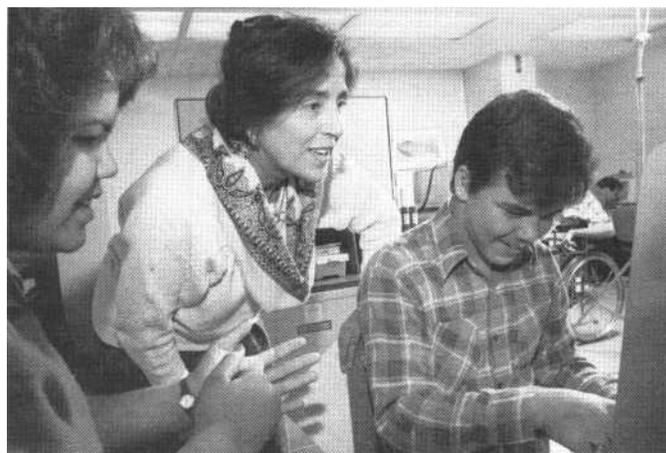


## **Adaptations for Other Disability Groups**

Adapted computer technology can benefit individuals whose disabilities are other than visual, orthopedic or learning. Persons who are deaf or hard-of-hearing or have acquired traumatic brain injury can also profit from access to some components of adapted computer technology. In many instances, the benefits will be in the form of access to the computer as a dynamic tool for building or strengthening basic skills, producing written materials more efficiently or assistance with learning new information.

### **Deaf and Hard-of-Hearing**

The processes by which we acquire and use spoken or written language are subtle and complex. Learning to produce spoken language requires, among other things, the intricate interplay of auditory memory (remembering how a word sounds), motoric/kinesthetic memory (remembering how to shape the lips, position the tongue and manipulate the breath in order to produce the spoken word) and pragmatic/word usage memory (remembering how to arrange words in ways that correspond to currently understood word usage patterns). Spoken or written language and hearing are intimately bound to one another. The process of acquiring spoken language is largely dependent upon continuous auditory feedback. The learner dynamically compares his/her word pronunciation with an auditory memory of how the word is "supposed" to sound. Continuous motoric/kinesthetic corrections are made to speech production until the spoken word matches auditory memory. Over time, the developing individual learns to communicate his/her needs, feelings or thoughts by assembling groups of words in ways which



are meaningful to others. Ultimately, the user of spoken language gains mastery over an extraordinary array of sounds which allow the individual to communicate the full, subtle and intricate spectrum of human thought and emotion. Acquisition of written language follows the development of spoken language. Because successful use of written language is profoundly connected to spoken language, individuals who for one reason or another experience difficulty with the acquisition of spoken language will often experience difficulty perfecting the use of written language. Listening to the way language sounds is one of the primary ways in which we learn to develop and refine "correct" grammatical usage of written language. We both shape and are shaped by our use of spoken and written language. We use language to organize and codify our thoughts. It is the tool by which the abstract is made concrete. And this entire intricate structure of communication, conceptualization, organization and interaction is based, fundamentally, on our ability to hear.

5.3

For congenitally deaf or hard-of-hearing persons, this critical ability is absent or seriously impaired. As a consequence, they frequently experience great difficulty acquiring and using written or spoken language. There is often, however, very little real correlation between a deaf or hard-of-hearing person's innate intellectual capacity and his or her ability to use spoken or written language. Acquisition of vocabulary is largely accomplished through use of auditory memory. Deaf persons who must depend entirely on visual-memory (how the written word looks), typically have significantly smaller spoken or written vocabularies than hearing individuals. Absence of spoken and written language as the primary method of communication can also have an effect on the congenitally deaf or hard-of-hearing person's ability to shape, formulate and express abstract concepts. For deaf or hard-of-hearing individ-

uals with basic writing skills, production of written language can often be assisted through use of the following adaptive interventions:

### **Visual cueing of auditory prompts**

Since many computer programs make use of various tones, chirps and beeps to alert the user to error conditions, work completion or other events, it is vitally important that deaf or hard-of-hearing persons have access to these cues. The system should provide a visual, on-screen prompt (screen flash, icon or other symbol) to notify the hearing-impaired user of these events.

### **Conventional or "smart" word processing systems**

Word processors provide a structured environment for the production of written materials. The ease with which grammatical, structural or spelling errors can be corrected is unmatched by any other writing method. "Smart" word processors have the added capability of suggesting likely word choices as a sentence is being written. This can be invaluable to deaf students who experience difficulty with word recollection. The ability of "smart" word processors to append suffixes, pluralize words, provide automatic spacing after punctuation marks and automatic capitalization of new sentences is an additional aid.

### **On-line spell checking programs**

Phonetically based spell check and correction programs are vitally important to providing productive writing environments for deaf or hard-of-hearing individuals. Spell checkers should be easy to use and continuously available (on-line). Ideally, they should be integrated with the word pro-

cessor and no more than a keystroke or two away. When correcting a spelling error, such programs should display the misspelled word along with the sentence in which it was used, suggest the correct spelling, provide a definition of the correctly spelled word and perform the correction automatically.

### **On-line thesaurus programs**

Continuously available thesaurus programs can be invaluable aids to augmenting limited vocabularies and suggesting new directions for self-expression. Ideally, such thesauruses should provide a definition of each available synonym, maintain correct verb tense and perform word replacement automatically.

### **A method for review and correction of faulty sentence structure**

Once a document has been written using a word processor, programs exist which are capable of performing a rigorous analysis of usage and style. Although still somewhat in their technological infancy, such programs are capable of pointing out a wide variety of grammatical, usage and style errors. Run-on sentences, vague terms, missing punctuation marks, sexist terminology and awkward word choices are all within the scope of problem areas which can be identified. As another tool in the error identification/correction process, grammar and usage checkers can be extremely valuable.

5.5

### **Screen reading programs**

For persons who are hard-of-hearing, easy-to-use screen reading programs combined with advanced speech synthesizers can be a great help in the production of written materials. Advanced speech

synthesizers provide for hundreds of adjustments to speech output. In many instances, the synthesizer can be adjusted to produce spoken output at a volume and frequency which fall within the auditory range of a hard-of-hearing individual. Once this has been accomplished, the same types of screen reading systems and techniques which have proven successful for use by students with learning disabilities can be used by individuals who are hard-of-hearing. For additional information on screen reading systems, refer to the chapter in this book on adaptations for students with learning disabilities.

### **Adaptations for Persons with Acquired Traumatic Brain Injury**

5.6

Individuals with acquired traumatic brain injuries (ABI), represent the fastest growing disability group in North America. Head injuries resulting from automobile, sport and industrial accidents account for a large percentage of this population. Such injuries can produce a wide range of effects including memory loss, disorientation, cognitive processing deficits and emotional disturbances. Although significant brain injury can result from seemingly minor accidents, advances in modern medicine now provide dramatically improved opportunities for surviving what would, until fairly recently, have been considered a fatal head injury.

In addition to the effects outlined in the previous paragraph, major head injuries can sometimes have additional consequences including loss of fine motor control and/or vision. For persons with ABI undergoing post-injury rehabilitation through the use of computer assisted basic skills instruction and special computer programs which help reestablish basic cog-

nitive processes, adapted computer technology can help to remove barriers imposed by limited fine motor control or limited vision.

For additional information on the specific requirements for such adaptations, please refer to the chapters on providing adapted computer access for persons with orthopedic or visual disabilities.

