A Resource Guide to Assistive Technology for Students with Visual Impairment

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Introduction

Students with visual impairments face unique challenges in the educational environment. Not only must they be able to access text information across all curricular areas, but they also need to be able to participate fully in instruction that is often rich with visual content. Assistive technology is one way of supporting them in that process.

Consideration of assistive technology by the Individualized Education Program (IEP) team is required for all students with disabilities under the Individuals with Disabilities Education Act (IDEA), and when deemed appropriate, it must be provided and supported by the local education agency. This is to ensure that students with disabilities have the tools necessary to fully access and participate in the curriculum, with the greatest possible level of independence. Even more important, use of assistive technology helps prepare students for independent living, vocational pursuits, or higher education following graduation from high school!

"Assistive technology" refers to a range of tools, devices, and strategies that allow a student to accomplish a task that they would otherwise be unable to do, or would have difficulty accomplishing effectively. Assistive technology can be simple or complex. Examples of low tech tools for students with visual impairments might include enlarged text or raised line paper, while high tech tools may encompass digital tools that "read" to the student, connect to a braille display, or even incorporate GPS.

The term "visual impairment" describes a broad range of visual abilities and needs. Because each child is unique, what works well for one student may not work well for another. Selection of assistive technology should be the result of a team process that takes into consideration feedback from family, educators, paraprofessionals, and the student. It is important to remember that "high-tech" is not always the best solution for a student. Selected tools should reflect the student's unique strengths and needs, the activities he needs to be able to accomplish, and the environment in which he will be working. A student's need for assistive technology will likely change and evolve throughout his or her education, and in most cases, no single tool will meet all of a student's needs.

The purpose of this resource guide is to provide an introduction to the types of assistive technology that may benefit students with visual impairments. *Specific* products and their features are not described here. Instead, a general overview of tools will help raise your awareness so that you are able to determine what tools to investigate further. A list of additional resources and vendors is provided at the end of this guide if you'd like to learn more. There is also a glossary of terms if you are unfamiliar with some of the terminology related to assistive technology and visual impairments.

Assistive Technology for Reading

Reading is not only an essential part of the English Language Arts curriculum, but is also a key component of all other subject areas. Students rely on textbooks in science and social studies, complete word problems in math, and complete assessments that are often text-based. Assistive technology tools to support reading should reflect the student's level of visual functioning, their literacy development, as well as the environmental and task demands.

Environmental Considerations
Consider lighting and positioning of materials for optimal visual function.

Enlarged Text
For students with some existing visual function, providing text information in enlarged format may be the simplest strategy. As a general rule of thumb, 18 point or 24 point font size is good, but enlarging beyond that may not be efficient. Enlarged text can be acquired through a variety of sources, including publishers and vendors, or materials modified through the magnification feature of copy machines, while text size of most digital materials can be easily adjusted to a user's preference.

Handheld Magnifiers
These low-tech, portable tools allow students with some vision to access not only text, but other objects in their environment as well. They are available in a range of magnification power, are relatively inexpensive, and eliminate some material modification. However, selection of magnification power should be based on the recommendations of a low vision specialist.

Video Magnifier
A video magnifier can be used for other objects as well. It may be in the form of handheld device, a stand-alone device, or work with a computer, TV or projection system.

Braille
For students who do not have sufficient vision to rely on other supports, Braille is an essential tool for teaching literacy skills and will serve as a lifelong skill. Learning Braille allows students to experience aspects of written language such as spelling, grammar and sentence structure, and will provide a valuable foundation for written language. Braille products can be obtained commercially or can be created using specialized software and a braille embosser.

Braille Labeler
Labelling items throughout the student's environment will not only reinforce vocabulary, spelling and reading but will also promote independence and assist with orientation.

Audio Books
Audio books are generally recorded using human voice, and can be accessed through the use of specialized computer software, devices, or mainstream tools like MP3 players. The various devices allow options in features such as searching and navigating an audio file. While many students will find the use of audio books useful, educators warn not to rely solely on audio books

for access to text. Students who are still developing literacy skills need continued access to print or braille, while preferences of older students vary.

Digital Text

The use of digital text provides one of the widest ranges of options to students with varying needs. Visual aspects of documents and text can be customized, a variety of supports can be easily integrated, and digital text can be obtained through numerous resources. Digital text materials can be obtained commercially, through providers of accessible instructional materials, or created by instructors and students themselves, and can be accessed through a variety of tools including computers, mobile devices, or specialized devices such as braille notetakers.

- Digital text generally allows user to adjust the visual display including font size, color, and contrast.
- Digital text can be viewed on an enlarged monitor.
- Computer magnification software can be used to view digital text, and can be customized by magnification level, area of the display being magnified, and visual qualities of display.
- Text-to-speech software allows the computer to "read" digital text to the student in a digitized voice. Some programs will highlight words as they are read, allowing students to follow along.
- Refreshable braille displays can be connected to the digital text source, providing students with the option to read the text tactually.
- Scanners with optical character recognition (OCR) can be used to create digital text that can then be used with any of the above tools. OCR scanners can be handheld or freestanding.

Video Magnification System
Retrieved from:
http://www.abisee.com/products/eye-pal-vision-general.html

Refreshable Braille Display
Retrieved from:
http://www.pathstoliteracy.org/technology-braille-readers

Assistive Technology for Writing

Writing Tools
Using bold felt-tip markers or soft lead pencils can provide greater contrast on paper, allowing students with low vision to read with greater ease.

Adaptive Paper
Specialized paper with darkened lines, raised lines, or using color can significantly improve the writing of students with low vision.

Slate and Stylus
A slate and stylus can be equated to paper and pencil for individuals who are blind. This simple low tech tool allows students to quickly and efficiently complete simple tasks like creating labels or writing notes to themselves. The slate and stylus is not practical for longer writing tasks.

Handheld Digital Recorder
A handheld digital recorder allows the student to record lectures, dictate assignments, or make notes to self.

Video Magnification/CCTV
Writing with traditional paper and pencil under a video magnification camera allows the student to view their work in real time through the use of a large monitor.

Word Processor
Word processors are readily available and are highly adaptable. Text size and font can be customized or built-in operating system accessibility features can be used to enhance the visual display. The use of adaptive keyboards with high contrast or enlarged keys can also be utilized

Word Processor with Specialized Software
Text-to-speech software can create a "talking word processor" which provides feedback to the student about what they have typed, while speech recognition software allows the student to dictate into a microphone, which the computer translates into text. Screen magnification software can enlarge the entire display or only selected portions and may or may not provide audio feedback.

Word Processor with Refreshable Braille Display
For students with no vision, a refreshable braille display can be used in conjunction with the word processor, which will display the text tactually allowing the student to reread and edit their own work. This strategy can be used with or without audio feedback, which supports multisensory learners and allows the student to choose the access method. The incorporation of braille has the potential to significantly improve the editing process.

Manual & Electric Braillewriters

A manual braillewriter is similar to a typewriter and is a simple, yet rugged device that is often introduced to students who are emergent readers and writers. As students progress, they may transition to an electronic braillewriter before beginning to use a braille notetaker.

Braille Notetaker

A braille notetaker is a portable word processing device that utilizes the eight key braille input system and has an integrated refreshable braille display. This tool encompasses many functional areas in addition to writing. Students can use a braille notetaker to complete assignments, read textbooks, and navigate the Internet. Although products and their features vary, many are available with speech output, Wi-Fi connectivity, access to e-mail, calculators, calendars and other personal organizational tools, or GPS navigation systems. The braille notetaker is a lifelong tool and should be introduced as soon as the student demonstrates readiness.

Braille Embosser

A braille embosser allows the student to print out their completed work in braille format.

Manual Brailler
Retrieved from:
http://shop.aph.org/wcsstore/APHConsumerDirect/Attachment/products_secondary/1-00815-00_LightTouchPerkins_girl.jpg

Writing with CCTV
Retrieved from:
http://www.opmnj.com/services/low-vision.html

BrailleNote Apex
Retrieved from:
http://www.humanware.com/en-usa/products/blindness/braillenotes

Assistive Technology for Math

Due to the visual and abstract nature of math concepts, math is perhaps one of the most challenging subjects for students with visual impairments to master. Using two-dimensional, and when possible, 3-dimensional items to represent math concepts, space, diagrams, and graphs is critical to helping students grasp and form mental images of these concepts.

Abacus

The abacus is a critical tool for early math development among students who are blind, but continues to be a practical tool for many students as they get older. It is used to teach early number concepts, operations and fractions, can be used in lieu of paper and pencil, and is a low-tech substitute for a calculator.

Tactile, Braille and Visually Enhanced Manipulatives

Math manipulatives are a critical component to teaching beginning math concepts in primary grades, and continue to play a vital role in grasping math as students progress into middle and secondary school. Here is a list of manipulatives that may be useful to your student:

- Tactile manipulatives for sorting by size, shape, or other properties
- Geometric manipulatives can be used to show concepts such as angles, area, and spatial relationships
- Tactile or braille number line
- Fraction manipulatives and puzzles
- Large print/braille dice can be used to reinforce number recognition and play a variety of math games
- Large print/braille Bingo cards teach students to quickly scan for numbers while reinforcing concepts of horizontal, vertical and diagonal
- Base-ten blocks and braille math blocks help students "visualize" and manipulate numbers
- Large print or braille hundreds board
- Pegboards or geoboards are useful for teaching shapes, spatial relations, or graphing
- Wikki Stix™ can be used to represent lines or shapes
- Braille flashcards

Low-tech Refreshable Braille Cubes

These non-electric, low-tech tools can be used to introduce and reinforce Nemeth Code (the braille system for writing numbers and math functions), but can also be used to teach patterning and simple math operations.

Manual and Electronic Braillewriters

Can be used for writing out math computations. Although somewhat time consuming and awkward, introducing the braillewriter in early math instruction is useful in helping students understand the steps involved in completing math operations.

Adaptive Calculators
Adaptive calculators range from simple 5-function, to scientific and graphic calculators. Built-in supports include large display and large keys, tactile or braille keys, braille displays (which are very expensive) and talking calculators. In addition, some adaptive calculators are compatible with a computer or CCTV for viewing on a large monitor. Digital talking calculators are also available for both computers and mobile devices or are integrated into advanced math software.

Adaptive Measurement Tools
Measurement tools can be adapted through large print, tactile cues or braille, or electronic devices are available with audio feedback, as with a talking measuring tape. Some examples include rulers, tape measures, protractors and compasses.

Adaptive Time Pieces
Tools for teaching and telling time can be adapted with large print, tactile cues, braille or auditory feedback, and may include clocks, watches, and calendars.

Talking Money Identifier
This handheld device may be helpful for students when learning and working with money.

Adaptive Paper and Tactile Graphics
While 2- and 3-dimensional manipulatives are preferable for representing charts, graphs, diagrams, tables, angles and shapes, when unavailable, tactile graphics can utilized as well. These can be purchased, or created using swell paper, or produced using specialized software and an embosser. Other adaptive paper includes raised-line graph paper.

Specialized Math Software
Depending on the software being used, accessing and completing math assignments digitally allows the use of supports such as screen magnification, text-to-speech support, audio representation of graphics, and translation into Nemeth code.

Abacus
Retrieved from:
http://blennzonlinelearninglibrary.edublogs.org/2012/12/01/developing-early-abacus-skills-at-primary-school/

Big Key Calculator
Retrieved from:
http://www.enablemart.com/giant-calculator

Braille Ruler
Retrieved from:
http://atwiki.assistivetech.net/index.php/Math_notation

Assistive Technology to Support Social Studies and Science

The supports used by students for reading and writing will, of course, play an integral role in their access to and participation in both social studies and science. However, there are additional considerations that will optimize their participation.

Magnification

For students with low vision, handheld magnifiers, digital magnifiers, and CCTVs may be useful for viewing and manipulating objects, observing experiments, or viewing graphic information.

Visually Enhanced or Tactile Graphics

Drawings, maps, graphs, and tables can be enlarged, outlined with a felt tip marker, color coded, or modified to eliminate unneeded visual information. Tactile graphics can be created using objects like Wikki Stix™ or other manipulatives, swell paper, or an embosser. Relief maps are often available through vendors, agencies, libraries or museums. Braille labels may also be added to maps.

Models and 3-Dimensional Objects

Models and 3-dimensional representations of objects can be purchased from vendors, borrowed from museums, or created using common objects. Presenting a multisensory representation of objects is more meaningful than relying solely on tactile graphics.

Large Print, Tactile, Or Braille Measuring Tools

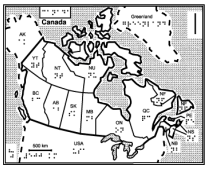
In addition to the adaptive measuring tools discussed in the math section, items such as large print, braille or talking scales or thermometer may be useful in the science lab.

Specialized Software

Specialized STEM (Science, technology, engineering and math) software is available that provides a variety of support, including screen magnification, screen reading, voice navigation, and built in talking calculators.

Handheld Computing Device

For students in advanced science classes, accessible handheld computing devices are available with speech output that provides audio feedback and can be used to complete a variety of science-related data collection and analysis.



Adapted Map
Retrieved from:
http://www.maproomblog.com/2007/03/maps_for_the_visually_impaired.php

Talking LabQuest
Retrieved from:
http://www.independencescience.com/sensors-and-accessories.php

Assistive Technology for Computer Access

Skills and competence in computer use are essential to every student in the 21st century, and will significantly increase a student's success in their pursuit of higher education, vocation and independent living after graduating from high school. Instruction in basic keyboarding and word processing skills should begin early. As students grow older, use of social media tools should also be explicitly taught as key to participation and inclusion in higher education, many vocational settings, and society in general.

Adaptive Hardware

Hardware such as enlarged, large print or high contrast keyboards, as well as enlarged monitors may provide adequate supports to students with low vision, allowing them to use the computer independently.

Operating System Accessibility

Whether using a Mac, PC, desktop or mobile device, all operating systems have built-in accessibility features that may make the device easier to use. These include changes to visual display (i.e. high contrast, color scheme, font size), enlarged icons, screen magnification, enlarging the cursor or pointer, or a built-in screen reader.

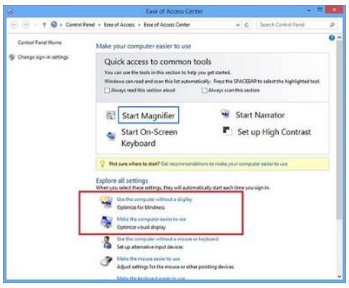
Specialized Accessibility Software

When built-in accessibility features do not provide adequate support, specialized software can be used to create a highly customized computer environment. This may include features such as text-to-speech feedback with and without text highlighting, the ability to customize what is magnified on the screen, greater customization of visual displays, voice navigation, and advanced screen reading features.

Refreshable Braille Display

A refreshable braille display can be used as a peripheral device with a desktop, laptop or mobile computing device, providing braille translation of documents, websites, and other text information.

iPad with Refreshable Braille Display
Retrieved from:
http://www.bartimeus.nl/hulpmiddelen_detail/ipad_in_het_onderwijs



Windows Accessibility Options
Retrieved from:
https://www.microsoft.com/enable/guides/vision.aspx

Assistive Technology to Support Orientation and Mobility

Safe, efficient and independent travel throughout the school environment should be a high priority for all students. For those with visual impairments, a Certified Orientation and Mobility Specialist should be consulted to determine appropriate modifications and supports. Some assistive technology tools that may be implemented are described here.

Low Tech Adaptations in Environment

Attention should be given to the entire environment: both inside and outside of the school building. When possible, rearrange furniture, shelving, or other potential hazards. Take into consideration lighting. You may consider reducing glare through use of windows shades or film, or allowing the student to wear a hat with a brim. Decrease visual clutter and store materials and frequently used objects in a consistent location. Use color or contrast tape to identify steps, curbs, boundaries, door frames, or shelves. Provide tactile cues or braille labels for objects and landmarks throughout the environment. Window decals on glass doors can prevent unnecessary accidents for students with low vision.

Cane

This is an important tool for students with visual impairment, especially those who are blind, to allow safe and independent travel throughout all environments. Effective use of a cane requires training from a Certified Orientation and Mobility Specialist. Students with multiple disabilities and wheelchair users may require an adapted cane.

Enlarged, Braille or Talking Compass

This handheld device provides visual, tactile or auditory cues related to direction.

Electronic Travel Aids

Electronic travel aids (ETA) use a variety of systems including radar, sonar and optical triangulation to detect barriers and provide feedback through vibration or auditory cues in an effort to compensate for limited "spatial sensing". ETAs may be an effective supplement to long canes but will not replace a cane.

GPS Devices

GPS devices use satellite technology to provide auditory feedback to individuals regarding their position, direction of movement, environment, and routes. They may be dedicated devices, or GPS technology may be integrated into other devices such as a smart phone, mobile device, or braille notetaker.

Student with cane
Retrieved from:
http://www.pcc.edu/resources/disability/sensory.html

Assistive Technology For Art, Music and Physical Education

Students with visual impairments may require adaptations and assistive technology to fully participate in, enjoy, and benefit from art, music, and physical education. Some strategies and tools are listed here, but this not a comprehensive list – often participation in art, music or physical education will require "thinking out of the box" and creative problem solving. Keep in mind that art is a process of not only exploring the work of others but also of expressing one's own creativity. The objective of an art project is not necessarily to produce something that is visually pleasing to others, but to create something that is meaningful to the student.

Magnification

Use of handheld or digital magnifiers, a CCTV, or a light box may assist students with low vision in exploring the work of others or by providing visual feedback as they complete their own work.

Textures and Materials

Provide a rich sensory experience in art through the use of a variety of media, including textured fabrics, textured glass, wire or plastic mesh, paper mache, clay, finger prints. Provide 3-dimensional objects that can be combined to create a product as a substitute to 2-dimensional drawings. Add a variety of objects to products to add tactile interest and depth.

Specialized Materials

Items such as swell paper, embossed pictures, a tactile drawing board, or tactile diagram kits may be useful for viewing and creating projects.

Low Tech Adaptations for Music

Music can be enlarged using a copier or purchased from a vendor. Lyrics can be provided in large text or braille format. Music instruments can be labelled with braille.

Mid- to High-tech Supports for Music

Specialized low vision music reading devices allow the student to read music with a variety of visual display options including magnification, contrast, and color. Specialized music software allows blind students to create and read music with audio or braille output.

Adaptive Tools for Physical Education

Physical education is a wonderful opportunity for students with visual impairments to practice orientation and mobility skills, experience the freedom of movement, and develop lifelong healthy habits. A range of low-tech modifications and specialized equipment can facilitate independence and participation.

- Tape and string can be used to provide tactile boundaries to a playing area, while high contrast tape can provide visual cues.

- The use of acoustic equipment (i.e. beeper balls) or low-tech adaptations such as players wearing bells can provide essential auditory cues. Goal ball is a sport which challenges players to rely solely on tactile, auditory and spatial awareness.
- A tether, or short guide rope, can be used with a guide runner to participate in track activities.
- Tandem bicycles allow a student and peer to participate in physical activity together.
- A batting "T" and a "caller" on base encourages independence and participation in baseball or softball.
- A tapper (pole with tennis ball) can be used to provide cues to a swimmer as they approach the end of the pool. A sprinkler aimed at the end of the lane may also do the trick.
- Guide rails can be used during bowling.

LimeLighter Music Reader
Retrieved from:
http://www.dancingdots.com/limelighter/limelightermain.htm

Embossed coloring page
Retrieved from:
https://shop.aph.org/wcsstore/APHConsumerDirect/Attachment/products_secondary/1-03933-00-Paint-Pot-Palette_Bear.jpg

Tandem cycling
Retrieved from:
http://photos.oregonlive.com/oregonian/2009/07/blind_kids_tandem_bike_ride_11.html

Agencies & Organizations Where You Can Learn More

American Association of Blind Teachers. Geared toward supports for teachers who are visually impaired, this website also includes many resources that can be applied to promote student success as well, including integration of assistive technology.
http://www.blindteachers.net/

American Foundation for the Blind. In addition to their product line, the AFB has many resources to help educators, families and individuals find the resources they need to maximize independence. www.afb.org

AppleVis. An online resource developed to help individuals with visual impairments make the most of their iOS devices. Provides support for access, troubleshooting, information about accessories, and app reviews. http://www.applevis.com/

Paths to Literacy. A collaborative effort between the Perkins School for the Blind and the Texas School for the Blind and Visually Impaired, this website is devoted to addressing literacy needs of students with visual impairments. It contains extensive resources related to strategies and tools for accessing information and engaging in learning across curricular areas.
http://www.pathstoliteracy.org/

Perkins School for the Blind. Extensive resources for individuals, families and educators, including a teacher resources page with links to webinars, articles, and "ask the expert".
http://www.perkins.org/

Special Education Technology British Columbia. This website has extensive resources for students with visual impairments in their "Learning Centre".
http://www.setbc.org/lcindexer/default.aspx

Texas School for the Blind and Visually Impaired. Extensive resources for individuals, families and educators, including supports for assessment, accessing the curriculum, AT implementation, administrative issues, and information for students with multiple disabilities.
http://www.tsbvi.edu/

United States Association of Blind Athletes. Information related to recreational and sports opportunities for individuals with visual impairments. http://www.usaba.org/

Product Vendors

Ai Squared. A source for screen magnification and screen reading software, adaptive keyboards, and magnifiers. http://www.aisquared.com/

American Printing House for the Blind. A source for an extensive range of low-tech to high-tech AT products, accessible media, materials and tests, tactile graphic image library, and software. http://www.aph.org/

C-Tech Low Vision Products. A source for mid- to low-tech AT including digital book players, video magnifiers, screen magnification and screen reading software, GPS systems, braille displays and notetakers. http://www.lowvisionproducts.com

Dancing Dots. Accessible music technology for blind and low vision musicians, including a low vision music reading device, resources for creating and using braille music, and music translator. http://www.dancingdots.com

Enablemart. A range of low- to high-tech products including handheld and video magnifiers, OCR scanners, specialized software, adaptive calculators, color identifier, braille displays, embossers and notetakers, and book players. Also carry products for students with multiple disabilities. http://www.enablemart.com

Freedom Scientific. A source of mid-tech to high-tech solutions including screen magnification software, screen reading software, CCTVs, braille displays, braille notetakers, audio book players, and curriculum support. http://www.freedomscientific.com/

Humanware. A source for mid- to low-tech AT including handheld magnifiers, digital magnifiers, screen magnification and reader software, OCR software and scanners, book players, GPS systems, braille printers, braille displays and notetakers. Also carries products for students with deaf-blindness. http://www.humanware.com

Independent Living Aids. A broad range of AT from low- to high-tech, including magnifiers, adaptive calculators, watches and measuring tools, mobility products, braillers and braille products including games and instructional materials, labelers, slate, adaptive paper, and maps. http://www.independentliving.com

Independent Science. Publishers, of specialized accessible STEM (science, technology, engineering and math) software and tools for data collection and analysis. Also provides resources for adapting STEM curriculum. http://www.independencescience.com

Maxi Aids. Variety of adaptive aids for independent living and recreation. http://www.maxiaids.com.

National Foundation for the Blind. Visit their "Independence Market" for products addressing life skills, mobility, reading, writing, and other curriculum areas. http://nfb.org

Glossary of Terms

Abacus: An adaptation of the traditional Japanese abacus, this device is used to teach basic number concepts, addition and subtraction for students with visual impairments.

Adaptive paper: Paper that may provide extra visual or tactile cues and feedback to aid in the process of writing. Examples include raised-line paper, dark-line paper, color-coded paper, and writing guides.

Accessible instructional materials (AIM): Materials that are designed or modified to provide access to the widest possible range of students, including those with disabilities. Accessible formats may include Braille, large print, audio, or digital materials. AIM is required under Individuals with Disabilities Education Act for students who cannot access or use traditional print materials.

Acuity: A measure of the ability to see details of the smallest possible letter or symbol. Typical acuity is 20/20 (print size/distance).

Assistive technology: Any tool that is used to improve, increase or maintain functional capabilities of an individual with a disability. Includes a range from simple and inexpensive low tech solutions to complex high tech systems.

Audio book: A recording of a book, typically using human voice. May be available in various formats, including MP3, .wav, or DAISY. Some audio book players have advanced navigation and search features (generally requires DAISY format).

Blindness: An inability to see anything using either eye.

Braille: A tactile reading system, utilizing a 6-dot system of characters, typically used by individuals who have extremely limited or no functional vision. Braille characters represent letters, therefore is an important literacy tool for students who cannot otherwise access text, and should not be substituted entirely by audio.

Braille display: See "refreshable Braille display".

Braille embosser: A printer used for producing Braille on paper.

Braille notetaker: A portable Braille word processing device with refreshable Braille display and synthesized speech. May have additional features, including personal organization tools, Internet access, e-mail access or GPS.

Braille writer: Similar to a typewriter, a Braille writer uses six keys, that when pressed in various combinations, create Braille code characters on a sheet of paper. Device also has space, backspace and line space keys. May be manual or electronic.

Closed Caption Television (CCTV): An electronic system for capturing and projecting an enlarged image onto a screen or monitor. Also referred to as "video magnifier" (see below).

Cortical visual impairment (CVI): A neurological visual disorder results in inefficient, disturbed vision, due to brain pathology rather than damage to the eyes or optic nerve.

DAISY (Digital Accessible Information SYstem): A format of digital materials that meets international standards for accessibility, by enhancing navigation and supporting text/audio synchronization. DAISY files require specialized software or devices to read.

Digital audio books: May be human voice or computer synthesized voice, available in multiple formats. Can be played on a computer or a digital audio player (many off-the-shelf digital audio players do not offer full accessibility or are not compatible with all formats).

Digital recorder: A portable electronic audio recorder that saves recorders in digital format, allowing the user to save and manage files on a computer. Digital recorders may be used as part of the writing process or to capture information from lectures or lessons.

Digital book player: Stand-alone device or computer software that provides access to digital talking books specifically developed for individuals with disabilities, with advanced features such as changing the audio output speed, navigating and searching the file.

Document camera: A system for capturing images of a document or object and projecting onto a monitor or screen. Typically used by the general population and frequently lacks the advanced features of video magnifiers.

Enlarged text: A process of enlarging text for low vision readers that can be accomplished by changing the font on electronic files or through the use of a copy machine. Standard large font is from 18 to 24 pt.

E-text (electronic text): Any text available in digital format, which can be accessed electronically (i.e. through computer or other mobile devices). Appearance of e-text can typically be modified by changing font, size, or text and background colors.

Global Positioning System (GPS): A satellite navigation system commonly used by drivers to determine position, direction, and assist with navigation. Devices or software with GPS capabilities may help an individual with visual impairment move more independently and safely throughout their community.

Handheld magnifier: A small, portable, low tech device that can be used to provide immediate magnification or illumination. Range in magnification from 2x to 16x, and should be prescribed by a low vision specialist.

Legally blind: A level of vision loss with central visual acuity of 20/200 or less in the better eye with best possible correction, and/or a visual field of 20 degrees or less (Key definitions of statistical terms, 2013).

Low vision: Term used interchangeably with "visually impaired".

Monocular: A handheld device similar to a telescope, generally used to improve visual clarify from a distance.

Nemeth code: Braille code for writing mathematical and scientific notations, using the 6-dot Braille system.

Optical character recognition (OCR): A process of converting images to digital text, allowing text images to be read, edited or otherwise manipulated. Some specialized software or devices incorporate OCR to enable text-to-speech capabilities.

Orientation and mobility: The process of learning to safely and independently travel throughout one's environment, while reinforcing concepts about body, space, direction and movement.

Refreshable Braille Display: A device that can display Braille characters using a dynamic system of dots that can be raised. Can be used with a computer or other devices to allow the user to read digital text through Braille.

Screen magnification: Enlargement of computer screen content using software. Depending on the software, may provide audio feedback, allow for color enhancement, or modify cursor and pointer. Some software will enlarge the individual items on the screen, maintaining the screen integrity, while others zoom in on only one section of the screen, requiring the user to navigate to the unseen portions of the screen.

Screen reader: Digital content of a computer monitor (i.e. text, icons, graphics) are read by software in an audio format.

Slate and stylus: A low tech template and punch which allows the user to create Braille on a paper. Not commonly used.

Speech-to-text: Software that converts spoken word into text through a process known as "dictation", or allows voice-activated access to a computer through "commands".

Tactual reading: Another term for reading through the use of Braille.

Text-to-speech: Software that allows the computer to "read" text out loud using digitized voice. May be used to access digital text (i.e. documents, websites) or in conjunction with writing (i.e. talking word processor). Some versions include tracking support, where text is highlighted as it is read by the computer.

Video magnifier: Using a video camera, an image is captured and projected onto a video monitor or TV screen. May be used with documents, while writing or completing a fine motor task, or to view objects. Some video magnifiers have cameras that can be repositioned to view other parts of the classroom ("room viewing").

Visual impairment: A general description of significant vision loss. May include individuals with low vision, legal blindness, or total blindness. Clinically, visual impairment is defined as a visual acuity of 20/70 or worse in the best eye with correction, or total visual field loss of 140 degrees. Visual impairment is defined in IDEA more generally as a visual impairment that adversely affects a child's educational performance.