
Our little corner of the world
assistive technology for people with visual impairments

What technology means to me…

Family

Love

Connection

Introductions

- Who am I?
  - VI Assistive Technology Consultant for large education service center
- Who are you?
  - Educational role
  - Experience with students with visual impairments
  - Biggest frustration with technology
  - Something you love about technology

Today's Agenda:

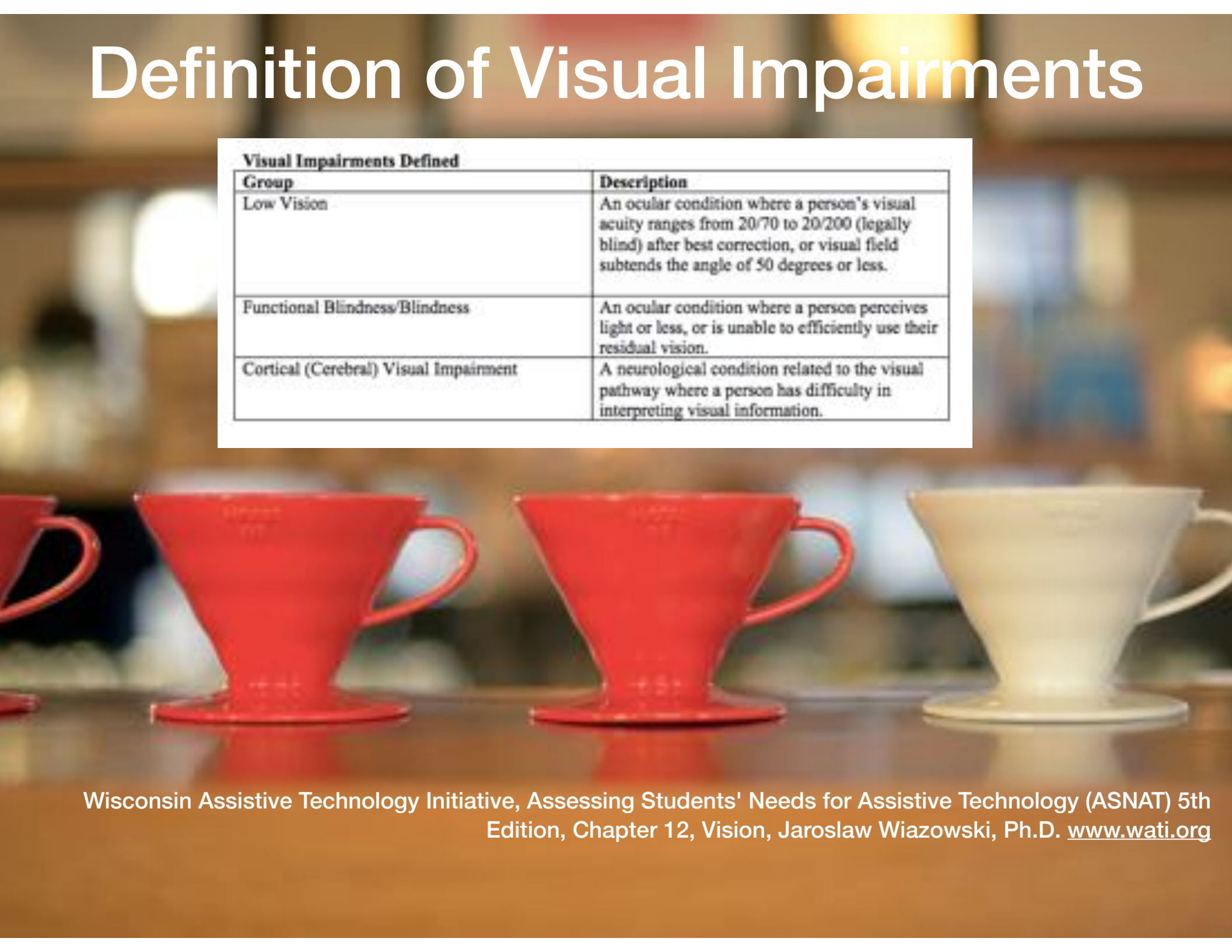
- Settling into our little corner
- Catching up with some friends
- Seeing what's on the menu
- When only an espresso will do…

www.tinyurl.com/ourlittlecorner

Definition of Visual Impairments

Visual Impairments Defined

Group	Description
Low Vision	An ocular condition where a person's visual acuity ranges from 20/70 to 20/200 (legally blind) after best correction, or visual field subtends the angle of 50 degrees or less.
Functional Blindness/Blindness	An ocular condition where a person perceives light or less, or is unable to efficiently use their residual vision.
Cortical (Cerebral) Visual Impairment	A neurological condition related to the visual pathway where a person has difficulty in interpreting visual information.



Wisconsin Assistive Technology Initiative, Assessing Students' Needs for Assistive Technology (ASNAT) 5th Edition, Chapter 12, Vision, Jaroslaw Wiazowski, Ph.D. www.wati.org

Examples

Fernando, 8 years old, blind
Fernando is only beginning his adventure with assistive technology. He is a proficient Braille reader who has been using a Braille writer for writing. He has also learned touch typing, allowing him to produce some of his schoolwork in print. Because he has no vision he uses a screen reading program to give access to the computer system. He is only beginning to master his computer skills, so he relies mostly on the lower tech devices, including an abacus for math.

Britney, 14 years old, low vision
Although, Britney has only some residual vision in one eye, she is a visual learner. She tends to access learning material visually with a minimal addition of touch. She uses three different learning media, with print being the primary. Britney is an avid reader both in print and braille. Large print has been determined to be impractical due to its physical dimensions. She is a proficient user of a portable electronic magnifier for shorter readings. She uses this device to access her print textbooks and worksheets. This method is not for longer readings due to eye fatigue. Braille appears to be a logical solution here. What is difficult for her is handling large braille books. An electronic note-taker or laptop with braille display would solve most of the issues in her case.

Wisconsin Assistive Technology Initiative, Assessing Students' Needs for Assistive Technology (ASNAT) 5th Edition, Chapter 12, Vision, Jaroslaw Wiazowski, Ph.D. www.wati.org

Examples

Amelia, 11 years old, cortical (cerebral) visual impairment
Amelia's condition affects the brain's ability to interpret visual information. Although she can see print, she is not able to identify the characters. She uses Braille as her primary learning medium. She can distinguish some details in pictorial information, so simple graphical presentations are functional for her. She has been learning to use a screen reader to access text information on the computer. She enjoys using the mouse to start programs from the desktop. Her enjoyment of the mouse led to the use of software that reads information under the mouse pointer, providing her with auditory support.

Marquee, 15 years old, low vision, Asperger Syndrome
Marquee is a high school student with retinopathy of prematurity. He has some residual vision in one eye only. He has been learning Braille for many years, but has not been able to master it, thus it is not a viable learning medium at this time. He likes using CCTV, especially for short reading or writing. He has excellent computer and auditory skills. So although he can access written material visually, audio versions work best for him. His comprehension soars when he listens to his learning material. Because his handwriting is rather poor he uses computer for longer papers. Marquee also occasionally records his answers as he finds written composition difficult.

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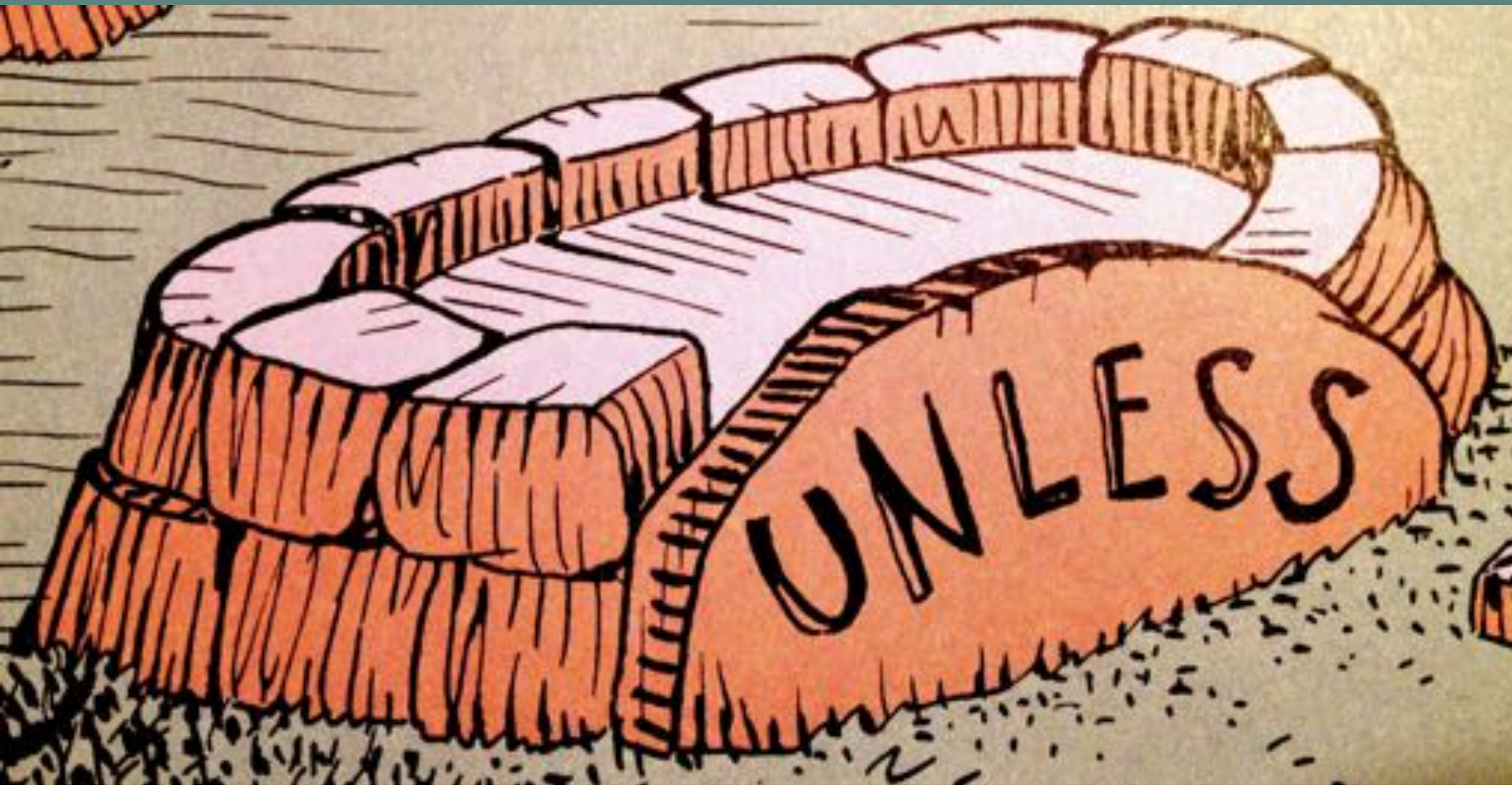
"VI Professionals are rare and difficult to find. Therefore, retention is of critical concern. Unlike other disciplines, even other high need areas like math, when a VI professional is unavailable, typically there is no one else in the district with the specific expertise needed to assess and meet the unique educational needs of students with visual impairments."
Summary of Need for VI Professionals 2014



Assistive technology for people with visual impairments: 111 Competencies

Journal of Visual Impairment & Blindness 2009
Smith et al.

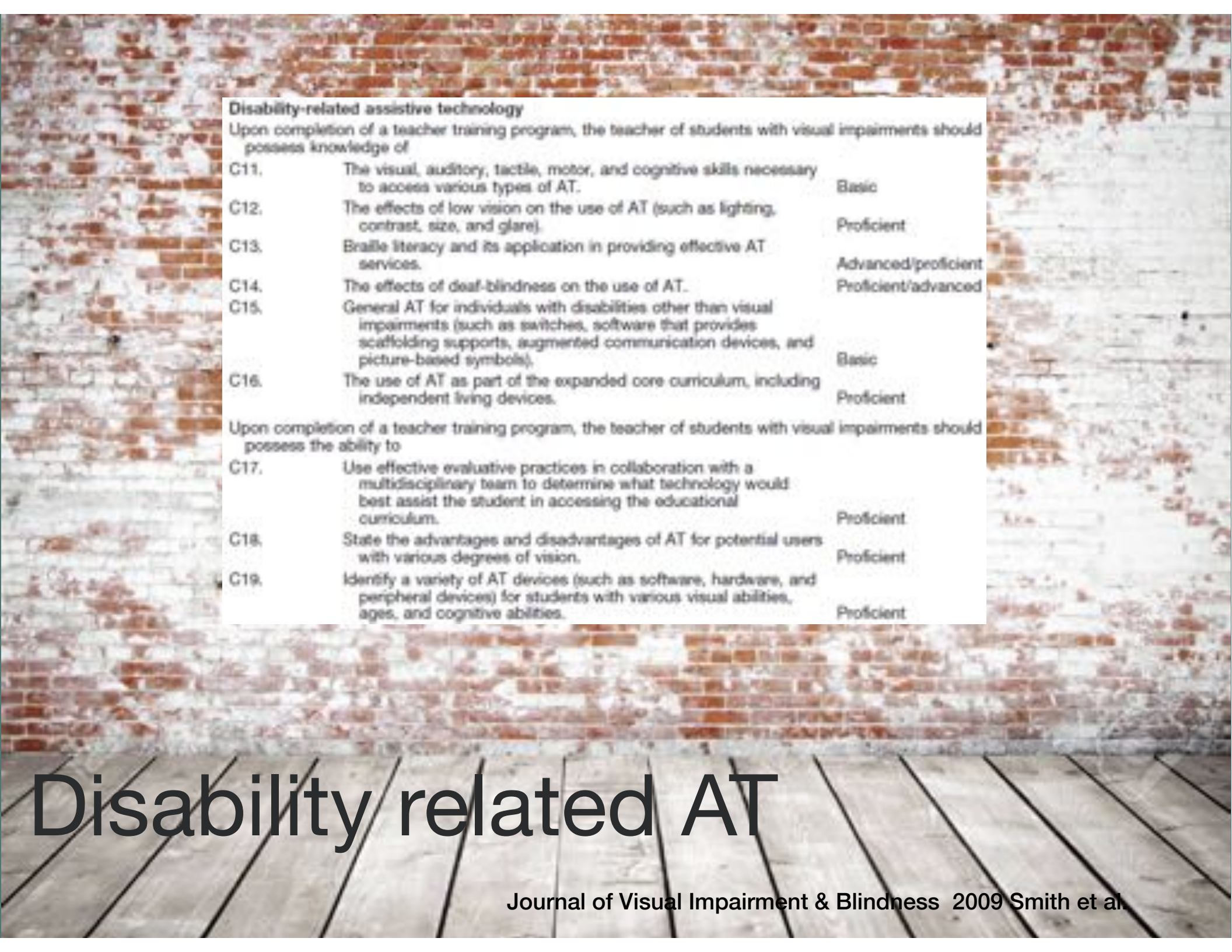
Foundations of assistive technology

Upon completion of a teacher training program, the teacher of students with visual impairments should possess knowledge of

C1.	The history of the development of assistive technology (AT) devices and software for individuals with visual impairments.	Basic
C2.	Individuals with Disabilities Education Act (IDEA) rules and regulations related to AT devices and services, assessment, and inclusion in the Individualized Education Program (IEP).	Proficient
C3.	Assistive technology components of state and federal legislation (such as Section 504 and Section 508 of the Rehabilitation Act, Americans with Disabilities Act, the Assistive Technology Act).	Basic
C4.	The federal definition of AT devices and services.	Proficient
C5.	The requirements for documentation of AT.	Proficient
C6.	The difference between AT devices categorized as "no tech," "low tech," and "high tech."	Proficient
C7.	Laws regarding copyright and licensing of software, including shareware and freeware.	Basic
C8.	Local, state, and federal laws that govern the purchasing of AT.	Basic/proficient
C9.	Both federal and state transition requirements and the vocational rehabilitation process as it relates to AT.	Basic/proficient
C10.	The concept of universal design as it relates to AT for individuals with visual impairments.	Basic

Foundations

Journal of Visual Impairment & Blindness 2009 Smith et al



Disability-related assistive technology

Upon completion of a teacher training program, the teacher of students with visual impairments should possess knowledge of

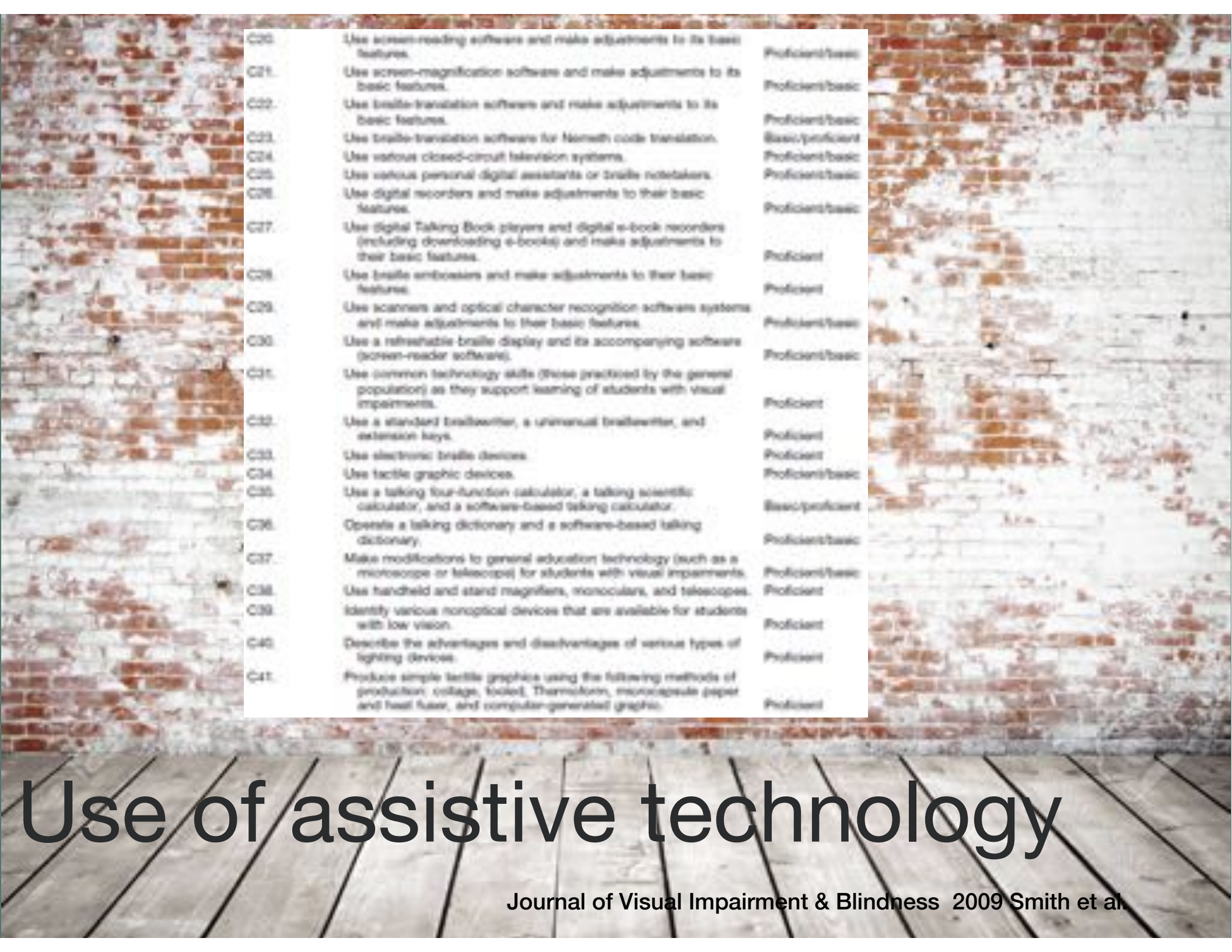
C11.	The visual, auditory, tactile, motor, and cognitive skills necessary to access various types of AT.	Basic
C12.	The effects of low vision on the use of AT (such as lighting, contrast, size, and glare).	Proficient
C13.	Braille literacy and its application in providing effective AT services.	Advanced/proficient
C14.	The effects of deaf-blindness on the use of AT.	Proficient/advanced
C15.	General AT for individuals with disabilities other than visual impairments (such as switches, software that provides scaffolding supports, augmented communication devices, and picture-based symbols).	Basic
C16.	The use of AT as part of the expanded core curriculum, including independent living devices.	Proficient

Upon completion of a teacher training program, the teacher of students with visual impairments should possess the ability to

C17.	Use effective evaluative practices in collaboration with a multidisciplinary team to determine what technology would best assist the student in accessing the educational curriculum.	Proficient
C18.	State the advantages and disadvantages of AT for potential users with various degrees of vision.	Proficient
C19.	Identify a variety of AT devices (such as software, hardware, and peripheral devices) for students with various visual abilities, ages, and cognitive abilities.	Proficient

Disability related AT

Journal of Visual Impairment & Blindness 2009 Smith et al



C20.	Use screen-reading software and make adjustments to its basic features.	Proficient/basic
C21.	Use screen-magnification software and make adjustments to its basic features.	Proficient/basic
C22.	Use braille-translation software and make adjustments to its basic features.	Proficient/basic
C23.	Use braille-translation software for Nemeth code translation.	Basic/proficient
C24.	Use various closed-circuit television systems.	Proficient/basic
C25.	Use various personal digital assistants or braille notetakers.	Proficient/basic
C26.	Use digital recorders and make adjustments to their basic features.	Proficient/basic
C27.	Use digital Talking Book players and digital e-book recorders (including downloading e-books) and make adjustments to their basic features.	Proficient
C28.	Use braille embossers and make adjustments to their basic features.	Proficient
C29.	Use scanners and optical character recognition software systems and make adjustments to their basic features.	Proficient/basic
C30.	Use a refreshable braille display and its accompanying software (screen-reader software).	Proficient/basic
C31.	Use common technology skills (those practiced by the general population) as they support learning of students with visual impairments.	Proficient
C32.	Use a standard braillewriter, a unimanual braillewriter, and extension keys.	Proficient
C33.	Use electronic braille devices.	Proficient
C34.	Use tactile graphic devices.	Proficient/basic
C35.	Use a talking four-function calculator, a talking scientific calculator, and a software-based talking calculator.	Basic/proficient
C36.	Operate a talking dictionary and a software-based talking dictionary.	Proficient/basic
C37.	Make modifications to general education technology (such as a microscope or telescope) for students with visual impairments.	Proficient/basic
C38.	Use handheld and stand magnifiers, monoculars, and telescopes.	Proficient
C39.	Identify various nonoptical devices that are available for students with low vision.	Proficient
C40.	Describe the advantages and disadvantages of various types of lighting devices.	Proficient
C41.	Produce simple tactile graphics using the following methods of production: collage, tooled, Thermoform, microcapsule paper and heat fuser, and computer-generated graphic.	Proficient

Use of assistive technology

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C42.	Teach concepts related to the basic installation of AT devices, including managing cords and plugs.	Basic/proficient
C43.	Teach concepts related to the basic maintenance of AT devices.	Basic/proficient
C44.	Provide instruction in AT devices in purposeful ways and in authentic environments.	Proficient
C45.	Teach the student to use troubleshooting techniques.	Proficient
C46.	Provide sequenced instruction regarding technology as it relates to transition and employment.	Proficient
C47.	Teach students with visual impairments about resources for obtaining AT devices and services.	Proficient/basic
C48.	Use appropriate educational strategies for the development of age-appropriate concepts and motor development appropriate for use of AT.	Proficient
C49.	Develop lesson plans that incorporate the use of AT.	Proficient
C50.	Know differences in AT instruction for students with visual impairments along with other disabilities.	Proficient
C51.	Teach students with visual impairments in one-on-one situations, small groups, and large groups.	Proficient
C52.	Collect formative data and adjust lessons accordingly on the basis of the student's needs.	Proficient

Instructional Strategies

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Upon completion of a teacher training program, the teacher of students with visual impairments should possess the ability to		
C53.	Articulate the visual features of learning environments as they affect instruction and the use of AT.	Proficient
C54.	Assess and recommend AT devices for specific learning environments (such as in the classroom and gymnasium).	Proficient
C55.	Analyze the visual (such as lighting and glare), auditory (such as sound distractions and noise pollution), and physical environment to determine appropriate modifications of AT devices.	Proficient
C56.	Teach the student to adapt the learning environment to his or her needs.	Proficient
C57.	Teach the appropriate social skills when using technology in various environments.	Proficient
Upon completion of a teacher training program, the teacher of students with visual impairments should possess knowledge of		
C58.	The least restrictive environment and the use of AT in different placements.	Proficient
C59.	Strategies to involve the student with visual impairments in the class while still using AT.	Proficient
C60.	The dynamics of the physical arrangement of the classroom (including ergonomic issues) and their impact on the use of AT.	Proficient
C61.	How to use AT across environments.	Proficient
C62.	The need for portability and limitations of portability of specific AT devices for students in various environments.	Proficient

Learning Environments

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C63.	Teach students with visual impairments the use of AT for access to information in the classroom.	Proficient
C64.	Teach students with visual impairments to produce files in a readable format, including braille, large print, or an electronic form.	Proficient/advanced
C65.	Teach students problem-solving techniques for the use of AT in the classroom when materials are not in an accessible format.	Proficient/advanced
C66.	Teach students with visual impairments to use the Internet.	Advanced/proficient
C67.	Teach students with visual impairments to transfer files to appropriate AT devices.	Proficient/advanced
C68.	Teach the student to stay current with new technology, access online manuals, and obtain technical assistance from vendors.	Proficient
C69.	Identify and use a variety of sources for braille and large-print materials.	Proficient
C70.	Identify and use a variety of sources for electronic and recorded materials.	Proficient
C71.	Identify and use a variety of options for accessing information presented on chalkboards, whiteboards, DVDs and other video sources, overhead projectors, and computer projector systems.	Proficient
C72.	Assistive technology services that allow a student to participate at the same level of involvement in learning activities as their nondisabled peers.	Proficient
C73.	PC computer and MacIntosh computer accessibility options (universal options menu, accessibility wizard, and display settings) for individuals with visual impairments.	Proficient/basic

Access to information

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C74.	Plan for AT instruction that is comprehensive, relevant, and focused on the needs of the individual student.	Proficient/advanced
C75.	Plan for assessment-based AT instruction.	Proficient
C76.	Plan instruction that will increase students' keyboarding skills.	Proficient/advanced
C77.	Develop organizational and time-management skills to make planning instruction effective and efficient.	Proficient
C78.	Infuse AT instruction into the general academic curriculum.	Proficient
C79.	Infuse AT instruction into the expanded core curriculum.	Proficient/advanced
C80.	Write AT goals and objectives in lesson plans.	Proficient
C81.	Modify tutorials on AT when needed.	Proficient/basic
Upon completion of a teacher training program, the teacher of students with visual impairments should possess the knowledge of		
C82.	How to record and analyze data to measure students' progress in the use of AT.	Proficient
C83.	Research on AT and its application when planning instruction.	Basic/proficient
C84.	How to incorporate the use of AT in the instructional planning process.	Proficient

Instructional Planning

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C85.	Complete a comprehensive AT assessment (along with an AT specialist), when appropriate, for students with visual impairments at different ages or grade levels.	Proficient
C86.	Interpret and write AT plans and reports.	Proficient
C87.	Write measurable goals in a student's IEP, including those for the use of AT equipment.	Proficient
C88.	Assess the student's level of independence after exposure to AT and techniques of access.	Proficient
C89.	Conduct formative and summative assessments (along with an AT specialist) to assess a student's understanding of the AT instruction.	Proficient
C90.	Assess the effectiveness of AT devices.	Proficient

Assessment

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Upon completion of a teacher training program, the teacher of students with visual impairments should possess the knowledge of		
C91.	Funding mechanisms for AT professional development.	Basic
C92.	Resources of local, state, and national professional development training programs.	Basic
C93.	Federal, state, and local agencies that provide technology assistance to individuals with visual impairments.	Basic
C94.	Assistive technology conferences (such as those held by Closing the Gap, California State University–Northridge Center on Disabilities, California Transcribers and Educators for the Blind and Visually Impaired, and the Association for Education and Rehabilitation of the Blind and Visually Impaired).	Basic
C95.	Major AT manufacturers and vendors.	Proficient/basic
C96.	Local, state, and national consumer organizations (such as the National Federation of the Blind and the American Council of the Blind).	Proficient/basic
Upon completion of a teacher training program, the teacher of students with visual impairments should possess the ability to		
C97.	Obtain AT to assist families through service organizations (such as the Lions Club and associations of the blind).	Basic
C98.	Engage in professional development activities to demonstrate continual growth in current and emerging AT services.	Proficient
C99.	Access resources, such as journals and web sites.	Proficient/basic
C100.	Advocate for AT professional development.	Basic
C101.	Engage in reflective practice and evaluate his or her attitudes toward the application of AT services.	Proficient

Professional Development

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C102.	Participate as a member of a multidisciplinary team in assessing the needs of students with visual impairments.	Proficient
C103.	Participate as a member of a multidisciplinary team in planning and developing an AT program.	Proficient
C104.	Collaborate with local, district, and state AT specialists and education instructional technologists.	Proficient/advanced
C105.	Collaborate with the district personnel in the evaluation and purchase of AT equipment.	Proficient/advanced
C106.	Collaborate with related service personnel (such as orientation and mobility specialists, occupational therapists, and physical therapists) in the determination of and instruction to use appropriate AT.	Proficient/advanced
C107.	Collaborate with vocational rehabilitation personnel in addressing AT needs during transitions.	Proficient
C108.	Collaborate with general education educators and paraeducators in using general technology with students with visual impairments.	Proficient
C109.	Communicate effectively with AT specialists from other disability areas, such as speech therapy and deafness.	Proficient
C110.	Explain the use and care of AT equipment to parents, other educators, teachers, specialists, and aides.	Proficient
C111.	Advocate to administrators for the need for AT for students.	Proficient

Collaboration

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VI Categories:

- Blind
- Low Vision
- CVI

VIAT Domains:

- Foundations
- Disability related AT
- Use of AT
- Instructional strategies
- Learning environment
- Access to information
- Instructional Planning
- Assessment
- Professional Development
- Collaboration

Key Differences

VIAT vs. AT

1

AT is normally covered in the Accommodations section rather than reflected in minutes of instruction

2

AT is a key component of the VI Expanded Core Curriculum—therefore, instructional goals specific to equipment use may be written. Students must learn how to use their equipment before they will need it to access & produce content.

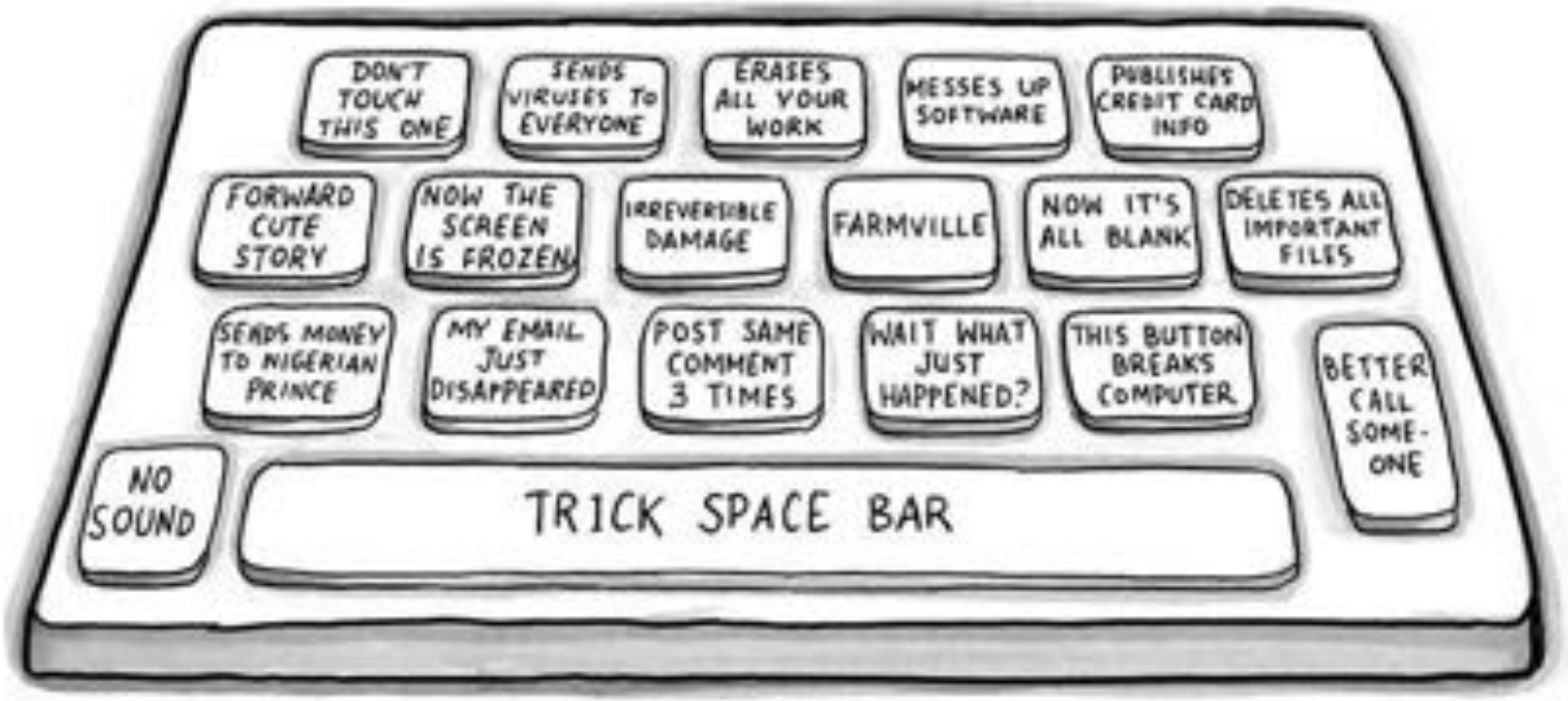
Collaboration takes on a whole new meaning. Unlike mainstream technology, some devices, many proprietary devices can be intimidating to parents, teachers, etc. These same people are crucial to supporting technology use in natural environments

3

VI is a shortage field—TVIs do not receive much, if any, training in AT, even though they are responsible for instruction

4

MY MOM'S COMPUTER KEYBOARD



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Our Friends

Low Vision Domains

- Instructional Strategies
- Environment/Collaboration
- Use

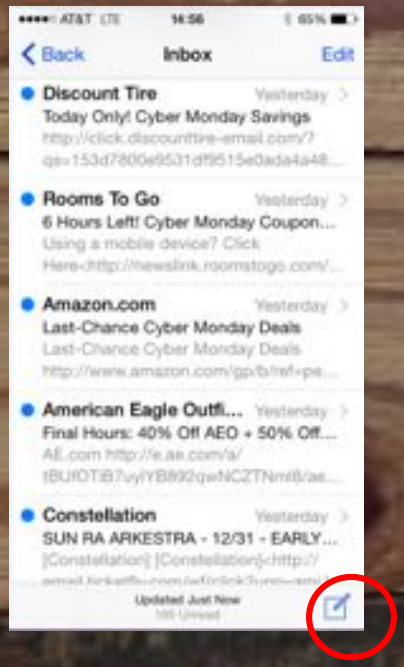
No Vision vs Low Vision

No Vision	Low Vision
◦ Technology is more complicated ◦ Students <u>have to</u> use available technology ◦ Teachers/Staff are <u>very</u> aware that student has a visual impairment	◦ Technology is more intuitive ◦ Students are resistant to use available technology ◦ Teachers/Staff have little to no idea the degree to which a student has a visual impairment

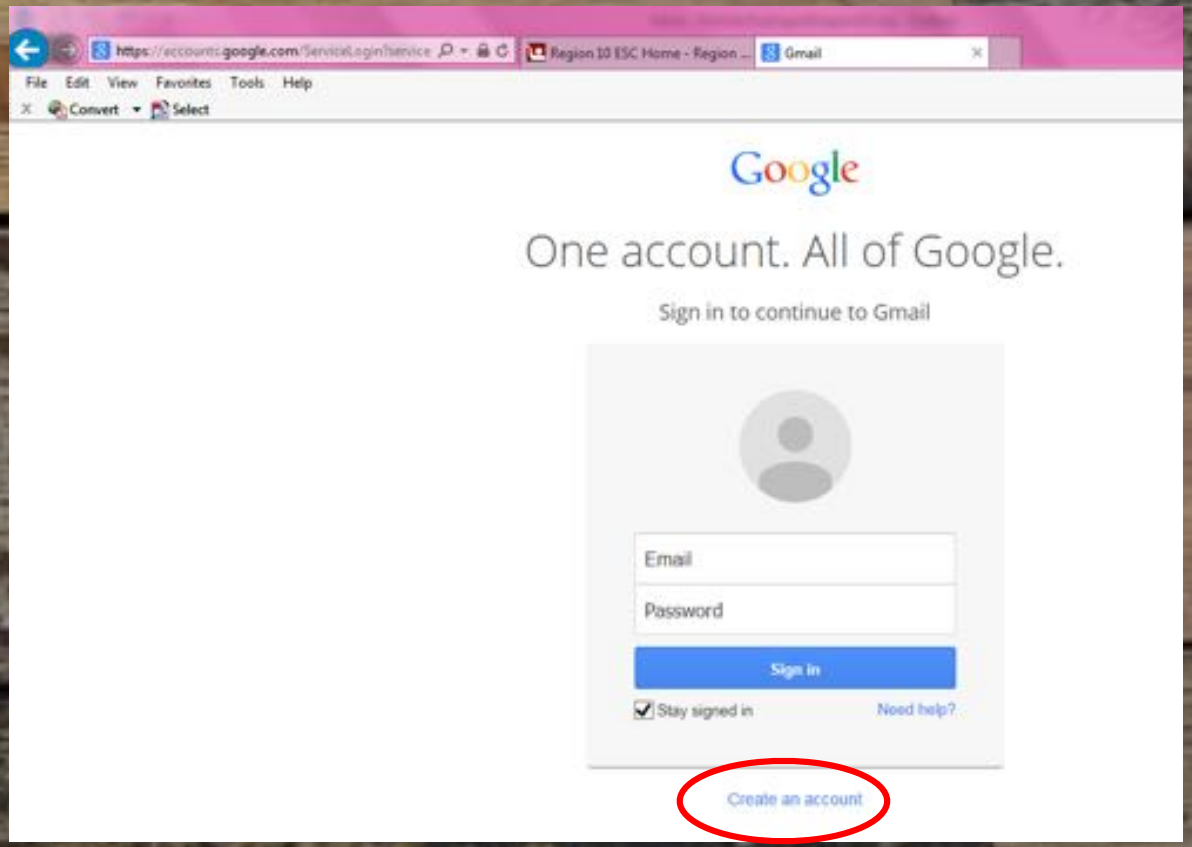
Low Vision Issue #1:
They don't know what they can't see

- Missing pieces of the environment: non-existent pictures on the wall, tiny invisible icons
- Social cues: a friend is reaching out for a high five
- Missing the full picture: the Gestalt of a graph, chart, diagram in its entirety

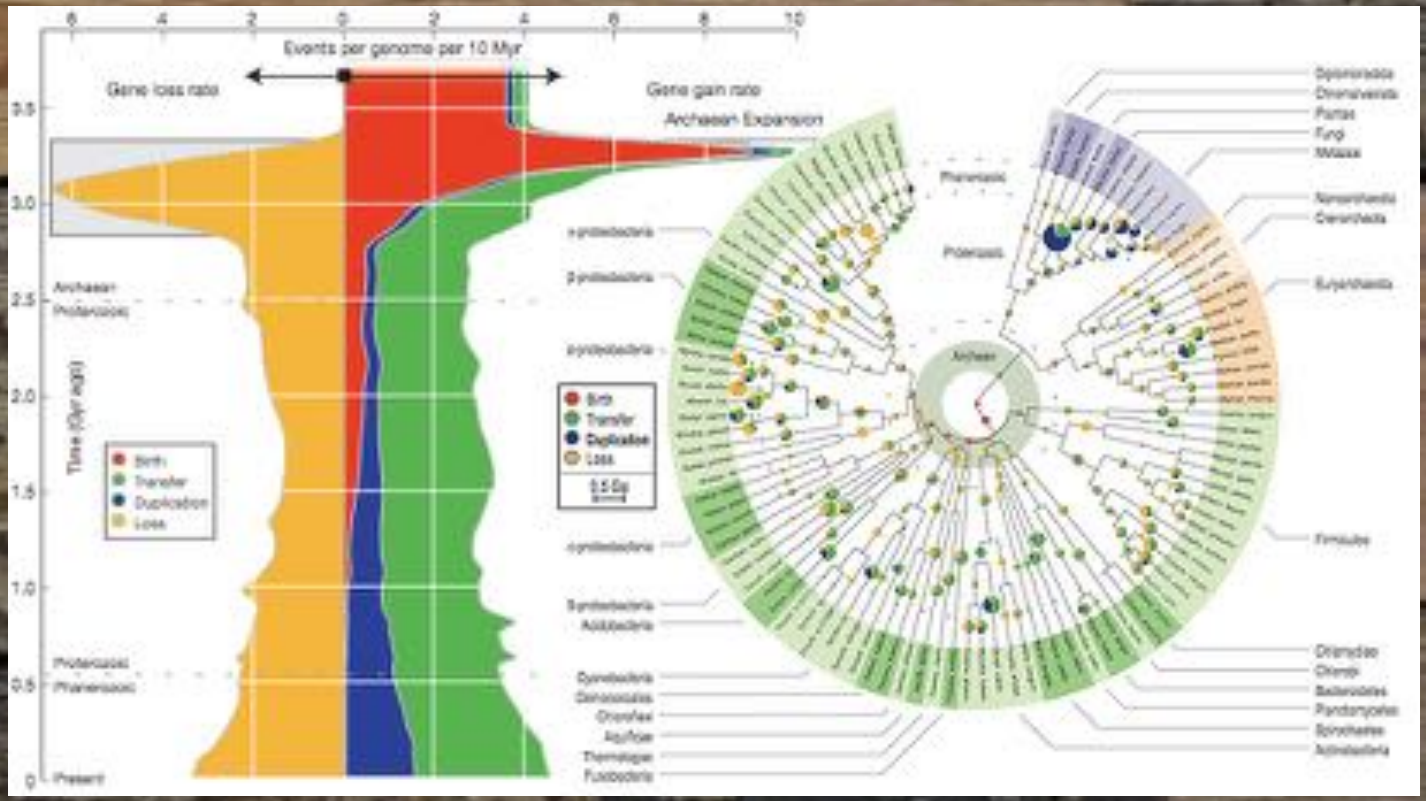
How do you send an email from an iPhone?



How do you create a new email account?



“Just use your CCTV….”



Low Vision Issue #2: They don't want to look different

- They want to hide their visual impairments…and often they can
- The older they are, the worse this becomes…
- Large print vs. devices
- Mainstream vs. VI specific devices

Large Print vs. Regular Print + Magnification Devices

Large Print:

- More planning & preparation for teachers
- Cheap
- Will not be available at universities or most workplaces
- Can delay fluent use of magnification devices
- LP Textbooks do not have color & are bulky
- LP standardized tests are not very large print (usually 14 pt. max)

Regular Print + Magnification Devices:

- No work for teachers
- One time cost of device purchase
- Will be the option once student enters the world of university or the workplace

Homeschool example

Substitute example

Mainstream vs. VI Specific Devices

VI Specific

- Targeted toward VI population
- Allow for bookmarks & levels
- Not immediately well received by users
- Sometimes more expensive

Mainstream

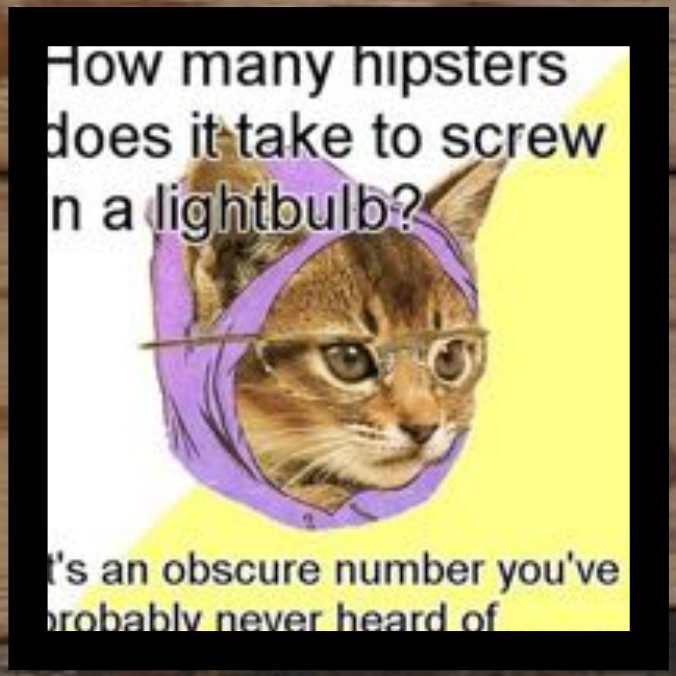
- Easily accepted
- Frequently cheaper
- Not created with accessibility necessarily in mind

Low Vision Issue #3:
Their teachers don't realize they don't see…

- The students don't seem different, so the teachers don't consistently provide accommodations
- The students have a vested interest in not standing out, so they reinforce the teacher's actions
- It is a vicious cycle!

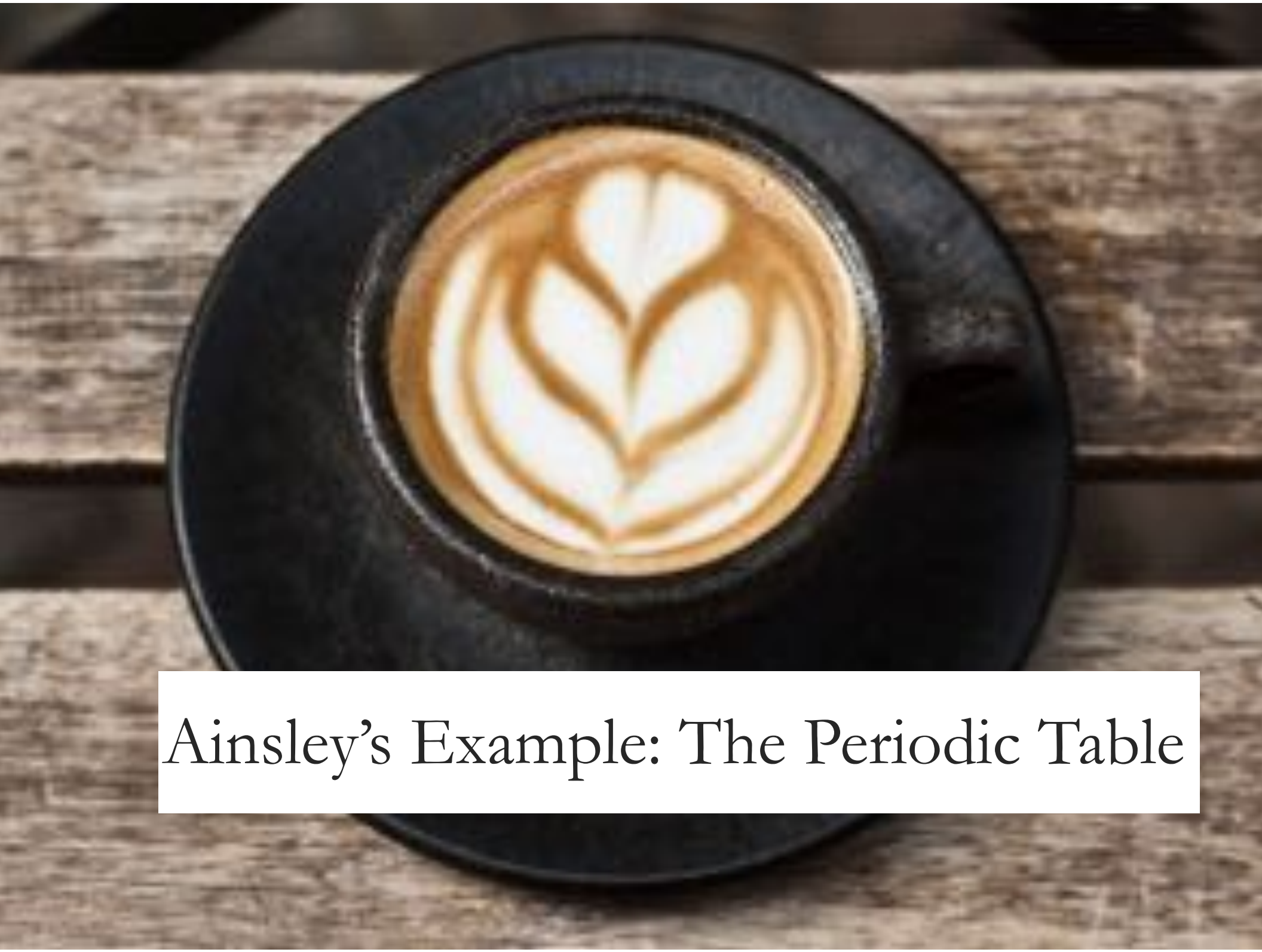
Low Vision Issue #4:
They persist in inefficient use of computers

Low Vision Issue #5: Collaboration (Also see problems #1 & #3)



Mike's example: Timeline

Mark's Example: Buy In



Ainsley's Example: The Periodic Table

Blindness Domains

- Access to information
- Tools/Types of AT
- Use
- Environment/Collaboration

Blindness Issue #1:
Sighted people are intimidated by braille & its devices

- Potential lack of environmental/systemic support for non-visual devices
- TVIs lack braille experience because of low number of users
- Learning curve for devices
- Mainstream vs. VI specific devices

Mainstream vs. VI Specific Devices

VI Specific

- Targeted toward VI population
- Designed with user in mind
- Allow for bookmarks & levels
- Difficult for parents, classroom teachers, even TVIs
- Expensive & difficult to repair
- Vendor technical support available

Mainstream

- Easily accepted
- Frequently cheaper
- Not created with accessibility necessarily in mind
- Steeper learning curve with no technical support
- Gap between hardware & software—students are often left stranded in the middle

Mainstream/Proprietary Combinations

Blindness Issue #2: Embossed braille vs. Electronic braille

Embossed braille:

- Necessary for young students
- Students can access multiple pages of braille rather than 14-40 cells
- Bulky, heavy textbooks
- No learning curve
- Necessary through college for math, science, foreign language study, graphics
- Takes "a special set of skills" to produce (Example: Just Add Water)
- Costs include production time, planning time, embosser, software, & paper
- Low teacher & administrative support/ understanding (Example: covert benchmark missions)

Electronic Braille:

- Great for literary documents for older students
- Puts control, responsiveness & immediacy in the hands of the reader
- Portable, lightweight
- Students can only access 14-40 cells at a time
- Immediate braille gratification (Bookshare example)
- Learning curve
- Costs include device purchase & training time; potential is there to make a return on investment!
- Text files can be easily read—easier to handle last minute braille emergencies
- Auditory feedback

Blindness Issue #3: Accessibility

- Screen readers can't accommodate programs & applications that weren't built with accessibility in mind: Google Sheets Example
- By the time a district has purchased an inaccessible resource, it's too late—the student is caught in the middle: Test Prep Example
- Lack of accessibility training and awareness on multiple, systemic levels
- Students must learn to use assistive technology to access devices and information already available to sighted users—this is an additional hurdle.

Blindness Issue #4: Learning to read

- With its 200 contractions and many rules, braille is its own code—it is not simply the alphabet represented tactually. Students learn this above and beyond learning to read.
- Students are expected to learn to read and write without the visual clues available to sighted learners (Guided Reading is an exercise in frustration—only predictive texts will work)
- Students must be explicitly taught phonetic concepts and patterns that aren't immediately available visually (example v-c-e words)
- Some students may need tactual symbols or Grade 1 braille rather than learning fully contracted braille
- Little fingers can't run across a page quickly enough to take in everything a sighted person sees in just one glance (headings, bolded words, side notes, pictures)
- Even the best braille reading rates are lower than sighted reading rates

Blindness Issue # 5: Hours in the day

- These students can't read, write, or do math without assistive technology

- These students have to spend a LOT of time learning to use the very technology that will make it possible to access content & the general curriculum.

Azra: Foreign Exchange Student Example

Mary: AT Environment Example

Elizabeth: AP Statistics Example

Ruben:Voiceover Schedule Example

Cortical Visual Impairment Domains

No Vision

- Tools/Types of AT
- Environment/Collaboration

CVI Issue #1:
Vision fluctuates daily

- Students' vision changes from one day to the next.
- A spectrum of support may be needed to accommodate different days

CVI Issue #2:
Visual Clutter

CVI Issue #3:
Contrast

David: Reading Example


E S C A P E
He finally did it!

The menu

Reading options

- Make it auditory
- Make it bigger
- Make it into braille
- Make it less distracting
- Make it stand out

Writing options

- Use special pens & paper
- Use a braillewriter
- Use a keyboard
- Use dictation
- Use symbols
- Use auditory support

Math options

- Use a talking calculator
- Use a large print calculator
- Use a calculator under a magnification device
- Use manipulatives with tactile/braille labels
- Use tactile graphics
- Use auditory graphing software/calculators

Computer, Phone, & Tablet use options

- Use a screen reader
- Use magnification options
- Use a braille display
- Use internet options wisely
  - Browsers that limit distractions or add enhancements
  - Text extraction
  - Theme customization
  - Other tips and tricks

Who needs an espresso?

Resources for the TVI on the GO!


Thanks for stopping by!
Belinda Rudinger M.Ed.
www.region10.org/viat