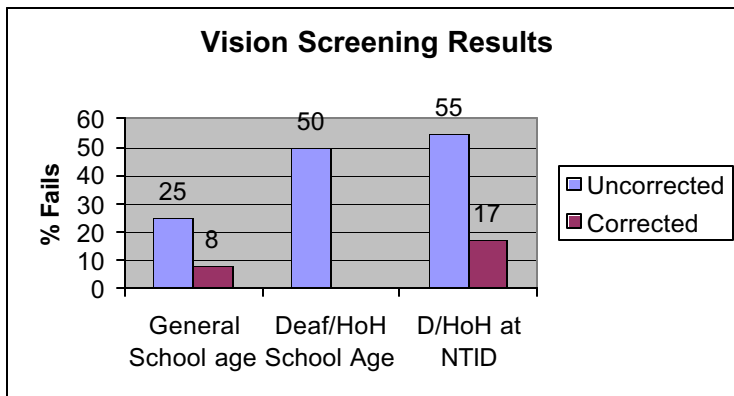


Supporting Visually-Impaired Deaf and Hard-of-Hearing Students

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Fifty percent of students in schools for the deaf are reported as having an uncorrected vision problem. By comparison, general school-age populations report an incidence of 25%. As can be seen in Figure 1 when correction is applied (refractive eyeglasses) these numbers drop to 17% and 8% respectively.¹



Why is the incidence of vision impairment among students with hearing impairment twice that of their peers in general education? The answer lies in concomitant etiologies. In addition to the 'normal' incidence of impaired vision, the etiology of hearing impairment may also cause abnormalities of the visual system. Table 1 lists the common causes of impaired vision among school aged children while Table 2 outlines some of the common etiologies of hearing impairment that may result in concomitant aberrations in the visual system.

- Myopia
- Nystagmus
- Cataract

¹ Corrected values not available for school age. This figure is from NTID research and may be lower than school age as many students with multiple disabilities do not pursue postsecondary education

Retinopathy
Albinism
Glaucoma
Hyperopia
Retinitis Pigmentosa
Optic Atrophy

Table 1: Leading Causes of Vision Impairment Among School Aged Children

OTOLOGIC ETIOLOGY	POTENTIAL OCULAR INVOLVEMENT
Prematurity	Retinopathy
Rubella	Microphthalmus Cataracts Retinopathy
Usher Syndrome	Retinitis Pigmentosa

	Cataracts
CHARGE Syndrome	Scotomas
Neurofibromatosis	Dry Eye Syndrome
Cytomegalovirus	Retinitis

Table 2: Sample Etiologies of Hearing Loss with common Concomitant Ocular (vision) involvement.

There are 5 types of vision: acuity, color, stereoscopic (3D or depth), night, and peripheral. Standard eye chart exams evaluate only acuity. Unless warranted by other presenting complaints an eye exam generally tests only near and far acuity. Eyeglasses are prescribed to correct the majority of acuity problems which result from refractive error, the most common being myopia (nearsightedness). Figure 2 outlines the type of uncorrected vision impairment found in the deaf and hard-of-hearing students attending the National Technical Institute for the Deaf.

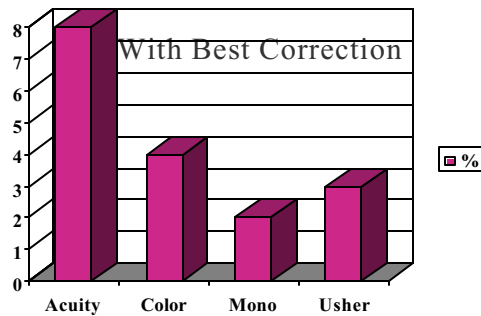


Figure 2: Incidence of Uncorrectable Vision Among Students Enrolled at NTID

Uncorrectable acuity problems account for 8% and include many of the same etiologies as seen in the general population; nystagmus, cataracts, glaucoma, and optic atrophy. Accommodating low acuity will be addressed later in this paper. Monocular vision (one good eye or often called

'lazy eye') results from strabismus, aphakia (no lens), and/or anisometropia (unequal refraction) resulting in lack of 3D vision. Lack of depth perception is typically self-accommodated over time and, beyond limiting some professional choices (e.g.: professional pilot) rarely causes significant problems beyond young adulthood. Usher syndrome accounts for the majority of night and peripheral vision loss. Ushers occur in 3-6% of all deaf and hard-of-hearing individuals. It is suspected that these statistics are not an accurate reflection of the school age population as those with other etiologies (e.g. CHARGE) seldom attend NTID.

Intervention

Any student suspect of impaired vision should be seen by an ophthalmologist and if need referred for a low vision evaluation. Students with significantly impaired acuity and/or peripheral vision should receive the services of an orientation & mobility instructor so they may travel safely in the school environment. Significant changes in the environment, including construction and moving classroom furniture should be reviewed with the student.

The following section suggests possible modifications and strategies that may assist with student access and success in the classroom. Vision is highly individual, even students with the same diagnosis e.g.; Usher Syndrome will have different needs. The following are suggestions and resources you may try.

Making Communication Accessible

- Reduce sign space
- Wear darker/lighter clothing (depending upon skin color)
- Reduce unnecessary movement while teaching
- Repeat comments by other students
- Ensure adequate lighting
- Enhance residual hearing
- Remove sources of background distraction & glare
- In a busy classroom with signing students employ a copy signer
- Employ tracking and/or tactile when needed

Making Projected Materials Accessible

- Make materials available for student to review a second time
- Adjust classroom lighting so student can still see you during projection
- Enlarge images (also see computer software)
- Use yellow transparencies with overheads to increase contrast
- Provide student with hard copies to follow

Making Computers Accessible

- Student may need cursor locator or enlarged mouse (use customizing options on computer and/or adaptive software)
- Adjust monitor brightness & color for best contrast
- Use larger font size and/or enlarging software
- Apply keycap enlargers when needed
- A yellow transparency taped over the screen will decrease glare and increase contrast

Making Printed Materials Accessible

- Use non-glare papers
- Provide clear copies (laser print quality)
- Enlarge when needed.
- Yellow transparency over pages will increase contrast for reading
- Employ closed circuit television (CCTV)
- Type comments on student papers rather write
- Use dark ink (never red) when writing on papers
- Allow student to write answers instead of using computer score sheets
- Employ tactile enhancement

Making Black/whiteboards Accessible

- Describe what you are writing
- Use black markers on white boards (avoid colors)
- Use yellow chalk on clean blackboards (avoid colors)
- Use combined upper and lower case
- Give student hard copies ahead of time
- Stay close to the images on the board

Resources

NTID Eye & Ear Clinic
52 Lomb Memorial Dr
Rochester, NY 14623
(716) 475-6294 v/TTY

American Association of the Deaf-Blind
814 There Ave Set 300
Silver Spring, MD 20910
(301) 588-6545 TTY

Boys Town Research Hospital
555 N 30th St
Omaha, NE 68131
(800) 835-1468 v/TTY

Genetics Program
Gallaudet University
800 Florida Ave NE
Washington DC 20002
(800) 452-8834 ext 5258 v/tty

Helen Keller Center
111 Middle Neck Road
Sand Point, NY 11050
(516) 944-8900 v/TTY

Foundation Fighting Blindness
Executive Plaza 1 Set 800
11350 McCormick Rd
Hunt Valley, MD 21031
(888) 394-3937

www.blindness.org
www.boystown.org
www.deafblind.com
www.helenkeller.org
www.nidcd.nih.gov
www.catalog.com/blindness
www.tr.wou.edu/dblink
<http://blindness.about.com>

Suppliers

For Computers

Keytops

Lighthouse International
www.lighthouse.org

Enlarging Software

InLarge

www.aagi.com

Kurzweil 1000

www.Kursweiledu.com

ZoomText

www.aisquared

Cursor Locators

Intelli Mouse/IntelliPoint

www.microsoft.com

Lunar & SuperNova

www.dolphinusa.com

Screen Loupe

www.gregorybraun.com

Braille Translators

www.duxburysystems.com

General Catalogs

Alva Access Group

www.aagi.com

HumanWare

www.humanware.com

MaxiAids

www.maxiaids.com

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For Printed Materials

Enlarged Books

American Print House for Blind
www.aph.org

CCTVs

Aladdin (Telesensory)

www.telesensory.com

Optelec

www.optelec.com

VideoEye Corp

www.videoeyecorp.com

Tactile Enhancers

PIAF Human Ware

www.humanware.com

RTI

www.repro-tronics.com

www.tactile-audio.com

C Tech

www.lowvisionproducts.com

Lighthouse International

www.lighthouse.org

Telesensory

www.telesensory.com