

Theoretical Foundation

by Linda Cohen

National Standards in Mathematics

The National Council of Teachers of Mathematics has determined that “many students are not learning the mathematics they need or are expected to learn. In some instances students have not had the opportunity to learn important mathematics. In other instances the curriculum offered to students does not engage them.” (NCTM Principle and Standards for School Mathematics, p.5) Programs should seek to improve the knowledge of mathematics in students by providing engaging mathematical activities in a challenging and fun environment.

The six principles for mathematics (NCTM Principles and Standards for School Mathematics, p.11) are encompassed in the development of this program. Pre- and post- test assessment provide teachers with useful information about student strengths and needs. High expectation for student success is combined with supportive strategies. All lessons focus on building new knowledge from previous knowledge. Teachers are provided with quality questions to encourage student thinking. Number sense and mental math strategies are utilized to facilitate computational accuracy and efficiency. Calculator usage is thoughtfully integrated into the program. Students solve problems daily and interact with mathematical concepts in new and exciting ways. Communication of mathematics is stressed throughout the program and is required in the daily Tournament.

The elements of a program should reflect the skills indicated by the NCTM Standards for primary and intermediate level students in the following areas:

- Numbers and Operations
- Algebra
- Geometry
- Measurement
- Data Analysis
- Problem Solving
- Communication
- Connections

State content objectives mirror the NCTM Standards, and a complete list of content objectives is available.

Best Practices in Improving Student Achievement in Mathematics

Programs should provide a curriculum that is based on research findings on how best to improve student achievement in mathematics. Those findings are summarized by Grouws and Cebulla in an ERIC Digest, January 2002 (www.ericse.org/digests/dse00-09.html). Programs should be designed to offer supplemental instruction, which expands students' exposure to mathematical skills and concepts. Strong correlations between opportunity to learn (OTL) and mean student achievement scores is documented in several international studies cited by Grouws and Cebulla. Other best practices identified in this study are included:

- Daily problem-solving
- Opportunities to discover and invent new knowledge
- Opportunities for student interaction and discussion
- Whole-class discussion following individual and group work
- Instructional focus on number sense
- Use of concrete materials
- Use of calculators

Linda Cohen, Director of Program Development for Camelot Learning, is an experienced teacher, supervisor, active member of the National Council for Teachers of Mathematics, educational consultant and curriculum writer. Ms. Cohen developed mathematics content standards for the State of Maryland, and wrote and revised curriculum for Sylvan Learning. In addition to overseeing the writing of mathematics curriculum, her Camelot Learning responsibilities include developing teacher training and technical support systems.