

Assistive Technology Guide

Third Edition



www.SchwabLearning.org



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Helping kids with learning difficulties be successful in learning and life

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Helping kids with learning difficulties be successful in learning and life

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The **Web** version of our Assistive Technology (AT) Guide provides further information on Assistive Technology, including:

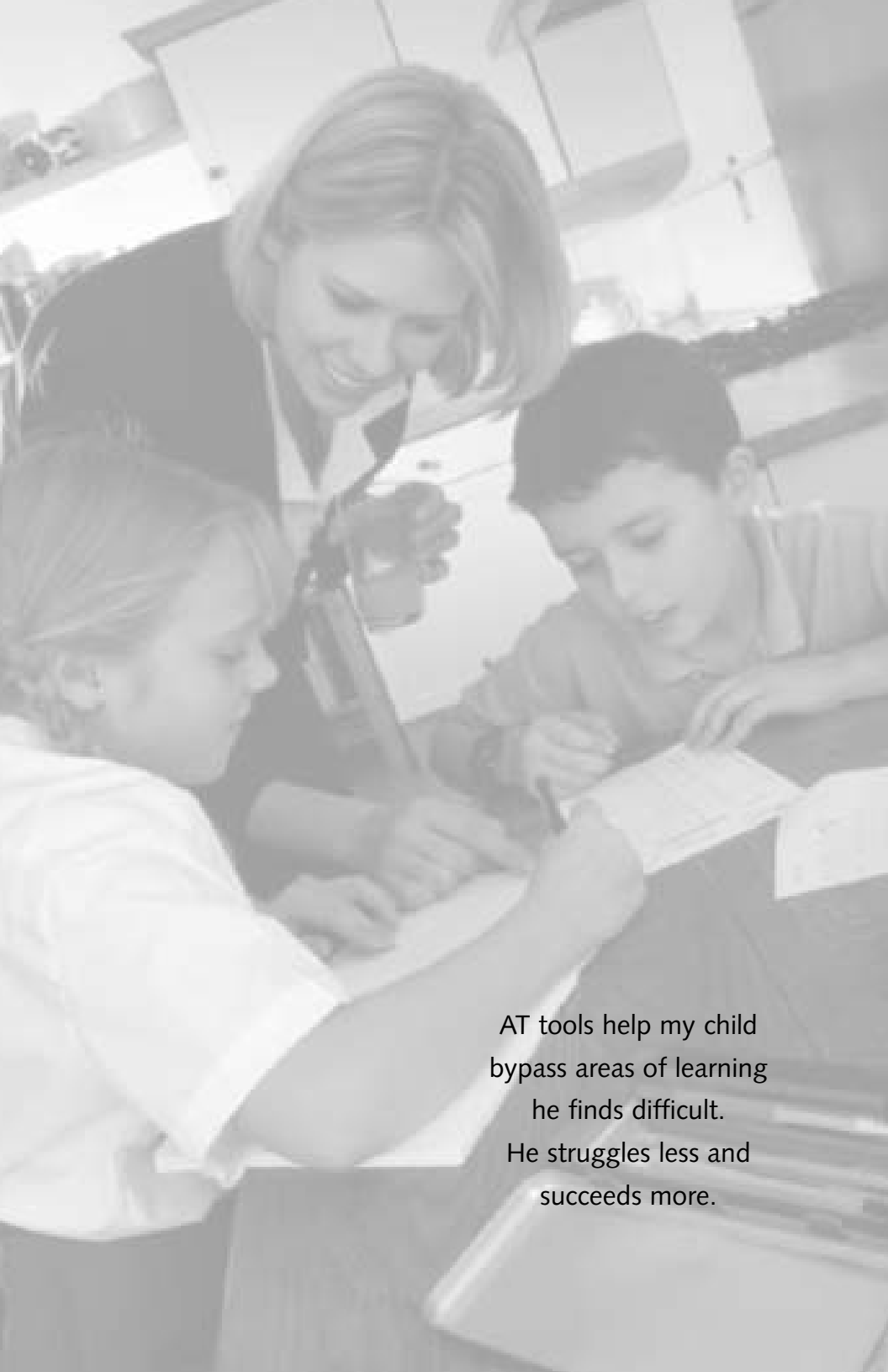
- Links to additional information about the technology
- Specific product information and links

The Web version is available at:



www.SchwabLearning.org/atguide

AT tools help my child
bypass areas of learning
he finds difficult.
He struggles less and
succeeds more.



getting started

overview

Schwab Learning considers assistive technology (AT) to be any item, piece of equipment, or system that helps bypass, work around, or compensate for specific learning deficits. AT is not the same as instructional software that develops specific academic skills.

AT can be hardware, such as computers, tape recorders, and calculators. AT also can be programs (software) that run on computers and tell the computers what to do.

The cost of AT can range from a few dollars for “low-tech” equipment to thousands of dollars for “high-tech” items. Here are some examples:

low-tech

- Pencil grips
- Highlighting pens and tape
- Talking calculators
- Tape recorders
- Electronic spell checkers and dictionaries

high-tech

- Mind mapping/outlining software
- Reading systems that use a computer, scanner, or software to read scanned book pages out loud

Kids with learning disabilities (LD) have unique strengths, needs, talents, and interests. AT can help them use their strengths to learn new information and express knowledge. To make sure kids are successful, it's important to choose the right tools to meet their individual needs.

use

Learning disabilities (LD) affect the ability to listen, think, speak, read, write, spell, or do mathematical calculations. They result from a presumed central nervous system dysfunction for which there's no known cure. Kids don't outgrow LD; they become adults with LD. But assistive technology (AT) tools can greatly enhance their success in school and life.

Kids with LD must be able to learn at school and function in other settings — home, work, social, and recreational. AT that is easy to carry around lets them use a bypass strategy wherever they go. A child with LD can write a school report at home on a word processor. He can check for spelling errors at the library with an electronic spell checker or use a calculator to keep score in a game at a friend's house. AT helps kids “get the job done.”

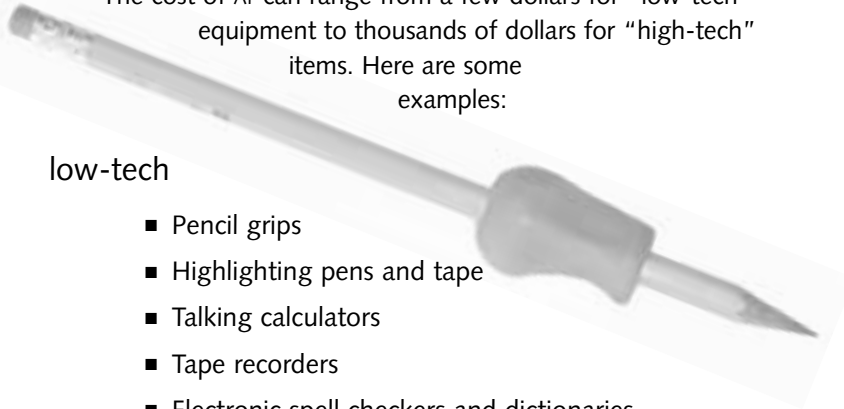
AT also can increase self-reliance and independence. Many times, kids who struggle in school depend on parents, siblings, friends, and teachers for help with assignments. By using AT, kids learn they can do things on their own.

selection

With so many AT products available, it can be difficult to choose the “best” one. The right product depends on your child's individual needs, the specific setting, and the particular task(s) to be accomplished. A tool that may be a great aid for one child may not be helpful to another.

test out AT

Try out technology at Alliance for Technology Access Centers, conferences, schools, universities, computer shows, retail outlets, or a friend's home. Most manufacturers provide demonstrations, and some will loan AT on a trial basis.



consider these points

Before selecting AT for your child, answer these questions:

What are his specific needs?

- Does he need to bypass a reading disability, such as sounding out new words?
- Does he need help with writing, such as spelling words correctly?
- Does he need to compensate for a memory problem, such as forgetting directions?

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What are his strengths?

AT should use your child's strengths. For example, if he has difficulty reading but easily understands spoken information, he might benefit from a system that changes printed words to computerized speech.

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How interested and skilled is he in using technology?

Include your child in the selection process. He's the one who's going to use — or not use — the technology. The "perfect" item can't help him if he does not want to use it!

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Where will it be used — home, school, work, or social settings?

The right technology in one setting may be entirely wrong in another. Think about where you'll put it, how it will be stored, and if you have the right furniture for it.

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Will it need to be used in more than one place?

Fortunately, hand-held and pocket-sized tools often are as useful as larger systems. A pocket-sized spell checker may work just as well as a computer with a spell check program, and it's much easier to carry around.

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acquisition

Assistive Technology (AT) can vary in cost from a dollar or two for “low-tech” tools — pencil grip or calculator — to several thousand dollars or more for “high-tech” hardware and software. There’s a lot to think about when selecting AT for your child.

Before you spend any money, take time to learn all you can about AT. Have your child try out the tool or device first. Alliance for Technology Access (ATA) can help you find the nearest place to preview software in your area.

> family

If you don’t have technology in your home, check to see if a relative or friend has something your child could use. It’s a good way to evaluate his interest and skill in using AT.

AT is generally purchased by the parents of kids with LD, especially if the tool or device is used mainly at home or between home and school. Relatives can help by purchasing electronic spell checkers, calculators, and software as gifts for special occasions.

> community

Public libraries and other community agencies have computers kids can use, which can be especially helpful for kids doing reports or who need Internet access. Often, though, the software they have available may not provide enough help to bypass some learning difficulties.

> schools

Many kids who don’t have computers at home use school computer labs before and after school and during lunchtime. Keyboarding classes are taught in many middle and high schools.

If your child receives special education services from a public school, the Individualized Education Plan (IEP) team should consider AT needs at an IEP meeting. Assessment of AT needs should take place in the school setting.

The IEP team will decide whether AT is necessary or advisable for your child. If so, it should be written into the IEP and may be provided by the school.

For kids with LD, IEP accommodations often mean having access to technology as a bypass strategy (such as writing papers on a word processor instead of by hand, or using a calculator to check answers to math problems). It rarely involves the school’s purchase of expensive equipment for your child’s exclusive use. “Access” may mean using classroom or computer lab equipment or being able to do homework on technology available in your home.

> medical plans

You may wonder if Medicare, Medicaid, or private insurance would provide monies to assist you in purchasing AT equipment. Some medical plans will help with communication devices under certain conditions for kids with severe disabilities. However, educational technology is rarely covered.

> software publishers

Some software publishers have websites that offer demonstration versions. Other publishers offer the “fully operable” program for a thirty-day preview. Check to see if free trial offers are available on the products you’re interested in.

> donations

Your child doesn’t necessarily need the latest model computer at home. A used computer may do the trick. Learn what’s available from local social service agencies, churches, and community groups in your neighborhood. Some community based service groups in your state may give away repaired, donated computers.

instructional software

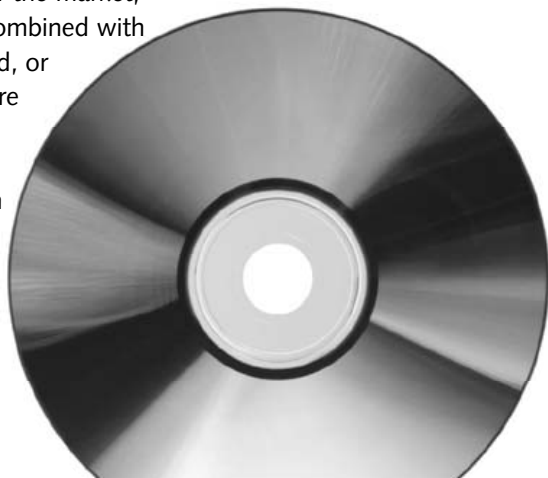
Instructional software is used to develop or improve weak skills in specific academic areas. It's different from assistive technology (AT), which is used to work around, or bypass, areas of difficulty.

Some instructional software can be customized — text to speech, adjustable skill levels — to meet kids' special needs. Always preview software before purchasing to see if it meets your child's needs and interests. You can review software online or at local computer, office, and educational supply stores.

Online instructional software reviews can help you make wise choices for your child because they provide:

- Overview of the program
- Discussion of software features
- Appropriate age or grade levels
- Outline of curriculum area(s) covered
- Publisher contact information
- Cost information

Because of the rapid changes in software development, instructional software may be taken off the market, packaged another way (combined with another product), renamed, or owned by another software company. If you see it reviewed and can't find it on the market, check with the publisher about availability.



writing technologies

> Highlighting Pen/Tape

Highlighting pens (highlighters) are used as study and pre-writing tools. Kids highlight main ideas, facts, and details, such as definitions, numbers, dates, people, and places, to help them study for tests or gather information for a report. Highlighters can help kids organize by using different colors; for example, highlight main ideas in blue, supporting details in green, dates in yellow.

Highlighting pens come in many shapes, lengths and colors. The ink is either washable or permanent.

Some even are erasable with yellow ink at one end and an eraser at the other end.

Highlighting pens are available in stationery and office supply stores, as well as office/school supply sections of drug and grocery stores.

Highlighting tape, an alternative to pens, can be removed without leaving a mark in a school text or library book. Tape is pulled from its dispenser, cut, and placed on paper to highlight short selections of text. Various colors and widths are available at some local stationery and office supply stores.



> Pencil Grip

Pencil grips for both right- and left-handed children are slipped onto pens and pencils to provide a stable grasping surface, which can help kids with fine motor skill problems. Office/school supply and stationery stores, even some bookstores, stock various rubber or plastic pencil grips. Grips come in a variety of shapes, sizes, and colors and some pens have grips built-in. It may take a few tries to find the most comfortable "fit."

> Slant Board

A slant board provides a smooth, angled, "drafting table" work surface that helps position the wrist for writing. It can be made of plastic, wood, or cardboard. Some even provide padded arm support. Check with your child's teacher or an occupational therapist to see if a slant board would help your child with the physical process of writing.

> Specialty Paper

Specially designed paper can help kids who struggle taking class notes. A proficient student can take notes, creating an extra copy on an attached carbonless paper. At the end of class, notes (original and copy) are available to the note taker and his struggling "buddy."

Some writing paper comes with raised lines which are tactile reminders for kids who need help staying within the lines as they write. It helps them know where to stop their pencil stroke.



> Word Processing

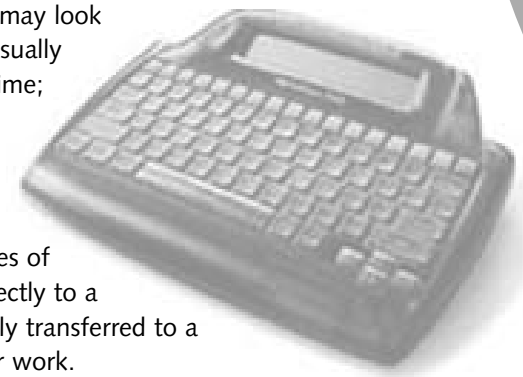
A word processing program can be a valuable writing aid by allowing a child to see typed text on a computer screen before printing on paper. In this way, he can easily remove or add words, move sentences or paragraphs around, and correct spelling errors. It's easy to underline, boldface, change spacing between lines, and center the text. A child can feel confident his paper will be neat, clean, and easy to read. This frees him to focus on the thoughts he wants to express.

Word processing programs may be included with the purchase of a computer or can be bought separately. Kids can use word processing programs designed for adults, but they may need some help. Software with speech synthesis can read back what has been written using a computerized or "synthetic" voice. These programs are very helpful for kids who struggle with reading and writing, but have good auditory skills.

> Portable Keyboards

Portable keyboards are lightweight, easy to transport and use, and inexpensive when compared to a computer. Kids can use them to take notes in class if their keyboarding skills are good. They can use them in place of computers to complete writing assignments or to practice keyboarding. Although usually used for word processing, data can be entered into other applications as well (such as spreadsheets and databases).

Lower end, battery operated keyboards are not computers although they may look similar. The small screen usually displays 4 or 8 lines at a time; some can accommodate up to 16 lines at a time. Editing can be done and spell-checking is built-in. They store 40 to 100 pages of text. Data can be sent directly to a printer, although it's usually transferred to a word processor for further work.





> Keyboarding Skills and Software

Correct typing techniques make word processing easier. Keyboarding programs develop skills of proper hand placement — important for speed and accuracy. Programs designed for kids in the primary grades should be engaging and fun. Elementary school kids often like a more formal approach combined with game-like practice sessions. Middle school and high school kids usually prefer a structured program to develop skills.

It's difficult to know which keyboarding program might work best for your child. Match the purpose and focus of the software program to his age, needs, and skills. Software review sites provide information on keyboarding programs for kids of all ages and can help you make a wise decision for your child.

> Proofreading Programs

Proofreading programs are sometimes called “grammar checkers.” They are used with word processing programs to check for errors in grammar, punctuation, capitalization, and word usage.

Possible errors are shown on the computer screen, and the child gets a chance to correct them before printing a document. Unfortunately, many proofreading programs are not completely accurate; some may miss errors while others may suggest changing parts that are already correct.

Grammar check may be a part of the word processing program or purchased separately. Local and online computer, electronic, and office supply stores sell proofreading programs.

> Spell Checkers

Most word processing programs include spell checkers that can scan a written document, show misspelled words, and offer suggested spelling corrections. Stand-alone desktop and pocket-sized spell checkers also are available. On a small keyboard, a child can enter the word the way he thinks it's spelled, and in response, get one of the following displays:

- The correctly spelled word.
- A list of words to choose from.
- A complete dictionary and thesaurus.
- If the program has a speech synthesizer, it will give a recitation of the words, allowing the child to hear, as well as see, the words on the screen.

Be aware of the limitations

- When words sound alike but have different meanings (there/their/they're), the spell checker doesn't show a wrong spelling because the word is spelled right even though it's not used correctly.
- When a word is spelled phonetically (nawty), it may not be recognized. The spell checker suggests words that begin with the same two or three letters typed in (Nate, nat, natty).
- Spelling that is not phonetic is not recognized, so no suggestions for the correct word are given.

Keep in mind

- The chances of success are greater if the first two or three letters are typed correctly.
- As the size of the spell checker's word database is increased, there's a better chance the spell checker will recognize misspellings and give alternatives.
- Definitions sometimes help to figure out a word. A spell checker/dictionary with a small base word vocabulary is designed for younger students. The definitions will use simpler language than products with a larger word base from a collegiate dictionary.

> Speech Recognition

Speech recognition systems allow kids to use a computer by talking to it. As the child dictates into a microphone, his words appear on the computer screen. These programs may be most useful to kids whose oral language skills are stronger than written language.

There are two basic types of systems:

- *Discrete speech systems* require a short pause of approximately 1/10 of a second between words. These programs have been used with students with speech difficulties.
- *Continuous speech systems* lets a child dictate without pausing between words. If the system can't understand the word he is saying, it provides a list of similar sounding words to choose from on the screen. The more the system is used, the more readily it will recognize his voice.

When choosing a speech recognition system, think about the following:

- Hardware requirements for the computer and microphone.
- Quality of the microphone; the one included with the software may cause translation errors.
- Time necessary for your child to train the computer to his voice.

Since translations usually contain errors — anywhere from 2% to 10% — corrections will be necessary. Think about how your child handles proofreading and error correction.

Because programs are designed to work with mature voices, the error rate can increase when young children use the software. Voice recognition software seems to work better for kids in high school and older.

> Graphic Organizers

Some kids find success with a graphic or visual approach to organizing thoughts when studying for tests or preparing to write. Graphic organizers are intended to help kids who find it hard to express ideas in a sequential, outline form, but can be an effective tool for all students.

Brainstorming (sometimes called mind-mapping, visual-thinking, or graphic-organizing) is a pre-writing method used to produce and record ideas without worrying about structure and order. Ideas are written down no matter how unrelated they may seem to be. Hopefully, one idea leads to another, and relationships between ideas are formed.

Brainstorming software can help kids quickly record ideas and easily organize them. First, the child types in a main idea. Then he types in related ideas that appear in different shapes — circles, ovals, or rectangles — around the main idea. Supporting ideas can be linked to the main idea or to each other with lines. Ideas can easily be moved and placed in different groups. After the diagram is completed, it can be changed to outline form automatically.

> Outlining

Outlining is a fundamental part of the writing process. There are times when a child may want to make a beginning outline before reading and taking notes. A final outline is made after the notes are organized.

Outlining programs help kids who have great ideas but can't organize them on paper. Many word processing programs can create outlines using Roman numerals, Arabic numbers, and diamonds. A child can "dump" ideas on the computer screen without worrying about order, importance, or categories because the text can be easily moved and reorganized at a later time. With just a few simple keystrokes or clicks of the mouse, the program automatically inserts symbols for topics and subtopics based on the style he selects. If he decides to move text around, the program corrects the symbols.

reading technologies

> Screen Readers

Screen readers can help kids of all ages who have reading and writing difficulties. Hearing text is especially helpful to those who are better listeners than readers.

Screen readers combine screen review software with speech synthesis — the computer's ability to change text into spoken words using a synthetic voice. Words, usually highlighted, are spoken in a computerized voice through a device either inside or attached to the computer.

Kids can review what they have written by seeing it on the computer screen and hearing the words at the same time. The text may be a child's own writing, a saved file, or an article from the Internet.

Hearing the text may help kids identify errors in grammar or missing words — things they might not have caught by reading it. Listening to text may help kids decide if their writing makes sense and effectively communicates their intended meaning.

> Optical Character Recognition

Optical Character Recognition (OCR) is software that converts a scanned document to a text file that can be changed by adding or deleting words and letters. It is often combined with speech synthesis so text can be read out loud. Many scanners come with OCR software as part of the package.

There are small, lightweight reading pens that use an OCR system to translate words and phrases from one language into another, such as English to Spanish. They can also be used in a single language to scan an unknown word or short phrase in English and show a translation. If speech synthesis is used, the translation is heard as well.

Larger OCR systems, when combined with speech synthesis, might be thought of as "reading machines." With the click of a button, a paper document is scanned on a flatbed

scanner and then read aloud while displayed on the computer screen. In this way, a child can hear and see the text at the same time. Size, color, and the speed of the screen reader can be adjusted to meet individual needs.

OCR systems are particularly helpful to kids who have problems reading printed words or understanding what they read.

> Audio Books

Kids with reading difficulties can listen to recorded text — textbooks, journals, newspapers — to gain information. Audio books are available from many different sources. Local book, toy and record stores, and public libraries have popular titles available.

Commercially produced audio books are easy to find and can be used in homes, cars, and on public transportation since they work on standard cassette players.

Organizations offering audio taped books generally require verification of a learning disability from a qualified professional. Some charge a fee for borrowing and require special tape recorders for playback.

Not all audiotapes work on every tape recorder. They may play at varying speeds and formats (two-track, four-track), so be sure that tapes you order work with your playback unit.



listening technologies

> Tape Recorders

Personal recording devices (tape recorders) capture spoken information, such as a teacher's instructions or a classroom lecture, so a child can listen again at a later time. This helps kids who have difficulty understanding or remembering what they hear. Before recording, however, the child should ask the speaker for permission to tape.

Local and online office supply and electronic stores sell many brands and models of portable, handheld tape recorders which can use either micro-cassettes or standard sized cassettes.

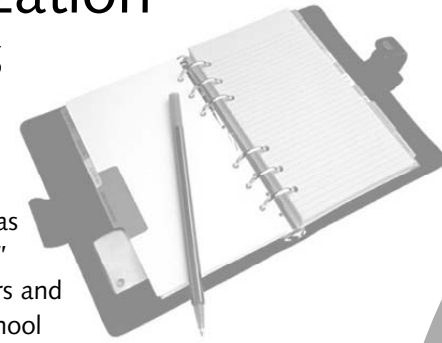
Variable speed control (VSC) tape recorders allow your child to play back tapes or audio books faster or slower than originally recorded without distorting the actual sounds of the words. This feature helps kids who benefit from hearing language spoken at a slower pace. Other kids find they can review material faster by speeding up the tape. These devices usually are larger than the handheld and pocket sized machines. The National Library Service for the Blind and Physically Handicapped (NLS/BPH) provides resource information on VSC machines. In addition, some specialty stores serving kids who have visual impairments or physical disabilities sell these tape recorders.

> Personal Listening Systems

A personal listening system, also known as an FM system, is a wireless transmitting unit consisting of a microphone and an earphone or headphone. It brings the speaker's voice directly into the listener's ear, minimizing background noise and helping the listener focus on what the speaker is saying.

Many kids reject using such an FM system because they say it makes them self-conscious and feel "different." A certified audiologist with expertise in personal listening systems should work with you, your child's teacher, and the school's speech and language pathologist to decide whether an assistive listening device would be beneficial for your child.

personal organization technologies



> Planners

Paper-based organizers, such as "Day Runner" and "Day Planner," can be used as homework planners and schedulers for middle and high school kids. If used correctly, a planner can become a one-stop record of all assignments your child needs to work on outside the classroom.

Planners are compact, easy to carry, simple to use, and come in different sizes. Space is provided to write down the subject, description of the assignment, and the due date. Additional spaces allow for other information. Daily and monthly planners are sold in stationery and office supply stores. Some organizers are designed specifically for student use and are available online.

> Personal Data Organizers & Managers

Personal data managers are software packages for computers or electronic hand-held devices that help with memory and organization. They provide a way to store and retrieve large amounts of personal information easily.

A child can keep phone numbers, addresses, important dates, appointments, assignments, and reminders in a personal data manager. He can enter information using a keyboard or stylus and retrieve it the same way. The information is then displayed on a computer monitor or small liquid crystal display (LCD).

Features and capabilities vary a great deal. Some hand-held units connect to a computer to exchange information. Selected

My son used to struggle to stay organized. Using a PDA to keep track of tasks and assignments has really helped him.

hand-held units will allow your child to enter and retrieve information by speaking into the device and stored information is spoken back in his own voice.

Software can be purchased online or at computer stores. Office supply stores and electronic stores sell many low cost electronic organizers, as well as higher end electronic, portable handheld organizers called Personal Digital Assistants (PDA) that vary in price and features.

Free-Form Databases

Free-form databases are software programs that allow a child to type notes into the computer in much the same way he might write them on paper. Notes are displayed on the computer screen and can be stored in memory. He can retrieve specific comments by typing in any piece of information contained in the note. For example, "Mike," "birth," or "Dec." could be used to retrieve the note "Mike's birthday is on December 8." Such systems may help him organize and retrieve important information. This software is also referred to as Free Form Information Manager or Personal Information Manager (PIM).



math technologies

> Calculators

After solving math problems involving basic computation, kids can use calculators to check answers. Calculators also can help compute complex multi-step mathematical functions. For instance, when a child is asked to solve a complex word problem, a calculator can be useful once he has determined which operation(s) (+, -, x, ÷) should be used to solve the question. Interpreting a word problem requires one skill set; performing the required math functions requires another one. The calculator can "solve" the problem once the child decides which functions are necessary by allowing the child to break the math tasks into manageable steps and focus on one concept at a time.

Office supply sections of local drug and grocery stores, as well as local and online office supply, electronic, and computer stores sell standard calculators.

> Talking Calculators

Kids who struggle with math may benefit from using calculators that provide auditory, as well as visual, feedback. Talking calculators use a built-in speech synthesizer to recite numbers, symbols, or operation keys as the keys are pressed. They also read back answers from completed problems.

Hearing the numbers or symbols helps some kids find errors they made when pressing keys. Hearing the answer can help a child double check for errors made when copying numbers, such as writing "91" for "19" or confusing "6" with "9."

Talking calculators vary in size, shape, color, and functions. Some models have an earphone jack. The external speaker automatically shuts off when the earphone is inserted, so the calculator can be used without disturbing anyone.

> Electronic math worksheets software

Electronic worksheets can help a child organize, line up, and work through basic math problems on a computer. Once he enters the addition, subtraction, multiplication, or division problem, it will automatically line up the numbers correctly. If your computer has a speech synthesizer, numbers on the screen can be read aloud. This often helps kids who have difficulty organizing and lining up paper-and-pencil math problems. Although designed for use in the classroom, these products can be used at home, too.

closing comments

Your child is fortunate to live at a time when so many assistive technology tools are available to help kids with learning differences. But choosing the appropriate technology for your child requires time and patience. The right product depends on your child's individual needs, the setting in which it will be used, and the task(s) to be accomplished. The more informed you are and the more you involve your child in the process, the greater the chance for success.

Assistive technology can't fix or eliminate learning disabilities. But by learning to capitalize on strengths and bypass areas of difficulty, kids with learning disabilities can be successful.



www.SchwabLearning.org/atguide

additional resources

Expanded copies of this publication with additional information and links to specific AT products can be downloaded from our website at www.SchwabLearning.org/articles.asp?r=488.

Various agencies, centers, and organizations conduct research and offer information, training, support services, and conferences on assistive technology for students with learning disabilities. Here are a few of them:

Alliance for Technology Access (ATA)

www.ataccess.org

ATA strives to integrate technology into daily lives of children and adults with disabilities. Its Resource Library and Related Resources provide links to general AT information in English and Spanish, community based resource center development, AT initiatives, advocacy, funding, and Web accessibility. ATA Centers, listed by state, provide guided technological assistance, assessment, and information about enabling technology to meet individual needs.

Center for Applied Special Technology (CAST)

www.cast.org

CAST supports education by developing learning models, methods, and products to enhance the educational experience of diverse learners. It offers professional development and workshops to educators. Its Universal Design for Learning (UDL) approach to education uses research to develop adaptable technologies customized to meet needs and match strengths of all learners. The goal of CAST's National Center on Accessing the General Curriculum is to envision new, practical, instructional strategies to help students with disabilities be successful with the general curriculum.

Closing the Gap

www.closingthegap.com

Closing the Gap provides information on how computers can positively impact people with disabilities through its bimonthly newspaper featuring articles on hardware and software, its annual technology conference, and its website. The homepage has easy access to articles from the current issue of the newspaper, a searchable hardware/software resource directory, library (topical archive of past newspaper articles), AT bookmarks (listing of notable websites nominated by AT specialists across the country), forum for AT discussions, and calendar of AT conferences and events.

Community Technology Center's Network (CTCNET)

www.ctcnet.org

CTCNet is composed of independent, not-for-profit community based technology centers providing free or low cost access to computers and related technology. The online member directory lists contact information for U.S. and overseas centers.

Family Center's Network of Organizations

<http://fctd.ucp.org/fctd/tnetorgst.htm>

An ever-growing network of national, state, and local organizations that share and disseminate AT information, and provide local or regional assistance. Its state/territory membership list provides local contacts for AT help.

Recording for the Blind and Dyslexic (RFB&D)

www.rfbd.org

RFB&D provides materials, including textbooks, in audio cassette, digital, or E-text formats to individuals who have difficulty reading print. Its catalog is online, but you must be a member to receive materials. RFB&D has regional units across the country.

Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Technical Assistance Project

www.resna.org/taproject/index.html

RESNA members (consumers and professionals) are engaged in research, development, education, advocacy, and provision of technology to the disabled population. It provides technical support to Assistive Technology Programs.

This guide was originally developed in 1996 and revised in 2000 by the Frostig Center in Pasadena, California. Marshall Raskind, Ph.D., Director of Research at the Center is an authority on technology and learning disabilities, and served as the project director and primary author. Revisions to this Third Edition of the Assistive Technology Guide were done by Lynette Hiebert, B.A., M.L.S. Ms. Hiebert has been a classroom teacher, reading specialist, and home teacher. Her experience teaching computer science in schools led to her interest in assistive technology for kids with learning disabilities.

