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Assistive Technology for Students with Mild Disabilities. ERIC Digest E529.

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Technology is bursting into the classroom at all levels, as a tool for teachers to develop, monitor, and provide instructions, and for students to access and engage in learning. P.L. 100-407, The Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Tech Act) was designed to enhance the availability and quality of assistive

technology (AT) devices and services to all individuals and their families throughout the United States.

WHAT ARE ASSISTIVE TECHNOLOGY (AT) DEVICES?

The Tech Act defines AT devices as any item, piece of equipment, or product system (whether acquired off the shelf, modified, or customized) that is used to increase, maintain, or improve functional capabilities of individuals with disabilities. AT devices may be categorized as high technology and low technology. Many low-tech devices can be purchased at a hardware store, selected from a catalog, or fabricated using tools and materials found in home workshops (Franklin, 1991). Examples might be note-taking cassette recorders, pencil grips, NCR paper/copy machine, simple switches, head pointers, picture boards, taped instructions, or workbooks. High-tech devices frequently incorporate some type of computer chip, such as a hand-held calculator or a "talking clock." Examples might be optical character recognition (OCR) calculators, word processors with spelling and grammar checking, word prediction, voice recognition, speech synthesizers, augmentative communication devices, alternative keyboards, or instructional software.

HOW CAN AT BE APPLIED IN INSTRUCTION?

Lahm and Morrissette (1994) outlined seven areas of instruction where AT could assist students with mild disabilities. These areas include organization, note taking, writing assistance, productivity, access to reference materials, cognitive assistance, and materials modification. A number of approaches are available to assist students with mild disabilities in these areas of instruction.

ORGANIZATION: Low-tech solutions include teaching students to organize their thoughts or work using flow charting, task analysis, webbing or networking ideas, and outlining. These strategies can be accomplished using graphic organizers to visually assist students in developing and structuring ideas. A high-tech solution might be the outline function of word processing software, which lets students set out major ideas or topics and then add subcategories of information.

NOTE TAKING: A simple approach is for the teacher to provide copies of structured outlines for students to use in filling in information. A high-tech approach might include optical character recognition, which is software that can transform typewritten material into computer-readable text using a scanner.

A teacher's typewritten notes can be duplicated using either NCR paper (carbonless copies) or a copy machine. A slightly more high-tech method is to use microcassette recorders. Or, notes can be read by a voice synthesizer, allowing students with reading difficulty to review the notes much the same as reviewing a tape recording. Recorders are beneficial for students with auditory receptive strength, but they may be less useful

for those needing visual input. Videotaping class sessions may be helpful for visual learners who pick up on images or body language, or for students who are unable to attend class for extended periods of time.

Laptop or notebook computers can provide high-tech note taking for many students with disabilities. An inexpensive alternative to a full-function portable computer is the portable keyboard. The limitations of these keyboards are in formatting information and a screen display limited to four lines of text.

WRITING ASSISTANCE: Word processing may be the most important application of assistive technology for students with mild disabilities. Many of these students have been identified as needing assistance in the language arts, specifically in writing. Computers and word processing software enable students to put ideas on paper without the barriers imposed by paper and pencil. Writing barriers for students with mild disabilities include mechanics: spelling, grammar and punctuation errors; process: generating ideas, organizing, drafting, editing, and revising; and motivation: clarity and neatness of final copy, reading ability, and interest in writing.

Grammar/spellcheckers, dictionaries, and thesaurus programs assist in the mechanics of writing. Macros, a feature that allows keystrokes to be recorded in a file that can be used over and over, also assist in mechanics. Macros can be used for spelling difficult text, for repetitive strings of words, or for formatting paragraphs and pages. Macros also save time for students who have difficulty with either the cognitive or motor (keyboarding) requirements of writing. Word prediction is assistive software that functions similarly to macros. If a student has difficulty with word recall or spelling and cannot easily use the dictionary or thesaurus feature, then word prediction software offers several choices of words that can be selected.

Teachers can use the editing capabilities of the word processor during the writing process, making electronic suggestions on the student's disk. If the computer is on a network, students can read each other's work and make comments for revision. Painter (1994) indicated that peer feedback was an effective way to assist students in generating and revising text. Computer editing also reduces or eliminates problems such as multiple erasures, torn papers, poor handwriting, and the need to constantly rewrite text that needs only minor modifications. The final copy is neat and legible.

Motivation is often increased through the desktop-publishing and multimedia capabilities of newer computers. A variety of fonts and styles are available, allowing students to customize their writing and highlight important features. Graphic images, drawings, and even video and audio can be added to the project to provide interest or highlight ideas. Multimedia often gives the student the means and the motivation to generate new and more complex ideas.

PRODUCTIVITY: Assistive productivity tools can be hardware-based, software-based,

or both. Calculators, for example, can be the credit-card type or software based, which can be popped up and used during word processing. Spreadsheets, databases, and graphics software also offer productivity tools, enabling students to work on math or other subjects that may require calculating, categorizing, grouping, and predicting events. Productivity tools also can be found in small, portable devices called personal digital assistants (PDAs). Newer PDAs can be used as notetaking devices via a small keyboard or graphics-based pen input. Some PDAs can translate words printed with the pen input device to computer-readable text, which can then be edited with the word processor and transmitted to a full function computer.

ACCESS TO REFERENCE MATERIALS: Many students with mild disabilities have difficulty gathering and synthesizing information for their academic work. In this arena, telecommunications and multimedia are providing new learning tools for the students.

A computer and a modem can transport students beyond their physical environment to access electronic information. This is particularly appropriate for individuals who are easily distracted when going to new and busy environments such as the library. Telecommunications networks offer access to the information superhighway. Students can establish "CompuPals" with other students, which often motivates them to generate more text and thus gain more experience in writing. Students can also access electronic encyclopedias, library references, and online publications. However, these experiences should be structured, because the information highway is complex and it is easy to get distracted or lost as opportunities are explored.

Multimedia-based tools are another way in which information can be made accessible to students. Multimedia's use of text, speech, graphics, pictures, audio, and video in reference-based software is especially effective in meeting the heterogeneous learning needs of students with mild disabilities.

COGNITIVE ASSISTANCE: A vast array of application program software is available for instructing students through tutorials, drill and practice, problem-solving, and simulations. Many of the assistive technologies described previously can be combined with instructional programs to develop and improve cognitive and problem-solving skills.

Multimedia CD-ROM-based application programs offer another tool for assisted reading. Similar to talking word processors, CD-based books include high-interest stories that use the power of multimedia to motivate students to read. These books read each page of the story, highlighting the words as they are read. Additional clicks of the mouse result in pronunciation of syllables and a definition of the word. When the student clicks on a picture, a label appears. A verbal pronunciation of the label is offered when the student clicks the mouse again. These books are available in both English and Spanish, so students can read in their native language while being exposed to a second language.

MATERIALS MODIFICATION: Special educators are familiar with the need to create instructional materials or customize materials to meet the varied needs of students with disabilities. Today there are powerful multimedia authoring and presentation tools that educators can use to develop and modify computer-based instructional materials for students with mild disabilities, providing a learning tool that these students can access and use to balance their weak areas of learning with their strong areas.

Authoring software allows teachers and students to develop instructional software that can incorporate video, pictures, animation, and text into hypermedia-based instruction. Multimedia authoring software is very easy to learn and use. In fact, authoring software packages are even available for young children. For example, if the objective is to teach map reading, an image of a local map can be scanned in and specific locations can be made into buttons that the students can click on, causing a short video clip playing of the familiar location. A set of questions might be asked using both text and synthesized speech to have students give directions on how to get the location shown on the video. Students could then write directions (or draw their own map). Digitized pictures of landmarks could also be incorporated into the directions. These directions, along with the images, could then be printed for use in completing the assignment. Without the ability to author and incorporate multimedia easily into instructional software, such computer-based training would be impossible because of the need to incorporate the shared learning concepts inherent in local environments into the assisted-learning process. Such instruction can make learning more efficient and certainly more real for students for whom abstract learning and generalization may be difficult.

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ELECTRONIC RESOURCES

Digests published by the ERIC Clearinghouse on Disabilities and Gifted Education are available for downloading or online reading on the AskERIC Virtual Library <ericir.syr.edu>.

The following Internet sites provide additional information on assistive technology for students with disabilities:

Gopher sites: gopher sjuvm.stjohns.edu

St. John's University

Electronic Rehabilitation Resource Center

gopher hawking.u.washington.edu

University of Washington

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