



10 Tips for Software Selection for Math Instruction

By: Beatrice C. Babbitt (1999)

Are you excited about the potential technology may have in assisting students with learning disabilities in mathematics? We know that many students with learning disabilities struggle to learn mathematics. Students have trouble understanding mathematical concepts, recalling and carrying out mathematical procedures, and solving a range of mathematical problems. Importantly, researchers have identified a range of effective mathematics interventions for students with disabilities. Computer-aided instruction has been shown to be an effective tool for mathematics instruction (Goldman & Pellegrino, 1987; Okolo, Bahr, & Reith, 1993). Students who use appropriate technology persist longer, enjoy learning more, and make gains in math performance. The potential of hypermedia to improve mathematical performance (Babbitt & Miller, 1997) is being realized in today's software design. There seems to be many good reason to celebrate technology's use.

On the other hand, are you overwhelmed by the many math software programs available? Is there any substance beneath the sound, color, cute characters and animation? To help you effectively select technology for math instruction, I've put together a list of 10 tips to guide teachers and parents in selecting instructional math software. The focus here is on instructional software such as concept development, drill and practice, tutorial and simulation software rather than tool software such as spreadsheets or graphing software. The software mentioned is for illustrative purposes only.

Tip 1 - The less clutter on the screen, the better.

Most students with LD are distracted by too much stimuli coming at them at the same time. Moreover, cluttered screens often distract from the math concept or procedure being studied. Choose programs that use simple screen displays.

Tip 2 - Procedures should match those being taught in school.

Many LD students get confused if the same task is presented in different ways particularly in the early stages of learning. Some computation procedures used in software differ from standard classroom presentations. Weigh the other advantages of the software before introducing this conflict into math instruction. If you decide to use software with differing procedures, take the time to carefully point out the differences and be ready to assist if confusion arises.

Tip 3 - Choose modifiable software.

Software in which speed, number of problems, and instructional levels can be modified will serve the needs of a wide range of students in a single classroom or an individual student over a long period of time. Some students are motivated by the necessity of a speedy response while others become frustrated by the time pressure. While some students enjoy the ever increasing speed of Math Munchers Deluxe (MECC) others are very relieved to play this math matching game with the speed element turned off. Having the ability to modify the response speed is very important to effective math instruction. In addition, students vary greatly in their ability to complete a number of problems before they need feedback and a break. Individuals differ within themselves on persistence depending on the time of day and the difficulty of the problems. This variation can best be responded to by being able to adjust the number of problems in any problem set and the starting level for each student.

Tip 4 - Choose software with small increments between levels.

Most math software designed for all students makes rather large jumps in difficulty from one level to the next.

This is particularly true of retail math software that purports to cover the entire K-8 math curriculum. Students with LD will often test out of Level 1 but then fail miserably on level 2 because the problems have gotten too difficult too fast. Special education publishers such as **Edmark** are more aware of this difficulty and incorporate smaller difficulty increments between levels. The other solution is to choose software that allows problem selection or construction to design an intermediate level that fits a particular student.

Tip 5 - Choose software with helpful feedback.

Math software should provide clues to the correct answer when a student makes an error. Software might indicate the range within which the answer should lie or show a diagram to indicate the underlying concept that could help the student solve the problem on their own. Software that simply indicates a student is wrong is less helpful. Fraction Fireworks (**Edmark**) incorporates an interesting and useful feedback technique. The fireworks celebration after a correct answer illustrates the fraction chosen.

Tip 6 - Choose software that limits the number of wrong answers for a single problem.

A sure formula for creating student frustration is to require students to repeatedly guess on a problem they don't know. It's also a sure formula for encouraging random guessing and other non thinking behavior. The best software will limit the number of attempts, give clues as to the correct answer, provide the correct answer, and then reintroduce that same item at a later time. Test this feature on a software program by making deliberate errors.

Tip 7 - Choose software with good record keeping capabilities.

We know that informative performance feedback can help students understand their errors and help them set realistic but challenging goals. Software should keep records for each student. Young children might be told how many items out of the total number were correct. Older students can be given percentages correct. Information should be made available on the types of problems or the exact problems that caused difficulties. Most software will include record keeping capabilities but preview software to be sure.

Tip 8 - Choose software with built-in instructional aids.

The ability to accurately represent word problems can increase problem solving performance. Software that incorporates built-in instructional aids such as counters, number lines, base-ten blocks, hundreds charts, or fraction strips can give the student tools to represent a given problem and then go on to solve it. These virtual manipulatives are incorporated in such programs as Equivalent Fractions by **Sunburst**. A colleague and I have done some preliminary work with students using concrete manipulatives with software when built-in instructional aids were not available. Students found the aids very helpful as they solved fraction comparison problems.

Tip 9 - Select software that simulates real-life solutions.

In real life there is usually more than one way to solve a problem. Money, time, and problem- solving software is more effective if it allows multiple roads to problem solution. Making Change by **Attainment Company, Inc.**, for example, is a very helpful program because it combines decisions (where can I buy this item on my shopping list?) with multiple solution routes (students can select any combination of bills and coins to pay for items as long as they give the clerk enough money).

Tip 10 - Remember software is a learning tool - not the total solution!

Instructional software is a tool in effective math instruction and learning. With color, graphics, animation, sound and interactivity, it can capture and hold the attention of students so that they persist in mathematics tasks. Software can use these same features to present mathematics in imaginative and dynamic ways. When modifiable, it can support learning at the child's pace and on the child's level. It is important, however, to combine direct teacher instruction with technology- assisted instruction. In most instances, concept development

with concrete materials and clear procedural instruction should precede software use. Pencil and paper tasks still have a role to play in student learning. Problem solving should occur with and without technology use. While well designed math software can support student learning in a positive manner, software can rarely stand on its own. Instruction must precede software use and then extend beyond the software to apply the math concepts, procedures, and problem solving in many new settings.

As a final note, there are some useful math software tools that can assist teachers and parents as they instruct students in mathematics. One such tool is a program called Math Companion from Visions Technology (outdated - note from LD OnLine) which can create individualized math activities tied to key math objectives. A powerful numeric and word problem generator creates traditional worksheets, math anagrams and color-ins that can be modified to meet the needs of individual students. Options include controlling the number of items on a page, selecting a single objective or any combination of objectives, modifying type size, style and problem orientation (horizontal or vertical), producing problems with procedural hints, showing examples on the page, selecting alternative graphics, producing answer keys with problems worked out, and providing estimation lines. The user friendly interface makes it easy to select among options and by just a click of the mouse, change a problem on the page.

Teachers who have used Math Companion like the fact that they can use the same color-in for all the students in class while varying the individual problems with only a few minutes of work. The random numeric generator enables teachers to create additional unique practice sheets for those students who need more work on a particular skill. Since several objectives can be chosen, teachers can also easily generate review work for students. If the library of word problems is not sufficient, teachers can add their own word problems to the database. Math Companion is a great technology tool to help teachers meet the individual math needs of students.

By selecting software wisely and using it effectively with other instructional tools, parents, teachers, and more importantly, students with learning disabilities will find learning mathematics can be an interesting and enjoyable experience.

References

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http://www.ldonline.org/article/10_Tips_for_Software_Selection_for_Math_Instruction/6243?theme=print

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