather than requiring tedious paper and pencil computations. Reduce the early use of symbolic notation.

- **Help student acquire an understanding of geometry and measurement** by developing spatial sense, performing actual measurements in the different units of measure, and using geometry in problem solving. Decrease the use of memorizing facts and relationships, equivalences between units of measure, and geometric formulas without understanding. Internalization should come with use and feedback.

- **Help student acquire an understanding of statistics and probability** by requiring students to collect and organize data, and to use statistical methods to describe, analyze, evaluate, and make decisions rather than memorizing formulas.

- **Help student acquire an understanding of patterns, functions and algebra** by recognizing and describing patterns; identifying and using functional relationships; developing and using tables, graphs, and rules to describe situations; and using variables to express relationships. Decrease memorizing procedures and drilling without understanding.

- **Evaluate the success of the math program** by students' mathematical habits, attitudes, and understanding rather than only by test scores. Evaluation information about students' content learning as well as attitudes toward math should give direction to mid-course corrections, which should be made in a timely manner.

- Provide ongoing, **high quality professional development** to increase teacher competence--visits to innovative programs, district-sponsored graduate level courses, workshops, conferences, etc. Collaborate to understand the underlying problems and to set goals for attending to them.

- Consider identifying teachers with mathematical instructional expertise to provide assistance, mentoring, and support to other teachers. Additional support may be found at near by colleges or through Regional Educational labs or Eisenhower National Clearinghouse.

- **Provide opportunities for parents** to become involved through focus groups, surveys, one active site councils. Increase communication with parents--calls home, notes to parents, classroom news, etc. Disseminate information about ways parents can reinforce mathematics in the home.

#### **Reference:**

Chabran, M. (1999). Self-assessment guide for improving mathematics. Washington, D.C.: Planning and Evaluation Service, US. Department of Education ([www.ed.gov](http://www.ed.gov)).

Best Practices in Math. (Source Unknown)

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