

Accessible Technology: Minimum Standards for Computer Hardware
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In December 2000, the Architectural and Transportation Barriers Compliance Board (Access Board), an independent federal agency charged with creating an accessible environment for disabled citizens, published minimum standards for technology-based products used in federal agencies. These congressionally mandated standards, listed in Section 508 of the Rehabilitation Act of 1973, as amended, were meant to insure that technology procured by federal agencies met minimum accessibility standards.

Although Section 508 does not apply to schools, this legislation has prompted states throughout the country to explore and adopt methods to secure accessible educational technology for their schools. In the mid-Atlantic region, Maryland has taken the initiative of enacting a policy that uses the Section 508 standards for procuring technology-based instructional products in their public schools. This trend toward equitable access to educational technology for all students regardless of their physical abilities is becoming a priority for states, school districts, and local education agencies.

Considering minimum standards for accessibility is important, because the technology bought today will be used for many years and by many students with special needs. This fact is underscored by the former Assistant Secretary of the Office of Special Education Judy Heumann when she wrote, "In many cases, decisions now being made about the selection of systems configurations, and computer hardware and software will provide the technological infrastructure to be used in schools for years to come. If every school adds consideration of accessibility to its decision-making process when acquiring technology, it will greatly increase the ability of students, teachers, and other individuals with disabilities to participate equally in the information age with their nondisabled peers." (Heumann, 1997)

The Access Board divided the technology standards into six general areas: software, Internet applications, telecommunication products, video and multimedia products, self-contained products, and desktop and laptop computers. Because districts usually purchase hardware first, those purchases often influence subsequent technology purchases. This techno-brief will discuss hardware standards; future techno-briefs will discuss standards for software and Internet applications.

Standards for Hardware

There are several areas that Section 508 addresses in regard to accessibility of computer hardware. First, computer controls (e.g., keyboards, mouse, joysticks, and latches) should be reachable and operable with one hand and with minimal dexterity. This criterion's focus is on students who have little or no use of their hands, who rely on wheel chairs, or who have a limited range of motion and may be unable to use standard controls. By placing controls only in the front part of the computer, by using controls and latches that require a light touch (along with keys that are conducive to mouth or head stick use), and by installing rocker switches or sliding controls, the standard can be met, and those with limited strength, reach, or dexterity can successfully use the equipment.

Any input devices, regardless of the type, used for the purpose of accessibility should be operable with one hand and should require no more than 22 pounds of force. If keyboards are used, they should have a key repeat rate of no less than 2 seconds. This standard will accommodate students who are unable to move quickly and who may inadvertently and unnecessarily stroke keys repeatedly.

Currently, an increasing number of systems rely on the use of biometric identification. This process involves using a part of the anatomy to gain access to a system. Since any given disability may make the act of applying a body part difficult, or in the case of a student missing that specific body part, impossible, using this form of identification as a sole method of entry would make the hardware inaccessible. Hardware can be made accessible to those who have very specific physical needs by simply adjusting the system to accept a badge or by offering several types of biometric identification.

Because some physically limited students cannot adequately use a standard keyboard or mouse, the computer should include an industry standard port (i.e., USB port) that could be used to install switches, speech synthesizers, or Braille displays. These ports will allow for a wide variety of adaptations to be made without altering the basic configuration of the machine.

To ensure accessibility for visually impaired students, desktop or laptop computers should be fitted with tactilely discernable keyboards that can be perceptible without actually activating the keys. This can be accomplished by offering a visually impaired student the use of keyboards that are in standard form (i.e., QWERTY), with tactile clues, such as those having different shaped surfaces or Braille overlays.

Toggle keys such as number lock, capital lock, and scroll lock should have an alternative indicator so that a visually impaired student can recognize the toggle's position. Machines that use auditory clues or tactile feedback make the device appreciatively more appropriate for blind and low vision users and comply with the standards.

Color should be used only as a decorative feature or secondary indication of controls, distinctions in functions, or as a means of labeling elements of the hardware. Students who are unable to distinguish between colors may be unable to use a machine in which color is a means of translating information. If color is necessary to transmit information, it should be used in conjunction with textual or auditory clues.

An alternative method for input by touch screens or touch-operated controls should be offered so that those with limited vision, limited reach, or lack of physical ability can use the hardware. If touch screens are used, a redundant form of input should be offered. Supplemental forms of input such as tactilely discernable input devices (e.g., keyboards, Braille devices) can be used to make the machine accessible to a wide variety of students.

As with color, sound should not be used as the only means of communicating information. Hearing-impaired students require the use of alternative types of communication such as visual or text prompts. If an alert or alarm is needed or desired, sound can be accompanied or replaced by a flashing screen or the use of icons to convey the message. However, if a flashing screen is used in any application it must not be at a flashing rate of between 2Hz and 55Hz. This is approximately the range that will cause seizures in photosensitive epileptics.

Finally, any computer used by a student in a public facility should be accompanied with directions and technical documentation in several different formats. This requirement will allow the use of adaptive technology for a wide variety of students with a range of physical restrictions.

Conclusion

As educators attempt to fulfill the needs of all children who enter the public school system, the criteria set forth in the Section 508 of the Rehabilitation Act of 1973 will serve students who previously missed the benefits and opportunities of technology. These minimum technological standards will enable educators to provide access to a fair and equitable education as well as ensure that students who come to the school system with unique needs can obtain a state-of-the-art education. Decisions made with knowledge of the criteria in Section 508 will have a positive impact in the years following the initial purchase and will add a layer of efficiency to the procurement process.*

References

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