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A Comparison of North Carolina's State, Private, and Community Colleges and Universities  
Regarding Assistive Technology and Services for Students With Disabilities

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A dissertation

presented to

the faculty of the Department of Educational Leadership and Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Education

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by

Chris Cain

May 2007

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Dr. Jasmine R. Renner, Chair

Dr. James Lampley

Dr. Lori Marks

Dr. Terry Tollefson

Keywords: Assistive Technology, Postsecondary, Services for Students With Disabilities

## ABSTRACT

### A Comparison of North Carolina's State, Private, and Community Colleges and Universities Regarding Assistive Technology and Services for Students With Disabilities

by

Chris Cain

The purpose of this study was to compare postsecondary institutions in North Carolina including state universities, private colleges and universities, and community colleges in regard to the number of students with disabilities, assistive technology availability, funding ratios for assistive technology, frequency of professional development training, legislative understanding, and other support factors for students with disabilities. This comparison was accomplished through quantitative and case summarization and analysis research methodologies.

Data were collected through case summarizations and the administration of surveys sent to 110 coordinators of students with disabilities services at the 15 state universities, 37 private colleges and universities, and 58 community colleges within North Carolina. The response rate was 65.5% ( $N=72$ )

Findings suggest there were no significant differences among coordinators' perceptions of legislative issues, student responsibility, institutional responsibility, consideration of context in which accommodations are used, and the impact of accommodations on other faculty and students and the institution. However, there were significant differences between the three types of institutions regarding assistive technology, funding for assistive technology, and services available to students who have disabilities. The findings also included that students who self-report disabilities attend private colleges and universities at a greater percentage than attend state universities or community colleges in North Carolina.

## DEDICATION

This study is dedicated to my family and my colleagues whose love and support has given me the strength to complete this endeavor. To my mom and my dad, for all the nights you stayed up with me in grade school to help me study my spelling words, for each hug and kiss you gave me before bedtime, and most of all for always having faith in me even when others expected me to fail. To my co-workers at Mars Hill College (Jim Brown, Barbra Cary, Sharon Cupstid, Tom Destino, Deb Morris, and Cornelia Wood) for the laughter and guidance you have given me; you are more than my co-workers, you are my lifelong friends.

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## CHAPTER 1

### INTRODUCTION

Students with disabilities make up a growing percentage of the diversity found on postsecondary education campuses today. Current research indicates that the number of students with disabilities is growing at an astounding rate. Between 1978 and 2000, the percentage of college students who self-identified as having disabilities had quadrupled (Michaels, Prezant, Morabito, & Jackson, 2001). The rate at which this percentage has been growing may be underestimated. Many of these studies do not indicate how many students are attending all postsecondary institutions, but rather only the number of full-time freshmen enrolled in each school. West et al. (1993) suggested that the number of students with disabilities in postsecondary education might actually be much higher than published because reporting a disability was voluntary on behalf of the student.

In a statistical-profile study, Henderson (1992) stated, "Slightly more than 1 in 11 students (9.4%) self-reported a disability" (p. 3). According to Henderson (1992), that number was up from 1978, when the percentage was estimated to be almost 3% of college freshmen reporting disabilities.

West et al. (1993) stated, "The literature tends to describe how postsecondary schools and students with disabilities have coped with each other, rather than exploring means of improving services to promote success" (p. 457). One way that postsecondary institutions can ensure the success of students with disabilities is to abide by the federal regulations that pertain to them. Some of these include the *Rehabilitation Act of 1973*, in which section 504 mandates:

No otherwise qualified individual with disabilities ... by reason of his or her disability, be excluded from the participation, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. (p. 292 USC 749)

West et al. (1993) pointed out, "It is important to note that Section 504 requires

programs, not environments, be accessible to student with disabilities” (p. 457). One way to eliminate discrimination is to provide “equal access” to all educational programs. A major tool by which access can be provided is assistive technology. Assistive technology is defined by the *Tech Act of 1988* as: “any item, piece of equipment, or product system . . . used to increase, maintain, or improve the functional capabilities of individuals with disabilities” (n. p.).

The *Americans with Disabilities Act (ADA) of 1990* also placed regulations into effect that encouraged any institution regardless of federal funding to provide access to individuals with disabilities through auxiliary aids (including assistive technology). The burden of cost of assistive technology in regard to equalization of access to postsecondary programs should be placed on the institution. The responsibilities of the institutions regarding cost were further defined by the U.S. Department of Education (2005) with the publication of its *Auxiliary Aids and Services for Postsecondary Students With Disabilities*.

Does the size of the institutions make a difference in how well colleges and universities comply with regulations concerning students with disabilities? Or, do students with disabilities choose to attend a community college before entering a 4-year school? If the answer to the latter question is yes, it must be determined if students with disabilities make this choice because the smaller institutions have better services.

To date, few studies have been published pertaining to assistive technology at the postsecondary level. The available literature tends to focus on specific devices and certain disabilities. Most in-depth studies in this area have been conducted outside the United States, thereby, making this research minimally applicable to colleges and universities in the United States (Michaels et al., 2001). This study addresses the issues of assistive technology and other services available to students with disabilities at the postsecondary level within the United States, more specifically, in North Carolina. The findings from this study should be helpful to administrators, coordinators of disability support services, professionals in the field of special education, and students with disabilities. The researcher examined the percentage of students with disabilities, the assistive technology available on postsecondary campuses, funding and

adequacy of assistive technology, staff training for those who work with students with disabilities, support for faculty, and the faculty members' understanding and knowledge of the mandates set forth by the *Americans With Disabilities Act of 1990* and Section 504 of the *Rehabilitation Act of 1973* on postsecondary campuses in North Carolina.

### *Statement of the Problem*

Students with disabilities have been a minority in higher education for quite some time. Their needs have either been ignored or dealt with on an individual basis (Bento, 1996). Individuals in this minority group have tended to drop out of college at a rate that exceeded that of their peers. Postsecondary survival requires that students with disabilities get the accommodations and modifications they need (Sahlen & Lehmann, 2006). Some of the barriers faced by postsecondary institutions as they struggle to equalize the playing field for students with disabilities include assistive technology offerings, faculty and staff's understanding of legislation demands, training of faculty and staff in regard to assistive technology, and funding. Burgstahler, Duclos, and Turcotte (2000) suggested that faculty at postsecondary institutions might find the legal requirements for reasonable accommodations vague and unclear. This was reinforced by Aksamit, Leuenberger, and Morris, 1987; Burns, Armistead, and Keys, 1990; Dunn, 1996; and Malcolm and Matyas, 1991, when they wrote that the majority of faculty depended on the students with disabilities services to provide the correct legal information regarding requests for accommodations. Several studies over the past 20 years have consistently shown obstacles to equitable participation in postsecondary institutions for students with disabilities. These researchers pointed out a lack of adequate support systems within postsecondary institutions (Aksamit et al.; Burns et al.; Dunn; Lehmann, Davies, & Laurin, 2000; Malcolm & Matyas).

Michaels et al. (2001) stated there was a need for faculty members and others in disability services to:

1. have access to initial and ongoing training on assistive technology;

2. have the ongoing programmatic and fiscal support of college administration; and
3. collaborate in assistive technology trainings and strategy development. (p. 9)

The purpose of this study was to compare postsecondary institutions in North Carolina, including state universities, private colleges and universities, and community colleges, in regard to assistive technology training, funding, and other support factors for students with disabilities. This comparison was accomplished through both quantitative and case summarization and analysis research methodologies.

### *Research Questions*

The following research questions were employed to gain a better understanding of the discrepancies among the multiple levels of postsecondary education in North Carolina.

1. Do North Carolina community colleges, private colleges and universities, and state universities differ in the percentage of students with disabilities?
2. Do North Carolina community colleges, private colleges and universities, and state universities differ in the number of technology devices available for their students with disabilities?
3. Do North Carolina community colleges, private colleges and universities, and state universities differ in the age of the assistive technology equipment that is available for their students with disabilities?
4. Do North Carolina community colleges, private colleges and universities, and state universities' students with disabilities services differ in the funding of assistive technology for students with disabilities?
5. Is there a difference among coordinators at North Carolina community colleges private colleges and universities, and state universities regarding their perceptions of the adequacy of funding to meet students' needs?
6. Do North Carolina community colleges, private colleges and universities, and state universities differ in the staffing of students with disabilities support services,



coordinator training, and the way services for students with disabilities works with faculty?

7. Is there a difference among coordinators at North Carolina community colleges private colleges and universities, and state universities regarding their perceptions of: (a) legislative issues, (b) student responsibility, (c) institutional responsibility, (d) consideration of context in which accommodations are used, and (e) the impact of accommodations on other students?

### *Significance of the Study*

Individuals with disabilities are entitled to full participation in all aspects of society, including education (Beech, 2002). Institutions of postsecondary education are experiencing an increased number of students with disabilities. However, according to Walters (2000), “Students with disabilities drop out of college at a much higher rate than students without disabilities; about one half of all students with disabilities drop out, compared to about one third of students without disabilities” (p. 30). The 1996 United States Census reported that only 15.6% of persons with disabilities having less than a high school diploma were in the work force. When compared with those individuals with disabilities holding a 4-year degree or higher, this percentage rises 50.3% (Tagayuna, Stodden, Chang, Zeleznik, & Whelly, 2005).

Walters (2000) stated, “Stronger efforts on the part of the colleges and universities to educate faculty and staff would significantly enhance the likelihood of academic success of students with disabilities” (p. 10). Michaels et al. (2001) stated, “Even the most frequently cited assistive technologies were roughly available at only approximately three-fourths of campuses” (p. 15). Current findings indicate that a number of colleges and universities have limited assistive technology resources available to students with disabilities. One factor that has been cited as having the greatest potential to facilitate access to assistive technology was support for and funding of its purchase (Michaels et al.).

As stated by researchers such as Michaels et al. (2001) and Bedford (2005), studies regarding assistive technology services at the postsecondary level are few. If studies are found, they tend to relate to rehabilitation and life skills or to focus on a particular device or disability.

The results from this study could better define the current offerings of assistive technology that are applicable to students with various disabilities as well as the funding procedures, staff and faculty training, and other critical issues as they relate to the postsecondary institutions in North Carolina. Other benefits for this type of study are:

1. a much needed addition to the insufficient body of literature that focuses on this topic within the United States (Michaels et al., 2001);
2. a summarization of assistive technology devices available at the postsecondary level within North Carolina;
3. a better understanding of the needs that relate to equalization for students with disabilities on postsecondary campuses;
4. a guide for individuals with disabilities in selecting a postsecondary institution; and
5. a possible decrease in the number of students with disabilities who drop out of postsecondary education as a result of colleges and universities examining and improving assistive technology, funding, and training on their campuses.

Without this type of knowledge, postsecondary institutions may unknowingly create environments that discriminate against individuals with disabilities and deny these students an equal opportunity to obtain a college education.

### *Definitions of Terms*

In this section, the definitions associated with this study are presented in alphabetical order. These definitions are given in order to ensure full comprehension for the reader as they relate to the full range of information taken into account during this research.

1. *Americans with Disabilities Act*: A federal legislation intended to provide a clear and comprehensive national mandate for the elimination of discrimination against all individuals with disabilities (*Americans with Disabilities Act*, 1990).
2. *Assistive technology*: As defined by the *Tech Act of 1988*, assistive technology devices means any item, piece of equipment, or product system, whether acquired commercially off a shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. A more basic definition is given by Thompson (1997) in which she defined assistive technology as "a device or process that assists a person with a disability to do something that could otherwise be difficult or impossible" (p 1).
3. *Assistive Listening Devices and systems*: An Assistive Listening Device (ALD) is any type of device that can help one better communicate functionally in everyday situations. An ALD can be used with or without hearing aids to overcome poor sound quality.
4. *Braille calculators, printers, or typewriters*: These are devices that print in Braille rather than traditional text.
5. *Closed caption*: This allows people to read what is said on TV and movies.
6. *Closed caption decoders*: A device whereby viewers can read on the screen what may be difficult to hear using this device for TVs that are not equipped with closed captioning.
7. *Coordinators of students with disabilities services coordinator*: This is the person on a campus of a postsecondary institution who advocates for services for students with disabilities (Walters, 2000).
8. *Electronic readers*: This is usually a computer with a scanner or other device that translates written words into electronic speech.
9. *Individual with a disability*: An individual with a disability, as stated by ADA, has:
  - (a) a physical or mental impairment that substantially limits one or more of the major

- life activities of such individual, (b) a record of such an impairment, or (c) being regarded as having such an impairment (*American with Disabilities Act*, p. 645). Major life activities include such functions as caring for oneself, walking, seeing, hearing, speaking, breathing, learning, and or working.
10. *Individuals with Disabilities Education Act* (IDEA): As stated by Walters, this Act of 1973 makes it possible for states and localities to receive federal funds to assist in the education of students with disabilities. Basically, in order to remain eligible for federal funds under the law, states must ensure the following: (a) all children and youth with disabilities regardless of severity of their disability will receive a free and appropriate public education (FAPE) at public expense; (b) education of children and youth with disabilities will be based on a complete and individual evaluation; (c) an Individualized Education Program (IEP) is developed for every child or youth found eligible for special education; (d) to the maximum extent appropriate, all children and youth with disabilities will be educated in the regular education environment; and (e) the rights of children with disabilities and their parents are protected (p. xx).
  11. *Interpreter*: This is someone who interprets or translates one language to another. This is most frequently used in the classroom for individuals with hearing impairments through the use of sign language.
  12. *Learning Disability (LD)*: Walters suggested that a LD is a disorder in which one or more basic psychological processes involved in understanding or in using language, spoken or written, manifests itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations (p.xviii).
  13. *Note takers*: This is a process whereby another student will provide a copy of his or her notes to an individual who would have difficulty taking notes on his or her own; there are also portable electronic devices such as Braille note takers for the blind and hearing impaired that may be used to accommodate an individual.
  14. *Open captioning*: This allows people to read what is said on TV and movies.

15. *Readers*: This is someone who reads material to an individual who has difficulty reading on his or her own.
16. *Reasonable modification*: As defined by the *Americans with Disabilities Act of 1990*, these are: (a) making existing facilities readily accessible and usable by parents, children, and employees with disabilities; (b) providing additional staff training; (c) providing certain adaptive equipment; (d) adapting curriculum; and (e) revising policies and procedures.
17. *Rehabilitation Act*: As stated by Walters, this Act prohibits federal agencies and their grantees and contractors from discriminating against people based on disability in employment, programs, and activities (p. XXII).
18. *Section 504 of the Rehabilitation Act of 1973 (ADA/ 504)*: As defined by Walters, this is a federal legislation that guarantees the rights of all people with disabilities to an equal opportunity in all programs and activities that receive federal funding or financial assistance. It prohibits the discrimination against qualified individuals solely on the basis of handicap. Section 504 regulations apply to state education agencies, elementary, secondary, and college and university levels of education.
19. *Students with disabilities services*: This is the office on a campus of a postsecondary institution responsible for providing accommodations, modifications, and other services for students with disabilities.
20. *Specialized gym equipment*: This is equipment that has been bought, made, or modified to allow individuals with disabilities the opportunity for equal participation.
21. *Taped texts*: This is the assistive technology of books on tape for individuals with reading or sight disabilities.
22. *Telephone handset amplifiers*: These are devices that increase the conversational volume for individuals with hearing impairments.

23. *Telecommunication devices for deaf persons*: These are devices that allow individuals to communicate using a traditional phone; the most common device of this type is the TTY.
24. *Television enlargers*: These are devices or systems that allow monitors or TV screens to be enlarged to benefit individuals with sight impairments.
25. *Transition services*: These are defined as a coordinated set of activities for a student, designed with in an outcome-oriented process that promotes movement from school to postschool activities including postsecondary education and vocational training; the entire process is based on the individual's wants, needs, and abilities.
26. *Videotext displays*: These are systems that display text on a monitor or screen to enable an individual with vision or motor problems to have exposure to written materials.
27. *Voice synthesizers*: This is any device that allows an individual to communicate; these are usually electronic, augmentative, or assistive communication devices.

### *Delimitations and Limitations*

This study focused on postsecondary institutions in North Carolina. The research was conducted by surveying coordinators of the students with disabilities services programs on the campuses of North Carolina's community colleges, private colleges and universities, and state universities. The study did not take into account the difference between private liberal arts and private research colleges and universities within the state. This study was conducted only in North Carolina; therefore, the findings for postsecondary institutions might not be generalized to other states and countries.

### *Overview of the Study*

Chapter 1 contained an introduction, a statement of the problem, research questions, the significance of the study, applicable definitions, and delimitations and limitations. Chapter 2 is

comprised of a review of relevant research and literature related to this study. Chapter 3 includes methodologies and procedures that were employed in the conduction of this study as well as restrictions to the study. Chapter 4 presents the results of data analysis, and Chapter 5 provides a summary of the findings and conclusions along with recommendations to improve current practice and for further research.

## CHAPTER 2

### REVIEW OF THE LITERATURE

Today, the number of students with disabilities entering colleges and universities is larger than it has ever been. In 1991, 8.8% of full-time college freshmen reported a disability, compared with 2.6% in 1978 (Henderson, 1992). It is the responsibility of educators to ensure that these individuals get the needed support that will enable them to not only be successful in college but to have an equal opportunity to do so through “reasonable accommodations.”

Through this review of literature, the researcher will strive to accomplish the following nine objectives: (a) examine past studies that deal with assistive technology and services at the postsecondary level for students with disabilities, (b) provide a clear picture of the growing number and the under-representation of students with disabilities on postsecondary education campuses as well as the types of disabilities represented, (c) examine the level of support services involvement as well as assistive technology offered on university and college campuses for students with disabilities, at the postsecondary level, (d) explore the evolution of assistive technology and special education over the years by providing an overview of the history of assistive technology as well as the benefits thereof, (e) provide the legislative aspects of assistive technology in order to fully explain the mandates placed upon colleges and universities as applied to individuals with disabilities, (f) analyze pertinent legislation through the use of *Legal Research and Case Law Analysis*, (g) explore procurement of funding that relates to assistive technology at the postsecondary level in order to gain a better understanding of the rationale of why colleges and universities offer the services they provide, (h) investigate faculty and staff training as it relates to students with disabilities, and (i) discuss the ethical considerations that are related to this type of study.

My indepth review of the literature indicated that there has not been a similar study conducted. Numerous studies have focused on the use of assistive technology for students with



disabilities in the elementary and secondary educational levels. However, research at the postsecondary level is less comprehensive and limited to specific aspects or applications of technology (Michaels et al., 2001). This comparison of postsecondary institutions including state universities, 4-year colleges and universities, and community colleges in regard to assistive technology for students with disabilities includes several important topics for which related studies and literature was available.

### *Students With Disabilities on College and University Campuses*

The trend of increasing enrollment of students with disabilities into colleges and universities can be attributed to several factors including legislation, a more appropriate public special education, and effective transition planning. This trend will continue. Students with disabilities represent a previously untapped, but viable student market for college admissions officers. The charge for postsecondary schools is to afford students with disabilities the best scenario possible for postsecondary education and social outcomes.

Henderson (1992) reported that in 1991, 8.8% of all full-time college freshmen declared having a disability. Later, in 1993, Jaschik reported that 9% of full-time college freshmen reported having a disability. In an article entitled "More College Freshmen Report Disabilities" (2000) in *Black Issues in Higher Education*, it was noted that the number of freshmen with disabilities had increased three fold "over a 20-year period" (p. 9). Lewis and Farris (1999) stated that postsecondary institutions in the United States enrolled 428,280 students with disabilities between the years of 1996-1998.

Table 1 displays Henderson's (1999) statistics. This table shows the increasing number of students who self-reported disabilities.

Table 1

*Percentage of Full-Time College Freshmen Reporting Disabilities: Selected Years*

Disability	1988	1991	1994	1996	1998
Speech	0.3%	0.5%	0.3%	0.3%	0.5%
Orthopedic	1.0%	1.2%	0.9%	0.9%	0.8%
Learning Disability	1.2%	2.2%	3.0%	3.1%	3.5%
Health Related	1.2%	1.3%	1.5%	1.6%	1.7%
Partially Sighted or Blind	1.9%	2.2%	2.0%	2.0%	1.1%
Hearing*	0.8%	0.9%	0.9%	0.9%	0.9%
Other	1.4%	1.6%	1.7%	1.8%	1.9%
Totals	7.0%	8.8%	9.2%	9.2%	9.4%

\*Hearing data were not collected in 1998; this figure reflects 1996 data

Figures in columns do not necessarily reflect the totals because individuals were allowed to identify more than one disability.

Notes: Source: HEATH Resource Center, American Council of Education. (Based on unpublished data from the Cooperative Institutional Research Program, UCLA, selected years).

As shown in Table 2, a similar report was issued by Henderson in 2001. The numbers between the two tables do not match for the previous years. In the 2001 report, Henderson found that only 6% of first-time, full-time freshmen had self-reported a disability. This can be explained by the fact that when this statistical information was collected in the fall of 2001, it reflected only first-time, full-time freshmen at 4-year institutions and did not include 2-year institutions as did the 1992 report (Henderson, 2001). Henderson (2001) cautioned that these data cannot and should not be compared to past editions of this report because of the redesign of the study. This new design of the report did not include data from community colleges, returning adult students, or students enrolled part-time (Henderson, 2001). The rationale, as stated by

Henderson (2001) and his survey administrators for this gap in data, was, “. . . it has become increasingly difficult to tabulate survey responses” (p. 2).

Table 2

*Percentage of Full- Time College Freshmen Reporting Disabilities at Four-Year Institutions:  
Selected Years*

Disability	1988	1991	1994	1996	1998	2000
Hearing*	0.8%	0.8%	0.8%	0.7%	0.7%*	0.5%
Speech	0.2%	0.3%	0.3%	0.3%	0.4%	0.2%
Orthopedic	0.9%	1.0%	0.8%	0.7%	0.7%	0.4%
Learning Disability	1.0%	1.4%	2.0%	2.3%	2.6%	2.4%
Health Related	1.0%	1.2%	1.4%	1.4%	1.5%	0.9%
Partially Sighted Or Blind	1.9%	2.4%	2.2%	1.9%	1.1%	1.0%
Other	1.2%	1.5%	1.5%	1.5%	1.6%	1.0%
Any	6.5%	7.8%	8.2%	8.1%	7.1%**	6.0%

\*Hearing data were not collected in 1998; this figure reflects 1996 data.

\*\*estimated

Notes: individuals were allowed to identify more than one disability. “Any” means students reporting any type of disability

Source: HEATH Resource Center, American Council of Education. (Based on unpublished data from the Cooperative Institutional Research Program, UCLA, selected years)

According to Henderson (2001), between the years 1988 and 2000 “learning disability” was the fastest growing category reported by college freshmen. This translates to 40% or two out of five students with disabilities as having a learning disability. Thomas (2000) made the statement, “Today, there are more students with documented disabilities in higher education than

ever before” (p. 248). Walters (2000) determined, “From 1987 to 1997, the percentage of students in higher education institutions who reported a learning disability increased by 264.2% from 3,555 in 1987 to 12,939 in 1997” (p. xi). This being the case, it is becoming increasingly apparent that colleges and universities can no longer overlook the services they should provide to individuals with disabilities.

### *Support Services for Postsecondary Level Students With Disabilities*

With more and more students with disabilities at the postsecondary level, educators must be in tune with both the legislation with which they are required to comply and with the proper accommodations and modifications for these students. Current analyses of surveys revealed that colleges and universities have continued to provide more services for students at the postsecondary level. As these services increase, so does the use of auxiliary aids, including assistive technology. Day and Edwards (1996) reviewed a study completed by Bursuck, Rose, Cowen, and Yahaya in 1989 and reported:

This nation-wide survey of postsecondary services for students with learning disabilities, reported that a majority of schools they surveyed provided auxiliary aids, such as taped textbooks, tape recording of calculators, and word processing programs. The same study concluded that small colleges and community colleges offer more personalized services, such as individualized tutoring and counseling, the use of Individualized Education Programs (IEPs), and progress monitoring of students with learning disabilities. It is unclear, however, whether access to assistive technology, and support in its use, varied according to the size of the institution. (as cited in Day & Edwards, p. 5)

As expected, the larger the university or college, the more support and use of assistive technology was found. However, the law does not address the size of an institution--it simply states it must give “reasonable accommodations.” There is a wide range of assistive technology from one campus to another. There are campuses that provide only minimal compliance with section 504 and others that have comprehensive programs and services (Ganschow, Philips, & Schneider, 2001).

In this new age of technology, assistive technology is often thought of as something that is electrical, loaded with buttons, difficult to understand and operate, and very expensive. This

may not necessarily be the case. In fact, a small piece of string tied between a student's notebook and his or her desk serving as an anchor for the notebook would be considered assistive technology at a cost of less than one penny. Another student with a hearing loss might use a high-tech amplification system in order to hear classroom presentations. Assistive technology is seen and used every day; even optical correction lenses (better known as "glasses") are a form of assistive technology. Other assistive technology devices range from picture cards, calculators, and spell checkers to word processors with optical character recognition, voice recognition, and augmentative communication systems.

Ganschow et al. (2001) explained that one could think of assistive technology devices on a continuum and suggested considering a range of assistive technology devices as being from "no tech" to "high tech." Even so, one must keep in mind that a "high tech" solution is not always the best or the most appropriate. High-tech devices incorporate computers or sophisticated electronics. Mid-tech devices are relatively complicated devices, such as a wheel chair or switch; whereas, low-tech devices are less sophisticated and include such items as adapted scissors and Velcro fasteners. The modification of the environment through the use of existing conditions without the use of devices or equipment would be considered no-tech assistive technology. An example of this type of modification would be allowing a student to place a keyboard on his or her wheelchair.

Each assistive technology device varies in its effectiveness depending on the individual. Not all students with like disabilities will benefit from the same assistive technology. Section 504 of the *Rehabilitation Act* stated:

[A]ids, benefits, and services, to be equally effective, are not required to produce the identical result or level of achievement for handicapped and nonhandicapped persons, but must afford handicapped persons equal opportunity to obtain the same result, to gain the same benefit, or to reach the same level of achievement, in the most integrated setting appropriate to the person's needs. (U.S. Department of Education, 2005, n. p.)

Various types and examples of assistive technology devices as reported by the U. S. Department of Education and used by college students are shown in Table 3.

Table 3

*Examples of Assistive Technology Devices Used by College Students*

Types of Assistive Technology Devices	
taped texts	closed caption decoders
note takers	open and closed captioning
interpreters	voice synthesizers
readers	specialized gym equipment
videotext displays	calculators or keyboards with large buttons
television enlargers	reaching devices for library use
talking calculators	raised-line drawing kits
electronic readers	assistive listening devices
Braille calculators, printers, or typewriters	assistive listening systems
telephone handset amplifiers	telecommunication devices for deaf persons

All of these technologies, as shown in Table 3, were related as being useful to students with disabilities (U.S. Department of Education, 2005). The majority of students who used assistive technology at the postsecondary level were between the ages of 18 and 25 (Joseph, 2005). The assistive technologies that were perceived to be most useful to students with disabilities included recorded textbooks, real-time captioning, screen magnification software and devices, specialized tape recorders, screen readers, optical character recognition systems, curriculum modification, testing accommodations, alternative exam formats, and adapted workstations (Michaels et al., 2001; Ross, 1998; Ward & Berry, 2005).

## *Evolution of Special Education and Assistive Technology*

Assistive technology has a much longer history than most people would expect. Assistive technology has been traced back to the Stone Age. Because of this history and the continuing evolution of assistive technology, it was difficult to chronologically categorize the development of assistive technology. For the sake of chronological convenience, the researcher adopted what Bryant and Bryant (2003) called the three periods of assistive technology: (a) the Foundation Period (prior to 1900), (b) the Establishment Period (1900 through 1972), and (c) the Empowerment Period (1973 to present).

### *Foundation Period: Pre-1900s*

In the text, *Assistive Technologies: Principles and Practices*, by Cook and Hussey (1995), the authors used the story of a Borg who broke his leg on a hunting trip to emphasize that assistive technology began with man's first attempt to "make do" using a stick as a cane. This stick became assistive technology by definition: it was an item that was customized that allowed him to maintain his functional capabilities. The uses of assistive technology continued to develop into the 1600 and 1700s. Many pirates were forced to use assistive technology after the loss of a limb or extremity that resulted from battles and seafaring accidents. This could account for the trademark of Captain Hook with his wooden leg and a metal hook that functioned as a hand.

According to Smith (2006), the history of special education started in the 1800s when Marc-Gaspard Itard found a boy in the wild (Victor) and attempted to train him in social skills, nervous sensibility, extended range of ideas, use of speech, and simplest mental operations. This was the first well-documented effort of special education in the 18<sup>th</sup> century. In 1817, as recorded by Bryant and Bryant (2003), Gallaudet opened a school called the American Asylum for Education of the Deaf and Dumb; the institution's name later changed to the American School for the Deaf. Twelve years later, Braille introduced an adaptation of Barbier's "Ecriture Nocturne" (night writing, originally designed for the French military) (Bryant & Bryant). This

assistive technology is now known as Braille. According to McNurtrie (1980), at about this same time, Blomer established an institute for people with physical disabilities where he made replacement limbs (prosthetics) and other early assistive technology devices. Then in 1836, Taylor devised what some called the first tangible math apparatus to be used by the blind (Bryant & Bryant). In 1860, the *Gallaudet Guide and Deaf Mute's Companion* became the first publication written for individuals with disabilities and in 1846, Gallaudet University was opened as the National Deaf Mute College (Bryant & Bryant). By 1877, Edison had invented the phonograph to help his hard-of-hearing mother (Smith, 2006). This apparatus would later contribute to individuals who learned by listening to recordings.

#### *Establishment Period: 1900-1972*

Bryant and Bryant (2003) stated, “The 72-year period from 1900 through 1972 established the disability disciplines as specific entities, and the policies, laws, and litigation that were established ushered in an era of unprecedented gains for people with disabilities” (p. 11). In the years 1900 through 1972, many organizations were founded including the Council for Exceptional Children, Association of Retarded Citizens, and the Learning Disabilities Association. Shortly after World War I in 1918, congress passed the *Soldier Rehabilitation Act* or *Smith-Sears Veteran Act* (Bryant & Bryant). This Act was passed to help veterans from the war who had acquired physical, sensory, language, or cognitive disabilities to resume more normal lives. This was the first vocational rehabilitation legislation (Bryant & Bryant). Two years later, this legislation was extended to nonveterans. By the end of the 1920s, Americans with disabilities were using guide dogs, reading machines, and embossed print (Braille). The invention of the X- frame-folding wheelchair came in 1937, and in 1947, Americans were introduced to the Hoover Cane to help with mobility for the blind (Bryant & Bryant). By the end of the 1950s, computerized Braille and reading devices sent vibrations to the fingertips to enable sight-impaired persons to read. This century also introduced Americans to the closed captioning motion picture.



Several legislative acts came from this period, some dealing with architecture and accessibility and others dealing with basic civil rights. One case that stood out was *Brown vs. Board of Education (1954)*. Although this case was not directly related to assistive technology or to individuals with disabilities, it did pave the way for the majority of the legislation that followed with the wide-sweeping statement that "separate is not equal." At the same time, a large number of veterans were returning from World Wars I and II, Korea, and Vietnam with disabilities (Bryant & Bryant, 2003). Assistive technology devices and services were being devised and used at an unprecedented rate.

#### *Empowerment Period: 1973 to Present*

This period was described by Bryant and Bryant (2003) as one that has given individuals with disabilities the legal authority to continue the pursuit of the American Dream. During this period, the manufacturing and demand for assistive technology has grown exponentially. Today, assistive technology is a booming business thanks to the demand for more effective assistive technology, the legislative history focusing on individuals with disabilities, and the tools that support them.

#### *Chronological Account of Legislation Relating to Assistive Technology*

Several legislative acts have addressed assistive technology as far back as the 1800s.

Fein (1996) pointed out:

The first known piece of federal legislation that addressed technology for persons with disabilities was *The Federal Act to Promote the Education of the Blind*. Approved on March 3, 1879, it was enacted in recognition of the need of the blind for embossed books and tangible apparatus. (p. 1)

Fein (1996) stated, "Prior to 1960, congressional involvement in legislation targeting persons with disabilities primarily focused on war veterans who became disabled in the course of military service" (p. 1). As time passed, other laws were enacted to enable individuals with disabilities to have a more productive life. One law that did just that was *Public Law (P.L.) 85-*

905. This law was enacted in 1958 and allocated monies for the purchase, rental, or captioning of films for the hearing impaired. Across the nation, this law gave access to information and entertainment to individuals who were hearing impaired. These films and movies were distributed to schools for the deaf and gave hearing-impaired persons access to motion picture theaters' doors. Fein stated that movie dialogue had not been accessible to these individuals since the introduction of movie sound in 1927. In the 1960s, a legislative initiative for assistive technology helped produce several amendments to *Public Law 85-905*. These included *Public Law 87-715*, *Public Law 89-258*, and *Public Law 90-247*. These amendments brought captioning of education and training materials to the classroom. They also widened the population of recipients from the hearing impaired to all individuals with disabilities including those who worked with this population (Fein).

By the 1970s, the civil rights movements had forced Americans to look at equality for all, including those individuals with disabilities. This push for equality brought with it two of the most powerful laws ever passed to help give equal access to those with disabilities. These acts were Section 504 (*Rehabilitation Act*) of 1973 and *Public Law 94-142, The Education of All Handicapped Children's Act of 1975*. Because of these two laws, public schools were forced to open their doors and accept all children. As these children became the responsibility of the schools, so too did their educational needs, including assistive technology (Julnes & Brown, 1993).

#### *Section 503 of the Rehabilitation Act (1973)*

In 1973, the *Rehabilitation Act* was passed by the U.S. Department of Labor's Office of Federal Contract Compliance Programs (OFCCP). Section 503 of this Act advocated for the equal employment opportunities of individuals who had traditionally been discriminated against in the job market. This included individuals with disabilities, minorities, women, and the Vietnam era disabled veterans. This Act required all agencies with government contracts in excess of \$10,000 to take affirmative action to employ and advance qualified individuals with

disabilities. According to the U.S. Department of Labor (2005), OFCCP has had coordinating authority under Title 1 of the ADA since 1992; this prohibited job discrimination by employers with 15 or more employees against qualified individuals with disabilities. Section 503's main objective was to target job discrimination but it could also reach into the realm of postsecondary education. Because it covers both mental and physical impairments that substantially limit or restrict a major life activity including hearing, seeing, speaking, walking, breathing, performing manual tasks, learning, or working, this Act can and does apply to postsecondary institutions (Rehabilitation Act, 1973).

#### *Section 504 of the Rehabilitation Act (1973)*

This act prohibits discrimination against individuals with disabilities and sets provisions that will not allow an institution to put limits on the number of individuals with disabilities they admit, the use of any admissions criterion or test that has disproportionate or adverse effects on these individuals, or any preadmission inquiry about whether an individual has a disability unless the recipient needs to know to correct issues of discrimination from the past (Kaplin & Lee, 1995).

Section 504 of the *Rehabilitation Act* declares:

No otherwise qualified individual with disabilities in the United States...shall, solely by reason of his or her disability, be excluded from the participation, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. (p. 292 USC 749)

Section 504 also states that a qualified person is one who meets the academic and technical standards of admission (Kaplin & Lee, 1995). West et al. (1993) put it best when they stated:

It is important to note that Section 504 requires that programs, not environments, be accessible to student with disabilities. A school need not create a totally barrier-free environment, so long as it does not significantly hinder the participation of students with disabilities in a program when viewed in its entirety. (p. 457)

The Office for Civil Rights (1998) stated that Section 504 contained this requirement relating to a postsecondary school's responsibility to provide auxiliary aids to qualified students who have disabilities:

A recipient ... shall take such steps as are necessary to ensure that no handicapped student is denied the benefits of, excluded from participation in, or otherwise subject to discrimination under the education program or activity operated by the absence of educational auxiliary aids for students with impaired sensory, manual, or speaking skills. (p. 2)

According to Robinson (1996), Section 504 was strengthened in 1990 by the *Americans with Disabilities Act* (ADA). Because most postsecondary institutions receive federal funding, they are subject to the laws and regulations set forth under Section 504 (Thomas, 2000).

#### *Section 508 of the Rehabilitation Act (1988)*

In 1998, Congress revised the *Rehabilitation Act of 1973* to require federal agencies to make electronic and information technology accessible to people with disabilities; part of this revision was known as Section 508. According to Section 508 (2006), “[this section] was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals” (n. p.). This section of the *Rehabilitation Act* applies to all federal agencies in the development, procurement, or use of electronic and information technology. Under Section 508 (29 U.S.C. ‘ 794d), “Agencies must give disabled employees and members of the public access to information that is comparable to the access available to others” (n. p.).

#### *Education of all Handicapped Children Act and Individuals With Disabilities Act*

In 1975, *P.L. 94-142: Education of all Handicapped Children Act* (EHA) was passed by Congress. President Ford, along with Congress, passed this legislation to improve opportunities in education for handicapped children and adults. This law set forth a free and appropriate public education and gave handicapped individuals a chance to be educated in the “least

restrictive environment" to the maximum extent appropriate, meaning that students would be educated with nondisabled children and not in separate schools to the maximum extent their disabilities would allow. *Public Law 94-142* was retroactively renamed *P.L. 101-476 The Individuals With Disabilities Education Act* (IDEA) in 1990. The reauthorization included a formal definition of assistive technology that matched that of the *Tech Act* from 1988. This definition stated, "Assistive technology devices means any item, piece of equipment, or product system, whether acquired commercially off a shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities" (n. p.). This law also established that assistive technology service means any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive device. IDEA stated the assistive technology services included:

1. the evaluation of the needs of a child with a disability, including a functional evaluation of the child in the child's customary environment;
2. purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices by children with disabilities;
3. selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing of assistive technology devices;
4. coordinating other therapies, interventions, or services with assistive technology devices, such as those associated with existing rehabilitation plans and programs;
5. training assistance for a child with or, if appropriate, that child's family, and;
6. training or technical assistance for professionals (including individuals providing education or rehabilitation services), employers, or other individuals who provide services to employ, or are otherwise substantially involved in the major life functions of children with disabilities" (*IDEA, P.L. 105-17, Section 1401 (a) (26)*).

The use of assistive technology was further encouraged by the 1997 reauthorization of the *Individuals With Disabilities Education Act* suggesting that the use of assistive technology could be necessary in meeting the standards of a free and appropriate public education for some

students. According to Scherer and McKee (1992), “The possible use of assistive technology devices must be considered along with the child’s educational needs and the potential for technology to help meet such educational needs must be determined on an individual basis” (p. 1).

In order to access and use technology tools in the postsecondary setting, individuals with disabilities must begin preparation in high school. Because of the difference between the protections and requirements of 504 and IDEA, transition planning is a critical issue. Dell (2004) suggested that transition plans for students with disabilities who want to attend postsecondary institutions must include the teaching of appropriate assistive technology skills and self-advocacy skills to help ensure that these individuals are ready to assume the increased responsibilities associated with accessing appropriate accommodations.

### *Tech Act of 1988*

In 1988, Congress acted to improve access to needed assistive technology by passing the *Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Tech Act; P.L. 100-407)*. This Act was reauthorized in 1994, *P.L. 103-218*. The *Tech Act* defined assistive technology as, “any item, piece of equipment, or product system, whether acquired commercially off a shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities” (Tech Act, 1988). The term “assistive technology service” was defined by this act as “any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device” (RESNA, 1998).

*P.L. 100-407* was passed to help increase access to, availability of, and monies for state efforts and national initiatives (RESNA, 1999). In 1994, *P.L. 103-218* was passed in an attempt to continue the *Tech-Act* and expand federal support for assistive technology for individuals with disabilities.

One of the main ideas behind the *Tech Act of 1988* was to aid each state in setting up assistive technology centers that would provide assistance to consumers within their respective

states. The federal government's objective was that these centers would be sustained by each state within a 10-year period.

### *Assistive Technology Act of 1998*

In 1998, President Clinton signed into law the *Assistive Technology Act (ATA, P.L. 105-394)*. This new law supported the *Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Tech Act)* and continued the idea that assistive technology was a valuable tool for individuals with disabilities (RESNA, 1999). As stated by RESNA (1999):

The *Assistive Technology Act of 1998 (ATA)* is the result of a bipartisan effort in Congress. It extends funding to the 50 states, the District of Columbia, Puerto Rico, and outlying areas (Guam, American Samoa, U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands) that received support under the *Tech Act*. The law provides flexibility to states in responding to the assistive technology needs of their citizens with disabilities and builds on the accomplishments achieved by states over the past decade through assistive technology programs funded under the *Tech Act*. Under the new ATA, all states and outlying areas are eligible to receive 10 years of federal funding for their state assistive technology program. States that have completed 10 years may receive 3 additional years of federal funding. (p. 1)

*P.L. 105-394* had three main goals and purposes. These purposes were set up into titles. The goal of Title I was to increase the sustainability and capacity to provide the assistive technology needs of individual with disabilities across the country and beyond. Title I provided grants to states just as the *Tech Act* of 1988 did. These grants could be used to ensure that states maintained comprehensive and consumer-responsive programs related to technology. This included public awareness, inter-agency coordination, technical assistance, training (in the laws, regulations, procedures that deal with assistive technology), and provision of outreach support to community-based organizations that provide assistive technology devices and services to individuals with disabilities including advocacy.

The section under Title II addressed national access. The intent was to support the investment in technology across federal agencies and departments. Under Title II, small businesses could receive innovative research grants related to assistive technology. Grants were

also given to commercial organizations for research and development of universal design concepts. Title II grants were awarded to address the unique assistive technology needs of urban and rural area individuals, including the elderly. Title II grants and monies were given to improve training of rehabilitation engineers and technicians as well as to increase employment of individuals with disabilities in the private sectors (RESNA, 1999). The Title III section was designed to support micro-loan programs to individuals wishing to purchase assistive technology devices or services (RESNA, 1999). These included low-interest loans, interest buy-down programs, a revolving loan fund, loan guarantee or insure programs, and other such aid.

#### *Americans With Disabilities Act of 1990*

The *Americans with Disabilities Act of 1990* (ADA) was intended to (a) “provide clear, strong, consistent, enforceable standards addressing discrimination against individuals with disabilities” and (b) “to provide a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities” (*Americans With Disabilities Act*, 1990). Section 504 applies only to organizations that receive federal funding; because almost all postsecondary institutions do, they are held accountable to the standards outlined in the ADA. The ADA provides civil rights protection against discrimination to citizens with disabilities in private-sector employment. According to the *ADA Regulations and Technical Assistance Materials* (2001), “The ADA prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, State and local government services, public accommodations, commercial facilities, and transportation” (n. p.).

The discrimination referred to in this legislation encompasses the individual with disabilities on college and university campuses. As Button and Wobschall (1994) stated regarding the passage of ADA, “The message of our nation was clearly that the historical and often intentional segregation and exclusion of people with disabilities would no longer be tolerated” (p. 196). This Act helped ensure the provision of an equitable education to all students. ADA specifies 10 areas in which colleges may not discriminate. Included in these are:



(a) eligibility criteria, (b) modifications and policies, (c) practices, (d) auxiliary aids and services, (e) removal of barriers in existing facilities, (f) personal devices and services, and (g) assistive technology (Kaplin & Lee, 1995).

According to *Tapping Technology* (2001), "One of the most important aspects of providing an equitable education to a student with disabilities is making all information resources accessible: computer labs, email systems, online systems, research and catalog systems, websites, and distance learning" (p. 2). Under section 504 and the ADA, this is not, however, limited to technology-rich environments; colleges are required to provide "reasonable accommodations" to make their programs equitable for all students.

According to Robinson (1996), one must take into account certain definitions to understand this Act. They include: "(a) an individual with a disability, (b) reasonable accommodation, and (c) undue hardship" (p. 2).

An individual with a disability, as stated by the *Americans with Disabilities Act* (1990), has:

1. a physical or mental impairment that substantially limits one or more of the major life activities of such individual
2. a record of such an impairment; or
3. being regarded as having such an impairment. (p. 645)

Title II of this Act prohibited universities, colleges, and graduate and professional schools from discriminating against individuals with disabilities (Office of Civil Rights, 1998). The Office of Civil Rights stated that the regulations of ADA requirements were:

A public entity shall furnish appropriate auxiliary aids and services where necessary to afford an individual with a disability an equal opportunity to participate in, and enjoy the benefits of, a service, program, or activity. (p. 3)

According to Robinson (1996), reasonable accommodations may include but are not limited to:

1. making facilities readily accessible to and usable by persons with disabilities,
2. modifying schedules,

3. acquiring or modifying equipment or devices,
4. adjusting or modifying examinations,
5. adjusting or modifying training materials or policies,
6. substituting or waiving specific course or training requirements; and
7. providing qualified readers and interpreters. (p. 3)

According to Lewis (1998), in Sec. 101 (9) (b), the *American with Disabilities Act* stated, “Reasonable accommodations should include the acquisition or modification of equipment or devices” (p. 24). Dell (2005) stated, “In many cases providing an effective assistive technology tool is considered a "reasonable accommodation" (p. 1). However, in Section 504 and in ADA, the term used to refer to devices and services that make programs accessible to individuals with disabilities is “auxiliary aids and services.” An example of auxiliary aids and services for a student who is sight impaired might be the use of a device that would translate his or her text into speech or books on tape. These types of devices would offer this student an equal opportunity to gain the information presented in his or her texts. Dell explained:

Of particular relevance to the topic of assistive technology is that although colleges are required to provide auxiliary aids and services, they are not required to provide the most sophisticated technology available. It is acceptable for a college to provide a different technology product from the one the student has requested. For example, the college may provide a different brand of screen reading software than the one originally requested. (p. 2)

Undue hardship, as interpreted by Robinson (1996), would be “an action requiring significant difficulty or expense when considered in light of such factors as the size, financial resources, and nature of the organization” (p. 3). Table 4 shows the substantial difference between ADA and IDEA and the responsibilities of the individual under each Act.

Table 4

*Comparison of the Requirements and Procedures of the Americans With Disabilities Act (ADA) and Section 504 With the Individuals With Disabilities Education Act (IDEA)*

Requirements	IDEA	ADA / Section 504
Rights guaranteed by the law	FAPE, LRE, and Due Process	FAPE, LRE, and Due Process
Who is covered	Every child; concept of zero reject	Students who are "otherwise qualified"
Type of required	IEP	Written accommodations
Funding	Funding for services	No funding
Type of consent for services	Requires written informed consent from parent	Requires informed consent from individual
Identification of students	District is responsible for identifying all students with disabilities, evaluating them, and covering the cost.	College has no such responsibility. Student must self-identify and provide appropriate documentation. If an evaluation is needed, the expense is the student's responsibility.
Evaluation and determination of services	In-depth evaluation and IEP	Less specific evaluation and a written plan
Evaluation timelines	Annual reviews and 3 year re-evaluations	Periodic re-evaluation
Personal devices and services such as wheelchairs, hearing aids, and personal care attendants	Provided by districts if determined to be necessary (and included in IEP)	Colleges not required to provide these devices and services
Role of parents	Parents must be included in the decision-making process	College students are 18 and over and are considered adults. Parent consultation is not required
Appeals go before the federal office that supports regulations	OSEP	Office of Civil Rights

Modified from Dell (2004)

Table 5 shows the obligations of both colleges and students under the *Americans With Disabilities Act*.

Table 5

*College and Student Obligations Under the Americans With Disabilities Act (ADA)*

College Obligations Under the ADA	Student Obligations Under the ADA
Ensure that qualified applicants and students have access to the college's programs.	Self-identify that he or she has a disability (following the specific college's stated policies and procedures)
	Provide appropriate documentation of disability
Provide reasonable accommodations for the students' documented disabilities	Request specific accommodation(s)
Demonstrate a good faith effort to provide the student with meaningful access	Follow the agreed-upon procedures for using accommodations
Dell (2004)	

*Assistive Technology Act of 2004*

With the passage of the *Assistive Technology Act of 2004*, the affirmation of the benefits of assistive technology could be seen. The *Technology-Related Assistance Act of 1988* and its revisions have had a significant impact on implementing strategies to raise awareness of assistive technology. The *Assistive Technology Act of 2004* focused on the continuation and development of new programs that would ensure that individuals with disabilities had direct access to the assistive technology they needed (Buck, 2004). This included assistive technology loan programs, device demonstration programs, device reutilization programs, and the continuation of alternative financing programs. The *Assistive Technology Act of 2004* also clarified states' responsibilities to ensure access to digital and electronic information including the Internet

(Buck). This Act also supports state grants for protection and advocacy programs that are related to assistive technology including data collection.

### *Case Law and Analysis*

Many of the previously discussed laws that deal with students with disabilities and postsecondary education have been further clarified by the court system. Cohen and Olson, (as cited in Renner, 2002) stated, “Legal research is the process of finding the laws that govern most of our life activities and the materials that explain or analyze these laws” (p. 40). Because of this process, one can better understand legislative rulings, and, thereby, better understand the responsibilities of the postsecondary institutions and individuals with disabilities.

This section contains a chronological account of reported case law on selected areas of the legislative acts that govern postsecondary institutions and individuals with disabilities roles and responsibilities. Specifically the ADA and Section 504 of the *Disabilities Act* is analyzed to find significance that a decision might have on current issues pertaining to the rights of both the postsecondary institution and the individuals with disabilities on campuses. Renner (2002), cited Shappo et al. as recording the main components of case summarization and analysis that form the analysis:

1. the legally relevant facts of the case that describe the events between the parties that led to the litigation;
2. the issue(s), which are the legal questions that the court must decide to resolve between the parties;
3. the holdings, which the court’s decision on the question that is before it; and
4. the court’s rationale that explains and supports the court’s decision. (p. 40)

The following court cases from 1990 through 1999 were obtained from the Lexus Nexis Academic and Congressional Universe website throughout the month of February 2006. This site provided access to legal records. The researcher searched for cases that were relevant to a discussion of individuals with disabilities in postsecondary education including the rights and

responsibilities of both the individual and the institution. This database had 52 cases. The following records contain the chronological account of individual case facts, issues, decisions, and the court's final analysis of each case. The cases presented represent issues in postsecondary education, examination agencies, and professional boards. In the majority of the following cases, an individual or group was denied accommodations.

In the case *Davis v. Southeastern Community College* (1979), the plaintiff was a hearing-impaired female who was unable to use hearing aids. Research indicated she had learned to read lips and wanted to become a registered nurse through the Southeastern Community College's program. She sued the petitioner in district court; she claimed that it was in violation of Section 504 and the *Rehabilitation Act of 1973*. Southeastern Community College denied her application. The college stated her disability would not allow her to participate safely in the nursing program or to care safely for patients because she had to lip-read. The college had an audiologist test the student and the audiologist stated that the student's handicap would affect her ability to perform safely and effectively in both clinical experience and in her proposed profession. The respondent stated that this was a violation of her 504 rights as well as rights from the *Rehabilitation Act of 1973* saying that it discriminated against an "otherwise highly qualified individual." The college's administrators maintained that they had not violated any laws because the problem was a safety issue rather than an act of illegal discrimination.

The legal issues and questions raised for a deliberation by the court included but were not limited to the following questions:

1. Is there a violation of the student's rights as stipulated by Sec 504 or *Rehabilitation Act of 1973*?
2. Does the student or individual qualify academically to receive the benefit or provisions stipulated under sec 504?
3. Should the school have to make accommodations for the individual?

The district court ruled in favor of the petitioner after reviewing the audiologist's statement that indicated the student's handicap would not allow her to perform safely in both training and in the

proposed profession. The court of appeals did not dispute the district court's findings, but said that the petitioner had to reevaluate the respondent's applications for admission without regard to hearing ability and to determine whether the respondent was "otherwise qualified." The appeals court also suggested that Section 504 required "affirmative conduct" by the petitioner. The court stated that the petitioner should modify its program to accommodate the disabilities of applicants (*Davis v. Southeastern Community College*, 1979).

According to the district court, the school made no violation because the audiologist had confirmed that the respondent would not be able to safely do clinical experiences or professionally be able to work safely because of her disability. The district did not find that the school was in any violation of Section 504 or the *Rehabilitation Act of 1973*. The court stated that the student would not be "otherwise qualified" for entry because her disability was a safety issue for the patients. The appeals court judges, even though they had all the information from the district courts, overturned the district court's decision. The appeals court said that the school should have to go back and review her application without any bias toward her hearing ability. They came to this verdict through the fact that the school should have to see if she was "academically and technically qualified" (*Davis v. Southeastern Community College*, 1979).

In another case, *Pushkin v. Regents of the University of Colorado* (1981) 10<sup>th</sup> Circuit Court, the court reviewed an admission denial by college officials of a potential student with a condition of multiple sclerosis. Dr. Pushkin was an individual with multiple sclerosis who applied for the program of medical residency at the University of Colorado's psychiatric unit. After a 45-minute interview, Dr. Pushkin was denied admission into the residency program. College officials stated that they believed Dr. Pushkin's patients would not be comfortable around him because of his disability. They also stated that his condition might affect the way he would treat his patients. The admission faculty also said they believed that Dr. Pushkin would not be able to handle the stress that would accompany the requirements of the program. Finally, the faculty at the University of Colorado stated that they believed Dr. Pushkin's medical condition would require too much medical care, and thus could pose problems for the completion

of the program's requirements. The faculty ignored recommendations from Dr. Pushkin's therapist who stated that he believed Dr. Pushkin was capable of successfully completing the residency program and the fact that Dr. Pushkin had composed a plan as to how he would handle his ongoing need for medical treatment while completing the residency program. The 10th Circuit Court found that the residency program had discriminated against Dr. Pushkin.

In the United States Courts of Appeals, First Circuit case of *Wynne v. Tufts University School of Medicine* (1992) No. 92-1437, the court looked at the issue of "necessary accommodations." Steven Wynne, a student at Tufts University School of Medicine, was asked to leave after he failed his courses. He claimed that Tufts University had refused to provide the necessary accommodations. Wynne requested untimed, oral administration of the multiple-choice tests. Because of a previous ruling, the Tufts school had provided Wynne with some necessary accommodations, such as permission to repeat the 1st-year's curriculum, tutoring, taped lectures, untimed examinations, and make-up examinations. It was after Wynne had failed a test three times that he said he felt he needed to be provided with an oral version of the test. Wynne also did not have sufficient information showing that his need for orally administered multiple-choice questions was necessary for his academic success. Wynne failed eight of his 1st-year's core curriculum courses despite the fact that Tufts' guidelines required for the dismissal of any student who failed five of his or her courses. Wynne was given permission to repeat the needed courses and was allowed to repeat the first year of medical school.

During the summer of 1984, Tufts University conducted tests on Wynne that showed he did possess learning problems and had problems with retaining information; however, he did not seem to have dyslexia or any other form of learning disability. After Wynne was given the above-mentioned accommodations, he was still unable to pass all his classes and failed two courses. Wynne was allowed to remain at the university and was given the opportunity to make up examinations in the two courses failed. Despite these accommodations, Wynne still failed another one of his classes. Wynne was then dismissed from Tufts University (*Wynne v. Tufts University School of Medicine*, 1992).



According to Wynne, he was learning disabled and believed that he had been discriminated against because of his disability. Wynne claimed that Tufts' refusal to administer tests using additional formats, other than multiple choice, was discriminatory against him. Wynne insisted that other schools in the past had offered oral multiple-choice examinations for individuals with dyslexia. Wynne ignored the fact that he did not have dyslexia and, therefore, was not entitled to the same accommodations as individuals who did have dyslexia (*Wynne v. Tufts University School of Medicine*, 1992).

On the other hand, Tufts University stated it felt it had provided all the necessary accommodations that Wynne needed. After evaluating its curriculum, Tufts University's administrators stated that multiple-choice testing was the only way that they could evaluate a student's biochemistry knowledge, and that by changing the testing format, they would indeed be lowering the academic standards of their program. Tufts University's staff said they felt that they had made adaptations to accommodate Wynne's needs and did not feel that it was necessary to include oral multiple-choice tests in the list of adaptations, especially because Wynne had completed and passed multiple-choice tests in other classes. It was also not until Wynne had failed his third biochemistry exam that he said he felt the need to implement oral testing. Had Wynne truthfully had a disability that required the use of verbal tests, he would have requested the service at an earlier date (*Wynne v. Tufts University School of Medicine*, 1992).

The legal issues and questions raised for a deliberation by the court included but were not limited to the following questions:

1. Are all accommodations reasonable for individuals regardless of their particular disability?
2. What type of accommodations should postsecondary institutions be required to make for individuals with disabilities?
3. What adaptations should a postsecondary school make before refusing to provide accommodations for students with disabilities?

The court ruled in favor of Tufts University School of Medicine and supported its decision in removing Wynne from its program (*Wynne v. Tufts University School of Medicine*, 1979).

According to the court, Tufts University did make an attempt to provide accommodations for Wynne. Staff warned Wayne when he failed biochemistry the first time and recommended that he reschedule his examinations, which he refused to do. After Wynne failed eight courses his freshman year, Tufts University provided the necessary means to test Wynne and see if there was any way of determining his disability. Testing showed that although he did have problems grouping information together, he did not have a learning disability or dyslexia. Tufts University also allowed Wynne to repeat his 1st year even though it went against school policies. Wynne was given the use of a tutor, taped lectures, time extensions on his tests, and make-up examinations for the tests he failed. Tufts University officials stated that they did make an effort to try to make accommodations for Wynne's disability. They also stated that it was unreasonable for Wynne to expect to receive oral examinations, especially because he had been able to pass multiple-choice tests in the past (*Wynne v. Tufts University School of Medicine*, 1979).

According to Wynne, these oral examinations should have been administered to him because a student at another university who suffered from dyslexia was given the accommodation of having oral examinations. According to the courts, even though this accommodation was made in the past for an individual with dyslexia, it was not reasonable to apply it to Wynne's case merely because he too had learning problems. In addition, Tufts University officials explained the importance of biochemistry in their medical program, and explained that multiple-choice questions were the best way to assess a student's understanding of the information. By changing the format of the test, they would undoubtedly be lowering the standards of their medical program. The court also stated that the school could not be expected to provide accommodations for a handicap for which it was unaware. In other words, Tufts University was only able to provide accommodations for the disabilities that it knew Wynne had. Wynne was never diagnosed with dyslexia while he was at Tufts, the university did make several accommodations for Wynne and gave him several "second chances." Wynne took and passed

multiple-choice tests in other classes; it was not until he failed his third biochemistry exam that Wynne felt the need to change the method of examination for his biochemistry class (*Wynne v. Tufts University School of Medicine*, 1992).

In the case of *Ohio Civil Rights Commission v. Case Western Reserve University* (1996), 666 N.E. 2d 1376 Ohio Superior Court, Cheryl Fisher, a blind applicant to the CWRU Medical School, was not allowed admittance to the nursing program. She filed a suit against the school claiming that her rights under the *Rehabilitation Act* should have allowed her admission to its nursing program. CWRU stated that according to the Association of American Medical College, medical school candidates needed to have the ability to observe field work such as: insertion of an IV, viewing of x-ray examinations, and making other judgments based on their observational experiences. Cheryl Fisher gave an example, of a student at Temple University Medical School who was blind and yet was able to graduate from its medical program. The court ruled that it would be “unreasonable” to try to accommodate the course-work required for the completion of medical school for a blind student.

The legal issues and questions raised for a deliberation by the court included but were not limited to the following question: Should postsecondary institutions be required to make “unreasonable” accommodations to their instructional program for an individual with a disability? (*Ohio Civil Rights Commission v. Case Western Reserve University*, 1996).

The court stated that the necessary accommodations for medical school for a blind student would be considered an “unreasonable adaptation” and supported CWRU's decision in denial of admittance. Although it was commendable that Temple University did provide a constant one-on-one aid for Hartman and did exempt him from certain requirements in order for him to complete its program, by law, postsecondary institutions are not required to make such accommodations. In other words, postsecondary institutions should not be required to make substantial changes to their programs in order to make accommodations for individuals with disabilities. Making such accommodations and alterations to a given institution's program is called “undue burden.” A postsecondary school has the ability to require certain functions from

its students; it is not required to make accommodations that exempt the given individual from the requirements and standards that are required of other students (*Ohio Civil Rights Commission v. Case Western Reserve University*, 1996).

The case of *Maczaczjy v. University of the State of New York et al.* (1997) dealt with issues related to accommodation for a student who suffered from an anxiety disorder. Mr. Maczaczjy was admitted to the master's degree program at Empire State College of the state of New York. Most of the graduate programs were taught in a nonresidential format. The plaintiff suffered from an anxiety disorder, social phobia, emotional trauma, and panic attacks that took place when he had to deal with people. In addition, he was a former drug addict as well as an alcoholic and he refused to take medications that were meant to make socializing less stressful. The plaintiff requested that the master's program be given in a distance-learning format as his undergraduate studies had been. Officials at the university said that it would be possible, but that it would require a detailed design and pedagogy that was different from the current program. They also offered him an alternative that included the plaintiff being able to go to an isolated room if he needed to get away, he could bring a friend or assistant to class with him, he could be excused from social activities that dealt with the residency part of the program, and he could have his choice of location within meeting areas during residency. In the end, the court denied the plaintiff's request. The court found that the proposed accommodations were unreasonable and the college argued that by doing this, the integrity of the program would be undermined.

In the case of *Guckenberger et al. v. Boston University, Jon Westling, Craig Klafter* (1998), students with learning disabilities at Boston University stated they believed that not substituting courses for the foreign language requirement of BU's college of the Arts and Sciences was a violation of ADA and the *Rehabilitation Act*. The students wanted to satisfy their foreign language requirement with a non-language course as a reasonable accommodation. After the court ruled that the college did not take a diligent assessment of the available options, the court ordered the college to examine completely whether giving alternate courses would

fundamentally alter the nature of its liberal arts program. The legal issues and questions raised for a deliberation by the court included but were not limited to the following questions:

1. Will providing alternative courses for the foreign language requirement at BU's College of the Arts and Sciences alter the nature of its liberal arts program?
2. If the college does not provide alternative courses, will it be violating the ADA and the *Rehabilitation Act*?

After BU held seven meetings, officials proposed to the court that the foreign language requirement was fundamental to the nature of the liberal arts degree at Boston University. The court concluded that a person holding a liberal arts degree from Boston University should have some experience studying a foreign language. The court also concluded that Boston University had not violated the ADA by not giving course substitutions to students with learning disabilities. On trial, BU officials showed adequate proof that they spent the time analyzing the possibility of having substitutions for students with learning disabilities. BU's committee concluded, "Knowledge of a foreign language is one of the keys to opening the door to the classics and so to liberal learning. It is not the only key, but we do judge it as indispensable" (n. p.). Because the institution submitted undisputed facts that demonstrated officials within the institution considered all possible options, the court could rule that the institution had met its duty of seeking reasonable accommodation. It also found that allowing course substitutions as a reasonable accommodation for all students was unconstitutional. However, it could be allowed based on an individual basis.

In the case of *Pell v. the Trustees of Columbia University* (1998), a graduate student and employee of Columbia University claimed that she was being harassed because of her disability. She was accused of faking her dyslexia, called mentally retarded, and was encouraged rudely to participate in the Special Olympics. She claimed that this treatment violated her rights under Section 504 of the *Rehabilitation Act*. She also stated that the university denied reasonable accommodations before she completed a required French course.

The legal issues and questions raised for a deliberation by the court included but were not limited to the following question: Did the harassment of the plaintiff and denial of accommodations violate the student's rights under Section 504? (*Pell v. the Trustees of Columbia University*, 1998).

With a ruling similar to the courts before it, this court made no distinction between establishment of sexual harassment in the workforce and establishment of disability harassment in the classroom. The court found the denial of accommodations to be moot and charges were dismissed. By denying the defendant's motion, the court stated that the complaint was "replete with the 'sharply-pointed, crudely-crafted, and frequently-launched' 'slings and arrows'" that courts have found sufficient to establish severe and pervasive harassment that alters a plaintiff's work conditions. The court found the denial of accommodations moot because the plaintiff had enrolled in a French course taught by New York City Community College, which granted accommodations. The university accepted the transfer credit from the community college (*Pell v. the Trustees of Columbia University*, 1998).

In a case in United States District Court-District of Massachusetts, *Joanne Cohen vs. The Trustees of Boston University* (1998), Civil Action Number 93-10667WD, the plaintiff, Joanne Cohen, an individual with Tourette syndrome, was denied re-admission into the Boston University School of Social Work in November 1992. Ms. Cohen stated that the denial of re-admittance was a violation of Title II of ADA, 1990 and Section 504 of the *Rehabilitation Act*. Title III of ADA claims that discrimination against an individual cannot be based on a disability, and he or she must be given the chance "to participate in or benefit from goods, services, facilities, privileges, advantages, and or accommodations of any public place" (n. p.). There is no question about the fact that Ms. Cohen was an individual with disabilities who was seeking to be admitted and receive services from Boston University School of Social Work, which is a public place. Boston University claimed that Ms. Cohen was not allowed readmission into the program because she was not qualified for the program, rather than because of her disability. The university also stated that even if its decision was incorrect, it should be allowed to make its

own academic judgments, and that it was protected under the principles of academic freedom. The university professors who denied the re-admission claimed that Ms. Cohen was incapable of learning at a graduate-school level and did not have the necessary social skills to complete successfully the school of social work's curriculum. These faculty members admitted that while Ms. Cohen's Tourette Syndrome was considered, it was not the ultimate factor in denying Ms. Cohen's re-admittance to their program. Boston University used the case of *Wynne v. Tufts University School of Medicine* (1992) as a basis for having the right to make its academic decisions.

Ms. Cohen stated she did not believe that she lacked the cognitive skills necessary to complete successfully the social work master's program at the University of Boston. It was apparent that part of the reason Ms. Cohen was dismissed from the program in 1987 was because of her disability. Hubert Jones, the Dean of the School of Social work, claimed that although she had good intellectual capabilities, and "positive experiential background," Ms. Cohen's disability and the medication that she was required to take caused her to perform poorly. Upon her request for re-admission, Professor Carolyn Dillon stated that Ms. Cohen would be unable to complete her clinical work if she continued. The faculty claimed that Professor Dillon's remarks were not taken into consideration when deciding upon Ms. Cohen's re-admittance. Another reason to question Ms. Cohen's denial for admittance was because during her interviews, both for admission and re-admission, the faculty members conducting the interview continually asked Ms. Cohen questions regarding her disability and how it might impact her academic success at Boston University. Ms. Cohen's employer was also asked questions in regard to her disability and how it had affected her work capabilities at the independent living center where Ms. Cohen counseled individuals with disabilities. It was stated that faculty also ignored the fact that Ms. Cohen achieved academic success as an undergraduate student at Boston University. During her first year at the school of social work, Ms. Cohen successfully completed the academic proportion of the curriculum. Evaluation concluded that Ms. Cohen was also able to form positive and professional relationships with those individuals whom she counseled. Upon her

request for readmission, Ms. Cohen had recommendations from her physician, psychologist, employer, and officer of the national Tourette Syndrome Association who emphasized their support and belief that Ms. Cohen possessed the necessary capabilities to complete the graduate-level course work and become a successful social worker. Although it is correct that postsecondary institutions do have the right to make their own “academic decisions,” the law states these decisions cannot discriminate against an individual based on his or her disability (*Joanne Cohen vs. The Trustees of Boston University*, 1998).

Although Boston University claimed that there were similarities between this case and *Wynne v. Tufts University School of Medicine* (1992), vast differences were also found. Unlike Wynne, Ms. Cohen did provide information showing that the university’s claims of lack of qualifications were ungrounded. In actuality, this case seemed to resemble that of *Pushkin v. Regents of the University of Colorado* (1981) where Dr. Pushkin was denied admittance to the psychiatric residency program of the University of Colorado because of his disability. In that case, the courts determined that Dr. Pushkin’s denial of admittance to the program was based on a discrimination against him because of his disability and not because he did not possess the necessary qualifications that the program required. This seemed to be true in Ms. Cohen’s case as well. It was not apparent that she lacked the intellectual capabilities to achieve the requirements of the program, unlike Wynne; rather, it seemed that she was being discriminated against because of her disability and the faculty members’ belief that her disability would not allow her to complete the requirements of their program (*Joanne Cohen vs. The Trustees of Boston University*, 1998).

Despite the fact that evidence shows that an individual does possess the cognitive and social skills needed to complete a higher education degree, can a university decide to deny an individual with disabilities admittance to its program based on the “principles of academic freedom” that universities possess and their sole evaluation of the individual?

In the case of *Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation* (1999), Gary Michael Powers, claimed that he was discriminated



against and not offered appropriate accommodations for his disability at the Wyoming Technical Institute where he was attending to become an auto-body repair person. Powers was involved in a car accident at the age of 19 and was left unable to walk without the aid of crutches. He had a surgery where doctors inserted two metal rods in his back. Despite this surgery, Powers needed to use forearm crutches for his hands and braces for his legs in order to walk and balance himself properly. Mr. Powers applied to Wyo Tech to pursue a career as an auto-body repairperson. Mr. Robert Saldana from Wyo Tech came, visited Mr. Powers, and assured him that Wyo Tech would provide the necessary accommodations for his physical disability. In his application, Mr. Powers indicated that he did possess a disability that could cause problems in the completion of the auto-body repairperson's program at Wyo Tech. Even after indicating his disability, school officials reassured Mr. Powers that they did think he was capable of completing the given program. After paying his \$100 admission fee, Mr. Powers was accepted to Wyo Tech in November of 1994. Mr. Powers stated that it was a struggle to complete his work because he needed his hands to carry his tools, while at the same time he was trying to stabilize and properly maneuver his body movements. On April 27, 1995, Mr. Powers fell as he tried to move a tray of plastic fillers to his model car. As he tried to place the tray near the car, he lost his balance and fell to the ground. His fall fractured his leg in three places and he needed rods, pins, screws, and surgery to reconstruct his shattered tibia. Because of his fall, Mr. Powers was confined to a wheelchair and was not able to complete his course. He had to withdraw from school, and Wyo Tech did not offer to pay back any of the money that he had paid for tuition.

Mr. Powers stated that he felt Wyo Tech had discriminated against him because of his disability and provided neither a safe environment nor the accommodations that it had promised in order to assure his success. He alleged that Wyo Tech officials had promised him that they would find the necessary equipment that he needed but failed to follow through in acquiring the equipment. They had promised Mr. Powers a "motostand," a standing or sitting electrical wheelchair to use within the shop, an inexpensive cart with handles and friction wheels upon

which he could carry his tools, and other accommodations (*Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation, 1999*).

Wyo Tech claimed that Mr. Powers was not “an otherwise qualified individual.” According to the school, Mr. Powers admitted that there were times when he doubted that he would be capable of completing the tasks of an auto-body repair person. Teachers at Wyo Tech stated that they believed that Powers was not qualified because there was no way that he could have successfully completed what was required of him. Because they claimed that Mr. Powers was not a “qualified individual,” Wyo Tech stated that his claim was not valid under the *Rehabilitation Act*, Wyo tech stated it was not liable in any way for Mr. Power’s accident (*Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation, 1999*).

Mr. Powers, on the other hand, said that he did receive a letter stating that Wyo Tech had “assured ourselves that you demonstrate the ability and desire to meet the high standards... your acceptance also means that you should have confidence in your ability to complete your training successfully” (n. p.). At the same time, Mr. Saldana, the man sent to inform Mr. Powers of the Wyo Tech's auto-body repair program, signed a statement saying that he believed that Mr. Powers met the requirements and the standards needed in order to successfully complete the requirements of the given program. Research indicated that Mr. Powers appeared to be able to perform the tasks that were required of him. Up to the time of his accident, he had been receiving a “B” average on all his assignments, thus showing that he was capable of performing the requirements of the program. There seemed to be evidence that Mr. Powers was capable of completing the requirements of the course (*Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation, 1999*).

The legal issues and questions raised for a deliberation by the court included but were not limited to the following questions:

1. Is a postsecondary institution required to provide accommodations for an individual with disabilities?

2. Is there a need to show intentional discrimination against the plaintiff?
3. If intentional discrimination is not shown, is the individual capable of holding a valid claim under the *Rehabilitation Act*?

In an appeal to a verdict that had already taken place by a Wyoming federal court judge in favor of Gary Michael Powers, the district court decided to affirm in part, reverse in part, and demand a retrial on the plaintiff's claims under the *Rehabilitation Act*. A retrial was demanded because the previous jury was not informed of the intentional discrimination that needed to be established before the plaintiff was able to place a claim under the *Rehabilitation Act*. The judge ordered that unless discrimination was intended by Wyo Tech, that financial award could not be given. The judge did agree with Mr. Powers that he was indeed capable of meeting the requirements needed to complete the program and that Wyo Tech did not offer the promised accommodations in order to properly accommodate the environment for his success (*Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation*, 1999).

The issues faced by the courts included: Can a university deny admittance to an individual based solely on the fact that the individual possesses a disability? Should individuals with disabilities be dealt with individually, based on the capabilities of the individuals, rather than assuming that because a given individual has a disability, he or she is incapable of achieving higher education? The court decided that the residency program of the University of Colorado did, in fact, discriminate against Dr. Pushkin because of his disabilities (*Pushkin v. Regents of the University of Colorado*, 1981). This case was important because it proved that individuals with disabilities need to be individually assessed. Postsecondary institutions need to evaluate how a given student can and cannot complete the given course requirements without making hasty decisions.

In the case of *Zuckle v. Regents of the University of California* (1999), a student with a learning disability that affected her visual processing in reading comprehension and rate asked for accommodations. She claimed her disability impaired her during timed tests. Zuckle sued the university for failing to provide reasonable accommodations. The university claimed that she was

not otherwise qualified despite the matriculation. The courts ruled in favor of the university and stated that Zuckle failed to establish that she could meet the essential eligibility requirements of the medical school even with the requested accommodation.

In a case review meta-analysis, Sahlen and Lehmann (2006) looked at multiple cases involving higher education. Their findings were applicable to the cases above. These findings included:

1. Postsecondary schools receiving federal monies must adhere to both Section 504 of the *Rehabilitation Act* and the *American with Disabilities Act*.
2. Students are fully responsible for providing documentation to support their disability claim.
3. Institutions must analyze their policies in regard to providing accommodations to students.
4. Institutions must consider the context of the students' requests and determine to what extent accommodations were beneficial.
5. Institutions must also consider the course request context and determine if accommodations lowers standards or fundamentally alters the plan of study. (p. 31)

The above findings help guide the remainder of this chapter, as the focus on the court cases is applicable to each finding.

#### *Postsecondary Schools Receiving Federal Monies*

Postsecondary schools receiving federal monies must adhere to both Section 504 of the *Rehabilitation Act* and the *American with Disabilities Act*. Detailed analyses of the cases in the findings previously stated were upheld. In the case of *Grove City College V. Bell, Secretary of Education* (1984), the ruling made clear that any postsecondary institution receiving any federal funding, including grants, must comply with the regulations of both the *Rehabilitation Act of 1973* and the *Americans with Disabilities Act of 1990*. In the case of *Gary Michael Powers and*

*Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation* (1999), the courts found that the postsecondary institution was required to provide accommodation for an individual with a disability; however, the plaintiff must prove that discrimination was intended. In the case *Pushkin v. Regents of the University of Colorado* (1981) the courts did rule in favor of Dr. Pushkin (plaintiff). The courts stated that the university's denial of admittance to Pushkin was based on discrimination against him because of his disability and not because he did not possess the necessary qualifications the program required. Research indicated that the university had violated his rights under section 504 of the *Rehabilitation Act* and the 1990 *Americans with Disabilities Act*. Likewise, in the case of *Davis v. Southeastern Community College* in 1979, the college was forced to evaluate this individual on all of her academic and technical qualifications as if she were a nondisabled individual. Just the opposite occurred in the case of *Zuckle v. Regents of the University of California* (1999). In this case, the university had looked at the student in light of her disability. It found that she did not meet the requirements of the university in the absence of the disability. The courts stated that this individual had failed to prove that she could meet the requirements with the requested accommodations.

#### *Students' Responsibility to Provide Documentation*

The law states that students with disabilities are responsible for providing documentation that proves the disability exists and that it will impair them in the secondary education setting. In the case *Wynne v. Tufts University School of Medicine* (1992) the courts stated that a school could not be expected to provide accommodations for a handicap of which they were unaware. In other words, Tufts University was only able to provide accommodations for the disability that they knew Wynne had. It was up to Wynne to prove the disability that he claimed; however, he was never diagnosed with dyslexia. In the Prima Facie Case, cited in the *Ohio Civil Rights Commission v. Case Western Reserve University* (1996), a student must document his or her disability by providing evidence or sufficient documentation that he or she has limitations in one or more aspects that hinder major life activity. Again, in the case of *Zuckle v. Regents of the*

*University of California* (1999), the student failed to prove that she could meet the requirements with the requested accommodations; therefore, the courts ruled in favor of the university. The outcome of this case stated that students must support their claims of disabilities as well as prove why an accommodation is necessary for equality and success.

### *Institutions' Responsibilities in Providing Accommodations*

The *Wynne v. Tufts University School of Medicine* (1992) case gave light that individuals with disabilities must be assessed on an individual basis. The outcome of this case proved that postsecondary schools need to evaluate how a given student can or cannot complete the given course requirements, without making hasty decisions. Schools should implement clear policies with associated outlined procedures as general guidelines; however, each student should be treated as an individual rather than assuming that because an individual has a disability, he or she is incapable of completing a program. As cited in Sahlen and Lehmann (2006):

The (school's) policies should clearly articulate the institution's declaration of nondiscriminatory treatment and fully apprise students of their rights. By implementing such a policy, the institution ensures that its students has and effective opportunity of fulfilling their notification and documentation obligations. These policies protect the postsecondary institution and the student from a denied request for a reasonable accommodation. (p. 29)

The term "good faith effort" evolved from the case of *Bakke v. Regents of University of California* in 1976 (as cited in Sahlen & Lehmann, 2006). This term is important in consideration of the lengths that postsecondary institutions go to ensure that reasonable accommodations have been sought. The consideration of alternate means for an accommodation, as in the case of *Wynne v. Tufts University School of Medicine* (1992) was proof that the institution was striving to accommodate the individual with disabilities.

The law states that institutions must consider the context of the students' requests and determine to what extent accommodations are beneficial. Again, in the case of *Wynne v. Tufts University School of Medicine* (1992), a student with a disability must be able to explain why the requested accommodation will be of benefit to him or her in postsecondary education. Wynne

also had made the request for a specific type of accommodation on a test, but he had no documentation that the accommodation would be beneficial. One key issue in this case was that accommodations reasonable for one individual might not be beneficial for another person with the same type of disability. In the case of *Maczaczjy v. University of the State of New York et al.* (1997) the courts decided that Maczaczjy's requests were unreasonable and that the college had documentation that they had offered him alternative accommodations that were suitable. Therefore, the university had made a good faith effort to accommodate the student with what the university and courts thought to be reasonable accommodations.

Institutions must also consider the course request context and determine if accommodations lower standards or fundamentally alter the plan of study. In the case of *Ohio Civil Rights Commission v. Case Western Reserve University* (1996) one key question was: Should universities and colleges be required to make "unreasonable" accommodation to their instructional programs for an individual with a disability. In this case, the courts said that the school did not have to exempt Fischer from certain requirements in order for her to complete its program because it would lessen the integrity of the program. If the *Zuckle v. Regents of the University of California* (1999) case is considered, the courts made the statement, "The medical school must show that Zuckle's requested accommodations would fundamentally alter the nature of the schools program" (p. 6). In this situation the university and college had the upper hand because it could define what lessened the integrity of its own programs.

According to Sahlen and Lehmann (2006), postsecondary institutions do not have to afford accommodations if doing so will weaken the program of study or hurt the outcome for other students in the program. They are also not expected to make accommodations that exempt individuals with disabilities from requirements and standards that are required of other students. Schools may also exempt the law of providing accommodations if they can prove that providing the accommodation will cause undue hardship on the college or university.

### *Resources: Procurement of Funding*

The cost of assistive technology has long been a barrier for individuals with disabilities. Wehmeyer (1998) conducted a survey of families and caregivers of individuals with mental retardation. He found that out of 284 family members or caregivers who used a computer, 223 mentioned cost as the number one barrier to accessing assistive technology. The cost of assistive technology has also become a burden on school systems. Bushrow and Turner (1994) noted that school administrators' main concern in relation to school budgets was the cost of assistive technology. This point was iterated by the Disability Policy Collaboration (2005) with their finding that lack of available funding was often cited as the greatest barrier for people with disabilities in their quest for acquiring assistive technology. To help address this problem, the *Technology-Related Assistance for Individuals with Disabilities Act* of 1988 (Tech Act; P.L. 100-407; reauthorized in 1994) provided discretionary grants to individual states to enable them to develop and implement consumer-responsive, comprehensive, and statewide programs of technology-related assistance to individuals with disabilities of all ages (RESNA, 1998). RESNA (1998) also made the statement:

Currently, all 50 states, plus the District of Columbia, Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands, have an assistive technology project (*Tech Act* project) funded under the *Tech Act* . . . this Act requires participants to examine barriers to accessing and obtaining assistive technology . . . and work to eliminate these barriers. (p. 1)

As previously stated, President Clinton's *Assistive Technology Act* of 1998 (ATA, P.L. 105-394) helped funding for individuals with disabilities by requiring the secretary of education to award grants to states and other areas to pay for the federal government's share of the establishment and administration of alternative funding (RESNA 1999). These alternative-funding mechanisms included special loans and programs working through collaboration with private entities for the purchase, lease, or loan of assistive technology devices and services.

As stated by the Disabilities Policy Collaboration (2005), there were four basic types of loans and funding models:



1. the revolving loan, in which monies from old loans are used to fund new loans;
2. the guaranteed loan, non-traditional borrowers are able to obtain loans because the alternative financing programs agree to pay them back if the borrower defaults;
3. the interest buy-down loan, where the alternative financing program uses its funds to buy-down the interest rate; and
4. traditional loans that one may obtain from a traditional lending company. (p. 2)

According to the Disability Policy Collaboration (2005), the *Assistive Technology Act of 1998* has seen bipartisan support over the years. From its inception in 1988, this Act has seen funding expansion with each revision until 2004. As discussed previously, the funding was put in place to allow states to develop sustainable assistive technology programs. In 2001-2002 the House and Senate recognized the benefits of this Act and agreed to postpone the sunset for the first nine states that were scheduled to lose funding. They also agreed to increase funding in the FY 2002 budget for loan programs (Arc and UCP Public Policy Collaboration, 2003). In 2003 President Bush recommended to cut the assistive technology funding and to eliminate 23 states from federal support; however, legislators saw the need for the assistive technology funding and continued to fund this Act in the FY 2002 budget. In 2004 Bush again recommended cuts to the *Assistive Technology Act's* budget. Funding was recommended to continue for 1 more year. In the FY 2005 budget President Bush proposed \$15 million for the Title III alternative financing programs. This budget included no monies whatsoever for Title I *Tech Act* projects (Disabilities Policy Collaboration, 2005).

Today, colleges and universities are mandated to provide “reasonable accommodations” to individuals with disabilities. Unfortunately, unlike the K-12 public schools, postsecondary institutions are not allocated monies from the federal government to carry out the legislative mandates that are placed upon them, including Section 540 and ADA (Boyle & Weishaar, 2001). Therefore, it is left up to each college or university to find the funding to support its own programs and services for individuals with disabilities.

According to Scione (2003), when it comes to assistive technology, there are other funding sources that individuals themselves may tap into. This author stated, “Those alternative financing programs represent a relatively recent and potentially cost-effective way of providing improved choice and control to people with disabilities” (p. 1). As reported by the Kentucky Assistive Technology Service Network (KATS, 2003), there was a wide variety of public and private entities that were willing to help offset the cost of purchasing assistive technology equipment. Because the field of assistive technology is continually changing, so also are the procedures for its funding. It is very difficult to identify the appropriate resources and find the most direct route to successful funding (KATS). KATS suggested that individuals with disabilities follow these steps to funding their own assistive technology needs:

1. define the need,
2. document the need,
3. identify the equipment and services needed and secure necessary prescriptions and other justification,
4. determine if alternative equipment will meet the need,
5. determine funding source,
6. collect and submit the required paper work,
7. ensure that authorization is received,
8. search for co-payment options, and
9. use the appeals process. (p. 7)

According to KATS (2003), from the above list of processes, step number five seemed to be the most complicated. There are several options, including private insurance, in which case funding is restricted to a condition resulting from an illness or an accident and is not pre-existing and the client must have a physician prescribe the assistive technology device and services (KATS).

Individuals might choose to acquire refurbished or used assistive technologies at a reduced cost. This approach could be used to obtain assistive technology in order to fill a void in

the education of individuals with disabilities (RENSA, 2000). Other options included private source funding, loan programs, and public sources of funding. Postsecondary institutions fall under the public source funding category. Under the ADA, employers and other entities such as postsecondary institutions might have some responsibilities to provide assistive technology to individuals as “reasonable accommodations”; however, once an individual with disabilities has been accepted into a postsecondary school, the institution is then responsible for making its programs accessible including provision of the necessary assistive technology. The college or university might choose to combine resources with outside agencies such as vocational rehabilitation centers or the department of the blind in order to obtain the technology that best meets the individuals needs (KATS, 2003). Once a school purchases the technology, it belongs to the school, not the student. The U.S. Department of Education (2005) defined the responsibility cost of auxiliary aids (assistive technology) as follows:

Postsecondary schools receiving federal financial assistance must provide effective auxiliary aids to students who are disabled. If an aid is necessary for classroom or other appropriate (nonpersonal) use, the institution must make it available, unless provision of the aid would cause undue burden. A student with a disability may not be required to pay part or all of the costs of that aid or service. An institution may not limit what it spends for auxiliary aids or services or refuse to provide auxiliary aids because it believes that other providers of these services exist, or condition its provision of auxiliary aids on availability of funds. In many cases, an institution may meet its obligation to provide auxiliary aids by assisting the student in obtaining the aid or obtaining reimbursement for the cost of an aid from an outside agency or organization, such as a state rehabilitation agency or a private charitable organization. However, the institution remains responsible for providing the aid. (p. 2)

Institutions across the country have identified the cost associated with both initial purchases and upgrades of assistive technology as being the greatest potential to inhibit the successful provision of assistive technology service to students (Michaels et al., 2001).

Postsecondary schools are not responsible for providing personal aids and services to individuals with disabilities. These include personal aids that help in bathing, dressing, or other personal care. Ross (1998) stated there have been several disputes stemming from differing interpretations of the *Americans with Disabilities Act*. Many universities claimed that state

agencies such as vocational rehabilitation were responsible for their clients. Nonetheless, when all is said and done, the ultimate responsibility still falls on the school (Michaels et al.).

*Faculty and Staff Training Relating to Disabilities Support Services*

Walters (2000) stated:

Faculty, staff, and students play a key role in creating an environment, not only in the classroom, but campus wide that allow students with disabilities to succeed. Stronger efforts on the part of the colleges and universities to educate faculty and staff would significantly enhance the likelihood of academic success of students with disabilities. (p. 10)

In addition, Walters (2000) pointed out, “With a handful of notable exceptions, little priority is given to building the capacity of faculty and staff at institutions of postsecondary education to teach students with disabilities” (p.10). This gives great insight for the incredible need of appropriately trained faculty. According to Cavanaugh (2006), the National Council for Accreditation of Teacher Education (NCATE) along with the International Society for Technology in Education (ISTE) required that assistive technology be addressed within such higher education programs as computing and technology leadership. Unfortunately, the majority of professors did not major in these areas and, therefore, had not been exposed to this standard. Michaels et al. (2001) agreed that the majority of professors lacked the knowledge and skills necessary to ensure equal access. Faculty and staff were very open when it came to discussing their lack of knowledge regarding the need for more training pertaining to students with disabilities. Burgstahler et al. (2000) recorded the following comments from their study's participants:

I just go by whatever we get from the disabled student services;

My approach is just follow your orders;

Something I am not sure of in class are what my rights are as a teacher;

What legalities do we have for ourselves and safety, what legalities do we have for the rest of the students in the class versus the legal things that a student has that disrupts the class?

I know that we are legally obligated to provide accommodations "within reason." I think it is the "within reason" that is ambiguous. For some of us in the math department, should we be waiving all math requirements for someone who has a math handicap? (p. 6)

These examples indicate that faculty members want and need more training. With this training, there could be a better understanding of students with disabilities and the responsibility of faculty pertaining to students with disabilities.

According to Burgstahler and Doe (2003), faculty members noted frustration with their lack of knowledge about legal aspects, different disabilities, accommodation, communication, assistive technology, and resource topics. However, they were willing to learn more about these topics to improve their classrooms (Salzberg, 2003). In a study by Leyser, Vogel, Wyland, and Brulle (1998), 88% of the faculty members surveyed said they were willing to accommodate students with disabilities, 82% reported little or no training, and 55% had no idea of the resources that were available to them. Faculty members who had more information about students with disabilities were more positive toward them; however, faculty members who were less knowledgeable were noted frequently as being barriers for students with disabilities (Leyser et al.).

The Association on Higher Education and Disability (AHEAD, 2004) set specific standards for the coordinators of students with disability services in higher education. Standard #3 addressed faculty and staff awareness. This included informing faculty regarding reasonable accommodations, legal requirements, and programmatic and curriculum modifications. It also addressed the area of disability awareness training for faculty, staff, and administrators. Standard #8 was solely dedicated to the area of training and professional development for disability service staff. This included providing initial and ongoing training for disability service staff (AHEAD). The remaining question is, Should faculty training be mandatory?

### *Ethical Considerations*

It is apparent that these legislative acts were brought about from hours of lobbying and from politicians taking ethical platforms for equality. Indeed, providing appropriate assistive technology equipment and assistive technology services is the “right” things to do. Nevertheless, administrators are often put in a difficult situation when it comes to justifying spending a large amount of money on one student versus the entire student body (Brown & Parette, 1992). Census data, national polls, and researchers have documented that persons with disabilities occupy an inferior status in our society and are severely disadvantaged in the professional and academic realms (Tagayuna et al., 2005). Bento (1996) and Ward and Berry (2005) found that faculty and staff in postsecondary education reported feeling torn between “the right thing to do” and maintaining the integrity of their courses. Such dilemmas emerged when requested accommodations benefited the student with the disability but implied negative consequence for other students. Bento acknowledged:

Faculty attitudes toward disabled students were typically characterized by deep-rooted ambivalence. On one hand, faculty perceived disabled students as people who confront and overcome special challenges, which engendered feelings of respect and anti-helpfulness. On the other hand, those feelings were also often accompanied by the perception that disabled students were somehow “less able” and their “disability” could jeopardize not only their own individual performance but also limit other students and the instructor. (p. 5)

Bourke, Strehorn, and Silver (2000) found that the greater the level of training and support, the greater was the faculty and staff members' understanding of the need for accommodations. Faculty were generally willing to allow extended time for exams and for exams to be proctored; however, they were least willing to alter assignment formats, provide outlines of lectures, and alter the format of examinations (Vogel, Leyser, Wyland, & Brulle, 1999). As pointed out by several researchers, including Leyser et al. (1998), both faculty and students benefited from everyone being informed when it came to disability issues. Faculty and staff made statements that they were willing to participate in training; however, as Salzberg et al.

(2002) pointed out, 73% of disability services coordinators reported that getting faculty to participate in training was a problem on their campuses.

It has been stated that assistive technology creates a sense of possibility for individuals with disabilities (Walters, 2000). The correct assistive technology and properly trained faculty members can literally mean the difference in success and failure for students with disabilities in postsecondary education.

## CHAPTER 3

### RESEARCH METHODOLOGY

#### *Introduction*

Students with disabilities are pursuing higher education in increasing numbers (Robinson, 1996). Postsecondary education institutions are held to legislative standards pertaining to appropriate accommodations, equal access, policy review, and appropriate training. Results of an investigation conducted by Beilke and Yssel (1999) indicated that faculty members were often willing to make instructional accommodations; however, they were reluctant to fully accept students with disabilities into their classes. In addition, Bento (1996) and Ward and Berry (2005) found that faculty and staff in postsecondary education often felt torn between “the right thing to do” and maintaining the integrity of their courses. Bourke et al. (2000) reported faculty who had strong training and support programs were better able to support the education of all students.

#### *Population*

The study’s population consisted of coordinators of students with disabilities services at the 15 state universities, 37 private colleges and universities, and 58 community colleges within North Carolina. Each postsecondary institution has one coordinator of disabilities services. The population size was 110 coordinators of disability services (see Appendix D). Each coordinator received an email stating that within the next 2 days they would receive a survey link; this email also explained the purpose of the survey. Two days later, participants received an email with an attached survey link; in addition, a follow-up by traditional mailing via U.S. postal service was sent to nonresponders.



### *Research Design*

A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying (surveying) the population (Creswell, 2003). With this in mind, the researcher surveyed the population of coordinators of students with disabilities services of community colleges, private colleges and universities, and state universities within North Carolina. I designed a survey (see Appendix C) that enabled me to gain a better understanding of each of the following areas as it related to each coordinator's postsecondary institution: (a) the percentage of students with disabilities, (b) the assistive technology available on campus, (c) funding and adequacy of assistive technology, (d) students with disabilities staff training and support for faculty, and (e) legislative understanding. Prior to mailing the survey, the instrument was evaluated by a select group from each type of institutional setting with four individuals reviewing the instrument. These personnel were comprised of the coordinators of students with disabilities services or a similar position at each type of institution. The researcher distributed the survey online with a follow-up of traditional mailings via U.S. Postal Service to nonresponders.

### *Data Collection*

#### *Legal Data Collection Methods*

A main objective of this study was to define, collect, review, and analyze state and federal law relevant to a discussion on individuals with disabilities in postsecondary education including the rights and responsibilities of both the individual and the institution. The researcher accessed Lexus Nexis Academic and Congressional Universe website throughout the month of February 2006. This database had 52 cases. The researcher read each case to determine if it held relevance to this study. After a review of the legal decisions, the researcher documented cases that dealt with institutions of three types of postsecondary entities: higher education, examination agencies, and professional boards. This information was used to help develop the survey and

gather information regarding how the courts interpreted the legislation. Chapter 2 of this study covered these cases in the form of case summarization and analysis.

### *Quantitative Data Collection Methods*

A survey was distributed to coordinators of students with disabilities services at the 15 state universities, 37 private colleges and universities, and 58 community colleges within North Carolina. The survey requested information regarding the type (state university, private college or university, or community college) of the institution, the percentage of students with disabilities, the assistive technology available on campus, funding and adequacy of assistive technology, students with disabilities staff training and support for faculty, and legislative understanding (see Appendix C).

### *Instrumentation*

Over the past few years online surveys have become more common. Several researchers (Dillman, as cited in Gotten, 2001; McCauley, as cited in Gotten) have suggested that telephone and paper surveys would soon be obsolete because of the speed, reliability, ease of response, and cost effectiveness of online surveys. There is some discrepancy in the suggested return rates of online surveys. For example, Gotten stated that email survey return rates were lower than methods that were more traditional. However, Bason (as cited in Less, 2003) and Less, Schefer, and Dillman (as cited in Less) stated that they found no significant difference in return rates on traditional and email surveys. In fact, they found the degree of completeness of email surveys to be significantly higher, thereby, yielding more data. Therefore, the researcher chose to disseminate the survey online with a follow up of traditional mailings via U.S. postal service to nonresponders.

The survey instrument (see Appendix C) was set up in a three-section format. Using Section One, Question 1, the researcher requested the type of postsecondary institution. Section One, Questions 2 through 6 addressed the percentage of student with disabilities. Section One,

Questions 11 and 12 and Section Two, Questions 1-20 pertained to information about the assistive technology and services available to students with disabilities on postsecondary campuses. Section One, Questions 10–15, focused on funding and adequacy of assistive technology. Section One, Questions 6–9 and 16–18 requested information about students with disabilities staff training and support for faculty. Finally, the legislative understanding on postsecondary campuses was addressed in Section Three of the survey. This section was broken into legislative issues (Questions 1 and 2), students’ responsibilities (Questions 3 and 4), institutions’ responsibilities (Questions 5-12), context of accommodations (Question 13), and impact of accommodations (Questions 14-16). Table 6 depicts the survey's format and alignment with research questions:

Table 6  
*Survey Instrument Alignment With Research Questions*

Section / Question(s) Number	Area of Research Focus	Research Question(s)
Section 1 / Question 1	Type of Postsecondary Institution	1, 2, 3, 4, 5, 6, 7
Section 1/ Question(s) 2- 6	Percentage of students with disabilities	1
Section 1 / Questions 11 & 12	Assistive Technology on Postsecondary Campuses	3
Section 2 / Questions 1-20	Assistive Technology on Postsecondary Campuses	2
Section 1 / Questions 10, 13 & 15	Funding of Assistive Technology	4
Section 1 / Questions 14	Funding of Assistive Technology	5
Section 1 / Questions 6-9 & 16-18	Staffing and Faculty Training	6
Section 3 / Questions 1 & 2	Legislative Understanding / Legislative Issues	7

Table 6 (continued)

Section / Question(s) Number	Area of Research Focus	Research Question(s)
Section 3 / Questions 3 & 4	Legislative Understanding / Students' Responsibilities	7
Section 3 / Questions 5-12	Legislative Understanding / Institutions' Responsibilities	7
Section 3 / Question 13	Legislative Understanding / Context of Accommodations	7
Section 3 / Questions 14-16	Legislative Understanding / Impact of Accommodations	7

The researcher used online surveys with a follow up of traditional mailings to nonresponders via U.S. postal service. The researcher sent emails with a cover letter first and then an email with an attached link to the survey (see Appendix A). Five days after the first email, the researcher sent follow-up emails (including the survey link) to the participants to remind them of the pending survey. After 5 additional days, the researcher disseminated the paper copy of the cover letter and survey (along with a reminder that the survey also could be found online) to the individuals who had not responded (see Appendix D). The paper surveys were sent along with postage-paid return envelopes. The researcher anticipated that these measures would ensure a strong return rate. In fact, the final return rate was a strong 65.45%.

#### *Determining Survey's Validity*

In order to establish content validity of the survey, the researcher disseminated the survey to a group of content experts who provided feedback regarding the survey instrument. Using this feedback, the researcher made the necessary adjustments to create the final draft.

Further validity was also established by administering the survey instrument to a select group of the coordinators of students with disabilities services. All together, the researcher had

four individuals review the survey, one from each sector private college and university, public college and university, and community college as well as an outside expert on assistive technology all located outside of the survey's population area of North Carolina.

## *Data Analysis*

### *Legal Data Analysis Methods*

Chapter 2 presented the legal aspects of individuals with disabilities in postsecondary education including the rights and responsibilities of both the individuals and the institutions. The majority of this research was accomplished through online and traditional methods. The researcher accessed Lexus Nexis Academic and Congressional Universe website throughout the month of February 2006. This database yielded 52 cases. The researcher read each case to determine if it held relevance to this study. After a review of the legal decisions, the researcher documented cases that dealt with institutions of three types of postsecondary entities: higher education, examination agencies, and professional boards. A comparison of these cases helped guide the researcher in identifications of some key points within the survey. Chapter 2 covered these cases in the form of case summarization and analysis. The final section of the survey deals with the issues of legislative demands, student responsibilities, institutional responsibilities, consideration of context in which accommodations are used, and the impact of accommodations on other students. Each of these dependent variables, with the exception of consideration of context in which accommodations are used, was measured as the average of the items under each concept as indicated on the survey

### *Quantitative Data Analysis Methods*

Data were analyzed by transferring the data into SPSS. The data collected from coordinators of students with disabilities services at the 15 state universities, 37 private colleges and universities, and 58 community colleges within North Carolina were analyzed in order to reject or retain the stated hypotheses. The following data were analyzed for each institution.

The independent variable was the type of postsecondary institution (state university, private college and university, or community college). The dependent variables consisted of items related to (a) the percentage of student with disabilities, (b) the assistive technology available on campus, (c) funding and adequacy of assistive technology, (d) students with disabilities staff training and support for faculty, and (e) legislative understanding. SPSS was used to analyze the data.

### *Research Questions, Hypotheses, and Methods*

Seven research questions and 25 null hypotheses were developed and tested. Listed below are the questions and null hypotheses along with the statistical tests used to answer the questions.

Research Question #1: Do North Carolina community colleges, private colleges and universities, and state universities differ in the percentage of students with disabilities?

Ho<sub>1</sub><sub>1</sub>: There is no difference among the types of institutions regarding the percentage of students with disabilities enrolled on their campuses.

Ho<sub>1</sub><sub>2</sub>: There is no difference among the types of institutions regarding the percentage of students with physical disabilities.

Ho<sub>1</sub><sub>3</sub>: There is no difference among the types of institutions regarding the percentage of students with learning disabilities.

The above hypotheses were tested using an ANOVA. If an ANOVA is significant, an appropriate post hoc test will be used to determine which pairs of means are different.

Research Question #2: Do North Carolina community colleges, private colleges and universities, and state universities differ in the number of technology devices available for their students with disabilities?

Ho<sub>2</sub><sub>1</sub>: There is no difference among the types of institutions regarding the number of assistive technology devices available on their campuses.

The above hypothesis was tested using an ANOVA. If an ANOVA is significant, an appropriate post hoc test will be used to determine which pairs are different.

Research Question #3: Do North Carolina community colleges, private colleges and universities, and state universities differ in the mean age of assistive technology equipment that is available for their students with disabilities?

Ho3<sub>1</sub>: There is no difference among the types of institutions regarding the percentage of assistive technology devices that are less than 2 years old.

The above hypothesis was tested using an ANOVA. If an ANOVA is significant, an appropriate post hoc test will be used to determine which pairs are different.

Research Question #4: Do North Carolina community colleges, private colleges and universities, and state universities' students with disabilities services differ in the funding of assistive technology for students with disabilities?

Ho4<sub>1</sub>: There is no difference among the types of institutions regarding whether or not grants are a source of funding.

Ho4<sub>2</sub>: There is no difference among the types of institutions regarding whether or not funding is part of the campus-wide budget.

Ho4<sub>3</sub>: There is no difference among the types of institutions regarding whether or not collaboration with outside agencies is a source of funding.

Ho4<sub>4</sub>: There is no difference among the types of institutions regarding whether or not institutions purchase refurbished or used assistive technologies.

Ho4<sub>5</sub>: There is no difference among the types of institutions regarding how much was spent on assistive technologies during the last fiscal year.

Ho4<sub>6</sub>: There is no difference among the types of institutions regarding the ratio of spending on assistive technologies and the number of students with disabilities during the last fiscal year.

Ho4<sub>1</sub> through Ho4<sub>4</sub> were analyzed with cross-tabulated tables and the chi-square test. ANOVA were conducted to analyze Ho4<sub>5</sub>.

Research Question #5: Is there a difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of the adequacy of funding to meet students' needs?

Ho5<sub>1</sub>: There is no difference among the coordinators at the three types of institutions regarding their perceptions of the adequacy of funding to meet the needs of their students with disabilities.

The above hypothesis was analyzed with cross-tabulated tables and the chi-square test.

Research Question #6: Do North Carolina community colleges, private colleges and universities, and state universities differ in the staffing of students with disabilities support services, coordinator training, and the way services for students with disabilities works with faculty?

Ho6<sub>1</sub>: There is no difference among the types of institutions regarding the employment status of the coordinator of services for students with disabilities.

Ho6<sub>2</sub>: There is no difference among the types of institutions regarding the number of full-time staff positions.

Ho6<sub>3</sub>: There is no difference among the types of institutions regarding the number of part-time staff members.

Ho6<sub>4</sub>: There is no difference among the types of institutions regarding whether or not there is personnel trained in assistive technology devices.

Ho6<sub>5</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends seminars and workshops related to assistive technology.

Ho6<sub>6</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends training related to legislation.

Ho6<sub>7</sub>: There is no difference among the types of institutions regarding whether or not faculty are contacted to discuss the accommodations and modifications of their students with disabilities.



Ho6<sub>2</sub> and Ho6<sub>3</sub> were analyzed with ANOVA, while cross-tabulated tables and the chi-square test were used to test the remaining null hypotheses.

Research Question #7: Is there a difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of: (a) legislative issues, (b) student responsibility, (3) institutional responsibility, (d) consideration of context in which accommodations are used, and (e) the impact of accommodations on other students?

Ho7<sub>1</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of legislative issues.

Ho7<sub>2</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of student responsibility.

Ho7<sub>3</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of institutional responsibility.

Ho7<sub>4</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of consideration of context in which accommodations are used.

Ho7<sub>5</sub>: There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations regarding faculty and students.

Ho7<sub>6</sub>: There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations regarding the institution.

An ANOVA was used to test each of the null hypotheses.

## CHAPTER 4

### RESULTS OF DATA ANALYSIS

#### *Introduction*

Students with disabilities are pursuing higher education in increasing numbers (Robinson, 1996). In fact, between 1978 and 2000, the percentage of college students who self-identified as having disabilities has quadrupled (Michaels et al., 2001). Keeping in mind that individuals with disabilities are entitled to full participation in all aspects of society, including education (Beech, 2002), it is the responsibility of the institution to understand and interpret the legal mandates and afford the accommodations or modifications that would allow an individual with disabilities the “full participation.”

The survey in this study pertained to information regarding the type (state university, private college and university, or community college) of the institution, the percentage of students with disabilities, the assistive technology available on campus, funding and adequacy of assistive technology, staff training, and support for faculty. The survey also contained questions related to the coordinators’ perceptions of legislative issues, institutional and student responsibilities, and the impact of accommodations for students with disabilities (see Appendix C).

#### *Survey Distribution*

An online survey invitation was sent by email to coordinators of students with disabilities services at the 15 state universities, 37 private colleges and universities, and 58 community colleges in North Carolina. Each postsecondary institution has one coordinator of disabilities services. The population was 110 coordinators of disability services (see Appendix D). In this process, the first step was to develop a database containing each postsecondary institution's name, type, coordinator’s name, coordinator’s email address, coordinator’s phone number, and

coordinator's physical address. Each institution was personally contacted to ensure that the correct person would receive the survey.

Prior to issuing the emailed invitations to take the online survey, each coordinator received a letter of introduction by email stating that within 2 days, he or she would receive an email invitation to take an online survey at East Tennessee State University's College of Education Survey System. This letter also addressed the purpose and importance of the study and covered the consent statement for participation as well as the assurance of anonymity of the respondent and his or her institution. Two days after the letter of introduction was sent, the email invitations were sent to the coordinators of students with disabilities services at 110 North Carolina postsecondary institutions. After 7 days, a postcard was sent via United States postal service to those who had not responded to the online survey. The postcard served as a reminder to take the survey and stated that for the convenience of the respondent, a second email invitation would be sent to them within 2 days. According to Len-Rios and Cameron (2001), most web-based surveys require one to four contacts to obtain an optimal response rate. A person-to-person telephone call was also made at this time with the hope of increasing the number of respondents. One calendar week after this, the second email invitation was sent to those who had not yet responded. A paper version of the survey was mailed via U.S. postal service to the remaining nonresponders. This was the last contact made with the participants. According to Len-Rios and Cameron, participants might perceive the survey pursuit after four contacts as an annoyance.

### *Online Surveys*

Len-Rios and Cameron (2001) reported that response rates of less than 10% are common in online surveys. In their study, they surveyed over 950 people and received only a 7% return rate (65 responses). They stated that over 200 people had visited the website but failed to completed the survey itself. One reason for a low return rate for online surveys was noted by Alvarez and VanBeselaere (2003) and Feld (2001). Both researchers stated the potential cause

could be a lack of access to computers or email. This should not have been the case with the population in this study. Given that each of the participants held an active email address assigned by the institution in which he or she worked, each coordinator had the means by which to complete the survey.

*Response Rates for Surveys*

Overall, 72 out of 110 coordinators of students with disabilities services responded to either the online or mailed survey for a response rate of 65.5%. Response rates for the online survey were much greater than the 10% reported by Len-Rios and Cameron in 2001. At the close of the online survey, the researcher had a response of 55 out of the 110 invitations sent. This was a return rate of 50%. The response rates for the online survey by type of institution are listed in Table 7.

Table 7

*Response Rates for the Online Survey by Type of Institution*

Type of Institution	# Sent	# of Responses	Response Rate
Community College	58	31	53.4%
Private College and University	37	16	43.2%
State University	15	8	53.3%
Total Online Response Rate	110	55	50.0%

At the time of the mailed survey distribution, the researcher had a strong survey response rate for the online survey that constituted 50% of the targeted population. The mailed survey return rate was not as strong as the online response rate. By the deadline for return of the mailed

survey, the researcher had received 17 additional responses. This added an additional 15.5% to the overall rate of return for 110 coordinators. For the 55 mailed surveys, the response rate was 31%. The diminished mailed survey return rate does not mean that this method is less productive in collecting data than is the online method. It is probable that many of the individuals who completed the online survey would have completed just as willingly a mailed version of the survey if they had received it first. The response rate for the 55 mailed surveys by type of institution is shown in Table 8.

Table 8

*Response Rates for U. S. Postal Service Mailed Survey by Type of Institution*

Type of Institution	# Sent	# of Responses	% Response Rate
Community College	27	7	25.9
Private College and University	21	6	28.5
State University	7	4	57.1
Total for Mailed Surveys	55	17	30.1

The final cumulative return total was 72 responses out of 110 invitations sent. This constitutes a return rate of 65.5%. Table 9 lists the return rate (both online and mailed surveys) by type of institution.

Table 9

*Response Rates by Type of Institution*

Type of Institution	Sent	# of Responses	% Response Rate
Community College	58	38	65.5
Private College and University	37	22	59.4
State University	15	12	80.0
Total Response Rate	110	72	65.5

Invitations sent to the state universities had a stronger response rate than those sent to the private colleges and universities and community colleges.

Of the 72 surveys returned, one (from a community college) was not usable because of unusual discrepancies throughout this particular survey and was excluded from the analyses of the data. Therefore, the sample for this study included 71 coordinators of students with disabilities services. The breakdown of the number and percentage of respondents by type of institution is shown in Table 10.

Table 10

*Counts and Percentages of Survey Respondents by Type of Institution*

Type of Institution	Frequency	%
Community College	37	52.1
Private College and University	22	31.0
State University	12	16.9
Total	71	100.0

### *Data Analysis*

For each of the following research questions, the independent (predictor) variable was the type of institution. The three levels of type of institution were: (a) community college, (b) private colleges or universities, and (c) state universities.

#### *Research Question #1*

Do North Carolina community colleges, private colleges and universities, and state universities differ in the percentage of students with disabilities?

Of the 71 survey respondents, 67 responded with information regarding the type of institution, the number of students enrolled at the institution, and the number of students with a disability. Using this information, a one-way analysis of variance was conducted to evaluate mean differences between the type of institution and the percentage of students with disabilities enrolled at the institution. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the percentage of students with disabilities enrolled in the institution. The ANOVA was significant  $F(2, 64) = 4.82, p = .01$ . Therefore, the null hypothesis was rejected. The effect size, as measured by  $\eta^2$ , was medium (.13).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tukey post hoc test was selected for the multiple comparisons because equal variances were assumed  $F(2, 64) = 2.76, p = .07$ . There was a significant difference in the mean percentage of students with disabilities between community colleges and private institutions ( $p = .01$ ). The mean percentage of students with disabilities enrolled in private institutions was 5%, whereas the mean percentage for community colleges was 2.5%. There was no significant difference between the percentage of students with disabilities enrolled in community colleges and state universities ( $p = .78$ ), nor was there a significant difference between private institutions and state universities ( $p = .19$ ). It appears that a greater percentage of students who self-report disabilities attend private colleges and

universities than attend community colleges or state universities in North Carolina. Table 11 depicts the means and the standard deviations for the percentage of students with disabilities enrolled in North Carolina postsecondary institutions by type of institution.

Table 11

*Means and Standard Deviations for Percentage of Students With Disabilities Enrolled in North Carolina Postsecondary Institutions by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	35	2.51	2.05
Private	20	5.01	3.60
State University	12	3.15	3.57
Total	67	3.37	3.04

Because the AVOVA was statistically significant (at the .05 level), the researcher rejected  $H_{01}$ : There is no difference among the types of institutions regarding the percentage of students with disabilities enrolled on their campuses.

Of the 71 survey respondents, 70 responded with information regarding the type of institution and the percentage of students with disabilities who self-reported a physical disability. Using this information, a one-way analysis of variance was conducted to evaluate the mean differences between the types of institutions and the percentage of students with disabilities enrolled at the institution who reported physical disabilities. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the percentage of students with physical disabilities. The ANOVA was significant  $F(2, 67) = 6.40, p < .01$ . The effect size, as measured



by  $\eta^2$ , for the type of institution and the percentage of students with physical disabilities was large (.16).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tamhane post hoc test was selected for the multiple comparisons because equal variances were not assumed  $F(2, 67) = 4.60, p = .01$ . There was a significant difference between community colleges and private institutions ( $p < .01$ ). Among students with disabilities, the mean percentage of students with physical disabilities at private colleges was 14% lower than was the mean percentage at community colleges. Although there was no significant difference between state universities and private institutions ( $p = .20$ ), the mean percentage of students with physical disabilities at private institutions was over 8% lower than was the mean percentage at state universities. There was no significant difference between community college and state universities ( $p = .59$ ).

It appears that a greater percentage of students with physical disabilities attend community colleges and state universities than attend private institutions. Table 12 depicts the means and the standard deviations for the percentage of students with disabilities who self-report physical disabilities enrolled in North Carolina postsecondary institutions by type of institution.

Table 12

*Means and Standard Deviations for Percentage of Students with Disabilities Who Self-Report Physical Disabilities by Type of Institution*

Type of Institution	$N$	$M$	$SD$
Community College	37	23.46	16.61
Private	21	9.43	9.71
State University	12	17.89	13.49
Total	70	18.29	15.44

Because the AVOVA was statistically significant (at the .05 level), the researcher rejected  $H_{012}$ : There is no significant difference among the types of institutions regarding the percentage of students with physical disabilities.

Of the 71 survey respondents, 70 responded with information regarding the type of institution and the percentage of students with disabilities who self-reported a cognitive or learning disability. Using this information, a one-way analysis of variance was conducted to evaluate the mean difference between the types of institutions and the percentage of students with cognitive or learning disabilities enrolled at the institution. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the percentage of students with disabilities who self-report cognitive or learning disabilities. The ANOVA was significant,  $F(2, 67) = 6.00, p < .01$ . The effect size, as measured by  $\eta^2$ , for the type of institution and the percentage of students with cognitive or learning disabilities was large (.15).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tukey post hoc test was selected for the multiple comparisons because equal variances were assumed  $F(2, 67) = 1.73, p = .19$ . There was a significant difference between private institutions and community colleges ( $p < .01$ ) and between private institutions and state universities ( $p = .04$ ). In each case, the mean percentage of students with learning or cognitive disabilities at private institutions was almost 19 percentage points higher than the mean percentages at community colleges and state universities. There was no significant difference between community colleges and state universities ( $p = 1.00$ ).

It appears that among students with disabilities, a greater percentage of students who self-report cognitive or learning disabilities attend private colleges and universities when compared with community colleges and state universities in North Carolina. Table 13 depicts the means and the standard deviations for the percentage of students with cognitive or learning disabilities enrolled in North Carolina postsecondary institutions by type of institution.

Table 13

*Means and Standard Deviations for Percentage of Students With Disabilities Who Self-Report Cognitive or Learning Disabilities by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	61.50	22.65
Private	21	80.36	16.88
State University	12	61.78	20.93
Total	70	67.21	22.26

Because the AVOVA was statistically significant (at the .05 level), the researcher rejected Ho<sub>13</sub>: There is no significant difference among the types of institutions regarding the percentage of students with learning disabilities.

The following hypotheses were each rejected for research question #1: Ho<sub>11</sub>: There is no difference among the types of institutions regarding the percentage of students with disabilities enrolled on their campuses. Ho<sub>12</sub>: There is no difference among the types of institutions regarding the percentage of students with physical disabilities. Ho<sub>13</sub>: There is no difference among the types of institutions regarding the percentage of students with learning disabilities.

*Research Question #2*

Do North Carolina community colleges, private colleges and universities, and state universities differ in the number of technology devices available for their students with disabilities?

Table 14 shows the number and percentage of coordinators who reported that their postsecondary institution had assistive technology devices available on their campuses. As shown in Table 14, the majority of institutions had note takers and assistive computer software

available to their students with disabilities. In contrast, 7% of the coordinators reported their campus had specialized gym equipment.

Table 14

*Percentages of Assistive Technology Devices Available at North Carolina Postsecondary Institutions*

Device	<i>N</i>	%
Note takers	60	84.5
Assistive computer software	57	80.3
Assistive listening devices	45	63.4
Interpreters for the deaf	44	62.0
Screen readers	44	62.0
Electronic readers	43	60.6
Adaptive workstations	41	57.7
Taped texts	37	52.1
Specialized tape recorders	32	45.1
Telecommunications for the deaf	30	42.3
Large key calculators or keyboards	30	42.3
Open and closed caption	27	38.0
Television enlargers	26	36.6
Voice synthesizers	22	31.0
Optical character recognition	22	31.0
Talking calculators	20	28.2
Braille calculators, printers, typewriter	16	22.5
Videotext displays	15	21.1
Telephone handset	12	16.9
Specialized gym equipment	5	7.0

All 71 survey respondents reported information regarding the type of institution and the number of technology devices available for their students with disabilities. This information was gathered using a list of technologies, as shown in Table 3 (Chapter 2), that were regarded as being useful to students with disabilities (U.S. Department of Education, 2005). Using the information gathered, a one-way analysis of variance was conducted to evaluate the differences between the type of institution and mean number of technology devices available for students with disabilities. The potential range of the number of devices was 0 to 20. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the number of technology devices available for students with disabilities. The ANOVA was significant  $F(2, 68) = 13.19, p < .01$ . The effect size, as measured by  $\eta^2$ , for type of institution and number of technology devices available for students with disabilities was large (.28).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tukey post hoc test was selected for the multiple comparisons because equal variances were assumed  $F(2, 68) = .38, p = .69$ . There was a significant difference between the mean number of types of devices available at private institutions and community colleges ( $p < .01$ ) and between private institutions and state universities ( $p < .01$ ). Of the 20 preselected technology devices regarded as useful to students with disabilities (U.S. Department of Education, 2005), private college and university campuses had fewer devices ( $M = 5.41$ ) than did both community colleges ( $M = 9.78$ ) and state universities ( $M = 12.25$ ). There was no significant difference between the mean number of devices available at community colleges and state universities ( $p = .17$ ).

It appears that of the 20 preselected technology devices, private colleges and universities had the lowest mean score for the number of devices available on their campuses as compared with community colleges and state universities in North Carolina. Table 15 depicts the means and the standard deviations for the number of the 20 useful assistive technology devices available on North Carolina's postsecondary institutions by type of institution.

Table 15

*Number of the 20 Useful Assistive Technology Devices Available on North Carolina Postsecondary Institutions by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	9.78	4.03
Private	22	5.41	4.00
State University	12	12.25	4.18
Total	71	8.85	4.70

Because the AVOVA was statistically significant (at the .05 level), the Ho<sub>2</sub> hypothesis stating there is no difference among the types of institutions regarding the number of assistive technology devices available on their campuses was rejected.

*Research Question #3*

Do North Carolina community colleges, private colleges and universities, and state universities differ in mean age of assistive technology equipment that is available for their students with disabilities?

Of the 71 survey respondents, 65 responded with information regarding the type of institution and the percentage of the assistive technology devices on their campus that is less than 2 years old. Using this information, a one-way analysis of variance was conducted to evaluate the mean difference between the types of institutions and the percentage of the assistive technology devices on their campus less than 2 years old. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the percentage of the assistive technology devices

on their campus that is less than 2 years old. The ANOVA was not significant,  $F(2, 62) = .13, p < .88$ . The effect size, as measured by  $\eta^2$ , was very small ( $<.01$ ).

The results indicate there was little difference among the types of institutions. The percentage of the assistive technology devices on their campus that are less than 2 years old was not significantly affected by the type of North Carolina postsecondary institution. Table 16 depicts the means and the standard deviations for the percentage of the assistive technology devices that are less than 2 years old on North Carolina postsecondary institutions by type of institution.

Table 16

*Means and the Standard Deviations for the Percentage of Assistive Technology Devices Less Than 2 Years Old on North Carolina Postsecondary Institutions*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	34	37.85	33.31
Private	20	40.05	40.01
State University	11	33.18	34.01
Total	65	37.74	35.12

Because the ANOVA was not statistically significant (at the .05 level), the researcher failed to reject  $H_{031}$ : There is no difference among the types of institutions regarding the percentage of assistive technology devices that are less than 2 years old.

*Research Question #4*

Do North Carolina community colleges, private colleges and universities, and state universities students with disabilities services differ in the funding of assistive technology for students with disabilities?

Of 71 respondents, 71 gave information regarding the type of postsecondary institution and funding as it relates to grants. Using this information, the chi-square procedure was not statistically significant. However, the percentages in Table 17 show that 43.2% of the community colleges received funding from grants, whereas 22.7% of the private institutions and 25% of state universities received funding from grants.

Table 17

*Crosstabulated Table for Funding From Grants by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Grants:						
No	21	56.8	17	77.3	9	75.0
Yes	16	43.2	5	22.7	3	25.0
Total	37	100.0	22	100.0	12	100.0

The results of the chi-square showed a statistically significant difference (at the .05 level) among the types of institutions regarding whether or not the institution received funding from grants,  $X^2(2) = 3.10, p = .21$ . Therefore, the researcher failed to reject  $H_04_1$ : There is no difference among the types of institutions regarding whether or not grants are a source of funding.



Of 71 respondents, all gave information regarding the type of postsecondary institutions and funding as it relates to part of the campus-wide budget. Using this information, the chi-square test was not statistically significant. Although there was no statistically significant difference in the types of institutions, Table 18 shows that 59% of private institutions received funding from a campus-wide budget, whereas almost 76% of community colleges and 75% of state universities received funding from a campus-wide budget.

Table 18

*Crosstabulated Table for Funding From Campus-Wide Budget by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Campus-Wide Budget:						
No	9	24	9	40	3	25
Yes	28	75	13	59	9	75
Total	37	100	22	100	12	100

There was no statistical significant difference (at the .05 level) among the types of institutions and whether or not the institution received funding from the campus-wide budget,  $X^2(2) = 1.97, p = .37$ . Therefore, the researcher failed to reject  $H_{04_2}$ : There is no difference among the types of institutions regarding whether or not funding is part of the campus-wide budget.

Of 71 respondents, all gave information regarding the type of postsecondary level and funding through collaboration with outside agencies. Using this information, a chi-square procedure was not statistically significant. There was little difference in the percentages for the three groups of postsecondary institutions in North Carolina. The marginal difference is shown in Table 19.

Table 19

*Crosstabulated Table for Funding by Collaboration With Outside Agencies by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Collaboration With Outside Agencies:						
No	21	56.8	11	50.0	6	50.0
Yes	16	43.2	11	50.0	6	50.0
Total	37	100.0	22	100.0	12	100.0

There was no significant difference among the types of institutions and whether or not the institution received funding through collaboration with outside agencies,  $X^2 (2) = .325, p = .85$ ; therefore, the researcher failed to reject  $H_{04_3}$ : There is no difference among the types of institutions regarding whether or not collaboration with outside agencies is a source of funding.

Of 71 respondents, all gave information regarding the type of postsecondary institution and whether or not institutions purchased refurbished or used assistive technologies. Because there were violations of the assumptions of chi-square, the null hypothesis was not tested. As shown in Table 20, the majority of community colleges, private institutions, and state universities do not purchase refurbished or used assistive technology equipment.

Table 20

*Crosstabulated Table for Purchase of Refurbished Equipment by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Purchase of Refurbished Equipment:						
No	34	91.9	21	95.5	12	100.0
Yes	3	8.1	1	4.5	0	0.0
Total	37	100.0	22	100.0	12	100.0

Because there were violations of the assumptions of chi-square, the researcher did not test Ho<sub>4</sub>: There is no difference among the types of institutions regarding whether or not institutions purchase refurbished or used assistive technologies.

Of the 71 survey respondents, 58 responded with information regarding the type of institution and the amount of money spent on assistive technology during the last fiscal year. Using this information, a one-way analysis of variance was conducted to evaluate the mean difference between the type of institution and amount of money spent on assistive technology during the last fiscal year. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the amount of money spent on assistive technology during the last fiscal year. The ANOVA was significant,  $F(2, 55) = 3.13, p = .051$ . The effect size, as measured by  $\eta^2$ , for the type of institution and the amount of money spent on assistive technology during the last fiscal year was medium (.10).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tamhane post hoc test was selected for the multiple comparisons because equal variances were not assumed,  $F(2, 55) =$

3.90,  $p = .03$ . Although the overall  $F$  was significant, the probabilities for the post hoc testing showed there were no significant differences in the pairs. The means for the amount of money spent on assistive technology during the last fiscal year was the highest for state universities ( $M = \$5,190.00$ ,  $SD = \$5967.03$ ) and community colleges ( $M = \$3,194.76$ ,  $SD = \$5417.55$ ). The least amount of money spent on assistive technology during the last fiscal year was appropriated to the private colleges and universities ( $M = \$847.37$ ,  $SD = \$1368.44$ ). Table 21 depicts the median amount of money spent on assistive technology by type of institution.

Table 21

*Median Amount of Money Spent on Assistive Technology*

Type of Institution	$N$	$Mdn$
Community College	29	\$ 1,200
Private	19	\$ 400
State University	10	\$ 4,000

Because the overall ANOVA was statistically significant (at the .05 level), the researcher rejected  $H_{045}$ : There is no difference among the types of institutions regarding how much was spent on assistive technologies during the last fiscal year.

Of the 71 survey respondents, 57 responded with information regarding the type of institution, the number of students with disabilities, and the amount of money spent on assistive technology over the last fiscal year. Using this information, a one-way analysis of variance was conducted to obtain mean differences among community college, private institution, and state university coordinators and the average amount spent per student with disabilities regarding assistive technology. The predictor, the type of institution, included three levels: community

colleges, private colleges and universities, and state universities. The criterion was the average amount of money spent per student. The ANOVA was not significant,  $F(2, 54) = 2.41, p = .10$ . The effect size, as measured by  $\eta^2$ , was medium (.08).

The results indicate practical significance. Private colleges and universities spend less on assistive technology per student with disabilities than do community colleges and state universities. The mean amount spent per student at private institutions was \$12.46 ( $SD = \$17.28$ ) whereas at the state university level, the amount spent was \$29.78 ( $SD = \$29.05$ ). Community colleges spent the most per student with a mean of \$63.50 ( $SD = \$108.53$ ). The median for each type of institution are depicted in Table 22.

Table 22

*Median Amount Spent Per Student With Disability by Type of Institution*

Type of Institution	<i>N</i>	<i>Mdn</i>
Community College	29	\$ 18.75
Private Institution	18	\$ 5.00
State University	10	\$ 22.90

Because the overall ANOVA was statistically significant (at the .05 level), the researcher failed to reject Ho4<sub>6</sub>: There is no difference among the types of institutions regarding the ratio of spending on assistive technologies and the number of students with disabilities during the last fiscal year.

In summary of research question #4, the researcher failed to reject Ho4<sub>1</sub>: There is no difference among the types of institutions regarding whether or not grants are a source of funding, Ho4<sub>2</sub>: There is no difference among the types of institutions regarding whether or not

funding is part of the campus-wide budget, Ho4<sub>3</sub>: There is no difference among the types of institutions regarding whether or not collaboration with outside agencies is a source of funding. Because of violations of the assumptions of chi-square, the researcher did not test Ho4<sub>4</sub>: There is no difference among the types of institutions regarding whether or not institutions purchase refurbished or used assistive technologies. The researcher rejected Ho4<sub>5</sub>: There is no difference among the types of institutions regarding how much was spent on assistive technologies during the last fiscal year. However, the researcher failed to reject Ho4<sub>6</sub>: There is no difference among the types of institutions regarding the ratio of spending on assistive technologies and the number of students with disabilities during the last fiscal year.

#### *Research Question #5*

Is there a difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of the adequacy of funding to meet students' needs?

Out of 71 respondents, 69 responded with information regarding the type of institution and the adequacy of funding. Because there was only one respondent who stated funding was more than adequate, this case was combined with adequate so that the variable used had only two categories: (a) inadequate and (b) adequate or more than adequate.

Using the chi-square test, there was a significant difference in the types of institutions and the adequacy of funding,  $X^2(2) = 5.85, p = .05$ . Private institutions had the highest percentage of coordinators who indicated funding was inadequate (71.4%) whereas 58.3 % of the state university coordinators and 38.9% of community college coordinators reported funding was inadequate. Table 23 depicts the perceptions of the adequacy of funding by type of institution.

Table 23

*Crosstabulated Table for Perceptions of the Adequacy of Funding by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Adequacy of Funding:						
Inadequate	14	38.9	15	71.4	7	58.3
Adequate	22	61.1	6	28.6	5	41.7
Total	36	100.0	21	100.0	12	100.0

Because the chi-square was significant (at the .05 level), the researcher rejected  $H_{05_1}$ : There is no difference among the coordinators at the three types of institutions regarding their perceptions of the adequacy of funding to meet the needs of their students with disabilities.

*Research Question #6:*

Do North Carolina community colleges, private colleges and universities, and state universities differ in the staffing of students with disabilities support services, coordinator training, and the way services for students with disabilities works with faculty?

Of the 71 respondents, 71 provided information regarding the type of institution and the employment status of the coordinator of services for students with disabilities. There was a violation of the assumptions of chi-square; therefore, the null hypothesis was not tested. As shown in Table 24, the percentage of institutions that had no full- or part-time person as the coordinator of disability services was greater at the community college level (18.9%) than at the private college and university (4.5%) or the state university levels (8.3%). In addition, whereas 46% of the community colleges and 54.6% of private institutions had a full-time position for the coordinator of students with disabilities services, the position was full-time at 83.3% of the state universities.

Table 24

*Crosstabulated Table for Employment Status of Coordinator by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Employment Status of Coordinator:						
Part-time	13	35.1	9	40.9	1	8.3
Full-time	17	46.0	12	54.6	10	83.3
No full- or part-time position	7	18.9	1	4.5	1	8.3
Total	37	100.0	22	100.0	12	100.0

Because there was a violation of the assumptions of chi-square, the researcher did not test  $H_{061}$ : There is no difference among the types of institutions regarding the employment status of the coordinator of services for students with disabilities.

Of the 71 respondents, 71 provided information regarding the type of institution and the number of full-time staff positions. Using this information, a one-way analysis of variance was conducted to evaluate the mean difference between the type of institution and the number of full-time staff positions. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in the number of full-time staff positions. The ANOVA was significant,  $F(2, 68) = 5.42, p = .01$ . The effect size, as measured by  $\eta^2$ , for the type of institution and the number of full-time staff positions was large (.14).

Because the overall  $F$  was significant, post hoc multiple comparisons were conducted to evaluate the pairwise comparisons of the three group means. A Tukey post hoc test was selected for the multiple comparisons because equal variances were assumed  $F(2, 68) = 1.93, p < .15$ . There was a significant difference between state universities and community colleges ( $p = .01$ )



and between state universities and private institutions ( $p = .01$ ). The mean number of full-time staff positions at state universities was 3.5, whereas the mean number for community colleges and private institutions was slightly over one full-time position. There was no significant difference between community colleges and private institutions and the number of full-time staff positions ( $p = .98$ ).

Table 25 depicts the means and the standard deviations for the number of full-time staff positions in North Carolina postsecondary institutions by type of institution.

Table 25

*Means and Standard Deviations for Number of Full-Time Staff Positions by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	1.22	2.41
Private	22	1.09	1.72
State University	12	3.50	2.54
Total	71	1.56	2.38

Because the ANOVA was significant (at the .05 level), the following hypothesis was rejected:  $H_{062}$ : There is no difference among the types of institutions regarding the number of full-time staff positions.

Of the 71 respondents, 68 provided information regarding the type of institution and the number of part-time staff positions. Using this information, a one-way analysis of variance was conducted to evaluate the relationship between the type of institution and the number of part-time staff positions. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the change in

the number of part-time staff positions. The ANOVA was not significant,  $F(2, 65) = 1.28, p = .28$ . The effect size, as measured by  $\eta^2$ , was small (.04). There was no significant difference among the type of institutions and the number of part-time staff positions. Table 26 depicts the means and the standard deviations for the number of part-time staff positions in North Carolina postsecondary institutions by type of institution.

Table 26

*Means and Standard Deviations for the Number of Part-Time Staff Positions by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	34	1.32	2.50
Private	22	.64	1.50
State University	12	.42	.90
Total	68	.94	2.01

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject  $H_{063}$ : There is no difference among the types of institutions regarding the number of part-time staff members.

Of the 71 respondents, 71 provided information regarding the type of institution and whether or not there was an individual on campus trained in assistive technology devices. Using a chi-square procedure, there was no difference among the types of institutions and whether or not there was personnel trained in assistive technology devices,  $X^2(2) = 3.65, p = .16$ . This information is depicted in Table 27.

Table 27

*Crosstabulated Table for Personnel Trained in Assistive Technology Devices by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Trained in Assistive Technology Devices:						
Yes	22	59.5	11	50.0	10	83.3
No	15	40.5	11	50.0	2	16.7
Total	37	100.0	22	100.0	12	100.0

Because there was no significant difference (at the .05 level), the researcher failed to reject  $H_{064}$ : There is no difference among the types of institutions regarding whether or not there is personnel trained in assistive technology devices.

Of the 71 respondents, 70 provided information regarding the type of institution and the frequency with which the coordinator attends seminars and workshops related to assistive technology. Because there were violations of the assumptions of chi-square for the original 3 by 5 crosstabulated table, the frequency with which coordinators attended seminars related to assistive technology was recoded into two categories: (a) every 2 years or less and (b) once a year or more. There were no violations of the assumptions of chi-square for the 3 by 2 crosstabulated table.

There was no significant difference among the types of institutions and the frequency with which coordinators attended seminars and workshops related to assistive technology,  $X^2(2) = 4.38, p = .11$ . However, as shown in Table 28, 75 % of the coordinators from state universities reported attending training every 2 years or less as compared to 61.9% from private institutions and 43.2% from community colleges.

Table 28

*Crosstabulated Table for Frequency of Attendance at Seminars and Workshops Related to Assistive Technology by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Attend Workshops Related to Assistive Technology:						
Every 2 years or less	16	43.2	13	61.9	9	75.0
Once a year or more	21	56.8	8	38.1	3	25.0
Total	37	100.0	21	100.0	12	100.0

Because there was no significant difference (at the .05 level), the researcher failed to reject Ho6<sub>5</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends seminars and workshops related to assistive technology.

Of the 71 respondents, 70 provided information regarding the type of institution and the frequency with which the coordinator attends seminars and workshops related to disability legislation. Because there were violations of the assumptions of chi-square for the original 3 by 5 crosstabulated table, the frequency with which coordinators attended seminars related to disability legislation was recoded into two categories: (a) every 2 years or less and (b) once a year or more. There were no violations of the assumptions of chi-square for the 3 by 2 crosstabulated table.

There was a significant difference among the types of institutions and the frequency with which coordinators attended seminars and workshops related to disability legislation,  $X^2(2) = 7.59, p = .02$ . Among coordinators at state universities, 91.2% reported attending seminars and workshops related to disability legislation once per year or more whereas 59.5% of coordinators of disabilities services at the community colleges and 42.9 % of coordinators of disabilities

services at the private colleges and universities reported attending seminars and workshops related to disability legislation once per year or more. Table 29 presents these data.

Table 29

*Crosstabulated Table for Frequency of Attendance at Seminars and Workshops Related to Disability Legislation by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Attend Workshops Related to Disability Legislation:						
Every 2 years or less	15	40.5	12	57.1	1	8.3
Once a year or more	22	59.5	9	42.9	11	91.7
Total	37	100.0	21	100.0	12	100.0

Because chi-square was significant (at the .05 level), the researcher rejected Ho<sub>6</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends training related to legislation.

Of the 71 respondents, 71 provided information regarding the type of institution and whether or not faculty are contacted to discuss the accommodations and modifications of their students with disabilities. Because there was a violation of the assumption of chi-square, the null hypothesis was not tested. However, Table 30 depicts that 89.2% of community colleges coordinators reported contacting faculty regarding accommodations and modifications, whereas 81.8% of private institutions and 66.7% of state universities coordinators reported contacting faculty regarding accommodations and modifications.

Table 30

*Crosstabulated Table for Faculty Contacted About Accommodations by Type of Institution*

	Community Colleges		Private Institutions		State Universities	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Faculty Contacted About Accommodations:						
No	4	10.8	4	18.2	4	33.3
Yes	33	89.2	18	81.8	8	66.7
Total	37	100.0	22	100.0	12	100.0

Because there was a violation of the assumption of chi-square, the following hypothesis was not tested: Ho6<sub>7</sub>: There is no difference among the types of institutions regarding whether or not faculty are contacted to discuss the accommodations and modifications afforded to their students with disabilities.

In summary, the researcher failed to reject the following hypotheses based on statistical significance (at the .05 level): Ho6<sub>3</sub>: There is no difference among the types of institutions regarding the number of part-time staff members, Ho6<sub>4</sub>: There is no difference among the types of institutions regarding whether or not there is personnel trained in assistive technology devices, and Ho6<sub>5</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends seminars and workshops related to assistive technology.

The researcher rejected the following null hypotheses based on statistical significance (at the .05 level): Ho6<sub>2</sub>: There is no difference among the types of institutions regarding the number of full-time staff positions and Ho6<sub>6</sub>: There is no difference among the types of institutions regarding the frequency with which the coordinator attends training related to legislation

The researcher failed to test the following hypotheses based on violations of assumptions of chi-square: Ho6<sub>1</sub>: There is no difference among the types of institutions regarding the employment status of the coordinator of services for students with disabilities and Ho6<sub>7</sub>: There is

no difference among the types of institutions regarding whether or not faculty are contacted to discuss the accommodations and modifications afforded to their students with disabilities.

#### *Research Question #7*

Is there a difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of: (a) legislative issues, (b) student responsibility, (c) institutional responsibility, (d) consideration of context in which accommodations are used, and (e) the impact of accommodations?

Of the 71 survey respondents, 70 responded with information regarding the type of institution and their perceptions of legislative issues. Legislative issues were measured as the mean of Likert-scaled survey items #1 and #2 in Section 3 of the survey instrument. Using this information, a one-way analysis of variance was conducted to evaluate the mean difference between the type of institutions and the coordinators' perceptions of legislative issues. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the perceptions of legislative issues. The ANOVA was not significant,  $F(2, 67) = .78, p = .46$ . The effect size, as measured by  $\eta^2$ , for type of institution and coordinators' perceptions of legislative issues was small (.02).

The results indicate that there was little difference among community college, private institution, and state university coordinators' perceptions of legislative issues. Table 31 depicts the means and the standard deviations for legislative issues by type of institution.

Table 31

*Means and Standard Deviations for Legislative Issues by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community college	37	4.14	.64
Private college and university	21	3.88	.76
State university	12	4.04	.99
Total	70	4.04	.74

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject  $H_{07_1}$ : There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of legislative issues.

Of the 71 survey respondents, 71 responded with information regarding the type of institution and perceptions of student responsibility. Student responsibility was measured as the mean of the Likert-scaled items # 3 and #4 in Section 3 of the survey instrument. Using this information, a one-way analysis of variance was conducted to evaluate the mean differences among the types of institutions and coordinators' perceptions of student responsibility. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the perceptions of student responsibility. The ANOVA was not significant,  $F(2, 68) = 2.10, p = .13$ . The effect size, as measured by  $\eta^2$ , was medium (.06).

The results indicate that there was little difference in the perceptions of community college, private institution, and state university coordinators regarding student responsibilities. Table 32 depicts the means and the standard deviations for coordinators' perceptions of student responsibilities by type of institution.



Table 32

*Means and Standard Deviations for Student Responsibilities by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	4.51	.55
Private	22	4.21	1.04
State University	12	4.71	.54
Total	71	4.45	.75

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject  $H_{07_2}$ : There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of student responsibility.

Of the 71 survey respondents, 59 responded with information regarding the type of institution and their perceptions of institutional responsibilities. Institutional responsibility was measured as the mean of the Likert-scaled items # 5-11 in Section 3 of the survey instrument. Using this information, a one-way analysis of variance was conducted to evaluate the relationship between the type of institution and the perceptions of the institutional responsibilities. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the coordinators' perceptions of institutional responsibility. The ANOVA was not significant,  $F(2, 56) = .26, p = .77$ . The effect size, as measured by  $\eta^2$ , was small (.01).

The results indicate that there was little difference among community college, private institution, and state university coordinators and their perceptions of institutional responsibilities. Table 33 depicts the means and the standard deviations for the perceptions of institutional responsibilities by type of institution.

Table 33

*Means and Standard Deviations for Institutional Responsibilities by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	33	3.68	.56
Private	17	3.64	.52
State University	9	3.81	.80
Total	59	3.69	.58

Because the ANOVA was not significant (at the .05) level, the researcher failed to reject  $H_{07_3}$ : There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of institutional responsibility.

Of the 71 survey respondents, 70 responded with information regarding the type of institution and their perceptions of consideration of the context in which accommodations are used. Context of accommodations was measured as the mean of the Likert-scaled item # 13 in Section 3 of the questionnaire. Using this information, a one-way analysis of variance was conducted to evaluate the relationship between the type of institution and the perceptions of the consideration of the context in which accommodations are used. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the perceptions of consideration of the context in which accommodations are used. The ANOVA was not significant,  $F(2, 67) = .79, p = .46$ . The effect size, as measured by  $\eta^2$ , was small (.02).

The results indicate that coordinators of community colleges, private institutions, and state universities do not differ in their perceptions of the consideration of the context in which accommodations are used. Table 34 depicts the means and the standard deviations for the

percentage of the perceptions of the consideration of the context for accommodations on North Carolina postsecondary institutions by type of institution.

Table 34

*Means and Standard Deviations for Context of Accommodations by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	3.59	.98
Private	21	3.24	1.09
State University	12	3.33	1.37
Total	70	3.44	1.09

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject Ho7<sub>4</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of consideration of context in which accommodations are used.

In order to gain a better understanding of the true impact of accommodations on other students, the following section will be analyzed regarding faculty and then regarding the institution.

Of the 71 survey respondents, 70 responded with information regarding the type of institution and their perceptions of the impact of accommodations on other students regarding faculty. The impact of accommodations regarding faculty was measured as the mean to the Likert-scaled item # 14 and #15 in Section 3 of the survey instrument. Using this information, a one-way analysis of variance was conducted to evaluate the relationship between the type of institution and the perceptions of the impact of accommodations on other students in regard to

faculty. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the perceptions of the impact of accommodations on other students regarding faculty. The ANOVA was not significant,  $F(2, 67) = 2.0, p = .14$ . The effect size, as measured by  $\eta^2$ , was medium (.06).

The results indicate that the perceptions of the impact of accommodations on other students regarding faculty did not differ significantly among community college, private institution, and state university coordinators. Table 35 depicts the means and the standard deviations for the coordinators' perceptions of the impact of accommodations on other students regarding faculty by type of institution.

Table 35

*Means and Standard Deviations for Impact of Accommodations on Other Students Regarding Faculty by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	2.69	1.16
Private	21	2.33	.93
State University	12	3.13	1.13
Total	70	2.66	1.11

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject  $H_0$ : There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations on other students.

Of the 71 survey respondents, 71 responded with information regarding the type of institution and their perceptions of impact of accommodations on other students regarding the institution. The impact of accommodations on the institution was measured as the mean of the Likert-scaled item # 16 in Section 3 of the questionnaire. Using this information, a one-way analysis of variance was conducted to determine mean differences among community college, private institution, and state university coordinators and their perceptions of the impact of accommodations on other students regarding the institution. The predictor, the type of institution, included three levels: community colleges, private colleges and universities, and state universities. The criterion was the perceptions of the impact of accommodations on other students regarding the institution. The ANOVA was not significant,  $F(2, 68) = 1.23, p = .30$ . The effect size, as measured by  $\eta^2$ , was small (.04).

The results indicate that community college, private institution, and state university coordinators' perceptions of the impact of accommodations on other students regarding the institution were not significantly different. Table 36 depicts the means and the standard deviations for the percentage of the perceptions of the impact of accommodations on the other students and the institution by type of institution.

Table 36

*Means and Standard Deviations for Impact of Accommodations on Other Students Regarding the Institution by Type of Institution*

Type of Institution	<i>N</i>	<i>M</i>	<i>SD</i>
Community College	37	1.51	.61
Private	22	1.77	.92
State University	12	1.42	.67
Total	71	1.58	.73

Because the ANOVA was not significant (at the .05 level), the researcher failed to reject Ho7<sub>5</sub>: There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations on other students

In summary for research question #7, the following hypotheses were retained because the ANOVAs were not statistically significant (at the .05 level) Ho7<sub>1</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of legislative issues; Ho7<sub>2</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of student responsibility; Ho7<sub>3</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, regarding state universities and their perceptions of institutional responsibility; Ho7<sub>4</sub>: There is no difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of consideration of context in which accommodations are used; Ho7<sub>5</sub>: There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations regarding faculty and students; and Ho7<sub>6</sub>: There is no difference among coordinators at North Carolina community college, private colleges and universities, and state universities regarding their perceptions of the impact of accommodations regarding the institution.

The findings of the research data analyses are summarized in Chapter 5. In addition, conclusions drawn from the study and recommendations to improve current practice and recommendations for further research are presented.

## CHAPTER 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides a conclusion of the research, an overview of the findings and conclusions, and recommendations for North Carolina's postsecondary institutions for further study. The purpose of this study was to examine the differences, if any, within North Carolina's state, private, and community colleges and universities regarding assistive technology and services for students with disabilities. The research questions focused on the current percentage of student with disabilities, the assistive technology available on campuses, funding of assistive technology, students with disabilities staff training and support for faculty, and legislative understanding. The methodologies used in this study were quantitative and case law analysis. The results from the surveys were analyzed using SPSS.

#### *Summary of Findings*

The review of literature revealed that between 1978 and 2000, the percentage of college students who self-identify as having disabilities has quadrupled (Michaels et al., 2001). Under the ADA, employers and other entities such as postsecondary institutions have the responsibility to provide assistive technology to individuals as “reasonable accommodations.” According to KATS (2003), once an individual with disabilities has been accepted into a postsecondary school, the institution is then responsible for making its programs accessible including provision of the necessary assistive technology. Although this is stated in the law, it does not mean that it happens at the same rate and fidelity at each institution. Findings from this study show discrepancies between the type of postsecondary institution and the funding, assistive technology offerings, and other support services for students with disabilities.

Michaels, et al. (2001) stated that institutions across the country have identified the cost associated with both initial purchases and upgrades of assistive technology as being the greatest

potential to inhibit the successful provision of assistive technology service to students. The findings of the study confirmed earlier research. The study found that the type of institution that had the lowest mean number of assistive technology devices was also the one that coordinators indicated had the most inadequate funding over the past fiscal year.

### *Summary of Findings Related to Research Questions*

Research Question #1: Do North Carolina community colleges, private colleges and universities, and state universities differ in the percentage of students with disabilities?

The mean percentage of students who self-report disabilities at private colleges and universities is 5% whereas the mean percentage for community college is 2.5%. These findings were statistically significant at the .05 level. The differences between the state university (3.15%) and the private colleges and universities (5.01%) hold practical significance. These findings signify that the number of students attending private college and university campuses who self-report disabilities is much greater than those attending community college or state universities. In an effort to address specific types of disabilities, two categories emerged: physical disabilities and cognitive and learning disabilities. Data obtained suggest that for practical significance, a greater number of students who self-report a physical disability attend community colleges ( $M = 23.46\%$ ) over private colleges and universities ( $M = 9.43\%$ ) or state universities ( $M = 17.89\%$ ). Private colleges and universities reported the smallest percentage of individuals who self-report physical disabilities. With cognitive or learning disabilities, the trend moves back to the private colleges and universities where  $M = 80.33\%$  of individuals who self-report a disability report a cognitive disability. This is statistically significant when compared to the community college ( $M = 61.50\%$ ) and the state university ( $M = 61.78\%$ ). Private colleges and universities have the greatest percentage of students self-reporting disabilities, with a majority self-reporting a cognitive or learning disability.



Research Question #2: Do North Carolina community colleges, private colleges and universities, and state universities differ in the number of technology devices available for their students with disabilities?

Using the list from Table 3 from Chapter 2 in which the U.S. Department of Education (2005) listed the 20 most useful assistive technologies for students with disabilities, coordinators were asked to report which of the 20 devices were available on their campuses. The findings included statistically significant differences between private colleges and universities and the other two types of institutions. The researcher looked at the mean number of the 20 preselected assistive technology devices that were reported on the campuses of North Carolina's private colleges and universities ( $M = 5.41$ ). This number reflected a much smaller mean than the mean number found on community college campuses ( $M = 9.78$ ) and state university campuses ( $M = 12.25$ ) within North Carolina.

Research Question #3: Do North Carolina community colleges, private colleges and universities, and state universities differ in the age of the assistive technology equipment that is available for their students with disabilities?

The mean for percentage of assistive technology devices that were less than two years old was not statically significant. Private colleges and universities reported a mean of 40.05 whereas state universities reported a mean of 37.73 and community colleges a mean of 37.85. This indicates that private colleges and universities have a greater percentage of new assistive technology devices.

Research Question #4: Do North Carolina community colleges, private colleges and universities, and state universities' students with disabilities services differ in the funding of assistive technology for students with disabilities?

Coordinators at postsecondary institutions in North Carolina reported procuring funding and resources for assistive technology (grants, campus budget, collaboration with outside agencies, or purchasing refurbished or used equipment) as well as how they perceived the adequacy of funding. There were no statistically significant findings in the ways institutions

procured funding; however, there was practical significance in funding from campus-wide budgets. Although 75% of both state universities and community colleges reported that funding for assistive technology was included in the campus-wide budget, only 59% of the private colleges and universities stated the same.

The true dollar amount spent on assistive technology, using data analyzed from research question #4, suggested that the overall  $F$  was significant ( $p=.03$ ); the probabilities for the post hoc testing showed there were no statistically significant differences in the pairs. However, practical significance stands out when considering that the means for the amount of money spent on assistive technology during the last fiscal year was the highest for state universities ( $M = \$5,190.00$ ) and community colleges ( $M = \$3,194.76$ ). The least amount of money spent on assistive technology during the last fiscal year was appropriated by the private colleges and universities ( $M = \$847.37$ ).

Percentages of the number of students vary depending on the type and size of institution, thereby, affecting the actual amount spent per student. The actual dollar amount reported for the past fiscal year was used to create a ratio of the amount spent per student. Interestingly, the data still reflect (with practical significance) ( $p = .10$ ) that private colleges spend less on assistive technology per student. Private institutions spent a mean of \$12.64 whereas state universities spent \$29.78 and community colleges spent an astounding \$63.50.

Research Question #5: Is there a difference among coordinators at North Carolina community colleges private colleges and universities, and state universities regarding their perceptions of the adequacy of funding to meet students' needs?

Statistically significant data suggest that private institutions had the highest percentage of coordinators (71.4%) with the perceptions that funding was inadequate, whereas at the state university level, 58.3 % reported that funding was inadequate and at the community college level only 38.9% said funding was inadequate.

Research Question #6: Do North Carolina community colleges, private colleges and universities, and state universities differ in the staffing of students with disabilities support

services, coordinator training, and the way services for students with disabilities works with faculty?

The percentage of institutions with no full- or part-time person as the coordinator of disability services was much greater at the community college level (18.9%), when compared to private college and university (4.5%) or the state university levels (8.3%).

When comparing the types of institutions and the number of full-time staff positions in the student support services division, there was a significant difference between state universities and community colleges ( $p = .01$ ) and between state universities and private institutions ( $p = .01$ ). The mean number of full-time staff positions at state universities was 3.5, whereas the mean number for community colleges and private institutions was slightly over one full-time position. There was no difference between community colleges and private institutions and the number of full-time staff positions ( $p = .98$ ). However, when looking at part-time positions, there was no statistical significant difference among the three types of institutions.

There was no statistically significant difference found among the types of institutions and the frequency with which coordinators attended seminars and workshops related to assistive technology ( $p = .11$ ). However, there was a statistically significant difference in the training for disability legislation ( $p = .02$ ). Of coordinators of disabilities services at the state universities, 98% reported attending seminars and workshops related to disability legislation once per year or more whereas only 59.5% of coordinators the community colleges and 42.9 % of coordinators at the private colleges and universities reported attending seminars and workshops related to disability legislation once per year or more.

Institutions' coordinators reported data reflecting practical significance that they each contacted faculty and staff regarding current accommodations and modifications. Of the three types of institutions, 89.2% of community colleges reported contacting faculty regarding accommodations and modifications, whereas 81.8% of private institutions and only 66.7% of state universities reported contacting faculty regarding accommodations and modifications. According to these data, there is an effort to ensure that the faculty understand and are

knowledgeable regarding the accommodations and modifications for students with disabilities. This statement holds true more so for the community colleges and private colleges and universities than it does for the state universities.

Research Question #7: Is there a difference among coordinators at North Carolina community colleges, private colleges and universities, and state universities regarding their perceptions of: (a) legislative issues, (b) student responsibility, (c) institutional responsibility, (d) consideration of context in which accommodations are used, and (e) the impact of accommodations?

Using case law analysis methods and a case review meta-analysis by Sahlen and Lehmann (2006), the researcher was able to focus on the differences of coordinators' perceptions regarding the legal mandates and impact on both the institution and the student. Perceptions were rated on mean responses from a Likert Scale of 1 strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree.

Perceptions of legislative issues regarding legislative understanding and adherence to mandates of Section 504, ADA and other relevant legislation, reflected a mean score that ranged from 3.88 at the private college and university level to 4.14 at the community college level with the state universities in the middle at 4.04. Little difference is shown in this category. Because the means ranged from 3.88 to 4.14 (generally in the agree range on the Likert scale) the indication is that coordinators of postsecondary intuitions have a good understanding of the legislation that governs services to students with disabilities.

Perceptions of student responsibilities regarding responsibility for providing current documentation to support the disability claim and the accommodation requests reflected a mean score that ranged from 4.21 at the private college and university level to 4.71 at the state university, with the community colleges being in the middle at 4.51. Little difference is shown in this category. Because the means ranged from 4.21 to 4.71 (generally in the agree to strongly agree range on the Likert scale), this indicates that coordinators of postsecondary intuitions have

a good understanding of the students' responsibilities as they relate to disability services on postsecondary campuses.

Perceptions of institutional responsibilities regarding accommodations, obtaining assistive technology, training of support staff, and reasonable accommodations reflected a mean score that ranged from 3.64 at the private college and university level to 3.81 at the state university, with the community colleges being in the middle at 3.68. Little difference is shown in this category. Because the means ranged from 3.64 to 3.81 (generally in the above neutral range on the Likert scale), this indicates that coordinators of postsecondary intuitions have a fair understanding of the institution's responsibilities on postsecondary campus.

Perceptions regarding the context of accommodations and effects on other students reflected a mean score that ranged from 3.24 at the private college and university level to 3.59 at the community college level, with the state universities being in the middle at 3.33. Little difference is shown in this category. Because the means ranged from 3.24 to 3.59 (generally above the neutral range on the Likert scale), this seems to indicate that coordinators of postsecondary intuitions do a fair job in looking at the accommodations they provide and the effects on other students.

Perceptions of the impact of accommodations on faculty and students reflected a mean score that ranged from 2.33 at the private college and university level to 3.13 at the state university, with the community colleges being in the middle at 2.69. Little difference is shown in this category. Because the means ranged from 2.33 to 3.13 (generally above the disagree to above the neutral range on the Likert scale), this indicates that coordinators of postsecondary intuitions seldom hear complaints from faculty that the provided accommodations and modifications give students an unfair advantage or are distracting to other students.

Perceptions of the impact of accommodations by causing the institution to lower instructional standards reflected a mean score that ranged from 1.42 at the state university level to 1.77 at the private college and university level, with the community colleges being in the middle at 1.51. Little difference is shown in this category. Because the means ranged from 1.42

to 1.77 (generally above the strongly disagree to disagree range on the Likert scale), this indicates that coordinators of postsecondary institutions reportedly do not feel that the respective institutions have lowered its standards or altered fundamentals of programs by giving accommodations or modifications.

Note that for each of the categories above (legislative understanding, student responsibilities, institutional responsibilities, context of accommodations and modifications, impact of regarding faculty and students, and impact on the institution), private universities and colleges held the lowest mean in each except for the impact of accommodations as it relates to the institutional standards. The overall mean for the private colleges and universities was the lowest at 3.17, whereas state universities held the highest at 3.31. Community colleges were in between with 3.35. This might be a reflection of the frequency of disability legislation training each type of postsecondary institution receives and other underlying issues. Again, 98% of coordinators of disabilities at the state universities reported attending seminars and workshops related to disability legislation once per year or more as compared to 59.5% of coordinators at the community colleges and only 42.9 % of coordinators at the private colleges and universities.

### *Conclusions*

The following conclusions are drawn based on the finding of this study:

#### *Conclusion #1*

Lewis and Farris (1999) stated that postsecondary institutions in the United States enrolled 428,280 students with disabilities between the years 1996-1998. Therefore, it was expected that a healthy percentage of students with disabilities at the postsecondary level would be found. However, total overall percentage of these students found at the private college and university levels was statistically significantly higher than the percentage found at community colleges and state universities ( $p = .01$ ). Community colleges seem to hold the greatest

percentage of students who self-report physical disabilities, whereas private institutions hold the greatest percentages of students who self-report cognitive or learning disabilities.

### *Conclusion #2*

Students with cognitive or learning disabilities often attend postsecondary institutions that are somewhat restricted in the resources to meet their needs. If a student who self-reports a disability chooses to attend a private college or university, he or she might not be afforded the same assistive technology opportunities as those would who attend community colleges and state universities. This is a critical point because Walters (2000) stated that assistive technology creates a sense of possibility for individuals with disabilities. Counter intuitively, institutions with the higher percentage of students with disabilities (private colleges and universities and community colleges) might be the ones to offer the least assistive technology services and support to these individuals.

### *Conclusion #3*

Private colleges and universities spent less per student on assistive technology over the past fiscal year. The funding reported for community colleges (\$3,194.76) and state universities (\$5,190.00) were thousands more than the funding of private colleges and universities (\$847.37). This could explain why a significant number of private colleges and universities (71.4%) reported inadequate funding and could explain the higher numbers of availability of assistive technology devices that the other postsecondary institutions offer.

### *Conclusion #4*

Findings suggest there were no significant differences among coordinators' perceptions of legislative issues, student responsibility, institutional responsibility, consideration of context in which accommodations are used, and the impact of accommodations on other faculty and students and the institution. However, there were significant differences found between

community colleges, private colleges and universities, and state universities regarding assistive technology, funding for assistive technology, and services available to students who have disabilities. Therefore, the researcher concludes that the differences in services and availability of assistive technology devices are not from lack of knowledge, skill, or training. It is possible that the underlying cause of this discrepancy is financial; this assumption is supported by Michaels et al. (2001) and their findings that cost associated with both initial purchases and upgrades of assistive technology was the greatest factor inhibiting the successful provision of assistive technology service to students.

#### *Conclusion #5*

Financial considerations may also impact sufficient staffing and training of individuals who work within the student support services of postsecondary institutions. Walters (2000) stated, "Stronger efforts on the part of the colleges and universities to educate faculty and staff would significantly enhance the likelihood of academic success of students with disabilities" (p. 10).

When looking at the frequency of training at each of the postsecondary levels, the researcher focused on both training related to assistive technology and training related to disability legislation. The researcher concludes that institutions with the highest percentage of individuals who self-reported a disability are less likely to receive training regarding disability legislation once per year or more often.

Walters (2000) pointed out, "With a handful of notable exceptions, little priority is given to building the capacity of faculty and staff at institutions of postsecondary education to teach students with disabilities" (p. 10). Michaels et al. (2001) agreed that the majority of professors lacked the knowledge and skills necessary to ensure equal access. Interestingly, Burgstahler et al. (2000) found that faculty and staff were very open when it came to discussing their lack of knowledge pertaining to students with disabilities.



### *Conclusion #6*

Day and Edwards (1996) reviewed a study completed by Bursuck, Rose, Cowen, and Yahaya in 1989 and reported:

A nation-wide survey of postsecondary services for students with learning disabilities, reported that a majority of schools they surveyed provided auxiliary aids, such as taped textbooks, tape recording of calculators, and word processing programs. The same study concluded that small colleges and community colleges offer more personalized services. It is unclear, however, whether access to assistive technology, and support in its use, varied according to the size of the institution. (as cited in Day & Edwards, p. 5)

The data in this project support the findings in the study reported by Day and Edwards and address the stated uncertainty of “whether access to assistive technology, and support in its use, varied according to the size of the institution” (as cited in Day & Edwards, p. 5). The data suggest that the larger the institution, the more assistive technology, support, and services the institution can offer students with disabilities.

### *Conclusion #7*

When considering the mean age of assistive technology devices at each type of institution, no statistical significance was found; however, there is practical significance that suggests that 40% of the assistive technology at the private college and university level is 2 years old or newer whereas only 38% of the assistive technology meets this requirement at the community college and state university levels. Data collected might suggest that private colleges and universities are making some effort to correct this issue.

### *Recommendations to Improve Current Practice*

As reported by Michaels et al. (2001), more students are attending postsecondary institutions than ever before. Data from this study reflect that the highest percentage of students who self-report disabilities are in the private colleges and universities. The findings reveal that of the three types of higher-education institutions in North Carolina, individuals with disabilities may be attending those institutions that are the most ill equipped to meet their needs. Because

these are the current findings, it is imperative to address possible future solutions to this dilemma. The following recommendations focus on private institutions but may be applied to others types of institutions.

The first major task is to make administrators, faculty, and other lead personnel aware of this trend. It is possible that the individuals who could make a difference in both budget and training are unaware of this trend. A less popular option would be to make individuals with disabilities aware of the institutions that provide the strongest services.

The Association on Higher Education and Disability (AHEAD) set specific standards for the coordinators of students with disability services in higher education (AHEAD, 2004) . Standard #3 addressed faculty and staff awareness. This included informing faculty regarding reasonable accommodations, legal requirements, and programmatic and curriculum modifications. It also addressed the area of disability awareness training for faculty, staff, and administrators. Standard #8 was solely dedicated to the area of training and professional development for disability service staff. This included providing initial and ongoing training for disability service staff (AHEAD). Postsecondary institutions should strive to meet these standards for training.

Even with additional training, the issue of financial inadequacies remains. Because this type of funding is not placed in the campus budget at many of the private colleges, and given the fact that funding is tight in all realms of postsecondary education, perhaps private colleges and universities should begin to look at outside funding sources such as grants and collaboration with other agencies as recommended by Scione (2003). These funds could be used to purchase more assistive technology devices and improve staffing of students with disability support services.

Private colleges and universities should become proactive and make this a priority initiative. Census data, national polls, and researchers have documented that persons with disabilities occupy an inferior status in our society and are severely disadvantaged in the professional and academic realms (Tagayuna et al., 2005). If educators continue to overlook this population, we will continue to see these individuals fail and drop out of college at a rate that

exceeds that of their peers. Postsecondary survival requires that students with disabilities get the accommodations and modifications they need (Sahlen & Lehmann, 2006). This includes assistive technology.

### *Recommendations for Further Research*

Several areas for continued analysis have emerged from the findings of this study. The research questions in the forefront would certainly include why these individuals with disabilities choose private colleges or universities at a rate that holds statistical significance over community colleges and state universities.

For years, researchers have pointed out a lack of adequate support systems within postsecondary institutions (Aksamit et al., 1987; Burns et al., 1990; Dunn, 1996; Lehmann et al., 2000; Malcolm & Matyas, 1991). Therefore, an important area to consider would be the trend of progress and improvements over the past several years for each type of institution. This could give some idea as to the progressiveness of postsecondary institutions.

The researcher would also like to continue this study by looking at the extent and comprehensiveness of the services that are provided including the number of hours individuals with disabilities receive extra support, the ratio of students with disabilities to the number of support tutors, and the extent to which accommodations and modifications are carried out at each type of postsecondary institution in North Carolina. The researcher feels it would also be worthwhile to compare the matriculation and graduation rates from each type of postsecondary institution for these individuals who self-report a disability.

As stated earlier, the findings in this document relate to North Carolina and should not be generalized outside of that particular state. With that being said, the researcher would recommend a continuation of this study across the United States. Trends of the increasing numbers of individuals who self-report disabilities are a nationwide issue (Michaels et al., 2001), and now researchers should look at what type of postsecondary institutions these individuals are attending and what services are being provided.

## REFERENCES

- ADA regulations and technical assistance materials.* (2004). Retrieved January 12, 2006, from <http://www.usdoj.gov/crt/ada/publicat.htm>
- AHEAD. (2004). Association on Higher Education and Disability. *AHEAD program standards and performance indicators.* Retrieved February 5, 2006, from [www.ahead.org/about/index.htm](http://www.ahead.org/about/index.htm)
- Aksamit, D., Leuenberger, J., & Morris, M. (1987). Preparation of student services professionals and faculty for serving learning-disabled college students. *Journal of College Student Personnel, 28*, 53-59.
- Alvarez, R. M., & Van Beselaere, C. (2003). *Web-based surveys.* Retrieved June 20, 2006, from <http://survey.caltech.edu/encyclopedia.pdf>.
- Americans With Disabilities Act.* (1990). 42 U.S.C. § 12102 et seq. (1998); title II, § 12131 et seq. (1998); 28 C.F.R. §§ 35.101-35.191 (1998); title III, § 12181 et seq. (1998); 28 C.F.R. §§ 36.101-36.608 (1998); Appendix A to Part 36 (Standards for Accessible Design; 1998); Appendix B (Preamble to Regulation on Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities; 1998)
- Arc and UCP Public Policy Collaboration. (2003). *Assistive technology act.* Retrieved December 20, 2005, from [www.ucp.org](http://www.ucp.org)
- Bedford, L. A. (2005). A multiple case study of the role of assistive technology in the education of adults with disabilities (Doctoral dissertation, University of Wyoming, 2005). *Dissertation Abstracts International, AAT 3168825.*
- Beech, M. (2002). *Accommodations and modifications for students with disabilities in vocational education and adult general education.* Tallahassee, FL: Bureau of Instructional Support and Community Services.
- Beilke, J. R., & Yssel, N. (1999). The chilly climate for students with disabilities in higher education. *College Student Journal, 33.* Retrieved February 6, 2006, from Academic Search Premier database.
- Bento, R. (1996). Faculty decision-making about “reasonable accommodations” for disabled college students: Informational, ethical, and attitudinal issues. *College Student Journal, 40.* Retrieved February 6, 2006, from Academic Search Premier database.
- Bourke, A. B., Strehorn, K. C., & Silver, P. (2000). Faculty members’ provision of instructional accommodations to students with LD. *Journal of Learning Disabilities, 33*, 26-32.
- Boyle, J. R., & Weishaar, M. (2001). *Special education law with cases.* Needham Heights, MA: Allyn and Bacon.

- Brown, L. H., & Parette, H. P., Jr. (1992). Children with disabilities who use assistive technology: Ethical considerations. *Elementary and Early Childhood Education*, 47, 73-77.
- Bryant, D. P., & Bryant, B. R. (2003). *Assistive technology for people with disabilities*. Boston: Allyn and Bacon.
- Buck, D. (2004). *Association of assistive technology act programs (ATAP): Congress passes the assistive technology act of 2004*. Retrieved December 20, 2005, from <http://www.ataporg.org>
- Burgstahler, S., Duclos, R., & Turcotte, M. (2000). *Preliminary findings: Faculty, teaching assistant, and student perceptions regarding accommodating students with disabilities in postsecondary environments*. Seattle, WA: University of Washington.
- Burgstahler, S., & Doe, T. (2003). *Improving postsecondary outcomes for students with disabilities: Designing professional development for faculty*. Retrieved February 5, 2006, from [www.rrth.hawaii.edu/documents/products/phase2/pdf/060d\(2\)-HO1.pdf](http://www.rrth.hawaii.edu/documents/products/phase2/pdf/060d(2)-HO1.pdf)
- Burns, J. P., Armistead, L. P., & Keys, R. C. (1990). Developing a transition initiative program for students with handicapping conditions. *Community/Junior College*, 14, 319-329.
- Bushrow, K., & Turner, K. (1994). *Overcoming barriers in the use of adaptive and assistive technology in special education*. (Report No. ACRESS RC 019 603). Austin, Texas: Annual National Conference of the American Council on Rural Special Education. ERIC Document Reproduction Service No. ED 369 633)
- Button, C., & Wobschall, R. (1994). The Americans with disabilities act and assistive technology. *Journal of Vocational Rehabilitation*, 4, 196-201.
- Cavanaugh, T. W. (2006). *The need for assistive technology in educational technology*. Retrieved February 1, 2006, from [www.unf.edu/~tcavanau/publications/site2001/AT\\_in\\_IT.htm](http://www.unf.edu/~tcavanau/publications/site2001/AT_in_IT.htm)
- Cook, A. M., & Hussey, S. M. (1995). *Assistive technologies: Principles and practices*. St. Louis, MO: Mosby.
- Creswell, J. W. (2003). *Research design qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.
- Davis vs. Southeastern Community College*. (1979). 442 U.S. 397 No. 78-711, (U.S. Dist. 1979). LEXIS.
- Day, S. L., & Edwards, B. J. (1996). Assistive technology for postsecondary students with learning disabilities. *Journal of Learning Disabilities*, 29, 486-492.
- Dell, A. (2004). *Transition: There are no IEP's in college*. College of New Jersey TECH-NJ Retrieved October 31, 2005, from <http://www.tcnj.edu/~technj/2004/transition.htm>

- Disability Policy Collaboration. (2005). *Assistive technology act fact sheet*. Retrieved December 20, 2005, from [http://www.ucp.org/ucp\\_generaldoc.cfm/1/8/11904/11904-11904/4525](http://www.ucp.org/ucp_generaldoc.cfm/1/8/11904/11904-11904/4525)
- Dunn, C. (1996). A status report on transition planning for individuals with learning disabilities. *Journal of Learning Disabilities*, 29, 17-30.
- Fein, J. (1996). A history of legislative support for assistive technology. *Journal of Special Education Technology*, 13, 1-3.
- Feld, K. (2001). Online polling and survey research. *Campaigns and Elections* 22, 41-43  
Retrieved June 9, 2006, using EBSCO Host Database.
- Ganschow, H., Philips, L., & Schneider, D. (2001). Closing the gap: Accommodating students with language learning disabilities in college. *Topics in Language Disorders*; 21, 17-37.
- Gary Michael Powers and Kimberly Ann Powers (Plaintiffs-Appellees) v. MJB Acquisition Corporation, a Wyoming corporation, d/b/a Wyoming Technical Institute, (Defendant-Appellant)*. (1999). 10<sup>th</sup> Circuit, Case Number: 98-8053, Retrieved February 16, 2006, from <http://www.oscn.net/applications/oscn/DeliverDocument.asp?citeID=152744>
- Gotten, S. R. (2001). Implications of internet technology for medical sociology in the new millennium. *Sociological Spectrum* 21, 319-340. Retrieved February 17, 2006, from EBSCO Host database.
- Grove City College v. Bell, Secretary of Education, Supreme Court of the United States*, 465 U.S. 555 (1984)
- Guckenberger et al. v. Boston University, Jon Westling, Craig Klafter*. (1998). No. 96-C.V.-11426-PBS, 1998 U.S. Dist. LEXIS 8469, 1-11.
- Henderson, C. (1992). *College freshman with disabilities: A statistical profile*. Washington, DC: American Council on Education.
- Henderson, C. (1999). *College freshman with disabilities: A statistical profile*. Washington, DC: American Council on Education.
- Henderson, C. (2001). *College freshman with disabilities: A statistical profile*. Washington, DC: American Council on Education, Retrieved December 29, 2005, from <http://www.heath.gwu.edu/PDFs/collegefreshmen.pdf#search='HEATH%20Resource%20Center.%20%281998%29.%20Profile%20of%201996%20college%20freshmen%20with%20disabilities.%20Washington%2C%20DC%3A%20American%20Council%20on%20Education>.
- Jaschik, S. (1993). Backed by 1990 law, people with disabilities press demands on colleges. *Chronicle of Higher Education*, 39, A26-A27.

- Joanne Cohen v. The Trustees of Boston University*, 1998. 1009. United States District Court-District of Massachusetts Civil Action Number 93-10667WD, Retrieved February 16, 2006, from <http://www.usdoj.gov/crt/ada/briefs/cohenbr.doc>
- Joseph, D. K. (2005). *A study of the perceptions and expectations of students with disabilities using assistive technology at the University of Maryland eastern shore*. (Doctoral dissertation, Wilmington College, Delaware, 2005) *Dissertation Abstracts International*, AAT 3156270.
- Julnes, R., & Brown, S. (1993). Commentary: The legal mandate to provide assistive technology in special education programming. *JSET E Journal*, 82, 737-748.
- Kaplin, W., & Lee, B. (1995). *The law of higher education* (3rd ed.). New York: Jossey-Bass.
- KATS. (2001). *The buck stops here... A guide to assistive technology funding in Kentucky*. Louisville, KY: Workforce Development Cabinet- Department for the Blind.
- Lehmann, J. P., Davies, T. G., & Laurin, K. (2000). Listening to student voices about postsecondary education. *Teaching Exceptional Children*, 32, 60-65.
- Len-Rios, M. E., & Cameron, G. T. (2001). *How are we doing? The use of web-based surveys to measure e-commerce consumer attitudes*. Paper submitted for consideration to The Second International Conference of Internet Researchers. Retrieved March 12, 2006, from <http://www.empiricom.org/reports/webbased%20Survey%20Methods.maria.doc>
- Less, K. H. (2003). *Faculty adoption of computer technology for instruction in the North Carolina community college system*. Unpublished doctoral dissertation, East Tennessee State University, Johnson City.
- Lewis, R. B. (1998). Assistive technology and learning disabilities: Today's realities and tomorrows promises. *Journal of Learning Disabilities*, 31, 6-26.
- Leyser, Y., Vogel, S., Wyland, S., & Brulle, A. (1998). Faculty attitudes and practices regarding students with disabilities: Two decades after implementation of Section 504. *Journal of Postsecondary Education and Disability*, 13, 5-19.
- Maczaczaj v. University of the State of New York and Anne Berholf, individually and as the Center Director-Associate Dean of Empire State College of the State University of New York*. (1997). State of New York, Mo. 96-CV-0823C(F), 1997 U.S. Dist. LEXIS, 1-9.
- Malcolm, S. M., & Matyas, M. L. (Eds.). (1991). *Investigating in human potential science and engineering at the crossroads*. Washington, DC: American Association of the Advancement of Science.
- McNurtrie, D. C. (1980). Notes on the early history of care for cripples. In R. F. Phillips & J. Rosenberg (Eds.), *The origins of modern treatment and education of physically handicapped children* (pp. 27-41). New York: ARNO Press.

- Michaels, G., Prezant, F. P., Morabito, S. M., & Jackson, K. (2001). *Assistive and instructional technology for college students with disabilities: A national snapshot of postsecondary service providers*. Washington, DC: Research Center for Disability Services.
- More college freshmen report disabilities. (2000). *Black Issues in Higher Education*, 16, 9.
- Office of Civil Rights. (1998). *Auxiliary aids and services for postsecondary students with disabilities: Higher education's obligations under section 504 and title II of the ADA*. Washington, DC: Author.
- Ohio Civil Rights Commission v. Case Western Reserve University*. (1996). No. 88-CV-66721 WL 716543, 1994 U.S. Dist. LEXIS, 1-15.
- Pell v. Trustees of Columbia University in the City of New York Barnard College Columbia University*. (1998). Christina Bickford, Sergio Castilla, Annette Insdorf, & James Schamus, No. 97 CIV.0193 (SS), 1998 U.S. Dis. LEXIS 407, 1-25.
- Pushkin v. Regents of the University of Colorado*. (1981). 10<sup>th</sup> Circuit Court, Retrieved February 14, 2006, from LEXIS, 1-19.
- Rehabilitation Act of 1973*, as amended by the Rehabilitation Act Amendments of 1974, 29 U.S.C. § 794 (1998); 34 C.F.R. §§ 104.1-104-47 (1998)
- Renner, J. A. (2002). *An analysis of the knowledge level of Ohio's postsecondary educators in public/state, private and two-year colleges and universities regarding copyright ownership of web-based / online course and materials*. Unpublished doctoral dissertation, Bowling Green State University.
- RESNA. (1998). Tech act projects improving access, provision, and funding for assistive technology devices and services. Arlington, VA: National Institute on Disability and Rehabilitation.
- RESNA. (1999). *Technical assistance project's TAP bulletin, under grant #H224A50006*. Retrieved December 19, 2005, from <http://www.resna.org/taproject/library/laws/ata98sum.html>
- RESNA. (2000). *Discovering hidden resources: Assistive technology recycling, refurbishing, and redistribution*. [RESNA Technical Assistance Project]. Arlington, VA: Association for the Advancement of Rehabilitation Technology.
- Robinson, W. L. (1996). *Accommodation hell or to hell with accommodation: The ADA and the administration* (Report No. HE 029 984). Bloomington, IN: ERIC Clearinghouse for Social Studies/Social Science Education. (ERIC Document Reproduction Service No. ED 404 961)
- Ross, R. (1998). Disability-friendly colleges. *New Mobility Magazine* [Online]. Retrieved December 19, 2005, from [www.newmobility.com/review\\_article.cfm?id=122&action=browse](http://www.newmobility.com/review_article.cfm?id=122&action=browse)



- Sahlen, C. H., & Lehmann, J. P. (2006). Requesting accommodations in higher education. *Teaching Exceptional Children, 38*, 28-34.
- Salzberg, C. L. (2003, November). *ASD project: Preparing higher education faculty for students with disabilities: It's right, it's smart, and it should be mandatory*. Retrieved February 5, 2006, from [www.asdproject.org/resources/preparing\\_faculty.htm](http://www.asdproject.org/resources/preparing_faculty.htm)
- Salzberg, C. L., Peterson, L., Debrand, C. C., Blair, R. J., Carsey, A. C., & Johnson, A. S. (2002). Opinions of disability services directors on faculty training: The need, content, issues, formats, media, and activities. *Journal of Postsecondary Education and Disability, 15*, 101-114.
- Scherer, M. J., & McKee, B. G. (1992). Matching the student with the most appropriate assistive technology: Evaluation of the assistive technology device predisposition assessment (Report No. IR 015 646). San Francisco: Annual Conference of the American Educational Research Association. (ERIC Document Reproduction Service No. ED 348 969)
- Scione, M. (2003). The Virginia alternative financing program: Policy features and innovations [Electronic version]. *Journal of Disability Policy Studies, 14*, 86.
- Section 508. (2006). *508 law*. Retrieved November 3, 2006, from: <http://www.section508.gov>
- Smith, D. D. (2006). *Introduction to special education: Teaching in an age of opportunity*. Boston: Pearson.
- Tagayuna, A., Stodden, R. A., Chang, C., Zeleznik, M. E., & Whelley, T. A. (2005). A two year comparison of support provision for persons with disabilities in postsecondary education. *Journal of Vocational Rehabilitation, 22*, 13-21.
- Tapping Technology. (2001). *Accessing a higher education in assistive technology*. Retrieved October 31, 2005, from <http://www.mdmap.org/TT/2001.12/art.2.html>
- Thomas, S. (2000). College students and disability law. *Journal of Special Education, 33*, 248-257.
- Thompson, A. (1997). *College students with disabilities and assistive technology: A Desk reference guide*. Washington, DC: Special Education Programs.
- U.S. Department of Education. (2005). *Auxiliary aids and services for postsecondary students with disabilities*. Retrieved December 29, 2005, from <http://www.ed.gov/about/offices/list/ocr/docs/auxaids.html>
- U.S. Department of Labor. (2005). *Employment standards administration office of federal contract compliance programs*. Retrieved December 20, 2005, from <http://www.dol.gov/esa/regs/compliance/ofcccp/fs503.htm>

- Vogel, S. A., Leyser, Y., Wyland, S., & Brulle, A. (1999). Students with learning disabilities in higher education: Faculty attitude and practices. *Learning Disabilities Research & Practice, 14*, 173-186.
- Walters, J. (2000). *Postsecondary education and individuals with disabilities: Recommendations to New York state for strategies to increase access and opportunity*. New York: Department of Education.
- Ward, M. J., & Berry, H. G. (2005). *Students with disabilities in postsecondary education: Accommodations received and needed*. Information from HEATH. Retrieved February 6, 2006, from [www.heath.gwu.edu/newsletter/Issue%2015/Studnets%20with%20Disabilities.htm](http://www.heath.gwu.edu/newsletter/Issue%2015/Studnets%20with%20Disabilities.htm)
- Wehmeyer, M. (1998). National survey of the use of assistive technology by adults with mental retardation. *Mental Retardation, 36*, 44-51.
- West, M., Kregel, J., Getzel, E. E., Ming, Z., Ipsen, S. M., & Martin, E. D. (1993). Beyond section 504: Satisfaction and empowerment of students with disabilities in higher education. *Exceptional Children, 59*, 456-467.
- Wynne v. Tufts University School of Medicine*. (1992). 932 F.2d 19 (1<sup>st</sup> Cir. 1991, modified 976 F.2d 791 (1<sup>st</sup> cir. 1992). U.S. Appellate LEXIS 24933, 1-19.
- Zuckle v. Regents of the University of California*, 97-16708166 F, 1999 U.S. Appellate LEXIS 2702, 1-14.

## APPENDICES

### APPENDIX A

#### Cover Letter (for email survey invitation)

Dear Colleagues:

My name is Chris Cain. I am a professor of Special Education with Mars Hill College in Western North Carolina and a doctoral student at East Tennessee State University in the Educational Leadership and Policy Analysis Program. As part of my degree requirements, I must complete a dissertation research project. I have chosen a topic of research that relates to what we do everyday. My dissertation is a study of North Carolina postsecondary institutions' Assistive Technology and Services for Students with Disabilities. This topic is of significant interest to me because I also Chair our Committee on Disabilities. I believe strongly that the findings from this study will be beneficial by providing important information to the field of special education and specifically the coordinators of disability services across North Carolina.

I am requesting your help in carrying out my study. Within the next two days, you will receive an email invitation to participate in this study by taking an online survey. As a coordinator of disability services your insight is extremely valuable. The survey has three sections that requests information about your institution and the assistive technology and services for students with disabilities available on your campus.

This survey is completely anonymous and confidential: No one on the research team, including myself, will be able to identify your institution or you personally. The findings of my research will be reported in summary form only.

If you have questions about the survey, please reply to this email or to my work email address below.

Sincerely,

Chris R. Cain, NBCT, ABD  
Coordinator, Special Education  
Coordinator, Academically or Intellectually Gifted  
Mars Hill College  
Campus Box 6684  
Mars Hill, NC 28754  
Phone: 828-689-1495  
Fax: 828-689-1274  
E-mail: [ccain@mhc.edu](mailto:ccain@mhc.edu)

## APPENDIX B

Cover Letter (for traditional mailing)

Chris Cain  
Campus Box 6684  
Mars Hill College  
Mars Hill, NC 28754

DATE:

Dear Colleges,

My name is Chris Cain. I am a professor of Special Education with Mars Hill College in Western North Carolina and a doctoral student at East Tennessee State University in the Educational Leadership and Policy Analysis Program. As part of my degree requirements, I must complete a dissertation research project. I have chosen a topic of research that relates to what we do everyday. My dissertation is a study of North Carolina Postsecondary Institutions Regarding Assistive Technology and Services for Students with Disabilities. This topic is of significant interest to me because I also Chair our Committee on Disabilities. I believe strongly that the findings from this study will be beneficial by providing important information to the field of special education and specifically the coordinators of disability services across North Carolina.

I am requesting your help in carrying out my study. As a coordinator of disability services your insight is extremely valuable. Therefore, I am requesting your participation in completing the attached survey. This survey has three sections that requests information about your institution and the assistive technology and services for students with disabilities available on your campus. Please make sure that you DO NOT place your name, the name of your institution, or any other identifying information anywhere on this survey. Remember, your answers will be completely confidential and anonymous and in no way reflect on you or your institution.

When you have completed this survey, please place it in the enclosed postage paid envelope. If you have any questions please feel free to contact me. Be assured that your anonymity will be respected and your cooperation will be greatly appreciated.

An executive summary of this study will be available upon request. If you have any questions regarding your participation, please feel free to contact me. I thank you for your consideration and participation in this study.

Sincerely,

*Chris R. Cain*, NBCT, ABD  
Coordinator, Special Education  
Coordinator, Academically or Intellectually Gifted  
Mars Hill College  
Campus Box 6684  
Mars Hill, NC 28754  
Phone: 828-689-1495  
Fax: 828-689-1274  
E-mail: [ccain@mhc.edu](mailto:ccain@mhc.edu)

## APPENDIX C

### Survey of North Carolina Postsecondary Institutions Regarding Assistive Technology and Services for Students With Disabilities

Welcome! The purpose of this survey is to explore the services for students with disabilities and the assistive technology devices available at North Carolina institutions of higher learning.

By completing this survey, you are giving your informed consent to include your responses in my study. Your responses are anonymous and confidential, and the findings will be reported in summary form only.

Thank you for your participation!

Section 1: The following questions should be answered by choosing the best answer.

1. My institution is a:  
 1. Community college  
 2. Private college or university  
 3. State university
2. The student enrollment at my institution is approximately \_\_\_\_\_ (total student enrollment)
3. Approximately how many self-reported students with disabilities are enrolled at your institution? \_\_\_\_\_
4. Of the students on your campus who self-report disabilities, approximately how many have a physical disability? (i.e. spina bifida, cerebral palsy, etc.) \_\_\_\_\_
5. Of the students on your campus who self-report disabilities, approximately how many have a learning or mental disability? (i.e. learning disabled, autism, etc.) \_\_\_\_\_
6. The position of coordinator of students with disabilities services is recognized by your institution officially as a:  
 1. Part-time position  
 2. Full-time position  
 3. My institution does not have a designated full or part-time position for coordinating services for students with disabilities.
7. How many full-time staff members do you have within the services for students with disabilities? \_\_\_\_\_

8. How many part-time staff members do you have within the services for students with disabilities? \_\_\_\_\_
9. Do you have an individual on campus knowledgeable in assistive technology devices (i.e. telecommunication devices for the deaf) ?  
 \_\_\_\_\_ 1. Yes                      \_\_\_\_\_ 2. No
10. How does your institution fund assistive technology? (Check all that apply.)  
 \_\_\_\_\_ 1. Grants  
 \_\_\_\_\_ 2. Included in the campus wide budget  
 \_\_\_\_\_ 3. Collaboration with outside agencies (vocational rehab)  
 \_\_\_\_\_ 4. Purchasing refurbished or used assistive technologies
11. What percent of your assistive technology equipment is less than two years old? \_\_\_\_\_%
12. What percent of your assistive technology equipment is 2 to 5 years old? \_\_\_\_\_%
13. Approximately how much did your institution spend on assistive technology or assistive technology training during the last fiscal year? \$ \_\_\_\_\_
14. Funding to meet the assistive technology needs of students with disabilities at my institution is:  
 \_\_\_\_\_ 1. Inadequate  
 \_\_\_\_\_ 2. Adequate  
 \_\_\_\_\_ 3. More than adequate
15. Have assistive technology accommodations placed a financial burden on your institution?  
 \_\_\_\_\_ 1. No                      \_\_\_\_\_ 2. Yes
16. How often do you attend training seminars and workshops related to assistive technology? (Check one.)  
 \_\_\_\_\_ 1. Never    \_\_\_\_\_ 4. Once a year  
 \_\_\_\_\_ 2. Once every few years                      \_\_\_\_\_ 5. Two or more times per year  
 \_\_\_\_\_ 3. Every two years
17. How often do you attend training seminars and workshops related to disability legislation? (Check one.)  
 \_\_\_\_\_ 1. Never    \_\_\_\_\_ 4. Once a year  
 \_\_\_\_\_ 2. Once every few years                      \_\_\_\_\_ 5. Two or more times per year  
 \_\_\_\_\_ 3. Every two years
18. Are faculty personally contacted by Student Disabilities Services regarding accommodations for students?  
 \_\_\_\_\_ 1. No                      \_\_\_\_\_ 2. Yes

Section 2: In the following section, please indicate if your institution has each of the assistive technology devices by placing a check by the device. (Check all that apply.)

- |   |   |
|---|---|
| <input type="checkbox"/> 1. Taped texts                               | <input type="checkbox"/> 11. Voice synthesizers                         |
| <input type="checkbox"/> 2. Note takers                               | <input type="checkbox"/> 12. Braille calculators, printers, typewriters |
| <input type="checkbox"/> 3. Telephone handset amplifiers              | <input type="checkbox"/> 13. Videotext displays                         |
| <input type="checkbox"/> 4. Interpreters for the deaf                 | <input type="checkbox"/> 14. Television enlargers                       |
| <input type="checkbox"/> 5. Assistive listening devices               | <input type="checkbox"/> 15. Talking calculators                        |
| <input type="checkbox"/> 6. Telecommunication devices for deaf        | <input type="checkbox"/> 16. Optical character recognition              |
| <input type="checkbox"/> 7. Open and closed caption                   | <input type="checkbox"/> 17. Assistive computer software                |
| <input type="checkbox"/> 8. Electronic Readers                        | <input type="checkbox"/> 18. Specialized tape recorders                 |
| <input type="checkbox"/> 9. Screen readers                            | <input type="checkbox"/> 19. Adaptive workstations                      |
| <input type="checkbox"/> 10. Calculators or keyboards with large keys | <input type="checkbox"/> 20. Specialized gym equipment                  |

Section 3: In the following section, please indicate the degree to which you disagree or agree with each of the statements by circling the appropriate number.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Legislative Issues					
1) Individuals who work in student support services understand the legislative demands that are placed on postsecondary institutions.	1	2	3	4	5
2) We fully adhere to the demands of Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, as well as other relevant legislation.	1	2	3	4	5
Student Responsibilities					
3) Students are fully responsible for providing documentation to support their disability claim.	1	2	3	4	5
4) Students are fully responsible for providing documentation to support their accommodation request.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Institutional Responsibilities</b>					
5) Every student is treated as an individual and accommodations are made for that individual.	1	2	3	4	5
6) The institution has adequate assistive technology to meet the needs of the majority of our students with disabilities.	1	2	3	4	5
7) If the institution does not have an assistive technology device on campus for a student with a disability, we find that device through outside agencies?	1	2	3	4	5
8) Student with Disabilities Services requires training of the support staff at least annually.	1	2	3	4	5
9) My institution revises its policies regarding students with disabilities at least annually.	1	2	3	4	5
10) The institution follows up on the success of an accommodation for a student with disabilities.	1	2	3	4	5
11) The institution is responsible for assistive technology as it relates to a student's educational program.	1	2	3	4	5
12) Outside agencies are responsible for assistive technology as it relates to a student's educational program.	1	2	3	4	5
<b>Context of accommodations</b>					
13) When evaluating assistive technology requests we consider the effects on other students.	1	2	3	4	5
<b>Impact of Accommodations</b>					
14) Faculty have expressed concerns that accommodations give students with disabilities an unfair advantage.	1	2	3	4	5
15) Faculty have expressed concerns that accommodations and modifications are distracting to other students in the classroom.	1	2	3	4	5
16) The institution has lowered its standards or altered fundamentals of programs by granting accommodations and modifications to students with disabilities.	1	2	3	4	5



## APPENDIX D

### Survey Population

<b><u>School</u></b>	<b><u>Type</u></b>	<b><u>DS Coordinator</u></b>
Appalachian State	State	Suzanne Wehner
Barber-Scotia College	Private	
Barton College	Private	Courtney Manning
Belmont Abbey College	Private	Stacey Davis
Bennett College	Private	Jacquelyn Lightsey
Brevard College	Private	Susan Kuehn
Campbell University	Private	Laura Rich
Catawba College	Private	Nan Zimmerman
Chowan College	Private	Frances Cole
Davidson College	Private	Ernest Jeffries
Duke University	Private	Emma Swain
East Carolina University	State	Elizabeth S. Johnston
Elizabeth City State University	State	Annie A. Hedgebeth
Elon University	Private	Priscilla Lipe
Fayetteville State University	State	Dr. Joseph F. Johnson
Gardner-Webb University	Private	Cheryl Potter
Greensboro College	Private	Julie Yindra
Guilford College	Private	Gaither Terrell
High Point University	Private	Kelly Norton
Johnson C. Smith University	Private	James Cuthbertson
Lees-McRae College	Private	Tamara Tressler-Blewitt
Lenoir-Rhyne College	Private	Janette Sims
Livingstone College	Private	Rick Freeman
Louisburg College	Private	Laura Arrington
Mars Hill College	Private	Linda Horton
Meredith College	Private	Beth Meier
Methodist College	Private	Darlene Hopkins
Montreat College	Private	Shirley McIntosh
Mount Olive College	Private	Jenny Bancroft
NC A&T State University	State	Peggy Oliphant
NC Central University	State	Brenda Parker
NC School of the Arts	State	Tom Murray
NC Wesleyan College	Private	Ginny Fowler
NC State University	State	Cheryl Branker
Peace College	Private	Marge Terhaar-Yonkers
Pfeiffer University	Private	Dr. William Faulkner
Piedmont Baptist College	Private	Chris Ronk
Queens College	Private	Sandy Rogelberg
Salem College	Women's	Robin Smith

Shaw University	Private	J Carver
St. Andrews Presbyterian College	Private	Mari Janet Doonan
St. Augustine's College	Private	Dr. Stanley Elliott
UNC-A	State	Dr. Heidi Kelley
UNC-Chapel Hill	State	Mr. Jim Kessler
UNC-Charlotte	State	Joann Fernald
UNC-Greensboro	State	Mary Culkin
UNC-Pembroke	State	Mary Ellen Walker
UNC-Wilmington	State	Dr. Peggy Turner
Warren Wilson College	Private	Deborah Braden
Wake Forest University	Private	Van D. Westervelt
Western Carolina University	State	Kimberly Marcus
Wingate University	Private	Linda Stedje-Larsen
Winston-Salem State University	State	Myra Waddell

Community Colleges:

Alamance Community College	Community	Monica Isbell
AB Tech Community College	Community	Annie Clingenpeel
Beaufort County Community College	Community	Dawn Holden
Bladen Community College	Community	Tommy Rains
Blue Ridge Community College	Community	Judy Stoneham
Brunswick Community College	Community	Matlynn Yeoman
Caldwell Community College/IT	Community	Johnna Coffey
Cape Fear Community College	Community	Bill Parker
Carteret Community College	Community	Mark Johnson
Catawba Valley Community College	Community	Wanda Horvath
Central Carolina Community College	Community	David C. Oates
Central Piedmont Community College	Community	Pat Nash
Cleveland Community College	Community	Alan Price
Coastal Carolina Community College	Community	Sarah Wheeler
College of the Albemarle	Community	Andrea Temple
Craven Community College	Community	Fred Cooze
Davidson County Community College	Community	Jimmie Gravely
Durham Technical Community College	Community	Karen Mosley-Lyon
Edgecombe Community College	Community	Cathy Stephenson
Fayetteville TCC	Community	Stephanie Altamirano
Forsyth TCC	Community	Gail Freeman
Gaston College	Community	Audrey Sherrill
Guilford TCC	Community	Angela Leak

Halifax Community College	Community	Sherida Gholston
Haywood Community College	Community	Patty Kirkley
Isothermal Community College	Community	Karen Harris
James Sprunt Community College	Community	Melvin Felton
Johnston Community College	Community	Toney Bond
Lenoir Community College	Community	Macrina Martin
Martin Community College	Community	John Wells
Mayland Community College	Community	Doug Dewar
McDowell TCC	Community	Donna Short
Mitchell Community College	Community	Donavon Kirby
Montgomery Community College	Community	Margo Gaddy
Nash Community College	Community	Sam Davis
Pamlico Community College	Community	Clark Dimond
Piedmont Community College	Community	Dorothy Yarborough
Pitt Community College	Community	Michael Bridgers
Randolph Community College	Community	Grover Yancey
Richmond Community College	Community	Dr. John Wester
Roanoke-Chowan Community College	Community	Sandra Copeland
Robeson Community College	Community	Cynthia Quintero
Rockingham Community College	Community	Terry Kent
Rowan-Cabarrus Community College	Community	Mark Ebersole
Sampson Community College	Community	Tonita Smith
Sandhills Community College	Community	Madie Ash
South Piedmont Community College	Community	Rhonda Treadaway
Southeastern Community College	Community	Angie Uhl-Kalev
Southwestern Community College	Community	Deb Pantini
Stanly Community College	Community	Andra Bennett
Surry Community College	Community	Laura Bracken
Tri-County Community College	Community	Linda Howell
Vance-Granville Community College	Community	Daniel Alvarado
Wake TCC	Community	Janet Killen
Wayne Community College	Community	Caroline Smith
Western Piedmont Community College	Community	David Collins
Wilkes Community College	Community	Dr. Dean Sprinkle
Wilson TCC	Community	Joya Ebison

