



## Consultative Expert Meeting Report

A Dialogue among Educators, Industry, Government and Civil Society

© UNESCO  
**Communication and Information Sector**  
**Knowledge Societies Division**  
1, rue Miollis  
75732 Paris Cedex 15,  
France

Cover picture: a picture was created by Ms Yasuko Takenaga (Japan)

The meeting report is available from the UNESCO website at:  
<http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/access-for-people-with-disabilities/>

## **Consultative Expert Meeting Report**

### **Accessible ICTs and Personalized Learning for Students with Disabilities:**

A Dialogue among Educators, Industry, Government  
and Civil Society

17 – 18 November 2011

UNESCO Headquarters, Paris

## **Acknowledgements**

Support for this report was provided by UNESCO's Communication and Information Sector, Knowledge Societies Division and Microsoft Corporation.

We are particularly grateful to Donal Rice from Centre for Disability Law and Policy, National University of Ireland, Galway (Ireland), who prepared the meeting report based on the recommendations, case studies and other information provided by the organizers and participants of the meeting.

The document benefitted from significant and constructive comments received from the following experts: Luiz M. Alves dos Santos, Amy Goldman, Axel Leblois, as well as from Microsoft Corporation colleagues LaDeana Huyler, Gary Moulton, James Thurston, and UNESCO colleagues Irmgarda Kasinskaite-Buddeberg and Zeynep Varoglu.

## Executive summary

Personalized learning requires attention to the unique needs of all students of all abilities, acknowledging that each have different learning styles including students with mild, moderate or severe disabilities. The use of technology in education plays a particularly vital role by enabling flexible curriculum development and assisting students with disabilities to participate as equals in the learning experience. It also helps to prepare them for life-long learning, recreation and work outside of school.

As the UN Convention on the Rights of Persons with Disabilities continues to be implemented globally, State Parties to the Convention continue efforts to realise the goal of Inclusive Education to ensure that students with disabilities have full access, on an equal basis with other students, to regular schools and teachings.

In total, an estimated 186 million children with disabilities worldwide have not completed their primary school education<sup>1</sup>. Thus, children with disabilities make up the world's largest and most disadvantaged minority in terms of education. Meanwhile, both governments and educational authorities face the challenge of meeting the Millennium Development Goals which have set a target of full enrolment and completion of primary school for all children by 2015.<sup>2</sup>

The World Summit of the Information Society (WSIS) recommends that information and communication technologies (ICTs) be used in all stages of education, training and human resource development (Declaration of Principles: 30).<sup>3</sup> As education leaders implement reform and changes to meet this challenge, the use of accessible ICTs continues to emerge as a key component in enabling students to learn according their individual abilities and learning styles.

The recommendations contained in this report target teachers, policy makers and administrators. The main recommendations centre on a number of core themes that include:

- Maximising the use of the myriad of accessibility features in mainstream ICTs such as personal computers, tablet PCs, mobile phones etc. already in use in classrooms;
- Empowering students to “self-accommodate” and learn their own preferences and settings when using technology for learning;
- Removing attitudinal barriers to the use of technology for inclusive education, in particular those of teachers who may struggle with modern ICTs;

---

<sup>1</sup> UNESCO, “Empowering Persons with Disabilities through ICTs”, 2009, available at <http://unesdoc.unesco.org/images/0018/001847/184704e.pdf>

<sup>2</sup>UN Millennium Development Goals, “Goal 2: Achieve universal primary education” Target “Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling”. <http://www.un.org/millenniumgoals/education.shtml>

<sup>3</sup> World Summit on the Information Society, <http://www.itu.int/ws/is/index.html>  
UN/ITU WSIS, Geneva Declaration of Principles, available at [http://www.itu.int/ws/is/documents/doc\\_multi.asp?lang=en&id=1161|0](http://www.itu.int/ws/is/documents/doc_multi.asp?lang=en&id=1161|0)

- Supporting teachers, students and their families in using technology for learning through developing local teams and networks of expertise in accessible ICTs;
- Developing national and regional policies and school-level ICTs plans that fully incorporate the use of accessible ICTs as a key tool in making inclusive education a reality;
- Developing and collating resources on the attitudes, skill and knowledge required by teachers to develop the competencies to be able to incorporate accessible ICTs to enable inclusive education in the classroom and wherever learning happens.

On 17-18 November 2011, UNESCO in cooperation with Microsoft Corporation convened a consultative two day meeting of 30 experts from more than 10 countries. The participants included teachers working with children with learning difficulties and physical disabilities, school administrators, experts from the IT industry, representatives from non-governmental organisations and disabled persons organisations.

The purpose of the meeting was to identify:

- Practical solutions and good practices on the use of accessible information and communication technology (ICT) to improve personalized learning for all student, including students with disabilities;
- Key competencies required by teachers to learn and use accessible ICTs which will complement the recently published UNESCO “ICT Competency Framework for Teachers”<sup>4</sup>.

Other topics addressed by Experts at the meeting included both the potential of and challenges in implementing accessible ICTs in the classroom. Experts reported progress and many interesting and informative case studies from around the world.

The huge amount of information resources on accessible ICT that are in existence and available to teachers was also evident. Frustrations remain at the low levels of awareness and implementation of accessible ICTs for the purposes of including more students more effectively in mainstream classrooms.

This is particularly poignant as most technologies in use in schools today have features that enable users to customise the look and feel of the interface to suit their individual accessibility requirements. Similarly, modern office applications for creating documents and presentations now contain “accessibility checkers” that can potentially help teachers and others create accessible content for class.

These technology trends and advances withstanding, the support and training of teachers to learn and facilitate the use of these features as well as other forms of accessible and assistive technology (AT) in the classroom was deemed as critical by all Experts in realising the potential accessible ICTs have to assist in part with making Inclusive education a reality.

---

<sup>4</sup><http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/>

## Structure of the report

**Part 1** explains the key themes identified by Experts during the meeting. It identifies a number of practical resources, case studies and good practices that can be used by teachers and inform school ICT plans.

**Part 2** provides a detailed breakdown of all recommendations made by the Experts.

**Part 3** describes policy aspects that are relevant to policy makers and administrators.

**Part 4** looks at the competencies and supports required by teachers to promote and support personalization and accessible technology in the classroom. It also contains a proposed structure and content for a supplemental “How-to Guide” to the recently updated UNESCO publication “ICT Competency Framework for Teachers”.

**Annexes** to the report provide a bibliography, the meeting agenda, questions used to stimulate discussion and thought in the breakout sessions with the Experts, a list of the participants and a list of recommended resources and readings.

The meeting report is available from the UNESCO website at:  
<http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/access-for-people-with-disabilities/>

## Summary of key recommendations

### Practical solutions for the use of accessible ICTs

**1. Maximise use of accessibility features in currently available technologies.** Most mainstream ICTs such as computers, tablet PCs and other technologies used in schools contain a wealth of features that, through the setting of preferences, can aid very many students in accessing the curriculum and recording their work.

**2. Facilitate students to ‘self-accommodate’ by learning the computer features that best suit their needs.** The ability to personalise technology to suit ones preferences and needs is a life-skill that will benefit students as they progress through the educational system.

**3. The potential of new developments and near-future technologies as a means of addressing current barriers should be monitored and exploited.** Technology trends worth monitoring are mobile learning, cloud-based solutions, touch screen, gesture interactive user interfaces and research into the use of game consoles for learning.

**4. Create an inclusive and positive attitude towards the use of technology for learning.** Attitudinal barriers towards and fear of technology by teachers, parents and administrators will significantly reduce the chances of teachers exploiting the benefits of accessible ICTs even in well-resourced settings.

**5. Teacher training and support is critical.** If teachers are to be convinced of the value of accessible ICTs in the classroom they must first have the necessary skills, attitudes and knowledge.

**6. The provision, training and on-going support required for effective accessible ICT usage is a ‘team effort’.** A functional accessible ICT eco-system requires joined-up thinking at a policy level as well as communication between all actors as a local level including Assistive technology specialists.

**7. An inclusive curriculum means considering students’ needs from the earliest stages of curriculum development.** The development of curriculum that is designed from the outset to meet the greatest number of students will reduce the need for costly and time consuming retrofitting (universal design).

**8. Accessible ICTs is a key consideration for national and regional policies.** The potential of accessible ICTs should be fully explored by national educational authorities and ministries with a view to updating national and regional policies to promote their use as a tool for achieving Inclusive Education.

**9. The use of accessible ICTs needs to be an integrated part of a school’s ICTs plan.** Key aspects to consider for a school level ICT accessibility plan are: (i) What can ICT offer pupils and staff that cannot be offered just as well in other ways? (ii) How can ICT help pupils and teachers to access a broad range of activities across the curriculum? (iii) How can ICT promote equal opportunities?



### **Leveraging the UNESCO “ICT Competency Framework for Teachers” (ICT-CFT) to raise awareness and build capacity of the use of accessible ICTs**

**1. Develop a “How-to Guide” as a companion to the ICT-CFT.** A structure and initial outline of the content for the Guide developed by the Experts is outlined in Part 4.

**2. Teachers should actively incorporate the use of accessible ICTs in the classroom**  
An initial listing of suggested attitudes, skills and knowledge needed by teachers was developed for use in the “How-to Guide”.

**3. The “How-to Guide” will be available online and will be accessible to and updatable by expert, teachers and students alike.** Taking as a starting point much of the content and resources gathered in this Consultative Meeting report, the “How-to Guide” will be an on-line ‘living document’ that will augmented and updated overtime to be a useful resources for teachers, educational authorities and students and parents.

## Contents

<b>Executive summary .....</b>	<b>5</b>
Structure of the report .....	7
Summary of key recommendations .....	8
<b>Contents .....</b>	<b>10</b>
Glossary .....	11
<b>1. Practical solutions and strategies .....</b>	<b>13</b>
Overarching challenges.....	14
Mainstream computer technologies – an underutilised wealth of accessibility features .....	16
Inclusive and integrated school ICT policies.....	23
<b>2. Summary of key points and recommendations for practical technology solutions.....</b>	<b>30</b>
<b>3. Policy considerations for the use of accessible ICTs for personalized learning and Inclusive Education .....</b>	<b>33</b>
Overview of International Policy Framework.....	34
UNESCO and Inclusive Education .....	37
<b>4. UNESCO ICT Competency Framework for Teachers .....</b>	<b>39</b>
Teacher training in accessible ICTs.....	39
Leveraging the ICT-CFT .....	40
Summary of key recommendations made in relation to the UNESCO “ICT Competency Framework for Teachers” .....	41
<b>Appendix A: Meeting Background and Agenda .....</b>	<b>47</b>
Agenda.....	49
<b>Appendix B: List of participants .....</b>	<b>51</b>
<b>Appendix C: Questions used to stimulate discussion and thought in the breakout sessions .....</b>	<b>54</b>
<b>Resources .....</b>	<b>55</b>

## Glossary

<b>Accessibility</b>	Accessibility describes the degree to which an environment, service, or product allows access by as many people as possible, in particular people with disabilities.
<b>AT</b>	Assistive Technology. In the context of ICT, AT provides access to and provides services beyond those offered by the ICT in use to meet the requirements of users with disabilities.
<b>Disability</b>	Refers to impairments, activity limitations, and participation restrictions, denoting the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal factors).
<b>ICF</b>	International Classification of Functioning, Disability and Health
<b>ICT</b>	Information and Communication Technology
<b>Inclusive education</b>	Education which is based on the right of all learners to a quality education that meets basic learning needs and enriches lives. Focusing particularly on vulnerable and marginalized groups, it seeks to develop the full potential of every individual. Inclusive Education ensures that "persons with disabilities are not excluded from the general education system on the basis of disability, and that children with disabilities are not excluded from free and compulsory primary education, or from secondary education, on the basis of disability" (Art. 24, CRPD)
<b>Inclusive society</b>	One that freely accommodates any person with a disability without restrictions or limitations.
<b>MDGs</b>	Millennium Development Goals
<b>OS</b>	Operating system (e.g. Windows, Mac OS, Linux)
<b>PDF</b>	Portable Document Format
<b>Screen-reader software</b>	An assistive technology potentially useful to people who are blind, visually impaired, illiterate, or have specific learning difficulties. Screen-readers attempt to identify and interpret what is being displayed on the screen and represent to the user with text-to-speech, sound icons, or a Braille output device.

<b>UD</b>	Universal Design means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. “Universal design” shall not exclude assistive devices for particular groups of persons with disabilities where this is needed.
<b>UN</b>	United Nations
<b>UN CRPD</b>	United Nations Convention on the Rights of Persons with Disabilities
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>VLE</b>	Virtual Learning Environment
<b>WSIS</b>	World Summit on the Information Society

## 1. Practical solutions and strategies

*There are estimated 150 million children in the world with disabilities, about four-fifths of them in developing countries...Beyond their immediate health-related effects, physical and mental impairments carry a stigma that often leads to exclusion from society and from school<sup>5</sup>*

*The number of children with special education needs has grown in the past 20 years due to increased diversity in communities and better diagnostic tools. According to Organisation of Economic Co-operation and Development, as many as 35% of school-age students need some kind of special support or have been diagnosed as having special needs.<sup>6</sup>*

*The inclusion of children with disabilities in mainstream schools promotes universal primary completion, is costs-effective and contributes to the elimination of discrimination.<sup>7</sup>*

### Accessible ICTs for Inclusive Education

Personalised learning requires attention to the unique needs of all students of all abilities, acknowledging that each have different learning styles including students with learning difficulties or mild moderate and severe disabilities.

Technology plays a vital role in enabling personalised learning by enabling flexible curriculum development and assisting students with disabilities to participate through the use of accessible ICTs as equals in the learning experience. It is important that the use of technology for learning does not in any way contribute to replicating any form of stigmatisation and labelling that may be found elsewhere in society.

Accessible ICTs for education include:

- Mainstream technologies, such as computers, web browsers, word processors, whiteboards and mobile phones that contain in-built accessibility features;
- Assistive Technologies, such as hearing aids, screen readers, adaptive keyboards, augmentative communication devices etc.; and
- Accessible media and formats, such as accessible HTML (Hypertext Markup Language), videos with captioning, DAISY (Digital Accessible Information System) books, etc.<sup>8</sup>

---

<sup>5</sup> UNESCO "Education for All Global Monitoring Report", 2010.

Available at <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/2010-marginalization/>

<sup>6</sup> Microsoft "Accessibility A Guide for Educators". Page 8.

Available at <http://www.microsoft.com/enable/education>

<sup>7</sup> World Health Organization and The World Bank, "World Report on Disability", 2011, Available at [http://www.who.int/disabilities/world\\_report/2011/en/index.html](http://www.who.int/disabilities/world_report/2011/en/index.html)

<sup>8</sup> Rice, D. Using ICTs to promote education and job training for persons with disabilities in "Connect a School, Connect a Community", ITU, 2009. Available at <http://www.connectaschool.org>

Other ICTs for learning include educational software and Virtual Learning Environments (VLEs). The installed base of ICT in classrooms across the world varies significantly but continues to increase.<sup>9</sup> In spite of these variances there was a general agreement among the Experts that the solutions to barriers that persist in 'resource rich' educational systems which may have accessible ICT programmes and systems in place for a number of years, are also relevant and contain learning for countries just beginning to look at this issue and initiate programmes.

This report and other international documents show that accessible ICTs have a broader application to all students. Therefore it is imperative that educational authorities adopt a universal design approach, as per Article 4 of the UN CRPD when procuring accessible ICTs by considering accessibility at the earliest stages of the procurement process. This will ensure that these technologies will require later minimum adaptations and have the least cost to meet specific users' needs.

### **Overarching challenges**

Many of the challenges in using accessible technology to support personalised learning mirrors the challenges in implementing the goals of Inclusive Education. During much of the discussion by the Experts, the successes and challenges being experienced tend to be particular cases of broader challenges of implementing Inclusive Education.

In general the discussion therefore gravitated around challenges related to:

- Availability of adequate ICT resources as well as the efficient use of existing resources;
- Awareness of teachers to the benefits of using ICTs;
- Attitudes of teachers towards the use of ICTs in the classroom;
- Awareness and attitudes of students and parents towards ICTs;
- Flexibility, or lack thereof current curriculum, teaching methods and assessment methods;
- Challenges in meeting a broad range of differences in how students learn with these current structures.

### **Attitudes towards technology**

Attitudes toward the use of technology in the classroom to enable core activities such as accessing the curriculum and completing class work may be negative among parents and teachers who are either unfamiliar or familiar but uncomfortable with the technology.

For example, when calculators were first allowed in schools their use was restricted due to the predominant view at the time that their use would decrease student capabilities to perform basic arithmetic functions.

---

<sup>9</sup>Experiences reported by Experts at the Consultative Meeting showed that, for example, Internet access in the classroom varies from almost 0% in some developing countries to 95% plus in countries such as Denmark. Therefore recommendations from the Experts contained in this Report endeavour to avoid any assumptions about the resources available and situation in-country.

Today calculators are freely available to use as a tool in the classroom. Similarly attitudinal barriers persist to the use of such tools as spell checkers, word prediction, text to speech and other performance support technologies that are often required by students with learning disabilities. This attitude of suspicion whereby such technologies are seen as a crutch must be acknowledged and overcome.

**GOOD PRACTICE:**

**"ICTs in Education for People with Disabilities - Review of Innovative Practice"**

The work of other organisations in collecting good practice examples was acknowledged by the Experts. A 2010 report by the European Agency for Development in Special Needs Education in collaboration with UNESCO Institute in Information Technologies in Education (IITE) gathered concrete examples of practice of the use of ICT with people with disabilities in different educational contexts and settings.<sup>10</sup>

**GOOD PRACTICE:**

**"Usability of Music for Social Inclusion of Children (UMSIC)"**

The project "Usability of Music for Social Inclusion of Children (UMSIC)" developed a mobile interactive learning environment for musical creativity intended to promote social inclusion of children with learning disabilities, caused in particular by attention deficit disorders (ADHD) or language problems (due to cultural background; for example, children with newly immigrant status).

It was reported that, while "attempting to carry our fieldwork with a young age group at a catering for specific immigrant group, the Head-teacher refused to allow the research team to carry out the sessions with the use of mobile phones/ handheld computers. She firmly stated that the parents of the children need to be asked specifically whether they allow their children to use mobile phones at school."

However in spite of these attitudinal barriers it was also reported that "[...] for most of the children, it was the first time to hear their own voice recorded and to explore the recording functions. [...] The children with articulation difficulties (L, 3 years, C, 5 years.) seemed to hear the target syllables or phoneme, and they were very motivated to learn and hear again improvements in the recordings. [...] The recording clearly helped the children to localise the crucial events, to talk together and to gain control. [...] We noticed that his level of participation increased. The educators welcomed this change, because C had been rather passive. His parents were considered not to be 'well integrated'."<sup>11</sup>

---

<sup>10</sup> <http://www.european-agency.org/publications/ereports/ICTs-in-Education-for-People-With-Disabilities/Review-of-Innovative-Practice>

<sup>11</sup> UMSIC is an EU FP7 funded project. Text excerpt from the D9.2 Project. Report available at <http://www.umsic.org/html/deliverables.html>

## **Mainstream computer technologies – an underutilised wealth of accessibility features**

Most mainstream ICTs such as PCs used in schools contain a wealth of features that, through the setting of preferences and other features such as ‘accessibility checkers, aid many students in accessing the curriculum and recording their work.

Features such as the “Ease of Access Center” and the “Personalization Center” found in the Control Panel in the Microsoft Windows operating system and “Universal Access” in the Apple Mac operating system contains a wide variety of user preference settings that make the computer easier and more comfortable to use for everyone.

These features are not additional add-ons but are contained right within the OS on the computer. Teachers and students just need to be aware they exist and try out what works best for them. Mainstream computers also allow users to store their preference so that they persist the next time the user logs on. This is possible for both stand alones computers used in a single classroom and for a system of networked computers on a campus.

### **RESOURCES on accessibility features in “mainstream” technologies:**

\* Accessibility “How to guides” from the BBC contain advice on the accessibility features in the most commonly used Operating Systems (OS) such as Windows, Mac or Linux: available at <http://www.bbc.co.uk/accessibility/guides/>

Each OS manufacturer provides accessibility resources:

\* Microsoft (Windows):

<http://www.microsoft.com/enable/>

<http://www.microsoft.com/education/guides>

<http://www.microsoft.com/enable/products/windows7/>

<http://www.microsoft.com/enable/products/office2010/>

\* Apple (Mac):

<http://www.apple.com/accessibility/>

<http://www.apple.com/accessibility/macosx/vision.html>

<http://www.apple.com/accessibility/resources/macosx.html>

<http://www.apple.com/education/special-education/>

\* Linux: <http://tldp.org/HOWTO/Accessibility-HOWTO/>

\* OpenOffice.org: <http://www.openoffice.org/ui/accessibility/quickstart.html>



**RESOURCES:**

1. One resource is “Accessibility: A Guide for Educators” from Microsoft. This contains information on the accessibility features in the Windows OS but also information on the different types of ATs available according to the functional needs of the student.

In addition, Curriculum Resources for Special Education for Windows 7 and Office 2010 provides specific options in Windows 7 and Office 2010 for students with various types of disabilities as well as information on how teachers can use Office 2010 to save accessible files for students who are blind or have other print disabilities.

Available at: <http://www.microsoft.com/enable/education/>

2. Definition and short review of main categories of assistive technologies.  
Available at: <http://www.youtube.com/watch?v=HXchQnJ6PoE>

While most Operating Systems and commonly used applications such as word processors are available in very many languages, the localisation of Assistive Technologies was identified as a particular issue in some parts of the world. One model of good practice identified was the NVDA, an open source screen reader for Windows for which a number of localised speech engines have been developed by local NGOs around the world.<sup>12</sup>

Early identification of specific learning requirements, including the need for accessible technology, significantly improves the chances of effective intervention and solutions. Preference tests, such as which text size is most comfortable to read or which mouse-click speed is easier to use, yield considerable information on their mix of abilities and how students learn.

**Self-advocacy as a life-skill**

Personalising learning through technology is a life-skill. All students need to learn the life-skill of personalising their technology and of self-accommodation.

Some successes were reported by Experts in ‘turning the control of the learning process’ over to students. In practice this involved, in one case, a project designed to help students ‘self-advocate’ for their own needs as they progressed through the educational system.

**GOOD PRACTICE:**

Nine to twelve year old students participating in a one year project to learn more about their own learning styles also learned a key life-skill of “self –accommodation”.

Students were facilitated in discovering and recording their individual preferences for a whole range of classroom activities, such as where they needed to sit in class in order to

---

<sup>12</sup>NonVisual Desktop Access (NVDA) is a free and open source screen reader for the Microsoft Windows operating system. Available at <http://www.nvda-project.org/>

perceive what was being taught. In relation to ICT, this included finding out their preferences for the set-up of the computer.

Students received some computer presentational and multimedia training and developed a checklist of their own learning preferences and styles. This taught the students 'self-accommodation' as a life-skill and empowered the students to 'self-advocate' for their own needs, including their user preferences on a computer, as they progressed through the school system.

## **GOOD PRACTICE:**

### **Basic self-accommodation framework in UK**

In the UK a number of schools have introduced a basic self-accommodation framework during induction week for new pupils into the school. Using simple self-help materials, pupils were shown how to adjust accessibility features on the Windows PCs to use them more easily and especially to improve screen readability.

This allows students to self-identify themselves by going through the Windows accessibility features in the "Ease of Access Centre" questionnaire. A benefit to this approach is that it didn't require students to be identified as having a learning disability or physical disability. Students weren't singled out and all students had the option to customize their PC.

When Windows accessibility features were not enough to address all students' individual accessibility needs, it was the student's individual responsibility to self-identify as needing Assistive Technology. Also, all students created a roaming profile that saved their preferences. When they used other networked PCs in, for example, the school library, the computer 'remembered' their accessibility preferences.

Students who required assistive technology used pen drives (USB sticks) to carry their AT with them so they could use it at the library, home, etc. A system of tiered support was available. If the student was unable to self-accommodate fully, they sought and received support from their teacher.

In situations where this was still not sufficient, AT specialists were then available to provide a more intensive review and assessment.

Teachers to help reduce certain constraints at the workstation used the same self-accommodation tool. Teachers were also trained to know some additional open source utilities that they could be added to make the computer more accessible. These included software such as Vu-Bar<sup>13</sup> or Screentinter Lite<sup>14</sup>.

---

<sup>13</sup> <http://www.oatsoft.org/Software/vu-bar-4>

Vu-Bar is "useful with dyslexia, when the user skips lines or drops from one line to the next. "

<sup>14</sup> [http://www.thomson-software-solutions.com/html/screen\\_tinter.html](http://www.thomson-software-solutions.com/html/screen_tinter.html)

Screentinter Lite " allows the screen foreground and background colours to be changed at the click of a button"

### **Continuity of use and ‘ownership’ of technology**

Students need to have access to proper and appropriate AT solutions to enable continuity of use as they progress through classes and schools. Where possible, giving ownership of the AT to the student avoids the loss of the AT and/or the need to reapply multiple times. Ownership of the AT by the student enables better continuity of use during transition through classes and schools. The portability of high tech, software based solutions such as screen readers, word prediction programmes etc., can be improved by sourcing a solution that can be used on a pen drive or is based in the ‘cloud’.

The case studies above illustrate the emerging tendency, as recorded in both the literature and by Experts at the Consultative Meeting, of students becoming effective and active agents in their own education within Inclusive Educational systems. However it was also agreed by the Experts that while the learner is the primary source for determining what does and does not work for them, the implementation of AT also often requires a team process that should include the student’s family, educational staff and where necessary AT specialists.

One issue related to self-accommodation that needs to be considered carefully relates to the privacy and security of users profiles, particularly in cloud-based systems and applications or public PCs such as those available in libraries.

### **Educational materials: from print to digital**

The currently restrictive practice of using text based learning materials as the primary modality of teaching inhibits personalised learning and the provision of alternate formats when required. An immediate policy implication is that educational content should be sourced and procured that has flexible copyright conditions such as Open Educational Resources (OER) which protect the authors’ copyright but also enable the reproduction of the content in formats that are accessible to the widest range of students.


As a result of this current practice of using text-based materials, teachers are often ill equipped to provide suitable versions of text for students who are unable to perceive or use the content. Teachers need to learn about the effect of particular media and interaction modes on the learning of persons with disabilities, for example how to use augmentative and alternative modes of media for a more effective and enduring assimilation of certain content.

However teachers also need to understand how to create accessible digital content themselves as not everything taught in the classroom comes from a textbook but is often produced by the teacher in advance of the lesson. Therefore teachers need to be resourced, trained and empowered to create accessible digital content.

#### **CASE STUDY:**

##### **“Blind student reaches top of her class with accessible technology”**

Ms Ignacia Picas, a student at Colegio San Benito, a primary-level school located in Santiago, uses a laptop computer with accessibility features in the Operating System and built-in tools in the office applications, together with screen reading software to participate fully in class. This enables Ignacia to maintain a near-perfect grade point average.

 [View her video](#) (WMV 29.3MB) or [read her story](#).

Available at:

[http://www.microsoft.com/casestudies/Case\\_Study\\_Detail.aspx?CaseStudyID=4000011355](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000011355)

#### **GOOD PRACTICE VIDEOS:**

##### **1. “Introducing iPods in Special Education”:**

Available at: <http://www.youtube.com/watch?v=VTSM0m6aT9M>

##### **2. Advanced Optical Character Recognition and Text to Speech application:**

Available at: <http://www.youtube.com/watch?v=Lf-0Dj95SgY>

One practical step that teachers can take is to learn about and use the accessibility features of the software they use for writing documents or making presentations. “Accessibility checkers” can help teachers to ‘build-in’ accessibility while they create accessible documents such as Word, PDFs or presentations.

#### **RESOURCES:**

1. **“Curriculum resources for Special Education”** is a practical Microsoft guide that includes a chapter on making accessible documents and presentations with Office 2010.

Available at: [www.microsoft.com/education/enable/](http://www.microsoft.com/education/enable/)

2. The Adobe **“Accessibility Quick Reference Card”** provides guidance on converting Word documents into accessible PDF:

[http://blogs.adobe.com/accessibility/files/accessibility/assets/WordToPDFReferenceCard\\_v1.pdf](http://blogs.adobe.com/accessibility/files/accessibility/assets/WordToPDFReferenceCard_v1.pdf)

**RESOURCES:**

A series of easy to follow factsheets and checklists on producing accessible curriculum materials are available from the ACCESS-ed website<sup>15</sup>. It includes:

\* **“Designing an Accessible Syllabus”** -

this PDF Posterette provides a guide for insuring that your syllabi are accessible.

\* **“Top 10 Tips for Accessible Slide Presentations”** -

this posterette is a guide for making slide and PowerPoint Presentations more accessible.

\* **“Font Size for Accessible Media in the Classroom”** -

these two PowerPoint slides provide a guideline to insure that the font sizes within print media are accessible when projected.

\* **“Accessible Test checklist”** -

this audit is used for evaluating the accessibility of a test.

For more see:

\* **Instructional Methods:**

[http://access-ed.r2d2.uwm.edu/Virtual\\_Campus/Instructional\\_Methods/](http://access-ed.r2d2.uwm.edu/Virtual_Campus/Instructional_Methods/)

\* **Media and materials:**

[http://access-ed.r2d2.uwm.edu/Virtual\\_Campus/Media\\_Materials/](http://access-ed.r2d2.uwm.edu/Virtual_Campus/Media_Materials/)

A newer, more Universal Design approach to designing digital instructional materials presented by one Expert features “tiers” that enable students with multiple learning styles to access the same content. Such tiered learning resources contain content in a variety of formats such as text, pictorial and in audio/video with support for translation and captioning.

**RESOURCE:**

For examples of digital instructional materials that feature tiers see:

\* **Literacy Center Education Network:**

[http://www.literacycenter.net/lessonview\\_en.php](http://www.literacycenter.net/lessonview_en.php)

\* **The Brain:**

[http://thebrain.mcgill.ca/flash/index\\_d.html](http://thebrain.mcgill.ca/flash/index_d.html)

\* **2010 Winter Olympics:**

<http://www.tieredwebpages.com/static/examples/olympics/>

---

<sup>15</sup>The ACCESS-ed is an initiative of the R2D2 Centre, of the University of Wisconsin – Milwaukee, USA. Available at <http://access-ed.r2d2.uwm.edu/>

## **Open Educational Resources**

Open Educational Resources (OERs) are learning materials that are freely available for use, repurposing and redistribution.<sup>16</sup> While many OERs are available over the web, many are not accessible to persons with disabilities.

Policy considerations in this area could include international cooperation with other countries or established OER projects to develop OERs that are accessible to persons with disabilities or to develop strategies to systematically provide existing OERs in accessible formats.

Flexible copyright conditions may necessary in many circumstances for the provision of accessible OERs.

---

<sup>16</sup>The term "Open Educational Resources" was first adopted at UNESCO's 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries. Open Educational Resources are teaching, learning or research materials that are in the public domain or released with an intellectual property license that allows for free use, adaptation, and distribution. More about UNESCO's work in this area is available at: <http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/>

## **Inclusive and integrated school ICT policies**

Inclusive education requires that the mainstream technology that is available to students within the classroom is accessible to those that need it. Therefore the policies on the provision and use of accessible ICT in the classroom need to be an integrated part of the overall ICT policy at national, regional and school level. Developing separate policies for 'disabled students' propagates inequality but is also ineffectual in realising any benefits that the use of accessible ICTs have for the broad range of student that stand to benefit from their wide-spread use in the classroom.

The use of ICT is only beneficial when used effectively in class and throughout the school. To achieve this goal, use of ICT must be addressed in the School Development Plan and reviewed annually. Schools that serve pupils with severe and complex needs should include a convincing and credible ICT Development Plan. This should:

- Describe the purpose and function of ICT within the school's overall educational framework;
- Include a current position statement on the use of ICT within the school;
- Changes and improvements envisaged for the forthcoming year ;
- Realistic allocation of resources (staffing, time and money) to deliver these intentions.

As an integral part of the School Development Plan, the ICT Development Plan should build on current ICT 'good practice' and be linked to school, local and government targets. Above all it should be:

- Manageable;
- Involve senior staff in its planning;
- Have an impact on lesson planning;
- Be linked to pupil assessment and attainment;
- Gain the support of all its stakeholders including parents' associations;
- Be integrated into the financial planning and budgeting of the school;
- Consider the expert judgement and experience of people and teachers with disabilities;
- Build in continuing professional development of staff <sup>17</sup>.

The following model was agreed by the Experts to be representative of what is happening in practice and one which can be used by any school system to identify where it is in relation to its strategy for the provision and use of accessible ICTs and, more importantly where it needs to go.

### **A Universal Design approach**

Systems that focus on accommodating students' individual needs without reference to the general educational environment are always reactive. Reactive accommodation tends to focus on providing a technical individualised solution, which often tends to be expensive, late and segregating. The approach of ensuring that the widest range of students needs possible are considered when choosing and developing curriculum and

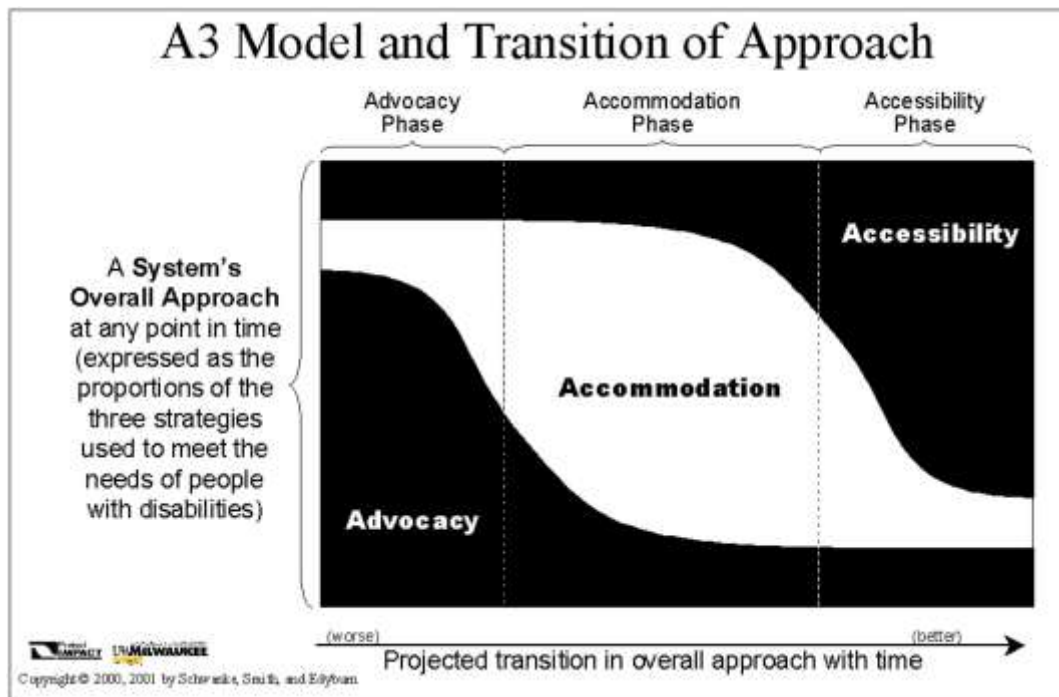
---

<sup>17</sup> [http://www.inclusive.net/resources/units/unitb/unitb\\_10.shtml](http://www.inclusive.net/resources/units/unitb/unitb_10.shtml)



ICT policy and programmes is being shown to be more cost effective and less segregating than other, more reactive traditional approaches.

As shown in Figure 1, the A3 model illustrates an ebb-and-flow of efforts that are needed to obtain universal accessibility.<sup>18</sup> In the first phase, Advocacy efforts and/or a change in policy raise awareness of inequity and highlight the need for system change to respond to the needs of individuals with disabilities.



*Figure 1: A3 Model and Transition of Approach*

Accommodations are the typical response to advocacy. In the classroom these could be, for example, the provision of a particular input device for the mainstream technology used by a student with a physical disability or a braille version of a text for a blind student.

Inaccessible environments and materials are therefore modified and made available in phase 2. Typically, accommodations are provided upon request. While this represents a significant improvement over situations found in the earlier phase, accommodations tend to maintain inequality since there may be a delay (i.e., time needed to convert a hand-out from print to Braille), it may require special effort to obtain (i.e., call ahead to schedule), or it may require going to a special location (i.e., the only computer with screen reading software is in the library).

In phase 3, Accessibility describes an environment where access is equitably provided to everyone at the same time. Historical success stories such as curb cuts and computer

---

<sup>18</sup>Schwanke, T. D., Smith, R. O., and Edyburn, D. L. (2001, June 22-26, 2001). A3 Model Diagram Developed As Accessibility And Universal Design Instructional Tool. RESNA 2001 Annual Conference Proceedings, 21, RESNA Press, 205-207.



accessibility control panels are examples of how disability design has had a subsequently larger impact for the general population. Thus, current work on Universal Design holds considerable promise.

The proportions illustrated in the graphic reveal the efforts associated with each of the three phases at any point in time relative to the impact of the general strategy being applied (advocacy that argues for need, accommodation to remediate inaccessibility, and accessibility where universal access is provided for all).

Assistive technology is provided through an individualized accommodations model. That is, a person with a disability must receive a referral and evaluation before appropriate assistive technology devices and services can be provided. In contrast, UD interventions are given to everyone with the understanding that those who need specialized support will use the tools when they need them (i.e., embedded just-in-time supports). In many cases, the technology supports given to everyone have been shown to be effective as Assistive Technology for individuals with disabilities.

### **Developing an accessible ICT policy**

Key questions to consider for a school level ICT policy are:

- What can ICT offer pupils and staff that cannot be offered just as well in other ways?
- How can ICT help pupils and teachers to access a broad range of activities across the curriculum?
- How can ICT promote equal opportunities?
- What would be the effect on pupils if computers and other types of ICT were not available? <sup>19</sup>

### ***Data required for effective planning***

As acknowledged by the 2006 Education for All Global Monitoring Report, “People with disabilities are often invisible in official statistics”. <sup>20</sup> Many Experts cited this general lack of reliable data about persons with disabilities in education as a barrier to the development of evidence-based policies in support of the use of accessible ICTs. Collection of relevant data is vital, and education increasingly needs to become a data driven enterprise, providing of course that privacy and security issues are considered. Data collection in education has traditionally focused primarily on students’ academic performance. Increasingly data collection needs to focus on students’ needs and the cost efficiency of interventions such as the provision of ICT.

This general lack of data is further compounded by difficulties in comparing available data between countries, in particular because of the different definition and classification of disabilities.

---

<sup>19</sup> See “Writing a school ICT policy” from ICTS as  
[http://www.inclusive.net/resources/units/unitb/unitb\\_10.shtml](http://www.inclusive.net/resources/units/unitb/unitb_10.shtml)

<sup>20</sup> UNESCO, “Education for All Global Monitoring Report”, 2006  
<http://www.uis.unesco.org/Library/Documents/gmr06-en.pdf>

Reliable data on the effectiveness of accommodations using accessible ICTs is particularly important in developing local and national programmes that are sustainable and scalable.

A focus on such data will enable educational policy makers to establish a balance between:

- Student needs and preferences;
- Educators needs and preferences;
- Quality service delivery, and;
- Cost-effectiveness and cost-efficiency<sup>21</sup>.

While there was general consensus among Experts that the informed and effective use of accessible ICTs within the classroom are likely to have an aggregate net benefit for the individual student and the class as a whole, there is little data to support this at present.

### *Implementing school ICT plans – roles and partnerships*

In implementing the school ICT plan, teachers need to know who to contact or where to go for find information on accessible ICTs in general and in some instance a particular piece of AT. While the role of the student in self-identifying and self-accommodating their own needs is important, the teacher plays a vital role in identifying needs and providing additional supports.

When required an accessible ICT technology specialist can work as a part of a team in partnership with the student and their teacher and parents to identify and support the use of the Assistive Technology and other accessible ICTs required.

### **Current technology developments and future possibilities**

#### *Cloud computing*

Cloud computing is a current technological paradigm shift whereby computing resources such as software are distributed over the Internet and provided to computers and other devices on-demand.<sup>22</sup> AT software applications are not installed on a particular machine, but rather are accessed via the Internet from any computer or other device such as a tablet PC or mobile phone.

Preliminary approaches such as online screen-readers have “yielded promising results towards an inclusive web by removing both economical and accessibility barriers”<sup>23</sup>. Cloud computing offers the potential of ubiquitous access to content and applications and, in terms of Inclusive Education, can enable students and teachers to access and use curriculum any time anywhere.<sup>24</sup>

---

<sup>21</sup> This mirrors the discussion that is happen within the wider field of AT provision. For more see Marcia Scherer in “Living in the State of Stuck : How Assistive Technology Impacts the Lives of People with Disabilities”. <http://www.matchingpersonandtechnology.com/StuckWorkbook.html>

<sup>22</sup> [http://en.wikipedia.org/wiki/Cloud\\_computing](http://en.wikipedia.org/wiki/Cloud_computing)

<sup>23</sup> <http://www.w4a.info/>

<sup>24</sup> Projects such as the Global Public Inclusive Infrastructure (GPII) and Cloud4All are focused on leveraging the cloud so that “everyone who faces accessibility barriers due to disability, literacy, or aging,

**GOOD PRACTICE:**

**LUCY e-Education in Tanzania**

In Tanzania, the “LUCY e-Education” project provides access to Internet and related e-Education and e-Content to people in Tanzania, regardless of their age, economic resources or disability.<sup>25</sup>

The objective of the project is to provide efficient and affordable access to ICT services communities who would not have access due to the costs involved in setting up such facilities by providing a Cloud based ICT infrastructure called LUCY which includes software applications, content and services localized for Tanzanian citizen and environment.

The project will in particular pay special attention to vulnerable groups including women, children, youth and persons with disabilities or illiterate by ensuring that both the ICT infrastructure to be deployed and the services to be delivered in the Lucy platform are fully accessible and meet respective international standards and comply with universal design principles, and provide the services considering also the minority languages (i.e. Swahili).

***Mobile technology for learning***

Similarly, cultural attitudes towards the use of mobile phones may also present a barrier for students who can potentially use them as a tool for communicating, accessing the curriculum or carrying out an assignment. The use of mobile technology for learning is a growing field and in many parts of the world it is the only available technology that can be used to access the Internet<sup>26</sup>. Mobile phones are often the most available and familiar devices to students. Mobile phones for learning, or M-learning, also offer the possibility to enable access to curriculum outside of the classroom.

However many parents and teachers may be very reluctant to allow children access to a mobile phone and these attitudes and cultural considerations need to be factored when choosing which technologies to use for learning. See proceedings from the ITU/UNESCAP/G3ict Asia-Pacific Regional Forum on Mainstreaming ICT Accessibility for Persons with Disabilities (Bangkok, 2009) on access to the internet for persons with disabilities via mobile phone and the use of mobile phones for children with disabilities.

---

regardless of economic resources, can access and use the Internet and all its information, communities, and services for education, employment, daily living, civic participation, health, and safety.” These projects are developing the tools and infrastructure necessary to enable persons with disabilities to have access to affordable ATs that are available anywhere on any computer. <http://gpii.net>

<sup>25</sup>This is a joint project between the Dominic Foundation, the International Telecommunication Union and the Tanzania Ministry of Communication, Science and Technology.

<sup>26</sup> For example, approximately 5 million new mobile subscribers join the ever growing population of mobile phone users every month in 2006, as compared to the total PC penetration of 5 million in 2005-06. See: Nokia India. Position Paper – Mobile Internet UX for Developing Countries <http://research.nokia.com/files/Joshi-MIUXforDevelopingCountries.pdf>

#### **GOOD PRACTICE:**

##### **Momaths for teaching Maths**

Momaths is as an innovative educational intervention using mobile telephones to connect learners by using personal mobile phones to study maths. Spearheaded by Nokia in partnership with several global and South African partners, the project has recorded good success in meeting learner's needs through the use of technology that they are familiar with. Momaths provides:

- maths theory descriptions and maths exercises;
- maths tests and individual progress reports;
- comparative usage, attainment; and competitions.

Momaths is an example of education being provided on a platform and through a technology that is familiar and comfortable to use by the students.<sup>27</sup>

#### **RESOURCE:**

**"Mobile Phone strategies to support Learning for Students with Disabilities - The 99 tools from the magical pocket of Aki-chan"** by Takeo Kondo and Kenryu Nakamura, Research Centre for Advanced Science and Technology, The University of Tokyo.

This research project provides tips on how mobile phones can offer strategies to engage students in learning in ways that best suit their needs. It covers reading, writing, keeping and making notes, understanding time, planning activities, listening, calculating and using a dictionary, surfing the web, calling and messaging friends which can all be undertaken on a mobile phone using tools from the 'magical pocket'. Available at:

[http://g3ict.org/resource\\_center/publications\\_and\\_reports/p/productCategory whitepapers/subCat 9](http://g3ict.org/resource_center/publications_and_reports/p/productCategory whitepapers/subCat 9)

#### **Potential for technology tools to help educators identify disabilities**

There is a potential for educational software systems to be leveraged as a tool for assisting teachers and students in identifying mild learning or physical disabilities. Data could be collected on repeated mistakes such as particular types of spelling errors that are indicative of dyslexia or repeated involuntary keystrokes that are indicative of some level of dexterity difficulty. However, ethical implications should be considered all time as well as the involvement of experts and family members.

##### ***Social networking***

It was reported that in Denmark, some students use social networking sites for connecting with and gaining peer support from other students facing similar challenges and for sharing information on the AT they use, what works for them etc. Even at a local

---

<sup>27</sup><http://www.momaths.org>

level the value of peer to peer teaching whereby a student who has mastered a particular piece of technology or accessibility feature can teach others students with similar needs was also stressed.

These types of activities are natural extensions of how many students tend to share knowledge about technology such as mobile phones, games and apps. This natural curiosity, ability and knowledge sharing among students should be consciously leveraged so that people with similar needs and requirements can share what accessible ICTs works for them. Above all, it is accessible ICTs that enable those students to participate in social networks, and reduce their sense of marginalisation from such opportunities.

**RESOURCE:**

**Action for Blind People in UK**

Action for Blind People has a variety of ways for service users and site visitors to communicate with each other and the wider community in and around visual impairment using a range of social media tools.

Available at: <http://www.actionforblindpeople.org.uk/other-pages/what-is-social-media/>

*Gaming systems*

Gaming systems such as the Nintendo Wii and Xbox Kinect are receiving a lot of attention among the educational research community. While both are already being used for the rehabilitation children and adults with physical disabilities, research efforts are also focusing on how the so-called “Natural User Interface” of systems such as the Kinect can be utilised to enable students with disabilities to participate in game based learning.

**OTHER RESOURCES:**

<http://www.7128.com/>

<http://www.20q.com/> (screen reader friendly)

<http://audiogames.net/>

<http://allinplay.com/>

<http://www.blindadrenaline.com/>

<http://www.pcsgames.net/game-co.htm>

<http://gameaccessibility.com/>

<http://www.playinginthedark.net/>

<http://www.bavisoft.com/>

## 2. Summary of key points and recommendations for practical technology solutions

### 1. Maximise use of accessibility features in currently available technologies

Most mainstream ICTs such as PCs used in schools contain a wealth of features that, through the setting of preferences, can aid very many students in accessing the curriculum and recording their work.

- Encourage use of features such as the “Ease of Access Centre” found in the Control Panel in the Microsoft operating system and “Universal Access” in the Apple Mac operating system which contain a wide variety of user preference settings that make the computer easier and more comfortable to use.
- Investigate the potential of newer office application suites for creating documents and presentations containing “accessibility checkers” that can assist teachers in creating accessible content for class.

### 2. Facilitate students to ‘self-accommodate’ by learning the computer features that best suit their needs

The ability to personalise technology to suit ones preferences and needs is a life-skill that will benefit students as they progress through the educational system.

- Plan for the early identification of learning / accessibility preferences as this significantly improve chances of effective intervention and solutions. Preference tests applied to students yield considerable information on their mix of abilities and how they learn.
- Enable students to understand and learn how to personalize and customize the user preferences on their PC so it is accessible to them.
- Enable students to store these user preferences on the computer so they persist and are available to them the next time they login.
- Ownership of the Assistive Technology by the student enables better continuity of use during transition through classes and schools. Where possible ‘portable’ solutions should be investigated such as the string of assistive technologies on pen drives or in the ‘cloud’.

### 3. The potential of new developments near-future technologies as a means of addressing current barriers should be monitored and exploited

Technology trends worth monitoring are mobile learning, cloud-based solutions and research into the use of game consoles for learning.

- Mobile phones are a cheap and ubiquitous technology and are increasingly being used for mobile learning solutions particularly in developing countries.
- The use of cloud-based solutions whereby content and applications, including assistive technologies are potentially available to any computer or device that can access the internet presents interesting possibilities for overcoming issues of affordability and availability of, in particular, assistive technologies needs by many students.
- Gaming systems offer the potential to enable games based learning for all students but in particular students with disabilities through Natural User Interfaces.

**4. Create an Inclusive and positive attitude towards the use of technology for learning**

Attitudinal barriers towards and fear of technology by teachers, parents and administrators will significantly reduce the chances of teachers exploiting the benefits of accessible ICTs even in well-resourced settings.

- The use of accessible ICT for Inclusive Education should aim to support all learners, not just those with physical and/or profound learning differences.
- The use of technology to enable a student to participate equitably in a learning activity should not be seen as a 'crutch' for learning. Accessibility features and aids such as spell-checkers specialised educational software and assistive technologies are tools that should be made available, as they are needed.

**5. Teacher training and support is critical**

If teachers are to be convinced of the value of accessible ICTs in the classroom they must first have the necessary skills, attitudes and knowledge.

- Once a particular need is identified in a student, teachers need to know where to go for information on how to assist this student, and where to find information on the use of accessible ICTs.
- Teachers need to overcome any inhibitions they may have about technology and explore the potential it holds for both students but also for their own life-long learning. The potential to also learn from students about the technologies they use should be considered.
- Teachers need training in accessible ICTs. They need to know how specialised assistive technology and accessibility features of mainstream technologies such as PCs can enable students of all abilities and disabilities to learn. They also need to know how learning materials can be produced and adapted digitally to meet the accessibility requirements of students.
- Teaching training in accessible ICTs should happen both at pre-service and in-service levels.

**6. The provision, training and on-going support required for effective accessible ICT usage is a 'team effort'**

A functional accessible ICT eco-system requires joined-up thinking at a policy level as communication between all actors as a local level.

- Educators need to have access to general information on learning differences and disabilities as well more detailed information about a particular student's needs and requirements.
- Teachers and schools should develop partners with the accessible ICTs and in particular the assistive technology experts and professionals in the local district and community
- The involvement of the students, their parents and carers in the provision and use of accessible ICTs is critical, especially if students are to integrate the use of assistive technologies outside the class room and in their everyday lives



**7. An inclusive curriculum means considering students' needs from the earliest stages of curriculum development**

The development of curriculum that is designed from the outset to meet the greatest number of students will reduce the need for costly and time-consuming retrofitting (universal design).

- The use of accessible ICTs should be considered across activities of instruction, assessment, interaction and communication
- Standards and procedures for the production and/or provision of learning resources should be implemented to ensure they are provided in the required formats in a timely manner.

**8. Accessible ICTs is a key consideration for national and regional policies**

The potential of accessible ICTs should be fully explored by educational authorities and Ministries resulting in reviews and updates to national and regional policies.

- Public procurement policies for school systems should incorporate accessibility requirements for all mainstream ICT acquisitions such as computers, educational software and other electronic content and services such as Virtual Learning environments. This will ensure that overtime that the stock of accessible ICTs improves and accommodates more students without the need for specialised adaptations and accommodations.
- Special consideration should be given to the purchase of learning materials such as text books from publishers and the possibility of receiving these in accessible digital formats such as DIASY, HTML or text files.
- Provision should be made for the acquisition of specialised ICT as required in the most cost-effective manner possible.
- Accessible ICT policy should be underpinned by data such as the installed base of ICTs in schools, the needs of students, the outcomes of interventions and supports and the cost efficiency of interventions using accessible ICTs.

**9. The use of accessible ICTs needs to be an integrated part of a school's ICTs plan**

- Key aspects to consider for a school level ICT accessibility plan are:
  - What can ICT offer pupils and staff that cannot be offered just as well in other ways?
  - How can ICT help pupils and teachers to access a broad range of activities across the curriculum?
  - How can ICT promote equal opportunities?
- Educational and schools authorities should include accessibility as a criterion in the purchase of all educational software and hardware such as:
  - Teaching programmes;
  - Content management systems;
  - Learning management environments;
  - Educational software;
  - Keyboards and mice;
  - Laptops and desktops;
  - Tablets;
  - Electronic blackboards, and;
  - Games.



### 3. Policy considerations for the use of accessible ICTs for personalized learning and Inclusive Education

According to the 2011 “World Report on Disability” by the World Bank and World Health Organization (WHO) more than a billion people are estimated to live with some form of disability, or about 15% of the world’s population.<sup>28</sup> The report found that students with disabilities are less likely to attend, progress through and complete school than their peers. The differences in percentages between the attendance, performance and completion of school between students with disabilities and their peers vary widely among countries. However the report found that “Even in countries with high primary school enrolment rates, such as those in Eastern Europe, many children with disabilities do not attend school.”

In total, an estimated 186 million children with disabilities worldwide have not completed their primary school education.<sup>29</sup> Thus, children with disabilities make up the world’s largest and most disadvantaged minority in terms of education.<sup>30</sup>

Inclusive Education continues to be an effective agent in breaking down attitudinal and societal barriers and in increasing equality of attendance, performance and completion of school by students with disabilities. Inclusive Education requires that the mainstream technology that is available to students within the classroom is accessible, affordable and adaptable to those that need it.

The extent to which students with disabilities are prevalent in mainstream classrooms is a product of the extent to which Inclusive Education has been set as a goal and then progressively realised within a country or school system. As the principle of Inclusive Education continues to be implemented within educational systems throughout the world, the awareness of and need to assess the extent of students’ learning differences continues to increase. More and more students with many different types of physical disabilities are now visibly present in mainstream schools and receiving their education alongside their peers. Typically these students are in receipt of some level of interventions and specialised supports in regions where such support systems are in place. The visibility and recognition of students with mild disabilities tends to be lower than that of students with more ‘obvious’ physical and sensory disabilities.

Where there are educational plans for each student<sup>31</sup> or other assessment reports available to teachers, teachers are more likely to be aware of students with learning difficulties and physical disabilities in their classrooms. However teachers have greater awareness of physical and sensory disabilities than mild disabilities and learning difficulties.

---

<sup>28</sup><http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTDISABILITY/0..contentMDK:23063040~menuPK:282704~pagePK:148956~piPK:216618~theSitePK:282699,00.html>

<sup>29</sup>UNESCO, “Empowering Persons with Disabilities through ICTs”, 2009, available at <http://unesdoc.unesco.org/images/0018/001847/184704e.pdf>

<sup>30</sup><http://www.un.org/disabilities/default.asp?id=18>

<sup>31</sup> In the United States these are called Individualized Education Program, commonly referred to as an IEP. In Canada and the United Kingdom, an equivalent document is called an Individual Education Plan.

**GOOD PRACTICE:**

**Inclusive Education policies in the USA**

One country for which detailed statistics on the impact of Inclusive Education policies are available is the USA.<sup>32</sup> The impact on retention levels for students with learning disabilities, for example, is quite noticeable.

In 2008, 62% of students with learning disabilities spent 80% or more of their in-school time in general education classrooms. This is up from just 40% in 2000. The high school dropout rate among students with learning disabilities was 22% in 2008, down from 40% in 1999. As a result more students with learning disabilities are graduating with a regular high school diploma—64% in 2008—up from 52% a decade earlier.<sup>33</sup>

However many challenges still remain. For example, students with learning disabilities go on to postsecondary education at a much lower rate than their nondisabled peers. The percentage of students recorded with a learning disability in second-level school was 42% in comparison to just 9% as recorded by undergraduate students who recorded a disability.

Although a majority of students with learning disabilities receive their instruction in general education classes, on 60% have general education teachers who receive any information about their needs and only half of all students have teachers who receive advice from special educators or other staff on how to meet those needs.

This predictably impacts on the use, availability and mix of assistive technology used in schools to assist students with learning disabilities. Just 6% of students with learning disabilities were using a computer for activities (when computer use wasn't allowed for other students). Only 8% were using recorded text such as books on tape and just 1% were using computer software designed for students with disabilities.

**Overview of International Policy Framework**

The corpus of international laws and texts contains significant human rights obligations and some development targets on the provision of accessible ICTs. The main legislative and policy backdrop to the Consultative Meeting was the UN Convention on the Rights of Persons with Disabilities. It is the primary piece of international law informing national policy on disability affairs around the world.

Figure 2 shows the history of many of the human rights and, more recently information society, conventions and international agreements in support of the use of accessible ICTs in Inclusive Education.

---

<sup>32</sup>The policy context the USA relates but is not limited to the Individuals with Disabilities Education Act (IDEA) 1990

<sup>33</sup> Data from the National Longitudinal Transition Study-2 (NLTS2), available at <http://www.nlts2.org/>

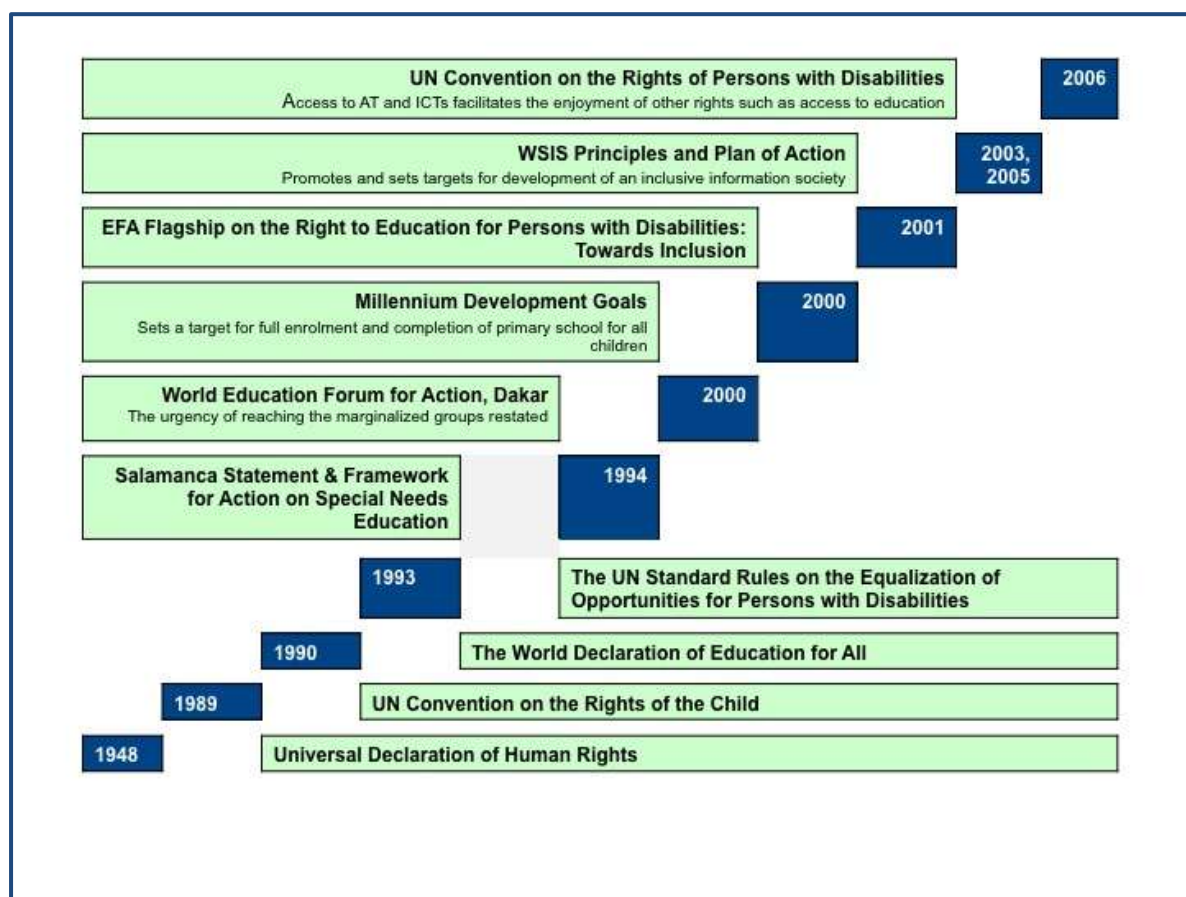


Figure 2. Overview of legal frameworks in support of the use of accessible ICTs in Inclusive Education

### UN Convention on the Rights of Persons with Disabilities

Article 9 on accessibility elevates access ICTs the same status as access to the build environment and transportation. It defines accessibility as access to, *inter alia*, Braille signage in buildings, assistance and support to ensure access to information and the provision of training to stakeholders on accessibility.

Article 9 (g) and (h) promote access for persons with disabilities to new technologies including the Internet and the inclusion of accessibility at the earliest stage in the development and procurement of ICTs so they can be made available at “minimum cost”.

Article 24 of the Convention contains specific obligations for the provision of Inclusive Education. These include the provision of “reasonable accommodations” for students with disabilities that include, *inter alia*, access to, training in and the use of accessible ICTs, including AT and educational materials in an accessible format.

Article 24 also contains an important requirement on the provision to professionals and staff who work in all areas of education of “disability awareness training and [training in] the use of appropriate augmentative and alternative modes, means and formats of communication, educational techniques and materials to support persons with disabilities”.

The Convention also holds that in and of itself, access to information about assistive technologies is important, placing an obligation on government officials

*“to provide accessible information to persons with disabilities about mobility aids, devices and assistive technologies, including new technologies, as well as other forms of assistance, support services and facilities” (Article 4 (1) (h))*

Article 26, on “habilitation and rehabilitation,” also emphasizes the importance of the “availability, knowledge and use of assistive devices and technologies” as they relate to rehabilitation as a means to attain independence and autonomy through, among other things, access to education.

Article 4 contains recommendations on how State Parties can achieve “progressively the full realization of these rights.” This includes the use of international cooperation which, as expanded on in Article 32, can be used to share knowledge and improve capacity between nations in relation to “scientific and technical knowledge.” This is particularly relevant to the development of accessible ICT eco-systems.

Article 4 also recommends all new technology developments follow a universal design approach and hence reduce the cost of including accessibility features by incorporating them at the earliest possible stage during the product development cycle.<sup>34</sup>

### **Millennium Development Goals**

The Millennium Development Goals have set a target of full enrolment and completion of primary school for all children by 2015.<sup>35</sup> The 2010 MDG Report shows that while enrolment of primary education has continued to rise, reaching 89 per cent in the developing world, the pace of progress is insufficient to reach the target by 2015.<sup>36</sup> To achieve the target, all children of school-going age would have had to be enrolled in primary education. In sub-Saharan African countries, for example, at least one in four children were out of school in 2008.

The 2010 MDG monitoring report suggests that a range of innovative approaches will be required to assist countries meet the MDGs including the use of accessible technology. However, many countries will have difficulties to achieve EFA or the MDGs without ensuring access to education for children with disabilities<sup>37</sup>.

---

<sup>34</sup> Article 4 (f) promotes the progressive realization of universal design for ICTs whereby the needs of persons with disabilities are taken into account at the earliest stages of development so that, as far as practicable, the technology requires the “minimum possible adaption and the least cost” to meet the specific needs of persons with disabilities

<sup>35</sup> UN Millennium Development Goals, “Goal 2: Achieve universal primary education” Target “Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling” <http://www.un.org/millenniumgoals/education.shtml>

<sup>36</sup> Millennium Development Goals 2010 Report

<sup>37</sup> UNESCO “Education for All Global Monitoring Report”, 2010. Available at <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/2010-marginalization/>

## UNESCO and Inclusive Education

The United Nations Educational, Scientific and Cultural Organization (UNESCO) leads the global *Education for All* initiative, aiming to meet the learning needs of all children, youth and adults by 2015. UNESCO promotes the ultimate goal of Inclusive Education, which it views as a means to ensuring a quality education for all and to achieving wider social inclusion goals.

UNESCO has developed and facilitated a number of key policy documents and agreements including:

- Guidelines for Inclusion: Ensuring Access to Education for All;
- Policy Guidelines on Inclusion in Education 2009;
- Salamanca Declaration (1994).

The Salamanca Declaration sets out that Assistive Technology is an essential part of Inclusive Education and should be used “to enhance success in the school curriculum and to aid communication, mobility and learning.”

The 2010 “Education for All Global Monitoring Report - Reaching the marginalized” examined the nature of exclusion from schools and provided practical solutions for its reduction.<sup>38</sup>

As well as these overarching policy initiatives and monitoring reports, UNESCO has produced a number of practical guides on policy development and implementation of accessible ICTs. These include:

- ICTs in Education for People with Special Needs<sup>39</sup>
- ICT for Inclusion: Reaching More Students More Effectively<sup>40</sup>

Other international policies contain other concepts that are helpful to note as they help frame discussions and recommendation later in this report particularly for policy makers as they strive to understand and implement Inclusive Education policies and identify the role of technologies in Inclusive education.

---

<sup>38</sup><http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/>

<sup>39</sup>UNESCO IITE “ICTs in Education for People with Special Needs.” <http://www.iite.ru/pics/publications/files/3214644.pdf>

<sup>40</sup> UNESCO IITE Policy Brief “ICT for Inclusion: Reaching More Students More Effectively” [http://iite.unesco.org/files/policy\\_briefs/pdf/en/ict\\_for\\_inclusion.pdf](http://iite.unesco.org/files/policy_briefs/pdf/en/ict_for_inclusion.pdf)

## **WHO International Classification of Functioning (ICF)**

The World Health Organization's (WHO) International Classification of Functioning (ICF), Disability and Health, known as the ICF, conceptualizes disability as 'a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors'.<sup>41</sup>As such, the ICF model has two components: the first looks at the issues of functioning and disability (the individual's body functions and structures), the second part looks at the environment and context in which the person lives and how these factors impact on the individual's participation in society. It points to a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors.

It moves away from the so-called "medial model" notion of an assumed 'norm' of human ability and firmly embraces the notion of society as an active agent in the quality of life of the individual.

## **Conclusion**

National authorities and governments face significant human rights and educational specific goals and challenges in relation to the provision of education for children with disabilities. The major tendency in new policy approaches is towards Inclusive Education. Whatever the policy environment, accessible ICTs can significantly empower children with disabilities to participate in lessons, to communicate and to learn more effectively.

---

<sup>41</sup> <http://www.who.int/classifications/icf/en/> International Classification of Functioning, Disability and Health (ICF) ICF describes how people live with their health condition. ICF is a classification of health and health related domains that describe body functions and structures, activities and participation. Since an individual's functioning and disability occurs in a context, ICF also includes a list of environmental factors.



## 4. UNESCO ICT Competency Framework for Teachers

*“Ensuring that children with disabilities enjoy opportunities for learning in an inclusive environment requires changes in attitude, backed by investment in teacher training and learning equipment”*

Education for All Global Monitoring Report 2010

The following recommendations will enable education leaders to promote and support personalization and accessible technology in the classroom for students with learning difficulties and physical disabilities. Practical solutions for the additions to and revision of the “ICT Competency Framework for Teachers” (ICT-CFT) are also included. These are based on edited summaries of the three working groups reports from the second day of the workshop.

A key issue identified at the start was that teachers need to feel supported and empowered and understand how accessibility will help them address real classroom issues.

Many teachers are simply not comfortable with using technology and this compounds the anxiety many teachers feel who do not receive sufficient training and support on meeting the learning needs of students with diverse learning style in the classroom. Therefore there is a double challenge right now with helping train teachers on Inclusive Education, meaningful technology integration and use and the benefits of accessible technology.

While Inclusive Education has become a stated policy of many educational ministries its implementation has yet to influence many of the teacher training courses currently available. Newly graduated teachers, while perhaps more ‘technology savvy’ than their predecessors and often ill-prepared for the range of abilities and disabilities that present in modern mainstream classrooms.

### Teacher training in accessible ICTs

All current **pre-service** teacher training should include training on the potential benefits and use of accessible ICTs. This should be part of any general training for trainee teachers on using ICT as a pedagogical tool and should integrate with other subjects dealing with differentiated learning and teaching styles and the requirements of students with disabilities.

Any **in-service** training that comes under the umbrella of Inclusive Education or ICT should incorporate content on accessible ICTs. Incentives should be provided for teachers to receive and attend in-service training.

### **GOOD PRACTICE:**

#### **Teacher support in the USA**

Providing a range of in-service supports for busy teachers is critical. In Virginia, USA teacher recertification requirements are being revised, with more emphasis on technology competencies. In Loudoun County Public Schools, the AT team provides a variety of types of professional development opportunities, (available on the website at [www.lcps.org/at](http://www.lcps.org/at)) such as:

- \* online courses,
- \* DVDs with videos,
- \* CD with audio recordings,
- \* strategy a day calendar, and more.

The A.T.TIPScast (Assistive Technology Tools in Public Schools) is a podcast about using technology to help students meet their educational goals.

### **Leveraging the ICT-CFT**

UNESCO takes a holistic and comprehensive approach to promoting ICT in education. A recently updated version of the UNESCO ICT Competency Framework for Teachers (ICT-CFT) is intended to inform educational policy makers, teacher-educators, providers of professional learning and working teachers on the role of ICT in educational reform, as well as to assist countries around the world in developing national ICT competency standards for teachers with an ICT in Education Master Plan approach.

The Framework therefore addresses all aspects of a teacher's work illustrated in the Figure 3 using three approaches of the framework:

<b>Technology literacy</b>	<b>Knowledge deepening</b>	<b>Knowledge creation</b>
----------------------------	----------------------------	---------------------------

Figure 3: Three approaches of the framework.

It also includes the six aspects of a teacher's work as illustrated in the Figure 4:

<b>Understanding ICT in education</b>
<b>Curriculum and assessment</b>
<b>Pedagogy</b>
<b>ICT</b>
<b>Organisation and administration</b>
<b>Teacher professional learning</b>

Figure 4: The six aspects of a teacher's work.



The ICT-CFT is very open in its language and content and has the potential to serve as a framework for describing how accessible ICTs may be used in all aspects of teachers' work as outlined. It was seen by the meeting Experts as providing a good framework to address capacity building for teachers on the wide range of competencies required for technology to be harnessed in providing Inclusive Education in the modern school.

Many of the policy issues from Section 3 and recommendations and practical solutions outlined in Sections 1 and 2 of the report are also relevant for how the Experts viewed that the updated ICT-CFT could be leveraged to promote and specify how counties could use accessible ICTs in Inclusive Education.

The second day of the consultative Meeting focused on making new recommendations for the use of the ICT-CFT and the development of new resources on accessible ICTs to complement its usage.

### **Summary of key recommendations made in relation to the UNESCO "ICT Competency Framework for Teachers"**

The main recommendations made on leveraging the current ICT-CFT were as follows:

- **Recommendations 1:** UNESCO to emphasise that Inclusive Education is its core educational strategy and promote the ICT-CFT as a framework that can potentially support this strategy.
- **Recommendation 2:** A 'How-to Guide' to accompany the ICT-CFT could be developed by the community of accessible ICT experts with support from UNESCO. Taking as a starting point much of the content and resources gathered at the Consultative Meeting report, it will be an on-line 'living document' that will augmented and updated overtime to be a useful resources for teachers, educational authorities and students and parents.
- **Recommendation 3:** The 'How-to Guide' will promote a Universal Design approach to educational system reform whereby the system aims to better meet the diversity of learning needs all learners have rather than attempting to 'fit' excluded learners into an existing system.
- **Recommendation 4:** An initial listing of suggested attitudes, skills and knowledge needed by teachers to actively incorporate the use of accessible ICTs in the classroom was developed for use in the "How-to Guide".
- **Recommendation 5:** A suggested structure for the 'How-to Guide' was proposed.
- **Recommendation 6:** Any revisions of the ICT-CFT should explicitly reference UNESCO's Inclusive Education strategy and relevant content from the "How-to Guide" on accessible ICTs.

The timeframe for the implementation of these recommendations was also suggested. In the **short term** UNESCO should emphasise Inclusive Education as UNESCO's core educational strategy and alert partners to the new 'How-to Guide' to be developed in the **medium term** that provides practical resources on using accessible ICTs for Inclusive Education. In the **long term** any revisions of the CFT should incorporate explicit references to and content on Inclusive Education.

#### **'How-to Guide' for teachers' competencies on accessible ICTs**

The Guide should be structured so as to map onto the competencies in the CFT (Figure 5). These are three approaches:

1. Technology literacy;
2. Knowledge deepening;
3. Knowledge creation;

and six aspects of a teacher's work:

1. Understanding ICT in education;
2. Curriculum and assessment;
3. Pedagogy;
4. ICT;
5. Organisation and administration;
6. Teacher professional learning.

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANIZATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organizations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

Figure 5: The UNESCO ICT Competency Framework for Teachers

For example, where a particular skill such as "keyboard skills" is mentioned in the CFT, this is understood to include using an adaptive keyboard and the Guide will explicitly reference this and provide a resource.

### *Universal Design of ICTs for learning and the CFT*

Conceptually there is a move in many countries away from identification of educational needs based on 'labels' of any categorical system. This move is linked to the need recognised in all countries to move away from a medically based model to an educational and socially based model for assessment, identification of needs and subsequent intervention.<sup>42</sup> This is reflected in the legal frameworks relating to education in countries such as Norway and Scotland where categories of need or even the term special educational needs is not used. Instead reference is made to 'additional needs' which is a broad concept reflecting more learners need support than those 'traditionally' identified as having special needs.

This move is in line with UNESCO's model of Inclusive Education which is about changing educational systems to better meet the diversity of learning needs all learners have rather than 'fitting' excluded learners into an existing system. Personalized learning is an approach which is in alignment with this view of inclusion. ICTs which are specifically labelled for a few learners continue to have a place in specific circumstances, but a better approach conceptually is the Universal Design of ICTs for learning which is more likely to meet all learners' needs more effectively.

Therefore the Guide will show how three levels required by teachers is applicable to accessible ICT:

- Technology Literacy; what personalized technology is available for all learners.
- Technology Deepening; what technology adjustments are needed for some learners.
- Technology Creation; what specialized technology is needed for a few learners.

### *Content and structure*

The recommendations of the Experts were that the Guide should be provided as an online Toolkit and will be developed by a community of practitioners, researchers, teachers, students and parents. It was agreed that much of the content and 'know-how' required for the Guide is already available. A similar approach taken in the development of the G3ict eAccessibility Toolkit for Policy Makers was proposed whereby the first task is to develop key pieces of content for the various sections of the Guide relating to the CFT and populate these with references to the myriad of on-line material already available.<sup>43</sup>

Other suggestions were that teachers, parents and students could contribute by commenting on these articles, share what works for them and suggest other resources of information. These moderated discussions would make the Guide a 'live' dynamic document that could be structured so as to meet the needs of many stakeholders. The main contents of the Guide could also be made available as a 'print-on-demand' book. The audience for this document would not just be ministries of education and school

---

<sup>42</sup>See Watkins, A., D'Alessio, S., Donnelly, V. in "Inclusive education across Europe: the move in thinking from integration to inclusion". Available at

<http://revistadepsicologiayeducacion.es/index.php/descargasj/finish/23/100.html>

<sup>43</sup><http://www.e-accessibilitytoolkit.org>

authorities but any teacher, student or parent looking to learn about how accessible ICT can enable education.

One immediate source of content for the Guide suggested by Experts is the Microsoft “Accessibility Guide for Educators”. This contains, for example,

- Assistive Technology Product Starter Guide (page 40)
- Assistive Technology Decision Tree [by UnumProvident](#) (page 42)

Other sources of information to be used are:

- The practical solutions identified in this report.
- UNESCO’s “ICTs in Education for People with Special Needs”<sup>44</sup>
- UNESCO’s “ICT for Inclusion: Reaching More Students More Effectively”<sup>45</sup>
- ITU’s “Connect a School Connect a Community” module on “Using ICTs to promote education and job training for persons with disabilities”.<sup>46</sup>

All these publications list many references to other sources of information.

### **Attitudes, knowledge, skills**

An initial list of the skills, attitudes and knowledge required by teachers were also outlined by Experts for use in the Guide:

#### **Attitudes**

- The provision of accessible ICT is now a human right issue and therefore can be viewed as a key component in meeting students individual needs;
- Technology is a helpful tool and not a crutch to be used by those less able;
- Technology can help build a better educational environment for all; students, parents and teachers;
- Students with technical skills are partners in using technology in the classroom and not to be as a ‘threat’ to the teacher’s authority or superiority;
- Accessible ICT is not about accommodations for the few but about providing all students with a better more differentiated learning experience;
- Learning about accessible ICT is not just about accommodating students with disabilities but also about learning a life-skill for the teacher that facilitate them to learn and grow professionally and personally into the future (life-long learning);
- Teachers need to be willing to learn new methods of teaching, new types and modes of curriculum materials and new technologies;
- Learning about accessible ICTs is not a one off activity and a teacher needs to actively update their knowledge overtime;
- Teachers need to view disability as part of the continuum of learning styles and not as special or other. While most countries and educational systems are in a state of transition in relation to Inclusive Education, the requirements that are viewed as special today will be viewed as part of the mainstream tomorrow.

---

<sup>44</sup>UNESCO IITE “ICTs in Education for People with Special Needs.” <http://www.iite.ru/pics/publications/files/3214644.pdf>

<sup>45</sup> UNESCO IITE Policy Brief “ICT for Inclusion: Reaching More Students More Effectively” [http://iite.unesco.org/files/policy\\_briefs/pdf/en/ict\\_for\\_inclusion.pdf](http://iite.unesco.org/files/policy_briefs/pdf/en/ict_for_inclusion.pdf)

<sup>46</sup><http://connectaschool.org/itu-module/15/331/en/persons/w/disabilities/connectivity/introduction/>

### *Knowledge*

Teachers must have:

- Strong knowledge of the accessibility features available in the current, mainstream technology they use in class;
- Strong knowledge about how to create and adapt teaching, learning and assessment materials, especially text into accessible formats;
- Good knowledge about the range of accessible ICTs that can support particular requirements e.g. physical, sensory disabilities as well as learning disabilities and different learning styles;
- Some knowledge about supporting students to use these technologies;
- Strong knowledge about where to find more information and support on all of the above including in-country online databases of products and services available in-country;
- Some knowledge about accessing peer-to-peer support from other teachers, including through on-line forums.

### *Skills*

- Teachers need to be able to learn about accessible ICTs. This applies equally to mainstream and Assistive Technology alike;
- Teachers need to be able to identify the different learning styles of all students and in particular those of students with disabilities;
- Teachers need to also be able to identify any 'hidden disabilities' that student may have and may choose to mask and compensate for in the classroom;
- Teachers need to be able to critically assess the potential benefit of a given technology for a student;
- Teachers need to be able to evaluate the quality of information on accessible ICTs available on the web.

### *Organization and administration*

The potential for ICT procurement practices received particular attention. Public procurement has long been used by many governments to achieve social inclusion goals. By specifying certain criteria for the good or service being purchased in the procurement process, educational authorities exert a significant influence on the quality of the goods and services for sale in the market place and innovation within industry to meet these requirements. Educational and schools authorities should include accessibility as a criterion in the purchase of all educational software and hardware such as:

- Teaching programmes;
- Content management systems;
- Learning management environments;
- Educational software;
- Keyboards and mice;
- Laptops and desktops, and;
- Games.

Procurement arrangements for text books and other teaching, learning and assessment materials with publishers should pay particular attention to copy right issues related to the conversion of the materials into other formats e.g. braille, digital text (HTML, MS Word, PDF etc.).

Finally, a **suggested structure for the Guide** was developed by one group of Experts for consideration when development of Guide commences.

- 1. Benefits and outcome for teachers, schools, students and parents**
  - Inclusive programs work;
  - Less dropout rates;
  - Higher test scores.
- 2. Inclusive education**
  - UN Convention on the Rights of Persons with Disabilities and Inclusive Education;
  - Instructional Design and promoting your best ability;
  - Advocate for your best potential.
- 3. Understand learner profiles**
  - Implications of mix of profiles- Students you have, not the ones you want;
  - Adjust to the group and they have equal access.
- 4. Self-assessment and self-accommodation for ICT as a life skill**
  - understanding your own abilities;
  - Determine own needs for accommodation.
- 5. AT tools that teachers may use in and outside the classroom**
  - Existing embedded OS, word and accessibility checker
  - Open source solutions/Cloud
  - Purchase for very specific situations as a license
  - PC based/Mobile/Cloud
  - Dedicated social networking tools
- 6. What are the resources available to teachers for basic training / certification and just in time support?**
- 7. How to enrol student support and expertise in the schools**
- 8. Examples of how you design your classroom work so that it is accessible**
  - Core activities in the classroom

Appended chapters:

Outcomes or live stories showing that the tools are effective

## **Appendix A: Meeting Background and Agenda**

### **About the Consultative Meeting: “Accessible ICTs and Personalized Learning for Students with Disabilities”**

In February 2010, UNESCO, in cooperation with the Global Initiative for Inclusive Information and Communication Technologies (G3ict), conducted a consultative expert meeting to discuss how UNESCO could assist its Member States in facilitating social inclusion of persons with disabilities through information and communication technologies (ICTs).<sup>47</sup>

The report contains recommendations on:

1. Making UNESCO ICT accessible
2. Mainstreaming ICT in Inclusive Education
3. Mobilizing resources and international cooperation: persuasive arguments for shifts in policy practices
4. Creating an information and knowledge access ecosystem

To follow on from this meeting in 2010, particularly regarding the second recommendation “Mainstreaming ICT in Inclusive Education” and to leverage the publication of the UNESCO “ICT Competency Framework for Teachers” a second workshop was convened on 17-18 November 2011 at UNESCO’s Headquarters in Paris.

The following report provides a synthesis of the two-day consultative meeting. It reflects the learning and recommendations of the Experts. (Appendix A: Meeting Agenda).

The meeting was attended by 30 Experts comprised of:

- Teachers (different countries around the world) working with schoolchildren with learning difficulties and physical disabilities
- Education policy makers, school administrators and teachers
- IT industry experts
- Representatives of organizations representing persons with disabilities (DPO) and non-governmental organizations (NGO) working with persons with disabilities
- Academic experts
- Representatives of international organizations such EC and OECD.

The opening plenary sessions comprised of welcoming speeches from the organizers and an overview of global trends in accessible technologies and education.

---

<sup>47</sup> UNESCO “Mainstreaming ICTs for Persons with Disabilities to Access Information and Knowledge”, [http://portal.unesco.org/ci/en/ev.php-URL\\_ID=29472&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/ci/en/ev.php-URL_ID=29472&URL_DO=DO_TOPIC&URL_SECTION=201.html)



The rest of the meeting comprised of a series of concurrent work sessions based around two main aims:

1. Identification of practical solutions and strategies for the personalization of technology and provision of accessible technology in the classroom for students with learning difficulties and physical disabilities
2. Development of recommendations for education makers to promote and support personalization and accessible technology in the classroom for students with learning difficulties and physical disabilities and propose practical solutions for the revision and/or a supplementary guide to the “ICT Competency Framework for Teachers” (ICT-CFT).

The ICT-CFT sets out a framework for global ICT competency framework for teachers worldwide. It is designed to help train teachers on ways to optimize the use of information and communication technologies in the classroom. It aims at helping countries to develop in their development of comprehensive national teacher ICT competency policies and standards, particularly ICT in Education Master Plans.

A series of questions were provided to the Experts to prompt thought and conversations in the work sessions (Appendix C: Questions for the breakout sessions). However the main aim of the sessions was to produce practical solutions that could be used by teachers, students, parents and educational administrators and policy makers and which could also form the basis of a practical guide on accessibility to compliment the ICT-CFT.

## Agenda

**Thursday, 17 November 2011**

Time	Agenda Item	Speaker(s) and remarks
08:30-09:00	Registration of Participants	Room XVI (Miollis building)
09:00-09:20	Plenary session: <b>Welcome notes by the organizers</b>	Mr Janis Karklins Assistant Director-General for Communication and Information, UNESCO Mr James Thurston Senior Strategist for Global Policy and Standards, Microsoft Corporation
09:20-09:50	Self-introductions	All participants
09:50-10:45	Plenary session: <b>GLOBAL TRENDS IN ACCESSIBLE TECHNOLOGIES AND EDUCATION</b>	Identify issues/challenges related to personalization technology in the classroom for students with learning difficulties and physical disabilities. Moderator: Mr Axel Leblois Executive Director, The Global Initiative for Inclusive Technologies, G3ict, an Advocacy Initiative of the United Nations Global Alliance for ICT and Development Rapporteur: Mr Donal Rice, Centre of Disability Law and Policy at the National University of Ireland, Galway
10:45-11:00	Coffee Break	
11:00-11:30	Plenary session: <b>INTRODUCTION - PRACTICAL SOLUTIONS</b>	Introduction to the break out session no 1 on practical solutions and discussion on expected results Facilitator: Mr Dave L. Edyburn Professor, Department of Exceptional Education, University of Wisconsin-Milwaukee
11:30-13:00	Break Out Session no 1 <b>PRACTICAL SOLUTIONS</b>	Identify practical solutions and strategies for personalization technology and providing accessible technology in the classroom for students with learning difficulties and physical disabilities. (See Annex I).
	1A: Room 16	Moderator: Mr David Banes Rapporteur 1A: Mr Axel Leblois
	1B: 13 floor room 38	Moderator: Ms Cynthia Feist Rapporteur 1B: Ms Barbara-Chiara Ubaldi
	1C: 8 floor room 38	Moderator: Ms Shilpi Kapoor / Mr James Thurston Rapporteur 1C: Ms Jill England
13:00-14:00	Lunch	
14:00-15:00	Break Out Session no 1 <b>PRACTICAL SOLUTIONS</b>	Work continues in the break out groups
15:15-15:30	Coffee Break	
15:30-16:30	Concurrent Work Sessions <b>PRACTICAL SOLUTIONS</b>	The facilitator, Mr Dave Edyburn, meets all group moderators and rapporteurs of the session while Mr Gary Moulton debriefs on breakout discussion with the rest of the participants.
16:30-17:30	Plenary Session <b>BREAK OUT GROUPS no 1 REPORTS</b>	Mr Dave L. Edyburn Mr Axel Leblois Ms Barbara-Chiara Ubaldi Ms Jill England Mr Gary Moulton

## Friday, 18 November 2011

Time	Agenda Item	Speaker(s) and remarks
08:30-09:00	Registration of Participants	Room XVI
09:00-09:15	Plenary session: <b>Recapitulation of Day 1</b>	Ms Irmgarda Kasinskaite-Buddeberg, Programme Specialist, Communication and Information Sector, UNESCO
		Mr James Thurston Senior Strategist for Global Policy and Standards, Microsoft Corporation
09:15-09:30	Plenary session: <b>INTRODUCTION - ICT TEACHER COMPETENCY FRAMEWORK</b>	Introduction to the break out session no 2 on practical solutions
		Facilitator: Ms Alethea Lodge-Clarke, Public-Private Partnerships Manager Microsoft Corporation
		Speaker: Ms Zeynep Varoglu, Programme Specialist, Communication and Information Sector, UNESCO
09:30-11:00	Break Out Session no 2 <b>ICT TEACHER COMPETENCY FRAMEWORK</b>	Develop recommendations for education makers to promote and support personalization and accessible technology in the classroom for students with learning difficulties and physical disabilities and propose practical solutions for the revision of ICT Teacher Competency Framework. (See Annex I.)
	2A: Room 16	<b>Knowledge Creation</b> Moderator: Mr Kenneth Eklindh Rapporteur 2A: Mr Dan Stachelski
	2B: 13 floor room 38	<b>Knowledge Deepening</b> Moderator: Ms Amanda Watkins Rapporteur 2B: Ms Cynthia Feist
	2C: 8 floor room 38	<b>Technology Literacy</b> Moderator: Ms Amy Goldman Rapporteur 2C: Ms Marcela Turner-Cmuchal
11:00-11:15	Coffee Break	
11:15-12:45	Break Out Session no 2 <b>ICT TEACHER COMPETENCY FRAMEWORK AND TRAINING</b>	Work continues in the break out groups
12:45-13:45	Plenary session: <b>BREAK OUT GROUPS no 2 REPORTS</b>	Mr Dan Stachelski Ms Cynthia Feist Ms Marcela Turner-Cmuchal
13:45-14:00	Plenary session: <b>CLOSING</b>	Ms Irmgarda Kasinskaite-Buddeberg Programme Specialist, Communication and Information Sector, UNESCO
		Mr James Thurston Senior Strategist for Global Policy and Standards, Microsoft Corporation
14:00-15:00	Lunch	
15:00-16:00	Finalization of the group reports (only facilitators, moderators, rapporteurs and voluntaries).	

## **Appendix B: List of participants**

Ms Sahar Al-Khashrami  
Special Education Department  
King Saud University  
Saudi Arabia

Mr. David Banes  
Deputy Chief Executive of Mada,  
Qatar Assistive Technology and Accessibility Centre  
Doha, Qatar

Mr Dave L. Edyburn  
Professor in the Department of Exceptional Education  
University of Wisconsin-Milwaukee, USA

Mr Kenneth Eklindh  
Former UNESCO staff and Director of the National Swedish Agency for Special Needs  
Education  
Sweden

Ms Jill England  
Educational and Assistive Technology Advisor  
Zayed Higher Organization for Humanitarian Care and Special Needs, Abu Dhabi  
USA

Ms Cynthia Feist  
AT specialist  
Loudoun County Public Schools, Virginia,  
USA

Ms Marcela Fernandez  
Colombian's Corporation of Down Syndrome  
Colombia

Mr Claudio Giugliemma  
President, Dominic Foundation  
Switzerland

Ms Amy Goldman  
Associate Director of the Institute on Disabilities  
Temple University, Pennsylvania  
USA

Mr Christian Hellum  
Principal teacher  
Denmark

Ms LaDeana Huyler  
Group communications manager for accessibility  
Microsoft Corporation  
USA

Mr Mohamed Jemni  
Professor of ICT and Educational Technologies  
University of Tunis  
Tunisia

Ms Irmgarda Kasinskaite-Buddeberg  
Programme Specialist  
Section for universal access and preservation, Information Society Division  
Paris, UNESCO

Ms Shilpi Kapoor  
Managing Director of Barrier Break Technologies, Mumbai  
India

Ms Meghan Kunz  
assistive technology specialist and coordinator of the Simon Technology Center  
Minnesota  
USA

Mr Axel Leblois  
Executive Director  
G3ict  
USA

Ms Alethea Lodge  
Public-Private Partnerships Manager  
Microsoft Corporation  
USA

Mr Arturas Mikoleit  
Policy analyst (e-government)  
OECD

Mr Gary Moulton  
Product manager, Microsoft's Trustworthy Computing Group  
Microsoft Corporation  
USA

Mr Donal Rice  
Centre for Disability Law and Policy  
National University of Ireland, Galway  
Ireland

Mr Luiz Alves dos Santos  
Policy Officer, Directorate General for the Information Society and Media, European  
Commission, Brussels  
Belgium

Mr Dan Stachelski  
CEO of Lakeside Center for Autism  
Washington  
USA

Mr James Thurston  
Senior Strategist for Global Policy and Standards  
Microsoft Corporation  
USA

Ms Marcella Turner-Cmuchal  
Project officer of the European Agency for Development in Special Needs Education  
Germany

Ms Barbara-Chiara Ubaldi  
Policy Analyst, Division for Public Sector Reform at the Public Governance and  
Territorial Development Directorate  
OECD

Ms Riitta Vänskä  
Senior Manager of Mobile and Learning Solutions, Sustainability Operations, Nokia  
Corporation  
Finland

Ms Amanda Watkins  
Assistant Director of the European Agency for Development in Special Needs Education  
United Kingdom

## Appendix C: Questions used to stimulate discussion and though in the breakout sessions

### Annex I : Proposed questions for the breakout sessions

17 November 2011	
Break Out Session no 1 <b>PRACTICAL SOLUTIONS</b>	<p><b>Major objective:</b> Identify practical solutions and strategies for personalization technology and providing accessible technology in the classroom for students with learning difficulties and physical disabilities.</p> <p><b>Proposed questions:</b></p> <ol style="list-style-type: none"> <li>1. To what extent are educators and schools aware of students with learning difficulties and physical disabilities in their classrooms?</li> <li>2. To what extent are mild disabilities prevalent in mainstream classrooms and impacting learning?</li> <li>3. To what extent are educators and schools aware of students with learning difficulties and physical disabilities in their classrooms?</li> <li>4. To what extent are accessible technology and accessibility features available and deployed in mainstream classrooms?</li> <li>5. What are the challenges to teacher knowledge and skills in effectively deploying technologies that will allow all students, including those with mild disabilities, to be successful?</li> <li>6. What are examples of the difficulties that students with mild disabilities manifest that directly impact on their learning ability?</li> <li>7. How can teachers and school leaders more readily identify students who need accessibility and accessible technology?</li> <li>8. When students are identified as needing accessibility/accessible technology, does the educator have the information or know who to contact to find solutions for those students?</li> </ol>
18 November 2011	
Break Out Session no 2 <b>ICT TEACHER COMPETENCY FRAMEWORK AND TRAINING</b>	<p><b>Major objectives:</b></p> <ol style="list-style-type: none"> <li>1. Develop recommendations for both practitioners in education to promote and support personalization and accessible technology in the classroom for students with learning difficulties and physical disabilities within the ICT Teacher Competency Framework.</li> <li>2. Propose practical solutions for the revision of the ICT Teacher Competency Framework.</li> </ol> <p><b>Proposed questions:</b></p> <ol style="list-style-type: none"> <li>1. What is accessibility and accessible technology and what role does it play in the classroom?</li> <li>2. Are teachers getting the professional development they need to address and accommodate students with learning difficulties and physical disabilities?</li> <li>3. Is accessibility and accessible technology part of the professional development of teachers? If not, what is needed to make it?</li> <li>4. What are the key competencies (knowledge, skills and attitudes) required for teachers to use accessible technologies in the classrooms?</li> <li>5. Do educators know how to use technology to adjust curriculum for students with learning difficulties or physical disabilities?</li> <li>6. How accessibility aspect could be included in the existing ICT Teacher Competency Framework?</li> <li>7. How three major aspects (Technology literacy, Knowledge Deepening, Knowledge Creation) included in the ICT CFT could be addressed from the accessibility aspect?</li> <li>8. What are the tools needed for teachers (chapter, guidelines, course/programme, and other tools) for inclusion of students with disabilities in the classrooms using assistive technologies?</li> </ol>



## Resources

- **UNESCO ICT Competency Framework for Teachers**  
(2011, available in English)  
<http://unesdoc.unesco.org/images/0021/002134/213475E.pdf>
- **ICT competency standards for teachers: implementation guidelines, version 1.0** (available in English and Portuguese)  
<http://unesdoc.unesco.org/images/0015/001562/156209E.pdf>
- **Accessibility Guide for Educators** (available in English and Spanish)  
<http://www.microsoft.com/enable/education/default.aspx>.
- **Consultative Meeting on Mainstreaming Information and Communication Technologies (ICTs) for Persons with Disabilities to Access Information and Knowledge**  
(2010, available in English)  
<http://unesdoc.unesco.org/images/0018/001892/189237e.pdf>
- **Empowering Persons with Disabilities through ICTs**", UNESCO (2009)  
<http://unesdoc.unesco.org/images/0018/001847/184704e.pdf>
- **ICT for Inclusion: Reaching More Students More Effectively**  
(2010, available in English, Russian)  
[http://iite.unesco.org/policy\\_briefs/](http://iite.unesco.org/policy_briefs/)
- **Policy guidelines on inclusion in education** (2009, available in English)  
<http://unesdoc.unesco.org/images/0017/001778/177849e.pdf>
- **Overcoming Exclusion through Inclusive Approaches in Education Conceptual Paper. A challenge and a Vision** (2003, available in English)  
<http://unesdoc.unesco.org/images/0013/001347/134785e.pdf>
- **ICTs in education for people with disabilities. Review of innovative practice**  
(2011, available in English)  
<http://www.european-agency.org/publications/ereports/ICTs-in-Education-for-People-With-Disabilities/ICTs-in-Education-for-people-with-disabilities.pdf>
- **Embracing Diversity: Toolkit for Creating Inclusive Learning-Friendly Environments**  
[http://www2.unescobkk.org/elib/publications/032revised/brochure\\_embracing.pdf](http://www2.unescobkk.org/elib/publications/032revised/brochure_embracing.pdf)
- **Salamanca World Conference on Special Needs Education (1994)**  
<http://www.unescobkk.org/education/inclusive-education/what-is-inclusive-education/background/>

- **e-Accessibility Policy Handbook for Persons With Disabilities**  
[http://g3ict.org/resource\\_center/e-Accessibility%20Policy%20Handbook](http://g3ict.org/resource_center/e-Accessibility%20Policy%20Handbook)
- **CRPD Progress Report on ICT Accessibility 2010**  
(and other relevant documents published by G3ict)  
[http://g3ict.com/resource\\_center/publications\\_and\\_reports/p/productCategory\\_studies/subCat\\_11](http://g3ict.com/resource_center/publications_and_reports/p/productCategory_studies/subCat_11)
- **ITU Connect a School Connect A Community:**  
<http://connectaschool.org/itu-module/15/338/en/persons/w/disabilities/connectivity/Section1.3> UN CRPD/