The Eye: Physiology, Diseases, and Educational Implications

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&

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The Human Eye
Parts of the eye

Diagram showing the parts of the eye:
- Cornea
- Lens
- Pupil
- Iris
- Choroid
- Sclera
- Retina
- Optic Disk (Blind Spot)
- Fovea Centralis
- Macula
- Ora Serrata
- Vitreous
- Conoorcular Vein
- Conjunctiva
- Canal of Schlemm
- Iris
- Lens
- Pupil
- Cornea
- Aqueous
- Suspenosy Ligament
- Ciliary Body
Accommodation

(a) Lens is flattened for distant vision

(b) Lens bulges for close vision
Hold an object, like a newspaper, at arm’s length from your eyes.

Focus on a word then quickly move the page to about 4 inches from your eyes.

The ability to accommodate enables you to refocus at near distances.

For some, the ability to focus quickly from distance to near is delayed.

When performing this task, you may be able to “feel” your lens changing shape or accommodating.
Types of Visual Loss

I. Acuity Loss
II. Field Loss
III. Muscle Imbalance
IV. Brain Reception
V. Others
Eye Conditions, Diseases and Educational Implications
Myopia
Myopia
Educational Implications

• Reduce Glare
• Corrective Lenses
• High Illumination with Good Contrast
• Sit Close to the Board
• Trouble in P.E. – may not be interested in activities that require distance vision
• Observe Precautions for Retinal Detachment
Hyperopia
Hyperopia
Educational Implications

- Corrective Lenses
- Magnifier
- Can’t See Close Up
- Tires Easily When Doing Close Work
- Variation in Near and Far Tasks can Prevent Tiring
- May Prefer Physical Activities that Require Distance Vision
Astigmatism

Educational Implications

• Good Contrast and Lighting
• Student May Tire Easily and Complain of Headaches when Reading
• Difficult to See Fine Details, Either Close-up or from a distance
Strabismus
Strabimus

Educational Implications

• Double Vision
• Hard to Focus and May need more Time to Adjust to Unfamiliar Visual Tasks
• Typoscope
• May have Difficulties in Physical Activities
• Affects Eye-Hand Coordination
• May Have Trouble with Depth Perception
Glaucoma
Glaucoma

Educational Implications

• Fluctuations in Visual Performance
• Stress and Fatigue
• Travel in Unfamiliar Places may be Difficult
• Expectations May Need to be Adjusted Accordingly
• Teachers Should be alert to symptoms of pain reported by the Student
• Student may have to take Prescribed Medications during the School day
Macular Degeneration
Macular Degeneration
Educational Implications

• Uses Peripheral Vision
• Enlarge Materials
• Bring Materials Closer to the Eye
• Telescopes for Distance
• CCTV with Reversed Polarity
• High Contrast
• Typoscopes / Line Markers
• Do Not Stand In Front of a Window
• Sit near the Board
• Sunglasses, Visor or Cap With a Brim
• Visual Fatigue May be a Problem
Cataracts
Cataracts
Educational Implications

• Teacher Should Not Stand In Front of a Window
• Lights with Adjustable Arms and Intensity are Helpful for Close Work
• Prescribed Glasses or Contact Lenses Should be Worn
• Extra Time Needed for varied Lighting Situations
• Rest Periods for Fatigue during Close work
Retinal Detachment
Retinal Detachment
Educational Implications

• Magnification for Close Work
• Telescopes
• High Illumination
• Reduce Glare
• Avoid Contact Sports and Activities
Albinism
Educational Implications

- Magnification - CCTV, hand-held magnifier
- Moving close to the object viewed
- Sunglasses - tinted lenses, cap with brim
- Reduce glare
- Move away from windows when teaching
- High contrast
- Typoscopes/line markers
- Paper copies of overhead transparencies
- May have trouble with depth perception
- Eyes fatigue may occur when doing close work
Amblyopia

I suppose you're wondering why I'm wearing this eye patch, Linus?

You probably have amblyopia ex anopsia. The vision in your right eye is dim so the doctor has patched the left one, thus forcing the right eye to work...

Actually, treatment of amblyopia is one of the most rewarding in medicine...without medication or surgery or hospitalization a child can be given eyesight in an eye which otherwise might have no sight...

You drive me crazy!!
Amblyopia
Educational Implications

• Good contrast
• Glare reduction
• Typoscopes/line markers
• Inaccurate reach for steps, so familiarize student with environment (can ease the awkwardness and help anticipate distances and heights).
Colobomas
Colobomas
Educational Implications

- Magnification
- Average to bright lighting
- Telescope for distance viewing
- Good contrast required
- Typoscopes/line markers
- Sunglasses, visor or cap with a brim
- Reduced depth perception
- C.H.A.R.G.E.
Cortical Visual Impairment

Educational Implications

• High illumination
• Bright contrast
• Consistent visual cues
• Determine which sense system gives the most accurate information to the student then pair visual skills with that system
• Tell students what they are seeing and encourage them to feel it/explore it while learning about it
• Space objects further apart on a page
• Use finger from one object to the next on a page
• Repetition and routine very helpful
• fluctuation in vision caused by fatigue, excessive noise, illness
Leber’s Congenital Amaurosis
Educational Implications

• Magnification/CCTV with Reversed Polarity
• Bring Materials Close to Eyes
• Reduce Glare
• Telescopes for Distance
• Good Contrast
• Typoscopes/Line Markers
• Do not Stand In Front of a Window
• Fatigue can Become a Problem
• Reduced Depth Perception
• Sunglasses, Visor or Cap with a Brim
Nystagmus
Nystagmus
Educational Implications

• Shifting Gaze
• Head Tilts to Find the “Null” Point Which Slows the Nystagmus
• Stress, Spinning, and/or Rhythmic Movements may Increase Nystagmus
• Typoscopes/Line Markers
• Good Lighting and contrast
C.H.A.R.G.E. Syndrome
C.H.A.R.G.E. Syndrome
Educational Implications

• Coloboma
• Heart defect
• Atresia change in nasal structures
• Retarded growth/mental development
• Genital problems
• Ear problem/deaf malformation of ears
Retinitis Pigmentosa
Educational Implications

• High illumination
• Reduce glare
• CCTV with maximum contrast
• Present things in front of student
• Loss of peripheral vision
• Precautions should be taken to prevent retinal detachment
Retinopathy of Prematurity
Educational Implications

• High illumination
• Magnification
• Telescope for distance viewing
• Precautions should be taken to prevent retinal detachment
Miami-Dade Eye Forms

These forms are mandatory before a student can be staffed into the VI program

1. FM-1665  Physician’s Report of Eye Exam
2. FM-3193  Functional Vision Evaluation/Learning Media Assessment
PHYSICIAN'S REPORT OF EYE EXAMINATION

Print Student’s Name (Last) _________________ (First) _________________ (MI) _________________

Birthday _________________ Sex _____ M _____ F _____ Grade _________________ Student ID No. _________________

School _________________ Parent or Guardian _________________ Home Address _________________ Phone _________________

Background Information/History/Etiology _________________ Type of Ocular Defect or Disease (and any secondary eye conditions): _________________

Symptoms to Watch for: _________________

**VISUAL ACUITY**

<table>
<thead>
<tr>
<th>Distance Vision</th>
<th>Near Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without Correction</td>
<td>Current Correction</td>
</tr>
<tr>
<td>OD (right)</td>
<td></td>
</tr>
<tr>
<td>OS (left)</td>
<td></td>
</tr>
<tr>
<td>OU (both)</td>
<td></td>
</tr>
</tbody>
</table>

**PROGNOSIS AND RECOMMENDATIONS**

Stable _____ Deteriorating _____ Capable of Improvement _____ Guarded _____

What treatment is recommended? _________________ Low Vision Examination? (Yes/No) _____

Glasses: _____ Not Needed _____ Constant Wear _____ Close Work Only _____ Other _____

Physical Activity: _____ Unrestricted _____ Restricted as Follows _________________

FOR STUDENTS BIRTH TO 5 OR STUDENTS OTHERWISE UNABLE TO BE ASSESSED

If a visual acuity cannot accurately be determined, indicate if the student meets any of the following criteria for program eligibility:

- Bilateral lack of central, steady or maintained fixation of vision with an estimated visual acuity of 20/70 or less after best possible correction
- Bilateral central scotoma involving the perimacular area (20/80-20/200)
- Bilateral grade III, IV, or V Retinopathy or Prematurity or documented eye impairment

PLEASE RETURN TO: _________________

______________________________________________

______________________________________________

______________________________________________

PHYSICIAN, PLEASE COMPLETE AND SIGN PAGE 2.
SPECIAL PROGRAMS FOR STUDENTS WHO ARE VISUALLY IMPAIRED

According to State of Florida Administrative Code Rule 6A-6.03014(1)(a-c), the definition of students with visual impairments includes students who are blind or have little potential for using vision, and students who have low vision. The term visual impairment does not include students who have learning problems that are primarily the result of visual perceptual and/or visual motor difficulties.

Rule 6A-6.03014(4)(a)(1-4) for students who are visually impaired mandate the following medical criteria must be met.

In your professional opinion, does this patient meet at least one of the criteria below?
Please indicate which criteria by check-mark:

1. _____ A visual acuity of 20/70 or less in the better eye after best possible correction;
2. _____ A peripheral field so constricted that it affects the student’s ability to function in an educational setting, not including students who have learning problems that are primarily the result of visual perceptual and/or visual motor difficulties;
3. _____ A progressive loss of vision which may affect the student’s ability to function in an academic setting;
4. _____ For children birth to five (5) years of age, bilateral lack of central, steady, or maintained fixation of vision with an estimated visual acuity of 20/70 or less after best possible correction, bilateral central scotomas involving the perimacular area 20/60-20/200, bilateral grade III, IV, or V Retinopathy of Prematurity (ROP); or documented eye impairment as stated in numbers 1, 2, or 3 above. For children birth to five (5) years of age or students who are otherwise unable to be assessed, a medical assessment describing visual functioning shall be documented when standard visual acuities and measure of field of vision are unattainable.

Visual Field

Does the student have a field loss? _____ no _____ yes. Describe if loss is present: ____________________________

Type of test used: ____________________________ Illumination in ft. candles: ____________________________

Test Object: Color(s): __________ Size(s): __________ Test Object: Color(s): __________ Size(s): __________

Distance(s): __________ Distance(s): __________

Signature of Physician: ____________________________ Date: ____________________________

Print Name of Physician: ____________________________

Address and Telephone of Physician: ____________________________

FM-1665 Rev. (05-09)
FUNCTIONAL VISION/EDUCATIONAL ASSESSMENT

(Only those areas applicable to the student's level of functioning are to be completed.)

School: ___________________________ Grade: ___________ Date of Birth: ___________
Teacher/Guidance Counselor: ___________________________
Parent/Guardian: ___________________________
Address: ___________________________
Telephone: ___________________________ VI Teacher: ___________________________
Evaluator: ___________________________ Title: ___________________________

PHYSICIAN'S REPORT OF EYE EXAMINATION

Nature of eye condition and any secondary eye condition(s) (describe in simple terms):

__________________________

Visual acuity without glasses: Near _______ Far _______ Visual acuity with glasses: Near _______ Far _______
Restricted field of vision: ___________________________
Prognosis: ___________________________ Medications: ___________________________
Date of most recent eye exam: ___________________________
Use of glasses: none _______ close work only _______ distance only _______ constantly _______
Restrictions: close eye work _______ physical activity _______ other _______
Is child currently being patched for amblyopia? ___________________________
Other handicapping conditions: ___________________________

VISUAL AIDS CURRENTLY IN USE

Glasses: condition of lenses: _______ condition of frames: _______
Is child wearing prescribed glasses for this evaluation? ___________________________
Reading lamp: _______ Reading stand: _______ Bold-line paper: _______ Monocular: _______
CCTV system: _______ Black felt tip markers: _______ Magnifiers: _______ Other: _______

EDUCATIONAL ASSESSMENT

Current Reading Level: _______ Instrument Used: _______ Date: _______
Current Math Level: _______ Instrument Used: _______ Date: _______
Handwriting Sample: ___________________________
THE END

"Th-th-th-that's all folks!"