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# Assistive Technology

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# ASSISTIVE TECHNOLOGY

by

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A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Science

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RESEARCH PAPER APPROVAL

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Approved by:

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Graduate School
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# INTRODUCTION

## Need for the Study

According to *An Institutional Perspective on Students with Disabilities in Postsecondary Education (1999),* the total number of students with disabilities that are enrolled in higher education has increased. According to a study by University of Washington (2004), the number of postsecondary undergraduate students identified as having disabilities in the United States represented 6% of the student body. The types of disabilities reported by these students were as follows:

| | |
|---|---|
| Learning disabilities | 45.7% |
| Mobility or orthopedic impairments | 13.9% |
| Health impairments | 11.6% |
| Mental illness or emotional disturbance | 7.8% |
| Hearing impairments | 5.6% |
| Blindness and visual impairments | 4.4% |
| Speech or language impairments | 0.9% |
| Other impairments | 9.10% |

**Figure 1: Type of Disabilities**

In today's world technology is essential for communication, learning, and employment. When persons with disabilities have access to technology it helps them in all facets of life and can prepare them for employment. The use of technology can build self-confidence in the disabled individual and allow them to make important choices about their learning experience.

Assistive technology means that persons with disabilities are the beneficiaries of the technology revolution too.

Students with a learning disability might require some adaptations during their learning experiences. According to Bryant (1998), with the use of certain assistive technology, adaptations may be needed to assist students with learning disabilities compensate for their learning difficulties so they can engage more in learning activities. Using assistive technology can allow students with learning disabilities to engage, interact, and succeed in a classroom more successfully.

Assistive technology can include computers, but also pertains to a number of other types of adaptations that allows individuals with disabilities to function more independently. According to LDA National (2004), appropriate assistive technology for students and adults with learning disabilities can include but is not limited to these:

- Computers with adaptive software
- Books on tape, or electronic format
- Speller and grammar checkers
- Specialized four-track tape recorders
- Audio players
- Computer screen readers
- Talking word processors and calculators
- Electronic data organizers

"Assistive technology has the potential to augment abilities and, bypass or compensate for barriers that disabilities create" (Lewis, 1993, p. 9). Assistive Technology Devices are useful

tools in providing persons with disabilities the ability to function and participate within a normal classroom setting. Assistive technology is a great tool that can be used to extend a disabled person's social, communicative, and physical abilities. This technology also helps provide a mean for cooperative and academic inclusion.

The use of assistive technology can allow the student to feel more active in their learning experiences. "Assistive technology (AT) devices can decrease student's isolation and allow them to become part of regular subject area classrooms. Assistive technology then becomes a tool that provides a method for an individual who is experiencing a disability or other issue to still participate in a classroom (Cavanaugh, 2002, p. 27)."

**Purpose of Study**

The purpose of this research was to contribute to knowledge regarding the importance of assistive technology within the school system. Education improves the opportunity for persons with disabilities to obtain job employment. Results of this research are beneficial to students in a classroom setting that are dealing with a disability.

The use of technology within a classroom can improve the performance of persons who are disabled. According to Riviere (1996),

Responding to the times, technology has made considerable advances in helping individuals with learning disabilities become productive and independent participants in work, classroom, and leisure settings. Recent laws mandating civil rights for those with disabilities can be interpreted to imply that the implementation of technology is a significant opportunity for the provision of equal access. (p. 1)

**Statement of Problem**

The problem of this research was to determine how the use of Assistive Technology can be beneficial to a person with a disability. The following research questions were addressed:

**Research Questions**

1. What are some laws associated with assistive technology?
2. What are some types of assistive technology devices?
3. What are the research studies that show the importance of assistive technology?

**Definition of Terms**

*Assisted Technology Device:* Products, devices or equipment, whether acquired commercially, modified or customized, that are used to maintain, increase or improve the functional capabilities of individuals with disabilities (Gerald, 2001).

*Assisted Technology Services:* Supports people with disabilities or their caregivers to help them select, acquire, or use adaptive devices. Such services include functional evaluations, training on devices, product demonstration, and equipment purchasing or leasing (Gerald, 2001).

*Blindness and visual impairments*: Means that even with eyeglasses, contact lenses, medicine or surgery, you don't see well. Vision impairment can range from mild to severe. The leading causes of vision impairment and blindness in the United States are age-related eye diseases: macular degeneration, cataract and glaucoma. Other eye disorders, eye injuries and birth defects can also cause vision loss (Medline Plus, 2010).

*Health impairments*: Common diagnoses include arthritis, cancer, Multiple Sclerosis, Asthma, AIDS, and heart disease. Unless the condition is neurological in nature, health

impairments are not likely to directly affect learning. However, the secondary effects of illness and the side effects of medications can have a significant impact on memory, attention, strength, endurance, and energy levels (University of Washington, 2004).

*Hearing impairments*: Occurs when there's a problem with or damage to one or more parts of the ear. The degree of impairment can vary widely (TeensHealth, 2010).

*Learning disabilities*: A learning disability is a neurological disorder. A learning disability can't be cured or fixed; it is a lifelong issue. A learning disability results from a difference in the way a person's brain is "wired" (LD Online, 2008).

*Mental illness or emotional disturbance*: Emotional and behavioral disturbances represent significant behavioral excesses. Many labels are used to denote deviant behavior; these labels include: emotionally handicapped or disturbed, behaviorally disordered, socially maladjusted, delinquent, mentally ill, psychotic, and schizophrenic (Zabel, 2009).

*Mobility or orthopedic impairments*: result from congenital conditions, accidents, or progressive neuromuscular diseases. These disabilities include conditions such as spinal cord injury (paraplegia or quadriplegia), cerebral palsy, spina bifida, amputation, muscular dystrophy, cardiac conditions, cystic fibrosis, paralysis, polio/post-polio, and stroke. Functional limitations and abilities vary widely even within one group of disabilities. Accommodations vary greatly and can best be determined on a case-by-case basis (Grand Valley State University, 2010).

*Speech or language impairments*: Problems in communication and related areas such as oral-motor function--sucking, swallowing, drinking, eating. These delays and disorders range from simple sound substitutions to the inability to understand or use language or use the oral-motor mechanism for functional speech and feeding (NICHCY, 2010).

# CHAPTER 2

## REVIEW OF RELATED LITERATURE

The problem of this research was to determine how the use of Assistive Technology can be beneficial to a person with a disability. As stated by Blackstone (1990), "assistive technologies enable people to communicate, receive instruction, learn, play, move about, achieve, and be independent" (p. 11). Persons with disabilities are now leading more independent lives in their communities. They are also attending regular schools and persons with disabilities have more professional careers than ever before.

Assistive technology helps persons with disabilities minimize the obstacles within the classroom and in the workplace. According to Jendron (2010), "Assistive Technology can offer powerful tools to students with learning disabilities by providing remedial or compensatory support in the classroom and for independent learning" (p. 1). With the use of assistive technology students with disabilities will be more successful in the classroom.

The method used for this study was descriptive research. According to Van Wagner (2009), descriptive research, "seeks to depict what already exists in a group or population. An example of this type of research would be an opinion poll to determine which Presidential candidate people plan to vote for in the next election. Descriptive studies do not seek to measure the effect of a variable; they seek only to describe" (p. 1).

The procedure used in the study was to find journal articles, theses, dissertations, and magazine articles, and the retrieving of data from the Internet to be used to obtain answers to the research questions,

1. What are some laws associated with assistive technology?

2. What are some types of assistive technology devices?

3. What are the research studies that show the importance of assistive technology?

The information obtained for the study was retrieved from searching the Southern Illinois University Carbondale Morris Library databases. Morris Library databases used included EBSCO and ProQuest. The keywords and phrases used to retrieve relevant information included: "Assistive Technology", "Learning disabilities", "Assistive technology devices", and "Disability Laws". Other important material found using the Internet was obtained by using Google and Yahoo search engines.

**Laws**

Students with a disability need to be informed about their rights. There are many laws associated with assistive technology. One key law that was passed is the Technology-Related Assistance for Individuals with Disabilities Act of 1988. The act was brought about by concerned persons with disabilities, their families, and those who provide services to individuals with disabilities.

These people indicated three major concerns to Congress. According to Morrissey and Silverstein (1989), the concerns were these:

1. People with disabilities and those involved with them, such as parents, siblings, friends, teachers, counselors, and employers, lack knowledge of and training in the use of technology and support services or the benefits that such technology and services would provide.

2. Funding for technology and support services is uncoordinated, severely limited and primarily dependent on a personal source of assistance or aggressive action by an individual to make it available from a nonpersonal source.

3. There is no comprehensive system in place to help persons with disabilities acquire technology, to ensure that such technology is appropriate or customized to meet an individual's unique needs or circumstances, or to provide training in, upgrading, replacement, or repair of such technology.

President Reagan signed the act and it became a law on August 19, 1988 and in October 1, 1988, $5 million in federal funds were available for the Technology Act. The $5 million was used to fund a technical assistance center that helped states to develop and implement statewide programs in technology-related assistance. In addition some funds were used to evaluate how well states that did receive those grants did in responding to the purposes of the act that applied to them.

Another law that was passed is the Rehabilitation Act Amendments of 1998, which covers access to federally funded programs and services. This amendment was signed into law on August 7, 1998 by President Clinton. The law, according to the Federal Communications Commission (2006), requires that all Federal agencies when they develop, procure, maintain, or use electronic and information technology the Federal agencies must ensure that this technology is accessible to employees and members of the public with disabilities to the extent it does not pose an "undue burden."

The Federal Communications Commission (2006) states that, “individuals with disabilities who are Federal employees must have access to and use of information and data that is comparable to the access to and use of the information and data by Federal employees who are not individuals with disabilities” (p.1).

In addition, Federal Communications Commission (2006) states, “individuals with disabilities who are members of the public seeking information or services from a Federal department or agency to have access to and use of information and data that is comparable to the access to and use of the information and data by such members of the public who are not individuals with disabilities” (p. 1).

Another law that was passed is called The Individuals with Disabilities Education Improvement Act (IDEA). IDEA is “the federal law that guarantees blind and visually impaired students the right to a free and appropriate public education” (Riccobono, 2009, p.1).

The Individuals with Disabilities Education Improvement Act was enacted in 1990. According to the National Research Center on AD/HD (2010), IDEA was designed to protect the rights of students with disabilities and to ensure everyone receives a free appropriate public education regardless of their ability.

**Assistive Technology Devices**

According to the Technology-Related Assistance for Individuals with Disabilities Act of 1988 (1988), assistive technology is described as, “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individual with disabilities. AT service is directly assisting an individual with a disability in the selection, acquisition, or use of an assistive technology device” (p. 100).

This Act also states that assistive technology should be defined as any service that directly assists a person with a disability in the selection, acquisition, or use of an assistive technology device. According to the Act, these services include the following:

1. Evaluation of needs, providing for the acquisition of assistive technology devices by individuals with disabilities;

2. Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing, such assistive devices;

3. Coordinating and using other therapies, interventions, or services with assistive technology;

4. Training or providing technical assistance for an individual with disabilities;

5. Training or providing technical assistance for professionals, employers, or other individuals who provide services to or are otherwise substantially involved in the major life functions of individuals with disabilities.

In all, there are many assistive learning devices that are used in the classroom to assist with the learning process of an individual with disabilities. Some devices are used more than others because of the need for the certain device. The range of assistance needed by persons with disabilities varies. As stated by Purcell and Grant (2002), "The level of guidance and support necessary for each student in the classroom may vary greatly; the student may need anything from physical, verbal, or visual prompts to high-technology devices and services" (p. 3).

There are different types of assistive technology devices for different types of disabilities. According to AbleData (2010), assistive technology devices are broken up into five categories. These categories are

- Assistive Technology for Vision
    - Aids students who are blind or have low vision.
- Assistive Technology for Communication

- Aids students who have difficulty in communicating effectively.

- Assistive Technology for Access
    - Aids students who have difficulties in accessing communication, learning tools, or engaging in classroom or home activities.
- Assistive Technology for Hearing
    - Aids students who are deaf or hard-of-hearing.
- Assistive Technology for Learning and Studying
    - Aids students with high-incidence disabilities (learning, behavior, or cognitive disabilities) to increase, maintain, or improve their functional capabilities.

The assistive technology used by an individual can cover all those types of students needs. According to Microsoft (2009), there are numerous types of assistive technology devices:

- Braille embossers
    - Transfer computer generated text into embossed Braille output. Braille translation programs convert text scanned-in or generated via standard word processing programs into Braille, which can be printed on the embosser.
- Keyboard filters
    - Are typing aids such as word prediction utilities and add-on spelling checkers that reduce the required number of keystrokes. Keyboard filters enable users to quickly access the letters they need and to avoid inadvertently selecting keys they don't want.
- Light signaler alerts

  - Monitor computer sounds and alert the computer user with light signals. This is useful when a computer user can not hear computer sounds or is not directly in front of the computer screen. As an example, a light can flash alerting the user when a new e-mail message has arrived or a computer command has completed.

- On-screen keyboards
  - Provide an image of a standard or modified keyboard on the computer screen that allows the user to select keys with a mouse, touch screen, trackball, joystick, switch, or electronic pointing device. On-screen keyboards often have a scanning option that highlights individual keys that can be selected by the user. On-screen keyboards are helpful for individuals who are not able to use a standard keyboard due to dexterity or mobility difficulties.
- Reading tools and learning disabilities programs
  - Include software and hardware designed to make text-based materials more accessible for people who have difficulty with reading. Options can include scanning, reformatting, navigating, or speaking text out loud. These programs are helpful for those who have difficulty seeing or manipulating conventional print materials; people who are developing new literacy skills or who are learning English as a foreign language; and people who comprehend better when they hear and see text highlighted simultaneously.
- Refreshable Braille displays

  - Provide tactile output of information represented on the computer screen. A Braille "cell" is composed of a series of dots. The pattern of the dots and various combinations of the cells are used in place of letters. Refreshable Braille displays mechanically lift small rounded plastic or metal pins as needed to form Braille characters. The user reads the Braille letters with his or her fingers, and then, after a line is read, can refresh the display to read the next line.

- Screen enlargers, or screen magnifiers
  - Work like a magnifying glass for the computer by enlarging a portion of the screen which can increase legibility and make it easier to see items on the computer. Some screen enlargers allow a person to zoom in and out on a particular area of the screen.
- Screen readers
  - Used to verbalize, or "speak," everything on the screen including text, graphics, control buttons, and menus into a computerized voice that is spoken aloud. In essence, a screen reader transforms a graphic user interface (GUI) into an audio interface. Screen readers are essential for computer users who are blind.
- Speech recognition or voice recognition programs
  - Allow people to give commands and enter data using their voices rather than a mouse or keyboard. Voice recognition systems use a microphone attached to the computer, which can be used to create text documents such

as letters or e-mail messages, browse the Internet, and navigate among applications and menus by voice.

- Text-to-Speech (TTS) or speech synthesizers
    - Receive information going to the screen in the form of letters, numbers, and punctuation marks, and then "speak" it out loud in a computerized voice. Using speech synthesizers allows computer users who are blind or who have learning difficulties to hear what they are typing and also provide a spoken voice for individuals who can not communicate orally, but can communicate their thoughts through typing.
- Talking and large-print word processors
    - Are software programs that use speech synthesizers to provide auditory feedback of what is typed. Large-print word processors allow the user to view everything in large text without added screen enlargement.
- TTY/TDD conversion modems
    - Are connected between computers and telephones to allow an individual to type a message on a computer and send it to a TTY/TDD telephone or other Baudot equipped device.

Also stated by Microsoft (2009), other devices are used in the classroom by persons with disabilities:

- Braille embossers

  - Transfer computer generated text into embossed Braille output. Braille translation programs convert text scanned-in or generated via standard word processing programs into Braille, which can be printed on the embosser.

- Keyboard filters
  - Are typing aids such as word prediction utilities and add-on spelling checkers that reduce the required number of keystrokes. Keyboard filters enable users to quickly access the letters they need and to avoid inadvertently selecting keys they don't want.
- Light signaler alerts
  - Monitor computer sounds and alert the computer user with light signals. This is useful when a computer user cannot hear computer sounds or is not directly in front of the computer screen. As an example, a light can flash alerting the user when a new e-mail message has arrived or a computer command has completed.
- On-screen keyboards
  - Provide an image of a standard or modified keyboard on the computer screen that allows the user to select keys with a mouse, touch screen, trackball, joystick, switch, or electronic pointing device. On-screen keyboards often have a scanning option that highlights individual keys that can be selected by the user. On-screen keyboards are helpful for individuals who are not able to use a standard keyboard due to dexterity or mobility difficulties.
- Reading tools and learning disabilities programs

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- Screen enlargers, or screen magnifiers
  - Work like a magnifying glass for the computer by enlarging a portion of the screen which can increase legibility and make it easier to see items on the computer. Some screen enlargers allow a person to zoom in and out on a particular area of the screen.
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- Speech recognition or voice recognition programs
  - Allow people to give commands and enter data using their voices rather than a mouse or keyboard. Voice recognition systems use a microphone attached to the computer, which can be used to create text documents such as letters or e-mail messages, browse the Internet, and navigate among applications and menus by voice.
- Text-to-Speech (TTS) or speech synthesizers
  - Receive information going to the screen in the form of letters, numbers, and punctuation marks, and then "speak" it out loud in a computerized voice. Using speech synthesizers allows computer users who are blind or who have learning difficulties to hear what they are typing and also provide a spoken voice for individuals who can not communicate orally, but can communicate their thoughts through typing.
- Talking and large-print word processors
  - Are software programs that use speech synthesizers to provide auditory feedback of what is typed. Large-print word processors allow the user to view everything in large text without added screen enlargement.

- TTY/TDD conversion modems
    - Are connected between computers and telephones to allow an individual to type a message on a computer and send it to a TTY/TDD telephone or other Baudot equipped device.

There are also types of alternative input devices which allow individuals with disabilities to control their computers through means other than a standard keyboard or pointing device. These alternative input devices include:

- Alternative keyboards
    - These keyboards are larger or smaller than the normal keyboards. They use alternative configurations and can be used with one hand.
- Electronic pointing devices
    - Are used to navigate the cursor on the computer screen without using hands.
- Sip-and-puff systems
    - Devices that are activated by inhaling or exhaling.
- Wands and sticks
    - Devices that are worn on the head, held in the mouth or strapped to the chin. They are used to press the keys on the keyboard.
- Joysticks
    - Devices that are used by the feet, hand, or chin to control the cursor o the computer screen.
- Trackballs

    - Balls that move on the keyboard that control the cursor on the computer screen.
- Touch screens
    - Allows an individual to point and touch the computer screen itself to make a selection.

One of the most common kinds of these alternative input devices are alternative keyboards. There are different types of alternative keyboards that can assist in the learning process of an individual with disabilities. Some of these alternative keyboards according to Infinitec (2010), are expanded keyboards which are designed for individuals with severe motor disabilities, Matron adaptive keyboards which are designed to allow individuals with special needs to enter data into the computer easier and quicker. Other keyboards include large print keyboards which are for users with low vision and Frogpad single-hand keyboards which allows an individual with one hand access the entire keyboard.

**Research**

According to National Center for Education Statistics (2006), 95 percent of students age 6 to 21 that served under The Individuals with Disabilities Education Improvement Act were enrolled in regular school, 3 percent were served in a separate school for students with disabilities, 1 percent were placed in regular private schools by their parents, and 0.4 percent were served in each of the following environments: separate residential facility; homebound or hospital; a correctional facility.

A study done by National Center for Education Statistics (2006), shows types of schooling individuals with disabilities participated in as well as the type of disability the individual had. The results are revealed in Table 1:

**Table 1: Disabilities Among Students**

| Type of disability | All environments | Regular school, time outside regular classroom | | | Separate school for students with disabilities | Separate residential facility | Parentally placed in regular private schools[1] | Homebound/ hospital placement | Correctional facility |
|---|---|---|---|---|---|---|---|---|---|
| **All students with disabilities** | 100.0 | 3.7 | 3.7 | 17.6 | 2.9 | 0.4 | 1.0 | 0.4 | 0.4 |
| **Specific learning disabilities** | 100.0 | 4.8 | 1.4 | 11.8 | 0.7 | 0.1 | 0.7 | 0.2 | 0.4 |
| **Speech or language impairments** | 100.0 | 4.2 | 6.1 | 6.8 | 0.3 | # | 2.5 | 0.1 | # |
| **Mental retardation** | 100.0 | 6.0 | 8.7 | 48.4 | 5.6 | 0.4 | 0.2 | 0.5 | 0.3 |
| **Emotional disturbance** | 100.0 | 5.1 | 0.8 | 26.6 | 12.3 | 2.1 | 0.2 | 1.2 | 1.7 |
| **Multiple disabilities** | 100.0 | 3.4 | 6.7 | 44.4 | 20.5 | 2.0 | 0.4 | 2.3 | 0.3 |
| **Hearing impairments** | 100.0 | 8.8 | 7.8 | 19.8 | 8.2 | 4.2 | 1.0 | 0.2 | 0.1 |
| **Orthopedic impairment** | 100.0 | 7.0 | 9.0 | 26.3 | 5.3 | 0.2 | 0.7 | 1.4 | # |
| **Other health impairments[2]** | 100.0 | 4.8 | 6.5 | 14.9 | 1.6 | 0.2 | 0.8 | 1.0 | 0.2 |
| **Visual impairments** | 100.0 | 7.2 | 4.7 | 15.9 | 6.4 | 4.4 | 0.9 | 0.5 | 0.1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Autism** | 100.0 | 2.3 | 8.4 | 38.7 | 9.0 | 0.7 | 0.5 | 0.3 | # |
| **Deaf-blindness** | 100.0 | 1.0 | 3.5 | 34.8 | 20.7 | 7.6 | 0.6 | 1.8 | # |
| **Traumatic brain injury** | 100.0 | 1.7 | 6.1 | 23.7 | 5.7 | 0.6 | 0.6 | 1.4 | 0.2 |
| **Developmental delay** | 100.0 | 8.8 | 1.3 | 18.4 | 0.8 | 0.1 | 0.4 | 0.2 | |

This study shows that there are a lot of students in the classrooms with disabilities. Assistive technology devices can be used within these environments to allow the persons with disabilities to function at a greater lever. According to Steele (2006), individuals that need help to keep up with their classmates, especially those with severe disabilities, can benefit from assistive devices.

Between the years 1994 and 1997, there was data collected from a survey done by the Disability Followback Survey. According to Carlson (2001), the survey showed that based on a sample of approximately 42 million Americans with disabilities aged 18 years and older:

- 8.3 million Americans with disabilities needed special equipment or aids (AT) to perform basic activities of daily living (ADLs) such as bathing or showering, dressing, eating, getting in and out of bed or chairs, walking, getting outside, and using the toilet, including getting to the toilet.
- 15.4 million Americans with disabilities reported using assistive devices or technologies (primarily medical), such as tracheotomy tubes, ostomy bags, catheterization equipment, glucose monitors, diabetic equipment and supplies, inhalers, nebulizers, hearing aids, crutches, canes, walkers, wheelchairs, scooters, and feeding tubes.

- 16.6 million Americans with disabilities used special equipment, aids or assistive technology (either one or more of the above).
- 7.4 million Americans with disabilities had surgical implants such as shunts to drain away fluid, artificial joints, implanted lenses, pins, screws, nails, wires, rods, or lates, artificial heart valves, pacemakers, silicone implants, infusion pumps, implanted catheters, organ implants, and cochlear implants.
- 14 million Americans with disabilities lived in homes modified to meet their special needs. Among these, over 1.5 million persons reported needing further home modifications to already existing ones. An additional 1 million persons with disabilities who did not have any home modifications indicated that they needed such accommodations.
- 511 thousand Americans with disabilities reported using modified cars or vans. 369 thousand persons with disabilities reported needing modifications to their cars or vans. Of these, 60 thousand persons needed modifications in addition to the ones they already had, and the remaining 309 thousand persons used vehicles that had no modifications but needed them.
- 15.1 million Americans with disabilities worked at the time of the interview. In this group, 4.2 million persons reported being limited in the kind or amount of work they could do.
- 714 thousand Americans with disabilities reported having an accessible work environment that included hand rails or ramps, accessible parking or an accessible transportation stop close to the building, elevators, including elevators designed for persons with special needs, specially adapted work stations, restrooms designed for persons with

special needs, automatic doors, voice synthesizers, TDDs, infrared systems or other technical devices, Braille, enlarged print, special lighting or audio tape devices, and special pens or pencils, chairs, or other office supplies.

- 1.3 million Americans with disabilities working at the time of the interview reported needing one or more of the above mentioned work place designs and accessories.
- 402 thousand Americans with disabilities were provided with special accommodations that included readers, oral and sign language interpreters, job coaches, personal assistants, job redesign or slowing the pace of tasks, reduced work hours and more breaks, part-time work and other types of equipment, help, and work arrangements not named above.
- 531 thousand Americans with disabilities, working at the time of the interview, indicated a need for one or more of the previously mentioned special accommodations.

This survey show how big of an impact assistive technology has on individuals with disabilities within the classroom. It shows the need for devices that improve persons with disabilities performance within the classroom.

Another study was done by Rehabilitation Engineering Society of North America. "The research was a survey done on 315 households with one or more members with a disability" (RESNA, 2001, p. 3). The 315 households were asked a total of 10 questions relating to assistive technology:

1. How much information have you received about assistive technology?
2. How much information have you received about how to get assistive technology devices?

3. How much difference has the information you received made in increasing your learning, independence, productivity, and community integration?
4. How much has the information you received helped you become moe aware of your rights?
5. How much has assistive technology devices decrease your need for help from other people?
6. To what extent has better designed assistive devices helped in your learning?
7. Do you agree that compared to 10 years ago, people are more aware of the needed for assistive technology devices for persons with disabilities?
8. Do you agree that compared to 10 years ago, laws or program policies have been changed to help persons with disabilities to get assistive technology devices?
9. Do you agree that compared to 10 years ago, people are more aware of assistive technology devices and how it can benefit persons with disabilities?
10. Do you agree that compared to 10 years ago, it is easier to find assistance for purchasing assistive technology devices and services?

According to the survey's responses, the answers were as follows:

| Question # | None | A Little | Some | A Lot |
|---|---|---|---|---|
| 1 | 27% | 31% | 21% | 21% |
| 2 | 35% | 27% | 22% | 16% |
| 3 | 16% | 27% | 35% | 22% |
| 4 | 15% | 27% | 35% | 23% |

| | | | | |
|---|---|---|---|---|
| 5 | 26% | 17% | 17% | 40% |
| 6 | 30% | 17% | 25% | 23% |

| Question # | Agree | Strongly Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|
| 7 | 31% | 60% | 5% | 4% |
| 8 | 21% | 69% | 8% | 2% |
| 9 | 20% | 69% | 7% | 1% |
| 10 | 20% | 62% | 10% | 8% |

**Figure 2: Household Members with Disabilities**

This RENSA study that the persons with disabilities believe that assistive technology devices are very useful. They understand how great of an impact these devices can have on their learning experience. They also believe that assistive technology devices can improve their confidence in the community.

# CHAPTER 3

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

As shown through studies and research, assistive technology devices are very useful to persons with disabilities. There are many laws that protect students with disabilities. Laws such as Technology-Related Assistance for Individuals with Disabilities Act of 1988, Rehabilitation Act Amendments of 1998, The Individuals with Disabilities Education Improvement Act (IDEA), gives persons with disabilities the rights that they deserve.

The research shows that there are a lot of assistive technology devices that can assist persons with disabilities. These devices are very useful to students and it gives them more power and freedom within the classroom. Assistive devices can allow a person with a disability to function normally in the classroom and be on the same level as students without disabilities. It also can give them freedom and allow them to feel and become more independent.

## Conclusion

Persons with disabilities are becoming more involved in academia. Enrollment has increased now more than ever before. "More and more high school students with disabilities are planning to continue their education in postsecondary schools, including vocational and career schools, two- and four- year colleges, and universities" (U.S Department of Education, 2007, p. 1).

Literature review revealed the importance of assistive technology for persons with disabilities within the classroom. "Assistive technology undeniably provides greater opportunities for persons with disabilities in the United States" (Verbrugge, Rennert, and Madans, 1997, p. 384).

## Recommendations

Recommendation for Further Studies

- More data should be collected on persons with disabilities that use assistive technology devices. The data collected can be used to improve the devices that are being used.
- Collect more data on a national level of the number of students who use assistive technology devices. Once data is collected on a national level, that information can be used to obtain government funding for assistive technology devices.

Recommendations for Implementation

- All states should have mandatory studies to show how assistive technology improves persons with disabilities live in and out the classroom. These studies will show the need for assistive devices and how they improve persons with disabilities lives.
- Have more government funding for educational programs that teach disabled students how to use certain assistive devices. These programs will allow persons with disabilities to get familiar with the devices. They will also have a chance to give suggestions on how a device can be improved.

## REFERENCES

AbleData. (2010). Your source for assistive technology information. Retrieved from http://www.abledata.com/

*An Institutional Perspective on Students with Disabilities in Postsecondary Education*, National Center for Educational Statistics, Postsecondary Education Quick Information System, August 1999

Blackstone, S. (1990). Assistive technology in the classroom: issues and guidelines. *Augmentative Communication News,* 3(6). p. 11

Bryant, B., & Bryant, D. (1998). Using assistive technology adaptations to include students with learning disabilities in cooperative learning activities. *Journal for Learning Disabilities,* 31(1): 41-54. DOI: 10.1177/002221949803100105.

Carlson, D. (2001). The AT/IT survey. Paper presented at the meeting of the Interagency Subcommittee on Disability Statistics, Washington, DC.

Cavanaugh, T. (2002). The need for assistive technology in educational technology. *AACE Journal, 10*(1), 27-31. Norfolk, VA: AACE

Federal Communications Commission. (2006). Section 508 of the Rehabilitation Act 29 U.S.C. § 798. p. 1. Retrieved from http://www.fcc.gov/cgb/dro/section1.html

Gerald, D. (2001). What is assistive technology? *Rehabtool*. Retrieved from http://www.rehabtool.com/forum/discussions/1.html

Grand Valley State University. (2010). Disability Support Service. Retrieved from http://www.gvsu.edu/dss/index.cfm?id=6BEA416F-0B32-C963-FDE0A6E3F64693C6

Infinitec. (2010). Infinite potential through assistive technology. Retrieved from http://www.infinitec.org/work/tools/singlehandtyping.htm

Jendron, J. (2010). South Carolina assistive technology program. Assistive technology and learning disabilities. p. 1. Columbia, SC: SCATP

Lewis, R.B. (1993). *Special education technology.* Belmont, CA: Brooks/Cole.

LD online. (2008). The world's leading website on learning disabilities and ADHD. *What is a learning disability?* Retrieved from http://www.ldonline.org/ldbasics/whatisld

LDA National. (2004). Assistive technology (AT) For individuals with learning disabilities. Retrieved from http://www.ldanatl.org/pdf/assistive_tech.pdf

Medline Plus. (2010). Trusted health information for you. *Visual impairment and blindness.* Retrieved from http://www.nlm.nih.gov/medlineplus/visionimpairmentandblindness.html

Microsoft. (2009). Assistive technology products. Types of assistive technology products. Retrieved from http://www.microsoft.com/enable/at/types.aspx

Morrissey, P, & Silverstein, R. (1989). The technology-related assistance for individuals with disabilities act of 1988. *American Rehabilitation.* p. 1

National Center for Education Statistics. (2006). Institute of Education Sciences. Fast Facts. p. 1.

National Dissemination Center for Children with Disabilities, NICHCY. (2010). Speech and language impairments. Retrieved from http://www.nichcy.org/disabilities/specific/pages/speech-language.aspx

National Research Center on AD/HD. (2010). Educational issues. IDEA: The Individuals with Disabilities Act

Purcell, S. L., & Grant, D. (2002). *Assistive technology solutions for IEP teams*. p. 3. Verona, WI: Attainment CO

Riccobono, M. (2009). Voice of Maryland's Blind. *National Federation of the Blind*. p.1. Retrieved from http://www.nfbmd.org/rights.html

Riviere, A. (1996). Assistive Technology for Learning Disabilities. National Adult Literacy and Learning Disabilities Center. A Program of the National Institute for Literacy. Retrieved from http://www.rehabtool.com/forum/discussions/93.html

Rehabilitation Engineering Society of North America, RESNA. (2001). National survey will provide new information on the technology usage and needs of individuals with disabilities. *RESNA Newsletter,* 1(2) 1-9

Steele, S. (2006). Assistive devices help challenged kids get the most from learning. *Education World*, 12(2), 2-10

Technology-related Assistance for Individuals Act of 1988. (1988). Assistive technology act, 3(1), 105-394

TeensHealth. (2010). Hearing Impairment. Retrieved from http://kidshealth.org/teen/diseases_conditions/sight/hearing_impairment.html

U.S. Department of Education. (2007). Office for Civil Rights, *Students with Disabilities Preparing for Postsecondary Education: Know Your Rights and Responsibilities*, Washington, D.C.

University of Washington. (2004). Disabilities, opportunities, internetworking, and technology**.** *The Faculty Room*, 37(2), 167-173

Van Wagner, K. (2009). *Introduction to research methods*. Retrieved from http://psychology.about.com/od/researchmethods/ss/expdesintro.htm

Verbrugge,L, Rennert, C, & Madans, J. (1997). The great efficacy of personal and equipment assistance in reducing disability. *American Journal of Public Health, 87*, 384-392.

Zabel, R. (2009). Emotional disturbances. *Mental Health Matters. Education Resources Information Center,* 1(2), p.1

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