

DOCUMENT RESUME

ED 333 686

EC 300 442

AUTHOR Berliss, J. R.
 TITLE Checklists for Implementing Accessibility in Computer Laboratories at Colleges and Universities.
 INSTITUTION Wisconsin Univ., Madison. Trace Center.
 SPONS AGENCY National Inst. on Disability and Rehabilitation Research (ED/OSERS), Washington, DC.
 PUB DATE 90
 CONTRACT G008300045; H133E80021
 NOTE 33p.; A product of the Trace Research and Development Center on Communication, Control, and Computer Access for Handicapped Individuals.
 AVAILABLE FROM University of Wisconsin, TRACE Research & Development Center, Waisman Center, 1500 Highland Ave., Madison, WI 53705-2280 (\$7.00).
 PUB TYPE Guides - Non-Classroom Use (055)
 EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS Accessibility (for Disabled); Check Lists; Computer Centers; Computers; Computer Uses in Education; *Disabilities; *Equal Facilities; Higher Education; Microcomputers; Postsecondary Education; Program Development

ABSTRACT

This paper discusses the issue of providing equitable access to computer equipment for disabled students in postsecondary education. Potential access problems may exist in the areas of input, output, environment, and documentation/support/training. Five checklists are provided that focus on generic strategies to fully or partially cover the needs of the majority of users with disabilities. The first checklist covers team preparation for development of campus adaptive computing services, while the other four cover different levels of implementation (low cost/short implementation time measures, moderate cost/moderate implementation time measures, annual budget measures, and long-term planning measures). For students requiring equipment that is highly individualized and specialized, it is recommended that a contingency fund be created to acquire necessary adaptations and that funds be pooled among a number of institutions and equipment acquired be made available to each institution. Appendixes list sources of general information, computer access guidelines information, product information, and alternative funding information, as well as disability-related organizations and organizations/conferences relating to computers and disability.
 (JDD)

 * Reproductions supplied by EDRS are the best that can be made *
 * from the original document. *

This document has been reproduced as received from the person or organization originating it
 Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

Trace Reprint Series

ED 333 686

Checklists for Implementing Accessibility in Computer Laboratories at Colleges and Universities

Berliss, J.R.

1990 - Version 1.0

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

M.E. Bradley

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."



Trace R & D Center
on Communication, Control
and Computer Access
for Handicapped Individuals

S-151 Waisman Center
University of Wisconsin-Madison
1500 Highland Avenue
Madison, WI 53705
(608) 262-6966

300 442

CONTENTS

Introduction	1
Potential Access Problems	2
Generic Access Strategies	2
The Checklists	3
Individualized Systems.....	4
Appendixes List More Resources	5
Checklist 1: Team Preparation	6
Checklist 2: Low Cost/Low Implementation Time Measures	10
Checklist 3: Moderate Cost/Moderate Implementation Time Measures	14
Checklist 4: Annual Budget Measures	18
Checklist 5: Long-Term Planning Measures	21
Individual Access Measures	23
Appendixes	25
Sources of General Information	25
Sources of Computer Access Guideline Information	25
Sources of Product Information	26
Sources of Alternative Funding Information	26
Disability-Related Organizations	27
Organizations and Conferences Relating to Computers and Disability	27

INTRODUCTION

The number of disabled students in post-secondary education is growing. For example, at the University of Wisconsin-Madison, more learning disabled students are being identified each year (inquiries about testing for LD were up 16% in the 1988-89 school year over the previous year). Not only are substantial numbers of disabled students enrolling, but each student has the potential of becoming temporarily or permanently disabled during their school years. Advances in rehabilitation increase the likelihood that students will be able to continue or later return to their schoolwork on-site.

It is crucial that accommodations be made to provide equitable access to computer equipment. These accommodations are important for a number of reasons, the most important of which is the increasing prevalence of courses in all fields that require use of computers for class participation and completion of homework assignments. To comply with federal legislation mandating equity of access to all academic resources for disabled and non-disabled persons, and to ensure that students with disabilities need not regard computers as a barrier instead of an aid to academic success, campus computer labs need to plan for and implement accessibility measures. Besides students, faculty and staff members may also have disabilities, so it is important to remember that the points made in this document about access for students apply to access for employees as well.

Since about 10% of the general population is disabled, a reasonable goal would be to have about 10% of computer equipment and resources earmarked for accessibility (although, unlike disabled parking places, these same computers should be usable by non-disabled people when they are not required by a person with a disability). Depending on the existing or planned on-campus computing structure and disability demographics, some or all of the equipment may be permanently housed in specific locations, may be shared among labs as necessary, or may be checked out by students for part or all of their academic career.

A point that will be stressed throughout this document is *cooperation* among users, computing center administration and support staff, and disabled student service employees. The more viewpoints and areas of expertise that can be represented during the process of implementing accessibility, the greater the chances for successful strategies and actions that will be satisfactory to all interested parties.

Potential Access Problems

Students with disabilities may have access needs in one or more of the following categories:

- *Input* issues affect people who have trouble with the devices used to input characters or commands into the computer. This is most likely to affect students who have difficulty using the standard keyboard or the standard "mouse" pointing device due to a diminution or loss of control of movement in their hands.
- *Output* issues affect people who cannot access the computer's output. This includes: people who have difficulty reading the screen due to visual impairment or learning disability, those who cannot hear auditory cues, or those who have difficulty reading or handling a standard computer printout.
- *Environment* includes a variety of non-computer components of a standard lab. Examples of potential problems include whether a person using a wheelchair can enter a computer lab and sit comfortably at a computer table, and whether a visually impaired person can easily find appropriate signage indicating how to get to the computer lab.
- *Documentation/Support/Training*, perhaps the most important category, affects the user's ability to find help in using equipment. Documentation covers alternatives to having to read and handle printed documentation. Support ensures that staff will have the knowledge to provide guidance on equipment use and the sensitivity to work effectively with students with disabilities. Training components provide new users of adaptive equipment with basic information and strategies for equipment use, which should both increase user success in equipment use and reduce the staff resources required for support.

Generic Access Strategies (Checklists 1-5)

For many users, solutions need not be complicated or expensive. For example, a strategically-placed lamp or Braille labels placed over certain keys on the keyboard may do wonders for students with some types of visual impairments. Most well-thought-out solutions will not hamper the ability of a non-disabled person to use the adapted computer. The first part of this document, which consists of five checklists, explains "generic" strategies to fully or partially cover the needs of the majority of users.

Many students will have already found strategies to cover some or all of their needs, and may be willing to share these strategies. While a single solution is unlikely to accommodate all individuals with learning disabilities, for example, discussions with and among these individuals may likely uncover solutions that will benefit many of them.

One of the hallmarks of the solutions suggested in the checklists is that they are either adjustable or are used to adjust other equipment—tables and chairs with adjustable heights, software to increase the volume of auditory output, firmware that allows different alternate keyboards to be used with standard hardware. This adjustability is important both to accommodate the variations in type and extent of disability among users, and to accommodate individual users with progressive conditions, such as muscular dystrophy, AIDS, or diabetes.

The Checklists

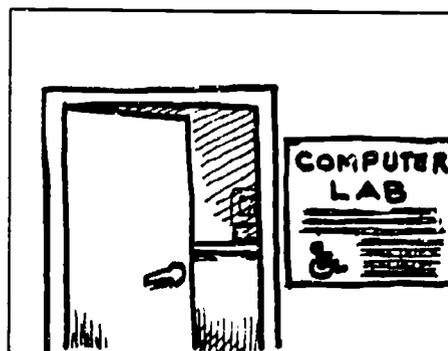
This document provides five checklists covering generic systems. Each checklist includes an outline with items to be checked off as they are implemented, followed by explanatory comments on each checklist item. The first checklist covers team preparation measures, while the other four cover different levels of implementation, as defined by the typical expense and timeline for the level of implementation being discussed.

- 1** Checklist 1 (Team Preparation) covers building a framework from which decisions can be made and evaluating the environment into which adaptive computing will be introduced or enhanced. The steps in this checklist form the groundwork for all other generic and individual access measures suggested throughout the rest of the document.



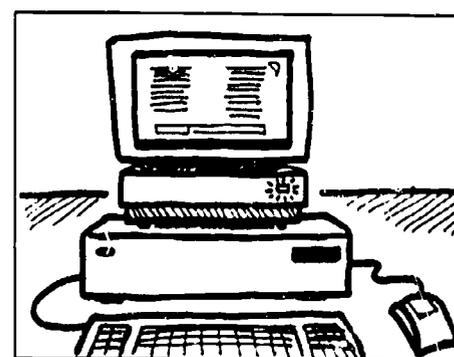
EXAMPLE: Determining what adaptive equipment already exists on campus

- 2** Checklist 2 (Low Cost/Short Implementation Time Measures) covers access steps that will take a minimum of time (less than thirty minutes) and financial outlay (less than \$100) to implement. (Note that Checklist 2 is the longest of the four implementation checklists; about half of all implementations fall into this category.)



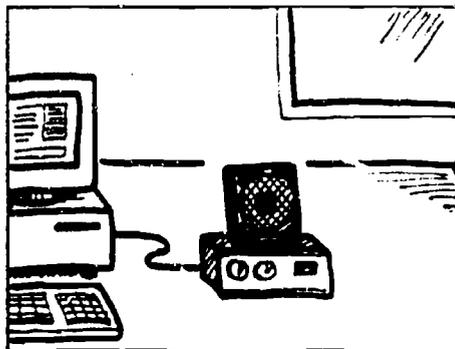
EXAMPLE: Printing a sign indicating that accessible equipment exists at a given lab.

- 3** Checklist 3 (Moderate Cost/Moderate Implementation Time Measures), consists of steps that require somewhat more time and/or money—roughly thirty minutes to two weeks, and up to approximately \$500.



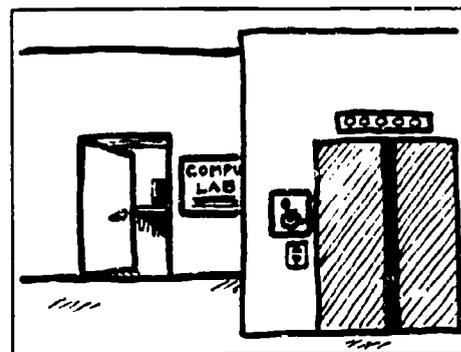
EXAMPLE: Purchasing hard disks and installing frequently used software on them, to reduce the need to handle floppy disks.

- 4** Checklist 4 (Annual Budget Measures) covers steps that should be planned into annual budgets.



EXAMPLE: selecting and acquiring speech synthesis equipment.

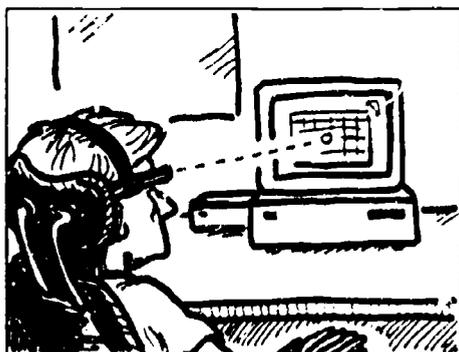
- 5** Checklist 5 (Long-Term Planning Measures) covers steps to be included in the plans for construction or remodeling of a computer lab, or in the widespread implementation of software and/or hardware (such as an on-line library catalog, or an officially sanctioned word processing program).



EXAMPLE: constructing a lab on the first floor or near an elevator for easier access.

The items in Checklists 2 through 5 are meant as indicators rather than anything hard-and-fast; depending on your situation, one or more steps may be implemented at different levels. In addition, not all solutions are available for all types of computers. It is impossible, therefore, to think in terms of a single "adapted computer." You may wish to provide some solutions from Checklist 2 for the majority of computers, and designate one or two computers to house solutions from Checklist 3.

Individualized Systems



Even the suggestions included in the Checklists will not accommodate every individual disabled student. There will be some students whose situation requires equipment that is highly individualized and specialized. For example, some people with severe physical disabilities must use a single switch to access a computer. There are dozens of types of adaptive switches available, activated by different types of body movement. It would be impractical for a campus computing center to keep all these switches in stock.

Rather than planning for every situation, it is suggested that a contingency fund be set aside to assist people whose needs are not met by the standard adaptations. This fund could be pooled by a number of institutions or institution branch campuses. The equipment and documentation obtained through the fund could then be available to each institution on an as-needed basis. For much of this equipment, it may also be appropriate to seek outside funding. (See the Appendixes for further information on funding sources.)

It is also crucial that appropriate referrals be made so that the individual's abilities may be assessed before equipment is purchased. The section of this document on *Individualized Systems* (following the 5 Checklists) contains information on determining when and how to refer a student for diagnosis and prescription of equipment, and how to find an appropriate clinician or other professional. Future revisions of this document will also give examples of situations describing actual implementation of individualized systems.

Appendixes List More Resources

The Appendixes include sources of information on computer equipment for individuals with disabilities in general, and disabled post-secondary education students in particular. This information includes books, articles, databases, conferences, and networks.

Different institutions use different computers for different applications, and no attempt has been made to suggest specific brands or manufacturers. The books and databases of product information should be used as a first step in contacting manufacturers. Whenever possible, equipment should be tested, especially by potential users. If the desired product does not appear to exist, consider contacting a manufacturer that has developed similar products, or other products for the same computer. A computer company could also be contacted (some have divisions specifically to serve people with disabilities). Both the adaptive equipment maker and the computer company may be able to suggest an alternate product.

Whenever possible, this brochure follows established legislation and other guidelines for accessibility. If further information on a particular item is available as part of a set of guidelines, an abbreviated title (in CAPITAL LETTERS) and page citation for that guideline follow the item in the checklist. A list of guidelines used and their sources is also included in the Appendix. You are strongly encouraged to obtain and consult these guidelines for further information.

Finally, although widespread implementation of accessible equipment will ideally encourage price reductions, some of the solutions will require substantial financial investment. The Appendix contains a list of sources of information on funding alternatives.

This document is slated to be reviewed and updated at least annually. Therefore, input is sought and warmly appreciated. Please write with suggestions, comments, and descriptions of access strategies (particularly for individualized systems) that you have developed or implemented, to: Jane Berliss, Trace R&D Center, S-157D Waisman Center, 1500 Highland Ave., Madison, WI 53705.

1

CHECKLIST 1

TEAM PREPARATION

This list is not meant to be exhaustive; additional measures may be required depending on specific campus situations. Blank lines have been provided for users to write in their own measures; we would greatly appreciate a copy of any measures you have added to this list.

_____ A. Initiate contact between disabled student service staff, computing center staff, and interested users .

_____ B. Develop team of consultants on campus adaptive computing.

1. Team should include persons (usually more than one in each area) with expertise in the following areas:

_____ a. Equipment currently being used on campus

_____ b. Adaptive computer equipment and peripherals

_____ c. Access needs of people with ALL types of disabilities

_____ d. Current and projected demographics of users with disabilities

_____ e. Computer lab funding

_____ f. Computing center policy

2. Team members should ideally be drawn from the following groups of people:

_____ a. Computing Center administrative staff

_____ b. Computer lab staff

_____ c. Disabled Student Services officers

_____ d. Potential users

_____ e. Outside consultants

_____ f. Professionals with clinical expertise in disability-related areas

_____ g. Rehabilitation technologists/engineers

_____ h. Other groups as appropriate

_____ C. Team walk-through of existing labs to determine existing accessibility accommodations/problems.

_____ D. Survey to determine types and usage of "standard" software/hardware.

_____ E. Survey students with disabilities to determine existing accommodations/problems.

_____ F. Placement of article(s) in campus information sources about intention to implement computer accessibility.

_____ G. Identification of personnel to implement accessibility measures.

_____ H.

_____ I.

1 CHECKLIST 1 EXPLANATION OF ITEMS

Checklist Item

Explanation

A. Initiate contact between disabled student service staff, computing center staff, and interested users .

The initial impetus for the process of establishing adaptive computing on campus is likely to come from representatives of one of these three groups; certainly all three groups will be immediately affected by the process. Since one or more of these groups may not be present on a given campus, it may be necessary to include representatives from other appropriate groups, such as the Dean of Students office or a Minority Affairs coordinator.

B. Develop team of consultants on campus adaptive computing.

To be effective, most plans for the implementation of adaptive computing require awareness of needs and demographics of persons with disabilities (both in general and on the specific campus), awareness of types of adaptive computing equipment and its compatibility with standard equipment, awareness of the existing computing environment on campus, and awareness of related issues such as funding. Since one individual or group is unlikely to be versed in all these areas, a team of experts drawn from various parts of the campus (and community, if relevant) should be assembled to evaluate and discuss issues, share information, and represent the concerns of the particular campus department or group to which they belong. This group may initially be fairly large during planning phases and may become smaller as goals are met, but will need to continue to exist on a long-term basis.

1. The team should include persons (usually more than one in each area) with expertise in the following areas:

- a. *Equipment currently being used on campus.* The type of standard equipment that students will need to access to will influence purchasing decisions of adaptive equipment, since the standard and adaptive equipment will need to work together.
- b. *Adaptive computer equipment and peripherals.* This team member will need some level of familiarity with equipment and strategies for access to input, output, environmental, and documentation/support by people with all types of disabilities (physical, visual, hearing, learning, etc.)
- c. *Access needs of people with ALL types of disabilities.* Many people whose disabilities would initially seem irrelevant to computer use may actually need some sort of accommodation. For example, students with deafness may be able to access the computer, but may need TDD access to the standard computing consultant services.
- d. *Current and projected demographics of users with disabilities.* This information facilitates the process of determining the order of priority in which equipment should be acquired.

- e. **Computer lab funding.** The way in which the campus chooses to fund acquisition, maintenance, and training for computers in general is likely to influence, if not dictate, the ways that these considerations are budgeted for adaptive technology.
- f. **Computing center policy.** Issues such as copyright of materials in alternative formats and policies for fair use of computer workstations when needed by both disabled and non-disabled students need to be developed in accordance with existing policies.

2. Team members should ideally be drawn from the following groups of people:

- a. **Computing Center administrative staff.** These persons will know about issues such as Computing Center funding, policies, and plans for future developments in the campus computing infrastructure.
- b. **Computer lab staff.** This group will know about day-to-day operation of and problems in the computer labs.
- c. **Disabled Student Services officers.** These individuals will know about existing campus policies and efforts relating to accommodations, as well as issues such as demographics.
- d. **Potential users.** These persons are not only the most likely to know about potential barriers to effective computer use, they are also the most likely to have had actual user experience with adaptive technology.
- e. **Outside consultants.** This may involve members of local disability-related groups (see Appendix, "Disability-Related Organizations," for examples), vocational rehabilitation counselors, parents, etc.
- f. **Professionals with clinical expertise in disability-related areas.** This may include interface specialists (generally occupational therapists with knowledge of physical barriers that may prevent an individual from effectively using technology) and seating/positioning/mobility specialists (therapists or engineers who work with issues relating to proper positioning in chairs or wheelchairs for maximal access). The list may also include physical therapists and occupational therapists.
- g. **Rehabilitation technologists/engineers.** These are persons with a thorough knowledge of disability and rehabilitation coupled with a background in the use of technology by persons with disabilities.
- h. **Other groups as appropriate.** Examples are: librarians, if the library system requires use of computers to access information; financial aid officers, for information relevant to students who will need their own systems; representatives from Planning and Construction, for any issues relating to the buildings where technology is housed.

C. Team walk-through of existing labs to determine existing accessibility accommodations/problems.

A variety of accommodations are likely to already exist in the computer labs, particularly since some computer manufacturers are building in accessibility features as part of their standard hardware or system

software (check the manuals for further information) and since the buildings may already fully or partially comply with architectural accessibility laws (see Checklist 3, Item C1). One or more members of the consultant team may also be aware of equipment purchased for the benefit of a few students but never publicized or made generally available. Use a copy of Checklists 2 through 5 to measure current accessibility and to determine the necessary steps for implementing further accessibility.

D. Survey to determine types and usage of "standard" software/hardware.

Increasingly, professors or colleges are requiring use of specific word processing, statistics, spreadsheet, or other mainstream software programs, or even use of specific types of computers, in the completion of homework assignments. In addition, some classes may require use of a tutorial or other program specific to an assignment, class, or discipline. For students with disabilities, it will be crucial to either have equal ability to use these programs or have appropriate alternatives set up. A knowledge of what equipment and software are already standard and what is required to complete coursework will be useful in plotting a course of action for implementing adaptive computing.

E. Survey of students with disabilities to determine existing accommodations/problems.

The survey should not only serve as a way to gather information; it should also be a means of notifying students of what is being planned, and of giving them as early an opportunity as possible to express opinions. The survey may also pique interest among students experienced with adaptive computer use, who are likely to have useful suggestions and may make excellent new members of the consultant team. Survey questions should cover the following areas: disability type, previous experiences with both standard and adaptive computer use, problems encountered in using computers on-campus, priorities for types and location of adaptive equipment to be purchased, and campus-specific questions as appropriate.

F. Placement of article(s) in campus information sources about intention to implement computer accessibility.

It would be difficult to over-publicize the implementation (and later, the availability) of accessible computers. The survey discussed above may only reach those students who have identified themselves as having a disability. Students with temporary disabilities may not realize that such equipment is available even when they need it. A continuous stream of information about the implementation process and equipment availability should ideally be placed in such publications as the campus student and/or staff newspapers and the computing center newsletter. Information about existing equipment should also be made available to prospective students, faculty, and staff with disabilities.

G. Identification of personnel to implement accessibility measures.

While eventually an Accessibility Coordinator should be hired to oversee the implementation process (see Checklist 4, Item D2), responsibility will need to be assigned so that it is clear who will be executing the implementation measures at every step and for every item. A follow-up procedure should also be instituted to ensure that measures are implemented in a timely, efficient, and thorough manner.

2

CHECKLIST 2

LOW COST/LOW IMPLEMENTATION TIME MEASURES

Implementations usually cost less than \$100 each and have implementation times of less than 30 minutes each. This list is not meant to be exhaustive; additional measures may be required depending on specific campus situations. Blank lines have been provided for users to write in their own measures; we would greatly appreciate a copy of any measures you have added to this list.

A. Input

- _____ 1. "Sticky key" software
- _____ 2. Software allowing control of keyboard delay and repeat rate
- _____ 3. Software allowing cursor control from keyboard instead of mouse
- _____ 4. Software permitting auditory or other non-visual indication of toggle key status
- _____ 5. Software allowing control of key input acceptance rate
- _____ 6. Alternative labels for the keyboard and keypad keys
- _____ 7. Keyguards
- _____ 8. An illuminated magnifying lamp that can be swung over the keyboard
- _____ 9. Devices to allow easy handling of floppy disks
- _____ 10. Surge protector power strip placed in an easily accessible location
- _____ 11.
- _____ 12.

B. Output

- _____ 1. Adjustable redundancy of auditory output
- _____ 2. Software permitting auditory output to be adjusted
- _____ 3. Earphones for speech synthesizer users and people who need to set the auditory output to a loud level
- _____ 4.

C. Environment

- _____ 1. Ensure that there is an accessible path between the wheelchair entrance and the computer lab
- _____ 2. Heavy earphones (such as those worn by jackhammer operators)
- _____ 3. Position terminals to best take advantage of lighting source
- _____ 4. Temporarily "adapt" tables to make them accessible by placing them on blocks (see Checklist 4, Item C1)
- _____ 5.
- _____ 6.

D. Documentation/Support/Training

- _____ 1. Indicate accessible equipment/entrances in any general brochure of computer lab hours and features
- _____ 2. Post large-print signs on computer lab doors indicating that adaptive equipment is available
- _____ 3. Label computers and workstations designated as accessible
- _____ 4. Identify personnel to construct and install simple modifications
- _____ 5. Provide a telephone with a headset and large push-buttons
- _____ 6.
- _____ 7.

2 CHECKLIST 2 EXPLANATION OF ITEMS

Note: Upper-case names refer to existing standards; the subsequent page numbers refer to pages within those standards. See Appendix, "Sources of Guideline Information," for full names of references.

A. Input

1. SHIFT, CONTROL, ALT, OPTION, COMMAND, and some other "modifier" keys are usually held down simultaneously with other keys. "Sticky key" software permits these modifier keys to be pressed and released; the next key pressed will then be affected by the modifier key exactly as if the two keys were held down simultaneously. This is necessary for users who type with one finger, a mouth-held stick, etc. Some sticky key software also permits any of these keys to be locked so that all subsequently pressed keys are affected by the locked modifier key until the locking feature is deactivated. (Unlike the "caps lock" key, the sticky key lock affects all symbols invoked by the shift key—e.g., the symbols associated with the number keys—and not just the capital letters.) Standard on some computers. (CONSIDERATIONS, pp. 13-14.)
2. If a single key is held down for a significant length of time, many computer systems will enter the corresponding character multiple times. This is inconvenient for users who may not have the motor control to pull their finger or mouthstick away from the keyboard in time to avoid activating this feature. Software that controls the "delay until repeat" and key repeat rate functions permits these times to be adjusted or these features to be turned off. Standard on some computers. (CONSIDERATIONS, p. 15.)
3. "Mouse" pointing devices, which permit cursor control, are becoming standard on many computers. However, some people lack either the eye-hand coordination or the physical ability to use the mouse. Software is available to permit mouse functions to be emulated by pressing keys on the computer keyboard. This function is standard on some computers. (CONSIDERATIONS, p. 16.)
4. Keys which can be toggled on and off, such as CAPS LOCK and NUMBER LOCK, often have their toggle status indicated by the presence or absence of a light on the keyboard. For the benefit of users with blindness or those who use the keyboard at an angle where the lights are difficult to see, adaptations are available to enable auditory indications of the toggle status.
5. Some users may frequently bump keys accidentally when typing, due to difficulty in controlling hand or typing stick movements. Software that controls the key input acceptance rate can filter out these undesired keys for some users by requiring that keys be held down for a given length of time before they are passed on to the computer and registered on the screen. Standard on some computers. (CONSIDERATIONS, pp. 21-22.)
6. Transparent Braille or other raised labels placed on some or all keys may provide a tactile method of orientation to the keys for users with total blindness, while still permitting other users to orient themselves visually. For users with some usable vision, large-print labels make keys easier to find. (CONSIDERATIONS, pp. 37-38.)
7. Keyguards are keyboard-sized sheets of plastic or other smooth materials that have holes cut in them. Each hole corresponds to a key. Users who have difficulty hitting keys accurately may find keyguards useful for reducing the number of unwanted keys they type. Keyguards may be purchased or made in-house. (CONSIDERATIONS, p. 21.)
8. An illuminated magnifying lamp that can be swung over the keyboard may make the keys easier to see for persons with a variety of disabilities.

9. Devices are available to permit handling of floppy disks by users with little or no use of their arms or hands. Most of these are mouth-controlled and allow disks to be inserted and removed. However, since even these devices do not solve all access problems involving floppy disks, it is highly recommended that these devices be considered a temporary measure for handling disks containing computer programs until more hard disks can be purchased (see Checklist 3, Item A4). (CONSIDERATIONS, p. 17.)

10. A surge protector power strip permits all equipment for the computer to be plugged into a single place so that the user only needs to hit one switch to turn on all equipment. The power switch may be placed in a variety of accessible locations near the computer, eliminating the difficult or impossible task of reaching around to the back of the computer, printer, etc. to turn it on. Surge protectors are widely-used accessories for computers, since they greatly reduce the likelihood of damage to the computer caused by voltage surges (e.g., surges caused by lightning storms).

B. Output

1. Error messages and other information are often communicated exclusively through sound, making it impossible for persons with deafness to access this information. Software should be made available that presents the information in a redundant visual form, such as a blinking menu bar or the word "beep" appearing on the screen. Standard on some computers. (END USER, p. 6; CONSIDERATIONS, pp. 40-41.)

2. The loudness of auditory output should be adjustable for the benefit of hard-of-hearing users. Standard on some computers. (CONSIDERATIONS, pp. 42-43.)

3. Speech synthesizer users and persons who require that auditory output be at a high level will require headphones so as not to disturb other users in the lab. These headphones are supplied with many speech synthesizer packages.

C. Environment

1. Determine the most accessible path between the wheelchair entrance and the computer lab, and provide maps or signage. Confirm that all doors along this path are unlocked during all hours that the computer lab is open. (See also Checklist 4, Item C1.)

2. Heavy earphones (such as those worn by jackhammer operators) should be provided so that an appropriate environment can be created for people who require a quiet atmosphere to work effectively.

3. Terminals should be positioned in such a way that glare on the screens is minimized. If the main lighting is provided by sunlight, position monitors at right angles to windows with adjustable blinds or curtains. (If this is not possible, polarizing lenses that fit over the screen are available inexpensively.) Overhead lighting should be provided by 75-watt fluorescent lights; a higher-wattage bulb may be needed for labs with unusually high ceilings. All lamps should be of the positionable swing-arm variety.

4. "Adapt" tables to make them accessible by placing them on sturdy blocks to raise them so that the bottom of the table is 28" from the floor. This should be a TEMPORARY measure until adjustable tables can be purchased (see Checklist 4, Item C1).

D. Documentation/Support/Training

1. Most non-departmental computer labs publish brochures indicating their location and hours of operation, as well as miscellaneous information such as types of computers in the labs. These brochures are ideal places to list information on types of available accessible equipment, location of wheelchair-accessible entrances, etc.

- 2. Signs on computer lab doors indicating that adaptive equipment is available should be low enough to be read by people who use wheelchairs or who are short, and should be large enough for people with low vision to read. The signs should briefly indicate what types of equipment are available, what the procedure is for accessing the equipment (e.g., "Ask the desk monitor for the software"), and where additional help can be obtained. (See also Checklist 3, Item C2).**
- 3. Label computers and workstations that have been specifically outfitted to be accessible. Establish a priority system so that non-disabled persons may use the equipment with the understanding that they should yield use of the computer to a disabled person as soon as another workstation becomes available.**
- 4. Simple modifications to standard equipment in accessible workstations may frequently need to be made to accommodate users. For example, it may prove impossible to find a surge protector power strip (see Item A10 above) with an on/off switch large enough to be accessed by persons with some motor control or manual disabilities; simple, inexpensive modifications could be put in place to give the user a larger switch to work with. Personnel should be identified who can make these modifications when necessary. A small budget should be allocated for construction materials.**
- 5. Many computer labs provide consultation on a phone-in basis, especially during off hours. A headset should be available for checkout by users who have difficulty using a standard handset, and existing phones should be checked for compatibility with this headset. There should also be at least one phone which has oversized push-buttons with large, easy-to-read labelling. (See also Checklist 5, Item D1)**

3

CHECKLIST 3**MODERATE COST/MODERATE IMPLEMENTATION TIME MEASURES**

For each item, implementation cost is \$100 - \$500 and/or implementation time is 30 minutes to two weeks. This list is not meant to be exhaustive; additional measures may be required depending on specific campus situations. Blank lines have been provided for users to write in their own measures; we would greatly appreciate a copy of any measures you have added to this list.

A. Input

- _____ 1. Test existing "standard" software with accessible equipment
- _____ 2. A card or box permitting people to plug alternate keyboards into public equipment
- _____ 3. Two or three different types of alternate keyboards
- _____ 4. An increased number of hard disks, reducing the need to handle floppy disks
- _____ 5. Trackballs
- _____ 6. Sticky key hardware
- _____ 7.

B. Output

- _____ 1. Magnifying screen
- _____ 2. Adjustable character magnification software that permits large-type copies to be viewed and printed
- _____ 3. Spell checker and thesaurus software (if not already an integral part of word processing programs)
- _____ 4. Auditory indicator of serial transmission status
- _____ 5.
- _____ 6.

C. Environment

- _____ 1. Consult with buildings operations on removal of existing architectural barriers
- _____ 2. Permanent signage near entrances indicating location of computer lab and route from that entrance
- _____ 3.
- _____ 4.

D. Documentation/Support/Training

- _____ 1. Train computing staff on sensitivity to people with disabilities, and equipment function and procedures
- _____ 2. Arrange for computing center information to be available in alternative formats
- _____ 3. If the computing center has a general goal statement, prepare a goal item on provisions for accessibility
- _____ 4. Obtain documentation on disk
- _____ 5. Provide a sign language interpreter for computing center courses and meetings
- _____ 6. Recruit students on a short-term basis to train users and computing staff in adaptive equipment use
- _____ 7. Implement a fair policy in charging students with disabilities for use of mainframe computer time
- _____ 8.
- _____ 9.

3 CHECKLIST 3 EXPLANATION OF ITEMS

Note: Upper-case names refer to existing standards; the subsequent page numbers refer to pages within those standards. See Appendix, "Sources of Guideline Information," for full names of references.

A. Input

1. Consult the survey of existing "standard" software (word processors, spreadsheets, etc.) already conducted (see Checklist 1, Item D). Test these pieces of software with accessible equipment as it is purchased or, better yet, as it is borrowed on a trial basis from the manufacturer. (If a representative from the school goes to a conference where accessible computer equipment is being demonstrated, the representative may wish to take examples of "standard" software and test it on the demonstration equipment.) If the software cannot be made to work satisfactorily, discuss alternatives with the teachers and/or administration staff who implemented the "standard" (e.g., permission to use more accessible software or a different type of computer).

2. Cards or boxes that permit people to plug alternate keyboards into public equipment (CONSIDERATIONS, p. 24) are now available for the most popular types of computers. These may come with built-in features, such as "sticky key" capabilities, and may be programmable to work smoothly with particular alternative keyboards and/or software programs.

3. Alternative keyboards usually have keys that require less pressure to be activated, or that are usable by people with a limited range of motion. These keyboards may be configured to have more or fewer keys than standard keyboards, and the keys may be programmed to perform various functions (e.g., a key may be programmed to execute a long but predictable series of commands within a program). A variety of keyboards are required to accommodate combinations of disability types—membrane keyboards, where the keys are flat on the keyboard surface, are appropriate for users with some types of disabilities, but since they have no tactile landmarks they cannot be used by persons who have both difficulty pressing keys and visual disabilities.

4. Because floppy disks may be difficult to handle for a variety of users with disabilities, it is preferable to store as much software as possible on hard disks. Although students may need to continue to use floppy disks for storing their own files, it will be easier for them to deal with the insertion and removal of one disk rather than an additional series of programs on floppies.

5. A number of alternatives to the standard mouse pointing device (used to control cursor movement) are available. These are beneficial to both individuals who have physical difficulty using a mouse, or who do not have sufficient hand-eye coordination to use a mouse effectively. Trackballs are particularly recommended as alternative mice. Only the fingers need be moved, reducing the strain on wrists and arms, and many people find them cognitively easier to use than standard mice. Standard on some computers.

6. Since not all computer operating systems are compatible with sticky key software (e.g., Macintoshes running AUX software), sticky key hardware should be made available. This hardware is used to physically hold down the desired keys when necessary. (See Checklist 2, Item A1 for information on sticky key software.)

B. Output

1. Magnifying screens both reduce glare and provide screen enlargement so that the characters are approximately twice standard size. This is a simple solution for users with minor visual disabilities, and may also be beneficial to users with learning disabilities. (END USER, p. 5)

2. Character magnification software permits large-type copies to be viewed and printed (END USER, p. 5) and permits the range of magnification to be adjusted, usually up to about 16 times standard size (STUDENTS, p. 1.1). Some types of character magnification software may also permit screen colors to be changed, the cursor shape to be modified, and graphics to be enlarged as well as text. Standard on some computers.

3. If not already an integral part of the word processing programs being used, spell checker and thesaurus software should be provided. This will assist both persons with learning disabilities and persons using optical character recognition systems (see Checklist 5, Item A1).

4. Hardware is available for providing an auditory indicator of serial transmission status—e.g., if information is being sent to a printer, or if a modem is active.

C. Environment

1. Any architectural barriers found during the team walk-through described in Checklist 1, Item C, should be discussed with the person or department responsible for buildings operations. While it should not be the responsibility of the computer labs to implement and fund such items as lever-style door handles and ramps, the buildings operations personnel should be made aware of any existing problems and encouraged to fix them in a timely manner.

2. Permanent signage near all entrances should indicate the location of the computer lab and the most accessible route from that entrance. The signs should have text in both large raised letters and Braille, and a visual/tactile map of the route. This can often be done on-campus quickly and relatively inexpensively.

D. Documentation/Support/Training

1. All computer center staff should be trained in sensitivity to needs of people with disabilities, general information on adaptive equipment, and procedures for obtaining help if person requires training or if equipment malfunctions. At least one full-time long-term staff member at each site should be trained in operation of adaptive equipment. Because the high turnover among student employees may make it difficult for them to be trained in a complete and timely fashion, these employees should be told, when hired, who the trained staff members are and how they can be contacted for assistance.

2. Have crucial computing center information—lab hours, sources of help, basic computer operation procedures—read onto a tape. Implement a policy for distributing the tape—e.g., if users bring in a blank tape, the computing center or disabled student service office will copy the tape for them. Where appropriate, materials should also be made available in Braille using Braille equipment (see Checklist 4, Item B).

3. If the computing center has a general goal statement, prepare an item on provisions for accessibility to be included in the statement. This statement should be consistent with the findings and actions of the consultant team, and should be reviewed annually.

4. If documentation is available on disk, it may be searched directly by users or printed out in large type or Braille. Contact product manufacturers to see if documentation is available on disk. If not, the documentation may be available on disk from Computerized Books for the Blind and Print Handicapped (see Appendix, "Sources of General Information") for a

nominal fee. Computerized Books also provides many popular general computing books on disk.

5. To accommodate students with hearing impairments, provide a sign language interpreter on request for computing center courses and meetings, and have an interpreter at all computing center lectures and other public meetings. The interpreter should be versed in vocabulary relating to computers. (END USER, p. 6.)

6. Recruit students in appropriate fields (e.g., human factors engineering, occupational therapy) on a short-term basis to assist both users and computing center personnel in training in use of accessible equipment. This may be on a volunteer or work-study basis, or may be part of the coursework for a lecture, lab, or independent study course. These students should undergo the same training mentioned in Item D1 above.

7. Students using adaptive equipment may require longer than other students to accomplish the same amount of work, especially if they are using a speech synthesizer to access a mainframe computer, or are using one finger or a mouthstick to type. This may be especially frustrating if fees are charged to the student for computer time. A fair policy should be established allowing students with disabilities to be granted sufficient computer time to carry out their work.

4

CHECKLIST 4

ANNUAL BUDGET MEASURES

To be planned into annual budget. This list is not meant to be exhaustive; additional measures may be required depending on specific campus situations. Blank lines have been provided for users to write in their own measures; we would greatly appreciate a copy of any measures you have added to this list.

A. Input

- _____ 1. Laptops with speech synthesizers, word processors, and spell checkers for loan to students
- _____ 2.
- _____ 3.

B. Output

- _____ 1. Speech synthesis hardware and software
- _____ 2. Large monitor
- _____ 3. Braille printer
- _____ 4. Refreshable Braille output display
- _____ 5. Braille translation software/firmware
- _____ 6. Color monitors and software to permit the selection of colors used
- _____ 7. Magnifying closed-circuit cameras
- _____ 8.
- _____ 9.

C. Environment

- _____ 1. Adjustable tables to accommodate both wheelchair users and short- or tall-statured people
- _____ 2. Adjustable chairs that provide support and stability
- _____ 3.
- _____ 4.

D. Documentation/Support/Training

- _____ 1. Design and implement a training program for users of complex equipment
- _____ 2. Hire Accessibility Coordinator for campus
- _____ 3.
- _____ 4.

4 CHECKLIST 4 EXPLANATION OF ITEMS

Note: Upper-case names refer to existing standards; the subsequent page numbers refer to pages within those standards. See Appendix, "Source's of Guideline Information," for full names of references.

- A. Input**
1. Laptops with speech synthesizers, word processors, and spell checkers should be made available for loan to students. These may be checked out on an as-needed basis, or borrowed for an entire semester.
- B. Output**
1. Speech synthesis hardware and software translates the information on the screen into spoken form; most systems also include provisions for specifying preferences—e.g., whether words should be read letter-by-letter or as a full word, and how much material should be read (a sentence, paragraph, or the entire page). The system should be easily controlled—e.g., the user should be able to stop the speech output at any point—and should work with a wide range of standard software. (END USER, p. 5; STUDENTS, pp. 1.14-1.22.)
 2. Character magnification software (see Checklist 3, Item B2) will not work effectively on a screen that is too small to see more than a few characters at a time. A large screen—roughly 19" to 25"—is therefore recommended. (END USER, p. 5; CONSIDERATIONS, pp. 27-28.)
 3. Although a large percentage of the general blind population does not read Braille, a significant number of postsecondary students will depend on Braille for fast access to information. Braille is also the only tactile medium currently supported by computers, and is thus mandatory for access by deaf-blind students or other students who would have difficulty using speech output. (END USER, p. 5.)
 4. Refreshable Braille output displays permit reading of small amounts of text (usually twenty to forty Braille characters) at a time. Pins on the display are raised or lowered to correspond to the letters on screen. On some models, the pins vibrate to indicate a capital letter. (END USER, p. 5.)
 5. For effective use of Braille, Braille translation software or firmware is required. This permits the user to type in and review the text (using a speech synthesizer or refreshable Braille device) in Arabic letters, produce a hard copy in Braille, and then back-translate the text to produce a final version that may be handed in to a sighted professor. (END USER, p. 5.)
 6. Users with color-blindness or low vision are likely to find that certain color combinations are easier to work with than others. This may also be true for users with learning disabilities. Color monitors and software which permit the selection of colors used are available; these allow individual users to adjust the information on the screen to accommodate their personal abilities. (CONSIDERATIONS, p. 29.)
 7. Magnifying closed-circuit cameras will permit users to conveniently examine printed materials (such as manuals or materials being typed) while working on the computer. The more sophisticated systems can be connected to the computer and have split screens, allowing computer and printed materials to be displayed on the same screen, at different rates of magnification if so desired.

C. Environment 1. Adjustable tables should accommodate both wheelchair users and people whose height makes use of standard tables difficult. These tables should also provide adequate work space.

2. Adjustable chairs should provide support and stability. The backs should be large and adjustable, and the base should have five legs with rolling casters. An assortment should be provided, including models with and without arms.

**D. Documenta-
tion/Support/
Training**

1. A training program for users of complex equipment should be designed and implemented. This should include provisions for alternative formats of both print materials (such as Braille) and communication (such as American Sign Language). The program should be offered regularly, and should be listed with other courses given by the computing center. On demand, these mainstream courses should be adapted so they can be offered via alternate formats. (STUDENTS has many good suggestions on training users with disabilities.)

2. An Accessibility Coordinator is a staff member, usually part of the computing center staff, who is the automatic initial contact for anyone wishing information about adaptive computing on the campus. This job requires someone with both a sensitivity to the needs of persons with disabilities and knowledge of adaptive and general computing. The coordinator works with students, faculty, computing center, and disabled student service staff to ensure that the computing needs of as many students with disabilities as possible are met generically. He or she also provides regular information on adaptive computing to the campus at large, and coordinates training, distribution of documentation, and funding of equipment.

5

CHECKLIST 5

LONG-TERM PLANNING MEASURES

To be planned into budget when computing labs are built or remodeled, or when new automated systems, such as on-line catalogs or telephone registration procedures, are selected. This list is not meant to be exhaustive; additional measures may be required depending on specific campus situations. Blank lines have been provided for users to write in their own measures; we would greatly appreciate a copy of any measures you have added to this list.

A. Input

- _____ 1. Optical character reader
- _____ 2.
- _____ 3.

B. Output

- _____ 1. Screen projector for teaching purposes
- _____ 2.
- _____ 3.

C. Environment

- _____ 1. Construct the lab in an accessible location
- _____ 2.
- _____ 3.

D. Documentation/Support/Training

- _____ 1. Plan the best strategy for supporting hard-of-hearing and deaf users
- _____ 2.
- _____ 3.

5 CHECKLIST 5 EXPLANATION OF ITEMS

Note: Upper-case names refer to existing standards; the subsequent page numbers refer to pages within those standards. See Appendix, "Sources of Guideline Information," for full names of references.

- A. Input** An optical character reader (OCR) permits printed materials to be translated into computer-readable format and stored as a computer file. Some OCRs designed specifically for users with blindness can read the material aloud as it is being translated. It is recommended that a spell checker be used with the translated and stored files, since the error rate in the translation may vary.
- B. Output** A projector, hooked up to a computer, will enable the teacher to display an enlarged copy of the screen. This will assist students with visual or learning disabilities as well as those seated where they cannot see the original screen. The projector may either be a video projector, which usually must be mounted in the lab, or an LCD panel on an overhead projector, which is portable. The LCD should produce very bright, high-contrast images. A video camera may also be hooked up to the computer and used to project large images.
- C. Environment** The lab should be constructed in an accessible location. This means it should ideally be located on the first floor or close to an elevator, and within a short distance of an accessible bathroom. There should be a minimal number of doors between the outside and the lab and all of these doors should have handles that are easy to operate, or buttons that may be pushed for automatic door opening.
- D. Documentation/Support/Training** If user support via telephone is part of the system, plan the best strategy for supporting hard-of-hearing and deaf users. This may involve use of a TDD, message relay system, electronic mail, or FAX. (END USER, pp. 6-7.)

INDIVIDUAL ACCESS MEASURES

Even the wide range of generic equipment described in the checklists will not be sufficient for some users; these people will require their own equipment. For some users, this may be as simple and inexpensive as a mouth-held or head-mounted stick for typing. For others, however, a more sophisticated personal system may be required. To ensure a correct fit between individual needs and abilities and personal systems of electronic equipment, an evaluation by a professional is strongly recommended.

The responsibility of the educational institution for funding the evaluation and equipment will vary. Some campuses have arranged for contingency funds to cover individual cases. A number of campus branches may work cooperatively to provide funds and equipment as necessary. This funding may come from a general disabled student service contingency fund, or may be obtained via outside donors. If such a fund cannot be established, measures should be taken to work with the student on obtaining alternative funding sources. Depending on the sources of the funding, the student may or may not retain the equipment after graduation.

A. When to refer

A student should be referred for an evaluation whenever it becomes clear that the existing adaptive equipment on campus will not be sufficient to gain full and efficient access to computing facilities on campus. This judgement may be made based on the severity of the user's disability (a decision most likely to be made by the office of disabled student services) or because the user has tried unsuccessfully to use existing adaptive equipment. There will be a period while generic access is being implemented when a large number of students will not be able to use existing equipment; therefore the first priority in equipment purchase should be to buy systems flexible enough to meet specific current needs and adjustable for future users with disabilities. However, there will always be a need to accommodate individuals. This is especially true in cases of severe or multiple disabilities, where a specific and unusual combination of equipment may be needed.

B. How to refer

A preliminary referral site—such as Disabled Student Services or the Accessibility Coordinator for the Computing Center—should be established and advertised. All faculty, disabled student service staff, and computer lab staff should be aware that this is the appropriate place to send students who require a professional evaluation. The primary referral site should determine likely places to send the student for evaluation, and assist students and parents with initial questions about funding for evaluation, transportation to evaluation site, etc.

C. To whom to refer

1. The following is a list of likely sources of information on local professionals who understand computer adaptations:

a. Occupational Therapy, Communication Disorders, or Rehabilitation Engineering departments of local rehabilitation centers or hospitals.

b. Local branch of the state Department of Vocational Rehabilitation.

c. Occupational Therapy, Communication Disorders, or Rehabilitation Engineering departments of college or university.

d. Local disability-related organizations—see Appendix, "Disability-Related Organizations," for suggestions and addresses.

e. "Rehabilitation Technology Service Delivery Directory" (RESNA, Suite 700, 1101 Connecticut Ave. NW, Washington, DC, 20036, (202) 857-1199; currently in press).

f. Service Delivery Directory, a computer database that provides information on professionals by specialty and geographic location, and that permits users to add records and comments on service providers. (Contact the Trace Center for further information.)

2. Once a list of potential evaluators has been established, contact each one to find out the following information:

a. Credentials;

b. Areas of expertise;

c. Ability to permit client to have hands-on experience using several types of equipment;

d. Restrictions on clients served;

e. Funding (fee for service, grant funds, etc.).

D. Examples of evaluation and implementation situations

PERSONS INVOLVED IN EXISTING PROGRAMS ARE ENCOURAGED TO SUBMIT ANECDOTAL DESCRIPTIONS AND ILLUSTRATIONS OF SITUATIONS WHERE EVALUATIONS WERE DEEMED NECESSARY AND WERE CONDUCTED. THESE DESCRIPTIONS AND ILLUSTRATIONS WILL BE INCLUDED, WITH CREDIT, IN THE NEXT VERSION OF THIS CHECKLIST.

APPENDIXES

Note: No endorsement is meant or implied by inclusion on any of these lists; please inform the editor of any resources that should be added.

Sources of General Information

"Information from HEATH" (newsletter)

Free from:

Center for Higher Education and Adult Training for
People with Handicaps (HEATH)

One Dupont Circle, NW
Washington, DC 20036
(800) 544-3284

"Connections" (publication)

Free from:

Apple Computer
Office of Special Education and Rehabilitation
20525 Mariana Ave. MS-43S
Cupertino, CA 95014
(408) 974-8602

Computerized Books for the Blind (organization)

\$20.00/ 1 year membership

33 Corbin Hall, University of Montana
Missoula, MT 59812
(406) 243-5481

The Reader Project (organization)

2631 Garfield St. NW
Washington D.C. 20008
(202) 667-7323

"Resources for Users of IBM Personal Computers"
(publication)

Free from:

IBM National Support Center for Persons with
Disabilities
P.O. Box 2150
Atlanta, GA 30301-2150
(800) 426-2133; TDD (800) 284-9482

"EASI Fixes" and "EASI Immediate Response
Brochure" (publications)

Free from:

Project EASI
Educational Uses of Information (EUIT)
EDUCOM
P.O. Box 364
Princeton, NJ 08540
(609) 520-3350

Sources of Computer Access Guideline Information

N.B. Phrase in parentheses indicates term by which document is referred to in the checklists.

"Computer Access in Higher Education for
Students with Disabilities", Second Edition
(STUDENTS)

Free to postsecondary institutions from:
The High-Tech Center for the Disabled
21050 McClellan Road
Cupertino, CA 95014
(408) 996-4636

"Considerations in the Design of Computers and
Operating Systems to Increase their Accessibility
to Persons with Disabilities, Version 4.2" (CON-
SIDERATIONS)

\$7.50 from:

Trace Research and Development Center
Room S-151 Waisman Center
1500 Highland Ave.
Madison, WI 53705
(608) 262-6966

"Managing End User Computing For Users With
Disabilities" (END USER)

Free from:

General Services Administration
Clearinghouse on Computer Accommodation
Room 2022
KGDO
18th and F Streets, N.W.
Washington, DC 20405
(202) 523-1906 voice/TDD

Sources of Product Information**Accent on Information (Database)**

P.O. Box 700
Bloomington, IL 61702
(309) 378-2961

ADDS (Assistive Device Database System) (On-Line Database)

American International Data Search, Inc.
650 University Ave.
Suite 101B
Sacramento, CA 95825
(916) 924-0280

ABLEDATA (On-Line Database)

Newington Children's Hospital
181 East Cedar Street
Newington, CT 06111
(203) 667-5405

CTG Solutions (Database) and Closing the Gap (Bimonthly newsletter)

Closing the Gap
P.O. Box 68
Henderson, MN 56044
(612) 248-3294

Hyper-ABLEDATA (Microcomputer version of ABLEDATA) and Trace ResourceBook, 1991-92 Edition (Book)

Trace Research and Development Center
Room S-151 Waisman Center
1500 Highland Ave.
Madison, WI 53705
(608) 262-6966

Also: many disability-related periodicals carry press releases or reviews of new products.

Sources of Alternative Funding Information**"Computer Access in Higher Education for Students with Disabilities", Second Edition, Chapter 8**

Free to postsecondary institutions from:
The High-Tech Center for the Disabled
21050 McClellan Road
Cupertino, CA 95014
(408) 996-4636

"Funding Devices and Services in Augmentative and Alternative Communication"

Free from:
Prentke Romich Company
1022 Heyl Road
Wooster, OH
(800) 642-8255
(216) 262-1984

A one-page sheet listing suggestions for organizations to approach and tips for approaching them.

"The Many Faces of Funding"

Anna Hoffman
Phonic Ear, Inc.
250 Camino Alto
Mill Valley, CA 94941
(415) 383-4000

A book of funding information. Updates are sent periodically. Pertains mostly to physically disabled and non-speaking persons.

The Sloane Report

\$42 (6 bimonthly issues) from:
The Sloane Report
P.O. Box 561689
Miami, FL 33256
(305) 251-2199

Contains a regular column called "Not-So-Common Funding Sources." A full list of corporate funding sources is available for \$35 (\$50 for non-subscribers) from the Sloane Report.

Disability-Related Organizations

The address and phone numbers for national headquarters of organizations are listed; however, most of these groups have chapters in major cities. This list is not intended to be comprehensive.

National Easter Seal Society
2023 West Ogden Ave.
Chicago, IL 60612
(312) 243-8400

National Spinal Cord Injury Association (NSCIA)
600 West Cummings Park #2000
Woburn, MA 01801
(800) 962-9629

Self-Help for Hard of Hearing People (SHHH)
7800 Wisconsin Ave.
Bethesda, MD 20814
(301) 657-2248 voice; (301) 657-2249 TDD

National Federation of the Blind (NFB)
1800 Johnston St.
Baltimore, MD 21230
(301) 659-9314

American Foundation for the Blind (AFB)
15 West 16th St.
New York, NY 10011
(212) 620-2000

American Council of the Blind (ACB)
1010 Vermont Ave. NW
Suite 1100
Washington, DC 20005
(202) 3933666

United Cerebral Palsy (UCP)
66 E. 34th St.
New York, NY 10016
(212) 947-5770

Orton Dyslexia Society
724 York Rd.
Baltimore, MD 21204
(301) 296-0232

Amyotrophic Lateral Sclerosis Association
21021 Ventura Blvd., Suite 321
Woodland Hills, CA 91364
(818) 340-7500

Organizations and Conferences Relating to Computers and Disability

Closing the Gap (CTG)
Conference focused on computers and disability, particularly in education. Conference held annually, late October, in Minneapolis.
Contact: Closing the Gap
P.O. Box 68
Henderson, MN 56044
(612) 248-3294

Technology and Persons with Disabilities (CSUN)
Conference focused on computers and disability, particularly in education. Conference held annually, mid-March, in Los Angeles.
Contact: Dr. Harry Murphy
Office of Disabled Student Services—DVSS
California State University—Northridge
18111 Nordhoff Street
Northridge, CA 91330
(818) 885-2869

Association of Handicapped Student Service Providers in Postsecondary Education (AHSSPPE)
Professional organization of disabled student service officers; conference features some presentations and equipment displays related to computers; has special interest group on computers. Conference held annually, early August, in varying locations.
Contact: AHSSPPE
P.O. Box 21192
Columbus, OH 43221
(614) 488-4972

EDUCOM
Professional organization of computing center administrators; parent group of Project EASI (Equal Access to Software for Instruction), a group focused on computer applications for students and staff with disabilities, as a subgroup of EDUCOM's Educational Use of Instructional Technology (EUIT) branch; conference features some presentations and equipment displays related to computers. Conference held annually, mid-October, in varying locations.
Contact: Danny Hilton-Chalfen, Coordinator, Project EASI
Room 2035, Anderson School of Management
UCLA
Los Angeles, CA 90024

American Library Association (ALA)

Professional organization of librarians; parent group of the Adaptive Technology Interest Group (ATIG) which is focused on issues relating to use of adaptive technology in libraries, as a subgroup of ALA's Library and Information Technology (LITA) branch. Conference held twice a year: midwinter meeting in Chicago, summer meeting in varying locations.

Contact: Ray DeBuse, Coordinator
(206) 438-6911

RESNA (an association for the advancement of rehabilitation technology)

Professional interdisciplinary organization concerned with all aspects of rehabilitation technology; conference features some presentations and equipment displays related to computers; has special interest group on computer applications. Conference held annually, mid-June, in varying locations.

Contact: RESNA
Suite 700
1101 Connecticut Ave. NW
Washington, DC 20036
(202) 857-1199

ACKNOWLEDGMENTS

Roger Smith, Gregg Vanderheiden, Peter Borden, Karen Johnson, Kelly Ford, Mark Novak, and the staff of Trace

Darola Hockley, Danny Hilton-Chalfen, and Project EASI

James Breene, International Business Machines

Gary Moulton and Jane Lee, Apple Computer

Trey Duffy, Nancy Smith, B.A. Scheuers, and the staff of the McBurney Center, University of Wisconsin-Madison

Dave Brown, Denise Rall, Tad Pinkerton, and the Computing Committee, University of Wisconsin-Madison

Electronic Access Subcommittee, Chancellor's Committee on Persons with Disabilities, UW-Madison

Marcia Carlson, University of Wisconsin-Madison

Ann Yurcisin and Mary Donley, University of Wisconsin-Stout

Joe Hsrich, University of Wisconsin-Eau Claire

Dariys Vander Beek and Julie Biernat, University of Michigan

Doug Thompson, Jim Knox, and members of the Barrier-Free Computer Users Group, University of Michigan

Beverly Bain, New York University

Laurence Minsky

Partial funding for this work was provided under Grant #'s G008300045, H133E80021 and from the National Institute of Disability and Rehabilitation Research, United States Department of Education.