Assistive technology

for learners who are D/deaf or Hard-of-Hearing

A TEDI short guide

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TEACHER
EMPOWERMENT
FOR DISABILITY
INCLUSION

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Foreword

The Teacher Empowerment for Disability Inclusion (TEDI) project aims to empower teachers and carers to provide quality education for children with severe to profound sensory or intellectual impairments (SPSII) through training that is focused on inclusivity, diversity and addressing learners' disability-specific needs.

In 2018, TEDI piloted its first professional development courses and workshops for carers, teachers and other facilitators of learners who are D/deaf or Hard-of-Hearing. Through these initiatives it became clear that there is a great need for the development of useful and practical resources for participants to enrich and further their learning on inclusive education. This guide is one example of a response to this need.

This short guide is aimed at teachers and facilitators working and interacting with learners who are D/deaf or Hard-of-Hearing. It responds to the need for these practitioners to understand more about assistive technology (AT), enable them to identify the need for technology, and assist with the selection of appropriate devices. Guidelines are provided on how technology can be used to support teaching and learning across the curriculum. This short guide adopts a practical, skills-based approach and is aligned with the Department of Basic Education's policy framework and learning programmes.

The purpose of this short guide is to:

› Provide basic knowledge on AT devices for learners who are D/deaf or Hard-of-Hearing.

› Highlight things to consider when teachers and facilitators select and use AT for learners who are D/deaf or Hard-of-Hearing.

› Enhance teachers' and facilitators' existing knowledge on AT for learners who are D/deaf of Hard-of-Hearing.

› Illustrate how learners who are D/deaf or Hard-of-Hearing can engage with the national school curriculum, aided by appropriate AT devices.

› Supplement readers' learning through accredited, short online and contact courses on inclusive education by providing additional information on suitable AT for learners who are D/deaf or Hard-of-Hearing.

› Promote a collaborative approach to teaching and caring for learners who are D/deaf or Hard-of-Hearing.

This short guide can be read in conjunction with the free online course 'Educating Deaf Children: Becoming an Empowered Teacher' available through Coursera: https://www.coursera.org/learn/educating-deaf-children

Note: Deaf (with the "D" capitalised) is used when referring to individuals who see themselves as members of a linguistic and cultural minority, namely the Deaf community, where sign language is used and Deaf culture is followed (Ladd, 2003).

Acronyms

AT   Assistive Technology

CAN   Computer-assisted note taking

CAPS   Curriculum and Assessment Policy Statement

DBE   Department of Basic Education

DSU   Disability Service Unit (University of Cape Town)

FET   Further Education and Training (Grades 10–12)

FM   Frequency Modulation

FP   Foundation Phase (Grades 1–3)

ICT   Information and Communication Technology

IP   Intermediate Phase (Grades 4–6)

LTSM   Learning and Teaching Support Materials

NCS   National Curriculum Statement

SP   Senior Phase (Grades 7–9)

SPSII   Severe to Profound Sensory and Intellectual Impairment

UDL   Universal Design for Learning

Section

1

SECTION 1

Defining assistive technology

In this introductory section, we define the term 'assistive technology' (AT) and look at things to consider when identifying the need for and forms of AT for learners who are D/deaf or Hard-of-Hearing. We also look at the classification of AT devices from no-tech to high-tech, and how this classification affects their application and use.

After reading this section, you will be able to:

› Define the term 'assistive technology'.

› Understand the classification of AT devices from no-tech to high-tech.

› Give some examples of AT.

› Understand the need for matching AT devices carefully to individual learners.

› Identify some of the AT recommendations made by the Department of Basic Education (DBE).

1.1   Introduction

The recommendations and considerations presented in this short guide come from observations, findings and guidelines from multiple research efforts, projects and sources. The starting point for determining the AT needs of learners who are D/deaf or Hard-of-Hearing derived from the prescribed learning activities in the DBE's National Curriculum Statement (NCS) for Foundation Phase (FP) (Grades 1–3). The FP Curriculum and Assessment Policy Statement (CAPS) comprises four subject areas: Home Language, First Additional Language, Mathematics, and Life Skills (DBE, 2011a, b, c).

The FP is the initial stage of schooling in which foundations of knowledge and skills development are laid for future learning and potential academic success. During this stage, learners who are D/deaf or Hard-of-Hearing need to be able to fully engage with the curriculum in order to maximise their learning potential. Identifying AT needs is vital for optimal learning and to enable learners to enter subsequent phases.

It is important to note that this short guide does not list all known technologies, and will need to be updated as needs and technologies change and develop. Rather, this short guide acts as a point of reference for teachers and carers to support teaching and learning using technology to enrich the experience of learners who are D/deaf or Hard-of-Hearing.

1.2   What is AT?

Technology is about how we use different types of tools to carry out different functions. We use technology all the time, ranging from simple low-tech tools such as pencils to high-tech devices such as cell phones and computers. Technology is growing in sophistication all the time and reflected in its use in schools and their classrooms. It presents great opportunities for the enrichment of learning if there is the right match according to the needs of learners, the environment, the knowledge of the teacher and the tools available (Dalton, McKenzie, et al. 2012).

Assistive technology is a device, piece of equipment or system that helps bypass, work around or remove barriers to participating in the curriculum (Reading Rockets, n.d.). AT can be used to address specific barriers to learning by enabling the learner to capitalise on strengths and bypass areas of difficulty.

1.2.1 Classification of AT devices

AT devices can be classified from no-tech to high tech according to the degree of mechanical and electronic parts they are made up of, other requirements such as a power source, and the knowledge and training the device user must have to optimise its assistance. It is always recommended that no-tech and low-tech solutions be considered before looking at mid-tech and high-tech options. Some experimentation may be required before the best learner-technology match is achieved.

Although no-tech or low-tech devices may save on costs, the main objective is to find the tools that offer learners full access to the school curriculum and ensure they are able to meaningfully engage in teaching and learning activities.

This short guide does not focus on no-tech or low-tech solutions, but acknowledges that they can help learners with disabilities gain access to the curriculum. Rather, we look more closely at the mid-tech and high-tech solutions available to learners and their teachers.

Table 1: Classification of AT devices

Type	Description
No-tech	No-tech solutions make use of procedures, services and existing conditions in the environment, and do not involve the use of special devices or equipment. Examples include pencil grips; coloured paper; extra time for testing; and the use of a scribe, reader or interpreter (Roy, 2003; Weiland, 2003, cited in Martinez Marrero and Estrada-Hernandez, 2008).
Low-tech	Low-tech devices are simple devices that have few mechanical parts and do not require a power source. They include adapted spoon handles, adapted pens, canes, non-tipping drinking cups, magnifying glasses, and eyeglasses. Limited or less training is needed to use these devices compared to mid-tech and high-tech devices.
Mid-tech	Mid-tech devices are relatively complicated mechanical devices that may require a power source, but do not contain sophisticated electronic systems. These devices include remote interpreting, manual wheelchairs, talking calculators, adapted keyboards, and trackballs. The operation of mid-tech devices requires some training and technical knowledge.

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Type	Description
High-tech	High-tech devices are often computer-based systems that incorporate sophisticated electronics. They are complicated to use and require extensive training, technical knowledge, and access to technical support. With their sophisticated electronics, high-tech devices are often much more expensive than other technologies. Examples include speech recognition software, eye gaze-controlled computers, closed captioning televisions, power wheelchairs, and environmental control units.

1.2.2 AT devices recommended by the DBE

The DBE's 'Draft National Guidelines for Resourcing an Inclusive Education System – Annexure A' (DBE, 2018) details, among other important aspects of inclusive education, examples of learning technologies recommended for learners who are D/deaf or Hard-of-Hearing. The standardised provision of AT to learners throughout South Africa would ensure they have access to appropriate educationally enriching information and communication technology (ICT). Assistive technology devices that are suitable for learners who are D/deaf or Hard-of-Hearing are listed in the appendix to this short guide.

Section

2

SECTION 2

Selecting AT devices

In this section, we look at challenges to the effective use of AT devices by learners who are D/deaf or Hard-of-Hearing, and their families and teachers. We outline some of the things to consider when selecting appropriate AT devices for learners who are D/deaf or Hard-of-Hearing, and basic learning and teaching support materials (LTSM) requirements. The different categories of AT available for learners who are D/deaf or Hard-of-Hearing are highlighted, as well as examples of mid-tech and high-tech devices.

After reading this section, you will be able to:

› Discuss some of the challenges facing teachers and learners in the effective use of AT.

› List criteria to consider in the selection of suitable AT devices for learners who are D/deaf or Hard-of-Hearing.

› Identify the types of AT devices that are most suitable for learners who are D/deaf or Hard-of-Hearing.

› Categorise AT devices for learners who are D/deaf or Hard-of-Hearing according to their function.

> ‣ List examples of mid-tech and high-tech AT devices for learners who are D/deaf or Hard-of-Hearing.
>
> ‣ Describe some of the teaching and learning resources that should be in a classroom to facilitate learning for learners who are D/deaf or Hard-of-Hearing.

2.1 Challenges to the effective use of AT

Access to AT by children with disabilities, and their families, is a difficulty experienced worldwide. Equipment may be costly and there is a lack of funding for the provision of AT. Devices might be expensive and need to be insured against risks such as theft or accidental damage. Apart from these factors, there is little information available about AT for persons with disabilities. Teacher education on how to support learners with SPSII, and ongoing support for learners and their families, is problematic. There are often no clear procedures set out for teachers and parents to learn how and who can get access to AT devices, which devices are available and suitable, and how to get funding or payment options for their provision (Alper and Raharinirina, 2006).

A further challenge is the environment in which AT devices are used and the level of knowledge required to use them. Even when AT devices are available, they may not be used; for example, the device might not fit the learner or suit the family's needs, or require maintenance that the family cannot provide. In some instances, the device might be too complex for the learning and home environment without additional support. It is important that suitable AT devices are matched to individual learners.

2.2 Choosing suitable AT devices for learners who are D/deaf or Hard-of-Hearing

Learners who are D/deaf or Hard-of-Hearing will have vastly different needs despite being in the same category of disability. What works well for one learner might not work well for another. The AT chosen for learners who are D/deaf or Hard-of-Hearing should reflect their specific needs and the activities they need to do to be fully included in the curriculum.

AT for learners who are D/deaf or Hard-of Hearing should include instructional materials in appropriate media to enable learners to communicate effectively, and

enhance social competence and personal independence. AT would, therefore, need to allow learners who are D/deaf or Hard-of-Hearing to learn through alternate media, using their other senses and alternate modes of learning.

The following factors are important to consider when selecting AT for learners who are D/deaf or Hard-of-Hearing:

› **Universal Design for Learning (UDL) principles**

The UDL philosophy or framework is defined more fully in Section 3. However, its principles of representation, expression and engagement, will inform the selection of AT devices. AT devices should:

- present information and enable the acquisition of information and knowledge in different ways (*representation*);
- differentiate the ways in which learners can express what they know (*expression*); and
- allow learners to deepen their engagement and interest in the world around them through an array of learning activities that are accessible to learners with different abilities (*engagement*).

› **Learning programme/curriculum requirements**

Different subjects require different types of engagement. AT devices should empower learners to engage in activities across the curriculum.

› **Family involvement and support**

Family involvement in the selection and use of AT is often neglected, despite it being important for children to generalise skills at home as part of their overall development. Without the support of families, there is a risk of AT devices being abandoned. Be mindful that many parents want to be active partners in supporting their child's learning, and will feel disrespected if they are not consulted when making these choices (Alper and Raharinirina, 2006). Where learners are based at hostels, the hostel staff function as family and need to be involved.

› **Socio-economic conditions of the learner's school and home environment**

If AT devices cannot be utilised to their full potential due to a lack of knowledge or facilities at a school or place of care, they will not be used properly and, therefore, not achieve their goal. It is important to choose devices that will be used in school and at home.

2.2.1 Main types and examples of AT for learners who are D/deaf or Hard-of-Hearing

There are different types of AT that learners who are D/deaf or Hard-of-Hearing may use to increase their participation in teaching and learning activities. Many learners who are D/deaf or Hard-of-Hearing use hearing aids or cochlear implants (a surgically implanted device that sends sounds electronically to the brain). These electronic aids are personal amplification devices that do not create normal hearing for the learner, and further AT is required for optimal use. Cochlear implants and hearing aids work best in quiet environments and/or with other AT devices.

D/deaf signing students may also benefit from using hearing aids to access residual hearing of environmental sounds such as traffic, a door banging, the school bus arriving, and other louder sounds. Hearing aids are unlikely to enable learners to hear spoken language, but will allow them to participate in their sound environment, promoting their safety and independence.

There are many more devices and systems available to learners who are D/deaf or Hard-of-Hearing that can assist engagement with the learning environment. Some devices convey information visually, while others enhance auditory information. It is helpful to know and understand the particular functions of different AT devices for learners who are D/deaf or Hard-of-Hearing, and how they can be used to assist effective teaching and learning.

Table 2 outlines the different categories of AT devices for learners who are D/deaf or Hard-of-Hearing.

Table 2: AT devices for learners who are D/deaf or Hard-of-Hearing

Devices to enhance listening	
These devices are designed to overcome distance, background noise and reverberation, so that the auditory signal is clearer.	
Frequency Modulation (FM) systems (personal and sound field)	These systems transmit sound directly from a microphone worn by a speaker via FM radio signals at a constant volume, regardless of the person's distance from the FM microphone. There are two types: › A **personal FM system** is coupled directly to a hearing aid or cochlear implant, with sound transmitted directly to the individual. A personal FM system needs to be set to the person using it. › A **sound field FM system** provides increased and directed sound levels to a group of individuals. Special speaker units are placed strategically throughout a classroom or open space (e.g. auditorium, cafeteria, etc.) to direct amplified sound to the area where it is needed. Everyone sitting within range of a speaker unit benefits from the amplified voice, including individuals who are not D/deaf or Hard-of-Hearing.
Infrared and audio induction loop systems	These systems may be used for listening in large spaces such as schools, religious institutions, and theatres. › An **infrared system** uses invisible light beams to carry sound to a personal receiver. Different types of attachments may be connected directly to a personal hearing aid or cochlear implant, or sound can be transmitted to headphones or speakers. › An **audio induction loop system** is a cable that circles a room and transmits sound electromagnetically. The electromagnetic signal is picked up by the telecoil in a hearing aid, cochlear implant or headset. To be tied into the audio loop, the telecoil is switched on in an individual's hearing aid or cochlear implant.

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Coupling accessories (for connectivity to media devices such as computers, TVs, tablets, smartphones, etc.)	These accessories are used with hearing aids or cochlear implants to connect to media devices. For example, there are cables that plug directly from a hearing aid or cochlear implant into tablet devices or phones, and couplers that transmit sound wirelessly from hearing aids to media devices.

Devices to convey information visually

Visual alerting devices	These devices alert individuals to sound using visual support. Specially designed alarm clocks, smoke detectors, doorbells, timers, baby monitors, and phone-alerting equipment provide typically audible information in visual or vibratory ways.
Captioning	This is an important vehicle that assists individuals who are D/deaf and Hard-of-Hearing access many media devices. TVs have closed-caption settings for programmes that offer this feature. A 'CC' logo in TV guides or on media programmes (e.g. YouTubeTM) indicates when something is closed captioned. There are also cinemas that offer open-captioned movies at specific dates/times.
Real-time transcription	This provides instant translation of the spoken word using a stenotype machine, notebook computer, and real-time software. The stenography may occur onsite or remotely and the captions are viewed on a screen or individual monitor. The process is quick, with virtually no delay from speech to text.
Telecommunication	Smartphone technologies have made text and video increasingly accessible. There are also captioned telephones that show word-for-word text of everything a caller says.

Table 3 lists some examples of mid- and high-tech AT devices for learners who are D/deaf or Hard-of-Hearing.

Table 3: Examples of mid- and high-tech AT devices for learners who are D/deaf or Hard-of-Hearing

Device	Function
Mid-tech devices	
Personal sound-amplification device	An assistive listening device that amplifies the sound near the individual while reducing ambient noise.
Remote interpreting	A video service that provides sign language or spoken language interpretation.
High-tech devices	
FM amplification system	Wireless FM system for personal amplification that uses a transmitter for the speaker and a receiver for the listener.
Induction loop system	The induction loop system uses the built-in receiver (telecoil) in a hearing aid to transmit the sound without background noise.
Conversion software for communication via video, text and voice	Software that enables individuals who are D/deaf, Hard-of-Hearing or deafblind to communicate directly or via an interpreter to hearing people.
Live captioning	Service that provides accurate and real-time speech-to-text from spoken content.
Video close captioning	Caption creation service to enhance existing video materials with displayed text.
Wearable warning system	Customisable system of transmitters and receivers to alert the user about various events in their environment, such as a bell or smoke alarm.
Touchscreen tablets	E-devices enabling visual communication for teaching and learning activities.

Technology, with its various software programs, has increased access to communication and educational outcomes for all learners, and especially those in the D/deaf community. Various stakeholders are now able to be more engaged and involved with learners through these platforms.

› **Note taking**

Note taking is the practice of capturing information from another source, most commonly oral discussions and lectures. Note takers support learners by providing clear and accurate notes as a record of what was discussed or taught in class (Fitzpatrick and Neild, 2017).

› **Computer–assisted note taking (CAN)**

CAN allows learners to watch a computer monitor, TV monitor or LCD panel as the note taker types the lecture from a computer. CAN enables the D/deaf or Hard–of–Hearing student to scan the text as it is being typed, and offers the learner a hard copy as notes for future use. CAN also allows for post-class editing and formatting to suit the needs of the learner (Fitzpatrick and Neild, 2017).

› **Real–time captioning**

The Disability Service Unit (DSU) at the University of Cape Town has developed a low-tech way of assisting D/deaf or Hard–of–Hearing learners. Transcribers transcribe lectures using a shared Google Drive document. The DSU uses Google Drive and Google Docs, connecting through eduroam (WiFi network). It offers a real–time experience for learners. Both the transcriber and the learner connect to the same shared document. As the transcriber types, the D/deaf or Hard–of–Hearing learner can see the words appearing on the computer screen. There is also a chat option, where the learner can ask questions and communicate with the transcriber. This screen text capability allows the learner time to look up at the educator and return to the screen without missing any information, and the document can be saved for future reference (Fitzpatrick & Neild, 2017).

› **Live Transcribe**

Live Transcribe is a speech-to-text app from Google. Live Transcribe (and other apps such as Web Captioner) converts speech and sound to text that can be viewed on a smartphone, tablet or laptop. The app saves transcriptions for three days. Although not specifically developed for use in the classroom, it could be used in this setting to encourage more participation and engagement between educators and learners (Google Play, n.d.).

› **Video modelling**

Visual strategies are essential when teaching expected behaviours to learners who are D/deaf or Hard-of-Hearing. Modelling a behaviour on video is one such strategy and can be used to provide learners with insight into social situations and narratives. While a variety of skills can be addressed by video modelling, it most readily addresses the behavioural, social, and emotional needs of the learner. Videos and video modelling can support the integration of signed language, spoken language, cued speech, speech reading, and other visual aspects to access and improve communication (Stromek and Sinnott, 2017).

Section
3

SECTION 3

Using AT devices

This section includes information about how a teacher or facilitator can use AT devices in the classroom to assist learners who are D/deaf or Hard-of-Hearing. We define and explain the purpose and principles of UDL in relation to the use of AT, and highlight its influence on the effective use of AT devices. We then look at the effective implementation of AT within the classroom, and illustrate the importance of using the correct AT devices to achieve specific learning outcomes for particular learning areas or subjects.

After reading this section, you will be able to:

› Define UDL and explain its principles.

› Describe how UDL principles affect the choice of AT devices.

› Outline things that need to be taken into consideration when using AT devices effectively in the classroom.

› Give examples of mid- and high-tech AT devices that help learners who are D/deaf or Hard-of-Hearing to reach specific learning outcomes.

3.1 Universal Design for Learning (UDL)

UDL is a research-based framework or approach to teaching and learning that helps to make education accessible to all learners. It is based on the notion that the needs of all learners should be accommodated during the design, implementation and teaching of learning stages and activities. It promotes a set of principles for curriculum development that gives all learners equal opportunities to learn (Sadao and Robinson, 2010).

UDL principles can be adopted to ensure that AT devices are chosen and used in a way that best suits individual learners. They encourage flexible ways of using devices, which are customised and adjusted for individual needs, and do not subscribe to a one-size-fits-all approach. The ultimate purpose of UDL is to increase access to learning for all learners by removing barriers that impede involvement and engagement.

3.1.1 Principles of UDL

In Section 2, UDL principles were applied to the selection of suitable AT devices for learners who are D/deaf or Hard-of-Hearing. We will now look more broadly at how UDL principles could be applied to the use of AT.

The three overarching principles of UDL that should guide curriculum design, the selection and planning of teaching and learning activities, and the selection of AT for the classroom and individual learners, are:

› **Representation:** Giving learners various ways of acquiring information and knowledge. This means that information and content is presented in different ways, and that different methods of teaching and reaching learning goals are used.

› **Expression:** Differentiating the ways that learners can express what they know. This means that learners are allowed to communicate what they know through various modes of expression, and can demonstrate their proficiency or mastery of a skill through a variety of means.

› **Engagement:** Stimulating interest and motivation for learning using content that is suitable for the varied levels of abilities and preferences/interests of learners. This is achieved by facilitating options and choices of activities and resources.

Table 4 indicates the AT devices that can be used to practically apply the UDL principles while teaching learners who are D/deaf or Hard-of-Hearing.

Table 4: AT for learners who are D/deaf or Hard-of-Hearing that enable the practice of UDL principless

UDL principle	AT devices
Representation	**Mid-tech**
Enabling multiple ways of presenting content	› Personal sound-amplification device › Remote interpreting
	High-tech
	› FM amplification system › Induction loop system › Live captioning › Video closed captioning › Wearable warning system
Expression	**High-tech**
Enabling learners to communicate what they know and can do through various means	› Conversation software for communication with video, text and voice › Touchscreen tablets
Engagement	**Mid-tech**
Enabling the facilitation of choices of learning activities to cater for varied abilities of learners	› Remote interpreting
	High-tech
	› Conversation software for communication with video, text and voice › FM amplification system › Live captioning › Video closed captioning › Wearable warning system

3.2   AT devices in the classroom

Every school subject has different types of knowledge and skills that learners need to acquire. Different AT devices will be required depending on the types of teaching and learning activities planned for achieving the learning outcomes of the subjects making up the school curriculum.

In this short guide, the DBE's FP CAPS curriculum documents for the various FP subjects are used to illustrate how AT devices could be used to achieve specific learning outcomes for learners who are D/deaf or Hard-of-Hearing. However, for hearing impairments there is less differentiation between the AT devices used for the various subject topics. If you are an IP or SP/FET teacher, you could use these devices for the more specialised subjects (e.g. devices indicated for Home Language could be used in other languages and in the teaching of other school subjects). Table 5 indicates the AT devices that are recommended by the DBE. Further specifications can be found in the Appendix.

Table 5: Table 5: DBE–recommended AT devices for FP CAPS subject topics/skills

FP CAPS subject topics/skills	Recommended AT devices
Language	
Sub-skills: – Listening and speaking – Writing and handwriting	› FM amplification system › Induction loop system › Personal sound–amplification device › Conversation software for communication with video, text and voice › Remote interpreting › Live captioning › Video closed captioning

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Topics/skills	Recommended AT devices
FP CAPS subject topics/skills	**Recommended AT devices**
Mathematics	
All topics: – Numbers, operations and relationships – Patterns, functions and algebra – Space and shape – Data-handling	› Same as above
Life Skills	
– Beginning knowledge – Personal and social well-being – Creative arts	› Same as above
Physical education	› Same as above › Wearable warning device

3.2.1 Implementing AT in the classroom

After selecting the most suitable AT device(s) to reach specific learning outcomes, there are other aspects that need to be considered when using AT in the classroom.

The following aspects of AT use and inclusive education need to be considered for successful, sustainable AT implementation (Alper and Raharinirina, 2006):

1. The AT devices need to fit with the learner's family's goals and values for their child's learning.

2. The AT devices need to be fully integrated into the learner's learning programme (i.e. they are not used when 'thought of' or as 'an add-on', but are incorporated in the planning of teaching and learning activities).

3. Family members, teachers, facilitators, support professionals and the learner work collaboratively to experiment with and use various AT devices, in order to reach learning outcomes for the learner optimally.

4. Communication among the aforementioned people is ongoing.

5. AT devices and accompanying equipment are maintained, replaced or modified as needed.

6. Problems experienced with the use of AT devices are resolved as quickly as possible.

While the focus of this short guide has been on the selection and use of AT devices for learners who are D/deaf or Hard-of-Hearing, it is important to note that the categories of AT for different types of disabilities are not mutually exclusive and can co-exist. For example, it is common for a child who is D/deaf to have a visual or intellectual impairment. It is recommended that teachers, facilitators and carers of learners with any type of disability become familiar with AT devices that can be used to assist learners with other types of sensory and intellectual disabilities.

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Appendix

APPENDIX

This Appendix presents the devices recommended in the DBE's 'Draft National Guidelines for Resourcing an Inclusive Education System – Annexure A' (2018) for learners who are D/deaf or Hard-of-Hearing.

The DBE's draft national guidelines document offers more AT device recommendations for a broad range of disabilities, some of which may also assist hearing-impaired learners. It is therefore advised that you not only read the other TEDI short guides on AT devices, but also refer to the guidelines published by the DBE.

Product Type	Functional Description	General Specifications
FM amplification system	Wireless FM system for personal amplification, using a transmitter for the speaker and a receiver for the listener	› Comprises a transmitter microphone and a receiver unit › Greater clarity of speech/sound › Background noise reduction › Works for hearing aid and cochlear implant users › Main frequency transmission bands: 863–865 MHz and 169–176 MHz › Battery operated

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Product Type	Functional Description	General Specifications
Induction loop system	The induction loop uses the built-in receiver in the hearing aid (T-coil) to transmit the sound without background noise through the personally adjusted hearing aid	‣ Transmits sound to hearing aids or cochlear implants by means of cabling running around a room ‣ No need to use a receiver/headset ‣ Any number of users can use the system ‣ Must conform to Standard IEC 60118-4:2006 ‣ Magnetic field strength at the listening height must be 400 mA/m (RMS) +/-3 dB ‣ Variation of field strength across the listening plane must not change by more than +/-3 dB ‣ Frequency response of the system must be within +/-3 dB of the level at 1 kHz from 100 Hz to 5 kHz ‣ Background magnetic noise should be no worse than -47 dB(A) (-32 dB(A) is acceptable) ‣ Affix sign depicting the presence of the induction loop
Personal sound-amplification device	Assistive listening device that amplifies the sound near the individual while reducing ambient noise	‣ Small and mobile ‣ Built-in speaker ‣ Microphone ‣ Noise reduction
Conversation software for communication with video, text and voice	Software that enables D/deaf, Hard-of-Hearing and deafblind individuals to communicate directly or via an interpreter to hearing people	‣ Allows deaf people to sign and visualise sign language ‣ Uses real time text (RTT) to communicate ‣ Compatible with screen-reading software and can be connected to a braille display ‣ Receive text back in braille or plain text ‣ Available for Windows, Mac OS, iOS, Android

Product Type	Functional Description	General Specifications
Remote interpreting	Video service which provides sign language or spoken language interpretation	› Computer device with good quality audio and video transmission › Remote site with a skilled interpreter
Live captioning	Service which provides accurate and real-time speech-to-text from spoken content	› Computer device with audio transmission and text reception and display › High-quality microphone › Remote site where a skilled captioner transcribes via stenograph or speech-to-text software › Optionally, with a good quality video feed, the service can offer sign language interpretation
Video closed captioning	Captions creation service to enhance existing video materials with displayed text	› Transcription of the audio portion of a video › Provides additional, interpretive or environmental information › Captions can be enabled/disabled by the viewer
Wearable warning system	Customisable system of transmitters and receivers to alert the user about various events in their environment, such as a bell or smoke alarm	› Available in a choice of receivers based on required function

The Teacher Empowerment for Disability Inclusion (TEDI) project aims to empower teachers and carers to provide quality education for children with severe to profound sensory or intellectual impairments through training that is focused on inclusivity, diversity and addressing learners' disability-specific needs. This short guide is aimed at teachers and facilitators working and interacting with learners who are D/deaf or Hard-of-Hearing. It responds to the need for these practitioners to understand more about assistive technology, enable them to identify the need for technology, and assist with the selection of appropriate devices. Guidelines are provided on how technology can be used to support teaching and learning across the curriculum. This short guide adopts a practical, skills-based approach and is aligned with the Department of Basic Education's policy framework and learning programmes.

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