CCTV USE BY VISUALLY IMPAIRED SENIORS LIVING INDEPENDENTLY IN COMMUNITY SETTINGS

by

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ABSTRACT

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This was a descriptive study of Closed Circuit Television (CCTV) magnification use by fourteen visually impaired seniors (male and female) living independently in a large metropolitan area. All of the subjects had been provided with financial assistance for the purchase of a CCTV. The researcher used a combination of a face-to-face interview and observation and performance measures to gather data regarding vision impairment issues, training received in use of the CCTV and utilization of the CCTV. Participants were assessed regarding ability to use their CCTV to perform one writing activity and two reading activities. Their opinions were solicited regarding the possible positive and negative impacts of sharing CCTV units in senior buildings.

The results showed that the subjects used their CCTV's primarily for reading activities and to a much lesser extent for writing activities. They were pleased with the training they received in CCTV use and a majority of participants reported that they used their CCTV at least daily. Additional survey information indicated that the participants were well informed about the cause of their vision impairment and over 75% believed they would not go totally blind. The participants indicated that they received regular eye medical care. This study surveyed customers/clients of Minnesota Services for the Blind that received a CCTV during the years 2000-2001. The results of this study imply that recipients of CCTV's could benefit from increased instruction in writing methods and from generalized follow-up regarding training needs.

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I would like to sincerely express my thanks to Dr. Robert Peters for his guidance, encouragement and understanding during my graduate experience at Stout. Where were you twenty years ago? I appreciate your dedication and commitment to Vocational Rehabilitation.

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CHAPTER I
CCTV USE BY VISUALLY IMPAIRED SENIORS LIVING INDEPENDENTLY IN COMMUNITY SETTINGS

Introduction

It is difficult to determine the exact degree to which vision handicaps the American public. The Lighthouse International (1999) estimated that one in every twenty people in the United States suffers from significant impairment of vision that cannot be further improved by corrective lenses. That same study reported that 17% of Americans aged 65-74 and 26% of those over 75 report some form of vision impairment. The American Foundation for the Blind (1999) indicated that one in 20 senior citizens are presently affected by age-related macular degeneration.

Wagner (2000), stated that age–related Macular Degeneration (ARMD) is an incurable disease that affects central vision and is the leading cause of legal blindness in persons over the age of 55. ARMD affects only central vision and as a result, people rarely go totally blind from this disease. People with ARMD generally find it difficult to read, see peoples faces, drive or perform other activities of daily living that require good central vision. Most State Agencies for the Blind provide services to seniors with ARMD that include training in activities of daily living, orientation and mobility (use of the white cane), communication (alternate methods of reading and writing) and low vision services. Low vision services generally include an evaluation to determine if the individual can benefit from the use of various optical or non-optical aids. Optical aids include magnifiers, spectacles and video magnifiers which are also called closed-circuit television (CCTV) systems. Follow-up low vision services are often necessary because as vision deteriorates, a magnifier or lenses may lose their effectiveness.

Optical treatment methods vary greatly. An untrained family member may provide a patient with a magnifier or the individual with a vision loss may be fortunate enough to complete

a multiple session low vision evaluation and training program in a medical or rehabilitation setting. Treatment programs are not often satisfactory to the patients involved and few studies have been published on this topic. More research needs to be done on the use of various lenses, magnifying glasses, and visual systems for intermediate distance and electronic magnification systems.

Harper, Doorduyn, Reeves and Slater (1999) found that 87% of low vision subjects used low vision aids and that 65% of the devices were used daily, mostly for reading. He further found that 78% of the users ranked their aids as moderately to extremely important. He also noted that knowledge of ARMD and use of residual vision was very limited.

A Swedish study by Myrberg and Backman (1996) found that after training, 95% of the original sample used optical aids as their preferred reading medium. Three years after the original study there was a substantial drop in the number of patients using reading aids with no significant decrease in their visual acuity's noted. Subjects who continued to use their aids after three years had become more proficient readers.

Duffy (1997) found that patients who receive adequate training in the use of low vision aids (LVA's) and are supported by professionals in the hospital and community cope better with ARMD. She found that 90% of her sample used optical LVA's for reading.

Stone, Mann, Mann and Hurren (1997) found high rates of dissatisfaction with magnifiers. They also found that when older persons were given the opportunity to try out magnifiers and make a choice from informed persons a majority indicated satisfaction with the magnifier. Stone et al. (1997) also noted that devices tried at a center were often not very satisfactory when tried at home.

Mann, Hurren, Karuza and Bentley (1993), found that persons with visual impairments

use the most devices compared to other disability groupings but report dissatisfaction with about 1 out of 5 devices that they own. He also noted that the biggest source of dissatisfaction was not having enough magnification. Much of the dissatisfaction with low vision aids was related to the nature of the impairment: the magnifier worked well when purchased but was abandoned or replaced when the vision decreased.

Goodrich, Mehr and Darling (1980) studied 96 Veterans with a median age of 49.49, who had been using a CCTV for at least two years. Continued use and proficiency was demonstrated by 87% after two years. They also found that 50% of the CCTV users also used an optical aid as well as the CCTV for near work. No difference in reading speeds between the CCTV and an optical aid was seen but significantly longer reading duration was found with the CCTV. Interestingly, 12% of the group stated that their vision had changed over the two-year period and they could no longer use their optical aids; however, their CCTV remained useful to them.

A similar study was carried out (Stelmack, Reda, Ahlers, Bainbridge and McCray, 1991) that evaluated reading speeds and reading duration with CCTV's, illuminated stand magnifiers and spectacles. Stelmack et al. (1991) found significantly faster speeds with spectacles and CCTV's as compared to stand magnifiers and significantly longer duration with the CCTV than either of the other. It was suggested that more efficient methods of visual rehabilitation for age related ocular diseases needed to be developed.

Mann, Hurren, Tomita and Charvat (1995) stated that generally three types of studies have been funded with regard to assistive devices: 1) those which focus on the device itself (durability, reliability) and do not link the device with the user; 2) those that focus on a specific device or category of device (such as toilet seating) and only permit the study of the impact of the device on one or a few tasks; and 3) those studies that focus on the rate of use or disuse of the

objects provided during hospitalization and acute rehabilitation.

Purpose

Minnesota Services for the Blind has been providing significant low vision services to seniors for over 20 years. These services have been purchased from community low vision providers or have been provided by the counselor responsible for providing services to that specific customer. Counselors often complete a low vision evaluation in the customers home to determine which aid or aids meets the low vision needs of the customer. Training in use of the recommended aid is then also provided in the home or community setting. Minnesota Services for the Blind has traditionally been able to provide a wide range of low vision aids to meet a variety of customer needs. These aids have included hand held and stand magnifiers, microscopic and telescopic spectacles, CCTV's and other optical and non-optical aids. To date, the agency has not systematically evaluated the use patterns of individual aids, their usefulness or the need for additional training and follow-up. The current study was designed to provide information to the agency that may be useful in determining training and evaluation programs for use by persons receiving CCTV's from the agency. The research could also provide useful information to the companies that produce and sell CCTV's as it is often the salesperson that provides training to individuals that purchase CCTV's with their own funds.

At the conclusion of this study it is the intention of the researcher to discuss the findings with agency administrators, agency service providers and the local vendors from whom Minnesota Services for the Blind purchases CCTV's.

Statement of the Problem

The purpose of this study is to describe utilization of closed circuit television magnifiers (CCTV's) by Minnesota Services for the Blind customers aged 60 years and over. These

customers live independently; none reside with children, in assisted living facilities or in nursing homes. This study will focus on the following objectives:

1. Determine the customers ability to adjust the CCTV controls (contrast, magnification, focus and reverse polarity) to allow reading of a paragraph from a large print Reader's Digest and a paragraph from an article in the Minneapolis Star newspaper.
2. Measure the customer's ability to use the CCTV to complete a commercially available check used by visually impaired persons.
3. What are the five most frequent reading activities for CCTV users?
4. What are the three most frequent writing activities for CCTV users?
5. To determine if there are periods of the month when the CCTV's are used more frequently.
6. To determine if there are days of the week when the machines are used more frequently.
7. To obtain customers top three personal opinions regarding strengths of sharing machines within senior buildings.
8. To obtain customers top three personal opinions regarding the weaknesses of sharing machines within senior buildings.

Hypothesis

The research hypothesis was: Visually impaired seniors who have been provided with a CCTV will demonstrate reading and writing skills that are necessary to living independently in the community.

The null hypothesis was: Visually impaired seniors who have been provided with a CCTV will not be able to demonstrate reading and writing skills necessary for living

independently in the community.

Definition of Terms

Age-related macular degeneration (ARMD) was formerly called senile macular degeneration. It is a common eye disease most frequently seen in people aged 55 and older (Wagner, 2000), (Harvard University, 2000). It is estimated that among individuals age 75 and older, more than one-third have macular degeneration (Lighthouse International, 1999). Macular degeneration can affect one or both eyes. Progression of the disease may be gradual ("dry") or sudden onset ("wet"). The National Eye Institute (2000) indicated that while only 10 percent of all people with macular degeneration have the wet type, it accounts for 90 percent of all severe vision loss from the disease. Macular degeneration generally affects central vision only and leaves the individual with color vision and peripheral vision that remains clear (Harvard 2000). Persons with macular degeneration generally complain of difficulty seeing people's faces and difficulty reading, as both are activities that require good central vision. Persons with macular degeneration are generally able to safely and independently ambulate in familiar environments. Macular degeneration very rarely leads to total blindness but the central vision may be extremely poor. A laser may be used to treat the wet variety, where new vessels grow and hemorrhage inside or under the retina but there is currently no treatment for the dry or atrophic variety (Wason and, McMillan, 1998).

Closed Circuit Television (CCTV) is a commercially available electronic low vision aid that combines a CCTV camera, a monitor, a lens and special high intensity illumination. These devices may provide magnification in the range of 2X to 60X or more depending on the size of the monitor used. They are available in many sizes and shapes and may be either portable or desktop. CCTV's may provide black and white images only or may be in full color. The cameras

may be mounted or hand-held; mounted cameras generally allow for greater ease in writing activities. The CCTV monitors may be either a side-by-side or in-line model and will allow the image to be viewed as either positive (black image on a white screen) or negative (white image on a black screen). CCTV's have a variety of features such as vertical and horizontal line markers that underline, overline or help line up columns and they are available with vertical or horizontal windows that blank out unneeded parts of the screen to make reading easier. Most models have controls that limit right-left and/or up/down movements of the viewing table. For the purpose of this study the term CCTV will apply only to stationary or desk/table top systems. Cameras will be mounted on a fixed stand. Reading materials will be placed under the camera on a table that is moveable from side to side and from the top of the page to the bottom (referred to as an xy table). Stationary CCTV's that connect to the users' television will not be used nor will portable units with hand held cameras. (Center for Assistive Technology, Buffalo, 2001)

Optical Aids may be any prescription or non-prescription lenses (glasses), magnifiers, microscopic or telescopic device, special lighting, glare reduction device or sunshield that improves an individuals ability to see clearly (Jose, 1983).

Magnification is described by Jose (1983) as method for increasing the size of the retinal image so that an object can be perceived or seen. This may be accomplished by using four basic methods: 1) increasing the size of the object, for example, large print; 2) by bringing the object closer to the eye; 3) by a system of lenses that provide angular magnification for example, binoculars or 4) projection magnification where an object is enlarged by projecting it onto a screen, for example a CCTV. Magnification methods may be used alone or combined for greater effectiveness. For example, you can use a CCTV and then move closer to the screen to increase the magnification. Magnification may be measured by the times or "X" that it increases the

retinal image. Magnification may also be measured using the medical term "diopter", where 2.5 diopters equal one magnification.

Retina is the innermost and most delicate part of the eye. Disorders of the retina generally cause blurred vision. The retina does not contain any pain fibers, so there is no pain with retinal disease and the eye does not develop redness or inflammation (Jose, 1983). Light must travel through the retina to reach and stimulate the layer of cones and rods.

Macula is a very small spot on the retina that is the area of sharpest vision and the highest concentration of cones (Hollwich, 1985). This is the area that is affected in macular degeneration. There is an area within the macula called the fovea that is totally free of rods and provides us with our most acute vision (Hollwich, 1985).

Cones are photoreceptors found in the retina that function best in bright light. They provide detail and color vision. Special cones are present in the macula, which is the area of the retina responsible for the best vision (Hollwich, 1985).

Rods are extremely light sensitive and function best in reduced illumination. They are most numerous in the periphery of the retina. They are not found in the fovea (Hollwich, 1985).

Power usually refers to the magnification provided by a CCTV or magnifier.

Legal blindness is a term used to define a severe loss of the visual field or of visual acuity. Legally blind individuals have useable vision but often have significant problems with reading, activities of daily living and mobility. This term is not used interchangeably with the term "total blindness" but both legally and totally blind individuals are frequently referred to as "blind". (Jose, 1983)

Low Vision Aid see Optical aid, above.

CHAPTER II

Review of the Literature

This section will explore the use of assistive devices by the elderly and the use of low vision devices by the elderly visually impaired. Psychosocial effects of low vision will be addressed. Some research studies involving CCTV training, screen color preference and spacing of letters and words will be reviewed. Finally, studies that specifically look at low vision elderly persons and their effective use of low vision aids (including CCTV's) will be reviewed.

The Elderly Disabled and Use of Assistive Devices

Few individuals will find cause to argue that for many people age means coping with an assortment of potentially disabling conditions that may include sensory loss, mobility impairments, malfunctioning body parts and intellectual concerns. Wagner (2000) stated that age-related impairments reduced the quality of life for seniors and also caused economic losses that included lost productivity and increased medical care. Paul (1999) noted that assistive devices and home modifications were underutilized because insurance plans and Medicare do not often cover them.

Hartke and Prohaska (1998) analyzed the National Health Interview Survey and Assistive Device Supplement of 1990 and looked at three variables: use of assistive devices, multiple device use and expressed need for devices. Their sample consisted of 14,222 adults aged 65 and older. They found 23% of older adults in the community used some type of assistive device. Users of multiple assistive devices were older than single device users, a finding consistent with Edwards and Jones (1998) who found that use of assistive devices increased with age.

Paul (1999) reported that persons receiving necessary assistive devices experienced less overall physical and cognitive decline than a control group that did not receive supports. The

treatment group reported significantly less pain and spent four times less time on hospital and nursing care (Paul, 1999).

In an earlier study by Mann, Hurren, Tomita and Charvat (1995), they stated that there were no reported studies examining the overall effect of the use of assistive devices on functional independence. Mann et al. (1995) noted that studies generally looked at the properties of devices such as durability/reliability, effectiveness of one type of device on a specific task and on use or disuse of devices. They suggested that use of assistive devices might reduce home health costs and increase the quality of life through greater independence. Their findings suggested that, for a majority of subjects, assistive device use increased overall functional independence. This study further suggested that older persons needed guidance in the selection of devices so that they did not invest in something that might not work for them or might not work for them in the long term. Mann et al. (1995), noted that in this study there were no controls over the quality of effort that led to the older person having a device but felt that it would show that assistive device use had a very major impact on functional independence.

Factors that influenced older persons decisions to adopt or reject fall prevention behaviors were studied by Aminzadeh and Edwards (1998). Their review of earlier studies suggested that many older persons perceived falling as symbolic of aging, diminishing competence and dependence. They further noted that elders saw many devices as symbolic of disability, frailty, and lost function. Negative reactions of family and friends influenced decisions that led to disuse of devices and device users had different standards for devices used at home and those used in public (Aminzadeh and Edwards, 1998). Mann et al. (1993) noted that many users of low vision devices did not want to have attention called to them and felt that certain devices would do this.

In the United Kingdom, Edwards and Jones (1998) used a random sample of 1405 elderly persons aged 65 and over to determine assistive device use. They felt that assistive device use could potentially compensate for disability, lessen the impact of handicaps and thus increase independence and improve the quality of life. This was consistent with Mann et al. (1995) who found that for a majority of subjects, assistive device use increased overall functional independence. Edwards and Jones (1998) found "very little wastage" in terms of nonuse of devices and felt that the provision of these devices to the elderly could reduce the strain on social services and health care professionals.

Psychosocial Aspects of Vision Impaired Elderly

A number of researchers have looked at the psychological and social factors associated with vision loss. A study in Iceland by Karlsson (1998) found self-reports of psychological distress that varied significantly with the degree of vision impairment. It was statistically significant that 24 percent of the population studied over age 69 said that they went through a difficult period after a serious deterioration of their vision as compared to 60% of the younger group; 61 percent of the younger group and 38 percent of the older group said they sought help during that period. Persons losing vision gradually (macular degeneration) had less distress than those who lost it quickly. They found fewer indications of depression in the older group than in the younger group which may have meant the older subjects considered vision loss a normal part of aging. They further found that the visually impaired group did not seem to worry more, feel more tense or enjoy their daily lives less than the general population but legally blind seemed to feel much greater distress. Duffy (1997) found that patients who used low vision aids, and were supported by professionals, coped better with ARMD. Duffy (1997) felt that restrictions on normal living might be a cause of the psychological effects of depression and anxiety. He too,

agreed that these behaviors could affect coping strategy and rehabilitation outcomes. Duffy (1997) saw anxiety, depression, insecurity, loss of independence and withdrawal from people or isolation as the main effects of ARMD.

Davis and Lovie-Kitchen (1995) found that in Australia the incidence of age-related macular degeneration in low vision clinics was 23-44 percent. They surveyed individuals and found that only 33 percent of patients had the correct interpretation of their vision loss and 36 percent had no idea or the wrong idea of what caused their vision loss! With regard to psychosocial issues the results indicated "that despite rehabilitation, persons with long standing ARMD still show psychosocial dysfunction well after the onset of vision loss and considerably longer than was previously reported" (Davis and Lovie-Kitchen 1995). Harper et al. (1998) found that only 38% of their subjects chose the correct name of their eye condition from a list of five possible answers and only 32 percent could correctly name the part of their eye that was affected. Fifty-nine percent of the people questioned went on to state that they had found the explanation of their eye condition by hospital staff either 'entirely' or 'fairly' satisfactory. However, 46 percent were in agreement (incorrectly) that using your eyes makes them deteriorate and 44 percent said sitting too close to the TV causes eyesight to worsen. When asked, 73 percent stated that it had not been suggested that 'stronger light might be helpful'. Duffy (1997) found that many age related macular degeneration (ARMD) patients she interviewed were confused about their vision and talked about going totally blind. Total blindness is rarely, if ever, seen in persons having only an ARMD diagnosis

The psychological impact of low vision was examined by Leinhaas and Hedstrom (1994) who noted that a primary psychological barrier to compliance with rehabilitation programs was depression. Leinhaas and Hedstrom (1994) observed that most patients presented with little or

no evidence of emotional distress except for grief and frustration regarding their vision loss. Improvements in patients' behavioral and visual function with optical and non-optical devices significantly alleviated the adjustment disorder but clinically depressed patients typically were unmotivated and difficult to engage in low vision rehabilitation (Leinhaas and Hedstrom, 1994). Duffy (1997) agreed with these findings.

Low Vision Needs of the Elderly

Reading speed seems to be the criterion used in most studies possibly because it is easier to measure than performance. Myrberg and Backman (1996) provided training and prescribed low vision reading aids to their subjects. Following training, 95 percent of their subjects used the prescribed aid as their preferred reading aid and 66 percent used their aid daily. A follow-up study three years later (Myrberg and Backmann, 1996) found that 73 percent of the group studied were still using their prescribed aid. Only a marginal decrease in visual acuity of the subjects was noted but there was a substantial change in preferred reading media. There was significantly greater use of tapes to accomplish reading. Myrberg and Backman (1996) did find that elders who continued to use their aids to read did so with the same or greater reading performance.

Harper et al. (1998) found that reading difficulty was the principal handicap for most people with low vision and found that the most popular uses for reading were letters and cards and instructions on packages and medicines. This is supported by Schuchard, Naseer and deCastro (1999), who interviewed 255 patients with ARMD and stated: "The most common rehabilitation goals were (in descending order): managing finances (46 percent), reading (27 percent), writing (20 percent), improving contrast and lighting (8 percent), cooking (6 percent), safety (6 percent), driving (5 percent), and face recognition (3 percent)" (p.296). These findings suggest that a shift in visual rehabilitation training goals might have to be made to place more

emphasis on spot reading and less emphasis on sustained reading.

Mann et al. (1993) surveyed thirty older visually impaired, non-institutionalized people. Four of the thirty had one disease in addition to the visual disability and twenty-four had more than one disease while two reported no other diseases. They used an average of 14.5 devices per person with a range of 6 to 34 devices. The devices used included remote controls, urinary incontinence shields, talking alarms, garage door openers, hearing aids and an assortment of devices for conditions and diseases other than visual impairment. The biggest dissatisfaction voiced by the subjects was that their magnifiers did not have enough magnification (Mann et al. 1993). The biggest dissatisfaction was related to decreasing vision and not the device. The device worked well once but no longer does as a result of decreasing vision. Mann et al. (1993) found that many subjects did not want to have attention called to them and felt that certain devices would do so. A similar study (Stone, Mann, Mann and Hurren, 1997) found that among 15 low vision aid users, the most frequently cited dissatisfaction was that there was not enough magnification. Davis and Lovie-Kitchin (1995) found that 66 percent of their subjects had been prescribed an optical device; 57 percent were satisfied with it and 66 percent said they used it at least once per day. The main complaints found with regard to the aids were that they were not strong enough, that the working distances were too short and that the restricted field of view slowed the reading speed. The primary dissatisfaction with the device seemed related to a recent loss of vision. Duffy (1997) reported that in the sample he studied, 90 percent used a low vision aid but only 40 percent did so without difficulty.

Stone et al. (1997) found that most magnifiers were self-prescribed and most people do not receive any training in their proper use. They found that when subjects were able to try out magnifiers and lighting at home thirteen out of fifteen found at least one satisfactory device.

Devices were often not satisfactory if they were not tried at home and were even less satisfactory if only tried out in a store (Stone et al. 1997). It appears obvious that buyers and users of magnifiers need to consult with a knowledgeable person prior to purchasing aids. Duffy (1997) indicated that patients who receive training cope better with ARMD.

Miscellaneous Testing with CCTV's

Epstein (1995) felt that CCTV use needed to be expanded or possibly replaced by a computer program that increased the spacing between individual letters of a word and between words. The increased spacing allowed individuals to use their peripheral vision to read with low vision aids or a CCTV. A drawback to this system was that it was only useful to persons whose central scotoma or blindspot was small. More recent information on this system could not be located leaving this researcher to infer that it was not successful.

Jacobs (1990) found that screen color of CCTV's was not important to reading speeds. Interestingly, he noted that the preferred screen color for subjects was often the screen color of the CCTV the subjects were currently using.

LaGrow (1981) used training as a variable to determine if reading rates of visually impaired college-bound students improved. He found that reading rates increased for both groups (those receiving training and those not receiving training) using the CCTV.

Okada and Kume (1999) conducted a study in Japan to determine the preferences of over one hundred CCTV users. The Government of Japan subsidized CCTV purchases at the time and over 20 models of CCTV's were commercially available. All age groups of CCTV users were included in the survey but those aged over 60 were a minority. The average age of subjects in the study was 34 years. Average daily CCTV use ranged from one to over ten hours, probably reflecting school or employment use. Findings were varied but noted that both positive

and negative displays needed to be available.

Ninety-six veterans who had used a CCTV for at least two years were surveyed (Goodrich, Mehr and Darling, 1980) and 87 percent continued to use the CCTV and could demonstrate proficiency in its' use. Half of those surveyed used an optical aid as well as the CCTV for reading. No brand comparisons were made. Subjects mean age was 49.49 years. Goodrich et al. (1980) noted that newspapers and periodicals was the preferred reading material followed by correspondence and then books. The subjects preferred reverse polarity (white letters on a black background) while reading. Similar reading speeds were found with a CCTV and optical aids but significantly greater reading duration was found with the CCTV (Goodrich et al. 1980) The mean strength of the optical aid was 5.45 (the aid increased the size of the retinal image 5.45 times) and Goodrich et al. (1980) further noted that as optical aid speed increased, magnification strength decreased.

CCTV Use With Elderly Visually Impaired

Stelmack, Reda, Ahlers, Bainbridge and McCray (1991) compared reading speeds and duration using illuminated stand magnifiers, spectacles and CCTV's for 37 Veterans over the age of 50. They found that little research had been done with low vision aids and the elderly population. All subjects were trained in the use of all three devices and the devices were limited to specific brands and types of aids. The magnification powers used by the subjects varied greatly for each device. Patients served as their own control. Longer reading duration was found with the CCTV and no significant difference in speed was found between spectacles and CCTV (Stelmack et al. 1991). They suggested that spot reading and spot-checking do not require speed or duration and that the lower price of illuminated stand magnifiers may justify their use over that of the more expensive CCTV.

VanTol (2002) surveyed a group of 86 blind elders who received training from Minnesota Services for the Blind during the year 1999. She found that approximately one-third of the participants reported that they usually or sometimes used a CCTV to read mail, recipes, correspondence and labels on household materials. She further noted that reading was a very important activity with regard to accomplishing activities of daily living.

CHAPTER III

Methodology

This section will describe the steps taken by the researcher to answer questions and accumulate evidence to test the null hypothesis. Specifically, this section will include a discussion of (a) specific procedures, (b) population, (c) subjects, (d) instrumentation, (e) data collection, (f) data analysis, (g) strengths and limits of methodology and (h) summary.

Specific Procedures

Minnesota Services for the Blind provides vocational rehabilitation services to transition-aged youth and adults and also provides self-sufficiency services to adults not seeking employment. Individuals are eligible for services if they have a significant vision loss that creates a functional limitation to employment or independent living. Generally, vocational rehabilitation recipients range in age from 15 to well over 65 and consumers of self-sufficiency services are aged 55 years or greater. Administrative staff of Services for the Blind approved this study and all identifying information was destroyed after the data was collected and analyzed. The Services for the Blind Information Technology Specialist then provided this researcher with a computer listing of individuals who received partial or total financial assistance for the purchase of a CCTV during the calendar years 2000-2001. To facilitate the face-to-face interviews, participants were limited to persons aged 60 years and over who lived in the six county Minneapolis-St Paul Metropolitan area.

The researcher developed a survey consisting of twenty-two general questions related to vision loss, eye care and CCTV use and three performance tasks that allowed the researcher to observe the subjects using their CCTV to perform reading and writing activities. Detailed information about the survey is provided in the section on Instrumentation.

Population

Administrative and supervisory staff of Services for the Blind reviewed the research proposal and the documentation regarding the Human Subjects Review and then gave their approval for this research. The SSB Information and Technology Specialist provided the researcher with a computer listing of all customers/clients that received low vision equipment (i.e. CCTV, telescopic and microscopic glasses) costing $300.00 and over during the calendar years 2000-2001. Each entry on this list included county of residence, customer name, customer identification number, authorization number, counselor identification number, authorization date and total cost.

There were 124 entries on the original list however, thirty-five names were eliminated because they were either duplicate names (people had received two or more pieces of equipment during the time period), names of individuals that the researcher had provided services to, or because it could be readily determined from cost of the item that it was not a table mounted CCTV. Thirty individuals were then randomly selected from the remaining list of eighty-nine names. Computer records were then used to determine the type of low vision equipment that was purchased for the initial thirty subjects. Four subjects were then eliminated from the list as it was determined that three had expensive head-borne low vision aids and one subject had computer equipment purchased that was erroneously coded as a low vision purchase. Four additional subjects were then randomly selected. The researcher was then able to obtain identifying data on the subjects and learned that three individuals on the list were under the age of sixty. Three additional subjects were then randomly selected but one did not meet the minimum age requirement so one additional subject was then randomly chosen.

Five of the subjects or 17% were men and twenty-five or 83% of the subjects were

women. Four of the subjects or 13.3% resided in Anoka County, 1 or 3.3% resided in Carver County, 3 or 10% resided in Dakota County, 12 or 40% resided in Hennepin County, 8 or 26.7% resided in Ramsey County and 2 or 6.7% resided in Washington County. The age of males in the study ranged from 79 years to 86 years with an average age of 83.0 years. The ages of the women in the study ranged from 71 years to 96 years. The mean age for female subjects was 83.44 years. The mean for all subjects was 83.1 years and the range was from 71 years to 96 years; with a mode of 86 years.

Instrumentation

The researcher designed the survey, with assistance from fellow rehabilitation counselors and teachers, who provided suggestions and recommendations for the questions used.

The survey was designed with two parts. The survey had twenty -two questions regarding vision loss, training in use of the CCTV, utilization of the CCTV and questions regarding the subject's opinions about possible shared CCTV use. In addition to the 22 questions on the survey, three performance items were included that allowed the researcher to observe the subjects as they used their CCTV to read regular print, read large print and to perform a simple writing activity. The performance items also served to validate some of the questions asked on the survey.

Data Collection

Data was collected by completing the survey with each subject in his or her home. The researcher read the consent form (Appendix) to each subject and allowed him or her to read it and/or sign it using their CCTV. If a spouse or significant other was present, the subject was informed that they could review this document prior to the subject signing it. The questionnaire (Appendix A) was read to each subject and the final page of the questionnaire was given to the

subject at the conclusion of the interview. The final page included the name, title, phone number and address of the researcher, the research advisor, the Human Protections Administrator and a general phone number for Minnesota Services for the Blind.

Additional data was gathered by using case file information, when available. Information contained in the case file included date of birth, primary cause of vision loss and best corrected vision. Computer data was used to identify the brand and model of the CCTV that was purchased for the subject and the date that it was ordered by Services for the Blind.

Data Analysis

The results of the survey were tabulated with frequencies and descriptive statistics used to report results. Group means were tabulated as appropriate. Percentages and rank order were used to describe responses.

Strengths and Weaknesses of Methodology

This study used face-to-face administration of a questionnaire plus observation of skills and techniques utilized by visually impaired seniors to operate their CCTV. A number of limitations and strengths were inherent in this research and are described below.

Strengths of the study.

The personal, face-to-face interview added strength to this study considering that the subjects were all visually impaired and would logically not have been equally able to fill out a printed survey. This method eliminated the possibility that the subject might have relied on a sighted spouse or friend for assistance in completing a printed survey. It further follows that had the researcher mailed surveys, the responses attributed to the subject might have been influenced by opinions of the reader or assistant. The researcher filled out the survey, and this eliminated practical problems such as skipping survey questions or incorrectly indicating responses because

of reduced vision. Having the researcher fill out the survey also eliminated difficulties that might have been encountered with handwriting legibility on the part of the subjects.

Completion of the survey in the subject's home allowed them to use a CCTV that they were familiar with. They were able to use the seating and table height that they were comfortable with; they did not encounter additional anxiety that might have been present in an unfamiliar environment or with an unfamiliar model of CCTV.

The researcher did not complete any surveys with subjects that she had previously served or met in the past. This action eliminated any bias that the researcher might have had. By conducting interviews with unfamiliar subjects, it also meant that none of the subjects experienced reduced anxiety as a result of knowing the researcher.

Subjects received their CCTV's while receiving services from a variety of counselors working in the Metro Office of Minnesota Services for the Blind. Additionally, a number of Services for the Blind staff and personnel from other service providers were credited with providing the initial training in use of the CCTV's.

Weaknesses of the study.

Sampling occurred only with subjects receiving the CCTV during the years of 2000 and 2001. The researcher did not attempt to contact recipients of CCTV's provided by the agency in earlier years or in more recent years. It is quite possible that the findings might be quite different for the year 2002 as the criteria for providing this type of aid appears to have become more stringent due to fiscal matters.

CCTV technology has changed over the years and the researcher noted that the majority of machines used by the subjects had an automatic focus feature. It is quite possible that if the sampling had included more subjects who received earlier model CCTV's that did not focus

automatically, the results might have been quite different.

All of the subjects in this study had CCTV's provided either totally or partially with funds from Minnesota Services for the Blind. It is possible that if the researcher had been able to include subjects who used 100% private funds to purchase a CCTV, the resulting outcomes might have been different. It is assumed that individuals would not be likely to spend retirement dollars in excess of $1,500 unless they could use the device for a number of activities.

Findings of this study are limited in that data was collected only at one point in time. There is no way to determine if the subjects skills have increased over time or if they have decreased due to factors such as the presence of other disabilities. A longitudinal study might have provided better data.

The size of the sample was a limiting factor. It would have been beneficial to be able to schedule and complete at least 30 interviews so that the results could have been generalized. Unfortunately, it appears that the advanced age of the sample group meant an increase in health problems that could result in a change of residence or a limited ability to take part in a study such as this.

All of the surveys were completed during the last 15 days of August. The researcher found a high number of subjects that were having guests for an extended period of time or that were planning to leave the area for a vacation. It is possible that if the surveys had been conducted at a different time of the year, the number of surveys completed would have been higher.

Summary

Thirty visually impaired seniors aged 60 years and over and living independently in their own homes in the six-county Minneapolis-St Paul metropolitan area were contacted to

participate in this survey of CCTV users. The population was reduced to 17 subjects due to lack of a current address or phone number, poor health, recent death of a spouse, prior commitments or a refusal to participate. The researcher administered a face-to-face survey consisting of 22 questions regarding vision loss, training received in use of the CCTV and questions regarding how the CCTV was utilized. In addition, three items were used to provide observational or performance information about the subject's ability to use the CCTV for one writing and two reading activities. Data analysis was completed using descriptive statistics. Survey results are described in the next section.

CHAPTER IV

Results

The purpose of this study was to gather descriptive data about CCTV use by visually impaired seniors living in the six-county Minneapolis-St Paul Metropolitan area.

Instrumentation

The survey instrument was developed by the researcher to provide answers to the following concerns:

1. Determine the customers ability to adjust the CCTV controls (contrast, magnification, focus and reverse polarity) to allow reading of a paragraph from a large print Reader's Digest and a paragraph from an article in the Minneapolis Star newspaper.
2. Measure the customer's ability to use the CCTV to complete a commercially available check used by visually impaired persons.
3. What are the five most frequent reading activities for CCTV users?
4. What are the three most frequent writing activities for CCTV users?
5. Determine if there are periods of the month when the CCTV's are used more frequently.
6. Determine if there are days of the week when the machines are used more frequently.
7. To obtain customers top three personal opinions regarding strengths of sharing machines within senior buildings.
8. To obtain customers top three personal opinions regarding the weaknesses of sharing machines within senior buildings.

The remainder of this section will report the findings related to each of these major

questions. Each of the above questions will each be answered and supported with data. Additional findings will also be discussed.

The Subjects

The researcher personally telephoned the 30 subjects using telephone numbers contained in the Minnesota Services for the Blind computer database. Seventeen of the individuals contacted indicated that they would be willing to participate in the study and were scheduled for interviews. Two of the subjects had disconnected telephones but had an alternate number that could be called; one had moved to a nursing home and the other had recently moved to a neighboring state. One individual was reluctant to agree to participate in the study but said that she would discuss the study with family members and call the researcher back, she did not return the call. Two individuals had telephone numbers that were not in service and another had been relisted under the name of another individual. One individual had recently been diagnosed with cancer, was receiving chemotherapy and felt too weak to participate in the study. One individual said that her spouse had recently died and she was not emotionally ready to participate in any study. Four individuals stated that they had been dissatisfied with their CCTV's and had returned them to Minnesota Services for the Blind. Two individuals said that they were too busy to participate in the study but indicated they could participate at a latter date. Of the 30 people contacted, 17 people or 56.7% agreed to schedule an interview and 13 or 43.3% declined or were otherwise unable to participate in the study (see table 1, page 27).

Table 1

Description of CCTV Users Completing the Survey

	Anoka County	Carver County	Dakota County	Hennepin County	Ramsey County	Washington County
Total Males	1	0	0	1	3	0
Mean Age	83			79	84.33	
Total Females	2	0	0	5	1	1
Mean Age	78.5			86.4	73	87

Rate of Cooperation from Subjects

The researcher successfully contacted 27 of the 30 randomly selected subjects; three subject's phone numbers had either been disconnected or reassigned. Of the 27 subjects contacted, two had moved and did not meet the residence requirements of the study and four reported that they had returned their CCTV due to dissatisfaction with them. Four individuals declined to participate in the study for the following reasons: poor health, death of a spouse, busy schedule, and a non-specified reason. Seventeen face-to-face interviews were scheduled however three appointments were not kept. One subject had an ophthalmological emergency and resultant vision that rendered her unable to use her CCTV for at least 2-4 weeks or more. One subject had an unplanned family visit and cancelled the appointment but indicated eagerness to

participate at a latter date and a final subject simply was not home at the time of the appointment and could not be reached after that time. The researcher was able to complete fourteen face-to-face interviews with subjects living in four of the six counties in the Minneapolis-St Paul Metropolitan area. Surveys were completed with 46.67% of the sample of 30 subjects.

Results Related to Research Question 1: Determine the customers ability to adjust the CCTV controls (contrast, magnification, focus and reverse polarity) to allow reading of a paragraph from a large print Reader's Digest and a paragraph from an article in the Minneapolis Star newspaper.

Subjects were given a paragraph from the Reader's Digest, Large Print Version to read and were then asked to read a letter from the Editorial Page of the Minneapolis Star. The researcher observed them to determine if they operated their CCTV in a reasonably correct fashion and made necessary adjustments with the controls. One hundred percent of the subjects attempted both reading tasks. Thirteen subjects (93%) completed reading the large print material while 10 (71.4%) were able to complete reading the standard type material. Four subjects read the large print material without substituting incorrect words while only three subjects were able to read the standard type without substituting incorrect words. One subject was not able to maintain his orientation to the lines on the large print material and two subjects had difficulty maintaining orientation to the lines with the standard print. Seven readers (50%) moved the X-Y table in order to accomplish reading while 6 (43%) preferred to move the reading material back and forth under the camera. It was observed that 13 subjects (93%) preferred to read black print on a white background while only 1 (7%) preferred white print on a black background. Two of the subjects had older model CCTV's that needed to be manually focused; they demonstrated the ability to perform this function. One subject with an automatic focus machine exhibited

difficulty with their machine and appeared to randomly push controls without waiting to determine what change in viewing was taking place.

The researcher observed that a number of the subjects appeared to experience anxiety about reading aloud. Mistakes in reading words may have been attributable to the combination of anxiety and seeming to feel as if they had to read aloud very quickly.

Results Related to Research Question 2: Measure the customer's ability to use the CCTV to complete a commercially available check used by visually impaired persons.

Once again, one hundred percent of the subjects completed the writing task. Half (7) of the subjects locked the X-Y table to limit its movement while they wrote. None of the subjects reduced the magnification level of their machine to allow a wider visual field to be used for the writing task. Ten (71.4%) subjects directed their gaze at the monitor while writing and four (28.6%) looked directly at the check while writing and did not make use of the CCTV's magnification. The researcher notes that one of the subjects attempted to write on the monitor screen instead of on the check and then self-corrected. Six (42.8%) of the subjects were able to fill out the check correctly; the remaining 8 (57.1%) subjects made a variety of mistakes that included signing the "memo" line or not filling in both of the amount lines.

Six (42.8%) of the subjects indicated that they used their CCTV's for writing checks and 5 subjects (35.7%) stated that they did not use their CCTV for any writing activities. The five inexperienced writers were all able to fill out at least a portion of the check. It would appear that with additional instruction a number of them would be able to write checks and perform other writing activities (see Table 2, page 30).

Table 2

Reading and Writing Performance Utilizing the CCTV

	Large Print Reader's Digest	Standard Newspaper Type	Completion of Guideline Check
Completed Activity	13	10	14
Did not Complete Activity	1	4	0
Mean # of Words read Incorrectly per Subject	1.64	1.36	N/A
Mean # of Words Omitted per Subject	.71	1.44	N/A
Correctly filled out check	N/A	N/A	6
Incorrectly Completed Check	N/A	N/A	8

Results Related to Research Question 3: What are the five most frequent reading activities for CCTV users?

All of the subjects indicated that they used their CCTV's to assist them in reading. The number of specific reading activities that each subject used the CCTV for ranged from 2 activities to 13 activities; twelve was the mode and the mean of reading activities was 8.5. The most frequent reading activities that the subjects engaged in were: 1) reading letters, 2) reading statements, 3) reading bills, and a four-way tie for 4 and 5), reading package food preparation

instructions, reading can and package labels, reading pill bottles and identifying medication, and viewing photographs. The "other" category had 24 activities listed that included Bible and religious activities, calendars, menus, crosswords, item descriptions from catalogs, fly tying, Physician's Desk Reference, Board of Director's Minutes and materials, greeting cards and cash register receipts (see Table 3, page 32).

Table 3

Five Most Frequent Reading Activities For CCTV Users

Reading Activity	Number of Responses	Rank
Reading Letters	13	1
Reading Bills	10	3
Reading Newspapers	5	9
Reading Magazines	6	8
Reading Books	2	12
Reading TV Guide	3	11
Reading Recipes	4	10
Reading Packaged food Preparation Instructions	9	4 (tie)
Reading Can and Package Labels	9	4 (tie)
Reading Pill Bottles/ Identifying Medication	9	4 (tie)
Reading Statements	11	2
Viewing Photographs	9	4 (tie)
Leisure/Hobby/Other	24	N/A

Total Number of Responses: 119
Mean Number of Responses: 8.5
Mode: 12
Range of Responses: 2 to 13

Results Related to Research Question # 4: What are the three most frequent writing activities for CCTV users?

The subject's use of their CCTV for writing activities differed substantially from their use

for reading activities. The number of specific writing activities that the subjects engaged in ranged from zero to seven writing activities with zero being the mode and 2.07 the mean number of writing activities engaged in by the subjects. Five subjects or 35.8% stated that they did not use their CCTV for any writing activities and four of the five "non-users" or 80% were either married or living with a non-related person. The most frequent reading activities engaged in were: 1) keeping lists, 2) writing checks and 3) writing letters to family and friends. The "other" writing activities varied widely from one individual drawing a star on her calendar to indicate the day her nurse visited to another writing an extensive family history (see Table 4, page 34).

Table 4

Three Most Frequent Writing Activities CCTV For CCTV Users

Writing Activity	Number of Responses	Rank
Writing Letters to Family/Friends	4	3
Writing Business Correspondence	0	
Writing Checks	6	2
Keeping Lists	8	1
Writing/copying Recipes Cooking activities	1	4
Other	9	4
Do Not Perform Any Writing Activities	5	N/A

Total Number of Responses: 29
Mean Number of Responses: 2.07
Mode 0.0
Range of Responses: 0 to 5

Results Related to Research Question #5: To determine if there are periods of the month when the CCTV's are used more frequently

Twelve or 85.7% of the 14 subjects indicated that they did not use their CCTV more at one time of the month than at others. Two subjects or 14.2% indicated that they used their

CCTV the most during the first week of each month.

Results Related to Research Question #6: To determine if there are days of the week when the machines are used more frequently

Thirteen of the fourteen subjects or 92.9% indicated that they did not use their CCTV more on one day of the week than on others. One of the subjects stated that she used her CCTV more on Sunday than on other days of the week.

Results Related to Research Question #7: To obtain customers top three personal opinions regarding strengths of sharing machines within senior buildings

Five of the 14 subjects did not offer an opinion when asked about the strengths or benefits of sharing a CCTV in senior buildings; two of the five (40%) lived in senior residences themselves. The responses given regarding the benefits of sharing CCTV's in seniors buildings included reducing expense, increasing independence of the seniors, increasing awareness of the product, a reluctance on the part of many to use a machine that is privately owned, and the fact that many seniors have vision problems but aren't able to take advantage of state programs (see Table 5, page 36).

Table 5

Individual Responses Regarding Strengths of Sharing CCTV's in Senior Buildings

"People can use it. Magnifiers do not always work."

"It would be nice to have one in each building because they aren't cheap."

"Should do it for people in subsidized housing only."

"We have over 200 people here and nine on this floor have eye problems."

"It would allow people to handle their own finances and they could read the newspaper."

"That's a great idea! Sharing would reduce the expense. Lots of people have difficulty but they aren't blind."

"It would be good for those who don't have one or know about them."

"Two ladies have been asking for one but can't get one. I've offered to let them use mine but they haven't asked about it. They might use one in a common area."

"Many seniors have vision problems. Having a CCTV would allow them to be more independent."

Results Related to Research Question 8: To obtain customers top three personal opinions regarding the weaknesses of sharing machines within senior buildings

Three of the 14 subjects indicated that they were unable to think of a single reason for not sharing a CCTV in a senior building. Two of the subjects mentioned that thievery might be a concern because the machine would have to be accessible. Three subjects indicated that a shared machine might be abused; four subjects indicated that training or instruction would have to be provided to anyone that used the machine. One subject indicated that if a machine were shared

the users might not be able to access it at any time of the day or night. The concern was voiced by one subject that physically handicapped building residents might not be able to access the machine as easily as if it were in their apartment. Two of the subjects stated that they needed/were so highly dependent on their CCTV's they did not see how they might be able to share a machine. One user stated that if he had to wait to use a machine, he might just walk away and another stated that some persons might "hog" the machine. One subject voiced concern that a shared machine might create bad feelings if access to the machine wasn't uniform (see Table 6, page 38).

Table 6

Individual Responses Regarding Weaknesses of Sharing CCTV's in Senior Buildings

"The mechanics of it. Improper use can be very costly to repair."
"People might fight over it. Everyone would have to be instructed because it's not a toy."
"Possible abuse and stealing."
"I can't imagine that sharing one would be bad."
"Some people are more capable than others but the machines are pretty durable."
"People wouldn't know how to use it. They would all need training."
"Somebody might 'hog' the machine. Worse yet, someone might steal it!"
"I can't think of a single reason."
"I need mine so badly, I can't see how I could share."
"Risk of damage to the machine. I'd rather let someone use mine, here."
"The people would all have to be compatible."
"You couldn't go to it anytime of day. The slow users might aggravate others. People can't all get around well and some folks might not be able to get to one."
"I guess it's selfish but I use mine too much to share. I'm dependent on it too much and I think if I had to wait to use one, I'd probably walk away!"

Note: One Subject did not offer an opinion about the weaknesses of sharing a machine.

Results Related to General Survey Questions

Thirteen of the fourteen subjects were able to provide the researcher with a reasonable explanation of the cause of their vision loss and only one subject stated that they did not know the cause of their vision loss.

Eleven, or 78.6%, of the subjects stated agreement with the statement that they would never go totally blind. Two of the subjects stated that they "did not know" and one subject disagreed with this statement.

Thirteen of the fourteen subjects (92.9%) indicated that they saw their ophthalmologist or optometrist with some degree of regularity. Only one subject indicated that they had stopped getting regular care because nothing could be done for their eye condition. One subject saw an eye care provider more than once in every six month period, five subjects saw a provider once in every six month period, six saw a provider annually and one saw a provider once every two years.

Seven of the subjects indicated that they lived with a spouse (50%) and six (42.9%) indicated that they lived alone. One subject indicated that they lived with a person that was not related to them. Five of the six (83.3%) subjects living alone were women.

Seven of the fourteen subjects indicated that they had been unable to read a newspaper or magazine without magnification for five years or more. The total number of subjects that indicated they had not been able to read a newspaper or magazine without magnification for two years or more was twelve or fully 85.7% of the subjects.

Two of the CCTV users indicated that they had not received any training in the operation of their CCTV. The remaining 12 CCTV recipients stated that they had received training from

their counselor, the Services for the Blind employee delivering the machine, the salesperson/vendor or from an employee in the Services for the Blind store.

The subjects indicated considerable variation in the amount of training time that they remembered receiving. Three subjects stated that they received approximately one hour of training and three stated that they received thirty minutes to one hour of training. Five subjects (35.7%) indicated that they received from fifteen to thirty minutes of training, two said they received fifteen minutes or less and one individual stated that they had received no training in use of their CCTV.

Eleven of the 14 subjects stated that the training they received in operation of their CCTV met their needs. Three subjects (21.4%) stated that they would have liked more training, all of these individuals had indicated that originally they had received fifteen minutes of training or less.

Eight of the subjects or 57.1% indicated that they felt their CCTV was very easy to use. Five subjects indicated that they felt their CCTV was easy to use and one individual stated that their CCTV was difficult to use.

Nine of the 14 (64.3%) subjects indicated that they used their CCTV many times a day. Three subjects indicated they used their CCTV at least once a day while one person said they used their CCTV Many times a week and one person said they used their CCTV at least once a week.

Five subjects felt the CCTV had a very positive effect on their ability to live independently and seven subjects felt their CCTV had a positive effect on their ability to live independently. One subject said that the CCTV had not effected their ability to live independently as they relied on their spouse for assistance with paying bills and performing

many activities of daily living. Six of the 14 or 42.9% said that the CCTV had allowed them to remain active in family events. Two subjects stated that the CCTV had not allowed them to remain active in family events. Five subjects (35.7%) said the CCTV had neither a positive or a negative effect on remaining active in family events and one individual stated that she had no living family members. Six of the 14 subjects credited the CCTV with allowing them to remain active in social/religious or other activities. Three subjects said the CCTV had not allowed them to remain active in social/religious or other activities and five indicated that the CCTV did not have a positive or negative effect on their ability to remain active in social/religious or other activities.

Thirteen of the 14 subjects or 92.8% of the subjects were able to provide the researcher with the name of a person that they would call if they needed their CCTV repaired. Ten subjects stated that they would call their Services for the Blind Counselor for repairs and one individual said they would call the general number for Services for the Blind. One subject stated they would call the salesperson or vendor and one said they would call the number on their screen (the number imprinted on their X-Y table), which was the name of the local vendor from whom Services for the Blind purchased the machine.

Subjects were queried about other hand-held magnifiers they used. Thirteen of the 14 CCTV users also used some type of portable magnification device. The number of additional magnifiers used ranged from 0 to 6 with a mean of 2.14 magnifiers and a mode of 2.5. The researcher did not make any assessments regarding the usefulness of the hand-held magnifiers. It was noted that of the 30 portable magnification devices used, fully 16 or 53.3% had a strength of 5X or greater.

Unanticipated Findings

Slightly over half (8 of 14 or 57.1%) of the subjects lived with their spouse or another unrelated person. An informal poll of counselors working in the Minneapolis-St Paul Metropolitan office revealed that most counselors believe that agency consumers over the age of 60 are generally female or widowers. The findings of this research project would appear to indicate that this might not be the case.

This research project included a small sample of Minnesota Services for the Blind customers who use a CCTV provided by the agency. The researcher was surprised to find that 12 of the 14 subjects were using models that provided an automatic focus feature. As much as four years ago, the company that provides this model of machine was not the largest provider of CCTV's for the State of Minnesota.

Analysis of findings indicated that 35.7% of all surveyed CCTV users stated that they did not use their CCTV for any writing activity. One would assume that most if not all, CCTV users would be using their machines to increase both reading and writing activities. A second surprising finding was that 2 of the 14 subjects used their CCTV only many times a week or at least once a week.

Reading statements (bank, IRA, investment) were the second most frequently performed reading activity. Considering that average age of the subjects in this study was 83.1 years this would seem to indicate that the sample group was mentally alert, interested and in control of their financial matters.

Nine of 14 subjects (64.3%) indicated that they used their CCTV for viewing photographs. An interesting finding was that 100% of those subjects indicated that they were not satisfied with the clarity of photographs when using their CCTV.

Almost all of the subjects (92.9%) were able to reasonably state the cause of their vision loss and the same percentage indicated that they saw their eye care provider with at least some degree of regularity. Considering the findings of earlier researchers, this outcome was unanticipated.

Summary of Results and evidence related to research hypothesis

Summary of results.

A majority of subjects (93%) were able to use their CCTV to read a paragraph from a large print publication and 71.4% were able to read a paragraph of standard newsprint from a local newspaper. Half of the subjects moved the X-Y table while reading and the remainder of readers used the less efficient method of moving the reading material back and forth under the camera. Ninety-three percent of the subjects appeared to prefer reading black type on a white background; only one subject read white print on a black background. Five subjects stated that they did not use their CCTV for any writing activity but 100% of the subjects attempted the check writing task. Six of the 14 completed the check correctly and the remainder (8 subjects) made a variety of omissions or made orientation errors. Research findings indicated that the CCTV's are used throughout the week and throughout the month with no time periods evidencing greater use. Reading letters, statements, bills, package food preparation instructions, reading can and package labels, reading pill bottles and identifying medications and viewing photographs are the most frequent reading activities of the CCTV users. Keeping various lists, writing checks and writing letters are the most frequent writing activities that the CCTV users engage in.

The subjects appeared to be open to sharing CCTV's in senior buildings but voiced a number of reservations about problems that might be encountered.

Additional findings indicated that the subjects were generally knowledgeable about their vision and received regular eye medical care. Half of the subjects lived with a spouse or a person unrelated to them. Two of the subjects indicated that they did not receive training in the use of their CCTV but eleven of the fourteen (78.6%) said that the training they received met their needs. A majority of the CCTV users felt that the CCTV had a positive or very positive effect on their ability to live independently. If repairs were needed on their CTV, 92.8% indicated that they knew whom to call. Thirteen of the 14 CCTV users indicated that they used at least one other type of magnification device to supplement their CCTV.

Evidence related to research hypothesis.

The research hypothesis was: Visually impaired seniors who have been provided with a CCTV will demonstrate reading and writing skills that are necessary for living independently in the community. This hypothesis was tested by examining the evidence collected to refute the null hypothesis. The null hypothesis was that visually impaired seniors who have been provided with a CCTV would not be able to demonstrate reading and writing skills necessary for living independently in the community. The evidence collected refuted the null hypothesis. The research hypothesis was accepted. Provision of CCTV magnification devices allowed visually impaired seniors to complete a number of reading and writing activities that are necessary skills for living independently. There was variation in the skill levels of the subjects but all demonstrated the ability to engage in reading and writing activities.

CHAPTER V

Conclusions and Recommendations

Conclusions

The researcher found that 85.7% of the sample group used their CCTV's at least daily. A high rate of daily use was anticipated based on earlier research of low vision subjects (Harper, Doorduyn, Reeves and Slater, 1998). This higher rate may have been due to the fact that all of the low vision subjects in the current study used CCTV's, which may have made reading easier than it would be with other types of low vision reading aids.

Over 75% of the visually impaired seniors used some type of portable magnification device in addition to their CCTV. This may indicate that Minnesota Services for the Blind places a priority on the quality of low vision care that it provides to seniors or it may mean that Minnesota seniors living in the Minneapolis St Paul area have access to magnification devices. Goodrich, Mehr and Darling (1980) studied 96 Veterans in 1980 and found that 50% of CCTV users used an optical aid as well as a CCTV for near work. It is quite possible that in the 22 years since that study was completed magnification and low vision services have become much more available.

Thirteen of the 14 subjects were able to state a reasonable cause for their vision loss and 78.6% believed that they would not go totally blind. These findings do not support those of the Australian study of patients by Davis and Lovie-Kitchen (1995), who found that only 33% of patients had the correct interpretation of their vision loss. Perhaps the results obtained with the Minneapolis-St Paul subjects is indicative of a better doctor patient relationship or of the efforts by Minnesota Services for the Blind Staff and Minnesota medical professionals to provide sound medical education for their patients and clients/customers.

Visually impaired seniors in the Minneapolis St Paul area indicated that their reading goals were reading letters, reading statements, reading bills and reading packaged food containers and medicine bottles (in descending order). The current research supports the findings of Harper, Doorduyn, Reeves and Slater (1999) and that of Schuchard, Naseer and de Castro (1999), who found similar reading goals among their subjects. It may well be that these goals are just a reflection of peoples reading goals in general and that the needs of low vision people are no different than their sighted counterparts.

The variety of activities that the CCTV users engage in indicates that they are actively involved in a number of life activities. They are managing their own finances, communicating with others (writing letters and extensive family histories), maintaining membership in a variety of social groups (kitchen band, Board of Directors for a large Senior Residence, religious groups), and even doing research on the transmission of the West Nile Virus! They are using a CCTV to perform numerous functions that allow them to continue participating in a variety of family, religious and recreational pursuits. The majority of the seniors surveyed are active participants in their community.

This study has provided initial information that Minnesota Services for the Blind can use to begin to substantiate the positive effect that its services have had on visually impaired seniors. Information can be used for fiscal planning to best meet the low vision needs of visually impaired seniors in Minnesota.

Implications

This study showed the value of providing CCTV's to visually impaired seniors who were unable to read efficiently with other types of magnification. There are implications for visually impaired seniors, service providers, CCTV sales professionals and manufacturers and for future

researchers. The findings of this research support the continued practice of providing or of assisting financially in the provision of CCTV's to visually impaired seniors. It is possible that the current research findings can assist in the development of providing fiscally responsible services to visually impaired seniors.

Implications to seniors.

Independence is valued by a majority of persons regardless of age or other factors. Providing a CCTV to a senior that is unable to effectively use other types of magnification undoubtedly increases their ability to function independently. They are able to pay their bills, arrange their own transportation, prepare their own meals, manage their own medical concerns and maintain membership in a variety of organizations. One visually impaired senior stated that the CCTV allowed her to regain an "I can do this" attitude and she is able to be the primary care provider for her husband who has Alzheimer's Disease.

Many of the seniors in this study stated that they have provided demonstrations of their CCTV to other seniors with failing vision. One senior in this study indicated a willingness to share his CCTV with others in his building as long as the CCTV remained in his apartment. It appears that successful CCTV users can be effective role models for persons just beginning to deal with a vision loss and the threat of lost independence.

Implications to service providers.

It appears that some type of systematic training in the use of the CCTV for reading and writing activity is needed. It might also be beneficial to provide follow-up training within a few weeks of the initial training. Special emphasis could be placed on increasing writing skills since that activity seems to be one that is difficult for a number of seniors. At least two of the subjects appeared to be having substantial difficulty operating their CCTV. The researcher could not

determine if these were training issues or if health issues were preventing the individual from using the machine. It might be beneficial to provide long-term follow-up to assure that the machines that have been provided to individuals are being used.

Implications for professional practice and practitioners.

CCTV's increase the independence and confidence of visually impaired seniors. It is apparent that they could be placed in many more public locations used by seniors such as libraries, senior centers and senior residences. Professionals and planners need to make arrangements for making these devices more accessible to the seniors that cannot afford the cost that is currently in the two thousand-dollar range. Blind agencies, county social service agencies, religious affiliated social service providers and others need to begin to work cooperatively to meet this ever-growing need. Medicare and other insurance providers need to consider developing criteria for assisting in the provision of these devices much as they do now for prescription lenses and other disability related aids and devices.

Implications for research.

There are a number of research implications from this study. This study supports earlier studies that found that CCTV's were used on a daily basis and were used most frequently for reading letters and cards, instructions on packages and medicines and managing finances. More research is needed to provide documentation that this is a cost-effective way of enabling seniors to function in an independent fashion without a number of expensive supports.

Implications for professional sales representatives and manufacturers.

Manufacturers and distributors of CCTV's need to be aware that many CCTV users try to use the machines for viewing photographs but find them generally very difficult to use for this purpose. It is possible that the machines can be modified to permit users to engage in this

activity with greater satisfaction. Sales representatives also provide training in the operation of CCTV's that are purchased with private funds. Sales representatives should be skilled in provision of training to allow users to engage in a variety of specific reading and writing activities.

Recommendations

For Seniors.

Seniors should ask for additional training or follow-up services when indicated. They could certainly benefit from one or two brief group training sessions in the operation and use of the CCTV's. Individuals skilled in reading and writing with the CCTV could act as resources in their buildings for new or potential users of CCTV's. Senior CCTV users who have memberships in organizations such as the Senior Federation or area senior centers should make others aware of the positive impact that CCTV's can have on visually impaired seniors.

For Service Providers.

CCTV's should be made available in a wide variety of locations for those seniors that are unable to purchase a machine with their own funds. Minnesota Services for the Blind should continue with efforts to provide the machines to eligible persons who are in financial need and cannot purchase the machines themselves. Staff should engage in some type of systematic training to ensure that the seniors receiving the machines are able to gain maximum use from the machines for reading, writing and other activities. It is possible that in some locations, group classes could be arranged and more skilled CCTV users could act as peer trainers for those individuals that are having difficulty. Services for the Blind should consider training follow up to provide assistance where needed.

For researchers.

Future research needs to be done so that a larger sample can be used and generalizations can be made with more accuracy. The current researcher had difficulty scheduling face-to-face interviews. It is possible that future studies could utilize gathering more information over the telephone from a larger sample as the current study indicated that the subjects were honest about indicating frequency of use and activities that the CCTV was and was not used for

It would be interesting to see if there were differences between seniors that had CCTV's and training in its use provided by the State agency and seniors who had purchased a CCTV with private funds and had training provided by the sales person or vendor. It would also be interesting to compare performance of users of different brands of CCTV to see if there were differences in use patterns and ability levels.

Additional research might look at the possible differences between seniors living alone and seniors living with a spouse or with a person that they are not related to. Many of the seniors living with a spouse stated that they would do the specific activity but found it much easier to have the spouse or significant other perform the activity.

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Appendix A

CCTV Use Scale

SURVEY OF VISUALLY IMPAIRED OLDER BLIND CCTV USERS

The Following Information will be obtained from the Case File:

SSB Customer Number:
Subjects Date of Birth:
Subjects Age at Time of Survey:
Subjects Sex:
Brand and Model of CCTV:
Date CCTV Provided to Subject by SSB:
Primary Cause of Vision Loss:
Best Corrected Vision:
Customer's Living situation: Own Home____ Apartment Building____ Senior Residence____

Each subject will be instructed as Follows: My name is Carol Ellingsberg and I am a Rehabilitation Counselor employed by State Services for the Blind. I am also a graduate student in Rehabilitation Counseling at the University of Wisconsin, Stout. I am conducting a survey of CCTV users in order to complete my graduate program. Your name was obtained from a computer print out of persons that received a CCTV from State Services for the Blind in either 2000 or 2001. Your responses to these survey questions will be kept confidential and will not be used to determine if you can continue to use the CCTV. Your responses will not be tied in any way to your name or case file number. State Services for the Blind staff will not be able to see how you specifically performed. They will be able to read the researcher's thesis when it is completed and will then be able to see how the group of subjects performed. At the conclusion of this survey (today), I will give you a list of phone numbers that you may want to call if you need additional services from Minnesota Services for the Blind. You can call me at 651/642-0799 if you have any questions. You can also call my advisor, Robert Peters, Ph.D. (715/232-1983) at the University of Wisconsin, Stout, if you have any questions about this study. I am providing you with the general number of State Services for the Blind, please call this number if you have any questions regarding your CCTV. Thank you for your cooperation with the items on this survey.

Do you have any questions before we begin?

The Following Questions will be asked of each subject:

1. What is the reason for or cause of your vision loss?

2. I will probably never go totally blind:
   a) Agree with statement
   b) Disagree with statement

3. I see my ophthalmologist or optometrist:
   a) More than once in every six month period
   b) Once every six months
   c) Once a year
   d) Once every two years
   e) I have stopped seeing an eye doctor because they can no longer help me
   f) Other (describe)_____

4. Which Statement best describes your current living situation?
   a) I live alone
   b) I live with my spouse
   c) I live with a relative
   d) I live with a person that is not related to me
   e) Other

5. How long has it been since you have been able to read a newspaper or magazine without magnification (a hand held magnifier, special glasses or your CCTV)?
   a) Five years or more
   b) Four to five years
   c) Three to four years
   d) Two to three years
   e) One to two years
   f) Less than one year
   g) I am able to read a newspaper/magazine without magnification.

6. Which statement best describes the training you received in operation of your CCTV?
   a) The staff person delivering the CCTV provided the training
   b) My SSB counselor provided the training
   c) The vendor (sales person) provided the training
   d) Another person (describe them) provided the training _____
   e) I did not receive training in use of the CCTV.

7. Approximately how long did your training in the use of your CCTV last?
   a) More than one hour
   b) One hour
   c) More than 30 minutes but less than one hour
   d) More than 15 minutes but less than 30 minutes
   e) 15 minutes or less.

8. Which statement best describes your training in use of the CCTV?
   a) The training met my needs
   b) I would have liked more training.

9. How easy/difficult do you feel your CCTV is to use?
   a) Very easy to use
   b) Easy to use
   c) Difficult to use
   d) Very difficult to use.

10. Which statement best describes the time that you usually use your CCTV?
   a) I use my CCTV many times a day
   b) I use my CCTV at least once a day
   c) I use my CCTV many times a week
   d) I use my CCTV at least once a week
   e) I use my CCTV many times a month
   f) I use my CCTV at least once a month.

11. Which of the following reading activities do you use your CCTV for (indicate as many as apply)?
   a) Reading letters
   b) Reading bills
   c) Reading Newspapers
   d) Reading magazines
   e) Reading books
   f) Reading the TV Guide
   g) Reading recipes
   h) Reading package food preparation instructions
   i) Reading can and package labels
   j) Reading pill bottles/Identifying medication
   k) Reading statements
   l) Viewing photographs
   m) Leisure/hobby activities (describe)_____
   n) Other (describe)_____

12. Which of the following writing activities do you use your CCTV for (Indicate as many as apply)?
   a) Writing letters to family and friends.
   b) Writing business correspondence.
   c) Writing checks.
   d) Keeping lists for myself (grocery, shopping, etc).
   e) Writing recipes and other cooking activities.
   f) Leisure and hobby activities.
   g) Other (describe)_____

13. What effect has the CCTV had on your ability to live independently?
    a) The CCTV has a very positive effect on my ability to live independently.
    b) The CCTV has had a positive effect on my ability to live independently.
    c) The CCTV has not affected my ability to live independently
    d) The CCTV has had a negative effect on my ability to live independently
    e) The CCTV has had a very negative effect on my ability to live independently.

14. The CCTV has allowed me to remain active in family events:
    a) True
    b) False

15. The CCTV has allowed me to remain active in social/religious and other activities.
    a) True
    b) False

16. What do you do (who do you call) if your CCTV does not work?
    a) The SSB equipment coordinator?
    b) My SSB counselor
    c) The vendor (sales person)
    d) Other (describe)

17. The day of the week I use my CCTV the most is:
    a) Monday
    b) Tuesday
    c) Wednesday
    d) Thursday
    e) Friday
    f) Saturday
    g) Sunday
    h) I do not use my CCTV more on one day than on others.

18. The time of the month that I use my CCTV the most is:
    a) First week of each month
    b) Second week of each month
    c) Third week of each month
    d) The last week of each month
    e) I do not use my CCTV more at one time of the month than at others.

19. I think that it would be beneficial to share a CCTV in Senior Residences because (give up to three reasons)
    1)_____
    2)_____
    3_____

20. I do not think it would be a good idea for residents of a Senior Building to share use of a CCTV because (give up to three reasons):
    1)_____
    2)_____
    3)_____

21. Please show the researcher the hand-held magnifiers that you currently use (Researcher records type and strength of magnifier if known)
    1)_____
    2)_____
    3_____
    4)_____
    5)_____
    6)_____

22. How easy are your hand-held magnifiers to use:
    a) very easy to use
    b) easy to use
    c) difficult to use
    d) very difficult to use

23. Subject is instructed: "I will now give you a paragraph to read from the Reader's Digest. Please adjust your CCTV and read the paragraph to the researcher. Read at a speed that is comfortable for you." (Researcher notes the following):
    a) Is black print on a white background preferred, or
       Is white print on a black background preferred?
    b) Is the material in focus? Yes/No
    c) Researcher has a copy of the paragraph and notes the following as the subject reads the paragraph:
       1) Words read incorrectly are circled.
       2) Words not read are marked with an "X" through them.
       3) Full lines not read are marked with a line through the entire line and
       4) Lines read twice or started twice are marked with a "2" at the beginning of the line.

       Note: A photocopy of the Large Print Reader's Digest is attached here so the researcher can record observations on or beside it.

24. Subject is instructed: "I will now give you a copy of a Letter to the Editor from the Minneapolis Star newspaper. Please adjust your CCTV and read the letter to the researcher. Read at a speed that is comfortable to you." (Researcher notes the following):
    a) Is the material in focus? Yes/No
    b) Researcher has a copy of the Letter to the Editor and notes the following as the subject reads:
        1) Words read incorrectly are circled.
        2) Words not read are marked with an "X" through them.
        3) Full lines not read are marked with a line through the entire line.
        4) Lines read twice or started twice are marked with a "2" at the beginning of the line.

    Note: A photocopy of the Letter to the Editor from the Minneapolis Star newspaper is attached here so the researcher can record observations on or beside it.

25. Subject is instructed: "I am now giving you a sample voided Guideline check, a type of check used by visually impaired persons. Please write the date July 4, 2000 in the correct spot. Please make the check payable to George Washington. Please make the check out in the amount of seven dollars and fifty cents. Please sign the check Martha Washington. (Researcher notes the following and staples the completed check to this survey):
    a) Did the subject first focus the check and then Zoom out to the smallest amount of magnification on the machine so that they had the largest possible viewing/writing area? Yes/no
    b) Did the subject generally stay on the line?
    c) Did the subject view their writing on the monitor or did they look directly at the check on the X-Y table when filling it out?

Appendix B

Supplementary Information Sheet Given to Subjects

(This page will be read to each subject and then detached and given to them at the conclusion of the survey)

This concludes the survey. Your responses will not be tied in any way to your name or case file number. State Services for the Blind staff will not be able to see how you specifically performed. They will be able to read the researcher's thesis when it is completed and will then be able to see how the group of subjects performed. Thank you for your assistance. I am giving you a listing of phone numbers that you may want to call. You can call me at 651/642-0799 if you have any questions. You can also call my advisor (Robert Peters, Ph.D.) at the University of Wisconsin, Stout if you have any questions about this study. I am also leaving you with the general number of State Services for the Blind. Please call this number if you have any questions regarding your CCTV. Thank you for your cooperation with the items on this survey.

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Phone: 651-642-0799

Research Advisor: Robert H. Peters, Ph.D., CRC
University of Wisconsin-Stout
715/232-1983

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
715/232-1126

PLEASE CALL MINNESOTA SERVICES FOR THE BLIND AT 651/642-0799 IF YOU HAVE ANY QUESTIONS REGARDING SERVICES FOR THE BLIND OR QUESTIONS REGARDING YOUR CCTV.

Note. This page was printed in 16-point bold type to make reading easier for the low vision subjects of the study.

Appendix C

Informed Consent Document

CONSENT FORM TO PARTICIPATE IN SURVEY OF CLOSED CIRCUIT TV (CCTV) USERS

I understand that my participation in this study is strictly voluntary and I may discontinue my participation at any time without prejudice. I understand that the purpose of this study is to investigate CCTV use by blind and visually impaired seniors (60 and over) residing in the seven-county Minneapolis-St Paul metropolitan area. I further understand that any information about me that is collected during this study will be held in the strictest confidence and will not become part of my permanent record. I understand that at the conclusion of this study all records that identify individual participants will be destroyed.

Risks: There is little or no risk to you for participating in this study. Your responses are completely confidential. Keeping the CCTV loaned to you by SSB is not dependent on your participation in this study. Your level of skill in using the CCTV will not affect loan of the CCTV.

Benefits: Although the results of this study may be of benefit to others in the future, there is no benefit to you by participating in this study. If you feel that you need additional services from Minnesota Services for the Blind, you will be provided with the phone number of the counselor providing services in your zipcode area.

Signature of Client_____

Date_____

NOTE: Questions or concerns about the research study should be addressed to Carol E. Ellingsberg (651/642-0799 or 651/917-2456), the researcher or Robert H. Peters, Ph.D., CRC (715/232-1983) 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.

Note: This document was provided to each subject in 16-point bold type to make reading the form possible for low vision subjects