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# Accessing the Visual Environment

## Understanding Magnification

# Dr. Leanne Grillot

Senior Director of Outreach Services

American Printing House for the Blind

# Amy Campbell

Director of Learning & Development

American Printing House for the Blind

# Learning Objectives

- Define low vision, explore its effects on accessing the visual environment, and debunk common misconceptions about vision loss.
- Compare different types of magnification and examine real-world applications
- Understand the process of prescribing optical devices and the role of various professionals working with students

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# Understanding Low Vision and Its Impact


# Definition of Low Vision

Low vision is a visual impairment that cannot be fully corrected with standard glasses, contact lenses, medication, or surgery. It affects a student's ability to access visual information, including reading, writing, recognizing faces, and participating in classroom activities. However, students with low vision still have usable sight and can benefit from individualized supports, such as magnification tools, adaptive technology, and classroom modifications.

# Common Causes

- Albinism
- Cataracts (congenital and acquired)
- Cortical Visual Impairment
- Diabetic Retinopathy
- Glaucoma
- Macular Degeneration (juvenile and Stargardt)
- Optic Nerve Atrophy
- Retinitis Pigmentosa

# Implications for the Classroom

- Seating
- Magnification tools
- Verbal descriptions
- Accessible materials
- Technology support
- Collaboration


# Misconceptions About Low Vision (1 of 3)

- Wearing glasses will fully correct low vision.
- Students with low vision just need to try harder.
- Using magnification will make the student's vision worse.

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# Misconceptions About Low Vision (2 of 3)

- Large print is always the best solution.
- Students with low vision should sit in the front of the class to see better.
- If a student can see something one day, they should always be able to see it.

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# Misconceptions About Low Vision (3 of 3)

- Students with low vision can't participate in sports or extracurricular activities.
- Using assistive technology is a crutch.
- Low vision only affects older adults.

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# Importance of Individualized Solutions

- Variation in vision conditions
- Different learning preferences
- Fluctuating vision needs
- Maximizing independence and confidence
- Classroom integration and accessibility

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# Magnification Matters

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# Magnification Defined

The process of increasing the size of an image that is received by the eye by spreading the image over a larger portion of the retina.


# Types of Magnification

- Relative size
- Relative distance
- Angular
- Electronic


# Relative Size Magnification

Enlarging the print


# Relative Distance Magnification

Holding materials closer to the eye

# Angular Magnification

Using a low vision device

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# Electronic Magnification

Using a CCTV or computer software


# Quote-1

*It is always better to explore alternatives to "large type" first, since they afford greater independence in selecting reading material. If an optical device can enlarge reading material sufficiently, it is preferable to providing "large type books." When special textbooks are provided, the student is limited to reading only what is given to him/her, instead of being able to select whatever appeals to his/her interests.*

*-Virginia E. Bishop, Ph.D. Teaching Visually Impaired Children*

# Large Print

## Benefits

- Useful when reading longer assignments

## Barriers

- Expensive to reproduce
- Limited availability of material
- Bulky & heavy to transport


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# Determining Size of Print

## Decision Making Guide

To provide a system to select appropriate print size that can be individualized for use with various non-optical, optical, and digital reading systems

https://www.aph.org/product/decision-making-guide/

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# Hive Course

Determining Print Size for Students with Low Vision

https://aphhive.org/#/catalog/course/5688/

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# Research-Based Guidelines for the Development of Documents in Large Print

- Font
- Size
- Color
- Space
- Format

https://www.aph.org/app/uploads/2022/04/Research-Based-Large-Print-Guidelines.pdf

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# Quote-2

*Large-print books are commonly ordered for students with low vision, even when their use is unnecessary or restrictive (Koenig, Foundations of Low Vision. 1996). If a student becomes dependent using large print when low vision devices or non-optical approaches would allow him or her to read print efficiently, then the student's access to print materials is restricted to those situations when large print is available.*

# Question-1

What challenges have you encountered with large print materials?

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# Optical Devices-Near Magnification

- Dome, bar
- Handheld
- Stand mounted
- Spectacle mounted

# Optical Devices-Distance Magnification

- Monocular
- Binocular
- Spectacle mounted
- BiOptic

# Electronic

- Video Mag HD
- Juno
- Jupiter

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# Real-World Examples of Students Using Prescribed Optical Devices

**Early**

- Recipes on boxes
- Lego instructions
- Zoo exploration

**Middle**

- Bus schedules
- Food labels
- Bird watching

**High**

- Yearbook
- Menu reading
- Nature hikes

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# Overview of Published Research on Optical Device Use

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# Early Research on Large Print

- 1920s: Sight Conservation Schools introduced large print to reduce eye strain (Irwin, 1920).
- 1991: Teachers often provided large-print books without systematic evaluation (Koenig & Ross, 1991).
- Advancements in magnification tools have paralleled improved understanding of eye anatomy.

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# Effectiveness of Low Vision Devices

- Early research used non-electronic handheld devices (Smith & Erin, 2002; Corn, et al., 2002).
- Gains noted in reading speed and comprehension (Corn, et al., 2002; Ferrell, et al., 2006).
- Modern tools (video magnifiers, smart glasses) show increased reading speeds, equal comprehension, and fewer errors (Legge, 2016; Lusk, 2012; McLaughlin & Kamei-Hannan, 2018; Moshtael, 2019; Pattillo, et al., 2004).
- Improved student attitudes toward reading (Pattillo, et al., 2004).

# Myths About Optical Devices

- Optical devices worsen vision.
- Students become dependent.
- Reading with them is too slow.
- Large print is always better.
- Devices are too complex.

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# Concerns About Optical Devices

- Social stigma
- Cost and accessibility
- Training requirements
- Field of view limitations
- Physical fatigue

# The Role of Professionals & Prescribed Optical Devices


# Knowledge Needed to Prescribe Devices

- Optical devices related to specific tasks
- Magnification and field of view
- Lens power & diopters
- Principles behind low vision devices
- Problem-solving related to lens fitting, prescription errors, & visual discomfort
- Principles of light

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# Detailed Specifics—Optics

- Magnification
- Calculation of magnification (20/50, 1M)
- Telescopes
- Magnifiers
- Assistive technology

# Detailed Specifics—Dioptrics

- Lenses
- Refraction
- Optical power
- Image formation

# Role of TVI

- Direct instruction of Expanded Core Curriculum
- Interpret eye reports
- Assessment
- Determine classroom and instructional materials
- Collaborate with families and classroom teachers

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# Role of Certified Low Vision Therapist

- Conduct low vision evaluations
- Develop treatment plans
- Instruction of adaptive devices
- Educate patients
- Collaborate with team to coordinate patient care

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# Role of Orientation & Mobility Specialist

- Assessment
- Direct instruction of concepts, routes, locations, mobility devices, and low vision devices
- Collaborates with families, teachers, and other providers
- Resource for referrals to additional services

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# Role of Low Vision Specialist

- Conduct eye exams
- Diagnose conditions of vision loss
- Develop rehabilitation plans
- Select optical and other assistive technology devices
- Offer counseling
- Referral to other specialists
- Collaboration with families, educators, and healthcare professionals

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# Who’s Responsible?

- TVI
- O&M Specialist
- Certified Low Vision Therapist
- Low Vision Specialist


# Resource

Appropriate Prescribing Practices for Optical Device Use in Students with Low Vision

an AER Position Paper

(Cynthia S. Bachofer, PhD, CLVT and Kelly E. Lusk, PhD)

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# Collaborative Support

## Families

- Encourage device use at home
- Celebrate progress
- Share observations with school team

## Educators

- Normalize device use in class routines.
- Create safe opportunities to practice.
- Reinforce device as a tool for independence

## Medical

- Provide student-friendly training
- Explain real-life benefits of the device
- Stay in touch for follow-up and adjustments

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# Collaboration Conversation Starters

- What does my child say about using their device in front of classmates?
- Are there times during the day when the device is most or least used?
- Can you show us how the device supports both reading and mobility tasks?
- What’s one daily activity the student enjoys where the device could help?
- What’s working well right now, and what’s frustrating for the student?

# Call to Action!


# Key Takeaways

- 4 types of magnification
- Print size varies with distance
- Guidelines for large print documents
- Psychosocial needs of students with low vision must be addressed
- Devices maximize residual vision
- Improved reading speed and comprehension with device use

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# Invitation to Next Webinar

May 1, 2025

3-4:30pm ET

Meaningful Clinical Evaluations

https://aphhive.org/#/catalog/course/5688/

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# Question-2

What is your biggest takeaway from today's session?

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