

Equals Mathematics White Paper



***mathematics curriculum
for students of differing abilities***

Effective math curriculums must afford students with disabilities the opportunity to learn standards based math with instructional strategies, materials and technology unique to each learners needs. In addition effective math instruction must combine standards based math with functional math development to maximize the most effective outcomes for students with disabilities.

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Equals Math is designed to enable every student with disabilities to succeed in math. The program is based on extensive research in math education, cognitive science, the content standards of all fifty states, and the recommendations of highly respected professional organizations. In addition to reflecting our commitment to best practice and research, the Equals curriculum exhibits a deep understanding of what students with disabilities need to become mathematically proficient, capable, and productive adults.

By offering each student countless opportunities to learn and understand essential math standards and concepts, Equals exceeds and meets the requirements set by states for students with disabilities. The program helps students develop a strong foundation and understanding of premath and readiness math, numbers and operations, geometry, algebra, measurement, data analysis and probability. Through Equals, students with disabilities are able to distinguish and understand multiple means of number representations and use them in a variety of conditions. In addition to developing flexible mathematical skills, students learn the justifications and meanings of mathematical procedures, making it possible to apply the procedures to an extensive range of problems and situations. Students further learn math process areas of communicating effectively with math, connecting math skills to real life and to new math learning, along with reasoning and proof. Equals uses

technology in a way that maximizes its unique powers – to provide a broad array of resources to students, teacher, and parents, including interactive-digital content and assistive technologies which tailor the program to each student's unique needs.

This innovative program is accessible to all levels of students with disabilities by using the most up-to-date strategies, methods and resources in math education and brain research for tested methodology, lesson components, and learning principles all related to students with disabilities learning mathematics. Each math lesson has been divided into three levels of instruction and materials for students with disabilities to make mathematical concepts meaningful and accessible. (i.e. level 1 provides for students with severe/profound disabilities, level 2 students with moderate disabilities and level 3 students with mild disabilities.)

All this information was put into a specially formed system to help students achieve and retain the concepts they are taught including the best in math instruction methodology, unique pacing guidelines, and a specialized assessment, hands-on materials, frequent review, and numerous sensory learning activities.

A Research-based Curriculum

What makes Equals Math unique is its ability to include students of all skill sets in the mathematical learning process. In this curriculum we have solved the age old issues of:

- The lack of a quality math curriculum specifically developed to meet the needs of students with disabilities (National Research Council, 1977)
- The lack of math methodologies in teacher training institutes to provide for quality math and instruction (Ball, 1990; Conference Board of the Mathematical Sciences, 2001; Simon & Blume, 1994).
- The lack of complete and specialized curricular materials and of age appropriate materials for students who require work on basic math skills (Sowell, 1989; Carlson, 1992; Marlow, and, Inmann, 1997).

In the Equals Math program, all of these problems are solved. Equals is a comprehensive math program designed specifically to meet the needs of students with disabilities. It has three levels which provide meaningful instruction and materials for students of varying ability levels. All lessons and materials were developed within an age neutral format to insure that each student, regardless of the math skills they need to work on, can do so with

materials and within a lesson framework that is appropriate. Each lesson provides proven math constructs to ensure teachers are providing quality math instruction. Finally, Equals provides a full set of specialized curricular materials for each lesson such as posters, measuring devices, counting blocks, math vocabulary cards, math graphic organizers, and many other tools and manipulatives. Through all of these new endeavors, Equals provides students with disabilities a fully formed math program in which more than just functional math can be appropriately taught.

In addition to drawing on existing research, AbleNet's Equals Project Team conducts ongoing research on learning, instruction, curriculum design, and effective uses of varying technologies. We analyze teachers' comments, student's performance and achievement, along with other measures of learning and program effectiveness, conduct experimental studies of our curriculum and its components, and continually develop and test enhancements to the program. Our ongoing research ensures that we not only maintain a superior curriculum but that we continually fine-tune and improve it.

During Equals Math Action Research in the spring of 2009, teachers in 10 school districts tested the math program with 138 students ranging from kindergarten to twelfth grade.

In the study, approximately 50% of the students were in elementary settings and 50% of the students were in secondary classes. Surveys and inventories were used to collect information about student progress and staff reactions to the Equals curriculum.

Students who took part in Equals instruction reportedly demonstrated progress in math learning. Faculty and staff related that working with Equals enhanced math instructional skills as it provided easy to administer, quality strategies for working with students with disabilities. 95% of students reported having positive experience with the program with 86% indicating they were consistently engaged in math learning. 95% of teachers were satisfied with the curriculum and indicated that it contributed to stronger math instruction with the classroom. 87% of teachers felt the program met their students' needs and 95% reported student gains in math skills.

Building Skills, Knowledge, and Understanding

Consistent with math education research, the Equals approach recognizes the importance of critical teaching and learning constructs specific to students with disabilities; repeated practice of skills, application of skills, multiple pathways to learning and achievement, and differentiated instruction for students of differing abilities and needs (Tomlinson,

2000; National Council of Teachers of Mathematics, 2009). To become as proficient in math as possible, given each student's unique needs, they must be provided instruction on a systematic consistent basis with materials and instructional strategies that are engaging and meaningful (Chester, Davis, & Bush, 1988). Recognizing that mastery of math involves a myriad of proficiencies; we have built into the curriculum a wide range of expectations for students.

These expectations include:

- Problem solving – the principal reason for studying math – posing questions' analyzing, translating and illustrating results; demonstrating with manipulatives, drawing diagrams; using trial and error; applying rules of logic; recognizing relevant facts; and scrutinizing conclusions.
- The application of math to everyday situations, which require students to translate mathematical relationships into models that must be solved, interpreted, and applied to daily activities.
- Appropriate computational skills – knowledge of number facts with hands on, visual and or mental arithmetic, including addition, subtraction, multiplication, division with whole numbers, decimals, fraction, percents, algebraic computation, and

additional computations as appropriate.

- Concepts – geometric figures, with emphasis on measurement and problem solving; recognizing similarities and differences among objects as the underpinnings for further geometry and additional math instruction.
- Understanding length, distance, weight, time, capacity, temperature, and angles; calculating simple areas and volumes; and using both metric and customary systems with appropriate tools.
- Reading, interpreting, and constructing tables, charts, and graph, including analyzing numerical information (within the context of manipulatives, representations, numbers) and partitioning this information into manageable/meaningful terms, and the ability to use conclusions with tables, maps, charts and graphs.
- Using mathematical models to predict and determine the likelihood of future events and identifying immediate past experiences that do not affect the likelihood of future events.
- Understanding technology capabilities – what technology can and cannot do.

Metacognition

Metacognition refers to the process of planning, reflecting on, and evaluating one's own learning. Research has consistently demonstrated that metacognition is a characteristic of good learners and plays a vital role in successful math learning (Costa, 1991; Perkins, 1992, 1995; Fogarty, 1994; Marzano et al, 1997; Swartz and Parks, 1994; Tishman, Perkins, and Jay, 1995). Equals provides a means within each lesson for students to identify what they have learned. Students demonstrate their learning through traditional and non traditional means (including worksheets, role-playing, sensory activities, individual, small, and large group demonstrations', interviews, etc.) Equals provides opportunities for even the most challenged students to respond to each day's lesson.

Equals Features

The Equals Math Curriculum provides a unique combination of materials and strategies to support systematic direct instruction of students with widely divergent ability levels:

- A comprehensive scope and sequence of essential K-12 math skills from pre-math to traditionally taught math standards.
- Lessons and materials developed for varying student abilities to include students with severe/

profound, moderate, and mild disability needs.

- An assessment which provides for administration to students of varying abilities.
- AbleNet's Math Action Dictionary™: the special educator's differentiated instruction guide which provides multiple means for students with cognitive or physical impairments to perform each and every skill.
- A multi-sensory, hands-on approach to ensure that students understand the concrete realities and underpinnings of mathematical concepts.
- Regular practice, review, and assessment to ensure mastery of basic skills.
- Interactive assistive technologies which ensure all students appropriate access to instructional methods and materials.
- A complete math manipulative kit including technologies which promote math accessibility for all learners.

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