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ABSTRACT

All students need to be computer literate; for students with disabilities, it may be even more important--it may be the only door to workplace skills. For many such students the computer can be the link that enables them to participate more fully in the educational process, learn the skills for career preparation, and adapt to the world of work. The Macintosh computer is "user friendly" and includes features easily used by students with special needs. Close View enlarges text for the visually impaired. Other adaptations available for visually impaired students are as follows: OutSPOKEN, which replaces visual icons with spoken words; the Duxbury Braille Translator; Voice Navigator, which uses sounds to activate macros; and PlainTalk, which provides both speech recognition and speech generation capabilities. Features to assist the upper extremity impaired are Macros, which allows users to program a few keystrokes to duplicate many strokes; Easy Access, which adapts keystrokes and mouse click for one-hand use; and a variety of alternative input devices and keyboards. Students with cognitive disabilities, such as head injuries or learning disabilities, may find alternative keyboards, word processing assists, Co:Writer, and Telepathic helpful. For the hearing impaired, Omnifone TDD allows communication between Mac and TDD. Speaking Dynamically enables speech impaired users to design their own communication board. Wheelchair users may use the Powerbook, a laptop computer. (YLB)

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The Macintosh Computer: A Link between Work and the Disabled Worker.

Abstract

With the passage of the Americans with Disabilities Act, the workplace has become more accessible to persons with disabilities. Before entering that world, the disabled student must learn the skills required. Like his nondisabled counterpart, the student with a disability may use the computer to prepare reports, improve typing speed and accuracy, and use a CAD program for design or a spreadsheet for accounting. All students need to be computer literate; for students with disabilities, it may be even more important—it may be the only door to workplace skills. For many such students the computer can be the link to enable them to participate more fully in the educational process, learn the skills for career preparation, and adapt to the world of work. For thousands of students with disabilities, the transition to the work place may be made more easily via a computer; for some it may be made only via a computer.

The Macintosh computer has won praise for features which make computing easier. Two such features were discussed—Close View, which enlarges text for the visually impaired, and Easy Access, which adapts input for some physical disabilities. Other programs and devices were discussed, such as trackballs, touch screens, split keyboards, or wrist rests, as well as those developed specifically for use with persons with disabilities. Although a Macintosh was targeted, most programs are also available for DOS-based computers.

Suggestions to help meet the needs of several special needs populations were addressed, including the learning disabled, visually impaired, and motor impaired. Software programs readily available, some for no charge or minimal charge, were described.

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The Macintosh computer has won praise for features which make computing easier. It is "user friendly" and includes features easily utilized by students with special needs. The Macintosh includes, as standard, features which enhance its accessibility by users with visual impairments or upper extremity limitations. Adaptations can also be purchased to make the computer more accessible to users with a disability.

Visually Impaired Students

Close View enlarges on-screen text and images up to 16 times and can invert screen images to white on black. In addition to Close View, other adoptions are available for visually impaired students. IntelliKeys is an alternative keyboard which works with all existing software, connecting directly into the keyboard port. The keyboard panel can easily change to fit the user's needs. Six overlays, including number, alphabet, & QWERTY, are available and have a bar code on the back that the keyboard recognizes. A setup overlay allows special Intellikeys functions. This would also be useful for students with physical or cognitive disabilities. (IntelliTools, 800/899-6687) OutSPOKEN replaces visual icons with spoken works. The feature can read folder names, documents, or menu items. Mouse emulation is provided via keypad functions and single keystroke commands, control of speed, pitch, and volume, and reference to talking text and

graphic dictionary is included. OutSPOKEN works with any text-based Mac program. Documentation in both print and audiocassette format, plus tactile sheets representing Mac screens assist in ease of use. A braille manual is also available. (Berkeley Systems, 510/540-5535) The Duxbury Braille Translator translates braille to text, and vice versa. It reads from Mac work processor and is compatible with the TeleSensory VersaPoint Braille Embosser which embosses braille dots which are of good height and consistency. Produces both six-dot and eight-dot Braille on a variety of paper stock. (TeleSensory 415/960-0920) Voice Navigator, which includes a headset mike, uses sounds to activate macros (sequences of basic actions such as typing text, clicking, and dragging), thus minimizing keyboard interaction. (Articulate Systems 617/935-5656) Apple recently introduced PlainTalk, software which works with certain Macs (the new Centris 660AV and Quadra 840AV), providing both speech recognition and speech generation capabilities. The new machines provide for creating voice activated macros to open files, scroll windows, or adjust system settings. Speech recognition works only on the AV Macs, but the text-to-speech features can be used on other machines, though programs must be updated.

Upper Extremity Impaired

Macros, available as a stand alone program or part of other software programs, is a feature which allows users to program a few keystrokes to duplicate many strokes. Easy Access (sticky keys) allows the computer operator to adapt keystrokes and mouse click for one hand use. It also allows the numeric keypad to be used instead of the mouse. It is a part of the system software which comes with the Macintosh. A variety of alternative input devises are available for students with upper extremity impairments. Several alternatives to the mouse are available, including tract balls of differing size, weight, and color; joy sticks; a device which looks like a bat and attaches to the fingers; and a selection of numeric keypads. These can be seen in vendor catalogues. The UnMouse is a cursor control device, programmable keypad, and small graphic tablet combined. Movement of the finger or stylus on a touch sensitive tablet serves to input information. (MicroTouch Systems, 508/694-9900) Keyboards also come in several sizes. An adjustable keyboard is now available. The user can divide the right and left hand portions, up to 30 degrees. A detachable palm rest and separate numeric keypad are included. A spastic guard for the keyboard is

available. Wrist wrests for the keyboard and mouse pad may also prove helpful. Another alternative keyboard is the Edmark TouchWindow which mounts over the existing monitor display, enabling the Mac to respond to touch. Special software, Ke:nx Version 2.0-software and hardware interface is needed for access. (Don Johnson Developmental Equipment) HeadMaster is another alternative to the mouse for those unable to use hands, but who have head and mouth control. It uses turn and puff control, rather than point and click. It is also available with a wireless infrared link up to 12 feet. A keyboard emulator, such as ScreenDoors is required. ScreenDoors is an on screen keyboard which can be accessed via any point and click device, including a head pointer. Features include several different keyboard layouts and a word prediction feature. It is available without word prediction feature as ScreenDoors lite. (Madenta Communications 403/450-8926 or 800/661-8406)

Cognitive Impairments

Students with cognitive disabilities, such as head injured or learning disabled may find alternatives described above, such as IntelliKeys alternative keyboard helpful. Readily available assists to word processing, such as spelling check or grammar checks would be useful. The Co:Writer is a word prediction program which uses artificial intelligence principles to help predict work usage, including subject-verb agreement. It uses fewer keystrokes and provides for help with spelling, grammar, verb-subject agreement. (Don Johnson Developmental) Telepathic is another word prediction program which uses frequency to predict word usage. (Madenta Communications 403/450-8926 or 800/661-8406)

Hearing Impaired

Omnifone TDD modem allows communication between Mac and TDD, allowing the user to talk and type over same phone line.

Speech Impaired

Speaking Dynamically enables the user to design their own communication board of graphics or text symbols by linking spoken words, phases, and sentences. Speech is heard when the symbols are clicked. As many as 200 boards can be created and linked. BoardMaker provides more than 3,000 graphic symbols to be used with the program. (Mayer Johnson)

Wheel-chair Users

The powerbook, a laptop computer weighing about 6-7 pounds, has the same features of the full-sized Mac. The Canyon Converter allows the student to use his wheelchair battery to power the powerbook. It connects to most 12-volt wheelchair batteries, mounting with velcro strips. (Apple Catalog)

Ke:nx On:Board is a alternative keyboard for Powerbook which provides complete keyboard and mouse emulation. The surface reacts to touch and can be adjusted for light or heavy touch. Extra keyboard overlays allow the user to change the keyboard's function. Included software allows the user to create their own design. Speech option for keys, to check keystroke accuracy. (Don Johnson Developmental Equipment)

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Limitation	Adaptation
Cognitive	word prediction software spell checkers grammar checkers calenders, reminders, address books Wrist Mac, Newton alternative keyboards
Upper Extremity	macros wristguards/mouseguards keyguards alternative keyboards switch devices (foot, mouth) mouse alternatives (bat, trackballs) voice control sticky keys, mouse keys
Mobility	Powerbook Canyon Converter
Vision	CloseView large monitors screen magnifier text reader braille embosser
Speech	communication boards speech synthesizers
Hearing	Modem to TDD device Visual Alert

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