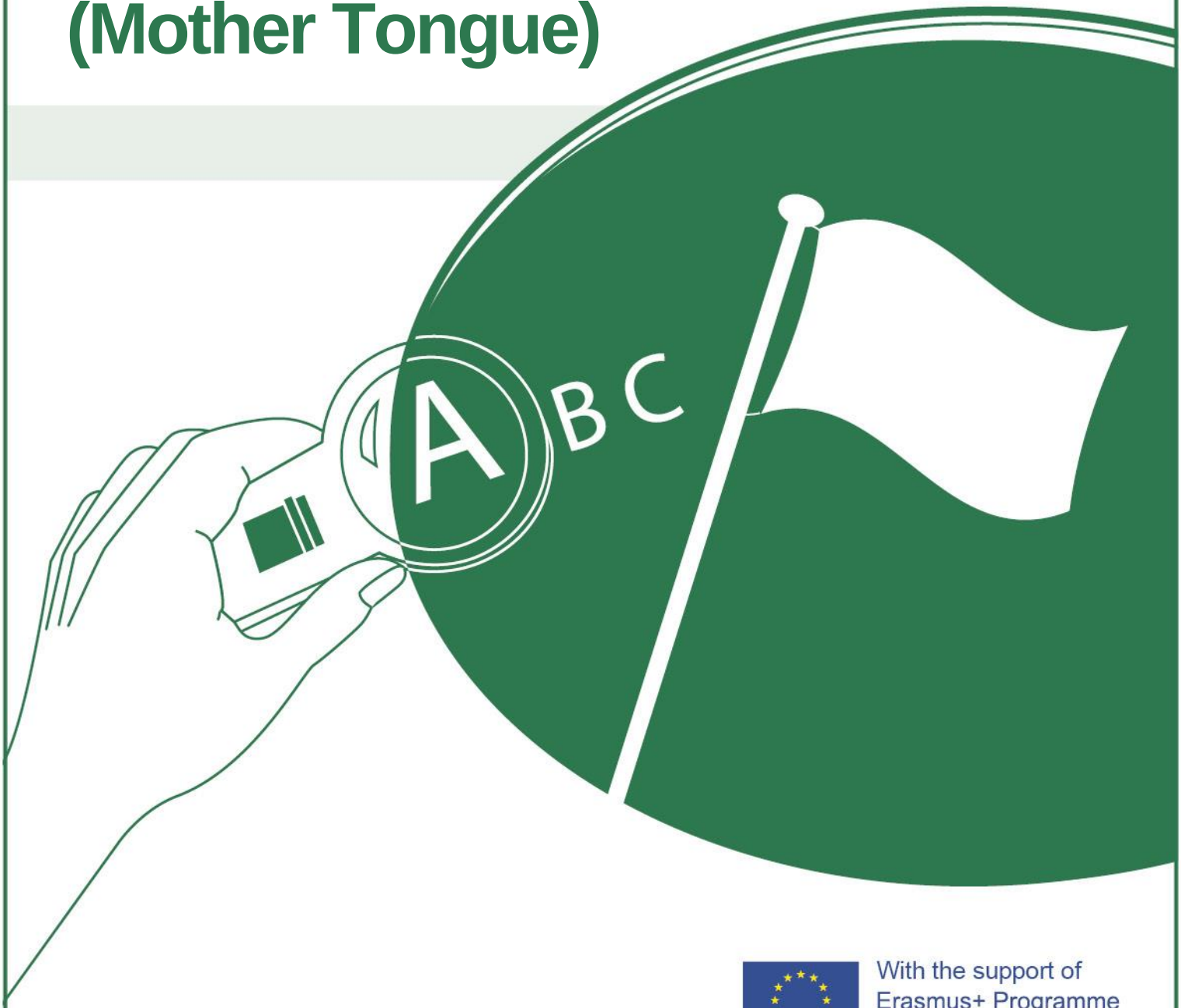
Teaching the Partially Sighted

First Language
(Mother Tongue)



With the support of
Erasmus+ Programme
of the European Union

A series of special education teaching guides

Inclusion in Europe through Knowledge and Technology

Project no: KA201-2015-012

Teaching First Language (mother tongue)

to Students who are Partially Sighted

Contents

Inclusion in Europe through knowledge and technology

Information on the fundamental principles, practices, educational material and teaching aids used to teach various subjects to students with special needs are few and far between. In some cases, material has been prepared for internal use at specialised schools or in other closed environments. In other cases, knowledge has been passed from teacher to teacher as part of workplace training.

No systematic material on pedagogical principles, practices, educational material and teaching aids exist for areas such as teaching first language teaching, first language teaching, mathematics and music for the blind.

With this in mind, the goal of this European project is to further develop, implement and disseminate good practices in the area of inclusive education and learning technologies by delivering three primary components: *Teaching Guides*, Guide on g*ood practices Inclusive learning and Teaching* and *SMART E-learning objects*.

Teaching guides

In completing the project, RoboBraille partners have created a series of twelve educational guides covering fundamental principles, practices, educational material and teaching aids covering first language teaching, first language teaching, mathematics and music for the blind, partially sighted and dyslexic.

Inclusion guide on good practices Inclusive learning and teaching

In support of this, the project has collected and collated information on good inclusion practices in five select areas (teacher skills, alternate media, support structures, preparation for inclusion and teaching environments) which are published in a catalogue of good practices.

SMART e-learning

Finally, the project will adapt a comprehensive set of educational material on the RoboBraille service prepared in the LLL LdV RoboBraille SMART project into a set of learning objects for popular e-learning platforms for web and tablet deployment.

For all materials produced by this project

Because the material covers teaching of students of various age, they are named students, learners, pupils and children. The material also reflects the different culture and level of inclusion practices of the project partners. The guide is not a substitute for formal training of teachers.

Introduction to this teaching guide

Low vision/partial sight

Low vision consists in a non-correctable vision loss that interferes with daily activities. It is defined in terms of function, rather than numerical test results. It takes into account both visual acuity and visual field.

Teachers must keep into the account the variety of partially sighted students (different pathologies, central or peripheral visual difficulties, daily or nocturnal vision etc.) and therefore different strategies and recommendations must be selected for each of them.

Two children may well have the same medical condition and even the same visual acuity and yet require remarkably different support within the school.

Children can be trained to use their functional vision to maximum effect; their motivation can be encouraged by following simple, often common sense principles when providing them with educational materials, planning their environment and allowing them the freedom to explore, experience and memorise this environment.

Partially Sighted Students' teaching and learning approach is not the same as that for the blind students, however in both cases teachers know that total or partial lack of vision is not an obstacle to learning.

Unlike blind students, Partially Sighted Students have a partial command of the experiential world around them, often they can take advantage of the experience accumulated before the loss of sight.

Modern pedagogical criteria referred to students with disability are based on the International Classification of Functioning [1](ICF). ICF measures both health and disability, takes into account the context and therefore teachers must base their strategies on the functioning profile and not only on the disability of their students.

Teachers may evaluate the opportunity of programming a personalised educational plan for each student with visual disability, based on the learner's abilities, needs, special requirements, prior learning, individual experiences, specific areas of strength and weakness. The individual plan should include strategies based on each student's pace and learning style, being specifically goal-oriented. It needs a continuous re-adjustment according to the feedback received from the student (new skills, knowledge, attitudes) and his learning outcome.

[1] ICF is the WHO framework for measuring health and disability at both individual and population levels. (2001 Resolution WHA 54.21)

Sensory-Perceptual Learning

The perceptual process allows us to experience the world around us and for people with visual disability it is the main way to gather information. Touch, sound, taste are often the only medium to interact with the people and objects around us**.**

Perception is our sensory experience of the world and involves both recognising environmental stimuli and actions in response to these stimuli. Through the perceptual process, we gain information about properties and elements of the environment that are critical to our survival. Perception not only creates our experience of the world around us; it allows us to act within our environment.

Perception includes the five senses; touch, sight, hearing, smell and taste. It also includes what is known as proprioception, a set of senses involving the ability to detect changes in body positions and movements. In addition, it involves the cognitive processes required to process information, such as recognising the face of a friend or detecting a familiar scent**.**

Partially sighted persons spontaneously use alternative channels to acquire and re-organize information.

The perceptual process to acquire information goes through sequential steps, it is not a global, simultaneously visual approach as with sighted people. Partially sighted persons cannot take advantage of the anticipatory function of sight. While a full sighted person can "see" the door handle while he/she is approaching the door, the blind or partially sighted person must first go through the details of the door using a "touch mode" and only after decide what to do.

Teachers should encourage and base teaching and learning strategies on the use of all the senses: visual (sight), auditory (hearing), kinaesthetic/tactile (touch and balance), gustatory (taste) and olfactory (smell). They represent an integrative support to help the student to acquire the missing details and re-adjust distorted information. Each student will have his own channel of preference and his own perceptual mode. The multisensory approach is recommended for **all** the students and is an inclusive strategy.

Narrative, descriptive mode. More complex situations, items, themes will be introduced during the lesson through a descriptive, narrative mode to compensate for the lack of interaction with the real object, situation etc.

The support of life-like situations and direct contact with the material will help stimulate concept development and cognitive functions.

Specialised pedagogies for teaching first language to partially sighted students

- Language, either maternal or second language, is the most important compensating tool for students with visual disability: listening versus reading, talking versus writing, narration and description compensate the lack of visual information.
- An inclusive teaching and learning environment must stimulate all the students towards sensory integration rather than let them proceed "sense by sense".
- Maternal language students are presumably around 5 or 6 years of age, and working with them requires an initial pragmatic approach and a slow, progressive pace. *"each context (….) provides a unique opportunity to learn some aspect of language: whole words or phrases, object labels or words for action and states (….). Thus as the range of context varies, opportunities for language learning will differ for individual children" (Gleason, 2001).*
- IRR speech is the language learnt by **I**mitation, **R**epetition, **R**outine. Non-verbal language (mimic, gestures, meeting of looks, smiles) being inaccessible, the phase of IRR speech may be longer than in sighted children; however verbal memory, capacity of retention and imitation are helpful assets.
- The acquisition of sounds, melody, rhythm and intonation of the language is facilitated by the excellent vocal-auditory learning channel.
- There are two styles of language acquisition by all children (regardless of disability): the analytic approach – from the parts to the whole – (combination of syllables into words, words into phrases, phrases into structure of the period) and the global approach (working from the whole to the part).
- The global, holistic approach (gestalt style language learning) is mostly preferred by children with visual difficulties, because they are unable to visually associate the sound of syllables or words to the articulation of the moving lips.
- In the holistic language processing and acquisition the learners will slowly develop modified and expanded language patterns introducing modifications, varying some elements or expanding the model, thus improving autonomously their command of the language.

Challenges relating to the disability/specific learning difficulty

General challenges

The most common barrier to teaching the partially sighted students is represented by the traditionally sight based visual teaching approach, with information and teaching material offered in a visual format.

- Non-accessible textbooks (small print, too many images, diagrams, illustrations)
- Handwriting difficulties
- Copying from the chalkboard
- Lack of eye contact and impossibility to catch non-verbal communication such as gestures, smiles, sad faces)

Specific challenges in the process of language acquisition

- Word identification (learners' vocabulary in terms of words known)
- Words phonetics (sounds and combination of sounds)
- Words comprehension (basic meaning, opposite meaning, analogies)
- Words spelling (words with the same sound and different spelling)
- Building vocabulary
- Comprehension word by word and global comprehension of a sentence, a paragraph, an entire text

Other barriers

- Poor space perception and spatial coordination by the students (spatial concept of height, length, depth, width)
- Notion of colours (use of conventional clues)
- In order to understand and comply with the students learning style, it is essential that the teachers assess the visual condition and modality of the PS student (central vision, peripheral vision, visual acuity, visual field etc.) and their preferable communication channel (tactile, auditory, verbal). Each student has his unique learning style.

Compensatory skills need to be introduced at an early stage of education:

- Visual communication must be integrated by descriptions, exploratory and experiential approach: teaching through concrete meaningful experiences and learning through hands-on exploration material

- The possibility to understand the characteristic of an object and its spatial relationship with other objects will stimulate concept development
- Development of listening and auditory skills at an early age, since listening is a major source of information (e.g., identification of a variety of environmental sounds, sound games etc.)
- Tactile graphics and charts are useful in the case of severe vision impairment, especially in relation to geographical maps, flat and solid geometric shapes, science education etc.

Other issues to be considered

- Clarity and contrast. Contrast is one of the most critical factors in enhancing visual functioning, for the legibility of printed materials as well as in environmental design. Text should be printed with the best possible contrast and accessory or equipment should have bright contrasting colours.
- Lighting: each student's preference and needs for lighting should be assessed and individual adjustments should be made to determine which is the most comfortable level of lighting. The type of lighting and its intensity, colour and direction all affect an individual's visual performance.
- Ease of access for mobility and independence, spatial understanding and organisation of materials are essential to move at ease in the school environment, to keep track of school material, (accessible labelling system like large print or tactual picture labels).
- The acoustic environment: A visually impaired child is definitely reliant on his auditory channel for input of information. It is vital then to provide good acoustic conditions avoiding acoustic glare, unnecessary background noises impair orientation and listening performances.

A description of suitable teaching methodologies and practices

- Life-like situations must be selected in order to stimulate concept development and cognitive functions
- Continuous exposure to listening and understanding (relying on partially sighted students excellent vocal-auditory abilities)
- Integration of alternative sensory channels to stimulate imagination, to acquire missing details or re-adjust distorted information:
    - Auditory channel (e.g., noise of water/sea, the perception of an air draft, a distant emergency alarm sound),
    - Tactile channel or olfactory medium (the smell of freshly cut grass or burning smell, etc.).

Organisation of class teaching

- All activities in the classroom should be orderly and systematic
- Teachers will plan the lesson ahead
- Given the slower pace of work of the visually impaired student, there will be special focus on reiterating certain pieces of information
- Curriculum adjustments in the format of didactic material (large print, font legibility, marked graphic contrast, broad felt tip markers simple shapes/words/phrases)
- Educational setting (i.e. the number of variables capable to increase the student's attention and participation – time, space, roles, rules, relationship)
- Dramatised activities (role play, speech and drama), continuous exposure to listening, team based learning), preferential alternative perceptive channels

Lack of visual spatial ability requires a special support in orientating the student with the spatial dimension of didactic material (books, exercise books, drawing papers, blackboard, computer screen): the school environment is not usually within the direct control of the visually impaired child.

Relief strategies

- Extra timing allowance.
- Replace written tests with oral tests.
- Setting (lighting, possibility to sit near the blackboard).

- Labelling system.
- Explain what steps are needed to reach the desired outcome.
- Repetition and routine.
- Face to face learning activities.

Figure 1: Student making eye-contact with teacher

- Instruct classmates to avoid non-verbal language (gestures, mimics that need eye contact) or addressing the student without calling out his/her name.
    - Note: It is difficult to avoid using the non-verbal language among students, which is used in all connections in the society. The partially sighted student has to cope with that anywhere else. It is perhaps better, that the other students are aware of the lack of ability to read this language.

Figure 2: Avoid visual-only gestures

- Notify changes in the classroom (obstacles, students sitting in different desks from the previous day).
- Dramatized activities (role play, speech and drama).

- Support of conceptual maps.

Adjustable, flexible format of teaching material and test material

- Large print (font size 16 and over), bold print (avoid slanted/italic printed characters).
- Avoid crowded, close together or full pages of print.
- Preferable font style: sans-serif.
- Marked graphic contrast.
- Simple shapes.
- Digital presentation.
- Use of broad felt pens or markers (black or coloured), with special pencil grips for the student, if necessary.
- Use of highlighter markers to help with reading (if needed).

Figure 3: Write with broad felt pens and markers

Compensatory and dispensatory measures

- Reduce the number of items on the page
- Allow students more time for copying from the board and/or move students closer to the chalkboard, or place material to be copied on his/her desk
- Provide students with a bookmark to help keep place when using a standardised scan sheet, have someone fill in the sheet for the student or do not require the use of a scan sheet
- Frequent visual breaks during sustained near point work

Figure 4: Bookmark in magnifier

Didactic materials for young learners

For young learners, teachers are able to be more practical. They usually have more time to focus on real objects or use of body parts in order to improve the learning process.

Figure 5: Interactive whiteboard

REALIA (objects from real life like plastic bottles, glasses, toys and so on) will strengthen students' association between words and the objects.

Learning technologies for inclusive teaching of first language to partially sighted students

Teachers should definitely rely on audio material to compensate for the limited sight of their students.

Songs and videos supported by voice output help students of all ages to learn the correct sounds and rhythm and have fun at the same time.

Often children tend to refuse the use of assistive ICT technologies, because of the stigma associated to them. Technological devices such as optical lenses, or magnifiers must be introduced slowly and discreetly. Tablets, are better accepted by the students, being non-specific devices. The age of the students must be taken into consideration: not all the technical devices are recommended at an early age.

Tablets first conceived as instruments for entertainment purposes, have now become a powerful tool in education, among other functions. In the eyes of students with disabilities, they represent a non-discriminatory device, extremely popular among both teachers and students. They promote social interaction by supporting pairs or small group inclusive activities that lead to peer monitoring, collaboration and problem solving.

Tablets feature the option of an attachable and detachable keyboard in addition to default accessibility options like magnification, colours inversion, speech output etc. IOS speech output (voiceover) is a default application, while for Android operating system it is necessary to use a screen reader.

With iPads, teachers can create personalised lesson plans assessing the needs of each student. There is a vast amount of apps available for the iPad specifically tailored to special needs children. Given the options, teachers can choose which apps best fit their teaching methods relevant to the way their students learn.

Figure 6: Reading on an iPad

Figure 7: iPad with keyboard

Figure 8: iPad in reading position

Figure 9: Stand for tablet

Electronic devices for accessible reading

Electronic Magnifiers (or CCTVs closed circuit television systems) are tools used to enhance vision. They enlarge or magnify print, pictures, artwork, or whatever else is placed under the camera; in addition, they can also enhance the contrast and brightness, reverse colours, apply rulers and reduce canvas to facilitate reading. They come in different varieties and sizes. The desktop or table-top version has a camera system that displays a magnified image on a monitor. Some models also have (OCR), along with speech output in order to hear the text being read aloud at the same time it is displayed on the monitor. In addition to seeing the reading material on the monitor, models with OCR optical character recognition and speech output allow the student to hear text and documents read out loud.

Figure 10: Desktop Magnifier

The portable version is a device with a camera on the underside that captures the image of text, pictures, or other items, and a monitor on the top side that displays the image. It can also have a built-in bright light. It can be hand held or meant to be placed directly on the reading page. A hand-held magnifier is especially useful for brief "spot" reading and for portable use. They have a smaller field of view than a CCTV.

Figure 11: Hand held portable video magnifier

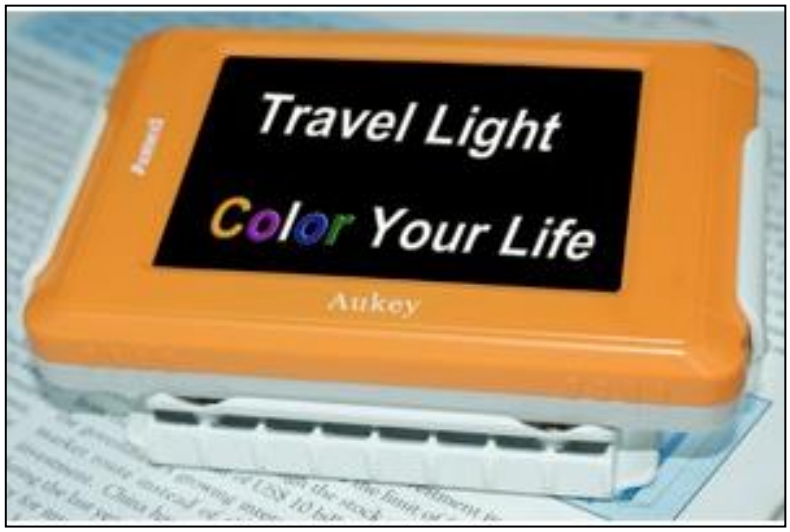


Figure 12: Portable video magnifier

Figure 13: Portable magnifier combining distance and near viewing

There are also models specifically produced for use in the classroom, because they have a flexible camera that can be directed towards the blackboard and display on the student's monitor what the teacher is writing on the board.

Figure 14: Long arm video magnifier

Computer accessibility tools

The two main computer accessibility tools are screen magnifiers and screen readers. They are both used for ASR audio supported reading. A screen magnifier is a software that interfacing with a computer's graphical output, enlarges part (or all) of a screen. Some screen magnifiers enlarge text, icons, cursor and other graphics up to 20 times or more. Screen

magnifiers provide features such as colour inversion, cursor customisation, different magnification (the presentation of the enlarged portion can cover the full screen, provide a lens that is moved around the un-magnified screen, or use a fixed magnified portion). Screen magnifiers also offer speech output. It can be used in concert with a screen reader. The digital text is displayed in on-screen magnified print in synch with speech driven by screen reader technology. Partially sighted students accessing visual and audio information simultaneously can have the advantage of seeing each word highlighted as it is spoken via synthesised speech.

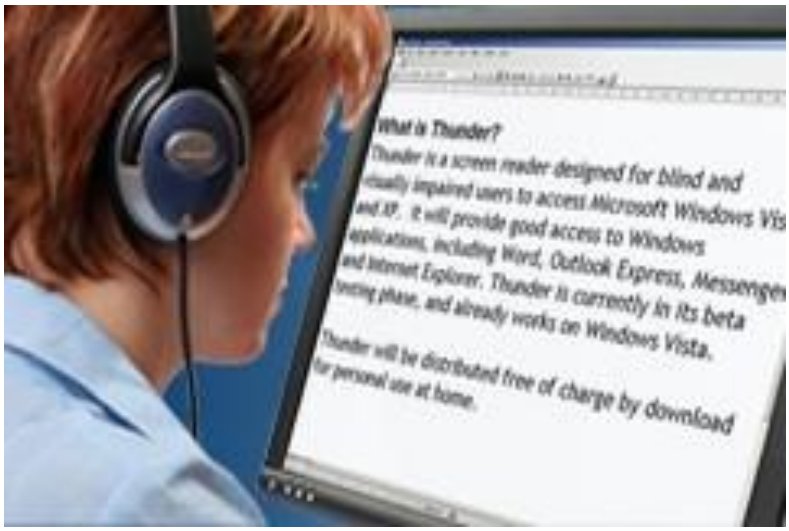


Figure 15: Screen reader

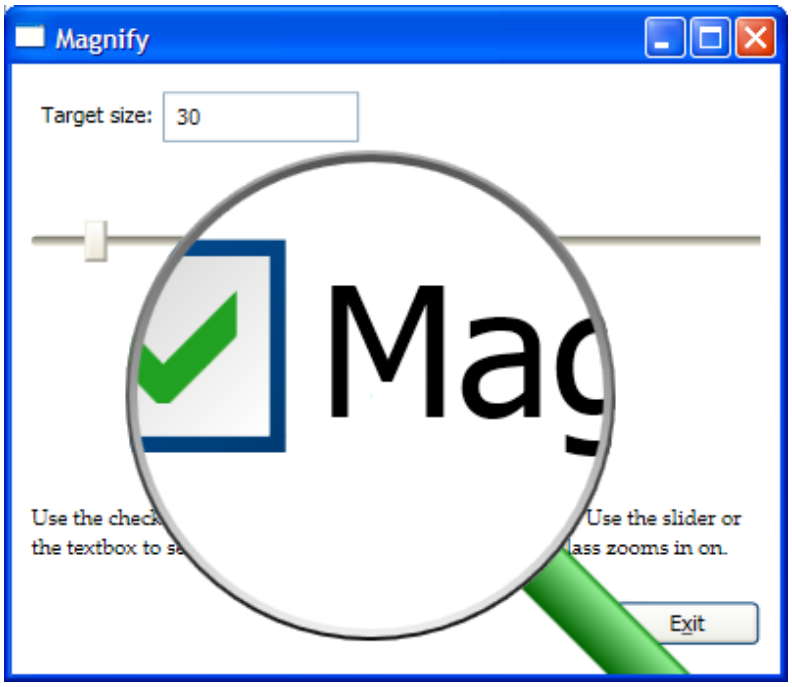


Figure 16: Screen magnifier

A Screen reader is a reading software, which reads aloud all of the text and text-based elements (such as characters, words, titles, paragraphs) displayed on a computer screen. Screen readers speak letters, words, numbers, punctuation, and elements aloud, sending the voice

output to the computer speakers or connected headphones. Screen readers announce each keystroke as you press it, decode and describe icons, and even describe certain graphic images. Screen readers also include special mouse navigation keys to manipulate the mouse pointer, moving it on the screen and to press other keys to perform a mouse click or double click. Screen readers are meant for blind students by they are also used by partially sighted students because they reduce eye strain and because sometimes the magnification offered by a screen magnifier is not sufficient.

Digital books

Partially sighted readers, though supported by enlarged prints or magnifiers take appreciably longer to complete tasks requiring reading than do their sighted counterparts and their reading rate levels are not comparable to those of average print readers. Students therefore supplement their print access with audio supported digital material.

An electronic book (or e-book) is a book publication made available in digital form, consisting of text, images, or both, readable on the flat-panel display of computers, e-book readers, tablets or other electronic devices. Also known as fluid eBooks reflowable formats support the individual needs of students with partial sight in terms of magnification, contrast, fonts as well as foreground and background colours. The two most common reflowable eBook formats are Mobi for Amazon Kindle and epub for all the other major devices including Apple's iPad and iPhone, B&N's Nook, Kobo, Google Play and OverDrive. A reflowable document is a document that can automatically rearrange its layout to fit any output device. For audio support e-books can be read via smartphones and tablets. Some smartphones and tablets feature default accessibility options like magnification, colours inversion, speech output etc. In particular, Apple devices feature a built-in screen-reader called Voice Over, which comes pre-installed in all Apple devices, including smartphones, tablets, TVs, watches. The Android OS features a similar application, called Talk Back, which is often already present on the device or that can be installed manually.

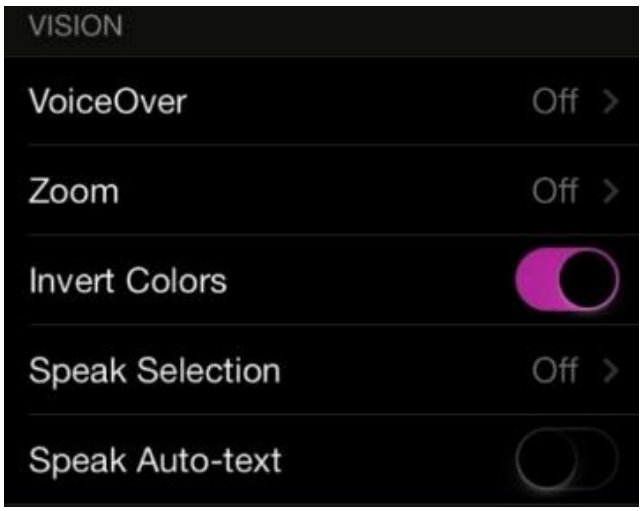


Figure 17: Smartphone screen with inverted colours

Figure 18: Smartphone with speech output

The Daisy format boosts special features that can improve reading experience, such as deep navigation functions, bookmarking, spelling, adding notes, etc.

Text to speech

A Text-to speech synthesizer is a piece of software that can convert text from an electronic document into an audio file using a synthetic voice that closely reproduces human voice. TTS engines are available in a variety of languages, and can coexist on the same machine, thus making it easier for foreign language students to convert long blocks of text into audible format. In addition, some screen-readers combine TTS with magnification so that a student can hear spoken text and watch it at the same time, this activates both auditory and visual perceptions.

The RoboBraille service

Digital material can be converted into accessible alternative formats by using the RoboBraille service.
RoboBraille is a web and email service capable of converting educational material and other textual material into a range of accessible formats including mp3 files, e-books, digital talking books and Daisy. The service can furthermore be used to convert otherwise inaccessible documents such as scanned images and pdf files into more accessible formats. RoboBraille offers the partially sighted students three categories of services:

1. Audio services: All document types listed in the previous section may be converted into mp3 files. Furthermore, RoboBraille is capable of converting well-structured Word documents (doc, docx, xml) into Daisy Talking Books complete with audio. Sim-

ilarly, RoboBraille can convert docx documents containing math (composed in MathType) into Daisy books with spoken math. The audio conversion services currently include high-quality voices for the following languages: Arabic, Arabic/English bilingual, Bulgarian, Danish, Dutch (male, female), English/American, English/British, French, German, Greenlandic, Hungarian, Icelandic, Italian, Lithuanian, Polish, Portuguese, Romanian, Russian, Slovenian Spanish/Castilian and Spanish/Latin American.

2. E-Book services: Most document types listed above may be converted into the popular EPUB and Mobi Pocket (Amazon Kindle) e-book formats. The service also supports conversion of documents into the EPUB3 format, including EPUB3 books with media overlay. Furthermore, EPUB may be converted to Mobi Pocket and vice versa. To accommodate users with low vision, the base line of the body text in an e-book may be raised to allow for more appropriate text scaling in mainstream e-book readers.

3. Accessibility services: Otherwise inaccessible documents such as image files in gif, tiff, jpg, bmp, pcx, dcx, j2k, jp2, jpx, djv and image-only pdf, as well as all types of pdf files can be converted to more accessible formats including tagged pdf, doc, docx, Word xml, xls, xlsx, csv, text, rtf and html. Word and rtf files are converted into text or tagged pdf files subject to the format specified by the user in the subject line, e.g., txt or pdf. PowerPoint files are converted into tagged pdf, web projects or rtf files. In addition to the traditional email-interface, RoboBraille is available via the web form at http://www.robobraille.org/

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With the support of
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of the European Union