

Who are the people who operate and direct High-Tech Centers for the Disabled? What are they like? What are their backgrounds, interests and aspirations? The following chapter eloquently describes the joys, challenges and satisfactions of one such program director as she acquired the skills which have made her an Adapted Computer Technologies specialist. This revised edition also contains a brief postscript written by the same High-Tech Center Specialist two years later.

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The concept of a High-Tech Center for the Disabled is new; it has evolved out of practical experience at Monterey Peninsula College over the last two-and-one-half years. This profile is being written in December, 1986. As you read the following narrative, please remember that I did not touch a computer until August, 1984, two-and-one-half years ago.

I am now able to coordinate this High-Tech Center, a computer center, because it is free of unnecessary technology. This is paradoxical because I am not a "computer person." I am a trained speech-language pathologist and also hold a B.A. in English literature. For eight years I was a full-time speech-language specialist at this college working primarily in the areas of language retraining and thinking skills development with adults having deficits arising from stroke or head injury.

My assignment expanded in August of 1984 and I began assisting the major author of this grant, Carl Brown, as lab instructor and classroom assistant in a beginning word processing class. At the conclusion of

his first lecture to the original class, he left the classroom with the statement that I would be there for the next two hours to help the students with their initial lab assignment. I learned how to complete the assignment as I instructed the students! Such an outcome does not indicate unique computer talent, but rather reflects maturity, teaching experience, and a strong streak of curiosity. With great composure and a straight face, I led the students through this initial assignment. They never knew it was my very first time to touch a computer.

It's OK to Be a Computer Novice

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My innocence with respect to computer technology cannot be stressed enough. Becoming familiar with computers and software is not the mystery a novice might imagine. Learning to use a computer is a very simple, straightforward task because a computer's basic nature is self-teaching.

Institutions wishing to start High-Tech Centers will benefit from training existing personnel. One of the major attributes of the program proposed in this model is that it is not difficult to begin from an instructional or an institutional perspective.

Learning to Become Familiar with Adapted Computer Technology

I learned adapted technology within the context of teaching. I think this is the way it should be, although it reflects a very curious paradox; since we think of teaching as an activity following study and mastery. Such prior mastery was not possible in this case.

I soon learned, however, that the students were not put off by my not always knowing what to do. My very visible learning process seemed to influence the students in a positive way. They had little sense of failure when they ran into problems, because they saw that exploration was a part of learning, especially in computer and software tasks. What I had to overcome was my conditioned inner belief that I was not competent to be instructing the students because I was so new to the technology.

As I learned to assist students in solving their computer problems, I remained a visible example of competent learning. Students soon came to understand their own "glitches" as a natural learning process, not as failures. I did not, and still do not, present a model of technological infallibility. I consider this a natural component of my role as director of the center.

For a professional specialist, proficiency and competency are the hallmarks of success within one's discipline. To operate on the very edge of what I knew went against all my training, for to function professionally at a level of emerging competency was unprofessional. And yet, because adapted computer technology is so profoundly important, many individuals who have rich years of teaching behind them will be asked to operate, initially, from just such a position. As I have developed the skills which I now use today on a daily basis in the High-Tech Center, I have come to understand the importance and rightness of this challenge. The richness of merging prior competencies with the presentation of the amazingly simple but versatile adapted technologies is truly a creative synthesis.

Why am I stressing these deeply personal observations in an otherwise technically-oriented manual? Because some people tend to think of computers as dehumanizing. Within the context of a High-Tech Center, they are, in fact, humanizing forces. There is,

as yet, no organized discipline known as "Adapted Computer Technology," but it is an area of great importance to disabled populations, and it will need trained specialists in the very near future. My personal experience suggests that seasoned professionals who are not yet computer users will be excellent and appropriate candidates for this new specialty area, for they will bring the richness of their years of teaching experience. I cannot emphasize enough the fact that experienced teachers of the disabled should seriously consider making the transition to computers via the field of adapted computer technology. To do so is a manageable and deeply rewarding learning experience. The benefits are two-fold: professional and personal. Not only does one develop the skills which are now needed to participate directly in the rapidly changing field of education, but one may also discover the increased proficiency which computer use may bring into one's own personal life.

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Developing a New Model of Professional Performance

The special education instructor who is not yet computer-literate must not be afraid to adopt a new model of professional performance. Whereas I had always taught from a premise of subject mastery as the result of professional training, now I learned to teach from another perspective. I focus on the new skills and insights I am discovering, rather than on what I do not know. As a professional, I am used to operating from consistent proficiency, but this is not possible when learning new skills and passing those skills on to others at virtually the same time. Therefore, if one is mindful

not to judge self-performance on the basis of one's past experience of competence, much progress can be made.

In my own experience, once I had realized I was judging each day from a perspective which evaluated not knowing as evidence of failure, I consciously restructured my belief system. In the past, an area of unknowing indicated to me a need for further study. Initially, in my new role as High-Tech Center instructor, to fill the void with a sense of completeness was impossible, since there was so much I did not know.

I restrained my professional responses to stuff information into this seemingly vast gap. I resisted the impulse to identify with all that I did not know. Instead I daily tallied the new I had learned. Once the positive framework was in place, my learning process accelerated. I developed a new model of professional performance. The stress which I had daily experienced from dealing with the unknowns of "the partially known" disappeared. I still revel in the discovery of freedom in operating from the new and merging it with the familiar old of my training.

6.5

Teaching Adapted Technology Applications to Disabled Students

A Unitary Curriculum which Fosters Prescriptive Teaching

Computerized word processing using WordStar (although many other word processors might have worked as well) is the primary application through which the adaptive technologies used by the High-Tech Center are taught. In retrospect, this factor of a unitary curriculum was critical to my success as an

instructor in the High-Tech Center. It meant that I had to become familiar with only one major program when I began teaching. As I became familiar with the program, I began to observe how students learned it. And it was at this point that I discovered a powerful attribute of this unitary curriculum: observing a student's use of WordStar became a diagnostic exercise. I began to see patterns of error emerge. I began to see responses to particular assignments as predictive of success or difficulty across a broad range of areas, as well as being indicative of access difficulties common to a particular disability group.

Observations were of two levels. (1) The process level: Could the student understand the way the word processor worked and what commands made it work? Did the student attend to the sequential screen activities? Did the student attend to screen prompts? (2) The language level: Was the student's writing fractured with misspellings? Could the student express his/her thoughts? Could the student organize material?

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By using one basic curriculum, there was a built-in standard of measure which gave the instructor an overview of how all students were functioning within the curriculum, although their disabilities and abilities might be very diverse. It was because of the consistency of the basic curriculum that student diversity stood out. Its uniformity highlighted their unique differences. And because these learning needs were so varied, so individualized, prescriptive teaching became the instructional method of choice. Basic information was presented in lecture form in a group class setting, and prescriptive techniques were individually applied during lab times.

Prescriptive teaching, in my case, drew upon a blend of prior training and past professional experiences. My particular training as a speech-language pathologist was of great relevance in the High-Tech



Center, for my strong background in assessment, diagnosis, and remediation of language deficits and my experience with retraining cognitive skills in the head-injured came into play on a daily basis. In fact, this strongly clinical background has deeply affected my instructional skills. It is a style of teaching that builds upon (1) direct observation of the student and (2) familiarity with his or her academic and/or medical history. With this information, and direct classroom observation of the student's response to the general class lecture, I am able to analyze how information should be presented to each student.

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Many disabled students have no secondary learning problems and simply need access to adapted technology in order to achieve more efficient computer use. Other disabled students present a more complicated picture and have learning problems which directly affect the ways in which information needs to be presented. Because of my background, I was able to perceive which learning problems were due to learning disabilities, which were due to language deficits, which were direct correlates of head injury, which were due to neurological disease and which may have been due to academic neglect or inadequate instruction in the K-12 system. In order for these students to learn the concepts of word processing, the same information was presented in a variety of ways: e.g., printed cue cards; visual reminders through color-coding of print material or keys on keyboard; oral questioning to elicit understanding of process; instructor modeling of computer activity.

Basic Disability Groups

Perhaps the best way to understand the nature of this instructional method, as it has evolved in the

High-Tech Center at Monterey Peninsula College, is to present brief sketches of typical groups of disabled students, their special instructional needs and the methods used with each. In reading these examples, please bear in mind that they represent disability groups served in the first years of the High-Tech Center and are in no way intended to place boundaries or constraints on the process of developing new and better instructional methodologies.

Student #1. Sally becomes confused with written directions and does not easily follow oral directions. She is quickly lost and confused. She watches passively as other students work at the keyboard.

This student is led through early tasks on a modeling basis. She is shown the computer command or action and is shown what happens as the result of this action. Then the student performs the action. If the student does not understand at this point, the action is demonstrated again and the student is requested to repeat her attempt. When this student memorizes the sequence of actions necessary to do basic operations, she then begins to understand the basic processes involved in word processing. This student also quickly understands the logic (such as it is!) behind the physical layout of the computer keyboard. Once the basic physical movement patterns necessary to affect computer action have been mastered, this student easily understands what she is doing and becomes a highly efficient user. Without prescriptive teaching, such a student would most probably not have mastered word processing if the major presentation of information continued to be oral or written. Modeling has made the learning task explicit.

Student #2. Although Bob grasps the basic tasks which he must do in order to get the word pro-

cessor functioning, he has *difficulty* remembering the keystroke sequences necessary to complete processes.

An effective means of working with this student is to anchor him in a strong sense of process and structure. For some, explanations must be concrete; for others, more figurative. The nature of the analogy is critical, for it is the element which integrates the student's understanding of process. Once the sequence of process for a new word processing task is intact, the student then has the tools to utilize onscreen help. The fact that WordStar help is organized by category is helpful to this student. This student usually needs visual help from the screen on a regular basis to complete the sequence of keystroke commands to perform an action. Because the student understands the processes and purposes of WordStar functions, he can easily use the categorically arranged help menus.

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Student #3. Gary has significant spelling problems. Writing, other than copying exercises, produces great anxiety. Although developing computer skills is not a problem, Gary is "language bound" and sits for long periods of time at a relatively blank computer screen.

The key for such students is simply to begin writing. In this instance, the nature and content of the writing assignment is critical. For some students it must be an affective assignment, one in which they will forget they are writing as they "talk" (through the keyboard) about something emotionally meaningful to them. For other students, the assignment must be objective so that there is no sense of personal association with the text. The student's desire to use the computer as a typewriter will overcome his/her past experiences of failure with writing.

Regardless of which pattern these students exhibit, they undergo a similar process of discovering

freedom and power in the written word through the use of the on-line spelling checker and thesaurus which are always used in tandem with word processing. In the past these students have felt no pleasure in expressing thoughts in writing. In using the computer, they come to discover that they can produce text which is not riddled with serious spelling errors. Watching these students discover their latent abilities to express thoughts in written form is one of the very strong rewards of teaching in the High-Tech Center. Learning disabled students with mild-to-moderate spelling problems are a population who soon function on the computer with almost no sign of disability. The students are able to focus on content and organizational skills rather than on compensating for their poor spelling skills. The principle of using an on-line spelling checker is of paramount importance to these students.

Student #4. Eric is a low vision, legally blind student who has never written assignments. In high school he always took exams orally, if at all. He types well but has not used the skill because he could not efficiently read what he produced on a typewriter. His spelling is phonetic and inaccurate.

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Such students may have very limited skills with written language. Attempts at written expression may at first be thought clusters or sentence fragments, rather than complete sentences, although the student can usually determine if a sentence is complete when he reads it aloud.

Because the High-Tech Center at Monterey Peninsula College is located adjacent to the English Center, where students work on an individualized basis, such students as Eric are often referred there for extensive classwork to build basic academic skills. The High-Tech Center staff works closely with English Center instructors to monitor academic progress. Ad-

ditional tasks are assigned to enhance visual monitoring of text and spelling. Typically, such students are not used to looking at words or punctuation, as neither has been seen with any clarity. The large print display capacity of the computer and the ability of the student to use the thesaurus and spelling checker are a powerful combination for such students. Although years of listening to words via books on tape may have allowed these students to develop strong auditory skills, because of the emphasis on the aural input and oral output, the student never developed expressive writing skills. (Such students in the High-Tech Center have compensated for years of instructional neglect in only five semesters.) These students, like many students with visual problems, are used to gaining information aurally. These students should be encouraged to ask questions to elicit information; listening may well be their strongest modality. At the same time, it is critical to train such students to become visual editors as they may not be used to using their eyes for detail work.

Student #5. Lyn is a non-sighted student who had low vision until she was 18. She has not learned braille well and does not use it. Her spelling skills are poor because she says she cannot remember what the words look like. Assumptions that this person would soon improve her spelling skills, as the result of working on the computer using screen reading programs and an advanced speech synthesizer, proved to be incorrect. Instead, her spelling seemed to deteriorate, and she became frustrated with learning to use the computer. It was not unusual for her to spend an hour correcting spelling errors in a paper she was to hand in for a transfer level English course.

Such a student would be referred to an on-campus remedial spelling program which emphasized an auditory and kinesthetic means of determining how to spell

words (Auditory Discrimination in Depth [ADD Program] by Charles and Patricia Lindamood). In many instances, students with little ability to sound out words come to rely heavily on remembering a visual image of correctly spelled words. With the loss of vision, these students also lose their strongest method of compensating for this auditory disability, and thus spelling skills deteriorate. Such students often experience dramatically improved spelling capability and a consequential increase in word processing proficiency. Effective word processing is not possible for these students until their spelling skills improve.

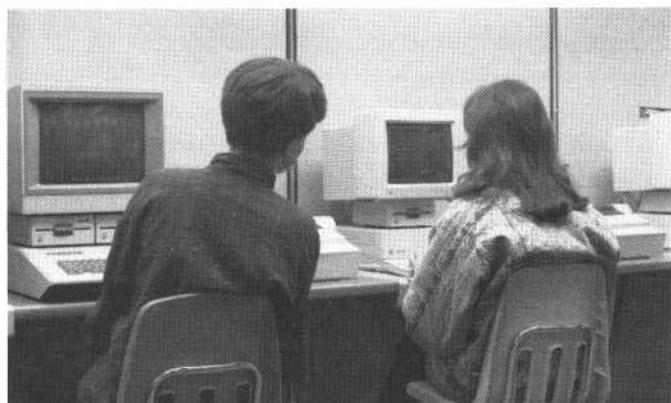
Student #6. Melanie is a learning disabled student with mild written language deficits arising from a traumatic head injury she suffered as an older child. A common error pattern includes the omission of verb inflections and/or plural markers on nouns.

Such students are encouraged to use the screen reading programs used by blind students. As they listen to what they have written, errors in verb inflection and pluralization are easily identified and corrected. Semantic confusions not visually discerned also can be corrected through listening (e.g., the difference between intend and attend will be noticeable).

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Student #7. Kelly is quadriplegic as the result of an automobile accident. He uses a headstick to access the keyboard.

In spite of the severity of such a disability, this student is not at a disadvantage except for the length of time taken up by single stroke access to the keyboard. Although proper keyboard positioning is critical, no special instruction is necessary beyond training in the use of two software programs: (1) a small program which latches/unlatches the Shift, Alt and Ctrl keys and (2) a "smart" word processing pro-



gram which reduces the number of keystrokes it takes to spell common words. Such students often have good written language skills and relative ease of computer access within the context of their particular disability. Consequently, they are often more proficient at the computer than many students with seemingly less severe limitations.

Student #8. Anna is a college graduate; she has multiple sclerosis and is affected by memory problems as well as muscular incoordination. She is still able to type-with one hand and with difficulty.

Meeting the physical keyboard access needs of such a student is straightforward. Correct keyboard position is established, a programmable, touch sensitive keypad is used to facilitate command entry; and a software program which disables the automatic key repeat function of the IBM keyboard is employed to eliminate unwanted key strokes arising from muscular incoordination. The critical issue is the presentation of information at a pace such students can absorb. The neurological dysfunction created by these types of disabling conditions can be circumvented if small amounts of information are presented when the student is ready to receive them. Too much information presented at any one time will often result in an instant sense of overload with the student being unable to perform, retain or remember. Rather than moving the learning process along at some preconceived rate, it is more productive to allow such students time to work with each small unit of information until they have mastered it to their own satisfaction. When that point has been reached, such students will then ask for more information.

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Student #9. Paul has a congenital, severe-to-profound hearing loss. His first language is American

Sign Language, but he is now working to develop improved written language skills by taking regular English classes and working with the Coordinator of the Deaf in special language development exercises.

Deaf and hard-of-hearing students frequently learn to operate the word processing system very rapidly and efficiently. However, their use of ASL syntax in the production of written language frequently results in text which does not convey meaning the writer intends. This inability to effectively manipulate the English language is a common problem among deaf students. Care must be taken in making sure that deaf students do not believe that a word processor will magically transform their writing to standard English. It is important that deaf students understand that although spelling errors can be corrected, they are responsible for sentence structure. Such an understanding will prevent significant levels of disappointment in deaf and hard-of-hearing students.

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A finger spelling program is used which incorporates the vocabulary lists being studied by deaf and hard-of-hearing students in the English Center. Visually tracking as well as manually shadowing the finger spelling of words seem to allow such students to internalize all the reading and writing they have done in vocabulary exercise books. A word is no longer a two-dimensional orthographic image (a visual string of letters) but a symbolic representation of a concept which is somehow internalized through tracking and shadowing the act of finger spelling.

This narrative description of typical students served by the High-Tech Center illustrates the extremely varied nature of the instructional environment. Use of a unitary curriculum in these classes allows for prescriptive teaching to be implemented. What has not been adequately addressed so far in this chapter is the apparent cumulative effect of immediacy in the learning environment.

Effectiveness of Teaching: The Effect of Immediacy

In computer use, every action receives feedback. An action is either correct or incorrect, and the computer patiently repeats its needs over and over until the process or procedure has been done correctly. When students write, they receive instant feedback regarding their spelling. When a word is incorrect, the computer beeps just after the student has entered the word. A list of likely correct spellings of the target word are displayed. The student presses a single key to have the word corrected and watches the incorrect spelling vanish and the correctly spelled word appear. In addition to this mechanical on-line support and feedback from the computer, students in the High-Tech Center also receive instant on-line instructional assistance from staff. Perhaps it is the extraordinary level of instant feedback from all sources which lies behind the apparent ability of a High-Tech Center to accelerate and facilitate student performance in addition to providing a means for computer access.

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The High-Tech Center provides an extremely sound educational environment for disabled students to learn the adapted technologies necessary for them to succeed in computer use and, at the same time, provides a means for these students to receive instruction which facilitates their performance potential on many levels.

Running a High-Tech Center on an Everyday Basis

The High-Tech Center at Monterey Peninsula College is a working concept as well as a site. In order to

illustrate this, I will first describe its actual physical setup, its staffing, curriculum and procedures. Then I will discuss the major concepts which underlie the operation of the center.

The Site

The center is located adjacent to the English Center in the Library building which is at the center of the campus. The fact that the center is located here is a philosophical choice; word processing is more related to English Center skills than it is to computer science classes. I believe that written language skills underlie success in any field of endeavor, and that the High-Tech Center can be a vehicle to implement, and most probably augment, those skills. As the students learn the adapted technology each must use in order to achieve successful, barrier-free computer use, they also are developing more successful written communication skills.

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Staffing

The Center has always been staffed by two instructors, one full-time and one part-time. When the center began in August of 1984, the instructors, Carl Brown and I, represented two different types of backgrounds: (1) computer science and educational computing experience and (2) English literature and speech-language pathology.

By the end of the first year, the concept of a High-Tech Center based on an educational, instructional emphasis rather than a technological one was intact. Ex-

cept for the technological innovations which Carl Brown was working on or looking for, the center ran smoothly as an educational unit. The technology and curriculum were so sound and flexible that, once set up and implemented, they served to meet the varying needs of new students who enrolled in classes.

At the beginning of the second year we brought in a lab assistant who had experience as an interpreter for the deaf. This was an important addition, for it meant that there was someone who could efficiently communicate with the deaf students. In this way we could always be certain that the deaf students comprehended the assignments and completed their lab assignments with appropriate understanding. During the first year we observed that, although we thought a deaf student understood the nature of an assignment, the end product frequently was far different from what we had in mind. Once we had the interpreter as a lab assistant, deaf students began to spend more time on completing assignments and with this support system had the confidence to branch out into projects of their own.

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Curriculum

Core Curriculum and Its Effect. The core curriculum of the High-Tech Center is word processing, which is taught within the framework of Word Star. This software was chosen for two reasons: it is an industry standard, and it works effectively with the many adaptations used by disabled students in the High-Tech Center.

The importance of using an industry-standard word processor cannot be overstressed. I have come to understand that the power and self-esteem which disabled students develop as they work in the High-

Tech Center stem in part from the fact that they can look in the help-wanted section of the newspaper and see exactly how useful and marketable their developing skills are. Students quickly come to understand the value of the word processing skills they are learning and often choose to upgrade their writing skills by taking classes in the English Center. The core curriculum-using an industry standard word processor-catalyzes students into seeing themselves as potential members of the working world.

As the students come to master the concepts of word processing, they are encouraged to bring in outside assignments to work on after completing High Tech Center assignments. In this way students come to understand the efficiency which is inherent with effective computer use. Students with physical disabilities can work more effectively on a computer than on a typewriter; learning disabled students are able to complete assignments which are free from spelling errors; and their efforts can be spent on content preparation rather than on spelling correction. I believe students acquire a heightened sense of self esteem as the result of gaining competency with a computer.

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Class Scheduling and Lab Hours

The Center is open five days a week. Classes are held twice weekly for one hour. An additional one hour of lab time per week is also required. We use Tuesdays and Thursdays for classes and Monday, Wednesday and Friday for lab times. Courses are scheduled on the basis of curriculum rather than disability. The only exception to this is a beginning word processing class exclusively for blind students.

If there are multiple sections of one type of class, students are grouped on the basis of time needed to

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complete an assignment, if possible. For example, an acquired brain injury student may take a long time mastering the processes of WordStar. Such students work well in a class with students who have severe physical limitations and are unable to produce text at a normal rate of speed.

Special Considerations

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Beginning Blind Students. The unique needs of these students require a special section because, in addition to word processing, they must learn to listen to and understand synthesized speech. The first session for a blind student is simply to listen and to comprehend a short file on disk. At the next class session, they review their listening comprehension and then attempt to use the computer like a typewriter. For the first two weeks we do all word processing commands for them so they are not overwhelmed with two different types of technology to master. After two weeks we then begin to introduce beginning word processing tasks.

Computer Use in Lab Times. A hierarchy of need is considered in determining computer use during lab time: some students (low vision, for example) must use the unit which houses their particular hardware adaptation. There are few hardware-specific adaptations in the lab, and the number of students requiring such adaptations is small. Sign-up for computers is done no more than one week ahead of time. If there is a valid emergency, and a student must use a specific computer, that student may temporarily preempt someone who is using the needed computer. This privilege is very seldom used. If two students have an emergency need at the same time, transfer-level work preempts basic skills class work.

The High-Tech Center as a Concept

For the first year of its existence, the High-Tech Center was a small classroom site. It was a place where I was learning the basics of how to interact with computers on a daily basis and teach from new knowledge rather than from previous patterns of training. It was also a place where Carl Brown was observing and correcting my difficulties with various hardware and software adaptations and also observing the still-unmet or poorly-met needs of disabled students who were enrolled in classes.

At the beginning of the second year, the High-Tech Center was much more than a classroom site. Carl Brown had come up with innovative technological solutions to the problems I had experienced in learning to teach the curriculum. The teaching process was simplified. The unmet student needs were no longer unmet as Carl found new, straightforward solutions. As the second year proceeded, we soon discovered that the equipment and applications programs used in the Center were amazingly flexible in adapting to many different student needs. It became time to refine teaching methods and concentrate on improving the ways in which the courses were taught. What has evolved over time is a Center where real-life expectations are the rule. Standards are flexible but high.

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A Real-Life Situation. In a sense, students who take classes in the High-Tech Center are in a work situation. We encourage them to solve assignment difficulties on their own. We offer the suggestion, "If someone were paying you to do this, what would you do?" Students call in if they are going to miss a lab session. (While there is no penalty for students who miss classes, the majority of the students take the center seriously and consider it a privilege to be working in

it.) If students have an important outside assignment to complete and will need extra lab time, they are very efficient about sign-up or cancellation.

Because we require the ability to type as a prerequisite, some students work for a semester in a modified typing class offered in the Business Skills Center before they begin to take classes in the High-Tech Center. Other students (those who have an acquired brain injury, for example) have been working on the computers in the Learning Disability Lab. When brain-injured students demonstrate appropriate maturity and cognitive stability, they are referred to the beginning WordStar class. Students are excited to think they are ready to take the class, and they bring to it a genuine sense of commitment and achievement.

High-Tech Center courses are listed in the college catalog under "Special Education." Although many times it looks like a special education class because of the wheelchairs and headsticks and guide dogs, the center itself is really a center for "specialized" rather than "special education." Mainstream students use the lab as well. Computer assisted instruction is assigned by English Center instructors and a computer assisted writing class taught by a member of the English faculty meets in the center during lunch hours. During lab time, this mix of students is a good learning experience for all. Self-consciousness and stereotypes dissolve as students exchange assistance or share successes. This real-world orientation minimizes concepts of disability, just as computer use minimizes disability.

The High-Tech Center, then, is both a classroom and a concept. I view it as a place where, as a by-product of learning appropriate adapted technology and basic word processing skills, students experience a quality of action almost totally free from the effects of their disability. Their performance is maximized. I believe it is this concrete experience of success that must

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underlie the tremendous impact of the Center on the students. They soon come to understand they do not need to remain in the safety of the center for success; they have developed skills for success in the outside world. They have found an area in which they can function just like everybody else.

Postscript

The insights and experiences described in this narrative profile two years ago remain surprisingly valid. Nearly 200 professionals have been trained in the basics of the adapted technologies described. Most specialists who have been trained have received a copy of this narrative profile. Its content has proved helpful to many. As new High-Tech Centers evolve, the effectiveness of the small but flexible range of adapted technologies is proving to be a workable, functional introduction for specialists and students.

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One understanding of major importance is emerging. Acquisition of written language skills is proving to be of great value in generating significant academic improvement in successful High-Tech Center students. The students who appear to make the most dramatic advances in academic progress are students who have not been able to use written language as a medium of expression. In the past, many disabled students have been denied effective use of written language because there was no technology to make writing easy and natural. Students with visual disabilities could not see well enough to comfortably produce written language and orthopedically impaired students could not efficiently produce written language. Therefore, access technologies successfully link students to computers and accessible computers create a new link to written language for disabled students.

