Education for All through Assistive Technology

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About This Report

This report was developed by Mada in conjunction with international experts in the field of accessible education. It is part of a wider research project that covers all aspects of effective use of Assistive Technology in education. The research material which has been developed includes specific focus on education for the deaf, vocational education, supporting teachers and will be part of a comprehensive capacity building campaign that aims to improve access to education throughout Qatar.

Introduction

Disability is one of the most potent factors in educational marginalization. Physical and mental impairments carry a stigma that is often a basis for exclusion from mainstream education. Students with disabilities are more likely to come from socio-economically disadvantaged backgrounds compared to the rest of the population. This creates a double disadvantage as those with disabilities, coupled with lower socio-economic status, are more likely to be placed in special school settings, outside of the mainstream.

Some form of disability with over four in five persons living in developing countries and 93 million of them are children under the age of 14 living with a 'moderate or severe disability' . Despite these rough numbers, there is a severe lack of concrete and accurate data showing the true scale of discrimination worldwide and on a national level. This is even more the case for education related data, as there is only little information regarding persons with disabilities. Approximate figures show that the situation is worrying with about 62 million children at primary school age having a disability around the world and 186 million children with disabilities who have not completed primary school education .

Early intervention plays a key role in supporting children with special educational needs, and can make a significant difference in a child's future. Technology supports students with disabilities to overcome barriers in educational access, participation, as well as markedly improving their learning progress. Therefore, it is essential that education policy reflects the critical role of Assistive Technology in ensuring an inclusive education sector.

Knowledge is a key driver of social and economic development. It helps shape individual and collective identity and can be a tool for empowerment and inclusion. Its production, dissemination and acquisition continue to gain currency in our information-rich society, and economic growth is increasingly determined by society's capacity to transform learning outcomes into quality goods and services. In this context, disparities in capacity to access and use knowledge can greatly hinder the development of an inclusive society and become a significant source of inequality.

While important progress has been made through assistive technologies and accessibility standards, persons with disabilities are still at risk of exclusion, from education in particular. Rapid changes in the fields of consumer technology and publishing, however, are transforming the educational ecosystem and the growth of digital and multisensory resources provides a unique opportunity to cater for the needs of millions of individuals who are unable to access printed material. Provided they are used appropriately and according to agreed standards, emerging ICTs can help overcome visual impairments, physical disabilities, or learning differences and greatly enhance access to knowledge for all.

The inclusion of children and adults with disabilities in education is important for four main reasons.

1. Education contributes to human capital formation and is thus a key determinant of personal well-being and welfare.

2. Excluding children with disabilities from educational and employment opportunities has high social and economic costs. For example, adults with disabilities tend to be poorer than those without disabilities, but education weakens this association .

3. Countries cannot achieve Education for All or the Millennium Development Goal of universal completion of primary education without ensuring access to education for children with disabilities .

4. Countries that are signatories to the United Nations Convention on the Rightsof People with Disabilities (UNCRPD) cannot fulfil their responsibilities under Article 24.

Defining Disability

According to the World Health Organization, “Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is identified as a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person’s body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers.

People with disabilities have the same health needs as non-disabled people – for immunization, cancer screening etc. They also may experience a narrower margin of health, both because of poverty and social exclusion, and also because they may be vulnerable to secondary conditions, such as pressure sores or urinary tract infections. Evidence suggests that people with disabilities face barriers in accessing the health and rehabilitation services they need in many settings.”

What is Assistive Technology?

Any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of people with disabilities. The term does not include a medical device that is surgically implanted, or the replacement of such device. Although this definition uses the term “device”, it is important to recognize that assistive technology devices required by students with disabilities include hardware and software as well as stand-alone devices.

The definition of an assistive technology device is very broad and gives Individual Educational Plan (IEP) teams the flexibility that they need to make decisions about appropriate assistive technology devices for individual students. Assistive technology includes technology solutions that are generally considered instructional technology tools, if they have been identified as educationally necessary and documented in the student’s IEP.

For example, a classroom computer with a word processing program can be considered assistive technology for a student who demonstrates difficulty in writing and spelling if the IEP team has determined that it is educationally necessary. Assistive technology devices can be purchased from a local store or a vendor that specializes in the production and sale of assistive technology devices. These devices often need to be modified or customized to meet the individual needs of a student with a disability.

For example, a computer keyboard may need to be adapted through the addition of tactile locator dots for a student with a visual impairment. When determining assistive technology needs, IEP teams should consider commercially available solutions that may be used “as is” or ones that can be modified to meet the student’s unique needs. In some situations, it may be necessary to construct a device to meet the student’s needs.

What is meant by the term Accessibility?

In common language, accessibility means, “the ability to reach, understand, or approach something or someone.” In laws and standards on accessibility, the word accessibility refers to what the law requires for compliance.

Article 9 of the United Nations (UN) Convention on the Rights of Persons with Disabilities defines accessibility as: “appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including Information and Communications Technologies (ICTs) and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas”.

An accessible environment allows for free and safe movement, function and access for all, regardless of age, sex or condition. It is a space or a set of services that can be availed by all, without obstacles, with dignity and as much autonomy as possible. Accessibility can be defined at three levels:

1. Accessibility of the built environment, which includes public and private buildings, as well as public spaces and structures.

2. "Geographic accessibility", which refers to the ability to circulate. Everybody should have the opportunity to choose their means of transport, to go from one place to another according to their needs, abilities and budget.

3. Access to information and communication which means, accessible media, and ready access to easy to understand information and data.

What is Universal Design for Learning (UDL)?

Before reviewing specific options to give consideration to the need for assistive technology devices and services for an individual student with a disability, it is important to examine the larger context of efforts to create instructional methods, materials, and assessments that work for all students. This means using flexible approaches with the ability to be customized and adjusted for individual needs. This larger context is known as Universal Design for Learning (UDL).

UDL establishes a framework for curricular reform wherein collaborative teams of general and special educators provide access to the general education curriculum while addressing the disability-specific needs of individuals within inclusive classrooms. This collaboration becomes the intersection of UDL and Assistive Technology (AT), with AT providing solutions for the disability-specific needs of individual students.

Essentially, the term Universal Design for Learning means a scientifically valid framework for guiding educational practice that:

1. Provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and

2. Reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who have limited English language proficiency.

Universal Design for Learning vs. Assistive technology

Universal Design for Learning (UDL)	Assistive Technology (AT)
Makes the general education curriculum accessible to students with varying needs.	Specifically considered for an individual student.
Facilitates use by all students with diverse learning needs.	Used by a student to meet the expectations of the general education curriculum.
Implemented by general and special education teachers.	Monitored by special educators but also used by general education teachers.

Barriers to Education for Persons with Disabilities

Barriers to education can take a variety of forms. They can be physical, technological, systemic, financial, or attitudinal, or they can arise from an education provider's failure to make available a needed accommodation in a timely manner. The following appear to be the main barriers to educational service for students with disabilities:

1. Inadequate funding: This is the prime reason for delayed and diminished special education services at the elementary and secondary levels. Often, accommodation decisions are made based on budgetary considerations rather than on an assessment of the actual needs of students with disabilities. At the post-secondary level, the funding structure is highly complex, with some programs containing eligibility requirements and restrictions.

2. Physical Inaccessibility: Students with disabilities continue to encounter physical barriers to educational services, such as a lack of ramps and/or elevators in multi-level school buildings, heavy doors, inaccessible washrooms, and/or inaccessible transportation to and from school. Students at the post-secondary level also experience difficulty in securing accessible student housing.

3. Accommodation Process: Accommodation is either not always provided in a timely manner, is often insufficient, or sometimes not provided at all. At the elementary and secondary levels, other difficulties include: delays at many stages of the accommodation process, a large backlog in the processing of claims for special education funding, long waiting lists for professional assessments, and delays in the provision of special education programs and services. At the post-secondary level, information about services and supports is not always accessible, there are delays in accessing accommodations, and the right of students to confidentiality is not always respected.

4.Lack of Individualization: At the elementary and secondary levels, some education providers are relying on blanket approaches to accommodation, rather than assessing each student on an individual basis. Some funding schemes rely on pre-set categories and labels, and emphasize student "weakness" rather than strength. Suspension and expulsion policies are at times rigidly applied and do not take into account a student's individual circumstances. At all levels of education, there needs to be a greater recognition of the context in which discrimination occurs. Not all students will experience discrimination in the same way. For example, some students with disabilities are also members of other historically disadvantaged groups, and thus may experience discrimination on more than one ground.

5.Ineffective Dispute Resolution Mechanisms: The dispute resolution mechanisms that exist to deal with accommodation issues are often ineffective, and disputes about accommodation are often causing students to lose time in school, and are increasingly ending up at the Ontario Human Rights Commission as complaints. At the elementary and secondary levels, the appeal process for decisions regarding identification and/or placement of exceptional students is cumbersome, time-consuming and overly litigious, and does not allow for appeals regarding programs and services. At the post-secondary level, processes for resolving disputes are inconsistent, time-consuming, and often, place the onus of proof on students themselves to show that an accommodation would

not cause undue hardship.

6. Negative Attitudes and Stereotypes: Students with disabilities continue to face negative attitudes and stereotypes in the education system. Lack of knowledge about and sensitivity to disability issues on the part of some educators, staff and students can make it difficult for students with disabilities to access educational services equally.

Educational Challenges for Persons with Disabilities in Qatar

According to Qatar's National Human Development Report, there are still fundamental challenges that face students with disabilities in the country. This in an excerpt from the 2015 report:

"Although Qatar has taken significant steps to promote and protect the rights of People with Disabilities (PWD), especially at legislative and institutional levels, challenges remain. Persons with Disabilities and their families are generally unaware of their rights and of the services and support available to them. Ensuring that PWD have access to all basic services and improving coordination between agencies in providing these services are continuing challenges.

Further, access to public buildings and amenities is often difficult for persons with a physical disability. Legislations requiring barrier-free building modification, such as installation of a ramp for wheelchairs alongside or in place of some steps, will improve access for the physically disabled."

Assistive Technology & Education

We live in an age where technological advances seem to appear daily, changing the ways in which we live our lives and creating greater access to information. For students with disabilities, technology is an important tool for reducing barriers to learning and independence. Assistive technology and accessible educational materials create opportunities for students with disabilities to enjoy greater access and meaningful participation in the general education curriculum with their nondisabled peers. Technology plays an important role in ensuring that all students with disabilities receive a free and appropriate public education.

AT in the classroom

Assistive technology devices are available in a variety of categories to address functional capabilities of students with disabilities. No single assistive technology service should address all of these, but it is important to understand their importance to the ability of students to access quality education. These categories include but are not limited to:

1. Academic and learning aids
2. Aids for daily living
3. Assistive listening devices and environmental aids
4. Augmentative communication

5. Computer access and instruction
6. Environmental control
7. Mobility aids
8. Pre-vocational and vocational aids
9. Recreation and leisure aids
10. Seating and positioning
11. Visual aids

Assistive technology also ranges from low tech to high tech devices or equipment. Low tech AT are devices or equipment that don't require much training, may be less expensive and do not have complex or mechanical features. AT devices or equipment that range in the middle of the continuum may have some complex features, may be electronic or battery operated, may require some training to learn how to use and are more expensive than the low-tech devices. High tech AT refers to the most complex devices or equipment, that have digital or electronic components, may be computerized, will likely require training and effort to learn how to use and cost the most.

AT Overview

Here is a quick overview of some types of AT that are used, divided by type of disability. These six types of disabilities were specifically included in the Realising Qatar National Vision 2030 The Right to Development Report.

Type of Disability	Available Assistive Technology
Developmental	Audio books, Computer access aids, Graphic organizers, Text To Speech technology, Voice recorders
Autism	Augmentative and Alternative Communication Devices (AAC), Computer access aids, Motor sensory aids, Sensory aids, Picture communication boards, Talking Book Readers
Physical	Adjustable workstations/desks, Hand grip(s), Mobility devices, Pointer(s), Seating and position systems
Visual	Audio books, Braille, Screen enlargement, Notetaker, Text To Speech technology
Audio	Closed captioning, Communication Access Realtime Translation (CART), Hearing Aid(s), Hearing Loop System
Speech and Language Disability	Augmentative and Alternative Communication Devices (AAC), Computer Access Aids, Graphic Organizers, Picture Communication Boards, Text to Speech Technology

Establishing an AT Service in Education

It is important to establish an assistive technology service that supports students with disabilities in all stages of their learning. This includes pre-school, primary, middle, secondary and post-secondary. Any service must include:

A. The evaluation of the needs of a student with a disability, including a functional evaluation of the student in the student's customary environment;

B. Purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices for students with disabilities;

C. Selecting, designing, fitting, customizing, adapting, applying, retaining, repairing, or replacing assistive technology devices;

D. Coordinating and using other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation programs;

E. Training or technical assistance for a student with a disability or, if appropriate, that student's family; and

F. Training or technical assistance for professionals (including individuals providing education or rehabilitation services), or other individuals who provide services to, employ, or are otherwise substantially involved in the major life functions of that students.

The Quality Indicators for Assistive Technology (QIAT) consortium, a national professional user organization based in the United States, has developed a set of widely applicable standards for use of AT in school settings. The standards, or indicators, have been developed and validated through research and should feature centrally in any AT service.

There are eight indicators that have been identified. These are:

1. Consideration of AT Needs
2. Assessment of AT Needs
3. AT in the IEP
4. AT Implementation
5. Evaluation of Effectiveness of AT
6. AT in Transition
7. Administrative Support for AT
8. AT Professional Development

Hands-On Guide for Educators

The following section will provide a substantial guide for teachers to create an inclusive educational environment for students with disabilities.

Creating an Inclusive Education Environment

It is important to understand that an accessible classroom is part of a wider ecosystem that needs to be accessible as well. Some of these touchpoints are infrastructural and others are within the wider school setting. For the purposes of this report, the accessibility of the school shall be discussed. Teachers and management need to take these considerations as part of the process of creating accessible classroom settings.

Physical Accessibility to Education

Students with disabilities may be unable to attend their local school due to lack of physical accessibility. Many schools are multi-level and the installation of elevators may be impractical or too costly. Parts of the school may be inaccessible due to lack of ramps, heavy doors, site elevation or playground features. Many schools do not have washrooms suitable for students with disabilities (wide doors, higher toilets, grab bars, change tables, hoists or lifts, etc.)

In the United States, disability policy outlines that “when constructing new buildings, undertaking renovations, purchasing new computer systems, launching new Web sites, [or] setting up new policies and procedures… design choices should be made that do not create barriers for persons with disabilities.”

This approach is referred to as “design by inclusion” or “inclusion by design”. Where barriers already exist, the duty to accommodate requires education providers to make changes up to the point of undue hardship to provide equal access for persons with disabilities. If, after making the required changes, persons with disabilities are still unable to participate fully, education providers have a duty to accommodate any remaining needs up to the point of undue hardship.

Physical Access

This means access to buildings, public spaces, and any other place a person might need to go for education, business, services, etc. Physical access includes things like accessible routes, curb ramps, parking and passenger loading zones, elevators, signage, entrances, and restroom accommodations. For more details you can see the Americans with Disabilities Act (ADA) Standards for Accessible Design.

It is expected that the school must make a “reasonable accommodation” to enable access for people with disabilities.

A reasonable accommodation is an adjustment to whatever barrier prevents access that doesn’t impose an undue hardship on the individual, business, organization, or institution providing the accommodation, or on its other users or participants. Thus, a small organization isn’t expected to install an elevator, since the cost would be out of the organization’s reach. It would be expected, however, to try to find some other way to deliver services to a participant who uses a wheelchair (equivalent to those services offered to others). This does not apply to schools, as schools are well resourced organizations.

Schools are public facilities, where accessibility is mandatory. Access here includes not only access to the buildings, but also to the classrooms or halls for education services.

Access to Accommodation

The accommodation of students with disabilities is a shared responsibility. Everyone, educators, school staff, government officials, school boards, parents and students themselves must take responsibility for becoming informed about disability and education issues to ensure that students with disabilities can count on a welcoming and inclusive environment.

Everyone needs to work together to ensure equal access to education for students with disabilities. When it comes to ascertaining the needs of a student for the purposes of developing an Individualized Education Program (IEP), for example, the student’s principal, teachers, and any special education professionals with whom the student has worked should co-operate with the student’s parents and the student, where appropriate, to devise the most effective plan. Everyone has an interest in providing all students with the opportunity to reach their potential.

Human rights law and policy establish that education providers have a duty to accommodate students with disabilities, unless it would impose an undue hardship. Without needed accommodations, students are often unable to access educational opportunities equally, education authorities are responsible for ensuring that all exceptional pupils in their schools have available to them appropriate special education programs and services.

When implementing a placement decision for a student who has been identified as exceptional, a school board is required to notify the student's principal of the need to develop an Individualized Education Program ("IEP") for the student. An IEP is a working document that includes the specific educational expectations for the student, an outline of the special education programs and services to be provided to the student, and a statement of the methods by which the student's progress will be reviewed.

In developing the IEP, the principal (or their designee) is required to consult with the student's parent and with the student when he or she is or older. If used properly, the IEP is a type of accommodation plan for the student.

Creating an Accessible Classroom

Creating an inclusive and accessible classroom requires a lot of considerations into account to be designed and delivered with a diversity of learning styles in mind. Identifying and removing barriers to teaching and learning are critical components in creating an accessible classroom. Physical access to the classroom is one component of accessibility in an academic environment. Ensuring the classroom environment is inclusive of students with disabilities (including invisible disabilities such as mental health and chronic illness) requires proactive measures such as:

- Using inclusive language:
  - use person first language such as 'student with a disability' (instead of disabled student);
  - avoid using adjectives as nouns e.g. 'the deaf, the blind, the disabled'. Rather use more respectful language such as using the student's name;
  - Including a syllabus statement regarding the duty to accommodate students with disabilities; and
  - Addressing discriminatory behaviors or stereotypical comments as soon as possible. Silence or inaction may be taken as an endorsement.

- Common examples of accessibility in a classroom can include:
  - Providing reading lists and course syllabus in advance;
  - Providing alternative formats of lecture notes ahead of time;

- Ensure lecture materials are available electronically;
- Ensure instructions and expectations are clear and concise.

Educational Material in Alternative Formats

Schools must ensure that all students with disabilities have equal access to the materials provided so they can fully participate in the classroom and enhancing accessibility in the school. Making accessible training, internal communications, meetings, and technology more accessible and user–friendly; educating students on disability appropriate tasks, language, and raising awareness of invisible disabilities.

Accordingly, it is essential to offer all materials in alternative formats. The statement should be in large, sans serif font so that students who need an alternative format will be able to know what is available. When setting the deadline for receiving all materials, factor in the time it will take to produce the alternative formats requested. Students who are blind or visually impaired may rely on alternative formats such as:

- Braille
- Large print, Font size
- Audio recording on CD or DVD

Students with learning disabilities may also rely on alternative formats such as:

- Audio recording on CD or DVD.
- Large print to ensure ease of access to printed material

Written materials are most accessible when printed using upper and lower case, sans serif and high contrasts (black on white and white on black). If alternative formats cannot be made available in a timely manner, use other means of conveying the information to students with disabilities.

Effective Teacher Feedback

Teacher feedback about student learning is essential for students and integral to teaching, learning and assessment. Feedback can clarify for students with disabilities:

- how their knowledge, understanding and skills are developing in relation to the syllabus outcomes and content being addressed
- how to improve their learning.
- provides information about how they can improve
- facilitates the development of and provides opportunities for self-assessment and reflection during the learning process

The Importance of Individualized Education Plans

The Individualized Education Program, also called the IEP, is a document that is developed for every student who needs special educational support. The IEP is created through a team effort and reviewed periodically. An IEP defines the individualized objectives of a child who has been determined to have a disability or requires specialized accommodation. The IEP is intended to help children reach educational goals more easily than they otherwise would. In all cases, the IEP must be tailored to the individual student's needs as identified by the IEP evaluation process, and must especially help teachers and related service providers (such as paraprofessional educators) understand the student's disability and how the disability affects the learning process. The IEP also describes how the student learns, how the student best demonstrates that learning and what teachers and service providers will do to help the student learn more effectively.

The following is a recommended step by step approach to creating an IEP:

Step 1. Child is identified as possibly needing special education and related services.

The education system or school board must identify, locate, and evaluate all children with disabilities who need special education and related services. A school professional may ask that a child be evaluated to see if he or she has a disability. Parents may also contact the child's teacher or other school professional to ask that their child be evaluated. This request may be verbal or in writing. Parental consent is needed before the child may be evaluated. Evaluation needs to be completed within a reasonable time after the parent gives consent.

Step 2. Child is evaluated.

The evaluation must assess the child in all areas related to the child's suspected disability. The evaluation results will be used to decide the child's eligibility for special education and related services and to make decisions about an appropriate educational program for the child. If the parents disagree with the evaluation, they have the right to take their child for an Independent Educational Evaluation (IEE). They should be able to ask that the school system pay for this IEE.

Step 3. Eligibility is decided.

A group of qualified professionals and the parents look at the child's evaluation results. Together, they decide if the child is a "child with a disability," as defined by the school system's criteria. Parents may ask for a hearing to challenge the eligibility decision.

Step 4. Child is found eligible for services.

If the child is found to be a "child with a disability," as defined by the school system's criteria, he or she is eligible for special education and related services. Within 30 calendar days after a child is determined eligible, the IEP team must meet to write an IEP for the child.

Step 5. IEP meeting is scheduled.

The school system schedules and conducts the IEP meeting. School staff must:

- contact the participants, including the parents;
- notify parents early enough to make sure they have an opportunity to attend;
- schedule the meeting at a time and place agreeable to parents and the school;
- tell the parents the purpose, time, and location of the meeting;
- tell the parents who will be attending; and
- tell the parents that they may invite people to the meeting who have knowledge or special expertise about the child.

Step 6. IEP meeting is held and the IEP is written.

The IEP team gathers to talk about the child's needs and write the student's IEP. Parents and the student (when appropriate) are part of the team. If the child's placement is decided by a different group, the parents must be part of that group as well.

Before the school system may provide special education and related services to the child for the first time, the parents must give consent. The child begins to receive services as soon as possible after the meeting.

If the parents do not agree with the IEP and placement, they may discuss their concerns with other members of the IEP team and try to work out an agreement. If they still disagree, parents can ask for mediation, or the school may offer mediation. Parents may file a complaint with the state education agency and may request a due process hearing, at which time mediation must be available.

Step 7. Services are provided.

The school makes sure that the child's IEP is being carried out as it was written. Parents are given a copy of the IEP. Each of the child's teachers and service providers has access to the IEP and knows his or her specific responsibilities for carrying out the IEP. This includes the accommodations, modifications, and supports that must be provided to the child, in keeping with the IEP.

Step 8. Progress is measured and reported to parents.

The child's progress toward the annual goals is measured, as stated in the IEP. His or her parents are regularly informed of their child's progress and whether that progress is enough for the child to achieve the goals by the end of the year. These progress reports must be given to parents at least as often as parents are informed of their nondisabled children's progress.

Step 9. IEP is reviewed.

The child's IEP is reviewed by the IEP team at least once a year, or more often if the parents or school ask for a review. If necessary, the IEP is revised. Parents, as team

members, must be invited to attend these meetings. Parents can make suggestions for changes, can agree or disagree with the IEP goals, and agree or disagree with the placement.

If parents do not agree with the IEP and placement, they may discuss their concerns with other members of the IEP team and try to work out an agreement. There are several options, including additional testing, an independent evaluation, or asking for mediation (if available) or a due process hearing. They may also file a complaint with the state education agency.

The Use of Technology for Increased Classroom Access

Assistive Technology (AT) is an essential tool which can assist students with disabilities to participate more fully in the classroom. Accessible equipment can be of benefit not just to students with disabilities but to all students. This section discusses the role of accessible equipment and assistive technology in the education system in school/ university such as classroom/hall.

More and more, access to rewarding education for students with disabilities is becoming easier, and technology has played a significant part in making this happen. Inaccessible electronic and information technology (IT) is often a significant barrier for students with disabilities in the classroom so that school leaders should examine accessible equipment and technical services to ensure accessibility to students of all abilities. Accessible equipment and assistive technology can be harnessed in a variety of ways. It can help in compensating for loss of dexterity, eyesight or other limitations. For example, a student who is blind may need visual support software to access a computer or a student who is experiencing mobility impairment may need voice recognition software which allows them to use their voice instead of using a mouse or keyboard.

Often people with disabilities only need a specific device to maximize their ability to do the work. AT can sometimes appear to be complicated or difficult, but with the right advice and support, it is in fact, no more or no less than a tool to assist the student at classroom. Assistive Technology encompasses everything from alternative ways of using computers to communication aids that use synthetic speech, power chairs operated by switch controlled interfaces and environmental-control systems offering total remote control of lights, doors and windows.

Assistive technology for students who are blind or low vision

Assistive technology has enormous potential to support students with blind and visually impaired across the age and ability range. In recent years assistive technology has enhanced learning experiences, education for them. Because of the ability to customize and adapt equipment that is responsive to the user's needs and skills. As well as providing an important alternative means of access on an individual basis (for example, through the use of a laptop or braille device for reading and recording), assistive technology can also provide students with visually impaired with access to the many mainstream ICT-based resources that increasingly form part of teaching, learning and participation in the education environment. Because changes in technology take

place so rapidly it is impossible to capture the current state, but we can indicate to ICT accessibility, assistive technology and programs available to enable blind and visually impaired to participate in the classroom.

AT devices in the classroom for Blind students:

- Audiovisual media accessibility for blind and visually impaired
- Braille Notetakers, Braillewriter, Note taking in the classroom, also for composing and printing, recommendations, writing notes, send emails, or browsing the Internet
- Text-to-Braille translation software
- Text-to-audio software
- Voice recording software
- DAISY audio players
- Give students with low vision better access to print, either a large print book, or regular print book with some type of magnifier can be provided
- Narrator connect automatically with (PC), connect with Mobile or audio device input.
- Scanner with Optical Character Recognition (OCR) software
- Image simplifying software
- Image embossing devices
- CCTV with considerations location of CCTV in the visual path of other students sitting behind him/her
- CCTV Monocular, CCTV with distance camera, audio text, high contrast pen, Portable word processing device, typing with audio support
- Narrated slide productions and computer generated presentations
- Hardware screen magnifiers and screen reading – monitor-mounted screens with magnifying screen, used
- Power Chord Braille Keyboard
- Material positioning devices – simple page holders, foldable book holders, or sturdier book stands, and slant boards enable better positioning of the material to decrease distance, angle, or glare
- For writing, (High contrast pen, portable word processing device, typing with audio support, typing with Braille support, tape or digital recording device
- Computer-based recording software
- GPS Device such as Talking GPS-positioning

Assistive technology for the Deaf and hard of hearing in the classroom

Students who are deaf or hearing impairment utilize a variety of assistive technologies that provide them with improved accessibility in numerous environments. Most devices either provide amplified sound or alternate ways to access information through vision and/or vibration. These technologies can be grouped into three general categories:

- hearing technology;
- alerting devices;
- communication supports.

Within each main category there may be subcategories based on different purposes or intended audiences when utilizing the technology.

AT devices in the classroom for Hearing Impaired students:

- Assistive Listening Devices (ALDs) – Provide students with hearing impairment with hearing aids for helping and enabling them to hear when the speaker talks into a microphone and the speech send straight to their ears, also avoiding the degrading effects of noise and distance on speech intelligibility.
- Availability to access to digital hearing aids on a global basis; when students with hearing impairment participating in their classroom and activities.
- Closed captioning and real-time captioning.
- FM infrared and induction or hearing loop systems use radio waves, light waves, or magnetic fields respectively to transmit the sound to hear speaker from some distance, (for example, from teacher to other students on the their tables).
- Access to Internet-based services and equipment, and enabled Bluetooth audio devices, for mobile or computers.
- Accessibility considerations for mobile telephones and other wireless devices should be take into account the ability to connect an alternative headset to particular devices; whether the keys on the keypad are easily discernible from one another; whether there are adjustable contrast and brightness controls; whether the handset has non-slip grips to prevent the phone from slipping out of the hand; and other display characteristics such as the screen size, adjustability of font sizes and more.
- Tools and services to engage in functionally equivalent telephone.

Communication with all other students in the classroom.

- Compatibility with hearing aids, assistive listening devices and TTYs, TTYs are devices that enable students with hearing or speech impairments to communicate over the telephone; they typically include an acoustic coupler for the telephone handset, a simplified keyboard and a visible message display.
- Access to telephone devices used with advanced technologies, including mobile phones or any other handsets used for Internet-based voice communications. “Broadband services needed for “phone communication”.
- Computer-assisted note taking, voice to text/sign language “caption Mic, iCommunicator, video remote interpreter” also web camera, video phone, whiteboard.
- Visual or vibrating alerting devices, i.e. (Baby monitor, Clock / Watch, Mobile Phone).

Assistive technologies for people with physical impairments

Physical impairments come in many forms and can generally be classified as a loss or limitation of function in muscle control or movement or a limitation in mobility. This may include hands that are too large or small for a keyboard, shakiness, arthritis, paralysis, and limb loss, among other difficulties.

AT devices in the classroom for the Physically Impaired students

- In some cases a desktop machine might be better because it has relatively big keys, a separate mouse, and is quite robust. On the other hand, if a student is in a wheelchair or needs access in lots of different places, a laptop might be better especially if attached to a wheelchair. There is a wide range of assistive technologies available to help students with physical disabilities for participating in their classroom.
- Adaptive keyboard: There are a wide range of alternative keyboards to help them, including compact, expanded, ergonomic, on-screen, concept, rubber and ABC keyboards.
- Eye tracking: Devices can be a powerful alternative for individuals with no control, or only limited control, over their hand movements.
- Voice recognition software: Programs enable the students with disabilities to enter text and, in some cases, carry out common computer tasks simply by speaking into a microphone – that is, without having to use a keyboard or a mouse.

- Mouth stick: a device that enables them to control input through a stick that they manipulate with their mouth.
- Sticky Keys: A method of typing where modifier keys, such as Shift, Control, Command, and Alt/Option, will “stick” down and apply to the next keystroke, so that only one key needs to be pressed at a time.
- Slow Keys: A keyboard feature that prevents keystrokes from registering until a key has been held down for a certain period of time.
- Oversized trackball mouse: A trackball mouse has the rollerball on top rather than underneath the mouse. Instead of moving the mouse to control movement.
- Single-switch access: For students with very limited mobility. For instance, if a student can move only the head, a switch could be placed to the side of the head that would allow the student to click it with head movements. This clicking would then be interpreted using special software.
- Head wand: Head wands are very similar in function to mouth sticks.
- Software such as predictive word processors, etc.
- Switch Input, switches and scanning systems.
- Augmentative and alternative communication.
- Access and environmental controls.
- Control a 3D printer.

Assistive technology for individuals with cognitive impairments

There are two main classifications of cognitive disabilities namely, functional or clinical disability. Clinical categories of cognitive disabilities include Autism and Down’s Syndrome. Less-severe cognitive conditions include the sub-category of so-called learning disabilities, such as dyslexia (reading) and dyscalculia (mathematics). Functional cognitive disabilities may involve difficulties or deficits involving:

Problem-solving, Attention, Memory, Math comprehension, Visual comprehension, Reading, Linguistic (speech), and Verbal comprehension. Assistive technology (AT) has the potential to enhance the quality of students with disabilities by providing them with a mean to compensate for their difficulties, and highlight their abilities. Because students with learning disabilities have individual strengths, limitations, interests, and experiences, a technology tool that is be helpful in one situation or setting may be of little use under different circumstances. Selecting the appropriate technology for students with LD requires careful analysis of the interaction between (a) the individual; (b) the specific tasks or functions to be performed; (c) the technology; and (d) the contexts or settings in which the technology will be used.

AT devices in the classroom for Cognitive Impaired students

There are tools can help students who have difficulty processing and remembering spoken language. Such devices can be used in various settings (e.g., classroom, training institution, lecture, or a meeting with multiple speakers such as conference).

- Paper-based computer pen: The person or participant records and links audio to what he writes using the pen and special paper. It enables him to take notes while simultaneously recording someone (e.g., a lectures, speakers) speaking. Then he can later listen to any section of his notes by touching the pen to his corresponding handwriting or diagrams.

- Personal FM listening systems: A personal FM listening system transmits a speaker's voice directly to the user's ear. This may help the listener focus on what the speaker is saying. The unit consists of a wireless transmitter (with microphone) worn by the speaker and a receiver (with earphone) worn by the listener.

- Variable-speed tape recorders: Tape recorders/players allow to student to listen to pre-recorded text or to capture spoken information (e.g., a lessons, courses, and lecture) and play it back later. Variable-speed control (VSC) tape recorders speed up or slow down the playback rate without distorting the "speaker's" voice.

- Abbreviation expanders: Used with word processing, these software programs allow a user to create, store, and re-use abbreviations for frequently-used words or phrases. This can save the user keystrokes and ensure proper spelling of words and phrases.

- Alternative keyboards: These programmable keyboards have special overlays that customize the appearance and function of a standard keyboard. Students who have trouble typing may benefit from customization that reduces input choices, groups keys by color/location, and adds graphics to aid comprehension.

- Proofreading programs: Students who struggle with writing (e.g., spelling, grammar, punctuation, word usage, and sentence structure) may benefit from software programs (included in many word processing systems) that scan word processing documents and alert the user to possible errors.

- Audio books and publications: Allow students with disabilities to listen to text and are available in a variety of formats, such as audio cassettes, CDs, and MP3 and special playback units.

- Optical character recognition: This technology allows a user to scan printed material into a computer or handheld unit. The scanned text is then read aloud via a speech synthesis/screen reading system. Optical Character Recognition (OCR) is available as stand-alone units and computer software.

- Speech-recognition programs: A speech recognition program works in conjunction with a word processor. The user "dictates" into a microphone, and his spoken words appear on the computer screen as text. This can help a user whose oral language ability is better than his writing skills.

- Speech synthesizers/screen readers: These systems can display and read aloud text on a computer screen, including text that has been typed by the speaker/user, scanned in from printed pages (e.g., Presentations, books, letters etc.).

- Talking spell checkers and electronic dictionaries: can help a poor speller select or identify appropriate words and correct spelling errors during the process of writing and proofreading. Talking devices "read aloud" and display the selected words on screen, so the user can see and hear the words.

Assistive Technologies for organizing and outlining information

- Freeform database software: Used in conjunction with word processing or other software, this tool allows the students with disabilities to create and store electronic notes by "jotting down" relevant information of any length and on any subject. They can later retrieve the information by typing any fragment of the original note.

- Graphic Organizers and outlining: it programs help students with disabilities who have trouble organizing and outlining information as they begin writing their suggestions and recommendations.

- Information/data managers: This type of tool helps a student plan, organize, store, and retrieve his calendar, task list, contact data, and other information in electronic form. Personal data managers may be portable, hand-held devices, computer software, or a combination of those tools working together by "sharing" data.

E-Accessibility & Education

E-Accessibility refers to the ease of use of information and communication technologies (ICTs), including all digital content, by people with disabilities. All electronic learning materials need to be developed so that disabled users can access the information.

This section of the report examines and explains the factors that should be taken into account when producing materials and information for the classroom. It aims to support the production of information which is accessible to students with disabilities.

It goes without saying, schools should ensure that the documentation for the classroom is accessible. As mentioned before, all information required for the teaching should be prepared in alternative formats.

Here are some of the most important ways to create accessible documents.

Microsoft Word Document Format (DOC)

For many print-impaired readers, this file format offers the easiest route to accessible information as the text content of the file is easily mutable and it can contain all three elements of structure, content and appearance. Creating a useful file in Word may mean creating a new Word document file at the end of production process.

There are seven basic steps to create accessible Microsoft Word Documents. These are:

1. Use appropriate font style and size
2. Use color appropriately
3. Add alternative texts and captions
4. Specify column header rows in tables
5. Use meaningful hyperlink text
6. Use built-in formatting styles
7. Check accessibility

More information and resources on this topic are available on the Mada Assistive Technology Center website – mada.org.qa

Portable Document Format (PDF)

PDF files are not typically created in Acrobat. They are usually created in another Program and converted to PDF. There are dozens or probably hundreds of programs that can create PDF files, but very few of them produce accessible or tagged PDF files. If you are using Microsoft Word or PowerPoint, OpenOffice.org Writer, or Adobe tools such as InDesign, you can often create accessible, tagged PDF files without opening Acrobat. Of course, the accessibility of the PDF depends on the accessibility of the original document.

Print ready PDFs

These are often the least accessible of all file formats as these particular PDFs contain content and appearance, but only minimally reflect structure; there is no reading order and no structural or semantic tagging. This particularly applies to image based PDFs (e.g. scans of text, or graphically rich books) as they contain no textual content at all. If PDFs are used, they should be edited in Adobe Acrobat to ensure the underlying text is present, and to add tagging.

PDFs optimized for digital use

These files tend to be more navigable and include structure so for some participants they may provide a reasonable option as they can include a reading order, ALT tags etc. These files have all three elements of structure, content and appearance. However, they tend not to be as customizable for individual reader needs as some other formats, and should not be seen as the format of choice in most circumstances.

More information and resources on this topic are available on the Mada Assistive Technology Center website – mada.org.qa

Digital Accessible Information Systems (DAISY) Format

A DAISY document/book can be explained as a package of digital files that may include: one or more digital audio files containing a human or pre-recorded synthesized narration of part or all of the source text; a marked-up file containing some or all of the text; a synchronization file to relate markings in the text file with time points in the audio file; and a navigation control file which enables the student with a disability to move smoothly between files while synchronization between text and audio is maintained. Specialist DAISY players can play the audio, read the text using Text to Speech and navigate through the document in a flexible way. The DAISY Standard allows the producer full flexibility regarding the mix of text and audio ranging from audio-only, to full text and audio, to text-only. The DAISY Consortium offers an open suite of software tools “The DAISY Pipeline” designed to assist in the creation of DAISY files which also has increasing support for conversion to EPUB 3.

Standard printed publications are not accessible to people with visual impairments. Many other categories of readers are not able to use the printed books, newspapers and magazines - including those with dyslexia, motor disabilities or age related macular degeneration. As such, schools leaders should consider this format when choosing a format for their publications.

Electronic Publication (EPUB) Format

This is rapidly becoming the universal "e-document/book" format for commercial publishers, and as version EPUB 3 becomes more widely available is increasingly seen as the format that is most suitable for both commercial exploitation and classroom accessibility needs. EPUB is an open standard for e-document/book creation and distribution and is the most common file format for commercially-available e-documents/books. It can be "read" on almost all e-reader devices.

Creating Accessible Microsoft PowerPoint Presentations

The very nature of PowerPoint is to add visual components to a live presentation or speech, including animation, graphs, charts, pictures, colors and more. But to make the information accessible to everyone, it is important that PowerPoint presentations are readable, navigable, and understandable.

PowerPoint presentations are commonly used among session presenters as an effective way to display ideas and data. PowerPoint is a visual media, presenters should be sure to make presentations accessible to all audience members including students with disabilities.

Color contrast and font selection are important in making a presentation accessible to students who have low vision or color-blindness. Fonts should be large and easy to read, and there should be high contrast between the background and text.

A few additional steps will also make online or e-mailed PowerPoint presentations accessible to students who use screen reader software, which allows a student to listen to the presentation. (This software is typically used by students who are blind or have low vision, or who have a disability related to reading.)

There is no automatic "compliance validator" tool available for PowerPoint documents, but following these best practices assures documents are accessible:

Text content

- All Text must appear in Outline View (Text in a text box will not appear in the Outline View).
- Create slide titles in a Title Holder, not with a text box
- Slide layouts are used for all text
- Title fonts should be 44 pt. or greater. Text fonts should be 36 pt. or greater
- Don't try to cram too many slides into your presentation. Allow your audience time to read slides.
- Place no more than 6 lines of text on a slide (excluding columns).
- Many students with disabilities use text-based screen reading software and computer devices.

- Note that graphics often cannot be read with screen readers and other text-based devices.

Graphic content

- Replace graphics with text whenever possible.
- If graphics are used, include a detailed explanation of the meaning of that charts or graphic in a descriptive text-only slide included immediately after the graphic slide. Note that the meaning of the graphic is needed, not a description.
- No flickering and/or flashing text or objects.
- No animated text or objects.
- An illustration created from several smaller images must be grouped to form one object.
- Alt Text must be associated with the grouped object

Charts content

- Check to see that charts were created in PowerPoint
- If charts were copied from another program, they are treated as images
- All charts must have Title, Legend, Axis Labels

Tables content

- Tables are a layout based on rows and columns
- Check that tables were created within PowerPoint
- When tables are imported into PowerPoint from another program or source, they are recognized as images
- Labeled column and row headers

Things to Avoid

- Slide transitions
- Busy slide backgrounds
- Chart filler patterns
- Over-crowding text
- Color schemes providing low contrast
- Charts without text descriptions

- Videos that are not captioned

More information and resources on this topic are available on the Mada Assistive Technology Center website – mada.org.qa

Video captioning

Captioning in is the process of converting the audio content of a television broadcast, webcast, film, video, CD-ROM, DVD, live event, or other productions into text and displaying the text on a screen, monitor, or other visual display system. Captions not only display words as the textual equivalent of spoken dialogue or narration, but they also include speaker identification, sound effects, and music description.

Schools should be aware that the captioning and alternative input devices should also be available to students with disabilities attending web and video event or on-line conference.

It is important that the captions are:

a. Synchronized and appear at approximately the same time as the audio is delivered

b. Equivalent and equal in content to that of the audio, including speaker identification and sound effects

c. Accessible and readily available to those who need or want them.

d. A captioned video contains text that transcribes the narration and provides descriptions of the sounds and music that are present. The assumption is often that this is for use by students with hearing difficulties, but captions also benefit people who aren't native speakers of the language used in the video, for those unfamiliar with the vocabulary of a discipline, and sometimes to allow interactive searches within the video. There are two ways to caption a video: open captions and closed captions. - Open captions burn the text onto the video image. They can't be toggled on/off, and no player functionality is required. Open captions are added with a video editing process. - Closed captions are the opposite. They can be toggled on/off, and require player functionality in order to be viewed. Closed captions are done using a timed-text file which is created by adding time codes to a transcript of the video.

e. In order to make videos accessible, it is imperative that all videos projected at a meeting or classroom include open captions to allow students with hearing disabilities and non-native speakers to understand the contents. It is also imperative that all videos projected at a meeting include audio description to allow students with sight disabilities to understand the contents. It is imperative that all videos in a foreign language projected at hall/classroom include captions, spoken and written to allow non-native speakers with sight disabilities and others to understand the contents.

Web accessibility for students with disabilities

Staff in charge of the preparation and maintenance of the school website need to make sure that the website is accessible and compatible with the range of hardware and software used by students with disabilities.

All web pages should comply with the Web Content Accessibility Guidelines (W3C WCAG 2.0 accessibility guidelines) and be tested for usability when fonts are enlarged, when style sheets are turned off, when images are turned off, and without using a pointing device (keyboard-only access). Testing with a screen reader and screen magnifier is also beneficial.

The website, including the available documents (e.g. applicants form, employment advertisements), should be accessible and well tagged or formatted according to the W3C specifications [W3C-Accessibility].

It is important to provide text equivalents to auditory and visual content (e.g., videos and images). When using images, ensure that the ALT text (Alternative text attribute) of the image tag conveys what is important or relevant about the image.

And, most importantly, offer all promotional and registration materials in alternative formats, such as Braille, large print, and electronic files, that are accessible to students with disabilities. The format will depend on the type of disability and the needs of the particular individual.

All work papers and training courses that are recorded with audiovisual means must also be captioned.

Recordings of the work papers posted on website of the school managers should be made accessible, including the captioning.

The website can provide information about accessibility of the classroom, accessibility of transportation to the school's site (including for bulky electric wheelchairs), details of local accessibility information services, and contact people at the school, and on the school leader committee for accessibility questions.

The website itself can offer information on how to create an accessible submission to the technical program.

More information and resources on this topic are available on the Mada Assistive Technology Center website – mada.org.qa

Checklists

A. Overview of Assistive Technology and Use in Classroom

Developmental Disabilities

Type of Assistive Technology	How it assists the student with their education
Audio Books	Recording of a book read by a narrator and are used to teach children to read and increase reading comprehension.
Computer Access Aids	Computer access aids enable people to access, interact with, and use computers. They can include software (such as apps) and/or hardware (such as mobile devices).
Graphic Organizers	Graphic organizers assist students with disabilities in studying, problem solving, decision making, and planning research and brainstorming.
Text to Speech Technology	Screen readers provide speech output for popular computer applications on personal computers.
Voice Recorder	By recording the lesson/tasks, the student can then replay them at a later time and repeat, if needed.

Autism

Type of Assistive Technology	How it assists the student with their education
Augmentative and Alternative Communication Devices (AAC)	AAC devices assist with language delays and impairments, as well as assist the student in continued speech and language growth and development (ex: communication board).
Computer Access Aids	Computer access aids enable people to access, interact with, and use computers. They can include software (such as apps) and/or hardware (such as mobile devices).
Motor Sensory Aids	Motor Sensory Aids are any tool or device which makes use of or aims to improve, motor functioning such as control, coordination and movement of the whole body or parts of the body. Sensory aids refer to any devices and tools which make use of, or which aim to improve sensitivity to, one or more of the senses.
Picture Communication Boards	This AT offers a way for teachers to provide pictures that the student can relate to – or – are needed to know and associate the pictures with the appropriate word(s).
Talking Book Readers	Such readers can be compact discs (CDs) or downloadable (and used on a computer or other device such as an MP3 player).

Multiple Disabilities

Type of Assistive Technology	How it assists the student with their education
Audio Books	Recording of a book read by a narrator and are used to teach children to read and increase reading comprehension.
Computer Access Aids	Computer access aids enable people to access, interact with, and use computers. They can include software (such as apps) and/or hardware (such as mobile devices).
Graphic Organizers	Graphic organizers assist students with disabilities in studying, problem solving, decision making, and planning research and brainstorming.
Picture Communication Boards	Depending on the student's disabilities, this AT offers a way for teachers to provide pictures that the student can relate to – or – are needed to know and associate the pictures with the appropriate word(s).
Text to Speech Technology	Screen readers provide speech output for popular computer applications on personal computers.

Physical Disability

Type of Assistive Technology	How it assists the student with their education
Adjustable workstations/desks	Adjustable workstations can be raised or lowered and even tilted to provide the maximum comfort level for the student.
Hand Grip(s)	Hand grips gently, yet firmly, hold the student's hand into a gripping shape enabling them to hold tightly onto objects such as pens, pencils, or pointers. Typically, such aids are designed so that the student can put them on independently.
Mobility Devices	Some examples include: canes, crutches, walkers, and wheelchairs. Such devices allow the student to move about the classroom and to other parts of the school.
Pointer(s)	Pointers – either to be used with the hand or strapped to the head – are useful AT for students with disabilities. A hand pointer can assist the student when they are unable to use their fingers to point. Head pointers are strapped to the head of the student and with movement of the head; they can be used to type on and navigate a computer keyboard.
Seating and Position Systems	Seating and positioning systems are generally determined by the occupational and physical therapist, in consultation with the classroom staff.

Visual Disability

Type of Assistive Technology	How it assists the student with their education
Audio Books	Recording of a book read by a narrator and are used to teach children to read and increase reading comprehension.
Braille	Braille is a system of raised dots that can be read with the fingers by people who have low vision or are blind.
Screen Enlargement	Screen Enlargement magnifies the information on the computer screen which allows the student to read what is on the screen.
Scribe/Note Taker	A sighted individual who provides assistance in writing or reading – and – in some instances completes exams on their behalf using the answers provided by the student.
Text to Speech Technology	Screen readers provide Braille and speech output for popular computer applications on personal computers.

Hearing Disability

Type of Assistive Technology	How it assists the student with their education
Closed Captioning	Closed captioning displays the audio portion of a television program or video as text on the television screen, providing a link to entertainment, information, and news for individuals who are deaf or hard-of-hearing.
Communication Access Realtime Translation (CART)	The instant translation of the spoken word into text using a notebook computer, stenotype machine, and realtime software. The text produced by the CART service can be projected onto a screen, displayed on an individual's computer monitor, combined with a video presentation to appear as captions, or otherwise made available using other transmission and display systems.
Hearing Aid(s)	A hearing aid is a small electronic device that is worn in or behind the ear. It makes some sounds louder. They can help people hear more in both quiet and noisy situations. A hearing aid has three basic parts: an amplifier, microphone, and speaker. The hearing aid receives sound through a microphone, which converts the sound waves to electrical signals and sends them to an amplifier. The amplifier increases the power of the signals and then sends them to the ear through a speaker.
Hearing Loop System	A hearing loop is a wire that is connected to a sound system and circles a room. It transmits the sound electromagnetically. The signal is then picked up by the telecoil in the cochlear implant or hearing aid.
Sign Language	As opposed to acoustically conveyed sound patterns, sign language is a language that uses manual communication to convey meaning. It can involve simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to express and convey a speaker's thoughts.

Speech and Language Disability

Type of Assistive Technology	How it assists the student with their education
Augmentative and Alternative Communication Devices (AAC)	AAC devices assist with language delays and impairments, as well as assist the student in continued speech and language growth and development.
Computer Access Aids	Computer access aids enable people to access, interact with, and use computers. They can include software (such as apps) and/or hardware (such as mobile devices).
Graphic Organizers	Graphic organizers assist students with disabilities in studying, problem solving, decision making, and planning research and brainstorming.
Picture Communication Boards	This AT offers a way for teachers to provide pictures that the student can relate to – or – are needed to know and associate the pictures with the appropriate word(s).
Text to Speech Technology	Screen readers provide speech output for popular computer applications on personal computers.

B. Checklist to Ensure Accessible Classroom Layout

School Building Level			
Requirement	Yes	No	Comments
Building and room entrances are obstacle free and/or are equipped with an automatic door with accessible push buttons			
All accessibility features are operational; e.g., doors, elevators, platform lifts etc.			
Public elevators can accommodate wheelchairs and motorized scooters			
Accessible washrooms are in close proximity to meeting location. Accessible washrooms are equipped with grab bar, sink located at appropriate level, toilet, soap and towel dispenser/hand dryer			
The eating facilities are accessible and are in close proximity to an accessible washroom			

Classroom Level			
Requirement	Yes	No	Comments
Classrooms and layout are spacious enough to allow participants to move around without running into obstacles or requiring the removal of objects during the event			
Classroom setup allows freedom of movement using mobility aids (e.g. wheelchairs, motorized scooters)			
Seating is reserved for persons using wheelchairs and motorized scooters			
There is access to a room that is appropriate for use as quiet, private prayer/meditation/resting place			
Background noise is not excessive in meeting rooms			

C. Checklist for Producing Accessible Classroom Information

Print Material

Text style and format

- Font should be easily readable, use Sans Serif fonts.
- Text no smaller than 12 point.
- Avoid underlining text.
- Avoid writing in capitals.
- Avoid italics; consider using bold instead.

Color and contrast

- Ensure contrast between font color and background.
- Cream paper increases readability

- Colored backgrounds should be a single solid color.
- For white text on dark background increase font depth.
- Avoid red, green or pink colored paper.

Layout and structure

- Ensure Right/left aligned text.
- Use sub headings and short paragraphs.
- Use bullet points and lists.
- Do not underline URLs.
- Use short, concise single idea sentences.
- Structure paragraphs coherently.

Language

- Use clear, straightforward language.
- Avoid unnecessary or complex words.
- Ensure consistency of terminology.

Alternative formats

Electronic format materials

- Obtain all relevant documents electronically.
- Schedule time for production of alternative formats in organizational plan.

Other alternative formats

- Ensure capacity to provide pre-event information in alternative formats.
- State availability of alternative formats.
- Ensure opportunity during registration to request alternative requirements.
- Know alternative format suppliers and their production timescale.

D. Presentation Checklist

1. At the start of the meeting, introduce the interpreter(s) and other service providers: [Yes __ No __]
2. At the start of the meeting, orally describe the room layout and location of emergency exits, food/beverages, and restrooms: [Yes __ No __]
3. Inform attendees in the presentation description and at the start of any writing or reading activities during the meeting so people with visual, cognitive, or motor impairments can fully and equally participate: [Yes __ No __]
4. Keep the presentation clear, simple, concise, and organized:
5. Provide an overview of the presentation at the start and a summary of the key points at the end: [Yes __ No __]
6. Avoid using gestures and visual points of reference: [Yes __ No __]
7. Use simple language; avoid acronyms, jargon, and idioms: [Yes __ No __]
8. Always face the audience; never turn away: [Yes __ No __]
9. Keep hands and other objects away from your mouth when speaking: [Yes __ No __]
10. Be visible to everyone; stand in good light: [Yes __ No __]
11. Use a microphone: [Yes __ No __]
12. If interpreters are being used, do not walk while speaking: [Yes __ No __]
13. Speak to the person for whom the interpreter is working, not the interpreter: [Yes __ No __]
14. Speak in well-modulated tones and at a pace that allows interpreters to interpret: accurately and persons with learning and cognitive impairments to process: [Yes __ No __]
15. Describe verbally all visual materials (e.g., slides, charts, overheads, videos) in detail: [Yes __ No __]
16. Ensure that visual aids are printed in large font and make print copies available:
17. Provide a written description of all images: [Yes __ No __]
18. Allow participants extra time to look at visual materials (for instance, individuals who use interpreters cannot look at both the interpreter and the materials simultaneously and persons with learning disabilities and cognitive impairments need time to process the information): [Yes __ No __]
19. Use multiple communication methods for different learning styles (verbal information, pictures and diagrams, text, auditory): [Yes __ No __]

20. Give people time to process information by pausing between topic: [Yes __ No __]

21. Check in with participants to ensure that presentation is understood and clarify if needed: [Yes __ No __]

22. Provide a verbal overview of information in textual materials: [Yes __ No __]

23. When reading directly from text, provide an advance copy and pause slightly when interjecting information not in the text: [Yes __ No __]

24. Provide audio descriptions (i.e., describe facial expressions, body language, actions, and costumes) and captioning or CART for all videos: [Yes __ No __]

25. Instruct participants to wait to be called on, not to interrupt, speak one at a time, and speak clearly into the microphone): [Yes __ No __]

26. Repeat questions posed by people in the audience before responding Allow for written questions: [Yes __ No __]

27. Build in sufficient time for participants to get from session to session: [Yes __ No __]

28. Prepare all materials (papers, PowerPoints, agendas, slides) in alternative formats (e.g., large print, Braille, audiotapes, computer disks, CD-ROMs): [Yes __ No __]

29. Make electronic versions of materials available in plain text, rich text, or Microsoft Word: [Yes __ No __]

30. Allow persons with visual or learning disabilities to tape meetings: [Yes __ No __]

31. Make materials available in advance of the meeting to allow persons with learning and other cognitive impairments, as well as interpreters and other support personnel, to familiarize themselves with the materials and ask any questions: [Yes __ No __]

32. Tab and label materials: [Yes __ No __]

33. Make text and visuals large enough to be read from back of the room:

34. Reserve seats in front of presenter for persons with visual, hearing, and cognitive impairments: [Yes __ No __]

35. Ensure that all accessible seating is integrated within the room so as to avoid sitting all persons with disabilities together: [Yes __ No __]

36. Allow for regular breaks (about every 45 minutes) for questions and answers; people/service animals restroom; access service providers such as interpreters, CART providers, notetakers, readers: [Yes __ No __]

E. Assistive Technology Collaboration Checklist

Since decisions for Assistive Technology are made by a team rather than by any one individual, it's important and helpful to understand the role of each member. Each member of the team share a common goal: enabling the child to succeed in school and in life – even though each person brings a different set of experiences and skills to the meeting.

Questions to guide the team's discussion about staff and supporters

1. Who is involved in the support of this student?
2. What are their individual and collective strengths and challenges?
3. Are they familiar with this student?
4. What is their prior experience with students with similar or same devices?
5. What is their comfort level with students using devices?
6. Does support staff have knowledge and/or skills of the device?
7. What are each person's specific roles in student's educational program?

Questions to guide the team's discussion about the student's environments

1. What are the conditions in the environments in which staff and supporters will be working with this student?
2. What is the availability of support?
3. What level of administrative support is available to this team?
4. What are the team's responsibilities in addition to support for this student?
5. What is the number of other students in the environments? Are there issues in classroom dynamics that must be addressed?
6. What needed resources regarding devices, time, money, people and physical resources like furniture and space should be considered as the team plans?

Questions to guide the team's discussion about the tasks that need to be completed

1. What do staff and supporters need to be able to do to help this student succeed?
2. How will the team implement collaborative planning and shared delivery of services?
3. How will the team set and share information about expectations of the student?
4. How will team members learn the basics of device operation?
5. Who will be responsible for maintenance to keep devices "operational"?
6. Who will be responsible for trouble shooting?
7. If the device needs programming, who will take that responsibility?
8. How will each staff member and supporter learn strategies for integrating devices into educational programs?
9. How will the device use be evaluated?
10. Who will be responsible for data collection and analysis?

Consideration of the student

1. What is (are) the functional area(s) of concern?
2. What does the student need to be able to do that is difficult or impossible to do independently at this time?

- Special needs (related to area of concern)
- Current abilities (related to area of concern)
- Expectations and concerns
- Interests and preferences

Consideration of the task(s)

1. What specific tasks occur in the student's natural environments that enable progress toward mastery of the goals and objectives?
2. What specific tasks are required for active involvement in identified environments (related to communication, instruction, participation, productivity, environmental control)?

Consideration of the environment(s)

Arrangement (instructional, physical)

- Support (available to both the student and the staff)
- Materials and Equipment (commonly used by others in the environments)
- Access Issues (technological, physical, instructional)
- Attitudes and Expectations (staff, family, other)

Consideration of the tool(s)

When considering the AT that is most appropriate for the student, it is important to consider if the tool can also be used at home (for homework) – and – if it can also be used as the student continues their educational experiences, such as from elementary to middle to high school and for higher education.

Conclusion

There is no doubt that AT plays an important role in facilitating greater access for students with disabilities to quality education. The existence of a robust AT service is one of several pillars that need to be in place to ensure that students of different abilities and needs can be active participants in the education system. Other key conditions that need to be met include availability of learning materials in alternative format, physical accessibility as well as other fundamental tenets of Universal Design for Learning.

For its part, Mada has created a series of resources to be made available to educators in Qatar. These resources will be part of a wider capacity building initiative that aims to increase expertise in Qatar in the area of accessible education and Assistive Technology. For more information, please visit www.mada.org.qa

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