Special Education Technology British Columbia www.setbc.org

Reading Strategies for Students with Visual Impairments: **A Classroom Teacher's Guide**

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Reading Strategies for Students with Visual Impairments:
A Classroom Teacher's Guide
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Acknowledgments

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About SET-BC

Special Education Technology - British Columbia (SET-BC) is a provincial government initiative established to assist school districts and group 1 and 2 independent schools in educating students with physical disabilities, visual impairments or autism through the use of technology.

The SET-BC Regional Centres
Region One - Victoria
Region Two - Vancouver
Region Three - Vernon
Region Four - Kimberley
Region Five - Prince George
Region Six - Prince Rupert
Region Seven - Dawson Creek

SET-BC's mandate is:

- to lend assistive technologies to facilitate students' access to educational programs, and
- to assist school districts in providing the necessary consultation and training for students and educators in the use of these technologies.

SET-BC services to school districts include:

- consultation, planning and follow-up for school based teams
- loan and maintenance of assistive technology
- training
- provision of resources and information

SET-BC consultants are based in seven Regional Centres around the province, providing community based services to all BC school districts. Each district has a SET-BC District Partner who can provide information on how services are provided for eligible students. For more information and resources on assistive technology, check SET-BC's web site at www.setbc.org.

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Introduction

This document is intended as a resource to provide classroom teachers with a selection of strategies to address the reading needs of students with visual impairments. It must be emphasized that a student's visual impairment and its impact will be unique. For example, two students with the same diagnosis and visual acuity may function differently in the classroom. The following is generalized information, and the needs of the students may be more specific. It is important to consult with your district Vision Resource Teacher to help interpret the functional vision assessment regarding the student's functional vision in the classroom.

The document is divided into 3 sections based on the types of media that students use to complete reading tasks.

The 3 sections are:

- Paper Strategies which include: regular print, enlargement of small amounts of text, large print text, handheld magnification, video magnification and paper Braille.
- E-Text Strategies which include: plain e-text with no enhancements, tracking support, changing text or background colors, magnification of text or entire screen, auditory supports, and refreshable Braille.
- Auditory Strategies which include: using a live reader, books on tape, CDs, and MP3 players.

How to use this document:

1. Start with the needs of the student.
2. With the help of the Vision Resource Teacher identify the student's visual functioning as it relates to reading in the classroom environment.
3. Select from the strategies contained in this document that best address the student's needs using the Reading Strategy Checklist.
4. In consultation with the Vision Resource Teacher implement the identified strategies.

Environmental Considerations

It is important to take into consideration the environmental factors that influence the student's functional vision within the classroom environment. These issues may be addressed with the student's Vision Resource Teacher to ensure success with reading tasks.

These include:

- adapted workspace (e.g. separate work station, larger desk or L-shape desk)
- storage space for large print or paper Braille materials
- ergonomics (e.g. positioning and seating)
- presentation of materials (e.g. slant boards, masking, colour overlays)
- lighting (e.g. glare, too much light, not enough light, type of lighting)
- sound (e.g. speech from computer or Braille notetaker, noise from Braille embosser)
- student positioning (e.g. preferential seating, lighting source)
- power source: (e.g. available power source, surge protection, batteries charged, extra batteries)
- portability (e.g. equipment mounted on cart, accessibility within school, weight of equipment and other classroom materials)
- peripherals (e.g. headphones, access to printer/embosser)
- safety issues in the classroom (e.g. cords, placement of furniture and equipment)

Student Considerations

- level of self-esteem and self-advocacy
- ability and willingness to use technology
- ability to manage equipment and mobility skills
- self awareness of needs
- awareness of fatigue and frustration levels

Reading Strategy Checklist

Strategy	Page	Doesn't need or can't use	Uses successfully	Try this strategy	Comments
READING PAPER					
REGULAR PRINT					
HANDHELD MAGNIFICATION					
ENLARGE SMALL AMOUNTS OF TEXT					
LARGE PRINT COPY					
VIDEO MAGNIFICATION (STANDALONE)					
VIDEO MAGNIFICATION WITH COMPUTER					
PAPER BRAILLE					
READING E-TEXT					
REGULAR E-TEXT (NO ENHANCEMENTS)					
CHANGE TEXT APPEARANCE					
MAGNIFY TEXT OR ENTIRE SCREEN					
TRACKING SUPPORT					
AUDITORY SUPPORT					
REFRESHABLE BRAILLE					
AUDITORY					
LIVE READER					
CDS					
DIGITAL AUDIO FILES					

Section 1: Paper Strategies

Provide Regular Print

Regular print is the source print without adaptations.

A typical student who would use regular print is one with normal or near normal acuity.

ADVANTAGES	DISADVANTAGES
• Availability • No special preparation • Use of same print materials as sighted peers	• Student who is blind or has low vision may not be able to use regular print

Best Practices and Considerations:

- Teachers should request a functional vision assessment from a qualified vision teacher to determine whether a student needs enlarged print.
- A student may try to use regular print when he or she should be using enlarged print. (These students may need to be monitored for fatigue, stress, frustration, and/or reduced performance.)
- Students with fluctuating vision may be able to access regular print for some subjects but not others, e.g. map reading.
- Students with fluctuating vision may be able to use regular print for part of the day.
- For students with cortical visual impairments, the arrangement of graphics and text may be visually confusing and require masking to reduce visual clutter.
- Students may need coloured acetate overlays to enhance contrast or reduce glare.
- When using photocopied materials, ensure that they are the best quality possible.

Use Handheld Magnification with Regular Text

Refer to websites that teachers use as part of their curricular practices.

A handheld magnifier is an optical device that provides magnification and/or illumination.

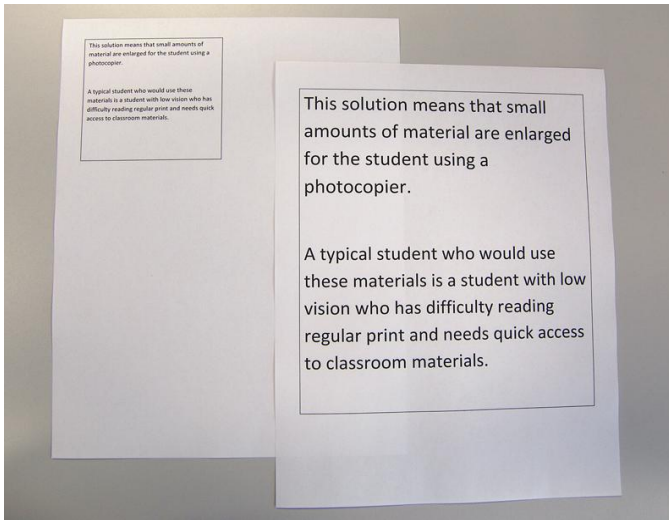
A typical student who would use a portable magnifier is a student with low vision who has difficulty reading regular print and requires immediate enlargement of text and/or graphics.

ADVANTAGES	DISADVANTAGES
• Instant access • Portability • Use of the same print materials as sighted peers • No material preparation • Magnification of non print materials, e.g. looking at coins, leaves, bugs, etc.	• The larger the magnification the smaller the viewing area • Possible edge distortion for higher magnification devices • Extended use can be fatiguing for younger children • Device can be lost or scratched

Best Practices and Considerations:

- Assessment and prescription for hand held magnifiers should be done through a low vision clinic or optometrist.
- Magnifiers range from 2x to 16x magnification and should be prescribed by a low vision specialist.
- Different types of magnifiers are needed for different tasks, e.g. portability.
- Student will require training on the use and care of a hand held magnifier.
- Student may need some instruction in navigating printed material.
- Scratches can affect the quality of the magnification; check on a regular basis.

Enlarge Small Amounts of Text, Pictures, Diagrams, Charts on Photocopier



This solution means that small amounts of material are enlarged for the student using a photocopier.

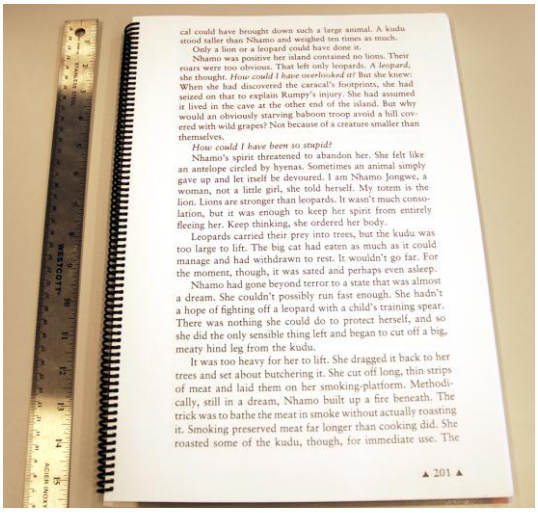
A typical student who would use these materials is a student with low vision who has difficulty reading regular print and needs quick access to classroom materials.

ADVANTAGES	DISADVANTAGES
• Availability • Quick access • Low tech • Creates more white space between words and letters	• Large size of paper/multiple pages • Loss of quality/details • Distortion • Lack of durability • Loss of colour • Hard to store • Requires time to prep and photocopier

Best Practices and Considerations:

- Enlargement above 30 point font size is considered inefficient for sustained reading.
- Enlargement may alter proportions or lengths of mathematics measurement activities.
- Enlarged materials should be prepared ahead of time so the student can participate with peers in the same activity.
- Consider copying on heavier paper if durability is an issue.
- Consider using a commercial copying service if colour is important.
- Consider purchasing larger format binders or file folders for oversized copies.
- Students may require additional assistance in organizing oversized materials.

Provide Large Print Version of the Text


cal could have brought down such a large animal. A kudu stood taller than Nhamo and weighed ten times as much.

Only a lion or a leopard could have done it.

Nhamo was positive her island contained no lions. Their roars were too obvious. That left only leopards. *A leopard,* she thought. *How could I have overlooked it?* But she knew: When she had discovered the caracal's footprints, she had seized on that to explain Rumpy's injury. She had assumed it lived in the cave at the other end of the island. But why would an obviously starving baboon troop avoid a hill covered with wild grapes? Not because of a creature smaller than themselves.

How could I have been so stupid?

Nhamo's spirit threatened to abandon her. She felt like an antelope circled by hyenas. Sometimes an animal simply gave up and let itself be devoured. I am Nhamo Jongwe, a woman, not a little girl, she told herself. My totem is the lion. Lions are stronger than leopards. It wasn't much consolation, but it was enough to keep her spirit from entirely fleeing her. Keep thinking, she ordered her body.

Leopards carried their prey into trees, but the kudu was too large to lift. The big cat had eaten as much as it could manage and had withdrawn to rest. It wouldn't go far. For the moment, though, it was sated and perhaps even asleep.

Nhamo had gone beyond terror to a state that was almost a dream. She couldn't possibly run fast enough. She hadn't a hope of fighting off a leopard with a child's training spear. There was nothing she could do to protect herself, and so she did the only sensible thing left and began to cut off a big, meaty hind leg from the kudu.

It was too heavy for her to lift. She dragged it back to her trees and set about butchering it. She cut off long, thin strips of meat and laid them on her smoking-platform. Methodically, still in a dream, Nhamo built up a fire beneath. The trick was to bathe the meat in smoke without actually roasting it. Smoking preserved meat far longer than cooking did. She roasted some of the kudu, though, for immediate use. The

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A large print version of text is material (e.g. textbook or novel) that has been prepared in a larger font size. Standard large font is 18 or 24 pt.

A typical student who would use large print material is a student with low vision who has difficulty reading regular print.

ADVANTAGES	DISADVANTAGES
• Low tech • Exact duplicate of original	• Availability often limited to authorized or recommended material • Possible loss of quality • Large size • Weight • Storage • Possible loss of colour • Font size available may not be the best for the student e.g. too large

Best Practices and Considerations:

- Good communication between classroom teacher and vision teacher is required to ensure that materials are available when needed.
- Teacher, vision teacher and/or student can provide an in-service for classmates about low vision to encourage understanding and inclusion.
- Time will be required to create or order print materials in advance of their need.
- Typically available in 18-22 point fonts.
- Students may require colour alternatives to black and white charts and maps.

Use Stand-alone Video Magnification

A video magnifier is a system that uses a video camera to project a magnified image of printed text, handwriting or photographs onto a video monitor or TV screen. Some video magnifier models (e.g. room viewing systems) have the capability to view the blackboard or materials posted on walls around the classroom.

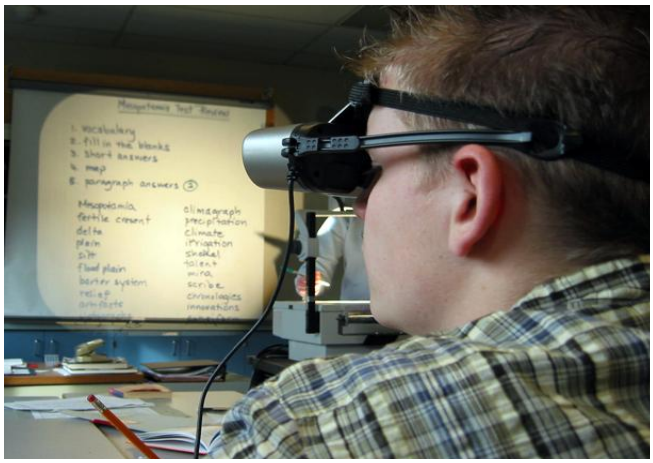
A typical student who would use a video magnifier is a low vision student who has difficulty reading regular print and requires enlargement of text and/or graphics.

ADVANTAGES	DISADVANTAGES
• Instant access • Adjustable magnification • Different colour and contrast options • Masking and underlining options • Magnification of both print and non-print materials • Some models have a room viewing feature e.g. board work, charts, etc. • Some models are portable	• The larger the magnification the smaller the viewing area • Students may experience vertigo when reading/navigating the print material • Requires large desk space or separate workstation • Can physically isolate the student from his/her peers • Moving material under the camera too quickly will create a comet like tail after the text

Best Practices and Considerations:

- Student should be involved in the selection of the video magnification device.
- Students should start with a higher magnification than they would require while learning to use the device. Once they have mastered the use of the device, the magnification should be reduced to the minimum setting to increase the amount of text displayed.
- Variable magnification from 2x to 16x (above 5x magnification consider Braille).
- At higher magnification levels reading efficiency may be reduced (loss of context and reading fluency).
- A portable unit tends to have a smaller screen size may affect reading fluency.
- The image can be displayed on either a monitor or a computer screen.
- Student requires training and good eye-hand coordination to use reading table.
- Navigation and place finding on a page may be an issue when using analog devices; digital devices reformat the page.
- OT should be involved in positioning to reduce neck strain and maintain posture.
- Student must be able to reach and use the controls.
- Video magnification devices required in multiple locations need planning for transportation and storage.
- Can isolate student who needs separate work station.

Use Video Magnification with Computer Integration



A video magnifier is a system that uses a video camera to project a magnified image of printed text, handwriting or photographs onto a video monitor, PC or TV screen. Some video magnifier models (e.g. room viewing systems) have the capability to view the blackboard or materials posted on walls around the classroom.

A typical student who would use a video magnifier is a low vision student who has difficulty reading regular print and requires enlargement of text and/or graphics. The computer allows the student to save the printed text and/or graphics as a computer file.

ADVANTAGES	DISADVANTAGES
• Computer is used as the monitor (less equipment to transport & smaller work area) • Ability to toggle between the video magnifier display and the information on the computer or view both in split screen • Ability to capture and save the magnified image e.g. notes from the board	• Making it all work (connections, cables, software conflicts) • Limited to Windows operating system • Time it takes to start the computer vs. no start up with stand-alone • Dependent on computer functioning properly • Does not fit on a typical classroom desk; need for a workstation • Clarity of the image on the laptop is inferior to the image on the standalone screen

Best Practices and Considerations:

- Requires team collaboration for successful implementation because of the complexity of the system.
- Student needs to have prerequisite computer skills to successfully operate system.
- Transporting, powering, and positioning equipment need to be well planned.
- Student needs to arrive to class early to set up equipment.
- The software for the video magnifier (e.g. Clarity, Flipper) may conflict with other screen magnification software on the computer (e.g. Magic, ZoomText).
- Labeling cables and connections is highly recommended.

Provide Paper Copies in Braille

Braille is a tactile reading system. Each Braille character or cell is made up of six dot positions, arranged in a rectangle containing two columns of three dots each.

A typical student who uses Braille is one who has limited or no functional vision. This student cannot read print or cannot read print for long periods of time.

ADVANTAGES	DISADVANTAGES
• Braille is a true literacy medium that gives students access to the same print information as their sighted peers. • Students can manipulate text (e.g. go back and reread, bookmark, scan, etc.) • Braille materials are portable.	• Not immediately available • Braille pages are often larger • Number of Braille volumes exceeds the print equivalent (e.g. Science 12 textbook = 28 volumes of Braille) • Requires more storage space • Braille is consumable (dots wear down) and requires proper storage. • Classroom teacher and/or parents may not know Braille well enough to support student's literacy needs. • Someone other than student or teacher decides what graphical information is provided.

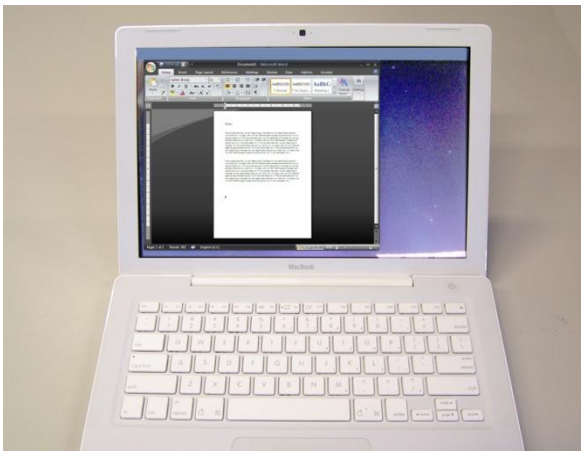
Best Practices and Considerations:

- While listening supports comprehension it is not the same as active reading. It is imperative for students to have access in Braille to the same curricular materials as their sighted peers have in print.
- Braille should be taught by a vision teacher.
- Braille transcription requires special training, equipment, and preparation time.
- Preparation of materials in Braille requires coordination between classroom teacher, Braillist and vision teacher.
- Teachers should be aware that navigation and locating information on a Braille page takes longer than sighted peers reading print.
- Space must be allocated for storage and production of Braille.
- Vision teacher or Braillist may have to supplement graphics with tactile drawings or description.
- Student needs to be organized and have ready access to all Braille books.
- For dual users (print and Braille), Braille materials can be supplemented with large print and/or graphics.
- Whenever possible, provide purpose of reading task before they read to prevent rereading of material which is time consuming and fatiguing.

- Braille symbols may represent whole words or parts of words. This may impact the student's spelling skills.
- Braille materials need to have print added so others can read it. This is usually done by the transcriber or vision teacher.
- Braille materials may be produced using optical character recognition software, Braille translation software, and a Braille embosser.

Section 2: E-text Strategies

Provide E-text with no Enhancements



E-text (from "electronic text"; sometimes written as etext) is, generally, any text-based information that is available in a digital format and read by electronic means.

A typical student who uses e-text requires access to curricular and recreational reading materials in electronic format.

ADVANTAGES	DISADVANTAGES
• Easier to store and retrieve files • Ability to manipulate text • Ability to use built in navigation features (i.e. keyboard shortcuts) • Can be viewed in any word processor • Easy transmission of files (e.g. email, download) • Can be used by multiple users • Many academic and leisure reading e-text titles already exist • Easily converted to additional formats	• Need hardware (computer) in order to access e-text • Low vision and blind students will need special software for additional access and enhancements • File management and navigation skills required • File must be acquired or prepared in electronic form • Many files may not contain any graphics

Best Practices and Considerations:

- Students who would benefit from using e-text should be encouraged to do so.
- Prerequisite is basic computer and file management skills.
- Using e-text requires an understanding of different file types and the programs required to open them.
- Student may require assistance in accessing e-text.
- Provide an instruction program to allow the student to independently create or access e-text.
- Searching for appropriate websites and e-text is time-consuming.
- Plan well in advance for the acquisition and use of e-text.
- Copy e-text file to the hard drive to manipulate file, e.g. to add bookmarks.
- Keyboard shortcuts should be taught for efficiency in navigation and manipulation of text.

Change Appearance of Text and/or Background

Changing the appearance of e-text means changing the font, size, and colour of text and/or background.

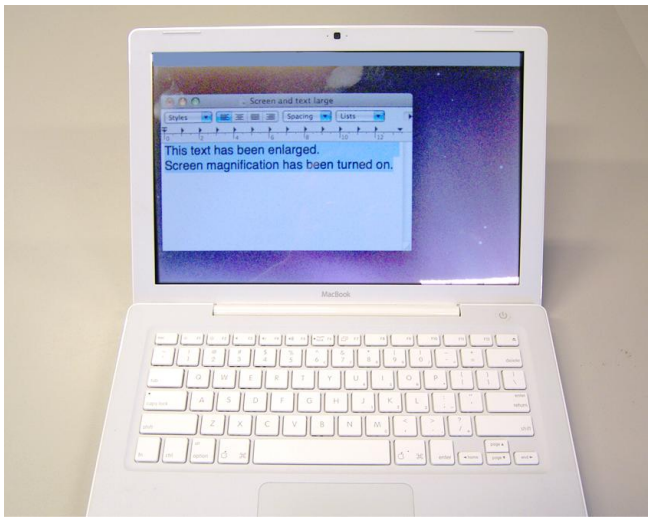
A typical student who would benefit from changing the appearance is one who requires higher contrast, different font, larger print, and spacing.

ADVANTAGES	DISADVANTAGES
• User can customize the colour combination that works best for his or her eye condition/task • Desktop and Menu fonts can be adjusted • Fonts in documents can be changed, e.g. Times New Roman to Arial • Can customize size and type of mouse cursor and text insertion point • Some program can track (highlight) text so student knows which word is being read • Speed of tracking, colour of tracking, and unit being tracked (word, phrase, sentence) can be customized depending on the software	• Setting custom colours in both the operating system and commercial products can cause confusion or conflicts • Can be busy or distracting

Best Practices and Considerations:

- When using screen magnification software, set your colour adjustments in the software program rather than in the operating system.
- Save enhancements as the default or user preference so that student does not have to make the adjustments each time. School district security software such as Deep Freeze must be off to save these changes.
- Keep track of all changes you make to the Display Properties in Windows OS as there is no “return to default” setting.
- Some fonts are more suitable for higher levels of magnification, e.g. Arial.
- Students may require special instruction in how to customize fonts and colours in operating system or enlargement program.
- Students may spend too much time playing with fonts and colours.
- Students can learn to read handwriting using cursive fonts even if they don’t write using cursive script.
- Keyboard shortcuts should be taught for efficiency in navigation and manipulation of text.

Magnify Text and/or Computer Screen



Magnification of text means that the size of the text has been changed either by increasing the font size, increasing the zoom, or using special screen magnification software. Magnification of the computer screen means that elements such as icons, menus, and dialogue boxes have been enlarged either by customizing the operating system or by using screen magnification software.

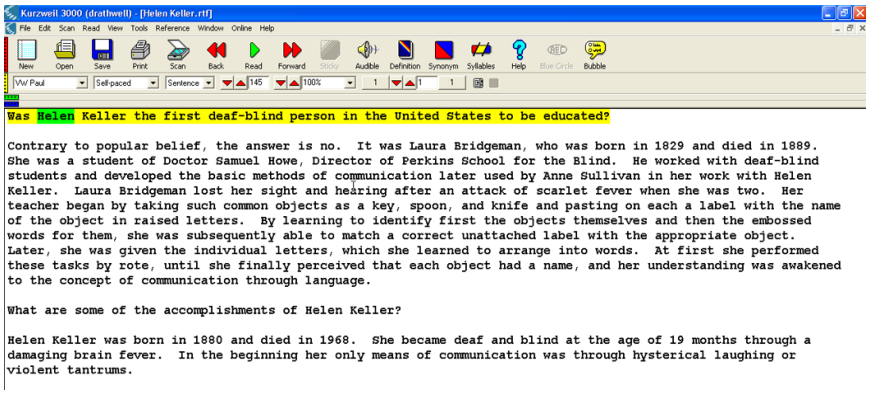
A typical student who uses magnification is one who requires enlargement of some or all on-screen elements.

ADVANTAGES	DISADVANTAGES
• Customization of text size, • Ability to customize text attributes (i.e. font style, bold etc) • Ability to enlarge menus and dialogue boxes • Better font smoothing • Custom magnification (e.g. only parts of screen)	• Amount of information on the screen is reduced • Screen navigation is more complex

Best Practices and Considerations:

- Start with larger magnification than students need to reduce frustration in reading. The next step would then be to reduce the magnification to encourage students to use minimal settings for reading efficiency.
- Student needs may be met through enhancements available within the computer's operating system, i.e. magnification options under Accessibility in Windows or Universal Access in Mac.
    - Document any changes made to the operating system as there is no reset to factory defaults.
- Students who require enlargement 5x or beyond will benefit from a screen reader program.
- Some students may benefit from software that provides both magnification and speech output.
- Student needs to gain independence in adapting their software and/or operating system to meet their visual needs.
    - Students with fluctuating vision may be able to access regular print for some subjects but not others.
    - Students with fluctuating vision may be able to use regular print for part of the day.
- Keyboard shortcuts should be taught for efficiency in navigation and manipulation of text.

Provide E-text with Tracking Support



Tracking support means that words or sentences are highlighted on the screen as e-text is read to the student. Some programs allow this highlighting to be used with or without speech.

An example of a student who would benefit from tracking support would be one with difficulty keeping his/her place when reading due to visual impairments that include: visual acuity loss, eye muscle imbalances, visual field deficits, visual perceptual skill delays and processing problems.

ADVANTAGES	DISADVANTAGES
• Program tracks on text so student knows which word is being read • Speed of tracking is customizable • Tracking colours are customizable	• Tracking can be visually confusing or distracting

Best Practices and Considerations:

- Tracking speeds can be adjusted to suit the student's reading needs.
- Some students may need to change tracking colours for highlighting from default settings.
- Some students may prefer to use tracking without the speech support.
- Some students may find the tracking feature to be distracting (i.e. students with autism).
- Kurzweil 3000 has the ability to magnify one or more words at a time in a separate window as the text is being read.
- Keyboard shortcuts should be taught for efficiency in navigation and manipulation of text.

Provide E-text with Auditory Support

Auditory support means that a computer voice will read e-text to the student. This requires a special program with text to speech features.

An example of a student who would use auditory support is someone who has difficulties with reading or someone who suffers from visual fatigue.

ADVANTAGES	DISADVANTAGES
• If student is visually fatigued he or she can listen • If student is unable to read the specific content, he or she can listen • Provides a multi-sensory reading approach • Level of speech support can be adjusted • Supports screen navigation (i.e. menu items, dialogue boxes) as well as text navigation • Can read information from the web • Some programs will highlight words as they are spoken • Student can choose the voice, reading unit, and the number of words spoken per minute • Reference tools may be available with speech access (i.e. dictionary, spellchecking) • Facilitates group activities (inclusion) • Research shows e-text with auditory support promotes literacy	• Requires headphones in the classroom • Quality of synthesized voices can vary

Best Practices and Considerations:

- Auditory processing will not be a strength for all students.
- Not all curriculum areas may be appropriate for speech output (i.e. Math).
- While listening supports comprehension it is not the same as active reading.
- Ongoing literacy growth (e.g. spelling) requires independent reading skills and strategies.
- Giving students the questions prior to reading will facilitate efficient reading strategies.
- Software programs can generate mp3 files from text to be used on portable devices.
- Software programs can support different languages.
- Braille using students can have auditory output using their Braille notetaker.
- If CDs are being used in classroom, headphones are required. A splitter and multiple headphones will allow several users to access the same recording.
- Keyboard shortcuts should be taught for efficiency in navigation and manipulation of text.

Provide E-text with Refreshable Braille

A refreshable Braille device is an electromechanical device for displaying Braille characters, usually by means of raising dots through holes in a flat surface. These displays can be attached to a computer or integrated into a Braille Notetaker.

An example of a student who would use this device would be an academic Braille using student. The main reason for using a Braille display is to support student literacy because students are reading the Braille and not just listening to content.

ADVANTAGES	DISADVANTAGES
• Access to the same curriculum materials as sighted peers • Teachers can provide the student with mainstream electronic text files • All curriculum materials are stored and accessible on computer or Braille notetaker • Portability of Braille notetakers • Lifelong tool	• Pictures, charts, tables, maps require additional description • Not all file formats can be opened by devices with refreshable Braille • Set up of computer with a refreshable Braille device requires time • Must be recharged and backed up • Device is delicate • Not easy to provide technical support for specialized devices • Devices are costly • Requires specialized training

Best Practices and Considerations:

- Refreshable Braille device can be connected to a computer with a visual display so a teacher or a parent who does not know Braille can monitor the student while reading.
- Tactual reading is often the preferential reading modality for students who are blind.
- Spreadsheets and charts will be challenging and will need the intervention of a sighted reader.
- E-text may be accompanied by a tactile graphics supplement such as a map with raised lines.
- Combined weight of laptop and refreshable Braille display will be heavier than a Braille notetaker.

Section 3: Auditory Strategies

Use a Live Reader

A live reader is a person such as a peer, parent or teaching assistant who reads to a student.

A student may use a live reader because they have difficulties with reading; they cannot physically access print material; or they do not have the print material in the appropriate medium.

ADVANTAGES	DISADVANTAGES
• No preparation • Expressive human voice • Information can be repeated • Questions can be answered • Reader can describe graphics, charts, tables and maps • Sighted students can benefit from being in the same reading group.	• Encourages dependency on others • May be disruptive • Requires personnel • Material may need to be read several times.

Best Practices and Considerations:

- While listening supports comprehension, it is not the same as active reading. It is imperative for students to have access in Braille to the same curricular materials as their sighted peers have in print.
- Students need to learn how to take ownership of what print materials need to be read to them. This helps to develop lifelong self-advocacy skills.
- Consider having a variety of readers ranging from peers to teacher assistants.
- A voice recorder should be used for information that needs to be retained.

Provide Auditory Books on CD

A CD audio book is a recording of the contents of a book read aloud by a human voice. Depending on the CD player, there may be enhanced navigation and search features.

An example of a student who would use this media would be a student who experiences visual fatigue, benefits from listening to some books on CD rather than reading them, and wants to use mainstream technology.

ADVANTAGES	DISADVANTAGES
• Portable • CDs and players are mainstream, inexpensive, readily available, and support inclusion • MP3 files can be burned to a CD	• Navigation and finding specific information may be difficult • CDs have a limited storage capacity • Security issues because the players are highly desirable

Best Practices and Considerations:

- While listening supports comprehension it is not the same as active reading.
- Best suited to access to a large quantity of information.
- Student may not be auditory learner and will need tactile and/or visual supports.
    - Vision teacher/classroom teacher needs to find alternate ways to provide graphics.
- Audio files on CDs come in different file formats (e.g. .wav, .mp3, etc.). These files cannot be easily manipulated.
- Files created in DAISY format allow them to have accessible features.
    - Student needs to have prerequisite computer skills to successfully manage the files.
- If CDs are being used in classroom, headphones are required. A splitter and multiple headphones will allow several users to access the same recording.
- To facilitate listening to classroom activities/instructions and CD material, headphones should cover only one ear.
- CDs can be easily scratched thereby degrading audio content.

Provide Books in Digital Audio Format

Books in digital audio format can either be recordings of human voices reading books or computer voices. Books in this format can be played on a computer or a digital audio player.

An example of a student who would use this media is someone who requires an alternative to print material in a portable form.

ADVANTAGES	DISADVANTAGES
• Portable • Allows for the organization of files in folders • Digital audio format and players are mainstream, inexpensive, readily available, and support inclusion • Digital audio players interface with a computer • Accessible mp3 players are available (e.g. Book Port) • E-text can be converted to digital audio format (e.g. mp3s) using software (e.g. Kurzweil 1000 or 3000)	• Navigation and finding specific information may be difficult • Off the shelf digital audio players may not be accessible • Additional time is required to add navigation features (e.g. bookmarks) • Possible poor quality of synthesized voice on the player • Bookmarking feature is available on only a few digital audio devices • Security issues because they are highly desirable and may be stolen or lost

Best Practices and Considerations:

- While listening supports comprehension, it is not the same as active reading.
- Best suited to access a large quantity of information.
- Student may not be auditory learner and will need tactile and/or visual supports.
    - Vision teacher/classroom teacher needs to find alternate ways to provide graphics.
- Student needs to have prerequisite computer skills to successfully manage digital audio files.
- If digital audio files are being used in classroom, headphones are required. A splitter and multiple headphones will allow several users to access the same recording.
- To facilitate listening to classroom activities/instructions and digital audio material, headphones should cover only one ear.
- When the digital audio device is integrated with a computer, certain settings may need to be changed for accessibility.
- There are conversion programs available to change commercially produced text materials to digital audio formats. (e.g. Kurzweil 1000 and 3000 can generate mp3 files from text documents.)