

Research Brief

Mathematics Programs for Students with Disabilities

Question: What are the mathematics programs for students with disabilities that show promise and provide ways for teachers to easily assess students?

Summary of Findings:

In a Nutshell

Any math program for students with disabilities should be a math program that has proven results for improving student learning. The U.S. Department of Education's What Works Clearinghouse (<http://ies.ed.gov/ncee/wwc/reports/>) lists two elementary and four middle school math programs that have a positive effect on student learning. Although two are comprehensive, core curricula (Everyday Math and Saxon Math), they could be adapted to work across grade levels in special education programs. The programs that involve interactive software have potential to be used individually or in small groups in special education classrooms and usually include assessment features.

Direct Instruction (di) is a proven instructional method for students with disabilities. It involves a six-step process: review, presentation, guided practice, corrections and feedback, independent practice, and weekly/monthly reviews.

Mathematics Programs for Students with Disabilities

There are several programs that have proven results. While designed for either elementary or secondary students, the programs can be adapted to work across grade levels in special education programs.

Elementary Programs

- a. **Odyssey Math:** This web-based K-8 program instructs using an interactive electronic math curriculum and incorporates an assessment tool with a data management system. Teachers can use it as a standalone program or a supplement to another program. It can be individualized for both instruction and assessment. This program is rated as having potentially positive effects on student learning. Distributed by CompassLearning, Inc. Web: www.compasslearning.com Telephone: (800) 232-9556.
- b. **Everyday Math:** This is a K-6 core curriculum program, often chosen as a whole school curriculum rather than a program for special education. It uses real life problem solving and engages students to talk about their math understanding. The program uses technology, various methods of instruction and skills practice, and includes recommendations for parent involvement. This program is rated as having potentially positive effects on student learning. Published by Wright Group/McGraw-Hill. Web: www.wrightgroup.com. Telephone: 800-648-2970. Fax: 800-593-4418.

Secondary Programs

- c. **Saxon Math:** Saxon Math has materials for a K-12 program and is used in many schools as a core curriculum. It has also been used in special education settings. The middle school math curricula (Grades 6-9) was reviewed by What Works Clearinghouse, designed to meet National Council for Teachers of Math (NCTM) standards. It involves 120 daily lessons and 12 activity-based investigations. It was found to have positive effects on math achievement. Web: www.saxonpublishers.com. Telephone: (800) 284-7019.
- d. **I CAN Learn Pre-Algebra and Algebra:** There are three elements of this system, with grades 5-6 math curriculum (not reviewed), pre-algebra, and algebra. The programs are interactive, self-paced, and involve software that differentiates and allows students to move towards individual mastery. The program includes instructional video and can be customized to align with state standards by selecting appropriate lessons from their database. The curricula can be accessed via internet or installed on a local server. There is a class management system that can track homework and test grades. The two elements rated were found to have positive effects on math achievement. JRL Enterprises, Inc. developed and distributes *I CAN Learn*[®]. Web: <http://www.icanlearn.com>. Telephone: (504) 263-1380.
- e. **Cognitive Tutor, Algebra I:** This Interactive software involves an Algebra curriculum that combines algebra textbooks with interactive software. The software can adapt to the correct/incorrect answers of students in order to customize instruction to match individual needs and pace. Students are taught from a textbook 3 days a week, and use the computer lab 2 days a week. Additional topics include: Bridge to Algebra, Algebra I, Algebra II, Geometry. This is rated as having potentially positive effects on student learning. Distributed by Carnegie Learning, Inc. Web: http://www.carnegielearning.com/software_features.cfm. Telephone: (888) 851-7094.
- f. **Expert Mathematician:** This software and consumable print material, using LOGO programming language, targets students in middle school to develop mathematical thinking skills in the areas of general math, pre-algebra, and Algebra I. The three-year instructional program includes tests for unit concepts administered at the end of each instructional unit. This program has been rated as having potentially positive effects on student learning. Distributed by J. J. Baker, Ph. D. Web: www.expertmath.org. Telephone: (612) 872-6741.

Proven Instructional Method

Another way to respond to this question is to recognize that instruction that is systematic and explicit works for students with special education needs. A meta-analysis of math instruction for students with learning disabilities, confirmed that explicit/direct instruction is an important tool for teaching math (Gerston, Chard, Jayanthi, Baker, Morphy, & Flojo, 2009).

A direct instruction (di) approach generally uses a process of six steps: review, presentation, guided practice, corrections and feedback, independent practice, and weekly/monthly reviews (Gagnon & Maccini, 2005). The University of Kansas identifies three direct instruction math programs that can be used for special education populations (www.specialconnections.ku.edu). These programs include teacher scripts to assist in the direct instruction, placement tests and assessments to track student progress. There are also workbook activities and mastery tests.

Choral responses (unison group responses) are part of the instruction, allowing for increased student responding and immediate teacher corrective feedback if needed, as well as individual opportunities to respond.

- a. **Connecting Math Concepts:** This program has six levels (A-F) corresponding to K-6 grade levels, and a level (K) for preschool. It is a comprehensive developmental program and can be used in special education classrooms. Johns Hopkins' Best Evidence Encyclopedia lists the elementary program as having moderate effects on student learning (www.bestevidence.org/overviews/C/conn-math.htm). Information is available from: www.sraonline.com.
- b. **DISTAR Arithmetic:** There are two levels in this program (I and II) which focus on solving problems related to addition, subtraction, multiplication, division, fractions, and increasing more difficult story problems. DISTAR is more typically used as a remedial program in elementary schools, and often used with students with low incidence disabilities (e.g., moderate to severe disabilities). Information is available from: www.sraonline.com.
- c. **Corrective Mathematics:** This program has four modules: addition, subtraction, multiplication, and division. It also has three other modules: basic fractions, fractions, and one including decimals, percents, ratios, and equations. Corrective Mathematics is chosen as a remedial program for students in grades 3-12 who need instruction in specific skill areas. Information is available from: www.sraonline.com.

Resources

Online Resources.

What Works Clearinghouse. Homepage: <http://ies.ed.gov/ncee/wwc/>

University of Kansas. (Special Connections web pages to help special education students access general education curriculum)

Homepage: <http://www.specialconnections.ku.edu/cgi-bin/cgiwrap/speconn/index.php>

Introduction to Math (by Dr. David Allsopp, University of South Florida):

<http://www.specialconnections.ku.edu/cgi-bin/cgiwrap/speconn/main.php?cat=instruction§ion=main&subsection=math/main>

Direct Instruction: Math: <http://www.specialconnections.ku.edu/cgi-bin/cgiwrap/speconn/main.php?cat=instruction§ion=main&subsection=di/math>

K-8 Access Center: Improving Outcomes for All Students K-8.

Homepage: <http://www.k8accesscenter.org/index.php>

Math professional development modules:

<http://www.k8accesscenter.org/index.php/category/math/>

Web-based Resources for Mathematics: Tools and Activities for Teaching and Learning:

http://www.k8accesscenter.org/training_resources/MathWebResources.asp

Vanderbilt University, Peabody College. (Iris Center for training enhancements to improve instruction for students with disabilities)



Resources (including math information):
<http://iris.peabody.vanderbilt.edu/resources.html>

Print Resources

Gagnon, J. & Maccini, P. (2005). Direct instruction in middle school mathematics for students with learning disabilities. *The Access Center, updated 3/17/05*. Retrieved from http://www.k8accesscenter.org/training_resources/directinstructionmath.asp .

Gersten, R., Chard, D.J., Jayanthi, M., Baker, S.K., Morphy, P., & Flojo, J. (2009). Mathematics instruction for students with learning disabilities: A meta-analysis of instructional components. *Review of Educational Research, 79* (3), 1202-1242.

Submitted Date: March 27, 2010

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