

Assistive Technology Use and Abandonment among College Students with Disabilities, 3(23)

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Abstract

The use of assistive technology by college students with disabilities is a necessary tool to enhance their academic success. Many individuals with disabilities, however, discontinue use of their technology. Discontinuance represents a waste of functional abilities and a disadvantage to college students with disabilities. The purpose of this study was to report the rate of use and abandonment of assistive technology among college students with disabilities. Fifty-three college students with various disabilities participated in a survey on assistive technology device use and abandonment across the domains of home, school, recreation, leisure, hearing, vision, and mobility. Results showed that a total of 51 devices were abandoned across all domains. School was the domain with the highest rate of use and the second highest rate of abandonment. The mobility domain represented the second largest number of devices used and the largest number of devices abandoned. These findings demonstrate that college students are using assistive technology devices for school and mobility. However, they are also abandoning them at a high rate.

Assistive Technology Use and Abandonment among College Students with Disabilities

Assistive technology plays a major role in the advancement of increased independence and functioning for individuals with disabilities. According to the National Center for Health Statistics, more than 17 million Americans used assistive technology in 1994 to facilitate disabilities ([National Center for Health Statistics \[NCHS\], 1994](#)). These large numbers reflect the significance of assistive technology in the lives of individuals with disabilities. Assistive technology is a necessity for individuals with disabilities to participate in daily tasks at home, work, school, and in the community ([Johnson, Dudgeon, & Amtmann, 1997](#)).

Although the benefits of assistive technology are well documented (e.g., [Johnson et al., 1997](#); [Justesen & Menlove, 1994](#); [Phillips & Zhao, 1993](#); [Reed, Fried, & Rhoades, 1995](#); [Scherer & Lane, 1997](#)), ultimately it is the individual with the disability who decides to use or abandon a device. Determination of the rate of use and abandonment among the population of university students with disabilities is particularly important. Students with disabilities must have access to the most appropriate technology to have equal opportunities in competitive educational settings. Further, an understanding of the rate of use and abandonment of devices among college students will aid professionals in designing techniques of service delivery for this population. This will lead to more functional products that will be accepted and used by students with disabilities. Assistive technology use and abandonment issues among this group received minimal attention in the research. Therefore, the purpose of this study is to report on the rate of use and abandonment of assistive technology devices among a sample of college students with disabilities.

Background

Assistive Technology Use

The Technology-Related Assistance for Individuals with Disabilities Act (Tech Act) of 1988 led to increased accessibility of technology for individuals with disabilities in the United States. [LaPlante, Hendershot, and Moss \(1992\)](#) supported this statement in a report on the National Health Interview Survey on Assistive devices. This report presented national estimates of the number of noninstitutionalized people using assistive technology devices. It also provided the types of devices and features used, the sources of payment for the technology and the number of persons who needed but did not have assistive technology. These researchers found that 5.3 percent of this population used assistive technology devices or had home adaptations.

Moreover, researchers documented characteristics associated with increased use of assistive technology. These characteristics included effectiveness, operability, durability ([Batavia & Hammer, 1989](#); [Yaeda & Rubin, 1992](#)), reliability ([Brienza, Angelo, & Henry, 1995](#)), efficiency, simplicity, comfort ([Brooks & Hoyer, 1989](#)), aesthetics ([Phillips, 1993](#)), performance ([Scherer & Galvin, 1996](#)), and safety ([Mallik & Elder, 1993](#)) of assistive technology.

Assistive technology use among persons with specific disability classifications was also analyzed in the literature. For instance, researchers found that individuals with mobility impairments used devices more frequently than any other disability group ([Giltin, 1995](#); [LaPlante, Hendershot, and Moss, 1992](#); [Mann, Hurren, & Tomita, 1993](#); [NCHS, 1994](#)). Furthermore, individuals with cognitive impairments had the greatest degree of functional disability, yet owned the lowest number of assistive devices (Mann et al., 1993). The deficiency in meeting individuals' with cognitive impairments needs may be attributed to fewer devices designed for cognitive impairments or to the difficulties these individuals have using assistive technology (

Assistive Technology Abandonment

Even when barriers to obtaining assistive technology devices are overcome, users often abandon their devices. The literature revealed several reasons for this abandonment. One significant factor was a disregard for consumers' preferences in technology selection ([Phillips & Zhao, 1993](#)). Additional explanations for technology abandonment were poor device performance, change in consumers' functional abilities, unreliable devices, difficulty using devices, environmental barriers, and fear of technology ([Giltin, 1995](#); [Phillips, 1993](#); [Rogers & Holm, 1992](#)).

Researchers also analyzed devices for specific impairments in relation to abandonment rates. Mobility aids had the highest rates of abandonment, with wheelchairs and canes being abandoned more than any other mobility device ([NCHS, 1994](#); [Phillips & Zhao, 1993](#)). Additionally, a national survey of adult assistive technology users demonstrated that almost one third of all the users' devices were completely abandoned ([Phillips & Zhao, 1993](#)). This high rate of abandonment ascertained that a large percent of assistive technology devices are not meeting consumers' needs. Consequently, there appears to be a demand for practical, reliable assistive technology devices.

College Students' Use of Assistive Technology Devices

The need for practical and reliable assistive technology is especially important for university students with disabilities. In light of the Rehabilitation Act of 1973, institutions in higher education receiving federal funds are to accommodate the needs of students with disabilities. However, in a review of the special services available to 593 university programs across the United States, technological support in university disabled student services programs were not nearly as sophisticated as the technology used by the general student population ([Huer, 1990](#)).

[Huer's \(1990\)](#) study was specifically related to the availability of technology in disabled student service programs in higher education. She obtained demographic data on special services and facilities available to university students with mobility impairments. In addition to a mail survey of 150 disabled student service programs in 42 states, Huer obtained information on the average age of students, types of disabilities reported and specific services available. Huer noted that the only published information, which discussed the use of up to date technology in educational settings, was in reference to public education, grades K-12. Additionally, she found that the services most frequently utilized in college were audiotaping, tutorial services, adapted test taking, and structural accessibility. Huer documented that technological assistance was available at only one-third of the university programs identified as accessible. This demographic study

provided information on college students with disabilities in an effort to gather more data on this population. Further, it provided evidence to question the effectiveness of current technology-related practices in universities. However, this study failed to look at use and abandonment rates of assistive technology devices once they are available to students.

In summary, the use of assistive technology was discussed in the literature. However, researchers typically focused on technology use among a specific disability group, or in a specific domain in which individuals use assistive technology. In addition, studies disregarded the phenomenon of assistive technology abandonment or they failed to include students with disabilities in their samples. Consequently, there still exists a lack of empirical data on the rate of technology use and abandonment across disability groups and domains within the population of college students with disabilities. It is crucial that an understanding of use and abandonment of assistive technology among college students is achieved. Therefore, the purpose of this study is to report on the rate of use and abandonment of assistive technology devices in the domains of school, home, recreation and leisure among a sample of students attending an American college.

Method

Survey Development

A questionnaire to ascertain use and abandonment was developed based on a review of the literature. It was piloted for clarity with five individuals with disabilities. Minor changes in wording were made accordingly.

The questionnaire covered use and abandonment in the following domains: home, school, recreation and leisure. Questions relating to assistive technology devices used to accommodate the functional limitations of hearing, vision and mobility were asked across all of the domains, as these disabilities are not domain-specific (see Table 1). Respondents were asked what assistive devices were used to help them hear, see, get around, learn and remember, and to assist their functioning in their home, school and in recreational and leisure activities. For instance, respondents were asked, "Do you use any devices to help you hear such as a hearing aid or telephone amplifier?" (0=no, 1=yes). They were also asked if they had abandoned any devices in each of the domains and disability groupings. Likewise, respondents were asked, "Have you ever used any devices to help you hear that you no longer use?" (0=no, 1=yes). The domains utilized for this study included home, school, recreation and leisure. As demonstrated in Table 1, home consisted of cooking, cleaning/maintenance, bathing/grooming/toileting, eating, other home chores, laundry and making the bed. School consisted of activities used at school and for general learning. The recreational domain consisted of physical activities performed while recreating, and the leisure domain was sedentary hobbies and activities. The domain of work was not used as the researchers found so few students employed.

Table 1
Domains in which assistive technology use and abandonment were measured

Domain	Areas Assessed
Home	cooking, cleaning, bathing/grooming/toileting, utensils, plates, grips, laundry, making bed, other eating, other home chores
School	tape recorder, computer, electronic daytimer, chair, desk, communication board, tools/equipment, other learning, other school
Recreation	sports equipment, hiking, walking, travel, recreation, other recreation
Leisure	crafts/hobbies, games, reading, other leisure
Hearing	Hearing aid, telephone, amplification, CCTV, other hearing
Vision	special glasses, screen enlarger, magnifier, other vision
Mobility	wheelchair, cane, brace, prosthetics, scooter, other mobility

Demographic information was obtained about each respondent's age, living arrangement, year in school, income level and self-reported disability(ies).

Sample

College students with disabilities who used the student disability center on a college campus in the United States were mailed a description of the study in one of the center's regularly mailed newsletters. A self-addressed stamped envelope was included to return the form which volunteers filled out indicating their willingness to participate. The form included their informed consent, first name identification, and a telephone number where they could be reached and best times to contact them.

To improve the initial response rate, a second letter was mailed to nonrespondents (identified by researchers only by number on mailed letters and matched with name by disability across center staff to protect anonymity of students). Also, flyers recruiting students were distributed by the center's secretary to all students using center services when they arrived. Out of 308 total students registered with the disability access center, 37 had nondeliverable addresses listed, and therefore they were disregarded from this study, for a revised total of 271 students. Out of the 271 students, 62 volunteered to participate in this study. However, after multiple attempts, only 53 of the students could be reached by telephone representing a 20% response rate. At no point did interviewers have access to students' full names so that students' confidentiality might be protected. Thus, targeted follow-up efforts to increase the response rate were hampered.

The majority of the students reported having either orthopedic limitations (n=21), or learning disabilities (n=14). The remainder indicated having psychological impairments (n=8), hearing

impairments (n=7), traumatic brain injuries (n=7), visual impairments (n=5), neurological impairments (n=4), spinal cord injuries (n=3) and other (n=9) such as chronic illness, attention deficit disorder, migraines, chronic fatigue syndrome and asthma.

The sample consisted of 10 graduate students, 14 seniors, 11 juniors, 10 sophomores, and 8 freshmen. The ages of respondents ranged from 18 to 50, with a mean age of 27 and a mode age of 20.

The distribution of living arrangements for the students revealed that the largest number corresponded to students living with roommates (n=19), followed by living alone (n=13), living with a spouse (n=12), living with a family member other than a spouse (n=5), living with an aide (n=3), and living with a significant other (n=1). Participants' yearly income levels ranged from less than \$4,001 (n=21) to greater than \$12,000 (n=12).

Procedure

Two graduate students called the volunteer participants. Initially the graduate student identified herself, briefly reviewed the purpose of the study and asked if this was a satisfactory time to administer the questionnaire. If not, it was rescheduled at the respondent's convenience. Each interview took approximately 15-30 minutes to complete, depending upon the number of assistive technology devices the participants used.

The questionnaire was broader and more comprehensive in its scope than the focus of this report. Therefore, only a subset of the total data collected about use and abandonment is reported and discussed here. A copy of the questionnaire and the other data collected and analyzed are available from the authors.

Data Analysis

Data were analyzed by frequency counts for use of technology across the domains of home, school, recreation and leisure (see Table 2). The frequency of use specific to hearing, vision and mobility was also counted. Determination of multiple device use in each domain was analyzed by summing use in each domain and for hearing, vision and mobility.

Frequency counts were used to determine abandonment for each of the domains and for hearing, vision and mobility. Additionally, the number of devices abandoned by individuals were analyzed by broad categories to determine if individuals abandoned multiple devices in each domain. These categories consisted of home, school, hearing, vision and mobility. The recreation and leisure domains were not analyzed for the abandonment of multiple devices as just one general question was asked regarding abandonment of recreation and leisure devices.

Results

Device Use

Fifty-three respondents had experience with a total of 134 different devices across all categories. As displayed in Table 2, the school domain represented the highest frequency of use (n=29). Within the school classification, tape recorders were the most frequently used device (n=20), followed by computers (n=15), and other devices (n=7). School devices (n=5) consisted of chairs, desks, computers, telephones, communication boards and tools and equipment. Mobility devices represented the next most frequently reported assistive technology device use (n=15). Within this category, canes (n=8) were the most frequently used device, followed by wheelchairs (n=4), braces (n=3), other mobility devices (n=2) and scooters (n=1). With regard to vision, 13 students used assistive devices (i.e., special glasses, magnifiers, screen enlargers) to help them see. Personal care devices were used by 13 students and cooking represented the activity with the most device use (n=7). Recreation devices were next as 11 students used devices in this category. Within the recreation area, "other" devices, such as fluorescent golf balls, specialized steps for horseback riding, accommodated skis, orthotics and specialized gloves for weight lifting were reported most frequently (n=6). The categories with less than 11 students reporting use of an assistive technology device were leisure (n=8) and hearing (n=4).

Table 2
Frequencies of Device Use
among College Students with Disabilities
Across Domains (n=53)

Domain	n	%
School	>(total) 29	54.7%
Tape recorder	20	37.7%
Computer	15	28.3%
Electronic daytimer	0	0
School devices	5	9.4%
Other school/learning	7	13.2%
Mobility	(total) 15	28.3%
Wheelchair	4	7.5%
Cane	8	15.1%
Brace	3	5.7%
Prosthetics	0	0
Scooter	1	1.9%
Other	2	3.8%
Home	(total) 13	24.5%
Eating	3	5.7%
Cooking	7	13.2%
Cleaning/maintenance	1	1.9%

Bathing/grooming/toileting	3	5.7%
Laundry	1	1.9%
Other home chores	1	1.9%
Vision	(total) 13	24.5%
Special glasses	8	15.1%
Screen enlarger	3	5.7%
Magnifier	4	7.5%
Visual aid	0	0
Other 1	1	1.9%
Other 2	2	3.8%
Recreation	(total) 11	20.8%
Sports equipment 1	2	3.8%
Sports equipment 2	1	1.9%
Hiking/walking	3	5.7%
Travel	2	3.8%
Other 1	6	11.3%
Other 2	1	1.9%
Leisure	(total) 8	15.1%
Crafts/hobbies	0	0
Games	0	0
Reading	6	11.3%
Other	2	3.8%
Hearing	(total) 4	7.5%
Hearing aid	3	5.7%
Telephone	3	5.7%
Amplification	0	0
CCTV	0	0
Other 1	1	1.9%
Other 2	1	1.9%

Note. Total represents the number of respondents that reported use in each domain; respondents could report multiple use in each category.

The number of assistive technology devices used in each category were counted and reported to determine if students were using multiple devices in each category (see Table 3). Four students used more than one device to assist with home care, whereas the school domain had the most multiple users. The home domain consisted of devices used for eating, bathing/grooming/toileting, cleaning and maintenance, laundry, cooking and other home chores. Results demonstrated that two students used two home devices and two students used three home devices. Nine students used only one school device, eleven students used two devices, three students used three devices and four students used four devices for school. The recreational domain contained one student using six devices. The leisure domain did not have any multiple users, but eight students had used one device for leisure activities. The vision category had

multiple device users, as five students used two devices for vision. The hearing and mobility categories both had three multiple users.

Table 3
Multiple Use of Devices by College Students
with Disabilities Across Domains (n=53)

Domain	# of devices used	n	%
Home	1	6	11.3%
	2	2	3.8%
	3	2	3.8%
School	1	9	17.0%
	2	11	20.8%
	3	3	5.7%
	4	4	7.5%
Recreation	1	9	17.0%
	6	1	1.9%
Leisure	1	8	15.1%
Hearing	1	1	1.9%
	2	2	3.8%
	3	1	1.9%
Vision	1	8	15.1%
	2	5	9.4%
Mobility	1	12	22.6%
	2	3	5.7%

Device Abandonment

Fifty-three students with disabilities abandoned 51 assistive technology devices. The mobility classification had the most devices abandoned (n=16). Within mobility, wheelchairs (n=6) were abandoned the most, followed by canes (n=3), other (n=3), braces (n=2), and scooters (n=2) (see Table 4). Devices used for learning were the next most frequently abandoned (n=15). Nine students abandoned devices in the vision category. The distribution of devices used to accommodate visual limitations that were abandoned was as follows: magnifiers (n=3), special glasses (n=2), screen enlargers (n=2), visual aids (n=1) and other (n=1). Areas with fewer than nine students reporting abandonment were recreation (n=6), and personal care (n=5). The categories without any abandonment were leisure and hearing.

Table 4
Frequencies of Device Abandonment among College Students with Disabilities
Across Domains (n=53)

Domain	n	%
Home	(total 5)	
Cooking	0	0
Cleaning/maintenance	0	0
Bathing/grooming/toileting	2	3.8%
Other bath/groom/toilet	1	1.9%
Laundry	1	1.9%
Other Laundry	1	1.9%
Making bed	0	0
Other home chores	0	0
School	(total 15)	
Tape recorder	7	13.2%
Computer	0	0
Electronic daytimer	0	0
Other 1	4	7.5%
Other 2	1	1.9%
School devices	3	5.7%
^aRecreation	(total 6)	11.3%
^aLeisure	(total 0)	0
Hearing	(total 0)	
Hearing aid	0	0
Telephone	0	0
Amplification	0	0
CCTV	0	0
Other	0	0
Vision	(total 9)	
Special glasses	2	3.8%
Screen enlarger	2	3.8%
Magnifier	3	5.7%
Visual aid	1	1.9%
Other	1	1.9%
Mobility	(total 16)	
Wheelchair	6	11.3%
Cane	3	5.7%
Brace	2	3.8%
Prosthetics	0	0
Other	3	5.7%
Scooter	2	3.8%

^aDomains were analyzed for the abandonment of assistive technology devices with one broad question: abandonment rates of subcategories of the domain were not analyzed.

Device abandonment was also analyzed to determine if individuals were abandoning multiple devices. The mobility category represented the most students abandoning multiple devices with a total of five (see Table 5). Two students abandoned two mobility devices and three students abandoned three mobility devices. Further, three students abandoned two devices for vision, two students abandoned two learning devices and two students abandoned homecare devices.

Table 5
Multiple Abandonment of Devices by College Students with Disabilities Across Domains (n=53)

Domain	# of devices abandoned	n
Home	1	2
	2	1
	3	1
School	1	11
	2	2
Hearing	0	0
Vision	1	3
	2	3
Mobility	1	3
	2	2
	3	3

Note. The recreation and leisure domains were not analyzed for the abandonment of multiple devices.

Discussion

The results of this study demonstrated that the school domain had the highest rate of use and the second highest rate of abandonment of assistive technology. This may be attributed to this study's sample, which consisted of college students, who may have more of a need for devices related to learning than the general population. The high rate of abandonment may be due to insufficient assistive devices produced specifically for learning or a lack of information about these devices reaching college students. The literature demonstrated that assistive technology has not obtained much consideration as an instrument for helping individuals with learning disabilities compensate for their deficits ([Day & Edwards, 1996](#); [Raskind, 1993](#); [Raskind & Higgins, 1998](#)). Only a few studies have been conducted on a limited range of technologies for individuals with learning disabilities ([Raskind & Higgins, 1998](#)). This lack of information could

add to poor selection of assistive technology and thus the high rate of abandonment regarding assistive technology for learning.

An interesting finding from this research is that only four individuals used a device to hear and no students abandoned any hearing devices. This may be due to the telephone format of the survey for the study. Individuals with hearing impairments without the proper assistive technology for the telephone may not have volunteered for this study, knowing it was conducted over the telephone. Additional research would be beneficial to specifically examine the rate of use and abandonment of assistive technology among individuals with hearing impairments.

Overall, this study demonstrated that technology abandonment is an issue of significance within the college population of individuals with disabilities. The mobility domain represented the second largest number of devices used and the largest number of devices abandoned. Wheelchairs and canes were the most frequently abandoned devices within this domain. This finding is consistent with the literature ([LaPlante et al., 1992](#); [Mann et al., 1993](#); [NCHS, 1994](#); [Phillips & Zhao, 1993](#)). Wheelchairs may be abandoned frequently due to the large number of mobility device users, and the difficulty and cost associated with repairing the devices. Canes, however, may be more transitional and abandonment may signify improvements or deterioration of an individual's functioning. Further research on mobility device abandonment which distinguishes abandonment of a device due to malfunctioning of the device from abandonment of a device due to functional changes in the individual is necessary.

This study did not examine reasons for abandonment of technology, as the goals were to determine if assistive technology abandonment was significant among college students with disabilities, and which devices were abandoned at a high rate. This study provided evidence that students with disabilities are abandoning assistive technology at a high rate. In particular, they are abandoning mobility devices at the highest rate. Therefore, future research is necessary to examine reasons for abandonment of technology across all categories and disabilities. This is especially important with the college population, as there may be poor support for assistive technology in this environment. Researchers reinforced the significance of appropriate support for assistive technology at the university level ([Brown, 1993](#); [Day & Edwards, 1996](#)). These researchers indicated that the successful introduction of assistive technology in a post-secondary setting requires more than just obtaining equipment. Sufficient ongoing support must be available in addition to formal training in the use of assistive technology.

Regardless of the reason, abandonment of assistive devices demonstrates a waste of functional abilities and a disadvantage to college students with disabilities. Without assistive technology, many students with disabilities miss opportunities and options beneficial to success in college. When used appropriately, assistive technology serves as a powerful integrator, equalizing potential of individuals with and without disabilities ([Ried et al., 1995](#)).

A few limitations of this study pertain to the sample obtained to conduct the research presented. First, the sample consisted of 53 students who volunteered to participate in this study. Volunteers may have different experiences than a random sample of individuals with disabilities. Additionally, this research was conducted through telephone interviews. Individuals with disabilities who were not comfortable using the phone or who did not have access to a telephone

with proper assistive technology to accommodate for their disabilities, may not have volunteered for this study.

This study does, however, have worth as it provides valuable information regarding the domains with high use and abandonment of assistive technology among college students with disabilities. It is important to understand which devices are abandoned at a high rate versus the devices that are used frequently. Hopefully, the abandonment rate will alert professionals that the technology designed, produced, selected and distributed is not fully serving the needs of students with disabilities. Also, this study demonstrated the necessity of college disability access centers in providing appropriate support and resources to college students with disabilities. Additional research is needed to expand upon this study to empirically determine possible explanations for the various use and abandonment rates. Specifically, determination of the factors that result in use versus abandonment of assistive technology by individuals with disabilities is recommended.

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