KNOWLEDGE OF BLINDNESS ADAPTATION TECHNIQUES AMONG

REHABILITATION UNDERGRADUATE STUDENTS

by

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ABSTRACT

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Abstract

This research study was an attempt to determine undergraduate

rehabilitation students' familiarity with adaptive aids for individuals with visual

impairments. According to the National Federation of the Blind (2002), there are

approximately 1.1 million people with a visual impairment in the United States.

The American Foundation for the Blind (2002) states that the numbers of visually

impaired older adults are expected to increase as much as one in three adults over

the age of 65 by 2030. As the number of persons with visual impairments rises,

more and more individuals will require rehabilitation services to live and function

independently.

Despite awareness of the growing demand for rehabilitation services, little information is known about the awareness of adaptive aids among undergraduate rehabilitation professionals. Currently, the Council on Rehabilitation Education (2000) does not require students to complete a course specifically addressing the needs of persons with visual impairments. In addition, students are not required to learn about adaptive aids and appliances specifically designed for individuals experiencing vision loss.

This study has examined the current level of knowledge of adaptive aids among vocational rehabilitation undergraduate students in the early stages of their professional training. Participants have been selected from undergraduate courses offered within the Vocational Rehabilitation program at the University of Wisconsin-Stout. Participation was sought during the Fall 2002 semester, and permission was obtained by course instructors to collect data in selected courses.

A new survey instrument was developed for this study, which asked participants to indicate their level of familiarity of various aids that are commonly used among people with vision loss. In addition, participants were asked to provide demographic information, such as gender, age, major, class rank, and prior interaction with someone with a visual impairment. The survey design used a four-point Likert scale ranging from "no knowledge" about an item to "much knowledge" about an item. Participants were asked to complete a two page survey that asks about four main categories of adaptive aids: Reading and Writing Aids,

Orientation and Mobility Aids, Independent Living Aids, and Computer

Technology Aids.   It is anticipated that the information gathered through this

study may be used to determine the need for additional education and training in

vocational rehabilitation programs at both the undergraduate and graduate level.

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CHAPTER ONE

Introduction of the Study

Introduction

There are approximately 1.1 million people who are legally blind in the United States today, and there are 10 million people with a visual impairment who are unable to drive or read a newspaper even with corrective glasses or contact lenses (American Foundation for the Blind, 2002). Many of these individuals need to use adaptive aids to assist them in various living activities. They use aids in reading and writing, orientation and mobility (O&M), independent daily living activities, and to effectively use computer technology. This knowledge is critical in serving persons with visual impairments since many of the items are used daily by person with a visual impairment. The following is a brief description of the areas of living where aids and adaptive equipment are used.

Reading and writing aids

Reading and writing are critical activities for everyone, but for the person with a visual impairment, use of adaptive aids is an integral part of the activity. Since many visually impaired people cannot read regular size print, alternative ways of access must be found. The choice of which aid is used depends on many factors, including type and severity of vision loss, exposure to the kinds of adaptive equipment available, training on the required equipment, funds available, and application in a given setting (Wolffe, K. 1999a). Examples of reading and

writing aids include: Slate and stylus, Braille, electronic note takers, various writing guides for letters and check writing, talking books, closed circuit televisions, and talking personal data assistants. These aids can all aid the person with a visual impairment read and write, and allow them access to the printed word in an alternative format.

Orientation and mobility aids

Orientation and mobility (O&M) skills are another area in which the person with a visual impairment needs to adapt. O & M refers to the training of the person with a visual impairment to ambulate with the use of a white cane. Safe travel both indoors and outdoors is critical for independent locomotion from place to place. In an adjustment to blindness training program, much emphasis is placed on O&M skills building. The training consists of use of alternative mobility aids to assist the person with a visual impairment to safely cross streets, learn directions, understand and interpret the use of tactile markings in sidewalks and roads, and use public transportation system when they are available. The use of the white cane is the most widely used device; with the use of a dog guide the next most common. Use of electronic canes is used when hearing is limited (Croce, R. & Jacobson, W. 1986).

Independent living aids

The use of aids for everyday living is also an important component of daily living for the person with a visual impairment. These aids include the use of

talking timers, bump dots for labeling dials, liquid indicators for safe and efficient pouring, and slicing guides for cutting meat and vegetables in the kitchen. All of these aids are used on an as needed basic. Since each individual is different with different needs, some may choose to use these aids while others will improvise or adapt in another way. These examples are only a sample of the items available for use in daily living activities.

Computer technology aids

The use of computers is rapidly becoming commonplace, both in home and work environments. For the person with a visual impairment, this can present many challenges since vision is typically required for use of a computer. There are however, many kinds of software packages available to assist the person with a visual impairment to effectively assess the computer screen. These software packages include screen reading software, magnification software, and refreshable Braille displays used in conjunction with a screen reader.

Rehabilitation counselor training

Rehabilitation counselors who work with persons who are visually impaired need to know what aids and adaptive equipment are commonly used in order to effectively serve this population. Rehabilitation students need to gain information about adaptive aids used so they can begin to integrate it into their professional training. The Council on Rehabilitation Education (CORE), which is the accrediting body for graduate education in rehabilitation and maintains an

undergraduate registry of programs, does not currently require a course in sensory impairments or in assistive technology specifically designed for individuals who are visually impaired. Consequently, it is unclear how much information rehabilitation counseling students have about adaptive aids before they begin their professional careers.

Statement of the problem

The number of visually impaired individuals is expected to double by the year 2030 (American Foundation for the Blind, 2002). Rehabilitation professionals serve as the primary source of information for individuals with a visual impairment seeking assistance. It is imperative that rehabilitation professionals understand and have knowledge of adaptive equipment used by persons with vision impairments. However, no research is available that identifies how rehabilitation professionals gain training, or the extent of their knowledge in rehabilitation education programs. Currently, there are no requirements for a student of a rehabilitation program to complete a class on visual impairments, or an assistive technology class regarding adaptive equipment for persons who are visually impaired. Thus, this research will investigate the knowledge of blindness adaptive aids among undergraduate rehabilitation counseling students.

It is the goal of this research to identify the knowledge base of undergraduate students about aids and equipment that is used by persons with a visual impairment. This research will add to the body of knowledge about how to

most effectively meet the needs of the person with a visual impairment in a rehabilitation or independent living situation. It is hoped that rehabilitation programs may recognize the need to require a course for the undergraduate or graduate rehabilitation student so that the visually impaired population will be served in the most effective manner.

Research Questions

The following research questions were identified to determine the knowledge levels of undergraduate students for this study.

Research Question One: What are the demographic characteristics of students in an undergraduate rehabilitation program and their reported knowledge of adaptive aids for persons with visual impairments?

Research Question Two: How frequently do undergraduate rehabilitation students interact with persons who are visually impaired?

Research Question Three: Is there a correlation between rehabilitation students' class rank and their perceived level of knowledge about adaptive aids for persons with visual impairments?

Research Question Four: Is there a correlation between the frequency of interaction between rehabilitation students and persons with visual impairments and their perceived level of knowledge about adaptive aids for persons with visual impairments?

CHAPTER TWO

Review of Literature

Introduction

This chapter provides an overview of current methods of adaptation to blindness. A discussion of the legal and functional definitions of visual impairment and blindness is included. In addition, adaptation and adjustment to blindness modalities and techniques are identified, and equipment modalities are addressed. Finally, this chapter discusses access to training services for people who have experienced vision loss.

Legal and Functional Definitions of Vision Impairments

The legal definition of blindness used by government agencies, such as the Internal Revenue Service and the Social Security Administration is described as 20/200 or less in the better eye or an angle of vision not to exceed 20 degrees (SSA, 2002). Other definitions include those with no vision, or total blindness, to those with partial vision requiring only some driving restrictions. Definitions utilized by the American Council for the Blind (2002) and the National Federation of the Blind (2002) include the legal definition, and use a broader more inclusive definition that includes those with low vision, but vision above the 20/200 standard.

A critical factor in determining a definition of visual impairment is to identify the functional capacities and limitations of the individual, resulting from their visual loss. The spectrum is wide and varies greatly from person to person.

An individual who has little to no residual vision may need to learn Braille, use of a slate and stylus and screen reading programs. On the other hand, someone who has 20/200 corrective vision may need only nighttime orientation and mobility instruction and using color contrast for identification of personal items.

Adventitious versus Congenital Blindness

Most people who lose their vision do so in their adult years. A large proportion of these individuals become visually impaired in late adulthood. Approximately fifty percent lose their vision after the age of 55 due to macular degeneration, diabetic retinopathy, or glaucoma (American Foundation for the Blind, 2000). For those coping with vision loss in later life, their needs will be different from a young adult, just beginning their career. People who are blind from birth have a different set of challenges. Congenitally blind individuals lack a visual reference for social contact. Many have delayed social skills, develop involuntary physical movements or "blindisms", and many lack skills to explore their surroundings adequately. Leonhardt (1990) states in his study of blind children that blindisms or mannerisms, can include staring, eye poking or rubbing, pulling on the eyelids, gazing at lights or other bright objects, holding the head low, bent walk, abnormal walk/shuffle, and seeking out narrow or small spaces. All of these behaviors in small children with a visual impairment can be transient or develop to become permanent socializing behaviors. This can and does affect the child's social development with others.

Independent Living Skills

There are a number of challenges people with vision impairments face when adjusting to vision loss. The primary issues include: (a) adequate social skills for interaction with others, especially for those with congenital blindness; (b) adaptation skills to access print; (c) orientation and mobility (O & M) skills both indoors and outdoors, including access to public transportation; and (d) equipment to aid the person in working with a computer or other forms of technology.

Adequate social skills are especially important for the person who has little to no vision. A person with very low vision misses many social and visual cues. In addition, to inadequate social cues, some people with congenital blindness, or blindness from birth, develop 'blindisms' or rhythmic involuntary rocking or eye poking movements. These nonverbal activities can hinder a person's social interactions with others (Leonhardt 1990).

Reading and writing aids

The ability to access regular print is a critical aspect of a person's independence. For those with visual impairments, reading articles in a newspaper, directions on a medicine bottle or a recipe in a cookbook are all necessary skills for day-to-day living. Adapting those tasks for someone who is either unable to read print at all or who can only read large print is important in maintaining independence. This can be accomplished by using a wide array of

accommodations, including taped recordings, scan-and-read programs, screen readers for computers, portable Braille devices, slate and stylus, use of Braille writers, and readers (Wolffe, 1999a). The use of other adaptive equipment such as voice activated personal data assistants, notebook computers, and screen enlargers are other adaptive options, and are becoming increasingly necessary as technology advances. These basic skills of adaptive reading and writing are typically included as part of an adjustment to blindness training program.

Orientation and Mobility Aids

Orientation and Mobility (O & M) training is an important skill that allows a visually impaired person to safely access his or her environment, both indoors and outdoors. Learning sighted guide techniques, the use of the white cane and possible dog guide training are all adaptations a person who has a visual impairment can use to access their environment (Wolffe, 1999b). O & M instructors are specifically trained in teaching sighted guide techniques, cane travel, and use of a dog guide. Training usually begins with the person receiving sighted guide training. Typically, the person with a visual impairment grasps the right upper arm of the guide and follows his or her movements by using the contact with the arm as a tactile aid. The person doing the guiding is positioned a half step in front of the person being guided. Some simple arm movements such as an arm swing to the left means the person needs to go behind the back of the guide to avoid an obstacle in the path, or if the person feels the guide stop they

should stop also to avoid an object or stepping off a surface. When going up or down steps, a sighted guide walks in front of the person who is visually impaired the same way as if on flat ground. They will be able to feel when the guide has reached the bottom step and are free to walk on flat land once again.

Cane travel usually begins indoors and gradually works up to busy street crossings and public transportation systems (Croce & Jacobson, 1986). The completion of an assessment to determine specific needs is conducted at the beginning of cane travel. The O & M instructor teaches cane use indoors with close supervision. Once the person with a visual impairment is traveling confidently indoors, outdoor training begins (Ramsey, Blasch, Kita, & Johnson, 1999). The outdoor training includes identification of various surface areas by tactile use of the cane handle. Smooth slick surfaces will feel different than a gravel sidewalk. For those with no vision or very low vision, use of sound identifiers also becomes part of the individual's learning. A sound in a doorway will sound very different from a tap of the cane on an open sidewalk. A three-point technique is taught as a way to maintain a straight line, and to identify driveways, alleyways, or landmarks along a route. An arc (side to side) technique is used to identify what is immediately in front of the visually impaired person. For someone with residual vision, cane travel may not need to be as extensive. The O & M instructor can complete training at night so the person and the trainer can identify where the client is having difficulties. O & M is one of the most

important tools a person with a visual impairment will receive. The O & M techniques a client learns will mean independence in most of his life. The other aspect to O & M training is use of the public transportation system and street crossings (Corn, & Sacks, 1994)

Access to transportation is a common barrier for people with visual impairments and a critical component in maximizing independence. A person with the vision impairment needs to have assurance that he/she can travel safely in familiar and unfamiliar environments. This O & M training needs to include navigation of the public transit system if there is one available where the person lives. To establish reliable means of transportation will assure maximal independence (Maxson, 1997).

Social skills are a necessary part of a person life. Skills such as assertiveness, asking appropriate questions, fitting in with others and the environment are all necessary aspects of adjustment to an acquired, or congenital vision impairment. The person who acquires a visual impairment later in life may withdraw from social contacts due to inadequate vision in recognizing others, or feelings of helplessness about the vision loss (Moore, Giesen, Weber, & Crews, 2001). Becoming involved with others who face the same challenges can assist the older adult to gain confidence in renewed social activities. For a younger or middle-aged adult, social adjustment can include changes in hobbies, interests, and change in social contacts.

Independent Living Aids

There are generally two kinds of equipment people with a vision impairment use to access print or to write: low tech equipment and high tech equipment. Low tech equipment consists of items such as talking calculators, talking watches, Braille watches, high marking materials to mark a stove or microwave to determine correct temperature, and a slate and stylus. Some people still use abacuses for basic math, although this is gradually being replaced with inexpensive talking calculators. Talking timers are used for cooking, as well as splatter guards for safe use in stovetop cooking. There are also special knife guards to avoid accidental injury while preparing foods. Recipes are Braille embossed on special plastic paper for easy reading or can be placed on tapes for review while cooking. High marking is another common practice for many people who have a visual impairment. High marking is the placing of either a tactile substance or a brightly colored substance on certain objects the person wants to locate. The most common uses of high marking include touch pads on microwaves, stoves, or ovens. For example, a person who wants to know where 350 degrees is on the oven dial will put a high marking substance on the place where the 350 mark is on the dial. A second mark would be placed on the stove itself. Where the two dots meet indicates the oven is at 350 degrees. Some sighted assistance is required to set up the high marks, but once they are set up, the person can independently cook for himself or herself.

Taped books from the Library of Congress are a common way people with visual impairments read their favorite novel. For those people who learn Braille, the slate and stylus are commonly used for taking notes, or keeping track of phone numbers and addresses. For those who do not use Braille and rely on speech only, a small tape recorder is used to keep track of appointments, addresses and phone numbers. Some tape recorders have tone indexing for easy retrieval. In order for a person to write a handwritten letter they would use a writing guide, and perhaps a 20/20 pen. For writing a check, they would use a check-writing guide. For those needing to take notes in Braille, a Braille writer, similar to manual typewriter is utilized. These are some of the more common low-tech items a visually impaired person may use on a day-to-day basis for increased independence.

Computer technology aids

High tech items a visually impaired person might use include a Closed Circuit TV (CCTV). This allows the user to enlarge the print up to 32 times larger than actual size for easier reading. This allows the person to read a book, get a recipe, read a medicine bottle, or read mail independently. These machines are large and require some space and training to use properly. Some machines come in color so the person can adjust the colors to his particular visual needs. In addition to a CCTV, a person could use a telescopic monocular to read street signs, bus numbers, fast food boards, a menu in a restaurant, or for reading or

watching television. Some telescopes are mounted to a glasses frame so the person does not have to hold the scope for long periods.

For people with less intensive visual needs a jeweler's loop, or a high-powered magnifier may be all that is required. Magnification with a strong light source might be used to aid someone in reading. For those using computers there are varieties of screen enlarging programs available that will enlarge the normal screen size up to 16 times its original size. For those with vision that is more limited there are screen readers available that will read the screen contents to the person unable to read the screen with an enlarger. In addition, there are personal data assistants that can assist a person with keeping track of appointments, memos, do basic math calculations, and automatically dial phone numbers by tone. These PDA's allow the person to speak into a microphone and then have the device speak back what they just recorded. Many of these adaptive PDAs have a section for different tasks such as addresses and phone numbers, calculator, and memos for easy retrieval. Organization is a major component for a person with a visual impairment to maintain independence.

Some of the more expensive devices people with little to no vision use are the note takers. These note takers can have Braille or a typewriter type (QWRTY) keyboard, and can use speech or Braille output. These devices can be used in conjunction with a computer or as stand-alone units. The training on these devices is extensive, costly and time consuming. For those that can access this kind of

training these devices serve as book readers, appointment and calendaring

functions, complex calculations, and keeping notes in a business or classroom

setting.

CHAPTER THREE

Methodology

Introduction

The purpose of this study was to determine the knowledge levels of

undergraduate rehabilitation students of adaptive aids used by persons with visual

impairments. This chapter describes the methodology used to complete the

present study. Information is provided on the identification of research subjects as

well as a description of the survey instrument used. A rationale is provided for the

development of a new survey instrument, as well as use of specific survey

questions. Finally, this chapter describes the procedures that were used for data

collection and data analysis.

Selection and Description of Sample

The sample consisted of undergraduate students enrolled in rehabilitation

courses during the fall, 2002 semester. Participants were selected from

foundational courses within the Department of Rehabilitation and Counseling.

The only knowledge known prior to the surveying of students was what class they

were participating in. Nothing else was known about the subjects until the

completion of the surveys.

Instrumentation

Since there was no published instrument available for this research study,

one was designed specifically to address the research questions. The instrument

included questions about the subject's gender, age, class rank, and frequency of contact with a person with a visual impairment. A four point Likert scale was utilized to determine participants' level of knowledge in four areas of adaptive aids: reading and writing aids, orientation and mobility aids, independent living aids and computer technology aids. A complete copy of the consent form and questionnaire can be found in the Appendix B.

Data Collection

The sample was collected by surveying undergraduate rehabilitation classes at the University of Wisconsin-Stout in the fall semester of 2002. Permission was obtained from three different instructors of undergraduate classes to enter the class and distribute surveys. Consent forms were distributed first, and surveys were dispensed immediately after consent was obtained. The surveys were confidential and participation was voluntary with implied consent. Surveys were completed in the beginning or end of a class period and completion of the surveys were immediate and completed one time only. A sample of convenience was used.

The study was explained both in writing and orally. To avoid any duplication of subjects the researcher inquired if anyone had completed the survey in a different class. Those who indicated by a show of hands, that they had filled out another survey, were not given a second one to complete. All surveys were filled out in the classroom and picked up by the researcher upon completion. The

surveys were then taken to a computer center where they were compiled using the Statistical Program for Social Sciences, version 10.0 (SPSS, 2002).

Data Analysis

A number of statistical analyses were used in the present study. The Statistical Program for Social Sciences, version 10.0, was used to compile the data (SPSS, 2002). The data were compiled and coded by an independent researcher. Statistical tests were performed using the .05 (alpha) level of significance. Data were analyzed to address the following research questions:

Research Question One: What are the demographic characteristics of students in an undergraduate rehabilitation program and their reported knowledge of adaptive aids for persons with visual impairments.

Measures of central tendency (frequencies, mean, median, and mode) were compiled as well as measures of dispersion (variance and standard deviation).

Research Question Two: How frequently do undergraduate rehabilitation students interact with persons who are visually impaired?

Measures of central tendency were again used to determine frequency of interaction between participants and individuals with vision impairments.

Research Question Three: Is there a correlation between rehabilitation students' class rank and their perceived level of knowledge about adaptive aids for person with visual impairments?

Chi square (χ^2) analyses were conducted to examine the relationship between students at the freshman, sophomore, junior, and senior levels and their perceived level of knowledge about adaptive aids for person with visual impairments. A five-point Likert scale was used to determine frequency of interaction, including the categories of never, once a year or less, once a month, once a week, and daily. A four-by-four contingency table was compiled for examination of the data.

Research Question Four: Is there a correlation between the frequency of interaction between rehabilitation students and persons with visual impairments and their perceived level of knowledge about adaptive aids for person with visual impairments?

A four-by-five contingency table was compiled for examination of the data.

Limitations

The sample size was small and limited to one school specializing in rehabilitation training. In addition, a sample of convenience was used in data collection. Therefore, results may not generalizable to other areas of the country. Another limitation is that the survey results were based on self-report and results may have been influenced by social desirability or lack of knowledge of resources.

CHAPTER FOUR

Results

Introduction

The purpose of this study was to determine the knowledge level of undergraduate rehabilitation students regarding adaptive devices used by people with visual impairments. This chapter will describe the results of statistical analyses that were conducted to address the research questions. The survey participants were recruited from undergraduate classes in the Department of Rehabilitation and Counseling at the University of Wisconsin-Stout. Eighty-eight surveys were completed in the fall of 2002, five of which were incomplete or lacking in critical information and were subsequently eliminated. Thus, a total of 83 surveys were used in data analysis.

Research questions

Research Question One: What are the demographic characteristics of students in an undergraduate rehabilitation program and their reported knowledge of adaptive aids for persons with visual impairments?

A large majority of participants were female, which is consistent with the typical enrollment patterns of students in undergraduate vocational rehabilitation programs. The breakdown included 22% (n=18) male and 78% (n=65) female participants. The population was relatively young, with the largest number of participants (89%; n=74) in the 18-25-age range. Five percent (n=4) were aged

26-35 and the remaining 6% (n=5) were aged 36-50. There were no participants over 50 years old.

Table 1 represents the various college majors reported by survey participants. A strong majority (87%; n=69) of the participants listed their college major as Vocational Rehabilitation or a combined program of Vocational Rehabilitation and Special Education. The classes that were selected are required courses in undergraduate vocational rehabilitation program, therefore it is expected that a higher proportion of participants would be vocational rehabilitation majors.

Table 1

Percentage of Students by College Major

Major	Percent
Vocational Rehabilitation	50.6
Vocational Rehabilitation/Special Education	36.7
Criminal Justice	5.1
Psychology	1.3
Service Management	2.5
Undecided	3.8
Missing	0

Research Question Two: How frequently do undergraduate rehabilitation students interact with persons who are visually impaired?

Table 2 provides detailed information on the frequency of contact between survey participants and individuals with a visual impairment. Very few participants indicated daily or even weekly contact with someone with a visual impairment. Approximately 93% (77) students had contact with a person with a visual impairment once a week or less.

Table 2

Frequency of Interactions Between Participants and Persons with a Vision Impairment

Time Frame	Percent
Daily	7.2
Once a week	15.7
Once a month	26.5
Once a year or less	39.8
Never	10.8

The level of familiarity with the adaptive aids was varied. Table 3 provides a summary of the items and level of knowledge among survey participants. The majority of the participants reportedly had "no knowledge" of the use of a slate or stylus, but about three quarters of the participants had "some

knowledge" of Braille. In all other areas of reading and writing aids, the participants indicated that they had "no knowledge" to "little knowledge". It is interesting to note that almost half the participants had "little knowledge" or "some knowledge" of talking books on tape. This is likely due to the frequent use of books on tape by students with a wide range of disabilities on campus.

Table 3

Reading and Writing Aids

	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Slate and Stylus	75.9(63	20.5(17)	3.6(3)	0(0)
Braille	6.0(5)	34.9(29)	49.4(41)	9.6(8)
Electronic Note Taker (N=82)	37.8(31)	31.7(26)	25.6(21)	4.9(4)
20/20 Pen (N=82)	85.4(70)	13.4(11)	1.2(1)	0(0)
Check Writing Guide	77.1(64)	18.1(15)	3.6(3)	1.2(1)
Letter Guide (N=82)	72(59)	19.5(16)	6.1(5)	2.4(2)
Talking Books (N=81)	16(13)	35.8(29)	32.1(26)	16(13)
Closed Circuit Television	44.6(37)	24.1(20)	19.3(16)	12(10)
Talking Personal Data Assistant (Parrot Voice Mate)	50.6(42)	30.1(25)	15.7(13)	3.6(3)

Table 4 lists the results of participants reported knowledge of orientation and mobility aids. Seventy five percent of participants indicated that they had "some knowledge" or "much knowledge" of the dog guides and approximately two thirds had "much knowledge" or "some knowledge" of the white cane. Very few participants had knowledge of tactile markings or the use of an electronic cane.

Table 4

Orientation and Mobility Aids

	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
White Cane (N=82)	12.2(10)	23.2(19)	45.1(37)	19.5(16)
Dog Guide	0(0)	19.3(16)	55.4(46)	25.3(21)
Electronic Cane	71.1(59)	22.9(19)	6(5)	0(0)
Tactile Markings	67.5(56)	21.7(18)	9.6(8)	1.2(1)

Table 5 lists the participants as having no or little knowledge of various independent living aids. Seventy seven percent of participants had "no knowledge" or "little knowledge" of the use of a talking timer. Over 95% of survey participants reported "no knowledge" or "little knowledge" of a slicing guide or a liquid indicator.

Table 5

Independent Living Aids

	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Talking Timer	51.8(43)	25.3(21)	19.3(16)	3.6(3)
Liquid Indicator	86.7(72)	8.4(7)	4.8(4)	0(0)
Bump Dots	53(44)	30.1(25)	15.7(13)	1.2(1)
Slicing Guide	86.7(72)	10.8(9)	2.4(2)	0(0)

Table 6 lists the knowledge levels of computer technology aids. The participants showed "little knowledge" to "no knowledge" in any areas with the least knowledge understood about Braille displays. This is likely because many students with a visual impairment do not use Braille displays, thus they do not have exposure to them on campus.

Table 6

Computer Technology Aids

	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Screen Reader (JAWS or Window Eyes)	48.2(40)	28.9(24)	20.5(17)	2.4(2)
Screen Magnification (Zoomtext or Magic)	36.1(30)	30.1(25)	26.5(22)	7.2(6)
Braille Display (Power Braille or Focus)	60.2(50)	22.9(19)	16.9(14)	0(0)

As evidenced by the above tables, most participants had "some knowledge" or "much knowledge" in talking books, dog guides, and Braille. All of the other areas were in the "no knowledge" or "little knowledge" levels. The next question discusses the correlations between class rank and knowledge levels.

Research Question Three: Is there a correlation between rehabilitation students' class rank and their perceived level of knowledge about adaptive aids for persons with visual impairments.

Chi square (χ^2) analyses were conducted to examine the relationship between students at the freshman, sophomore, junior, and senior levels and their familiarity with adaptive aids used by persons with a visual impairment. A four-

by-four contingency table was compiled for examination of the data. No statistical

significance was found between class rank of freshman, sophomore, junior, or

senior and the level of familiarity with any of the items.

Research Question Four: Is there a correlation between the frequency of

interaction between rehabilitation students and persons with visual impairments

and their perceived level of knowledge about adaptive aids for persons with visual

impairments?

Chi square (χ^2) analyses were conducted to examine the relationship

between levels of knowledge among rehabilitation students, adaptive items used

by persons with a visual impairment, and their reported frequency of interaction

of with a person who is visually impaired. A five-point Likert scale was used to

determine frequency of interaction, including the categories of never, once a year

or less, once a month, once a week, and daily. A four-by-five contingency table

was compiled for examination of the data. Again, there was no statistical

significance between the level of interaction by the rehabilitation student, their

perceived level of knowledge of adaptive aids, and frequency of interaction with a

person who has a visual impairment.

CHAPTER FIVE

Discussion

The purpose of this study was to determine the knowledge level of undergraduate rehabilitation students of adaptive devices used by people with visual impairments. Subjects for this study were recruited from the Department of Rehabilitation and Counseling of the University of Wisconsin-Stout fall semester undergraduate rehabilitation classes. Three undergraduate professors were contacted and granted permission to survey their undergraduates in each class. A total of 83 usable surveys were obtained from these three classes for this study. Since this study only examined one undergraduate rehabilitation program, generalizability of results is limited and conclusions made from this study must be used with caution.

Conclusions

This study addressed many areas as they relate to undergraduate rehabilitation students knowledge of adaptive aids that persons with a visual impairment use. While there was no correlation between class rank and familiarity of adaptive equipment, it was interesting to note that the most recognized items on the list of 20 adaptive items were dog guide, Braille, white cane, and talking books. These four items have been available to persons with a visual impairment since the early 1900's. More contemporary technological items such as a screen reader, a liquid indicator, or an electronic cane, were not known to the majority of

subjects. In addition, there was no statistical significance between frequency of contact with a person with a visual impairment and familiarity of items. This may have to do with the fact that only a few people in the study interacted with a person with a visual impairment on a regular basis. Those that did have contact only interacted one time week or less. There was no indication of the length or quality of the interactions, which further obscures the results. Additionally, the variety of aids questioned in the study was wide, varied, and cut across many levels of visual impairment.

The fact that there was no correlation between class rank and knowledge of aids, or frequency of contact and knowledge of aids, is a further indicator that most people surveyed do not know much about adaptive equipment used by persons with a visual impairment. As noted in the tables, the majority of the participants fell into the lower end of the Likert scale of no knowledge to little knowledge. This is cause for concern since participants are likely to encounter a person with a visual impairment seeking needed services, aids, and equipment in their professional careers. In order to more effectively serve this population it is imperative that professionals be able to address the needs of individuals with visual impairments. The results of this study suggest that students do not have the requisite knowledge, and thus are in need of additional training in the rehabilitation needs of persons with visual impairments.

Limitations of the study

There are several limits to the study that may reduce generalizability of research results. The sample size was small, and information was gathered at only one undergraduate rehabilitation program in the Midwest. In addition, after the surveys were completed, it was noted that the questions that were asked about frequency of contact and interaction with a person with a visual impairment needs to be more clearly defined. There is a large difference between meeting a person with a visual impairment on the street than having that person as a close friend. This clarification would aid in the process of understanding the true nature of a person's interaction. In addition, the term knowledge needs much more clarification since the subjects did not define it consistently. In future research, the knowledge of each item could be qualified by having the subject explain what they know about the item as well as checking a box. This gives the researcher more clarity in what the subject knows and understands about the adaptive aid.

Recommendations for future research

It is hoped that additional studies will be conducted on the topic of professionals' knowledge of adaptive aids that are used by persons with visual impairments. However, several recommendations may be considered for future research. Increasing the sample size and expanding the study to include undergraduate rehabilitation training programs from other geographic areas would

strengthen the study. In addition, the survey needs to be reworded to better clarify what is meant by "qualification of contact" and "knowledge of adaptive aids".

This study represents an initial investigation into the skills and training of future rehabilitation practitioners. Additional research may further assist rehabilitation training programs and the Council on Rehabilitation Education (CORE) about the growing needs of persons with visual impairments and the need for professionals to gain additional training in this area. As the population of persons with visual impairments continues to grow, the demand for qualified rehabilitation professionals with knowledge of the unique needs of this group will increase.

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APPENDIX A

Definition of Terms

The following terms are identified to assist the reader in understanding the items identified in the survey in Appendix C.

Slate and Stylus-The slate is a metal-hinged strip in which the cells of Braille are placed in an indented well. A piece of paper is placed between the cell and the small square opening where the stylus punches the dots to make the Braille letters or symbols. The stylus is a small pointed object that creates the indented Braille dots on a page.

Braille-Louis Braille created the Braille code in which a cell of six dots is lined up in two columns and three rows. The combination of raised dots in various positions in the cell creates the letters and numbers that the person with a visual impairment reads with his or her fingers.

Electronic Note Taker-The electronic note taker comes in many varieties depending on the users skill in the use of Braille. The Braille note takers have a refreshable Braille display that the person with a visual impairment can read by scrolling. These note takers translate text to Braille and the Braille is displayed at the bottom of the note taker. The voice output displays use a synthesized voice instead of the Braille strip. Input is completed by the use of the six-dot Braille

code located in keys at the top of the note taker. In addition, there are voice output devices that use the standard QWRTY keyboards.

20/20 Pen-This is a pen that has a broad tip and is black for better contrast in writing notes or documents.

Check Writing Guide-This guide is used to write checks when the user is unable to see the lines on a standard check. It has cutouts for each of the lines of a check to allow for proper line up of each check item.

Letter Guide-Similar to the check guide, this device allows the user to write a letter using an overlay so the lines of the letter can be felt thus keeping the direction of the letter legible.

Talking Books-The Library of Congress authorized this service in the early 1900's so people who could not read regular print could access a book on record or tape. This is a free service for anyone who meets the qualifications of disability or vision impairment.

Closed Circuit Television-This device uses a camera and a large screen to allow the reader to enlarge the text of reading materials in order to read them. The reading material is placed on a table where a camera sends the image to the screen. The reader has the option to use the camera to make the reading material as large as is needed to effectively read the material. Most of these devices can enlarge up to 32 times their original size.

Talking Personal Data Assistant-This device is similar to a small tape recorder with selections for memos, appointments, phone book, basic calculator functions, and time. It has a voice input and playback function for recording and storing information for retrieval later.

White Cane-The white cane is the most commonly used mobility device. It is a white cane used to identify obstacles, steps, tactile markings in walkways and curbs. It is used to identify that the person using it has limited to no vision.

Dog Guide-Dog guides are used in place of the white cane to assist a person with a visual impairment to ambulate safely. Dog guides are trained in centers that specialize in assistance to persons with vision impairments.

Electronic Cane-The electronic came sends s vibrating signal to the user when an obstacle is in his or her path. Similar to the white cane, it is used for those who need additional feedback to the surroundings such as the person with deaf-blindness.

Tactile Markings-These are raised strips on curbs or subways that allow a person who has limited vision to feel them with their feet or the white cane. They signal impending drop offs in the case of subways, or signal where a flat curb is located next to a street.

Talking Timer-Talking timers are used in the kitchen or whenever it is needed to know the time. They can be set to announce the hour and many have alarms, count down, and count up features for timed tasks. They announce the minutes

and hours for easy setting and usually have an alarm when the time is completed counting down.

Liquid Indicator-This device is used when pouring liquids into a cup or pan. It is placed on the side of the cup and a beep will sound when the liquid reaches the top of the lip. It prevents spills and pouring beyond the level of the cup.

Bump Dots-These dots are used to identify dials where two settings need to meet. A dot is placed on one panel and another dot is placed on the dial. The meeting of the two dots signifies, for example, a temperature on an oven dial.

Slicing Guide-This is a special knife with a guide to cut meat and vegetables in the kitchen. It allows for safe cutting by feeling the guide instead of the knife itself.

Screen Reader-A piece of software where text on the computer screen is read aloud by synthesized speech.

Screen Magnification-A piece of software that is used to enlarge the text on a computer screen for easier reading of the screen contents.

Braille Display-This device is used in conjunction with a screen reader and is used as an added output device on a computer. It will translate the text on the screen to refreshable Braille for tactile reading in addition to speech output.

APPENDIX B

Consent Form

Overview of the Study

This study is designed to identify the knowledge of adaptive aids used by people who have a visual impairment by students in rehabilitation classes at the University of Wisconsin-Stout. Many people with a visual impairment use the aids identified in the survey to obtain or maintain independent functioning. The aids are divided into four categories of Reading and Writing, Orientation and Mobility, Independent Living, and Computer Technology. Demographic information will be collected as well as information about prior contact with people with visual impairments. The results of the study may assist the Vocational Rehabilitation and Counseling department to identify knowledge levels of Introduction to Rehabilitation students about the adaptive aids used by people with visual impairments. These results may assist in future curriculum development.

Consent Form

I understand that by returning this questionnaire, I am giving my informed consent as a participating volunteer in this study. I understand the basic nature of the study and agree that any potential risks are exceedingly small. I also understand the potential benefits that might be realized from the successful completion of this study. I am aware that the data collected does not identify me personally, and every effort is made to protect my confidentiality. I realize that I have the right to refuse to participate and that my right to withdraw from participation will be respected with no consequences to me, including my grade or professor relationship.

NOTE: Questions or concerns about the research study can be addressed to Mary Jean Hoover 715-231-1220, the principle investigator, or Dr. Kathleen Deery 715-232-2233, the research advisor. Questions about the rights of research subjects can be addressed to Sue Foxwell, Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research, 11 Harvey Hall, Menomonie, WI, 54751, phone (715) 232-1126.

APPENDIX C

Survey Form

Knowledge of Adaptive Aids
Survey Form

Part I. Demographics
Please select **one answer** from the items below:

Gender

_____ Female   _____ Male

Age

__ 18-25   ___ 26-35   _____ 36-50   __ Over 50

Major _____

Class Rank

__Freshman   __Sophomore   __Junior   __Senior   __Other

How frequently do you interact with a person who is visually impaired?

Never   Once a year or less   Once a month   Once a week   Daily

Part II. Knowledge

Please place an "X" in the option that best described your level of familiarity with the

following adaptive aids used by people who have a visual impairment.

Reading and Writing Aids				
	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Slate and Stylus				
Braille				
Electronic Note Taker				
20/20 Pen				
Check Writing Guide				
Letter Guide				
Talking Books				
Closed Circuit Television				
Talking Personal Data Assistant (Parrot Voice Mate)				

Orientation and Mobility Aids				
	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
White Cane				
Dog Guide				
Electronic Cane				
Tactile Markings				

Independent Living Aids				
	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Talking Timer				
Liquid Indicator				
Bump Dots				
Slicing Guide				

Computer Technology Aids				
	No Knowledge	A little Knowledge	Some Knowledge	Much Knowledge
Screen Reader (JAWS or Window Eyes)				
Screen Magnification (Zoomtext or Magic)				
Braille Display (Power Braille or Focus)				

Thank you for participating in this survey.