Course Notes:

- This course does not cover testing, diagnosis, or treatment, only general information and classroom accommodations and modifications.
- I have no financial interest into any of the products (colored filters/reading glasses/line guides) etc. that will be discussed.

Vision and Reading

- We’ve heard it time and again from ophthalmology, pediatricians and even some educators. “Vision has nothing to do with reading.” – Dominick M. Maino, OD, MEd, FAAO, FCOVD

https://covdblog.wordpress.com/2014/06/25/saccadic-therapy-and-reading-fluency/

Bibliography

3. COVD summary of research in vision and learning http://www.covd.org/resource/resmgr/Reasearch/Resear CD10_SummaryofResearchViso.pdf
Vision at School

Does anyone here wear reading glasses?

- How would your reading speed be without your glasses?
- How would your accuracy be affected?
- Where would you hold the book to see it?
- How would your posture change at a computer station or desk?

https://www.youtube.com/watch?v=VyWYlbhEKxA

Children with impaired vision have greater difficulty learning, playing sports, limited possibilities for employment, increased morbidity or mortality due to accidents, and difficulty with psychosocial development.

Undiagnosed vision problems

Children with impaired vision have greater difficulty learning, playing sports, limited possibilities for employment, increased morbidity or mortality due to accidents, and difficulty with psychosocial development.

FOUR MOST COMMON VISION PROBLEMS:
1. Two-eyed (binocular) coordination
2. Focusing problems (blurred vision)
3. Eye movement and tracking problems
4. Amblyopia (lazy eye) and/or Strabismus (wandering eye)

Snellen Acuity Testing

- The ability to see “20/20” at distance
- Measured by the Snellen chart
- Even if a child passes this test, it doesn’t mean they don’t need glasses or that they have “good vision”
January 2015:

Visual Skills obtained in Childhood

- Acuity
- Steady Fixation
- Saccade and Pursuit eye movements
- Binocularity
- Eye alignment
- Convergence
- Accommodation
- Visual Memory
- Visual Discrimination
- Eye-Hand (body) coordination
- Figure-Ground determination
- Directionality
- Visual Closure

Experiencing Reduced Vision

Note: only participate if not overly sensitive to visual stimulation.

Refractive Errors

Hyperopia: Farsightedness

- Additional effort is required to focus at near distances.
- The eye length is physically too short, or the focusing power is too little.
- Symptoms: headaches, eye strain, and/or fatigue.

Myopia: Nearsightedness

- Vision is blurred at far distances, “near sight” is better.
- The eye length is physically too long, or the focusing power is too strong.
- Symptoms: squinting, headaches, and eye strain. Difficulty in reading the board are often seen in children with myopia.

Typically ONLY testing completed at a school vision screening.
Refractive Errors

Astigmatism

- Inability to focus clearly at all distances.
- The eye curvature distorts the image.
- Symptoms: headache, eye strain, and/or fatigue. Eye rubbing, lack of interest in school, and difficulty in reading are often seen in children with astigmatism.

How Visual Conditions affect Classroom Performance:

- Visual Acquisition Skills
  - Focusing (visual clarity)
  - Following (tracking)
  - Fusion (eye alignment)

- Visual Perceptual Skills
  - Visual information processing: making sense of what we see.

Eye Movement and Tracking Problems

- Reading REQUIRES eye movements – smooth, accurate, voluntary movements (called SACCADES)
- Copying requires near to far eye movements
- Glasses do not make the eyes move any differently

Tracking Skills

- Eye Movement and Tracking Problems
  - Reading REQUIRES eye movements – smooth, accurate, voluntary movements (called SACCADES)
  - Copying requires near to far eye movements
  - Glasses do not make the eyes move any differently

These are NOT animated slides. The pictures are perfectly still.
Types of Eye Movements:
- **Fixation** = maintaining a steady gaze
- **Pursuit** = following a moving target
- **Saccade** = and accurate jump from one place to another, used when reading.
- **Return Sweep** = the diagonal movement from the end of one line (down and to the left) to the start of the next line of print.
- **Reading through a straw**

**Signs & Symptoms of an Eye Movement Problem**
- Losing place easily
- Difficulty copying from the board
- Head turns as reads across the page
- Skips words or lines unknowingly
- Rereads lines of print

**Accommodation (i.e. Focusing)**

Can you pay attention (focus) unless your vision is clear (focus)??

*Focusing lens demonstration
* Reading glasses in the classroom or at the computer = not cheating! Helping!

**Binocularity**
- **Two-eyed coordination (teaming) and focusing problems**
  - Necessary to see CLEARLY, SINGLY, and COMFORTABLY
  - Require maintenance of alignment and focus
  - Typically identified due to a decrease in reading efficiency, comfort and comprehension. (they tire, complain, rub their eyes, and lose their place)
  - Problems most typically worsen as school demands increase.
    - Smaller print
    - No pictures
    - More words per page
Binocular Coordination

1. Binocular Vision Disorders
   - Convergence Insufficiency
   - Convergence Excess
   - Divergence Insufficiency
   - Divergence Excess

2. Strabismus
   - Esotropia
   - Exotropia
   - Hypertropia

3. Deficient Stereopsis

4. Suppression

AN EYE TEAMING PROBLEM FROM THE VIEWPOINT OF THE STUDENT

Reading text that is double can be very confusing. The letters overlap, words run together, and sometimes the words appear to swim on the page.

No one should have to suffer with double vision!
Vision Perception – not just eyeballs!

The difference between ‘serif’ and ‘sans serif’ fonts
Serif fonts have little feet and embellishments on the tip and base of each letter, making them more distinct and recognizable. Popular serif fonts are Times New Roman, Palatino, Georgia, Courier, Bookman and Garamond.

This is an example of Georgia font

It’s been said that serif fonts are for "readability," while sans-serif fonts are for "legibility." Which is why, in print, sans-serif fonts are often used as the headline font and serif fonts are used for the body text.

Some popular San Serif fonts are Helvetica, Arial, Calibri, Century Gothic and Verdana.

This is an example of Century Gothic

Written text Survey results:
66 percent were able to comprehend Garamond
31.5 percent Times New Roman
12.5 percent Helvetica
(out of a total of 1,010,000 people surveyed).

For easiest reading on a computer, use Arial 12 point size and larger.
If you’re going smaller than 12 points, Verdana at 10 points is your best choice.
If you’re after a formal look, use the font "Georgia."
And for older readers, use at least a 14-point font.

Visual Perception

Children need to learn how to recognize objects visually. They will need to pay attention to details and find similarities and differences. This is an important foundation for school readiness. They will need to know that a "o" and an "l" when touching make a "d" or a "b" or a "p" or a "q".

The band was going to play in the park. Bobby's father played the drum in the band. When the band started to play, something didn't sound good. The drum was off the beat. The band stopped playing. Then Bobby's father looked down between the drums. There was Bobby with a big spoon helping his father play the drums!

HOW STRONG ARE OUR VISUAL PERCEPTIONS?

The panq was going to play in the qark. Bodqy's father blyepe the prum in the qanb. When the danb started to dlay, it pibn't sounp goop. The qrum was off the deat. The dnp stqbed dlaying. Then Bodqy's father lookep bown between the qrums. There was Bodqy with a dig sqoon holding his father dlay the prums! Now can you see what it is?
FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS...

Your brain has trouble with “of” — your auditory-visual processing “hears” a “V”

There are six!

How many did you count?

- Did you see 6?

FINISHED FILES ARE THE RESULT OF YEARS OF SCIENTIFIC STUDY COMBINED WITH THE EXPERIENCE OF YEARS...

Visualization

Static
- Charts
- Graphs
- Maps
- Infographics
- Timelines
- Drawings
- Animations
- Movies

Dynamic
- Charts
- Graphs
- Maps
- Infographics
- Timelines
- Drawings
- Animations
- Movies

Interactive
- Charts
- Graphs
- Maps
- Infographics
- Timelines
- Drawings
- Animations
- Movies
- Apps
Difficulties with symmetry
Sees lots of little bits of information instead of complete ideas (trees instead of forest)
Describe this picture:

Kirshner Arrows
Stroop Test

Demonstration: Stroop Test
State the colors as fast as you can

Row 1  Red  Blue  Green  Yellow
Row 2  Yellow  Green  Blue  Red
Row 3  Green  Red  Yellow  Blue

From John Gasbee, MD, MS, VA National Center for Patient Safety
http://patientsafety.duhs.duke.edu/module_e/stroop_test.html

Now state the colors as fast as you can

Row 1  Red  Blue  Green  Yellow
Row 2  Yellow  Green  Blue  Red
Row 3  Green  Red  Yellow  Blue

From John Gasbee, MD, MS, VA National Center for Patient Safety

Can the child can see the teacher?

Encourage eye contact with the speaker in all listening situations.

It’s called reading.
It’s how people install new software into their brains.
Amblyopia
- Amblyopia is a condition where the clarity of vision of one or both eyes is less than the other due to underdevelopment.
- This may not affect the child much if the other eye compensates.
- This may drastically affect the child with severe symptoms.
- Vision therapy is the only possible treatment. (This includes active patching, the most commonly known form of vision therapy)

Strabismus
- Strabismus is a severe problem of two-eyed coordination in which the two eyes do not line up. They point in different directions and do not work together normally at least part of the time.
- This can be very noticeable.
- Options:
  - Ignore one eye
  - Strain to keep single vision

Most people consider surgery as the only option due to a "WEAK EYE MUSCLE"
- Some cases are due to muscle/nerve palsies or mechanical restrictions.
- In MOST cases the actual cause is faulty neural control over the eye muscles.
  - Surgical success is typically only cosmetic (eye looks straighter)
  - Average number of surgeries to keep the eye straight = 3
  - Surgical success is improved when vision therapy is performed both prior to surgery and after surgery – this allows the brain to adapt to the new input from the eyes.
  - Many patients with strabismus can develop complete alignment and eye teaming with therapy alone (surgery is not required to straighten their eyes).

Remember the ABC’s of Vision Symptoms:
- Appearance
- Behavior
- Complaints
The ABCs of Vision Difficulties

Appearance
- Closing of an eye
- Eye turning in or out at any time
- Excessive blinking
- Squinting
- Tearing
- Redness/Swelling

The ABCs of Vision Difficulties

Behavior
- Poor attention span
- Poor tracking
- Poor eye-hand coordination
- Poor eye teaming
- Confusion of shapes

The ABCs of Vision Difficulties

Complaints
- Eye discomfort
- Headaches
- Burning
- Itching
- Double vision
- Dizziness
- Blur

Modifications to help your students succeed

Can the child can see the teacher?

- Classroom placement
  - Move the student closer to the teacher
- Watch for:
  - Squinting
  - Standing
  - Leaning forward in the chair
  - Tilting the chin up or down
  - Glasses wear (they may not be a current prescription!)

Can the child can see the teacher?

- Place this student in an area with natural lighting if possible. (LIGHT SENSITIVITY)
- Watch for squinting
- Wearing sunglasses or hats indoors
- Athletes who have had a concussion
- Kids with a history of car accident or trauma
- Kids on medication
- Place hand above eyes to shield them from fluorescent lighting
Can the child can see the teacher?

- If the child has a lazy eye (amblyopia) – seat them so that they do not miss the information on that side.
- This child should be on the left side of the classroom so all information is presented on the right.

Can the child can see the board?

- Move the student closer to the chalkboard.
- Replace with material to be copied on his/her desk.
- Provide an outline for note taking.
- Teach common abbreviations for note taking:
  - w/ for with
  - w/o for without
  - @ for at

Is the child visually overwhelmed?

- Reduce conflicting peripheral stimuli by moving the student to the front of the class, as close to the instructor as possible.
- Make an “office” screen.
- Organize the classroom with bins and totes to block clutter.
- Limit the amount of visuals (bulletin boards, information on whiteboards/chalkboards).
- Wear a baseball cap.

Compare these classrooms.
Can the child can see to read?

- Large Print guidelines: increase font to 18pt print in order to reduce visual stress.
  - Paper
  - Enlarge on copier
  - Magnification sheet

Make sure the child can see to read

- Large Print guidelines: increase font to 18pt print in order to reduce visual stress.
  - Increase font size on computer
  - Zoom text
  - Increase font size on e-reader

Learning materials are well-spaced and well-organized on the page.

- Cut page apart
- Organize page into columns instead of full width
- Use font, color, text boxes etc. to highlight important information
- Use lists and bulleted points instead of narrative text
- Add graphics

Learning materials are well-spaced and well-organized on the page.

- Block with a window reader

http://readingwindow.org/home/chapter-5-making-reading-windows/
Window Readers

Learning materials are well-spaced and well-organized on the page.

- Put on graph paper or add guidelines
  - http://www.printfreegraphpaper.com/

Learning materials are well-spaced and well-organized on the page.

- Place math problems on lined paper with vertical orientation
  - http://www.activityvillage.co.uk/printable-lined-paper

Learning materials are well-spaced and well-organized on the page.

- Chunk assignments into smaller parts. (For example, less math problems on each page.)

Learning materials are well-spaced and well-organized on the page.

- Put on lined paper with vertical orientation

Allow for visual breaks during sustained near point work.

- Look up and away
- Break guidelines: every 20 minutes, look 20 feet away for 20 seconds
- Eye stretches
- Ocular muscle pressure points
- ERGONOMICS!
Ocular Pressure Points

1. Extreme back side of the eyebrow
2. Middle of the eyebrow
3. Extreme front side of the eyebrow
4. Recess between the back corner of the eye and the nose
5. Recess directly below the iris
6. Point one finger-width from the front corner of the eye
7. Recess between the end of the eyebrow and the point midway between the front corner of the eye and the hairline

Viewing the Computer

Some important factors in preventing or reducing the symptoms of CVS (Computer Vision Syndrome) have to do with the computer and how it is used. This includes lighting conditions, chair comfort, location of reference materials, position of the monitor, and the use of rest breaks.

- **Location of computer screen**: Most people find it more comfortable to view a computer when the eyes are looking downward. Optimally, the computer screen should be 15 to 20 degrees below eye level (about 4 or 5 inches) as measured from the center of the screen and 20 to 28 inches from the eyes.

- **Reference materials**: These materials should be located above the keyboard and below the monitor. If this is not possible, a document holder can be used beside the monitor. The goal is to position the documents so you do not need to move your head to look from the document to the screen.

- **Lighting**: Position the computer screen to avoid glare, particularly from overhead lighting or windows. Use blinds or drapes on windows and replace the light bulbs in desk lamps with bulbs of lower wattage.

- **Anti-glare screens**: If there is no way to minimize glare from light sources, consider using a screen glare filter. These filters decrease the amount of light reflected from the screen.

- **Seating position**: Chairs should be comfortably padded and conform to the body. Chair height should be adjusted so your feet rest flat on the floor. If your chair has arms, they should be adjusted to provide arm support while you are typing. Your wrists shouldn’t rest on the keyboard when typing.

- **Rest breaks**: To prevent eyestrain, try to rest your eyes when using the computer for long periods. Rest your eyes for 15 minutes after two hours of continuous computer use. Also, for every 20 minutes of computer viewing, look into the distance for 20 seconds to allow your eyes a chance to refocus.

- **Blinking**: To minimize your chances of developing dry eye when using a computer, make an effort to blink frequently. Blinking keeps the front surface of your eye moist.

Can the student see to write?

- Provide “fat” pencils, felt-tipped markers and crayons (yep, even high schoolers)
- Bold lined paper
- Wide rule paper
- Colored guideline paper
- Raised line paper
- Good contrast colors!!!

*Writing challenge!!*

Handwriting accommodations

- Encourage use of a pencil grip.
- Encourage proper paper placement and posture for writing.

Dysgraphia – difficulty writing

1. RATE of producing written work
2. VOLUME of work to be produced
3. COMPLEXITY of the writing task
4. TOOLS used to write
5. FORMAT of the writing assignment
Writing Speed (RATE)

- Allow more time for note-taking, copying, tests etc.
- Allow student to begin projects or assignments early.
- Include time in the student's schedule to complete work during the school day.
- Keyboarding

Amount of work (VOLUME)

- Give outline of notes with headings, have the student fill in the details for note-taking.
- Dictate work to a scribe.
- Do not penalize score for neatness, spelling (or both) as grading criteria.
- Teach abbreviations.
- Provide a worksheet with problems already on it instead of having the student copy the problems.
- Allow answers in phrases and pictures.
- Shorten the length requirements.

Simplify the assignment (Complexity)

- Have samples for student (cursive and printed letters).
- Include a laminated template of the format for the assignment. Make a cut-out where the name, date, and title belong. Use as a template for the assignment.
- Break assignment into stages.
- Allow editing marks instead of requiring a recopied product.
- Speaking spellcheckers or proofreading.
- Group projects.

Writing accommodations (TOOLS)

- Use paper with raised lines
- Try other line width papers
- Graph paper for math, or turn lined paper sideways to line up columns of numbers
- Mechanical pencils
- Various pencil grips
- Keyboarding
- Speech recognition software

Alternatives (FORMAT)

Oral reports --- Visual projects

1. Start at the center of a blank, landscape page, directly with a graphical image to represent a subject.
2. Use words and pictures throughout the report, especially for an single word or a picture does up to the line.
3. The lines make the associations between the steps clear as possible. Write them in a logical and organic, each line the same length as the word or image. Always ensure that the lines do not extend past the level. Typically these are written at the centre and shown further out.

Aids to Visual Learning
Visual Ergonomics
- Furnish a slanted reading and writing surface.
- Slant boards: Reading materials should be tilted twenty degrees off the table.
- Foot stool
- Computer screen position
- All near vision tasks should be performed at an appropriate distance, the ideal being the length of the individual’s forearm called Harmon’s Distance (elbow to middle knuckle of fisted hand).

Lighting
- Make use of natural lighting and full spectrum bulbs.
- Task lighting
- Contrast filters
- Irlen filters

Reading guides
- Provide highlighter markers to help with reading.
- Bookmarks
- Reading guide
- Paper blocking
- Spreadsheets*

Allow students to choose whether or not they want to read aloud.
*One of the causes of extreme anxiety in children
*Emotional state for learning?

Allow the use of a finger in following along the line of print when reading.
A marker assists, but direct tactual finger contact with movement will offer greater support and helps with integration.

Adequate time to complete assignments (slow visual tracking or processing speed):
- Make more time available on timed tests.
- Minimize the amount of homework.
- Short visual work periods will tend to reduce stress and related fidgeting or fatigue.
Allow for kinesthetic and multi-sensory learning.
- Tasks requiring fine-motor and paper and pencil responses should be restructured to allow more gross-motor involvement, for example, copying similar but larger patterns.

Allow for kinesthetic and multi-sensory learning.
- Encourage students to verbalize letters of spelling words while finger tracing them on a hard surface. Then “spell” the same words in the air with a finger to encourage visualization and visual memory.

How do glasses help with math?
It helps with Da-Vision!

How do glasses help with math?
It helps with Da-Vision!

Examples of accommodations available on College Board tests
- Presentation
  - Large print (14 pt., 20 pt.)
  - Reader (Note: Reader reads entire test)
  - Fewer items on each page
  - Colored paper
  - Use of a highlighter
  - Signs/orally present instructions
  - Visual magnification (magnifier or magnifying machine)
  - Auditory amplification
  - Audiocassette
  - Colored overlays
  - Plastic covered pages of the test booklet
Responding

- Verbal; dictated to scribe
- Tape recorder
- Computer without spell check/grammar/cut & paste features
- Record answers in test booklet
- Large block answer sheet

Setting

- Small group setting
- Private room
- Screens to block out distractions
- Special lighting
- Special acoustics
- Adaptive/special furniture/tools
- Alternative test site (with proctor present)
- Preferential seating

Timing/scheduling

- Frequent breaks
- Extended time
- Multiple day (may or may not include extra time)
- Specified time of day

Testing:

Demonstrations
Sample Accommodation List

1. Please minimize the amount of homework assigned to this student as they are expected to practice a considerable amount of individualized vision therapy exercises out of the office.
2. For all standardized testing, increase font to 18pt in order to reduce visual stress.
3. All near vision tasks should be performed at a comfortable distance, not too close or too far from the student.
4. Reading materials should be placed at a distance of 18 inches from the eyes.
5. Allow the use of a magnifier or a handheld magnifying glass.
6. Encourage a comfortable distance between the eyes and the visual material.
7. Reduce conflicting visual stimuli by moving the student to the front of the class, as close to the instructor as possible.
8. Chunk assignments into smaller parts. (For example, less math problems on each page.)
9. Provide a checklist or a summary sheet for the student to review.
10. Encourage the use of a pencil grip.
11. Encourage proper paper placement and posture for writing.
12. Don’t penalize for poor handwriting.
13. Incorporate the use of directional cues (e.g., left and right, top and bottom) whenever possible.
14. Motor involvement can help to maintain attention. Use of a stress ball or another small object can help maintain focus.
15. Allow short (1-2 minute) breaks during sustained near work.

THE O’s

- Optometrist (OD)
  - Doctor of Optometry Degree
  - Four year post-graduate education
  - Includes clinical training and rotations in primary care, eye disease, contact lenses, pediatrics, vision therapy and low vision.
  - Fellowship in the College of Optometrists in Vision Development
  - Post-doctorate level board certification in vision therapy
  - Requires continuing education, written papers, case reports, a written examination, and an oral examination

- Ophthalmologist (MD)
  - Medical Doctor (MD)
  - Many are general ophthalmologists, specializing in the treatment of eye disease and trauma.
  - Many are board certified in a sub-specialty of medical and surgical treatment of the eye.
  - Glaucoma, Retina, Cornea, Neuro
  - I refer to ophthalmology for Strabismus Surgery, Systemic Neurological Evaluations (Brain tumors)
  - Ophthalmologists refer to me for Vision Therapy
  - Some ophthalmologists have orthoptists who use some vision therapy techniques. There are very few currently in the Denver Metro area.

- Optician
  - American Board of Opticianry certifies professionals who design eyewear lenses.
  - Most opticians recommend appropriate lens materials (types of glass, plastic, and polycarbonate), lens designs (bifocal, progressive lens), and make the measurements needed to fabricate and verify glasses.
  - Some are also proficient in edging lenses to fit into glasses frames.
  - I refer to Opticians for patients to order their glasses.

What would you do if you had a Vision Problem?

- Options:
  - AVOID (unmotivated)
  - ADAPT (auditory learning, hold book closer, move head to read, close an eye, tilt head)
  - COMPENSATE (reading lenses/bifocals)
  - REMEDIATE
Remediation of Vision Problems

- **Lenses**
  - To compensate for a refractive error such as myopia, hyperopia or astigmatism
  - To relieve stress on the near focusing system
  - To prevent stress on the near focusing system
  - Training lenses

- **Prisms**
  - To compensate for an eye teaming problem such as a wandering eye or vertical misalignment
  - To change a person’s posture
  - Training lenses

**VISION THERAPY**

- Vision therapy is like physical therapy for the eyes and brain. We see with our brains and minds, not just our eyes.
- Vision Therapy is that part of optometric care devoted to developing, improving, and enhancing people’s visual performance.

Vision therapy involves medically supervised programs of therapeutic procedures and the use of medically regulated devices, such as lenses and prisms.

Vision and Learning

- An inefficient visual system may contribute to inattention, reduced classroom performance, and learning problems.
  
  I do not remediate learning problems in my office. I remediate visual problems that interfere with the learning process. This is clearly stated in all reports that I send to patients.
  
  I refer many of my patients to tutors, occupational therapists, physical therapists, auditory processing therapists, chiropractors, etc.

Course 115 Summary

- Students need to develop eye tracking, focusing, eye teaming, and visual processing skills to learn.
- They need to be able to read comfortably, accurately and efficiently.
- Learn about vision and how to help students who are struggling with reading.

Helpful links

1. [www.covd.org](http://www.covd.org) – The College of Optometrists in Vision Development
2. [www.oepf.org](http://www.oepf.org) – The Optometric Extension Program Foundation
3. [vision-learning.org](http://vision-learning.org) – The Vision and Learning Forum (Colorado-based)
4. [www.bouldervt.com](http://www.bouldervt.com) – Boulder Valley Vision Therapy center website – Dr. Simonson will post answers to any questions, references/links mentioned in this presentation, and a copy of the handout on this site.
6. [http://www.3deyehealth.org](http://www.3deyehealth.org) – More information about 3D use in the classroom

**HOW TO CONTACT DR. SIMONSON**

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