

1-1-2004

Assistive technology devices for individuals with visual impairments : a study of preferences in two regions in the State of Illinois

Carole Michael

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NORTHERN ILLINOIS UNIVERSITY

Assistive Technology Devices for Individuals with Visual Impairments
A Study of Preferences in Two Regions in the State of Illinois

A Thesis Submitted to the

University Honors Program

In Partial Fulfillment of the

Requirements of the Baccalaureate Degree

With Upper Division Honors

Department of

Teaching and Learning

By

Carole Michael

DeKalb, Illinois

December 12, 2004

University Honors Program

Capstone Approval Page

Capstone Title (print or type):

Assistive Technology Devices for Individuals with Visual Impairments

A Study of Preferences in Two Regions in the State of Illinois

Student Name (print or type):

Carole Michael

Faculty Supervisor (print or type):

Toni VanLaarhoven

Faculty Approval Signature:



Department of (print or type):

Special Education

Date of Approval (print or type):

11-22-04

HONORS THESIS ABSTRACT

THESIS SUBMISSION FORM

AUTHOR: Carole Michael

THESIS TITLE: Assistive Technology Devices for Individuals With Visual Impairments
A Study of Preferences in Two Regions in the State of Illinois

ADVISOR: Dr. Toni Van Laarhoven

ADVISOR'S DEPT: TLRN

DISCIPLINE: Special Education

YEAR: Senior

PAGE LENGTH: 14 pages

BIBLIOGRAPHY: Yes

ILLUSTRATED: Catalog of Devices

PUBLISHED: No

LIST PUBLICATION: None

COPIES AVAILABLE: Hard copy

ABSTRACT: A study was conducted to gather information on which assistive technology devices for individuals with visual impairments were being used in public schools. Specifically, the researcher was interested in identifying which devices were available, the ease of their use, and the cost of each device. A survey was used to gather data to study trends in two different regions in Illinois: Northeastern region (25 mile radius around Plainfield, IL) and Northwestern region (25 mile radius around Freeport, IL). The data showed that visual impairment assistive technology devices are used more often in the northeastern region. There were only three visual assistive technology devices being used in the northwestern region as opposed to seventeen devices being used in the northeastern region. There was one device used in both regions.

Abstract

A study was conducted to gather information on which assistive technology devices for individuals with visual impairments were being used in public schools. Specifically, the researcher was interested in identifying which devices were available, the ease of their use, and the cost of each device. A survey was used to gather data to study trends in two different regions in Illinois: Northeastern region (25 mile radius around Plainfield, IL) and Northwestern region (25 mile radius around Freeport, IL). The data showed that visual impairment assistive technology devices are used more often in the northeastern region. There were only three visual assistive technology devices being used in the northwestern region as opposed to seventeen devices being used in the northeastern region. There was one device used in both regions.

Introduction

There are many devices that can be used to aid students with vision impairments. "Print is an important medium of communication, especially in educational and vocational settings. For sighted persons who are literate, print is a gateway to new information. However, for many persons with vision disabilities, print is a barrier. To circumvent this barrier, assistive technology is used." (Lewis, p.446)

Vision enables us to see the beauty around us. We are able to express ourselves by what we see in front of us. Whether it be nature, paintings, people, blackboards in the classroom, computers, or playing chess, the blind count on others to help them imagine what beauty there is around them. "Products for people who are blind or visually impaired are designed primarily to provide access to information or to ensure safe travel. Access to information may mean determining the time on a watch, identifying money, reading today's mail, reviewing text on a computer screen, differentiating between black and white chess pieces, or preparing dinner without being burned." (Galvin & Scherer, p.126) Students who are partially blind will need assistive technology in order to see fully. In order to read a book, use the computer, or complete assignments given by their teacher, a student who is partially blind might only need larger print materials. "These devices are aids for individuals with low vision, who cannot access newspaper- and book-sized print without the aid of an enlarging system. Large print can be created using word processing programs capable of producing changes in font sizes along with printers that can print using large type formats." (Brett & Provenzo, p.59) Other devices such as a magnifying glass, a telescope, or microscopes can also help these students see clearly.

this point, Freeport, IL and 25 mile radius was entered. A list of schools was generated and narrowed down to include only public schools.

A letter and survey were sent to the special education teacher from each school. The letter was written to explain the purpose of the survey and how to complete it. The letter requested that the teachers send no identifying information pertaining to their schools except for the region in which their schools were located. The data on the survey was kept anonymous. The survey, Appendix A, was generated and attached with the letter. The special education teachers were asked to list the different assistive technology devices used for students with visual impairments. There were approximately 200 surveys sent through the mail. The survey consisted of a column to list the devices and a rating scale for ease of use, availability, and cost of the devices. The teachers were asked to rate each device they were using. Table 1 is an example of the rating scale.

Table 1: Rating Scale

Score	Availability	Ease of Use	Cost
1	Not Available	Very hard to use	Very expensive
2	Limited Availability	Somewhat hard to use	Somewhat expensive
3	Average availability	Fairly easy to use	Fairly inexpensive
4	Very available	Very easy to use	Very inexpensive

The survey could be completed manually by using the copy sent to them or electronically by using the web-site provided. The survey also had a section to list preferred devices and comments. The teachers were asked to complete and submit the survey by May 1, 2004, which provided them with a two-month period in which to complete the survey.

Data Analysis

Once the data were collected, they were grouped by specific device and region. Data were entered into a table and sorted alphabetically by device name (Table 2). The data were then analyzed to determine the overall rankings for each specific item in the areas of cost, ease of use, and availability, as evaluated by the teachers. Further analyses were completed to determine if there were any usage trends among devices. The data were sorted by availability, with the least available to the most available (Table 3); then by ease of use with hardest to use to easiest to use (Table 4); and finally by cost with very expensive to least expensive (Table 5). The number of devices was totaled in each column by their rating. For example, all the devices with a four rating were added and then divided by the total number of devices. This provided a percentage for each category (with higher scores being more desirable).

There was only one device that was used in both the NE and NW regions. This device was the Computer with Jaws Duxbury. The rating for this device was determined by adding the two scores and dividing by the total number of users, which was two. This number became the mean score for this device.

Table 2: List of Devices shown alphabetically, by device

Device	Region	Availability Ratings	Ease of Use Ratings	Cost Ratings
4 Track Tape Recorder	NE	4	4	3
Abacus	NE	3	2	4
Braille Embosser	NE	2	3	1
Braille Lite	NE	4	2	1
Braille	NE	4	3	2
Can Do Recorder (language master)	NE	3	4	3
CCTV	NE	2	4	3
ColorCCTV	NE	4	4	1
* Computer with Jaws Duxbury	NE	4,1	3,2	4,4
Disc Drive for Braille Lite	NE	4	4	3
Franklin Talking Dictionary	NE	4	4	3
Light Box	NW	4	2	4
	NE	3	4	2
Lined paper	NW	4	4	4
Magnifier	NE	4	4	2
Print Printer	NE	4	4	3
Slant Boards	NW	4	4	3
Tactile Image Enhancer	NE	1	4	1
Telescope	NE	4	4	2
Thermoform	NE	1	4	2

*The Computer with Jaws Duxbury has two ratings in each column because it was recorded on the same survey by the same school twice. However, in each case the Computer with Jaws Duxbury was rated differently.

Table 3: Ranked by Availability Ratings (Not available to very available)

Device	Region	Availability Ratings	Ease of Use Ratings	Cost Ratings
Tactile Image Enhancer	NE	1	4	1
Thermoform	NE	1	4	2
Braille Embosser	NE	2	3	1
CCTV	NE	2	4	3
Light Box	NE	3	4	2
Can Do Recorder (language master)	NE	3	4	3
Abacus	NE	3	2	4
Braille Lite	NE	4	2	1
ColorCCTV	NE	4	4	1
Brailier	NE	4	3	2
Magnifier	NE	4	4	2
Telescope	NE	4	4	2
4 Track Tape Recorder	NE	4	4	3
Disc Drive for Braille Lite	NE	4	4	3
Franklin Talking Dictionary	NE	4	4	3
Print Printer	NE	4	4	3
Slant Boards	NW	4	4	3
Light Box	NW	4	2	4
Lined paper	NW	4	4	4
* Computer with Jaws Duxbury	NE	4,1	3,2	4,4

*The Computer with Jaws Duxbury has two ratings in each column because it was recorded on the same survey by the same school twice. However, in each case the Computer with Jaws Duxbury was rated differently.

Table 4: Ranked by Ease of Use Ratings (Hardest to Use to easiest to use)

Device	Region	Availability Ratings	Ease of Use Ratings	Cost Ratings
Braille Lite	NE	4	2	1
Light Box	NW	4	2	4
Abacus	NE	3	2	4
Braille	NE	4	3	2
Braille Embosser	NE	2	3	1
Color CCTV	NE	4	4	1
Magnifier	NE	4	4	2
Telescope	NE	4	4	2
4 Track Tape Recorder	NE	4	4	3
Disc Drive for Braille Lite	NE	4	4	3
Franklin Talking Dictionary	NE	4	4	3
Print Printer	NE	4	4	3
Slant Boards	NW	4	4	3
Lined paper	NW	4	4	4
Light Box	NE	3	4	2
Can Do Recorder (Language master)	NE	3	4	3
CCTV	NE	2	4	3
Tactile Image Enhancer	NE	1	4	1
Thermoform	NE	1	4	2
* Computer with Jaws Duxbury	NE	4,1	3,2	4,4

*The Computer with Jaws Duxbury has two ratings in each column because it was recorded on the same survey by the same school twice. However, in each case the Computer with Jaws Duxbury was rated differently.

Table 5: Ranked by Cost Ratings (Very expensive to least expensive)

Device	Region	Availability Ratings	Ease of Use Ratings	Cost Ratings
Braille Lite	NE	4	2	1
ColorCCTV	NE	4	4	1
Braille Embosser	NE	2	3	1
Tactile Image Enhancer	NE	1	4	1
Braille	NE	4	3	2
Magnifier	NE	4	4	2
Telescope	NE	4	4	2
Light Box	NE	3	4	2
Thermoform	NE	1	4	2
4 Track Tape Recorder	NE	4	4	3
Disc Drive for Braille Lite	NE	4	4	3
Franklin Talking Dictionary	NE	4	4	3
Print Printer	NE	4	4	3
Slant Boards	NW	4	4	3
Can Do Recorder (language master)	NE	3	4	3
CCTV	NE	2	4	3
Light Box	NW	4	2	4
Lined paper	NW	4	4	4
Abacus	NE	3	2	4
* Computer with Jaws Duxbury	NE	4,1	3,2	4,4

*The Computer with Jaws Duxbury has two ratings in each column because it was recorded on the same survey by the same school twice. However, in each case the Computer with Jaws Duxbury was rated differently.

Results

A summary of the data from the surveys is listed in Table 2, where the devices were listed alphabetically. The majority of the surveys returned were from the NE region. Out of the 200 surveys sent to the schools, twenty-seven surveys were returned for visual impairment assistive technology. The light box was the only device used in both regions. According to the surveys, the light box was harder to use in the NW region than in the NE region, but was cheaper in the NE region. The reason for this could be the type of light box used.

According to tables 3 and 4 above, the data showed that sixteen out of twenty devices were available giving an 80% availability and ease of use rating. Eighty percent of the visual impairment assistive technology devices had average availability, or higher and were very easy to use. Some of the least available devices included the tactile image enhancer, thermoform, braille embosser, and the CCTV. The hardest to use devices included the Braille lite, light box, and the abacus.

According to the data in table 5, eleven out of twenty devices (55%) used were affordable. The most expensive items included a Braille lite, color CCTV, Braille embosser, tactile image enhancer, brailer, magnifier, telescope, light box, and thermoform.

Discussion

A total of twenty-seven surveys were returned out of two hundred surveys mailed. The return rate was seventeen percent. For this study, a return rate of ten percent or more was set for collecting data. This lower rate, compared to the normal thirty percent response rate for social science studies, was selected due to the closeness to the end of the school year and the possibility of teachers conducting annual IEP reviews. The low return rate could partly be due to the limited number of students who require visual assistive technology devices as it is considered a low-incidence disability. "Vision loss is greater among older persons than younger persons. Four major causes of vision loss are glaucoma, macular degeneration, a cataract, and diabetic retinopathy which occur more in adults than children." (Mann, p. 84)

The survey basically provided a list of assistive technology devices for individuals with vision impairments. However, it did not provide enough information to determine which devices were used more than other devices. With the exception of two devices, all other assistive technology devices were listed once. There were two devices used twice. The light box was used in both the NW and NE regions. The average rating for availability was three and a half, and the average rating for ease of use and cost was three. The Computer with Jaws Duxbury was also recorded twice, but on the survey completed by the same school in the NE region. The Computer with Jaws Duxbury was recorded with different ratings for availability and ease of use. The availability rating for the Computer with Jaws Duxbury listed for the first entry on the survey had an availability rating of four, while the second entry listed on the survey had an availability rating of one, for an average of two and a half. The rating for ease of use was three for

the Computer with Jaws Duxbury device for the first entry listed on the survey and a rating of two for the Computer with Jaws Duxbury listed second on the survey with an average of two and a half. These entries could be caused by an error in completing the survey, or the school had two of the same devices with one being shared by more than one school.

The survey might have been more successful if more schools were included. The schools were provided with a two-month time frame, which should have been enough time to complete the surveys. However, the timing might have been a concern if the teachers were busy with IEP's or bringing in new students for the upcoming year. The response rate could have been improved if more surveys were sent to more regions. Also, if the surveys were sent earlier in the year, more schools might have responded.

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Appendix A

Assistive Technology Survey

Directions: In the column on the left, please list the augmentative alternative communication devices (AAC) and/or assistive technology devices used for individuals with visual impairments currently in use in your classroom. For each item listed, please rate each with the scale below for the availability, ease of use, and cost. If needed, please use the space on the back of this form to include additional items. In the space provided below, please list the preferred device(s) in your classroom and any comments you have regarding those devices. This form can also be completed electronically at the following web site: zuritacom/assistentech Please do not put any identifying information on this survey, all information is to remain anonymous.

Please mark which geographic region your school is located within 25 miles of: _____ -Freeport
 _____ -Plainfield

Scale

Availability scale: 1 = not available, 2 = limited availability, 3 = average availability,
 4 = very available

Ease of use scale: 1 = very hard to use, 2 = somewhat hard to use, 3 = fairly easy to use,
 4 = very easy to use

Cost scale: 1 = very expensive, 2 = somewhat expensive, 3 = fairly inexpensive,
 4 = very inexpensive

	Availability	Ease of Use	Cost
AAC devices			
VISual devices			

Preferred Devices and comments:

CATALOG OF
ASSISTIVE TECHNOLOGY
DEVICES FOR INDIVIDUALS
WITH VISUAL IMPAIRMENTS





A STUDY OF PREFERENCE IN
TWO REGIONS IN THE STATE OF ILLINOIS

By Carole Michael

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Light Box	14
Lined paper	15
Magnifier	16
Print Printer	17
Slant Boards	18
Tactile Image Enhancer	19
Telescope	20

Rating Scale

Score	Availability	Ease of Use	Cost
	Not Available	Very hard to use	Very expensive
	Limited Availability	Somewhat hard to use	Somewhat expensive
	Average availability	Fairly easy to use	Fairly inexpensive
	Very available	Very easy to use	Very inexpensive

* Each star represents a rating of 1.
The smaller star represents a rating of 1/2.

Telescope



A telescope is a device used to form magnified images of distant objects. This is an ideal device for students who have difficulty seeing far away objects, like the blackboard. This device comes in different sizes and shapes and the cost varies depending on the amount of options.

Vendor: Orion

Cost range: \$389 - \$1000

|* |* |* |*

Availability Rating:

|* |* |* |*

Ease of Use Rating:

|* |*

Cost Rating:

References and Manufacturers

Abacus

<http://www.shopping.com!xGS-AbacusNS-1-linkin...id-3056030>

BrailleLitelBraille 'N Speak Configuration

<http://www.viguide.com/BrailleLiteltoDesktopPC.htm...>

Britannica Online

<http://www.britannica.com!...>

Desk Top Solutions.

1182 White St.

Sturgis, MI 49091

Phone: 1-203-652-0549

Fax: 269-651-5706

<http://www.5starplastics.com!slantboards.htm...>

Enable Mart

Technology for Everyone

Phone: 1-888-640-1999

FAX: 360-695-4133

<http://www.enablemart.com>

Foundation for Blind Children

1235 E. Harmont Drive

Phoenix, AZ 85020

Phone: 1-800-322-4870

<http://www.the-fbc.org/index.html...>

Freedom Scientific

Phone 1-800-444-4443

<http://www.freedomscientific.com!index.html...>

Independent Living Aids, Inc.

Address not available

Phone: 1-800-537-2118

E-mail: can-do@independentliving.com

<Http://www.independentliving.com!home.asp>

Lifestyle Fascination Inc.

110 Lehigh Ave.

Lakewood, NJ 08701

Phone: 1-800-669-0987

Email: partnerS@enablemart.com

<http://www.shoplifestyle.com!store/home.asp?mcsessid=984MIDGSWJM98JG9J83MH54E30N63TGF>

Orion Telescope & Binoculars

Cupertino, CA

Phone: 1-800-447-1001

<http://www.telescope.com!...>

Paper.com

Phone: 1-203-652-0549

<http://www.paper.com/school.html...>

Phone Merchants

929 West Pike Street

Clarksburg, WV 26301

Phone: 1-877-291-1076

<http://www.phonemerchants.com/tacimen.html...>

PriceGrabber.com

http://www.pricegrabber.com/search...attrib.php?page_id=21

SanDiego Sign Company

Phone: 1-888-748-7446

<http://www.sdsign.com/lightbox3.htm...>

4-Track Tape Recorder



The tape recorder is a device used to record information. It can be beneficial for a visually impaired person because the information is stored on the recorder and can be played back whenever it is needed. There are many different types of tape recorders available, which can be used to fit the students' needs.

Vendor: Sony Average cost: \$120.

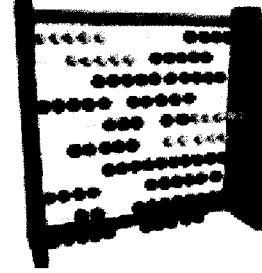
||*||*||*||*

Availability Rating: ||*||*||*||*

Ease of Use Rating: ||* ||* ||*

Cost Rating:

ABACUS



An Abacus is a calculating instrument that uses beads that slide along a series of wires or rods set in a frame to represent the decimal places. Students who are blind or partially blind can use this device. They can feel and count the beads as they complete their arithmetic problems.

Vendor: Montessori

Average cost: \$10 to \$20.

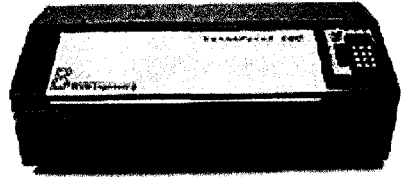
|* |* |*

Availability Rating: |* |*

Ease of Use Rating: |* |* |* |*

Cost Rating:

Braille Embosser



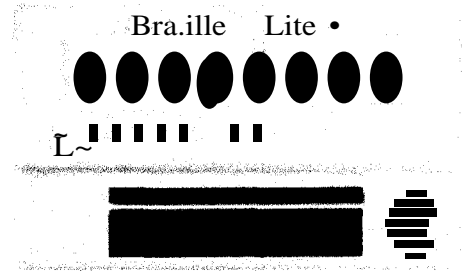
The Braille Embosser is a Braille printer: It raises Braille print onto paper via code sent by Braille translation software. In order to use an embosser, a Duxbury Braille Translator software will need to be purchased. This device can aid anyone who needs to produce hard-copy Braille.

Vendor: Versa Point Duo Embosser Cost range: \$1800 - \$4100

Availability Rating: ★ ★

Ease of Use Rating: ★ ★ ★

Cost Rating: ★



The Braille Lite is a note-taker used by students or adults who are visually impaired. The Braille Lite is a brand name and has a Braille display, which displays what is typed as raised dots. This particular note-taker allows the user to proofread their work more effectively and to do so without having to wear headphones to keep the speech output less obtrusive for others nearby.

Vendor: Braille Lite

Cost range: \$1500 - \$3550

||*||*||*||*

Availability Rating: ||*||*

Ease of Use Rating: ||*

Cost Rating:

Brailor



The Brailor is a device used to type print onto Braille paper. It embosses the letters onto a standard sheet of Braille paper as the information is typed onto the paper. Once the letters are transferred onto paper, the user will be able to read print..

Vendor: Perkins

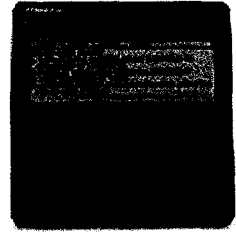
Average Cost: \$785

Availability Rating: ***

Ease of Use Rating: **

Cost Rating:

Can Do Recorder (Language Master)



The language master is a tool used as a reference to find words and their definitions. It is a talking device which allows a visually impaired person to hear words. This particular device has words, definitions, a thesaurus, and a grammar guide to aid the student.. It also has a large screen and display, which will help the student who has a visual impairment..

Vendor: Franklin Electronics

Cost Range: \$100 - \$120

|* |* |*

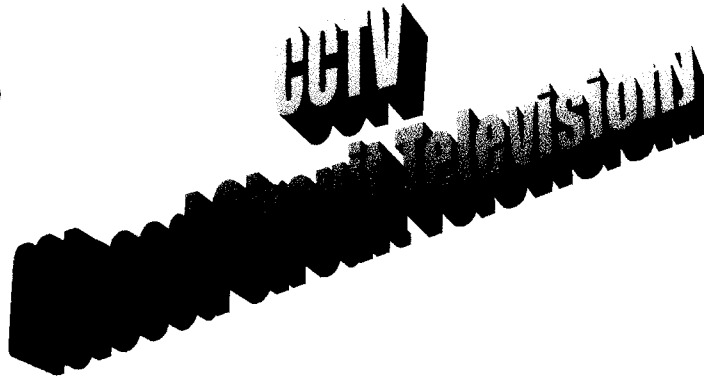
Availability Rating:

|* |* |* |*

Ease of Use Rating:

|* |* |*

Cost Rating:



CCTV enables the person who is visually impaired to read newspapers, medicine bottles, telephone books, and much more. It consists of a video camera, which magnifies the printed text, handwriting and photographs onto a monitor or television screen. CCTV comes in different styles and have more options than others. The black and white CCTV is less expensive than the color model..

Vendor: Quick Look (B&W)

Average Cost: \$795

Reliant (Color)

\$2600

Black and white: |* |*

Color:

Availability Rating: |* |* |* |*



Ease of Use Rating: |* |* |*



Cost Rating:



Computer with Jaws/Duxbury



Jaws is the script which supports the Duxbury Braille Translator.

The scripts include the automatic reading of a translated line, and provide help options for context and the spell checker. This is software which provides help options for the user.

Vendor: Windows

Average Cost: \$825

Availability Rating: |* |* *

Ease of Use Rating: |* |* |* |*

Cost Rating: ^{^^}

Disc Drive for Braille Lite



This is basically the disc drive for information on the Braille Lite.

It is where data is stored, exported, imported and to backup files on the note-taker. It is stored on a 3.5" floppy diskette format and can be used for reading computerized books, manuals, newsletters, and other materials.

Vendor: Lacie

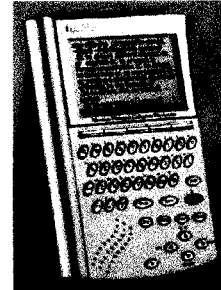
Average Cost: \$30

Availability Rating:

Ease of Use Rating:

Cost Rating:

Franklin Talking Dictionary



This device is a talking dictionary. It speaks a word and its definition. This particular device is a hand-held electronic dictionary. Some devices have a grammar guide, which helps the user with word and usage. Some devices also have word games or crossword puzzles to provide the user with leisure time and still help them learn. This is a device to help students who are visually impaired hear the words instead of visually looking for the words.

Vendor: Franklin

Cost Range: \$15 - \$130

||*||*||*||*

Availability Rating:

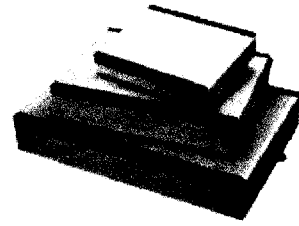
||* ||* ||* ||*

Ease of Use Rating:

||* ||* ||*

Cost Rating:

Light Box

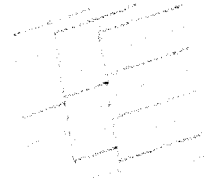


The light box can be used as a magnifier. The user can place their reading material under the light. The words are enlarged to make it easier to read the print. A person with a visual impairment can benefit with this tool. It makes it easier to read.

Vendor: San Diego Sign Company Cost range: \$75 - \$399

Availability Rating: *| *| *| *|
Ease of Use Rating: *| *| *|
Cost Rating: **

Lined Paper



Lined paper is one of the cheapest and most available devices to use to aid a person who has a visual impairment.. The lines can be separated far enough to enable the student to write larger. This will help the students see the print as they write it.

Vendor: D'Nealian

Average Cost: \$10

Availability Rating:

Ease of Use Rating:

Cost Rating:

Magnifier



A magnifier comes in many styles and sizes. It is a device that enlarges words or pictures. It enables the user to read a book or newspaper easier. The cost of the magnifier depends on the options the magnifier has to offer the user.

Vendor: QuickLook

Average Cost: \$795

*| *| *| *|

Availability Rating:

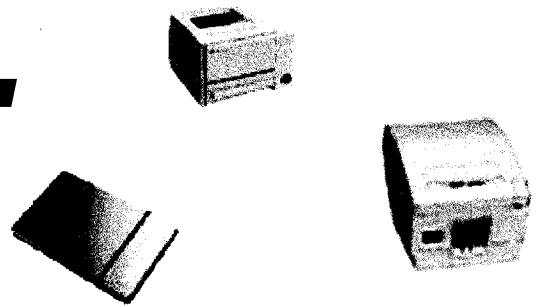
*| *| *| *|

Ease of Use Rating:

*| *|

Cost Rating:

pn,t,n,.



The printer is a device used for printing. It is a machine for printing from photographic negatives. If the print is set large enough, it can help a visually impaired person read the material..

The printer come in large and compact sizes and the cost varies depending on the printer.

Vendor: Samsung

Cost Range: \$50 - \$1000

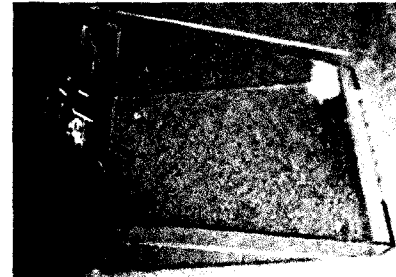
|* |* |* |*

Availability Rating: |* |* |* |*

Ease of Use Rating: |* |* |*

Cost Rating:

Slant Board



A slant board allows the user to place their materials on the board in a position that is more comfortable for them. They are built so the documents can be positioned ergonomically. Some boards are wide enough to fit two standard sizes of paper. Some boards have storage space under them to allow the user to place their supplies. Most boards are fairly inexpensive.

Vendor: 5 Star Plastics

Average Cost: \$30

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Availability Rating:

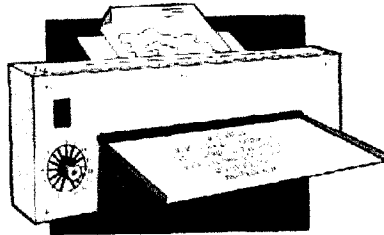
|* |* |* |*

Ease of Use Rating:

|* |* |*

Cost Rating:

TACTILE IMAGE ENHANCER



The tactile image enhancer enlarges the print of an image that is processed through the device. A duplicating machine, dot matrix printer, lead pencil, or any device that produces black lines, words or pictures, can be used to create raised tactile images on flexi-paper. The flexi-paper is passed through the tactile image enhancer and all black portions will be raised, so they can be tactually differentiated. This device is fairly expensive, but beneficial for those people who rely on touch rather than sight.

Vendor: Phone Merchants

Average Cost: \$1495

1*

Availability Rating:

1* 1* 1* 1*

Ease of Use Rating:

1*

Cost Rating: