

# ICT DIRECTORY FOR INCLUSIVE EDUCATION

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Humanity & Inclusion, January 2021

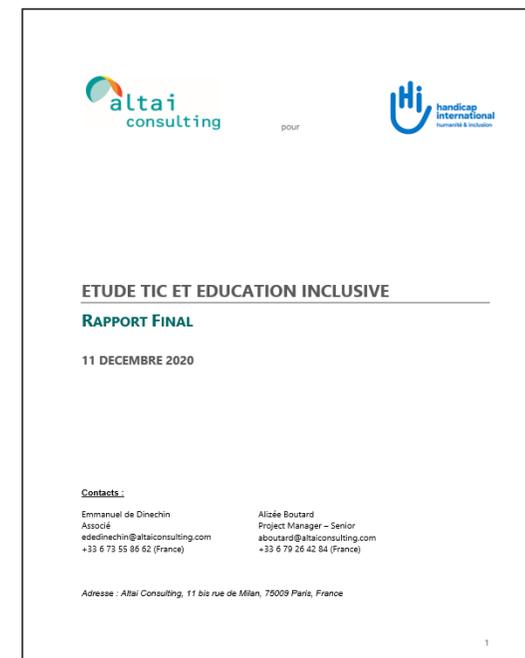


## Introduction to the ICT Directory for Inclusive Education

1. Visual impairment
2. Hearing impairment
3. Communication difficulties
4. Difficulty remembering/concentrating/learning
5. Difficulty moving upper limbs
6. Other ICT uses

## The ICT Directory for Inclusive Education presents technologies that can support inclusive education. It is accompanied by a report.

- The ICT Directory for Inclusive Education presents Information and Communication Technologies (ICTs) that have the potential to foster the education of children with disabilities in inclusive schools.
- The ICTs are presented according to the **type of difficulties** they can address. These difficulties, which are defined in the Washington Group questionnaire, can affect a student's participation in the classroom:
  - *Visual impairment*
  - *Hearing impairment*
  - *Communication difficulties*
  - *Difficulty remembering/ concentrating/ learning*
  - *Difficulty moving upper limbs*
- This ICT Directory is accompanied by a **final report** ('ICT and Inclusive Education Study - Final Report') that details the methodology of the project and explains the process used to produce the Directory. **Reading the accompanying report** will help understand how the directory has been developed.



*Final report of the study 'ICT and Inclusive Education' accompanying the Directory*

# Standardised ICT Directory Presentation Sheet

ICT type, with colours for easy reading

● Accessibility features    ● Equipment    ● Educational content or activity

● Accessibility features allowing the use of hardware

<p>ICT name</p>	<div style="background-color: #2c4e5c; color: white; padding: 5px; text-align: center;"> <span style="color: red; font-size: 20px; margin-right: 10px;">●</span> Screen reader                 </div>  <p>Possible uses:</p> <div style="border: 1px solid gray; border-radius: 10px; padding: 5px; background-color: #e0e0e0; text-align: center;">                     Access a computer and written material, express oneself in writing, take notes                 </div> <p>Description Software that enables a visually impaired or blind student to use a computer by speaking the screen and offering adapted navigation</p>	<p><b>Scope of use</b></p> <ul style="list-style-type: none"> <li>A screen reader allows the visually impaired or blind student to operate a computer (or smartphone) and access all associated educational resources.</li> <li>It is a complex tool that can be difficult to use, as it has to be mastered in addition to the computer (or smartphone).</li> <li>The use of headphones for speech feedback may isolate the student from the classroom environment and this must be taken into account by the teacher.</li> </ul> <p><b>Feasibility</b></p> <ul style="list-style-type: none"> <li><b>Technical requirements:</b> A computer with a compatible operating system, headphones, and an internet connection (optional) to download the software</li> <li><b>Adoption requirements:</b> Mastery of the computer (especially the keyboard) and the screen-reading software by the student, which may take some time</li> <li><b>Logistics:</b> Relatively easy to implement if the school already has computers, as the software can be downloaded directly from the internet.</li> </ul> <p><b>Cost</b></p> <ul style="list-style-type: none"> <li>While some of the applications are free (including NVDA on Windows and VoiceOver on MacOS), other more powerful applications are quite expensive, such as Jaws, which is accessible from EUR 1,500.</li> </ul>	 <p>See</p> <p>Examples of products</p> <ul style="list-style-type: none"> <li><a href="#">NVDA</a> (Windows, free)</li> <li><a href="#">JAWS</a> (Windows, paid)</li> <li><a href="#">VoiceOver</a> (MacOs, free)</li> <li><a href="#">Orca</a> (Linux, free)</li> </ul> <p>User</p>  <p>Student</p>
<p>Educational activities made accessible by the ICT</p>	<p>ICT description</p>	<p>ICT assessment</p> <p>Scope of use ★★★★★</p> <p>Feasibility ★★★★★</p> <p>Cost ★★★★★</p>	<p>Type of difficulty</p> <p>Examples of products, brands or content sources, with hypertext link</p> <p>ICT user</p>

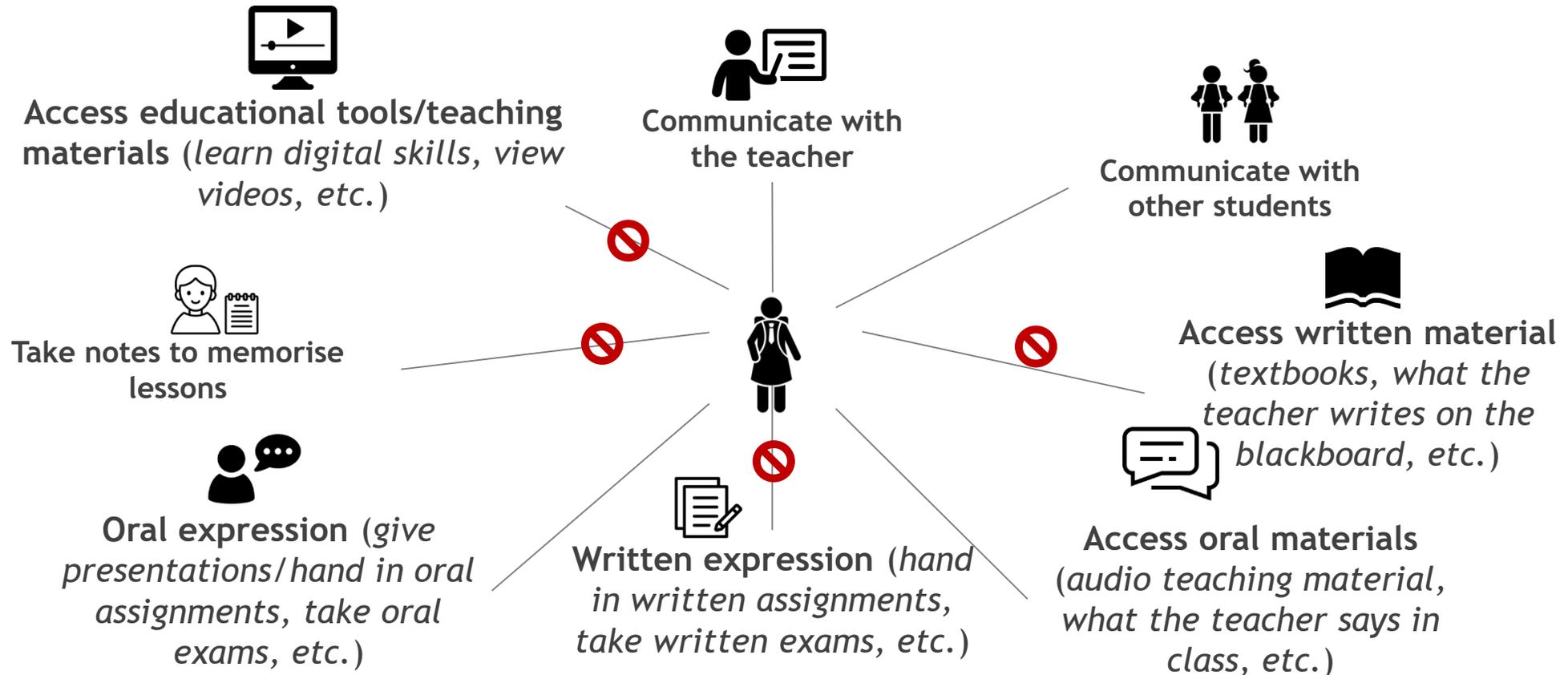
## Introduction to the ICT Directory for Inclusive Education

- 1. Visual impairment**
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6. Other ICT uses



In a non-inclusive school, children with disabilities are denied access to certain educational content and activities

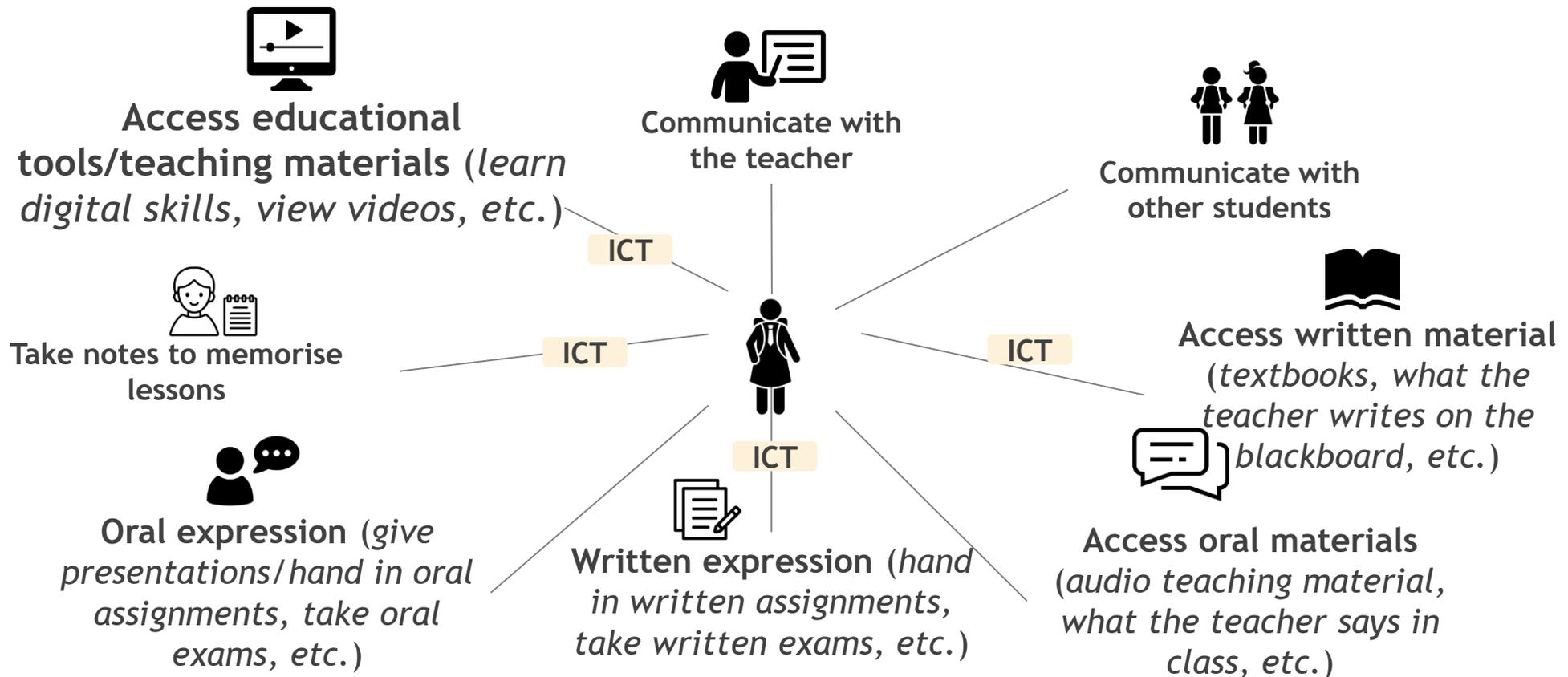
## Consequences of lack of inclusion for a child with visual impairment



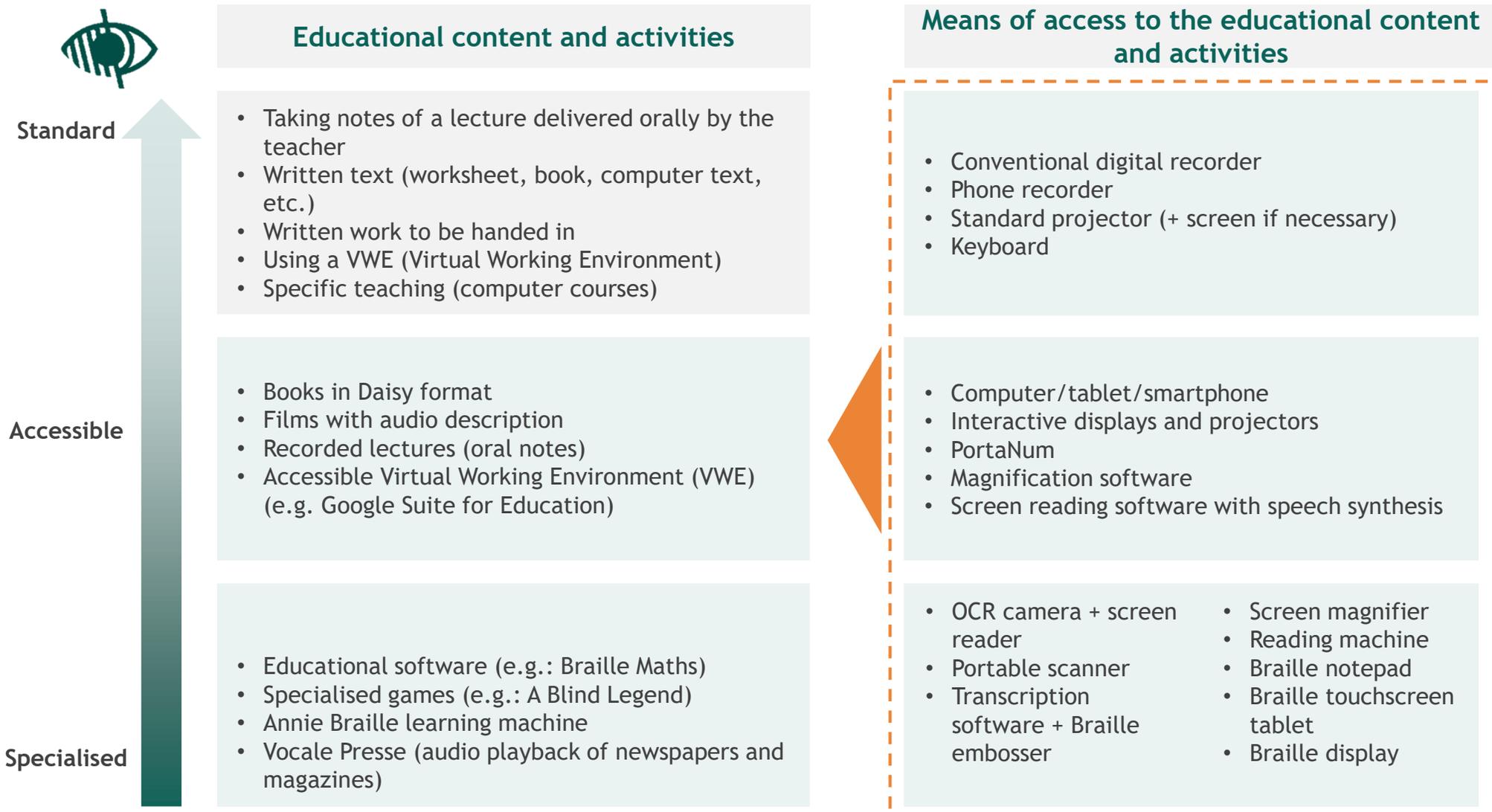


ICTs can help schools be more inclusive by providing alternatives to the usual non-inclusive educational content and activities

## Potential of ICTs for the educational inclusion of children with visual impairment



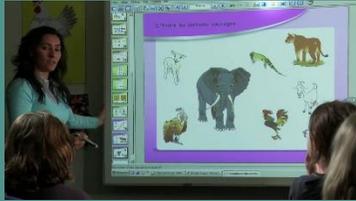
# Identified ICTs that can enable access to educational content and activities for children with visual impairment





## Hardware allowing access to educational content or activities

### Interactive screen



#### Possible uses:

Follow the course on the blackboard, access educational material

#### Description

An interactive touchscreen designed for use in the classroom as a replacement for the traditional blackboard, with a wide range of educational applications at all levels

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- The interactive screen replaces the blackboard or white board in the classroom. It allows documents to be presented in a digital form, displayed in very large size and with sound (thanks to integrated interactive software with screen reading functionality), so that the documents are accessible to all students in the classroom.
- The interactive screen can also be used to connect mobile devices such as a tablet or laptop in order to transfer the content displayed to a personal device suitable for the visually impaired student who can then use the device to follow the course.
- It is a flexible and versatile solution and is ideal for promoting access to school for visually impaired children.

#### Feasibility

- **Technical requirements:** Power supply, internet connection (optional), and personal equipment for each student (tablet, laptop)
- **Adoption requirements:** Integration into the teacher's educational methods, which requires preparation
- **Logistics:** Not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- Prices of interactive screens range from EUR 1,000 to over EUR 10,000. There are cheaper mobile boards starting at EUR 250.



See

#### Examples of products

- [EASYPITCH ADVANCE](#)
- [EASYPITCH PRO 4K](#)
- [SMART BOARD 7086](#)

User

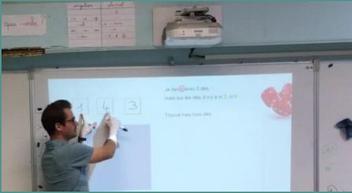


Teacher



## Hardware allowing access to educational content or activities

### Interactive projector



Possible uses:

Follow the course on the blackboard, access educational material

A standard projector mounted a few centimetres from the wall and equipped with an interactive module that turns any projected image into an interactive surface

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- Like the interactive screen, the interactive projector replaces the blackboard or white board in the classroom. It allows documents to be presented in a digital form, displayed in a very large size or with sound (thanks to integrated interactive software with screen reading functionality), so that the documents projected onto a wall or whiteboard are accessible to all students in the classroom.
- It is a flexible and versatile solution and is ideal for promoting access to school for visually impaired children.
- The main advantage of the projector over the screen is that children can write with an erasable pen (which is more suitable than a stylus) when the image is projected onto a whiteboard.

#### Feasibility

- **Technical requirements:** Power supply, white surface (white wall, whiteboard, etc.) Note: The lamp is powerful and the classroom does not have to be dark.
- **Adoption requirements:** Integration into the teacher's educational methods, which requires preparation
- **Logistics:** Not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- Prices of interactive projectors range from EUR 1,000 to EUR 5,000 depending on the model, to which one may have to add the price of a whiteboard and erasable markers for the children.



See

#### Examples of products

- [Epson EB-685WI](#)
- [Hitachi CP-TW3506](#)
- [Mimio MIM1762262](#) (mobile device)

User



Teacher



## Hardware allowing access to educational content or activities

### Standard projector (+ screen)



#### Possible uses:

Follow the course on the blackboard, access educational material

#### Description

A standard projector connected to the teacher's computer allowing educational material (texts, images, videos, etc.) to be projected onto a wall.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- The standard video projector is a tool allowing a computer screen to be projected onto a wall (or a screen) in a classroom (texts, images, videos, etc.). This makes it easier for visually impaired students (and the other students too) to see the content.
- It is particularly useful in large classrooms with many students where it is sometimes difficult to follow the course from the back of the classroom.

#### Feasibility

- **Technical requirements:** Power supply, a white surface (white wall, whiteboard, etc.) or a projector screen, and a computer for the teacher
- **Adoption requirements:** Teacher's computer literacy (the video projector itself is easy to use), and integration of the digital material into his or her teaching methods. No adoption requirements for the children.
- **Logistics:** Available in the countries of intervention from specialist dealers.

#### Cost

- A standard projector costs at least EUR 450 and the latest and best-performing models can cost up to EUR 3,000.



See

#### Examples of products

- [Epson SVGA EV S05](#)
- [Acer X118H](#)
- [WXGA Epson EB-W41](#)

User



Teacher



## Hardware allowing access to educational content or activities

### Computer



#### Possible uses:

Access educational content, communicate in writing, take notes

#### Description

A computer is a tool with many educational possibilities. It is both the content (for computer training or coding, for example) and a means of accessing the content.

#### Assessment

Scope of use	★★★★★
Feasibility	★★★★☆
Cost	★★★☆☆

#### Scope of use

- A computer can be used for various basic tasks in school, such as taking notes or doing exercises.
- It also gives access to a wide range of content (audiobooks, learning software, etc.) and educational activities (written expression, digital literacy, viewing videos, etc.).
- Adaptations are necessary for a computer to be used by a visually impaired student.

#### Feasibility

- **Technical requirements:** Power supply and suitable hardware for controlling the computer:
  - For **visually impaired students**, a sufficiently large screen, adaptation of the displayed content (e.g. with magnification software) and/or audio feedback.
  - For **blind students**, use of a screen reader and/or Braille feedback of the content displayed on the screen. This feedback is managed by accessibility software (screen-reading software). Braille content requires a Braille console.
- **Adoption requirements:** Computer literacy, which may take time for some students.
- **Logistics:** Available in the countries of intervention.

#### Cost

- The price of a lightweight laptop with good battery life ranges from EUR 200 to EUR 2,000 for high-end laptops. The price of a desktop computer that is more powerful and durable ranges from EUR 300 to EUR 3,000.



See

#### Examples of products

- [ChromeBook](#)
- [HP EliteBook](#)
- [ASUS Vivobook](#)
- [Acer Aspire 5](#)

User



Student



## Hardware allowing access to educational content or activities

### Touchscreen tablet



#### Possible uses:

Access educational content, communicate in writing, take notes

#### Description

An intuitive and easy-to-use touchscreen mobile computer. It has many features and applications that make it accessible.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- The touchscreen tablet allows visually impaired students to use content in an accessible form thanks to various applications (screen readers for example), some of which are free and sometimes pre-installed (such as VoiceOver, the iPad's screen reader).
- Its relative ease of use and the availability of educational applications make it a very interesting tool in elementary education.
- There are educational applications for tablets that are dedicated to visually impaired students. The main limitation of the tablet compared to the computer is the difficulty of using Office.
- A touchscreen tablet can be used with a conventional keyboard to allow visually impaired students to enter text.

#### Feasibility

- **Technical requirements:** Power supply, an internet connection (optional), a stand for a better sitting position, headphones in order to use the screen reader's speech synthesis.
- **Adoption requirements:** Familiarity with the tool, and possibly training of about 20 hours on using a conventional keyboard.
- **Logistics:** Usually available in major retail outlets.

#### Cost

- Prices of touchscreen tablets range from EUR 160 to over EUR 1,000 depending on the model and the features.



See

#### Examples of products

- [Samsung Galaxy Tab S7](#)
- [HUAWEI MediaPad T5](#)
- [Lenovo Tab P10](#)
- [Apple iPad New 10.2](#)

User



Student



## Hardware allowing access to educational content or activities

### Blitab



#### Possible uses:

Access educational content, communicate in writing

#### Description

Blitab is a tablet computer with a touchscreen and a 14-line Braille display. It transcribes the content displayed on the touchscreen into Braille (whether it is a text document, a web page or an application).

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- The Blitab Braille tablet allows the student to quickly interpret content sent by the teacher through a Braille display, even when the content is not in a text format.
- It is a stand-alone personal tool designed for education and access to school for visually impaired and blind children: the tablet computer converts any document into Braille and offers tactile navigation.
- It is designed to be inclusive and is an option to be considered for school inclusion in the countries of intervention, as it is affordable compared to other resources.

#### Feasibility

- **Technical requirements:** Power supply, an internet connection (optional), headphones for speech synthesis and navigation.
- **Adoption requirements:** Knowledge of Braille by the visually impaired student; familiarity with the tool, which may take a few days for complete mastery
- **Logistics:** This equipment is not available in the countries of intervention and must be imported from the manufacturer.

#### Cost

- The Blitab tablet costs approximately EUR 465.



See

Resource website:

- [Blitab](#)

Another Braille touchscreen tablet:

- [InsideONE](#)

User



Student



## Hardware allowing access to educational content or activities

### Smartphone



#### Possible uses:

Access educational content, communicate in writing, take notes

#### Description

A smartphone is a mobile phone that usually has a touchscreen and some of the features of a laptop. Some models have many accessibility features.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- A smartphone can be used for various basic tasks in school, such as taking notes (with a recording application).
- It also gives access to many educational resources such as audio books and learning software and can be used for reading documents or browsing the internet.
- Below are some of the many applications that make smartphones accessible to students, after some learning:
  - **TalkBack** (Android) - facilitates interaction with the smartphone through audio feedback and adaptive navigation
  - **Mobile Accessibility** (Android) - a complete solution consisting of a series of applications specially designed for the visually impaired Price: EUR 75.
  - **VoiceOver** (iPhone) - pre-installed screen reader

#### Feasibility

- **Technical requirements:** Occasional power supply for recharging and an internet connection for some uses
- **Adoption requirements:** Relatively easy to use for the student, but may require several days of practice
- **Logistics:** Generally available in the countries of intervention

#### Cost

- The price of a smartphone ranges from EUR 40 to EUR 1,000 for high-end devices. Generally, the most expensive devices, such as the iPhone, have many built-in accessibility features.



See

#### Examples of products

- [SmartVision2](#) (specialised equipment)
- [Samsung Galaxy](#)
- [Huawei P40](#)
- [iPhone](#)

User



Student



## Hardware allowing access to educational content or activities

### Transcription software + Braille embosser



#### Possible uses:

Access written material

#### Description

This solution enables the production of Braille documents from standard texts that have been digitised.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- With a transcription software and a Braille embosser, the teacher can produce accessible material for his or her visually impaired students who are proficient in Braille. Although it has its limitations (cumbersome Braille paper), this solution can increase the inclusiveness of a school in a practical, simple and effective way.

#### Feasibility

- **Technical requirements:** Power supply, a computer, Braille transcription software and Braille paper
- **Adoption requirements:** This solution requires proficiency in Braille for the visually impaired student and training for the teacher, who must be able to produce a Braille print version of all the material he or she hands out to students.
- **Logistics:** Using this solution in an inclusive school requires the acquisition of a Braille embosser, which may be a problem in the countries of intervention. However, once installed, the Braille printer can be used by several teachers in the same school and be useful to many visually impaired students for several years.

#### Cost

- The price of a Braille embosser ranges from EUR 1,000 to more than EUR 5,000 for the best ones. The cost of the computer and the transcription software (EUR 700 for Duxbury Braille Translator) also has to be taken into account.



See

#### Examples of products

Braille transcription software:

- [Duxbury Braille Translator](#)

Braille printer:

- [BrailleBox V5](#)
- [EmBraille](#)
- [Index Basic](#)

User



Teacher



## Hardware allowing access to educational content or activities

### Braille notepad



#### Possible uses:

Communicate in writing, take notes

#### Description

An electronic note-taking device with Braille feedback (and sometimes voice feedback) as well as many other features offered by built-in programs (word processor, file manager, address book, etc.).

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- A Braille notebook is a **stand-alone** device that can be used for many basic school tasks such as note taking and written expression. For a visually impaired child, this personal mobile device is more ergonomic than a computer.

#### Feasibility

- **Technical requirements:** A power supply to recharge the battery, an internet connection (optional), a USB cable for connection to the personal computer, and stereo headphones
- **Adoption requirements:** This system requires proficiency in Braille, as well as training (for students, teachers, assistants). Moreover, the use of this type of device should not be introduced too early in the schooling process, as the reading of Braille on paper has certain specificities; its use therefore depends on the level and abilities of the student.
- **Logistics:** The acquisition, maintenance and use of this equipment in classrooms are three delicate aspects in the context of the intervention countries, and many adjustments are necessary.

#### Cost

- Usually between EUR 4,000 and EUR 9,000 depending on the model, the number of characters and the optional features available



See

#### Examples of products

- [Esytime](#) by Eurobraille
- [Braillesense](#) by HIMS
- [Pronto](#) by Baum

User



Student



## Hardware allowing access to educational content or activities

### Digital recorder



Possible uses:

Take notes

#### Description

A device that allows the taking of personal voice notes through audio recordings of the environment. It comes in the form of a case with control buttons and sometimes a navigation screen.

#### Assessment

Scope of use ★★☆☆

Feasibility ★★★★★

Cost ★★★★★

#### Scope of use

- This device can be of great use to visually impaired students in their schooling, namely for **note taking** and information gathering. It can also be used to manage and archive the files created. Its size and its weight (about 70 g) make it a discreet and easily transportable accessory that does not weigh down the user's school bag or pockets. It is a mitigative tool that is particularly useful for visually impaired students who do not master Braille or do not have suitable equipment.

#### Feasibility

- **Technical requirements:** AAA batteries or rechargeable batteries + power supply, headphones, and optionally a computer and a USB cable (for file storage and management)
- **Adoption requirements:** The use of this equipment is very simple and intuitive for the student. Because it is invasive, its use requires that the teacher be informed and rules be agreed upon. However, it is simple to use, discreet and very compact.
- **Logistics:** Available in the countries of intervention.

#### Cost

- This solution costs between EUR 25 and EUR 300 depending on the model.



See

#### Examples of products

- [Olympus DM770](#)
- [Sony LCD-UX560](#)
- [Philips DVT7500](#)
- [TASCAM DR-05](#)

User

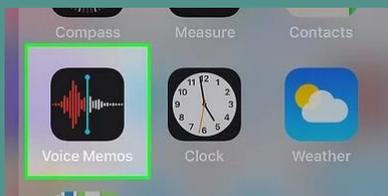


Student



## Feature/application allowing access to educational content and activities<sup>1</sup>

### Mobile phone + recording function/application



#### Possible uses:

Take notes

#### Description

Function (on a feature phone) or application (on a smartphone) allowing the taking of personal voice notes through audio recordings of the environment

#### Assessment

Scope of use ★★☆☆☆  
 Feasibility ★★★★★  
 Cost ★★★★★

#### Scope of use

- The application is equivalent to a traditional recorder and can be of great use to visually impaired students in their schooling, namely for **note taking** and information gathering.
- It is a **mitigative tool** for visually impaired students who do not have suitable note-taking equipment.
- This solution has the advantage of being directly integrated into the smartphone and is therefore easier to use than a conventional recorder; however, its disadvantage is that the phone's microphone, and therefore the audio recordings, are of poorer quality.

#### Feasibility

- **Technical requirements:** Occasional power supply to recharge the phone
- **Adoption requirements:** This solution requires the student to be familiar with the phone.
- **Logistics:** The solution is relatively easy to implement since it is integrated into many phones (both feature phones and smartphones).

#### Cost

- The recording application/function is usually free and pre-installed on the phone.



See

#### Examples of applications

- [iTalk Recorder](#) (iOS)
- [Smart Recorder](#) (Android)
- [Voice Recorder](#) (Android)
- [RecForge](#) (Android)

User



Student



## Hardware allowing access to educational content or activities

### Screen magnifier



#### Possible uses:

Access written material

#### Description

A screen magnifier improves the legibility of a paper document thanks to magnification, contrast and colour adjustments. It consists of a viewing screen, a camera and a tray/stand with adjustment buttons.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★★☆☆☆

Cost ★☆☆☆☆

#### Scope of use

- The screen magnifier allows visually impaired students to **perform many basic school tasks** with ease: reading a document (printed text, book, map, etc.), writing, reading over what one has written, observing and analysing an object, drawing, or calculating.
- This type of device **mitigates the limited availability of adapted materials**. It is very useful in primary schools, which often use paper-based material. It can also be used by everyone in the class; thus, using this tool to address the specific needs of one student benefits the whole class that can see the details of an object. It is a tool that helps to fight against stigmatisation.

#### Feasibility

- **Technical requirements:** Permanent power supply and adaptation of the student's desk (space, lighting).
- **Adoption requirements:** Relatively simple and intuitive solution that requires no special training
- **Logistics:** Available from specialist solution distributors. Once in place in a school, it can be used for many years.

#### Cost

- Screen magnifiers are **quite expensive**; prices usually range from EUR 2,000 to EUR 5,000 depending on the model and the features.



See

#### Examples of products

- [Clearview C](#) (by Optelec)
- [Magnilink \(LVI\)](#) (this device has no screen and must be connected to a monitor or computer)

User



Visually impaired student



## Hardware allowing access to educational content or activities

### OCR reading machine



#### Possible uses:

Access written material

#### Description

A device that a visually impaired student uses to read out printed (paper) documents thanks to optical character recognition (OCR) and speech synthesis

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- This solution for accessing written material in paper format is very user-friendly and is often more relaxing than a screen magnifier (which involves navigating). With the help of headphones, the student can read the same documents as his or her peers conveniently and discreetly.
- This type of device **mitigates the limited availability of adapted materials**. It is very useful in primary schools, which often use paper-based material.
- The major disadvantage of this tool compared to the screen magnifier is that it isolates the student from the classroom environment (use of headphones). However, it can be used by the whole class for a specific activity.

#### Feasibility

- **Technical requirements:** Power supply to recharge the battery, and headphones
- **Adoption requirements:** The equipment is very easy to use and does not require any special training.
- **Logistics:** Available from specialist solution distributors. Once in place in a school, it can be used for many years.

#### Cost

- Reading machines are **quite expensive**; they cost 2,500 to EUR 3,500 depending on the model.



See

#### Examples of products

- [Read Easy EVOLVE](#)
- [Optelec ClearReader+](#)
- [BLAZE ET PREMIUM](#) (pocket-sized reading machine)

User



Student



## Hardware allowing access to educational content or activities

### Hand-held scanner



#### Possible uses:

Access written material

#### Description

A hand-held scanner allows the visually impaired student to scan typewritten documents and convert them into digital format and then to audio if the scanner is connected to a screen reader.

#### Assessment

Scope of use ★★☆☆

Feasibility ★★☆☆

Cost ★★☆☆

#### Scope of Use

- When combined with a computer and screen-reading software, the hand-held scanner is a less expensive alternative to screen magnifiers or reading machines for giving visually impaired students access to written material in paper format. The students use the scanner to 'send' the content of the document from the sheet to the screen. It also allows students to retrieve notes from peers without having to borrow their sheets.
- However, the scanner cannot read a bound book. Moreover, manipulating the scanner takes time, which may result in the student falling behind his or her peers (-> lack of inclusion).

#### Feasibility

- **Technical requirements:** Power supply only
- **Adoption requirements:** The student may find it difficult to manipulate the scanner, but the teacher or the classmates can help. The use of this device requires that the student be computer literate, and screen-reading software is also needed.
- **Logistics:** Generally not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- The hand-held scanner alone costs between EUR 50 and EUR 200 depending on the model and the features. The price of the computer and the accessibility software needed to use the scanner must also be taken into account.



See

#### Examples of scanners

- [Vupoint - Magic Wand Scanner](#)
- [IRISCAN - Anywhere 3](#)
- [IRISCAN - Anywhere 3 wifi](#)

User



Student



## Software for access to educational content/activities<sup>1</sup>

### PortaNum



#### Possible uses:

Follow the course on the blackboard, access educational material

#### Description

PortaNum is a computer software which allows visually impaired people to read texts on a blackboard, or any resource at a distance.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- PortaNum is a free reading aid which allows the reading of texts at a distance (text/drawings on a blackboard, projection screen, etc.). The computer is connected to a good quality camera, a high-resolution webcam or a camcorder that films what we cannot read, and the software zooms in and applies image processing to adapt it to our vision (inversion, false colour, contrast, brightness or sharpness adjustment, etc.). You can record the images and take notes while viewing.
- It can therefore be a personal tool that allows the visually impaired student to see the blackboard like his or her peers.

#### Feasibility

- **Technical requirements:** A computer and a good quality camera, and optionally an internet connection to download the software
- **Adoption requirements:** Computer literacy for the student, installation of a camera, and consent of the teacher
- **Logistics:** This software can be easily downloaded directly from the resource website.

#### Cost

- The software can be downloaded free of charge, but the cost of the computer and the camera must be taken into account.



See

Download the resource:

- [PortaNum](#)

User



Visually  
impaired  
student



## Accessibility features allowing the use of hardware

### Conventional keyboard



PO **Express oneself in writing**

#### Description

When mastered by a visually impaired student and connected to a smartphone or tablet, a conventional computer keyboard allows for text entry and improved use of the device.

#### Assessment

Scope of use ★★☆☆☆  
 Feasibility ★★☆☆☆  
 Cost ★★☆☆☆

#### Scope of use

- When a visually impaired or blind student uses a smartphone or touch tablet, he or she can use the various accessibility features (e.g. screen reader with speech synthesis) and adapted applications available to browse or view content.
- A conventional keyboard can be used to give the student the possibility of entering text and expressing himself in writing. Mastery of a keyboard requires training but makes it possible to use many educational applications and clearly improves the usefulness of the smartphone/tablet.

#### Feasibility

- **Technical requirements:** A smartphone or tablet and a USB OTG adapter to connect the keyboard
- **Adoption requirements:** Training (~20h) is required for the visually impaired student to learn how to use the keyboard. [ApprentiClavier](#) is free typing software.
- **Logistics:** This type of equipment and the associated adapter are generally available in the countries of intervention.

#### Cost

- A conventional computer keyboard usually costs at least EUR 15.



See

#### Examples of products

- [Commercially available conventional keyboards](#)

Learning software:

- [ApprentiClavier](#)
- [Typefaster](#)

User



Student



## Accessibility features allowing the use of hardware

### Magnification software



#### Possible uses:

Access a computer and written material, express oneself in writing, take notes

#### Description

Software that enables a visually impaired student to use a computer by changing the content displayed on the screen with a magnifying glass effect and other features.

#### Assessment

Scope of use ★★★★★  
 Feasibility ★★★★★  
 Cost ★★★★★

#### Scope of Use

- Screen magnification software allows the visually impaired student to control a computer (or smartphone) and access all associated educational resources. However, it has limitations: the image on the screen sometimes looks fragmented and requires sustained mental effort. Although it is a great help for some students, it also has its challenges.

#### Feasibility

- **Technical requirements:** A computer with a compatible operating system (for example, the minimum requirement for *ZoomText 2020 niv2* is Windows 7), and optionally a large key keyboard.
- **Adoption requirements:** Mastery of the computer (especially the keyboard) and the magnification software by the student, which may take some time
- **Logistics:** Relatively easy to implement if the school already has computers, as the software can be downloaded directly from the internet.

#### Cost

- Prices of magnification software range from EUR 150 (*Zoomtext Express*) to over EUR 700 for the most elaborate ones. There are also free applications, such as the *Windows Magnifier*. The price of the computer must also be taken into account.



See

#### Examples of products

- [ZoomText](#)
- [Windows Magnifier](#): a free and very good tool integrated into the Windows operating system

User

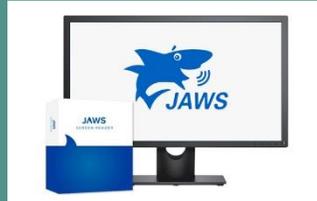


Visually impaired student



## Accessibility features allowing the use of hardware

### Screen reader



#### Possible uses:

Access a computer and written material, express oneself in writing, take notes

#### Description

Software that enables a visually impaired or blind student to use a computer by speaking the screen and offering adapted navigation

#### Assessment

Scope of use ★★★★★  
 Feasibility ★★★★★  
 Cost ★★★★★

#### Scope of use

- A screen reader allows the visually impaired or blind student to operate a computer (or smartphone) and access all associated educational resources.
- It is a complex tool that can be difficult to use, as it has to be mastered in addition to the computer (or smartphone).
- The use of headphones for speech feedback may isolate the student from the classroom environment and this must be taken into account by the teacher.

#### Feasibility

- **Technical requirements:** A computer with a compatible operating system, headphones, and an internet connection (optional) to download the software
- **Adoption requirements:** Mastery of the computer (especially the keyboard) and the screen-reading software by the student, which may take some time
- **Logistics:** Relatively easy to implement if the school already has computers, as the software can be downloaded directly from the internet.

#### Cost

- While some of the applications are free (including NVDA on Windows and VoiceOver on MacOS), other more powerful applications are quite expensive, such as Jaws, which is accessible from EUR 1,500.



See

#### Examples of products

- [NVDA](#) (Windows, free)
- [JAWS](#) (Windows, paid)
- [VoiceOver](#) (MacOs, free)
- [Orca](#) (Linux, free)

User



Student



## Accessibility features allowing the use of hardware

### Braille display



#### Possible uses:

Access written material

#### Description

A Braille display is a specific device for displaying Braille characters. It can be combined with a screen reader, allowing the computer to be controlled using the content displayed in Braille.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- Braille is essential for the education of blind students, and the Braille display allows 'finer' text reading (letter by letter).
- It is used with a screen reader and can be combined with speech synthesis. The combination of the two tools allows the student to operate the computer and consult documents more efficiently.

#### Feasibility

- **Technical requirements:** A computer with a compatible operating system, and optionally headphones and an internet connection to download the software
- **Adoption requirements:** Mastery of the computer (especially the keyboard) and the screen-reading software by the student, which may take some time, and mastery of Braille and the Braille console (refreshable Braille display) These requirements make this device suitable for users of a certain age only (starting from secondary school, for instance).
- **Logistics:** Available from specialist solution distributors.

#### Cost

The price of a Braille display varies between EUR 2,000 and EUR 6,000 approximately, for a 40-character display. The number of Braille cells of the display largely determines the price of the device.



See

#### Examples of Braille displays

- [Esys 40](#) (Eurobraille)
- [Trans braille Seika 40](#) (Telesoft)
- [SuperVario 40](#) (Baum)

User



Student

## Educational content and activities

## Educational software and applications

Possible uses:

Access to adapted educational activities

## Description

Many software and applications are designed to meet the specific needs of children with visual impairment. They are available for all subjects and all levels, including games and educational learning applications. These tools can be used to raise awareness, train, teach and entertain children.

## Assessment

Depends on each software or application

## Examples

### A Blind Legend

Educational game



[A Blind Legend](#) is a 'serious game' for both blind and non-blind players who want to play a game that uses hearing as the only means of detection and decision. This adventure video game with an exciting storyline is suitable for blind students. In this free action game for smartphones, tablets and computers, hearing replaces sight.

### Braille Maths

Learning software



[BrailleMath](#) enables the blind student to enter mathematical expressions, transform them into content understandable and readable by a sighted person, and perform mathematical calculations. It is a great tool for teaching mathematics to visually impaired children.



See

User



Student

## Educational content and activities

### Computer, tablet or smartphone + Vocale Presse



PO Access educational content

#### Description

A service (software or application) allowing a visually impaired student to access the contents of various print media thanks to voice feedback and adapted navigation.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★★★★★

Cost ★☆☆☆☆

#### Scope of Use

- This solution is particularly well suited to schools for the study of content, and for access to culture and information. The ergonomic interface allows for very fast and efficient navigation, and the voice feedback gives visually impaired students access to the same content as their sighted peers.
- It is therefore a specific tool that makes accessible to all students the study of the press or the use of press resources on a topic studied in French, civic education or in another subject.

#### Feasibility

- **Technical requirements:** Computer, tablet or smartphone, and suitable accessibility equipment if necessary
- **Adoption requirements:** Relatively easy-to-use solution, and the student learns how to use the navigation tool quickly. To use it in the classroom, the teacher has to integrate it into his or her teaching methods beforehand.
- **Logistics:** This solution is relatively simple to implement, as the software can be downloaded directly online.

#### Cost

- For a school, a multi-user licence and a subscription to a daily newspaper cost EUR 315 for one year.



See

#### Examples of content

- *Le Monde diplomatique*
- *Courrier International*
- *Sciences et Avenir*

User



Student

## Educational content and activities

### G Suite for Education



#### Possible uses:

Access to educational content and activities

#### Description

Google's G Suite for Education is a set of applications designed to provide a convenient, intuitive and accessible education environment. It is a free resource from Google Workspace.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- G Suite for Education is a virtual work environment that provides students with flexible, accessible and easy-to-use tools specially designed for education.
- Thanks to Google's accessibility features, the teacher can use it with all students, including visually impaired and blind students.
- Accessibility features include voice control, an on-screen virtual keyboard, a screen reader, a magnifier (screen magnification) and other display modification features.

#### Feasibility

- **Technical requirements:** A computer, ideally a Chromebook, and electricity and internet access at home (for both the student and the teacher)
- **Adoption requirements:** Computer literacy for the student and the teacher, and definition of the educational use of the tool by the teacher
- **Logistics:** Easy to implement, as the tool can be downloaded directly from the web

#### Cost

- G Suite for Education is either free or costs USD 4 per user and per month, depending on the features used.



See

Resource website:

- [G Suite for Education](#)

User



Student and teacher

## Educational content and activities

### Annie - Braille self-learning device



Possible uses:

Learn Braille

#### Description

Annie is the first Braille self-learning device. Its recreational and interactive content makes learning Braille fun.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- Annie is an educational tool that can be used in a mainstream classroom: it can be used by visually impaired or blind students in an autonomous and practical manner, and it does not require the teacher to be proficient or knowledgeable in Braille.
- Learning Braille with this device is intuitive and fun, which makes this tool an interesting first step in using Braille resources (Braille paper, refreshable Braille display, Braille notepad).
- However, the device is not necessarily compatible with the inclusive education approach in the classroom, since it involves personal activities for the visually impaired child. Reflection is therefore necessary before using it in the classroom.

#### Feasibility

- **Technical requirements:** Occasional power supply; headphones (optional).
- **Adoption requirements:** Learning is easy and intuitive for the student and prior training is not required.
- **Logistics:** This equipment is available from the manufacturer.

#### Cost

- This tool costs approximately USD 600.



See

Resource website:

- [Annie](#)

User



Student

## Educational content and activities

Daisy reader  
+ audiobooks in Daisy  
format

## Possible uses:

Access educational  
content

## Description

The Daisy book is an audio reading format with navigation capability. Daisy players come in two forms: hardware (CD or mp3 player) and software (on computers, smartphones, etc.).

## Assessment

Scope of use ★★☆☆☆

Feasibility ★★★★★

Cost ★★★★★

## Scope of use

- A Daisy book is a dematerialised (digital) book; it is an easy, practical and less cumbersome reading tool than a Braille book. It allows the reader to navigate easily through the book, from chapter to chapter and from page to page.
- ePub is another fairly common audiobook format.

## Feasibility

- **Technical requirements:** A hardware player or a screen reader on a computer, tablet or smartphone (application) In both cases, a power supply, Daisy books, an internet connection, and headphones.
- **Adoption requirements:** This solution is relatively easy to use. It requires discussion with the teacher, as its use isolates the visually impaired student from the classroom environment.
- **Logistics:** The many types of Daisy readers make the technology very flexible in use and adapted to the context of the countries of intervention. Audiobooks can be read on some smartphones, or on any computer available in the classroom.

## Cost

- Hardware players cost around EUR 350. However, free software players are available, and many online libraries offer free downloads.



See

Examples of  
playersHardware  
players

- [Plextalk pocket PTP1](#)
- [Milestone 212 DAISY](#)

Software  
players

- [Amis \(Windows\)](#)
- [Emerson \(MAC\)](#)
- [Robobralle](#)

User



Student



## Examples of useful libraries and resources

- **eKitabu** (audiobooks for kids)  
→ [https://open.ekitabu.com/dist/cloud-reader/?epubs=..%2F.%2Fepub\\_content%2Flibrary.json](https://open.ekitabu.com/dist/cloud-reader/?epubs=..%2F.%2Fepub_content%2Flibrary.json)
- **Nouvelles Éditions Numériques Africaines** (audiobooks)  
→ <https://www.librairienumeriqueafricaine.com/livrel/audiolivre>
- **LitteratureAudio.com** (audiobooks)  
→ <http://www.litteratureaudio.com/notre-bibliotheque-de-livres-audio-gratuits>
- **GIAA DAISY audiobooks**  
→ <https://catalogue.giaa.org/>
- **Audio Cité** (audiobooks)  
→ <https://www.audiocite.net/?>
- **eBookids** (audiobooks for kids)  
→ <https://ebookids.com/>
- **A guide for teachers of students with visual impairment**  
→ [https://media.eduscol.education.fr/file/ASH/35/7/guide\\_eleves\\_deficients\\_visuels\\_116357.pdf](https://media.eduscol.education.fr/file/ASH/35/7/guide_eleves_deficients_visuels_116357.pdf)



Vision

User



Student

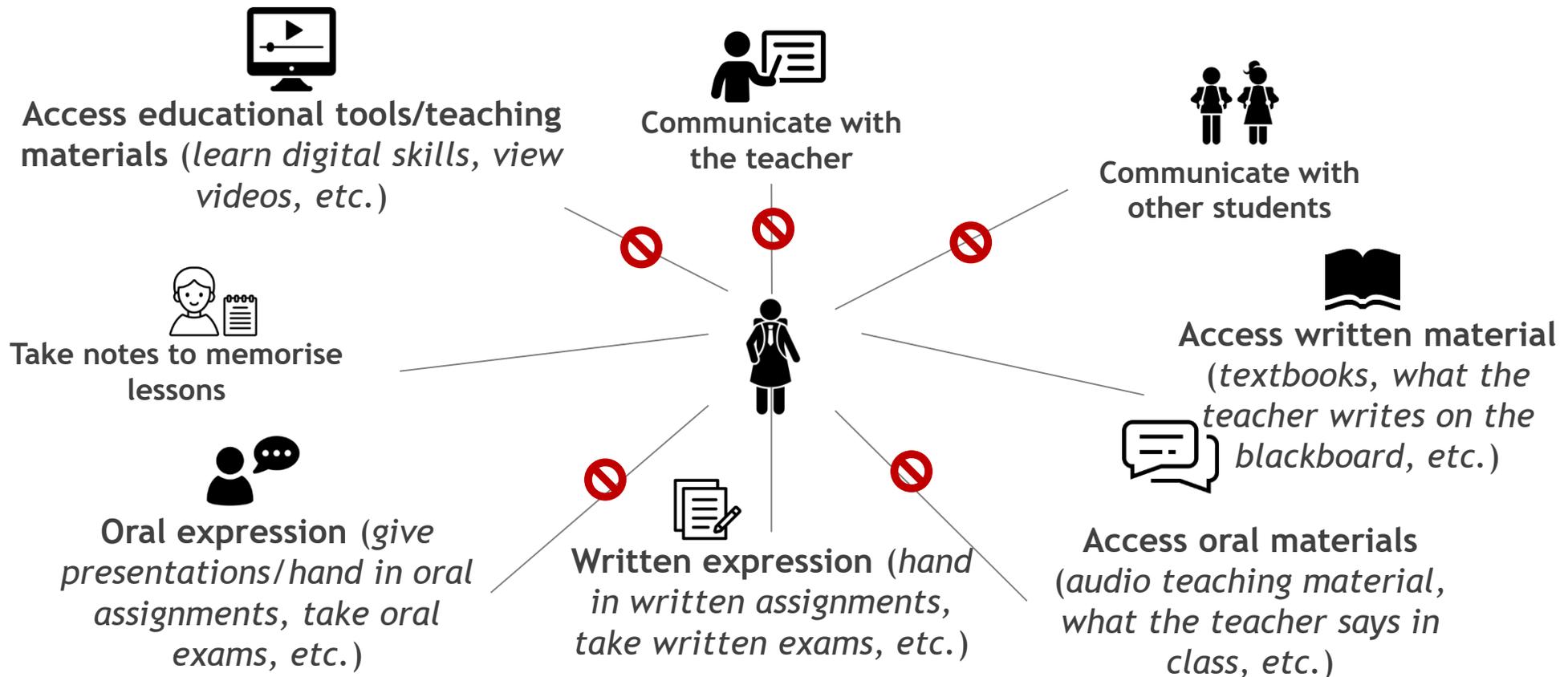
## Introduction to the ICT Directory for Inclusive Education

1. Visual impairment
- 2. Hearing impairment**
3. Communication difficulties
4. Difficulty remembering/concentrating/learning
5. Difficulty moving upper limbs
6. Other ICT uses



In a non-inclusive school, children with disabilities are denied access to certain educational content and activities

### Consequences of lack of inclusion for a child with hearing impairment

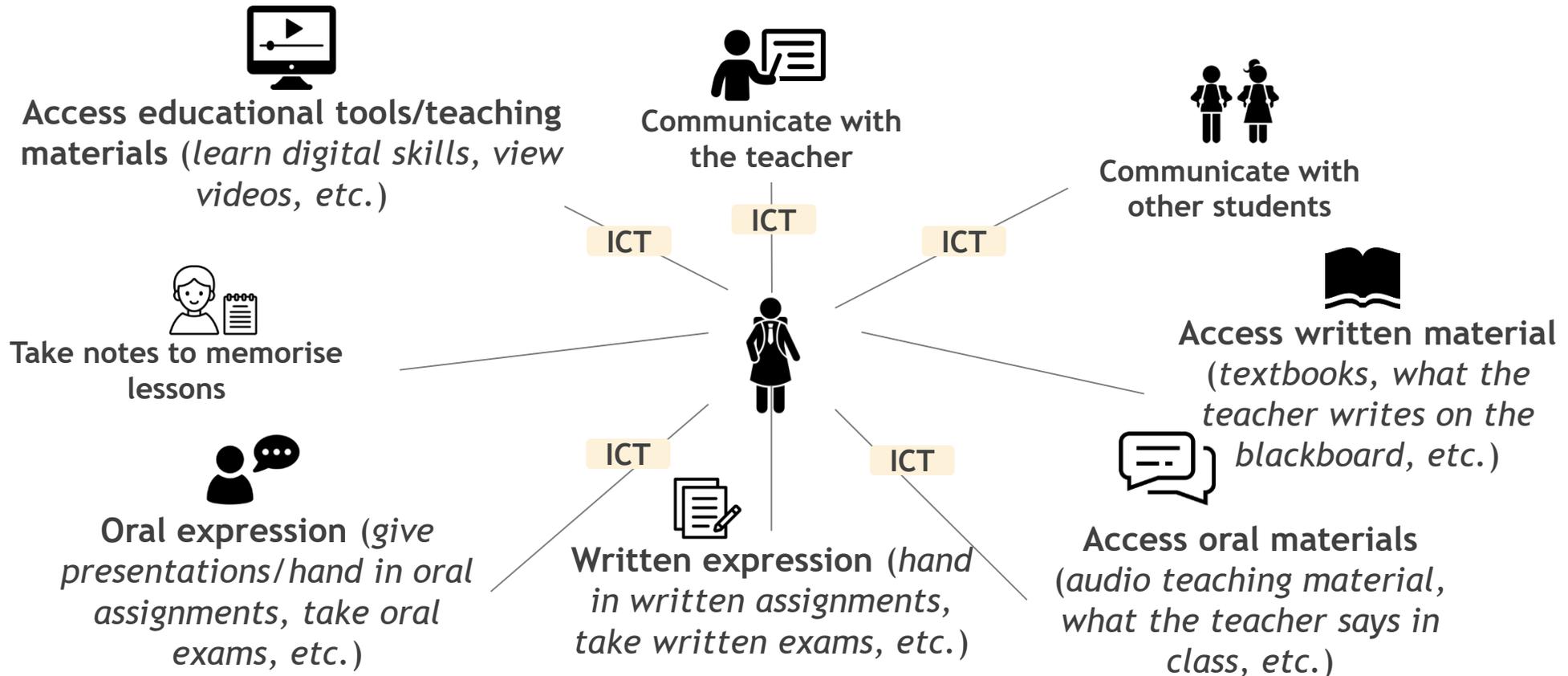




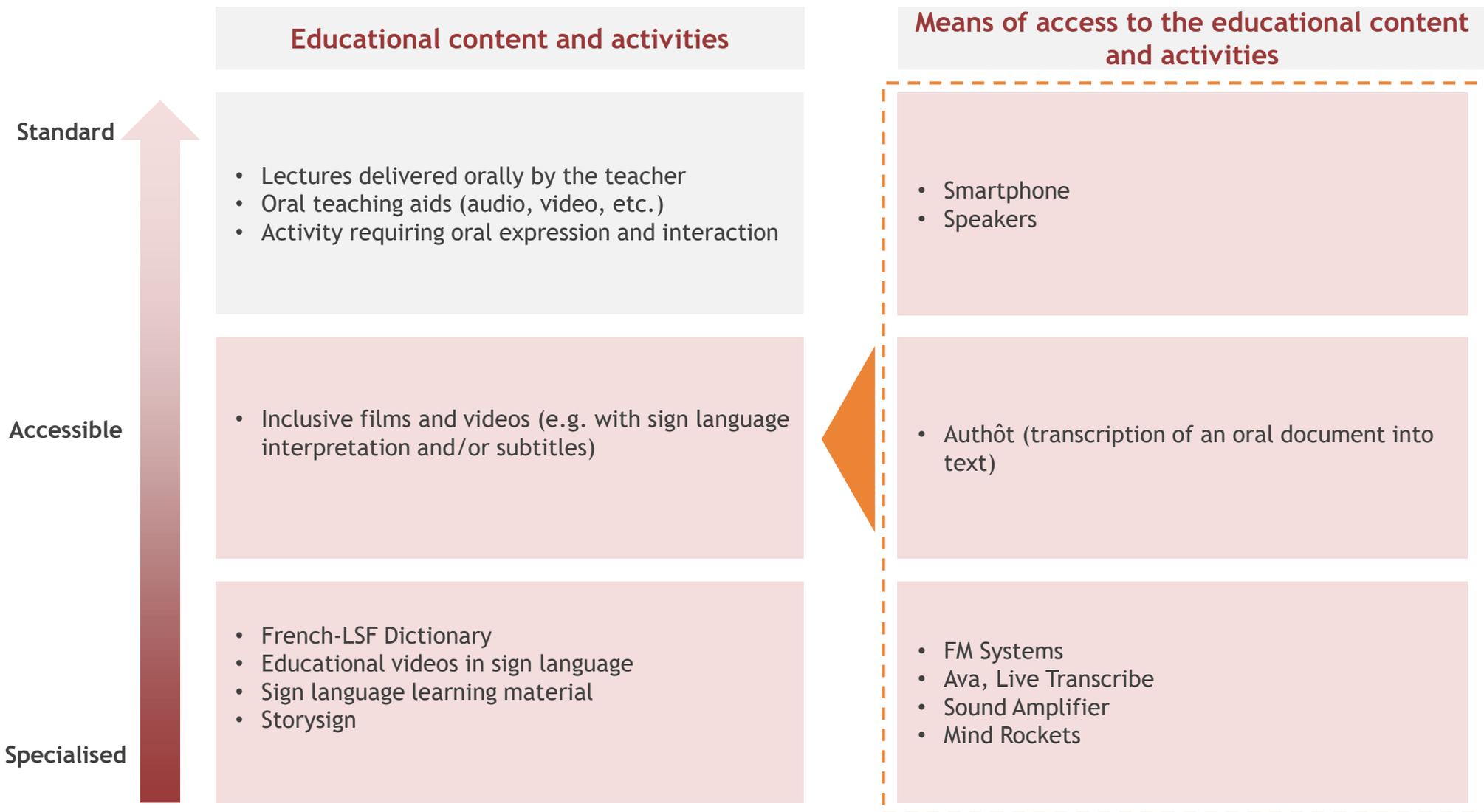
Hear

ICTs can help schools be more inclusive by providing alternatives to the usual non-inclusive educational content and activities

### Potential of ICTs for the educational inclusion of children with hearing impairment



# Identified ICTs that can enable access to educational content and activities for children with hearing impairment





## Hardware allowing access to educational content or activities

### FM Systems



#### Possible uses:

Follow a course in class,  
communicate with the  
teacher

#### Description

A tool for wireless audio communication between a transmitting microphone and a receiver, the signal of which is sent through a radio signal (FM) and can be used by a hearing-impaired student to follow a teacher's lecture in class

#### Assessment

Scope of use	★★★★★
Feasibility	★★★★☆
Cost	★★★☆☆

#### Scope of use

- Particularly suitable for schools, an FM system makes the voice of the teacher using the transmitter microphone more audible in the ambient noise and keeps the voice at a fairly constant level, even when the teacher moves about in the classroom.
- It is a personal tool that helps the student pay attention and concentrate on the educational objectives, and it therefore makes lessons in a mainstream school accessible to a hearing-impaired child.
- The disadvantage of this system is the fragility of the equipment (frequent breakage of the microphone/transmitter/receiver). Due to flaws in the technology (such as sensitivity to interference), the equipment requires regular monitoring.

#### Feasibility

- **Technical requirements:** Power supply to recharge the equipment (or batteries, depending on the equipment used)
- **Adoption requirements:** Adoption and mastery of the tool by the teacher, and possibly awareness raising for the whole class
- **Logistics:** This type of equipment is not available in the countries of intervention and must be imported from specialist manufacturers.

#### Cost

- An efficient FM system (with a transmitter microphone and a receiver) usually costs at least EUR 1,000.



Hear

#### Examples of products

- [Transmitters](#)
- [Receivers](#)

User



Student



## Hardware allowing access to educational content or activities

### Speakers/Loudspeakers



#### Possible uses:

Follow the course in class, access oral material

#### Description

Loudspeakers amplifying the sound when the teacher speaks (if he or she has a microphone) or when audio teaching aids are used (audio or video documents).

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- Loudspeakers are simple technologies for sound amplification. They can be used with audio teaching aids (audio or video documents) or, if the teacher is equipped with a microphone, for any lesson.
- Loudspeakers make it easier for children with hearing impairment to listen, especially in large classrooms where listening can be difficult when you are far away from the teacher, the tape recorder, or the computer playing the audio.

#### Feasibility

- **Technical requirements:** Equipment for playing the audio documents that the speakers will amplify (computer, tablet, telephone, tape recorder, radio, television, microphone for the teacher, etc.) Access to electricity
- **Adoption requirements:** Teacher's control of the equipment playing the audio documents (the speakers themselves are easy to use: just plug them in and press a button to turn them on) No adoption requirements for the children.
- **Logistics:** Available in the countries of intervention from specialist dealers.

#### Cost

- The total price of a public address system depends on the size of the classroom and the desired volume. Small portable speakers start at ~EUR 50, more powerful systems at over EUR 300.



Hear

#### Examples of products

- [Yamaha Boomer](#)
- [Yamaha in-wall or in-ceiling speaker](#)

User



Teacher and student



## Hardware allowing access to educational content or activities

### Smartphone



#### Possible uses:

Use accessible tools and content

#### Description

A smartphone is a mobile phone that usually has a touchscreen and some of the features of a laptop. It allows the hearing-impaired student to use many specialised applications.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of use

- Versatile and easy to use, the smartphone allows the hearing-impaired student to use many specialised applications, accessibility features and educational applications.
- Useful applications include:
  - **Ava** and **Live Transcribe**, which can display a text version of a conversation or a teacher's course in real time.
  - Resource applications such as **Elix** and **Authôt**, which provide the hearing-impaired student with accessible content and can be integrated into the teacher's teaching methods in a mainstream classroom.

#### Feasibility

- **Technical requirements:** Occasional power supply for recharging and an internet connection for some uses
- **Adoption requirements:** Mastery of the tool by the student and coordination with the teacher for the integration of the tool into classroom activities
- **Logistics:** Generally available in the countries of intervention

#### Cost

- The price of a smartphone ranges from EUR 40 to EUR 1,000 for high-end devices. Some devices, like the iPhone, have many accessibility features built in, such as sound recognition, headphone settings, automatic subtitling, and mono audio.



Hear

#### Examples of products

- [Samsung Galaxy](#)
- [Huawei P40](#)
- [iPhone](#)

User



Student



## Application for access to educational content or activities<sup>1</sup>

### Ava



#### Possible uses:

**Follow a course in class, communicate with the teacher and the students**

#### Description

A mobile application that allows real-time subtitling of verbal exchanges in a group, using artificial intelligence

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of use

- This application can be very useful for making a lesson accessible to a hearing-impaired student: the teacher downloads the application onto his or her smartphone, so that the microphone is close by, and connects to the student, who also uses his or her smartphone and sees a text version of the teacher's lesson displayed on the screen in real time.
- The application can also help the hearing-impaired student to communicate: they simply write what they want to say on their smartphone, and AVA speaks it for them.
- It is therefore a very versatile and flexible tool, which makes courses easily accessible to the student and offers them a great deal of autonomy.

#### Feasibility

- **Technical requirements:** A smartphone for the teacher, a smartphone for the student, a power supply to charge them, and an internet connection
- **Adoption requirements:** Reading skills for the student, and smartphone skills for the student and the teacher; the application is relatively easy to learn.
- **Logistics:** The application can be downloaded directly from the student's/teacher's smartphone store.

#### Cost

- This application has a limited free version. The subscription fee for the full version is EUR 99 per month and per licence.



Hear

#### Resource website:

- [Ava](#)

#### Similar application

- [Live Transcribe](#)

User



Student and teacher



## Application for access to educational content or activities<sup>1</sup>

### Sound Amplifier



#### Possible uses:

Follow a course in class,  
communicate with the  
teacher and the students

#### Description

An application that allows the user to hear their environment better through their headphones by increasing soft sounds without making loud ones too loud (Google 2019). Under certain conditions, it can be useful for a hearing-impaired student in the classroom.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- Sound Amplifier allows the hearing-impaired student to amplify sounds not only from their phone, but also from their environment. The application is designed to enhance important sounds such as conversations, without amplifying uncomfortable noises.
- It should ideally be used on a smartphone with a good quality microphone for the finest possible processing of the audio feedback.
- However, user opinions on this application are still very mixed, indicating that the technology has limitations. It therefore remains a mitigative solution in the absence of specialised hearing aids and is useful in particular circumstances (position in the classroom, reduced noise pollution, etc.).

#### Feasibility

- **Technical requirements:** A smartphone, a power supply to charge it, an internet connection to download the application, and headphones
- **Adoption requirements:** Consent of the teacher and possibly sensitising the other students to ensure a low noise environment
- **Logistics:** The application can be downloaded directly from the application store of any Android smartphone.

#### Cost

- This is a free resource.



Hear

Resource  
website:

- [Sound Amplifier](#)

User



Student



## Application for access to educational content or activities<sup>1</sup>

### MindRockets



#### Possible uses:

Access educational content and activities

#### Description

Mind Rockets is an application offering assistive solutions for deaf and hard-of-hearing people worldwide. Its 3D avatars provide instant translation of text and speech into sign language.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★☆☆☆☆

Cost ★★★★★

#### Scope of use

- Mind Rockets Inc. is working on sign language interpretation of content such as websites and Facebook pages using artificial intelligence and 3D avatars to process written content and interpret it into sign language.
- Hearing impaired children who are not able to read can use the technology to access online resources. Before using it in the classroom, the teacher has to integrate it into the teaching methods used.
- LSF is not yet available on the Mind Rockets application, but this technology is of interest and is worthy of follow-up. Moreover, even if it has many limitations, it can still be useful for sign language learning.

#### Feasibility

- **Technical requirements:** Power supply, a tablet or smartphone, and an internet connection
- **Adoption requirements:** Smartphone skills for the student The application is very easy to learn for the student.
- **Logistics:** The application can be downloaded directly online and requires a reasonable internet connection speed.

#### Cost

- The application is free for personal use. However, the price of the smartphone/tablet/computer on which the application will be used must be factored in.



Hear

Resource website:

- [Mind Rockets](#)

User



Student and teacher



## Application for access to educational content or activities<sup>1</sup>

### Authôt



#### Possible uses:

Access educational content and activities

#### Description

An online application that allows the transcription of an audio or video file into a text file. Once the source language of the file is selected, the transcription is done automatically.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- Authôt is an online application that allows the transcription and automatic subtitling of any audio or video document. The user simply sends the audio or video file directly to the platform which automatically returns a reliable transcription, provided the original file is of good quality. After choosing the language of the source file, the transcription is done automatically.
- The generated text can be corrected on the platform and then used like any digital text document.
- This solution can be used by students or by a teacher who wishes to make the content accessible to hearing-impaired students.

#### Feasibility

- **Technical requirements:** Power supply, a computer, tablet or smartphone, and an internet connection
- **Adoption requirements:** Reading skills for the student
- **Logistics:** The resource can be downloaded/used directly online and requires a reasonable internet connection speed.

#### Cost

- This is a free resource. However, the price of the hardware on which the application/resource will be used must be taken into account.



Hear

#### Examples of products

- [Authôt](#)

User



Student and teacher

## Educational content and activities

## STORYSIGN



## Possible uses:

Use accessible educational content

## Description

StorySign is a free mobile application that aims to help deaf children read by translating books into sign language. It uses artificial intelligence and augmented reality avatars to make the books accessible.

## Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

## Scope of Use

- StorySign is supported by the French National Federation of the Deaf (FNSF). The application was created and developed in collaboration with experts and charities from the deaf community to ensure its relevance.
- It allows the hearing-impaired student to scan a paper book (chosen from a list of books available on the application) and read a sign-language version of the text.
- While the application is not yet sufficiently advanced to be truly useful in a classroom setting, this technology is of interest and could eventually prove to be a very useful inclusive education tool.

## Feasibility

- **Technical requirements:** Power supply, a tablet or smartphone, and an internet connection
- **Adoption requirements:** Smartphone skills for the student. The application is easy to use for the hearing impaired student.
- **Logistics:** The application can be downloaded directly online and requires a reasonable internet connection speed.

## Cost

- This application is free. However, the price of the smartphone (or tablet) on which the application will be used must be taken into account.



Hear

## Resource website

- [Storysign](#)

User



Student

## Educational content and activities

French-LSF  
Dictionary

## Communicate orally

## Description

There are applications and online resources that can be used to access French-LSF dictionaries. They are designed for deaf and hard-of-hearing students as well as the hearing adults who support them and wish to strengthen their knowledge of LSF.

## Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

## Scope of Use

- To use a French-LSF dictionary, such as the one proposed by the online resource Elix, you need to know the spelling of the word whose translation or sign language definition you want, and enter it. It can be used with students who do not yet have good enough reading skills to use a dictionary definition.
- It is usually used as a collaborative resource and requires the involvement of the teacher. The dictionary helps the student learn sign language and is also an opportunity for the teacher and even the other students to learn it too and make the school more inclusive.

## Feasibility

- **Technical requirements:** Power supply, a computer, tablet or smartphone, and an internet connection
- **Adoption requirements:** Writing skills for the student Dictionaries are generally very intuitive and easy to use for a hearing-impaired student
- **Logistics:** Some dictionaries, such as Elix, can be accessed and/or downloaded directly from the resource website.

## Cost

- Most of these resources are free.



Hear

Resource  
website:

- [Elix](#)

User



Student and  
teacher

## Educational content and activities

### Educational videos in sign language



#### Possible uses:

Access educational content and activities

#### Description

Educational videos (stories, nursery rhymes, lessons on a specific topic...) with sign language interpretation

#### Assessment

Scope of use ★★★★★  
 Feasibility ★★★★★  
 Cost ★★★★★

#### Scope of use

- Educational video on a topic of your choice with sign language interpretation
- However, not all videos have the same level of inclusiveness. Some are fully inclusive and use different methods of communication (audio, text, sign language and images). They can be projected in an inclusive classroom to give all students - including hearing impaired and deaf students - simultaneous access to the same content.
- Others, however, are only available in sign language, making their use more problematic in an inclusive classroom as some students would not be able to follow.
- Moreover, there are still relatively few videos in LSF.

#### Feasibility

- **Technical requirements:** A computer/tablet or smartphone, a video projector, an internet connection (or videos downloaded in advance)
- **Adoption requirements:** Computer/tablet/smartphone skills for the teacher
- **Logistics:** The videos are available on the web.

#### Cost

- Many videos are available for free. However, some of the videos are paid.



Hear

#### Examples of content

- [eKitabu](#) (fully inclusive videos, but not available in French)
- [L'école en LSF avec Bastien](#) (videos with LSF + audio)

User



Student

## Educational content and activities

### Sign language learning material



Possible uses:

Communicate with other students

#### Description

Inclusive teaching material (videos, applications, etc.) allowing deaf and non-deaf students to learn sign language.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★★

Cost ★★★★★★

#### Scope of use

- Learning sign language is a necessity for deaf children.
- For the hearing students of the class, learning sign language is also beneficial in many respects. First of all, it is knowledge like any other which can be useful to them later on, and it is also a great tool for raising awareness of promoting the inclusion of deaf students.

#### Feasibility

- **Technical requirements:** Depending on the teaching aid chosen, a computer or tablet to play the videos, optionally a video projector so that the teacher can project them and a smartphone (for the applications).
- **Adoption requirements:** Computer/tablet/smartphone skills for the students or the teacher (if the videos are projected)
- **Logistics:** These videos and applications are available on the internet and in the phone's app store.

#### Cost

- Some of the videos/apps are available for free, but others are paid.



Hear

#### Examples of content

- [Au pays des signes](#) (TV programme of the piwi channel, available as a video)
- [EDDY](#) (game-based learning app for Malaysian sign language)

User



Student

### Examples of useful libraries and resources

- **Wikisign** (collaborative LSF dictionary)  
→ <http://lsf.wikisign.org/wiki/Wikisign:Accueil>
- **Langue des signes française** (teaching resource)  
→ <http://www.cndp.fr/ressources-lsf/>
- **Sematos** (LSF dictionary)  
→ <http://www.sematos.eu/lsf.html>
- **Le DicoElix** (LSF dictionary and videos in LSF)  
→ <https://dico.elix-lsf.fr/>
- **L'école en LSF avec Bastien** (LSF educational videos)  
→ [https://www.youtube.com/channel/UCpe8YgduLl9taovJ\\_yiyZfw/videos](https://www.youtube.com/channel/UCpe8YgduLl9taovJ_yiyZfw/videos)
- **Marie LittleBundao** (LSF educational videos)  
→ <https://www.youtube.com/c/LittleBunBao/videos>
- **A guide for teachers of students with hearing impairment**  
→ <https://ash-ain.circo.ac-lyon.fr/spip/spip.php?article177>



Hear

User



Student

## Introduction to the ICT Directory for Inclusive Education

1. Visual impairment
2. Hearing impairment
- 3. Communication difficulties**
4. Difficulty remembering/concentrating/learning
5. Difficulty moving upper limbs
6. Other ICT uses

## There are many causes of communication difficulties. This section presents ICTs that offer alternatives to verbal communication.

- Communication difficulties refer to difficulties in using verbal language, i.e. **difficulties in understanding or making oneself understood** in one's usual language.
- These difficulties can have different causes: **hearing impairment** (difficulty hearing), **cognitive impairment** (difficulty understanding), or **difficulties with voice or speech** (language difficulties).
- This section presents ICTs that offer **alternatives to the usual verbal language** (oralisation, use of symbols to facilitate understanding, etc.) and **make communication possible**.
- Other sections of the directory are devoted more specifically to **hearing impairment** (section 2) and **cognitive difficulties**, i.e. difficulty remembering/concentrating/learning (section 4)



### Hearing impairment

often result directly in communication difficulties



### Communication difficulties

are related to difficulties in understanding or being understood and require adaptations for the use of verbal language



### Cognitive difficulties

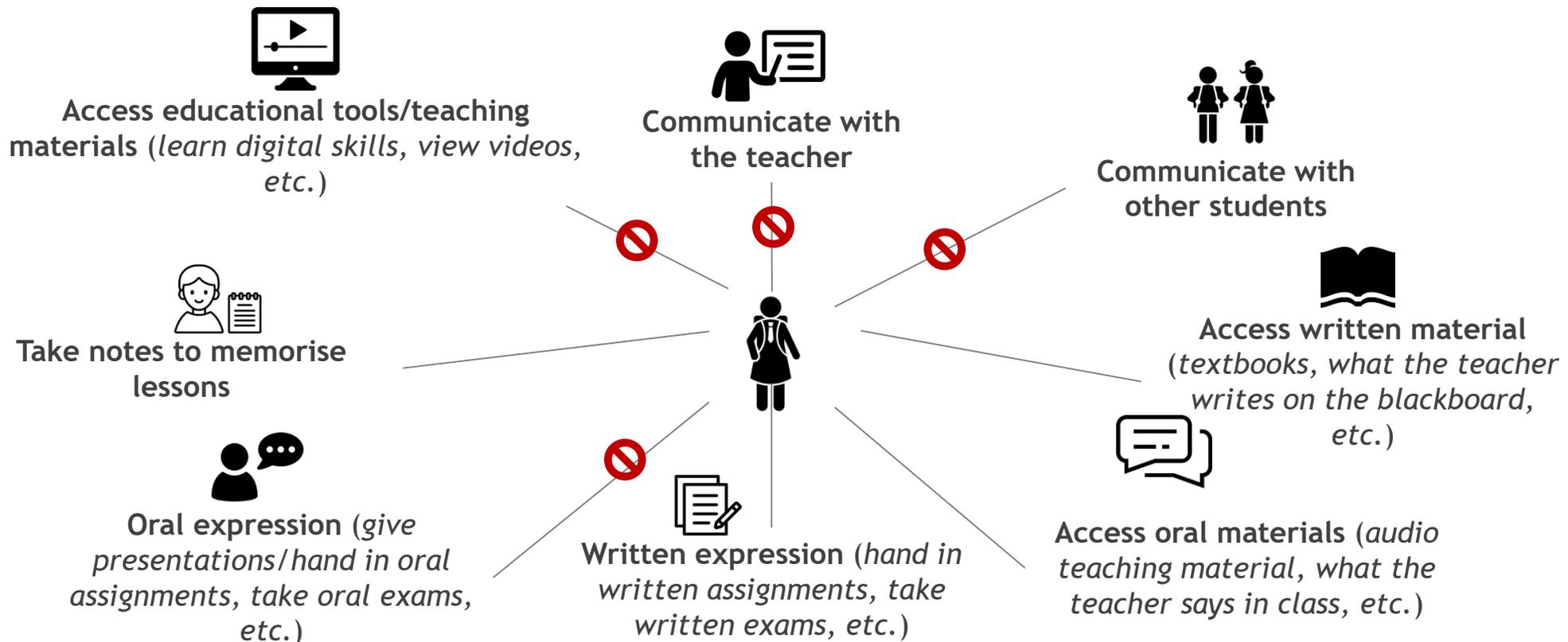
(remembering, concentrating, learning)  
often result directly in communication difficulties



Communicate

In a non-inclusive school, children with disabilities are denied access to certain educational content and activities

#### Consequences of lack of inclusion for a child with communication difficulties



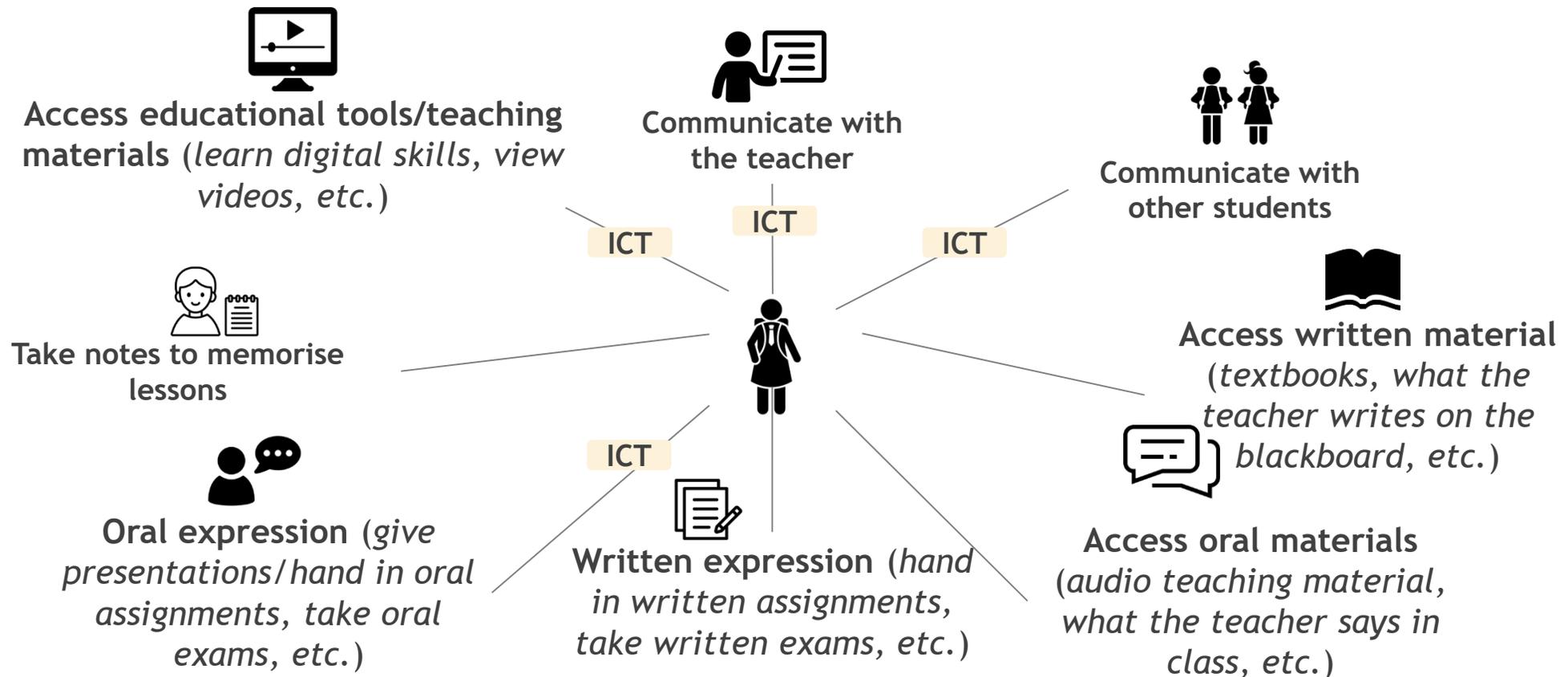
Note: Communication difficulties may be compounded by other difficulties, such as difficulties in accessing written material (cognitive impairment) or oral material (hearing impairment). These difficulties are not represented in this diagram, which only shows the consequences of communication difficulties.



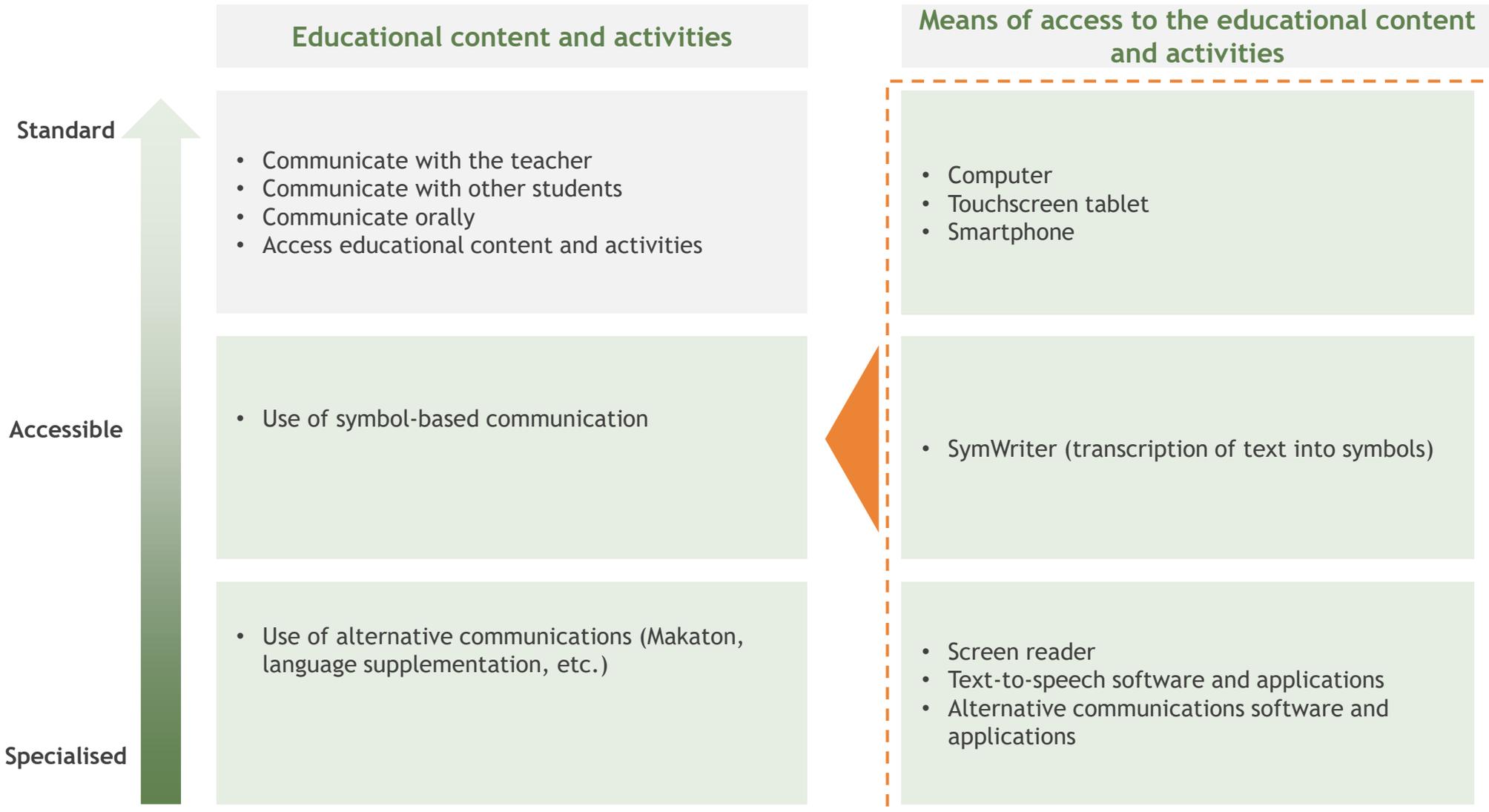
Communicate

ICTs can help schools be more inclusive by providing alternatives to the usual non-inclusive educational content and activities

#### Potential of ICTs for the educational inclusion of children with communication difficulties



## Identified ICTs that can enable access to educational content and activities for children with communication difficulties





## Hardware allowing access to educational content or activities

### Computer



#### Possible uses:

Access communication tools

#### Description

A computer is a tool with many educational possibilities. It is a means of accessing adapted tools for students with communication difficulties, thanks to various programs.

#### Assessment

Scope of use	★★★★★
Feasibility	★★★★★
Cost	★★★☆☆

#### Scope of use

- With a computer, the student with communication difficulties can have access to many communication aids.
- Simple and common software such as word processors can facilitate communication, provided the user can write and use a keyboard. The student displays what he wants to say on the screen, and can answer more quickly than when writing on a sheet of paper or a slate: his or her interlocutors read the answers directly on the screen.
- The student can also use the text-to-speech feature to verbalise their answers instead of repeatedly show their screen.
- There is also more specific communication support software, for example for children with language and/or writing difficulties.

#### Feasibility

- **Technical requirements:** Power supply
- **Adoption requirements:** Computer skills for the student and involvement of the teacher in the use of the tool
- **Logistics:** Available in the countries of intervention.

#### Cost

- The price of a lightweight laptop with good battery life ranges from EUR 200 to EUR 2,000 for high-end laptops. The price of a desktop computer that is more powerful and durable ranges from EUR 300 to EUR 3,000.



Communicate

#### Examples of products

- [ChromeBook](#)
- [HP EliteBook](#)
- [ASUS Vivobook](#)
- [Acer Aspire 5](#)

User



Student



## Hardware allowing access to educational content or activities

### Touchscreen tablet



#### Possible uses:

Access communication tools

#### Description

A laptop in the form of a touchscreen. It is a means of accessing adapted tools for students with communication difficulties, thanks to various applications.

#### Assessment

Scope of use	★★★★★
Feasibility	★★★☆☆
Cost	★★★☆☆

#### Scope of use

- Just like with a computer, the student with communication difficulties can have access to many communication aids.
- Simple and common software such as word processors can facilitate communication, provided the user can write and use a keyboard. The student displays what he wants to say on the screen, and can answer more quickly than when writing on a sheet of paper or a slate: his or her interlocutors read the answers directly on the screen.
- The student can also use the text-to-speech feature to verbalise their answers instead of repeatedly show their screen. For instance, they can download specialised applications for symbol-based communication.

#### Feasibility

- **Technical requirements:** Power supply, an internet connection (optional), a stand for a better sitting position
- **Adoption requirements:** Student's mastery of the tool and teacher's involvement
- **Logistics:** Available in the countries of intervention.

#### Cost

- Prices of touchscreen tablets range from EUR 160 to over EUR 1,000 depending on the model and the features.



Communicate

#### Examples of products

- [Samsung Galaxy Tab S7](#)
- [HUAWEI MediaPad T5](#)
- [Lenovo Tab P10](#)
- [Apple iPad New 10.2](#)

User



Student



## Software for access to educational content and activities<sup>1</sup>

### Text-to-speech software and applications

#### Possible uses:

Communicate with the teacher and students, express oneself orally

#### Description

These software and applications allow a student with communication difficulties to speak what they want to say in a fluent way. This can be done with text typed by the student or by selecting a pre-written word or phrase.

#### Assessment

Depends on each software or application

### Examples

#### Vocalyx

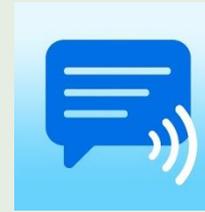
Software or application



Vocalyx provides communication assistance to all voice-impaired people and can be adapted to all uses and communication situations. It offers many communication modes and uses high-quality speech synthesis for very fluid rendering (*Acapela*). Vocalyx runs on Windows PCs but also on a wide range of devices, including smartphones.

#### Assistant Parole CAA

Application



Assistant Parole is an application that provides speech synthesis with customisable 'buttons' that the student can press to say a word or phrase. It is also possible to type text using the keyboard and turn it into speech. This practical and versatile personal tool is therefore a valuable aid for a student with communication difficulties.



Communicate

User

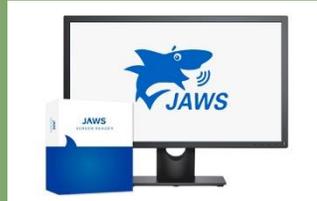


Student



## Software for access to educational content/activities

### Screen reader



#### Possible uses:

Communicate with the teacher and students, express oneself orally

#### Description

Software that allows for the verbalisation of content displayed on the screen. Although it is not its main function, a screen reader enables a student to communicate by verbalising written text.

#### Assessment

Scope of use	★★★★☆
Feasibility	★★★★★
Cost	★★★★☆

#### Scope of Use

- The screen reader and speech synthesis allow the student with communication difficulties to write down their answers or statements and oralise them so that they can be heard by the teacher or the other students. If the student has good writing and typing skills, they save a lot of time in communication compared to the use of handwriting.
- However, this is not the primary function of the screen reader; specialised software/applications are available, such as Vocalyx (see the 'Speech synthesis software and applications' sheet).

#### Feasibility

- **Technical requirements:** A computer with a compatible operating system, headphones, and an internet connection to download the software (optional)
- **Adoption requirements:** Mastery of the computer (especially the keyboard) and the screen-reading software by the student, which may take some time
- **Logistics:** Relatively easy to implement if the school already has computers, as the software can be downloaded directly from the internet.

#### Cost

- While some of the applications are free (including NVDA on Windows and VoiceOver on MacOS), more powerful applications are quite expensive, such as Jaws that starts at a purchase price of EUR 1,500.



Communicate

#### Resource website:

- [WordQ](#)

#### Other screen readers:

- [NVDA](#) (Windows, free)
- VoiceOver (MacOs, free)

User



Student



## Software for access to educational content and activities<sup>1</sup>

### Alternative communications software and applications

#### Possible uses:

Communicate with the teacher and students, express oneself orally

#### Description

These software and applications make it easier to communicate and express oneself orally thanks to an alternative language that uses images/symbols for instance, the meaning of which is then spoken.

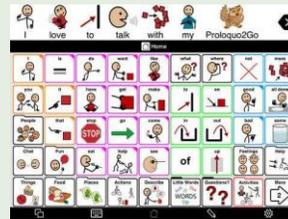
#### Assessment

*Depends on each software or application*

#### Examples

##### Proloquo2Go

*iPad app*



Proloquo2Go is an application that allows students with communication difficulties (cognitive and/or speech difficulties) to express themselves. The student selects images/symbols representing what they want to express, and the application speaks them. The interface can be customised according to the language needs of the student. The resource has been available in French since 2016 at a price of EUR 249, on iPad only.

##### SymWriter

*Software*



SymWriter is an adapted word processing software that combines alphanumeric characters, images, pictograms and speech synthesis. It is primarily intended for people who use picture-based communication due to cognitive impairment, specific language impairment, or autism spectrum disorder. The software has many features and an expandable bank of 8,000 images covering all levels.



Communicate

User



Student

## Introduction to the ICT Directory

### How to use the Directory

1. Visual impairment
2. Hearing impairment
3. Communication difficulties
- 4. Difficulty remembering/concentrating/learning**
5. Difficulty moving upper limbs
6. Other ICT uses

### Methodology

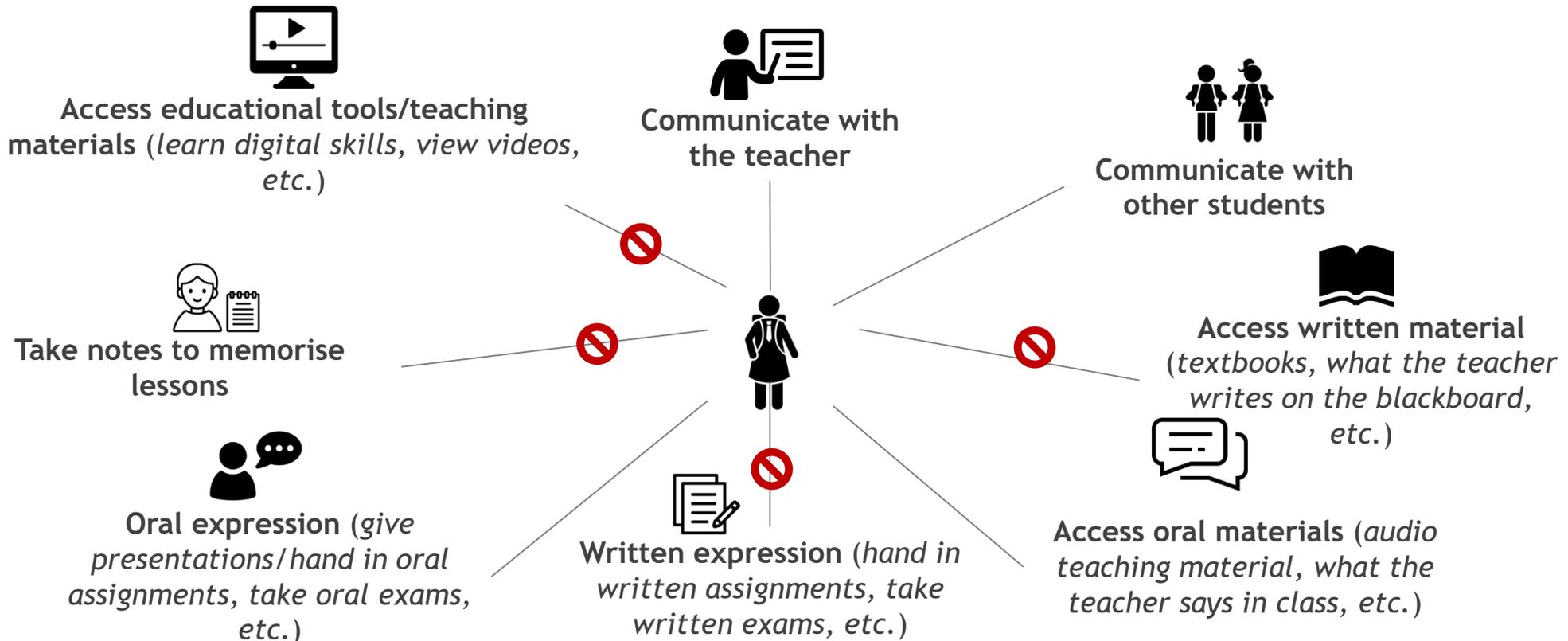
## 4. DIFFICULTY REMEMBERING/CONCENTRATING/LEARNING > CONSEQUENCES OF LACK OF INCLUSION



Learn

In a non-inclusive school, children with disabilities are denied access to certain educational content and activities

### Consequences of lack of inclusion for a child with working memory/concentration/learning difficulties

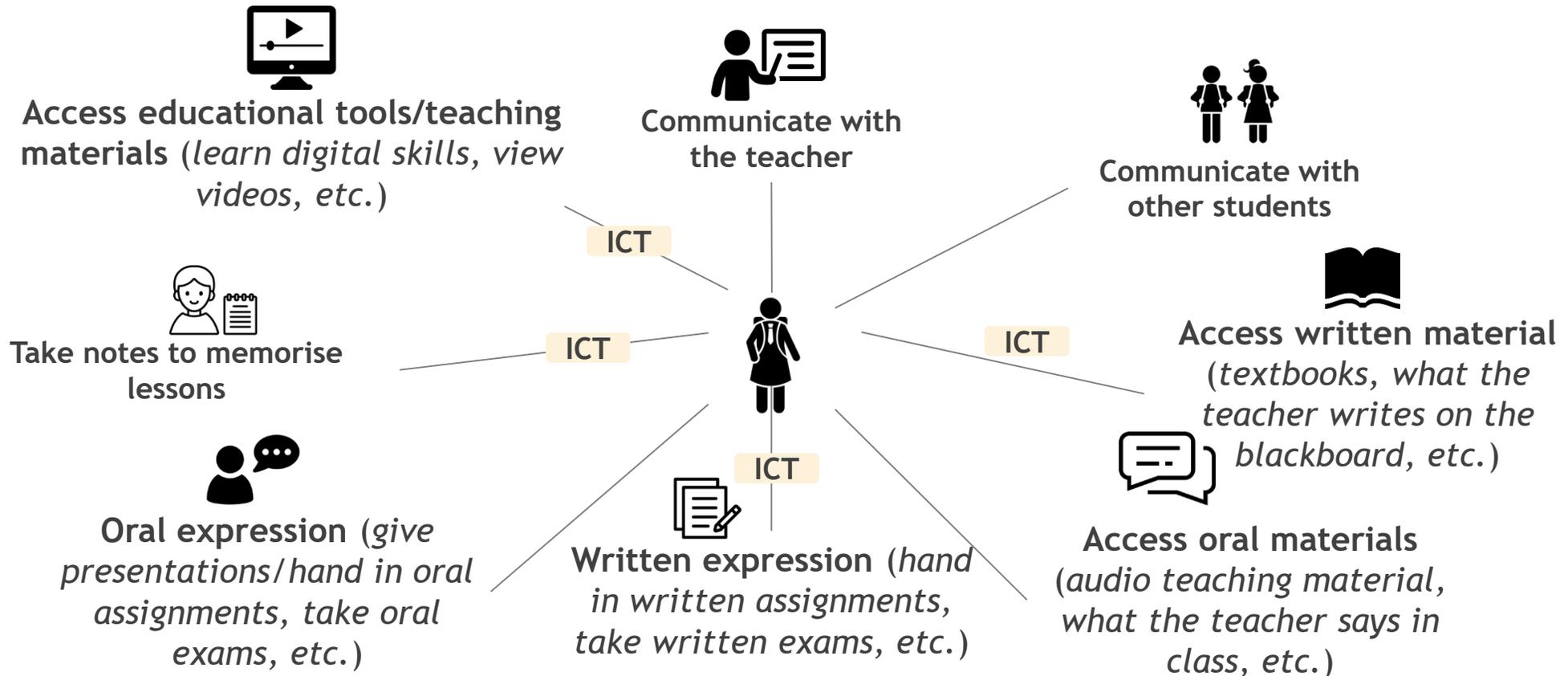


Note: Difficulties in memorising, concentrating and learning can be compounded with other difficulties, such as difficulties in communicating or accessing oral material. These additional difficulties are not presented in this diagram, which only shows the consequences of difficulties in remembering, concentrating and learning.

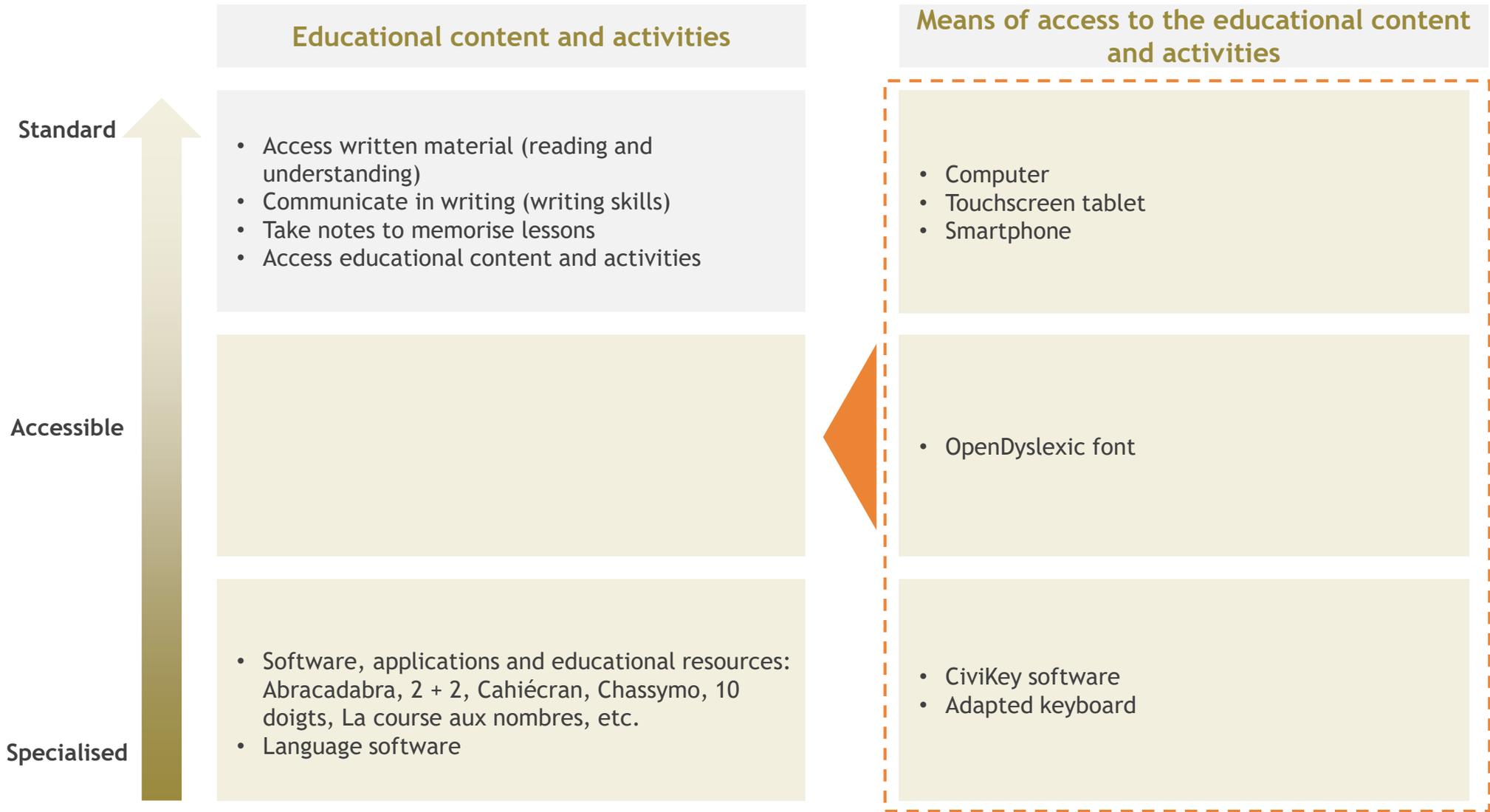


ICTs can help schools be more inclusive by providing alternatives to the usual non-inclusive educational content and activities

### Potential of ICTs for the educational inclusion of children with working memory/concentration/learning difficulties



# Identified ICTs that allow access to educational content and activities for children with working memory/concentration/learning difficulties





## Hardware allowing access to educational content or activities

### Computer



#### Possible uses:

Use adapted educational content

#### Description

A computer is a tool that offers many educational possibilities adapted to the specific needs of students with concentration, working memory or learning difficulties.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★★☆☆☆

Cost ★★☆☆☆

#### Scope of use

- The computer is a very interesting learning tool in all areas for students with concentration, working memory or learning difficulties.
- For mathematics or French, for instance, the child can avoid the challenges of handwriting (concentrating on letter formation, holding the pencil, etc.). They work in an environment that allows them to concentrate solely on the content.
- Both free and paid software are available in all fields and for all levels. It may be appropriate to provide a USB installation key containing a range of free and relevant software that the teacher can choose to install on the computer according to the teaching methods they use.

#### Feasibility

- **Technical requirements:** Power supply and, optionally, adapted hardware to control the computer and an internet connection to download software.
- **Adoption requirements:** Computer skills, which may take time to acquire for some students.
- **Logistics:** Available in the countries of intervention.

#### Cost

- The price of a lightweight laptop with good battery life ranges from EUR 200 to EUR 2,000 for high-end laptops. The price of a desktop computer, which is generally more powerful and durable, ranges from EUR 300 to EUR 3,000.



Learn

#### Examples of products

- [ChromeBook](#)
- [HP EliteBook](#)
- [ASUS Vivobook](#)
- [Acer Aspire 5](#)

User



Student



## Hardware allowing access to educational content or activities

### Touchscreen tablet



#### Possible uses:

Use adapted educational content

#### Description

A laptop in the form of a touchscreen. Just like a computer, a tablet offers many educational possibilities adapted to the specific needs of students with concentration, working memory or learning difficulties.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★★☆☆☆

Cost ★★☆☆☆

#### Scope of use

- Just like a computer, a tablet offers many educational possibilities adapted to the needs of students with concentration, working memory and learning difficulties.
- The child can avoid the challenges of handwriting (concentrating on letter formation, holding the pencil, etc.). They work in an environment that allows them to concentrate solely on the content.
- The advantage of the tablet over the computer is that the tablet is simpler and more intuitive, which can be very convenient for some students.
- Both free and paid software are available in all fields and for all levels.

#### Feasibility

- **Technical requirements:** Power supply to recharge the device and an internet connection to install applications
- **Adoption requirements:** Mastering this tool can take time for some students, even if the tablet is much easier to use than the computer.
- **Logistics:** Available in the countries of intervention.

#### Cost

- Prices of touchscreen tablets range from EUR 160 to over EUR 1,000 depending on the model and the features.



Learn

#### Examples of products

- [Samsung Galaxy Tab S7](#)
- [HUAWEI MediaPad T5](#)
- [Lenovo Tab P10](#)
- [Apple iPad New 10.2](#)

User



Student



## Software for access to educational content and activities<sup>1</sup>

### CiviKey



#### Possible uses:

Access educational content

#### Description

A 'word prediction' software that suggests different words that correspond to the first few letters typed, thus enabling the student to write quality and comprehensible text (by minimising spelling mistakes)

#### Assessment

Scope of use ★★☆☆

Feasibility ★★☆☆

Cost ★★★★★

#### Scope of use

- For faster input, Civikey offers a word prediction tool for use with students with specific language and learning disabilities.
- The 'word prediction' feature displays a list of words corresponding to the first letters entered. Each time the student enters a new letter, the word prediction system suggests a list of matching words. This system is very interesting for students with language disorders or a specific learning disability (SLD). The prediction system makes it easier for the student to avoid mistakes when writing.
- The student becomes more independent, can concentrate on the content and not on the form of the text, and gains self-confidence because the aid allows them to write high quality text.

#### Feasibility

- **Technical requirements:** Computer and power supply
- **Adoption requirements:** Mastery of the tool by the student and involvement of the teacher
- **Logistics:** Can be downloaded from the resource website

#### Cost

- This is a free resource.



Learn

Resource website:

- [CiviKey](#)

User



Student



## A font allowing access to educational content and activities<sup>1</sup>

### OpenDyslexic



#### Possible uses:

Access written content,  
communicate in writing

#### Description

OpenDyslexic is a text font designed to make reading easier for people with dyslexia. It is free and can be used with any word processing software on a computer.

#### Assessment

Scope of use	★★★★★
Feasibility	★★★★★
Cost	★★★★★

#### Scope of Use

- The OpenDyslexic text font is a font specially developed and designed to make reading, learning and working easier for people with dyslexia. Mirroring, reversing, rotating and merging letters are the most common reading difficulties for dyslexics. This font uses specially designed characters to make reading easier for dyslexic children (e.g. larger line indicating the bottom of letters to avoid mirroring).
- It can be used by the teacher to propose more accessible content to students with reading difficulties, and by the student as a writing tool adapted to their needs, thus minimising mistakes.

#### Feasibility

- **Technical requirements:** A computer and power supply, as well as a word processor and an internet connection (optional) to download the font.
- **Adoption requirements:** Reading and writing skills for the student, and computer skills for the student and the teacher
- **Logistics:** Can be downloaded from the resource website

#### Cost

- This is a free resource.



Learn

Resource  
website:

- [OpenDyslexic](https://www.opendyslexic.com/)

User



Student and  
teacher



## Accessibility features allowing the use of hardware

### Adapted keyboard



#### Possible uses:

Use a computer

#### Description

A computer keyboard designed to be used by students with memory difficulties: fewer keys, coloured keys, larger keys, etc.

#### Assessment

Scope of use ★★☆☆☆

Feasibility ★★☆☆☆

Cost ★★☆☆☆

#### Scope of Use

- Using a computer keyboard requires locating and memory skills that may be very challenging for a student with cognitive difficulties, for example. For those who are able to learn in spite of their disability, the conventional PC keyboard is complex and not very suitable. Using an adapted keyboard is therefore an option.
- Coloured keys can help the student understand the keyboard and the computer activities. There are also keyboards with keys that can be reorganised (e.g. alphabetically), and there are alternative keyboards with fewer, larger coloured keys that make the computer more accessible and intuitive to use.
- These tools can make educational software easier to use.

#### Feasibility

- **Technical requirements:** Computer and power supply
- **Adoption requirements:** The student may need several days of practice to use the tool
- **Logistics:** Generally not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- This type of keyboard usually costs at least EUR 70.



Learn

#### Examples of products

- [Clevy keyboard](#)
- [Clevy keyboard](#)

User



Student

## Educational content and activities

## Software, applications and educational resources



Learn

User



Student

## Possible uses

Use adapted educational content

## Description

Many specialised software and applications are designed to meet the specific needs of students who have difficulty concentrating, memorising and learning. They offer educational solutions in all areas and for all levels.

1

**ABRACADABRA** - Online resource (free)

Abacadabra offers educational games that teach how to read and write from kindergarten to Grade 3. The resource can be used with all students, but its use is particularly interesting with students with specific learning difficulties: the activities promote concentration and are designed to be used in the presence of the teacher. It even includes a teacher's guide outlining the educational value of each game.

**2 + 2** - Software (free)

2 + 2 offers educational games for learning basic mathematical operations. It suits the needs of students with concentration and learning difficulties, with instructions, oral comments, and sometimes graphic cues to support the student's attention. With the help of the teacher who supervises the activities, the software allows the student to train in an environment adapted to their pace and concentration skills.

**Cahiécran** - Software (free)

Cahiécran is used to work with dematerialised documents (handouts, extracts from manuals or books, etc.). The student can interact and work with the documents using various tools. The software creates a simplified, intuitive and fun working environment and is particularly suited to the educational needs of students with learning difficulties.

## Educational content and activities

## Software, applications and educational resources



Learn

User



Student

## Possible uses:

Use adapted educational content

## Description

Many specialised software and applications are designed to meet the specific needs of students who have difficulty concentrating, memorising and learning. They offer educational solutions in all areas and for all levels.

**ChassymO** - Software (EUR 99)

Software using a syllable-based approach to teach reading. This method uses syllabic units and letter-sound correspondence to facilitate the acquisition of reading skills. Chassymo is particularly interesting to use with students who have difficulty learning to read, especially students with language disorders or a specific learning disability (SLD).

**10 doigts** – Tablet application (EUR 2)

10 doigts has a tablet version and is particularly interesting for supporting students with mental disabilities who are learning to count. It strengthens the links between the analogical, auditory and visual representations of numbers and offers fun activities such as a 'challenge mode' that encourages the student to do the activity.

**La course aux nombres** – Software (free)

*La course aux nombres* is a program for students who have difficulties with mathematics, especially students with cognitive disabilities. Through a very visual approach, it allows students to consolidate the representation and manipulation of numbers and is fun and motivating for the student. The software can also be customised to suit the particular educational needs of the student.

## Educational content and activities

### Les Langagiciels



#### Possible uses:

Learn how to read and write

#### Description

*Les Langagiciels* is an educational software suite developed by the association Eclire. It is a reading and writing tool adapted to the needs of children who have difficulty concentrating, memorising and learning.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- *Les Langagiciels* proposes activities and exercises adapted to the needs of students with learning difficulties. For French, for example, there are 6 programs for the acquisition of basic reading and writing skills (segmentation of a text, anticipation, etc.).
- The developers consider that the acquisition of reading and writing skills is best achieved through group work. *Les Langagiciels* is therefore designed with group work in mind, and students work on the computer in pairs.
- The teacher uses this tool to define tasks to be carried out by the students (e.g. using an example to construct a simple sentence) according to their abilities and needs.

#### Feasibility

- **Technical requirements:** A computer, power supply, and optionally an internet connection to download the software
- **Adoption requirements:** Mastery of the tool by the student, which requires several days of practice, and involvement of the teacher
- **Logistics:** This software suite can be downloaded directly from the resource website.

#### Cost

- This is a free resource.



Learn

#### Resource website

- [Les Langagiciels](#)

User



Student

## Introduction to the ICT Directory

### How to use the Directory

1. Visual impairment
2. Hearing impairment
3. Communication difficulties
4. Difficulty remembering/concentrating/learning
- 5. Difficulty moving upper limbs**
6. Other ICT uses

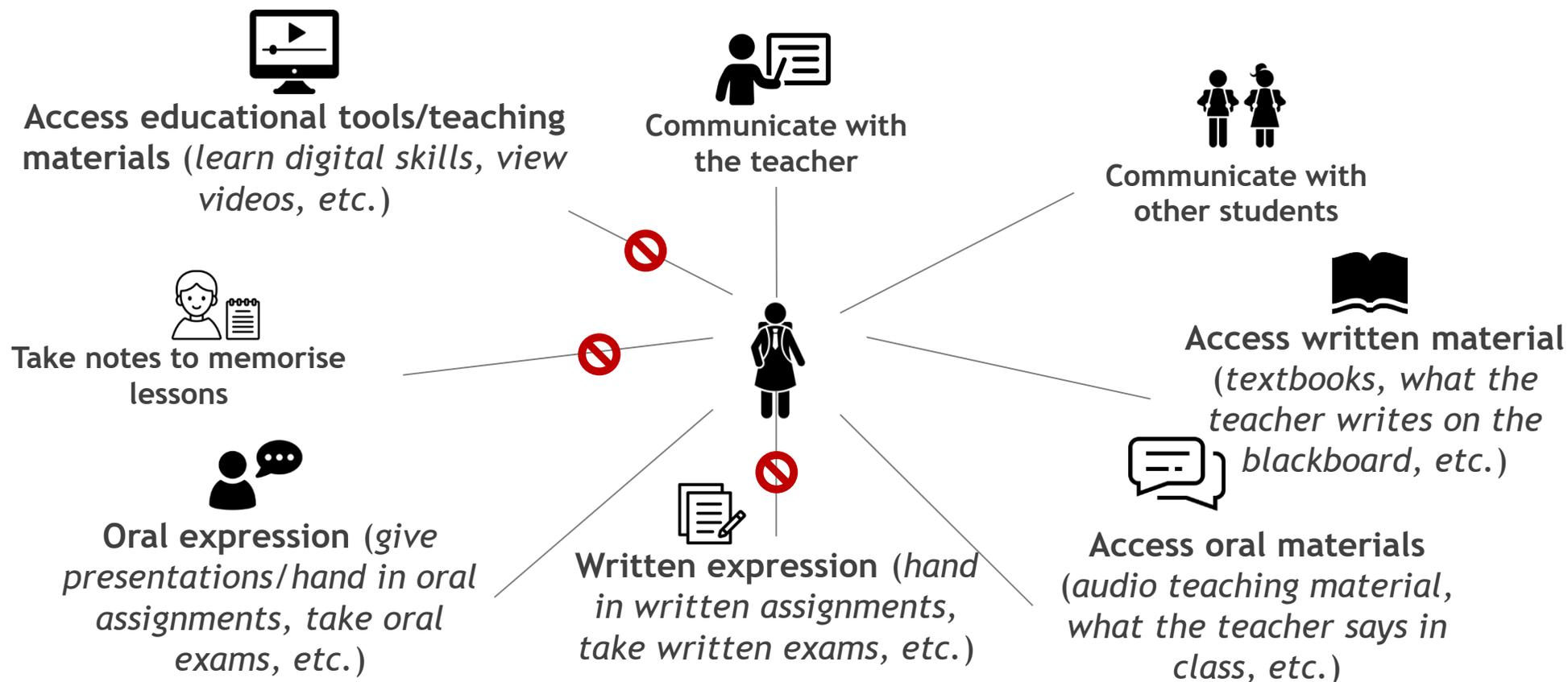
### Methodology



Move

In a non-inclusive school, children with disabilities are denied access to certain educational content and activities

### Consequences of lack of inclusion for children who have difficulty moving their upper limbs

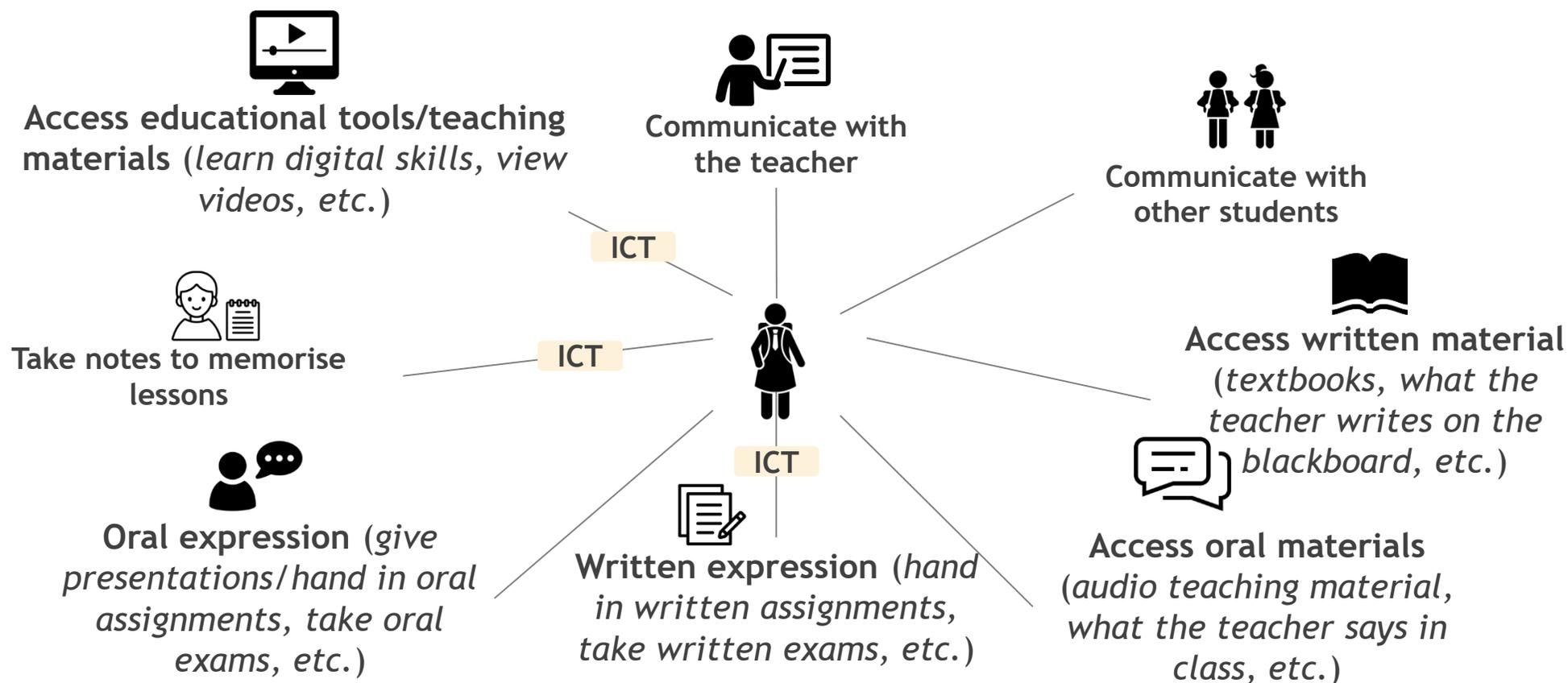




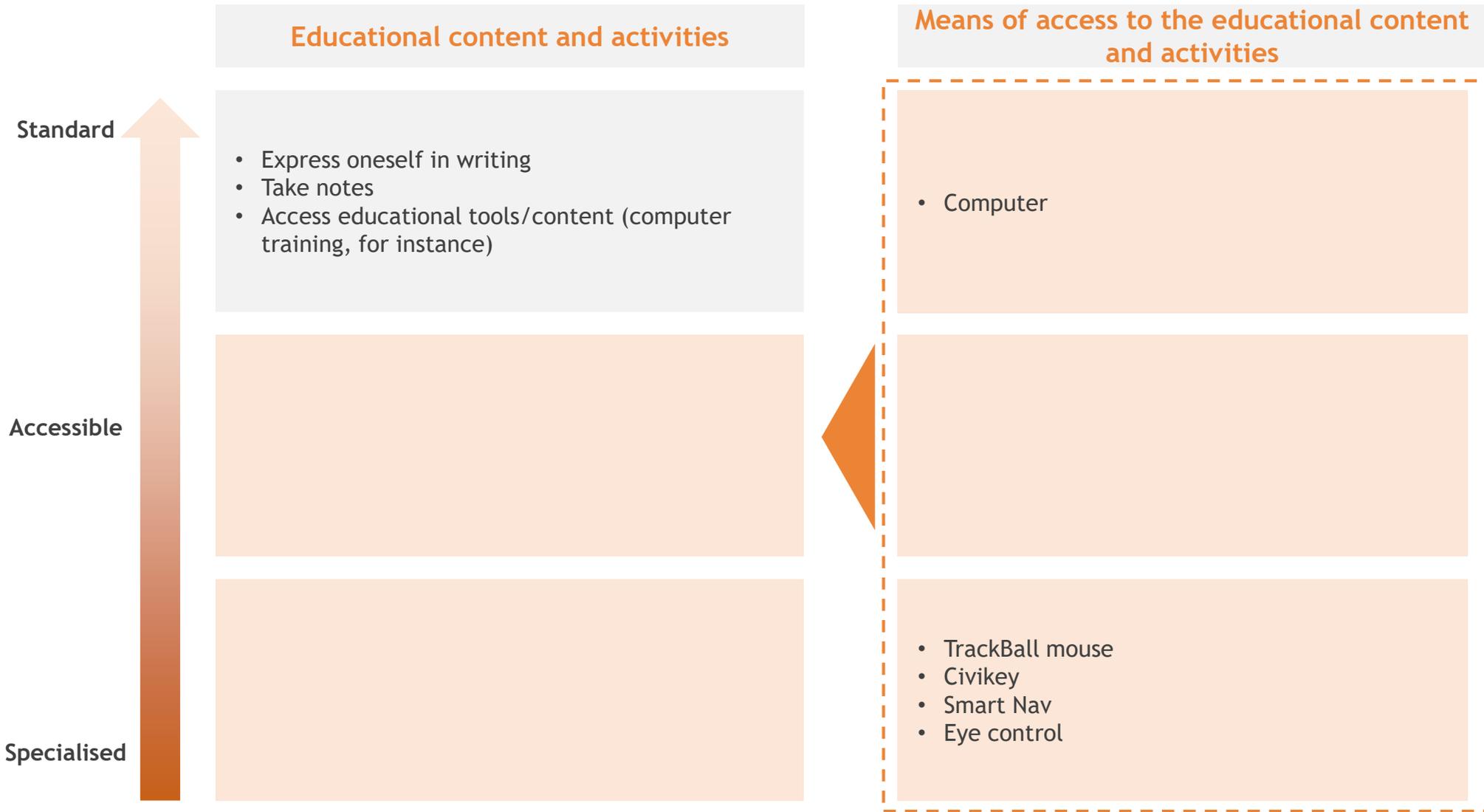
Move

ICTs can help schools be more inclusive by providing alternatives to the usual non-inclusive educational content and activities

### Potential of ICTs for the educational inclusion of children who have difficulty moving their upper limbs



# Identified ICTs that can enable access to educational content and activities for children who have difficulty moving their upper limbs





## Hardware allowing access to educational content or activities

### Computer



#### Possible uses:

Communicate in writing,  
take notes

#### Description

A computer is a tool that allows children with difficulty moving their upper limbs to express themselves in writing, take notes and use educational content more easily.

#### Assessment

Scope of use	★★★★★
Feasibility	★★★★☆
Cost	★★★★☆

#### Scope of Use

- A computer can be a very useful tool for a student who has difficulty moving his or her upper limbs. With the help of adapted equipment (see sheets below), the student can use the computer independently.
- It can be used to carry out many school tasks, such as writing, note taking (which are very difficult and even impossible tasks for a student with a motor disability, for example), or consulting educational content.
- The computer makes it much easier for the student to navigate from page to page and to browse a digital book or any other document.

#### Feasibility

- **Technical requirements:** Power supply and, optionally, adapted hardware to control the computer and an internet connection to download software.
- **Adoption requirements:** Computer skills, which may take time to acquire for some students.
- **Logistics:** Available in the countries of intervention.

#### Cost

- The price of a lightweight laptop with good battery life ranges from EUR 200 to EUR 2,000 for high-end laptops. The price of a desktop computer, which is generally more powerful and durable, ranges from EUR 300 to EUR 3,000.



Move

#### Examples of products:

- [ChromeBook](#)
- [HP EliteBook](#)
- [ASUS Vivobook](#)
- [Acer Aspire 5](#)

User



Student



## Accessibility features allowing the use of hardware

### Trackball mouse



#### Possible uses:

Use a computer

#### Description

The trackball is a pointing device that uses a rolling ball to control the movements of the cursor (and perform clicks). It replaces the conventional mouse.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★☆☆☆

#### Scope of use

- Using a mouse (which is necessary to operate a computer) is not always possible for a person with a motor disability in the upper limbs (inability to hold the mouse, inability to click, etc.).
- A tool such as a trackball can be used as a substitute for the mouse to make things easier.
- There are also joysticks that perform the same function; the choice of the equipment depends on the specific needs of the student.

#### Feasibility

- **Technical requirements:** Computer and power supply
- **Adoption requirements:** Student's ability to use a computer
- **Logistics:** Generally not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- A trackball usually costs at least EUR 100, which must be added to the price of the computer.



Move

#### Examples of products:

- [Big Track](#) (Genius Kye Systems)
- [Orbit Optical Trackball](#) (Kensington Computer)
- [Trackman Marble](#) (Logitech)

User



Student

## Software for access to educational content and activities

### CiviKey



#### Possible uses:

Use a computer

#### Description

In addition to the word prediction that we have mentioned previously, CiviKey is a virtual keyboard that offers alternative ways to control a computer, without a keyboard and mouse.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of Use

- A virtual keyboard emulates a keyboard on a screen. This type of tool is intended for students who do not have sufficient mobility or coordination to use a conventional keyboard. The student can click on the keyboard keys with a mouse.
- CiviKey offers students a set of solutions to control different devices:
  - The keyboard can be controlled by the mouse (the student then clicks on the keys of a visual keyboard with the mouse).
  - An auto key clicker compensates for the inability to depress mouse buttons.
  - There are different scrolling systems that allow the student to use the keyboard and mouse with a touch of a button.
- Different functions can also be combined to meet the specific needs of each user.

#### Feasibility

- **Technical requirements:** Computer and power supply
- **Adoption requirements:** Mastery of the tool by the student and involvement of the teacher
- **Logistics:** Can be downloaded from the resource website

#### Cost

- This is a free resource.



Move

Resource website:

- [CiviKey](#)

Other virtual keyboards:

- [Wivik](#)

User



Student

## Accessibility features allowing the use of hardware

### SmartNav



#### Possible uses:

Use a computer

#### Description

SmartNav is a computer control device that interprets the movements of the user's head. It is placed above the screen facing the user.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- This device is intended for use in the classroom by young people with motor disabilities who are completely unable to use the conventional keyboard and mouse. Using SmartNav requires reliable head movement with adequate amplitude on the vertical axis. A virtual keyboard is an essential tool, and the student should know how to use the simple ones at least, in addition to learning to read and write.
- SmartNav replaces the use of a mouse by tracking the movement of the student's head (using a reflective sticker on the forehead or on glasses). The student can validate a selection by touching a button on the side of the device or he can use the 'dwell-clicking' feature which will allow him or her to click by hovering the cursor in one spot for an adjustable amount of time.

#### Feasibility

- **Technical requirements:** Computer and power supply
- **Adoption requirements:** Student's ability to use a computer
- **Logistics:** Generally not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- This resource costs USD 500 (approximately EUR 412 as of December 2020).



Move

Resource website:

- [SmartNav](#)

User



Student

## Accessibility features allowing the use of hardware

### Eye control



#### Possible uses:

Use a computer

#### Description

There are computer control devices that use eye control and allow a student with motor disability to perform certain school tasks using a computer.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- Eye tracking or eye control is a technology used to track a person's eyes on a computer. It is used to control the computer, as one would with a conventional mouse or keyboard, thus giving people with motor disabilities more autonomy.
- The eye tracking is based on a 3D model of the human eye, and the head can move freely without loss of accuracy. This system is particularly beneficial for people with conditions that cause uncontrolled movements, such as cerebral palsy or ALS, which requires body position changes several times a day.
- Today, it is quite difficult to consider the use of this technology in the classroom, but it remains the only solution for access to education for some children with severe disabilities.

#### Feasibility

- **Technical requirements:** A computer, a power supply, and installation (on the user's wheelchair, for example).
- **Adoption requirements:** Mastery of the tool by the student and strong involvement of the teacher in its use
- **Logistics:** Generally not available in the countries of intervention - must be imported from specialist manufacturers

#### Cost

- The price of this resource varies greatly depending on quality/accuracy, from EUR 200 to over EUR 10,000 for the best ones.



Move

#### Examples of products:

- [Eye Tribe Tracker](#)
- [Irisbond Duo](#)

User



Student

## Introduction to the ICT Directory

### How to use the Directory

1. Visual impairment
2. Hearing impairment
3. Communication difficulties
4. Difficulty remembering/concentrating/learning
5. Difficulty moving upper limbs
- 6. Other ICT uses**

### Methodology

# This section presents other possible uses of ICTs to address barriers to the educational inclusion of children with disabilities.

- ICTs also have the potential to improve access to education for children with disabilities by addressing different barriers:
  - Access to electricity for schools
  - Training of teachers in inclusive education
  - Raising awareness of disability among teachers, parents and students
  - Connecting with health professionals
  - Helping to assess the specific needs of children...
  -



*Solar panels on a school roof  
Photo credit: Power for all*

- This section presents **other uses of ICTs** to address barriers to the educational inclusion of children with disabilities.

## Off grid solar power system

## Access to electricity



## Objectives

Provide the school with electricity to allow the use of ICTs

## Description

Installation of solar panels in a school to generate electricity  
Payment is made remotely via *mobile money*.

## Assessment

Scope of use



Feasibility



Cost



## Scope of Use

- Access to electricity is an essential prerequisite for any ICT, either to use it or to recharge batteries. However, many schools, especially in rural areas, are not connected to the national electricity grid, which is often poorly developed.
- However, the rise of ICT, especially mobile telephony and mobile money, has allowed the emergence of a new model: off-grid electricity. One of the major barriers for access to electricity is the collection of payments from users, but remote payment is now possible.
- Solar panels can therefore be installed in schools, and the schools can pay for their electricity via mobile money.

## Feasibility

- **Technical requirements:** A phone (even a feature phone) and a mobile money account are required for the installation of an off-grid electricity system.
- **Adoption requirements:** A school official who can make mobile money payments
- **Logistics:** Companies such as BBOXX and ARESS offer services in the countries of the study.

## Cost

- Electricity is often more expensive than on the state-subsidised national grid, but some countries offer subsidies for off-grid power.



Other

## Examples of products

- [BBOXX](#) (Mali, Senegal, Togo)
- [ARESS](#) (Benin)

User



Student and teacher

## Information and awareness raising

### Social networks



#### Objectives:

Raise awareness, inform

#### Description

A social network is a website that allows internet users to create a personal page and exchange with other users (messages, photos, videos).

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of use

- Social networks are increasingly popular and offer a good opportunity to raise awareness and provide information to parents who are unaware of their children's disabilities and capacities, to teachers, and to students with and without disabilities.
- They are used to share information (or resources) and discuss them with families.
- One possibility is to create WhatsApp groups (WhatsApp is a popular application, especially in French-speaking Africa) for parents of children with disabilities in the same area (by type of disability). The parents can then share information and practical advice, and receive relevant information about their children's schooling.
- Social networks build on the strength of the community and have a real potential for changing attitudes, which are a major barrier to the development of inclusive education in some countries.

#### Feasibility

- **Technical requirements:** A smartphone with internet access in the target group
- **Adoption requirements:** None
- **Logistics:** Conduct an awareness-raising programme

#### Cost

- Social networks are mostly free.



Other

Examples of social networks:

- [Facebook](#)
- [WhatsApp](#)
- [Instagram](#)

User



Students,  
teachers,  
parents

## Information and awareness raising

### Radio



#### Objectives:

Raise awareness, inform

#### Description

A means of telecommunication that uses radio waves (AM/FM) and allows radio stations to broadcast audio content (music, radio programmes) for their listeners.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- The radio has a strong presence in French-speaking African countries. Everyone listens to the radio at home (sometimes with a distracted ear), and the radio is at the heart of family life.
- It is therefore a privileged information channel for raising awareness and informing families about disability and the abilities of children with disabilities.
- For example, local radio stations are a good way to reach out to communities, sometimes in their local languages, and to provide information to combat discrimination and address harmful beliefs about disability.
- The radio can also be an opportunity to give a voice to people with disabilities and to show that disability inclusion is possible in the community (and in education).

#### Feasibility

- **Technical requirements:** A radio set and antenna coverage for the target groups
- **Adoption requirements:** None
- **Logistics:** Produce a programme to disseminate useful information and raise awareness

#### Cost

- Through partnerships with local radio stations, it is possible to implement an awareness-raising programme at no cost. The radio is widely used and the content will be easily accessible free of charge.



Other

User



Students,  
parents

## Information and awareness raising

### Vinz et Lou et le handicap



#### Objectives:

Raise awareness, inform

#### Description

*Vinz et Lou et le handicap* is a website that raises the awareness of children, parents and teachers about disability. It contains animated videos and awareness raising games.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of Use

- The Vinz et Lou website offers activities and cartoons on several themes: violence, the environment, the internet, and disability. The website mainly hosts cartoons featuring children. The cartoons are available in accessible versions (LSF, language supplementation, subtitles, audio description).
- Each cartoon has a sheet that can be used to organise a classroom debate. The aim is to show students' representations, reflect on disability, be it visible or invisible, and discuss the disability experience of each student.
- When used regularly, this set of activities contributes to de-dramatise disability and welcome students with special educational needs more easily.

#### Feasibility

- **Technical requirements:** Equipment to access the resource (computer, tablet, etc.) and an internet connection; optionally a video projector for classroom activities
- **Adoption requirements:** None
- **Logistics:** This resource is accessible directly online.

#### Cost

- This is a free resource.



Other

#### Resource website:

- [Vinz et Lou et le handicap](#)

User



Student and teacher

## Connecting with health professionals

### THEA



#### Objectives:

Diagnose, support

#### Description

That Health Again, or THEA for short, is an African telemedicine platform designed to improve access to health care. The idea is to allow any person to talk to a doctor for free in real time without having to travel, regardless of where they are.

#### Assessment

Scope of use ★★★★★

Feasibility ★★★★★

Cost ★★★★★

#### Scope of use

- The THEA online platform, which is still in its early stages of development, aims to connect patients and practitioners in Africa and facilitate access to health care.
- The resource can have many uses for children with disabilities, their parents and teachers. For example, the teacher of a child with a disability can be put in touch with a specialist who will make simple and useful recommendations on diagnosis, care, support, etc.
- Also, parents who want to find out about their children's abilities or ways of improving their daily life can use the platform to discuss with a doctor or another health professional without having to travel.

#### Feasibility

- **Technical requirements:** Equipment for access to the internet (computer, smartphone, etc.)
- **Adoption requirements:** None
- **Logistics:** THEA is being developed in many countries. It plans to expand, organise the network of practitioners, and improve the platform.

#### Cost

- The platform is free to use; however, teleconsultation with a doctor/health care professional is subject to a charge.



Other

Access the resource:

- [THEA](#)

User



Students,  
teachers,  
parents

## Needs Assessment

## First Screen



## Objectives:

Assess and understand students' needs

## Description

First Screen is an application used to screen for specific learning disabilities. It has been developed and is used in India.

## Assessment

Scope of use



Feasibility



Cost



## Scope of Use

- The Indian application First Screen aims to identify children at risk of developing specific learning disabilities at an early stage. The test takes about 20 minutes to complete and provides the parent or teacher (who must have known the child for at least 6 months) with an assessment and possible recommendations.
- This type of application can be very useful in promoting inclusive education. For example, teachers can assess and better understand the special educational needs of their students.
- This 'assessment' can never replace a professional diagnosis. However, it can provide the parent or teacher with initial recommendations for the management and education of students.

## Feasibility

- **Technical requirements:** A smartphone and internet access
- **Adoption requirements:** The parent or teacher who conducts the assessment using the application must have known the student for several months.
- **Logistics:** The application can be used anywhere.

## Cost

- This is a free resource.



Other

Resource website:

- [First Screen](#)



Teacher (or parent)

## Teacher training

### TheTeacherApp



#### Objectives:

Train teachers

#### Description

TheTeacherApp is a free application developed in India to help teachers learn and improve their skills.

#### Assessment

Scope of use



Feasibility



Cost



#### Scope of use

- TheTeacherApp aims to complement teacher training with free, easy-to-use course content that can be downloaded from anywhere.
- One of the barriers to inclusive education is the lack of information about the abilities and needs of students with disabilities. There are simple practices and educational methods that make schooling accessible to students who have difficulty seeing or hearing, for example.
- The application also provides access to experts on the Indian education system and can be used to share experiences with other teachers in the country and keep abreast of successful teaching innovations, methods and resources.
- This model holds great promise for inclusive education; it addresses the urgent need to train teachers to welcome and accommodate children with disabilities in mainstream schools.

#### Feasibility

- **Technical requirements:** A smartphone and internet access
- **Adoption requirements:** None
- **Logistics:** The application can be used anywhere.

#### Cost

- This application is free



Other

Resource website:

- [TheTeacherApp](#)

User



Teacher



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